THE
FARMER'S FRIEND

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J. C. Melty

The Farmers' Friend

THE MOST COMPLETE AND PRACTICAL BOOK EVER PLACED
INTO THE HANDS OF THE FARMER

Ira C. Welty.

PUBLISHED BY

I. C. WELTY, M. D., A. B., Ph. B.

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PREFACE.

THE author does not flatter himself to have done the impossible but he does believe that this book will be of incalculable benefit to every farmer who desires to get the greatest returns for time and capital expended.

While success in farming as in every other pursuit depends largely upon the individual yet the author believes that a careful reading and an occasional referring to this book which contains many of the most convenient tables now placed before the public cannot help but be a lasting benefit.

It has been the intention to make this a farmer's handbook, one that he may rely upon, one that he may refer to at all times and at all seasons of the year for guidance. Without loading it with technicalities it has been the endeavor to embody in its teaching the latest discoveries in the science of agriculture.

It is universally admitted that agriculture is the basis of all wealth, prosperity and luxury.

The farmer is the most important member of human society and will in no distant future be considered the leader and promoter of those things which go to make this the most progressive, patriotic and enlightened country in the world.

The author of this book was for several years general agent for a little book entitled "Business Guide" of

which he through his agents sold over one hundred thousand copies.

It was then that he learned of the demand for some practical common sense book on the subject of agriculture, stock raising, business forms and laws which would be of assistance to the farmer.

After years of careful study, investigation and diligent research, it is beyond a question of doubt that we have now prepared a book which for the farmers' use has not as yet been excelled.

The author has constantly held in mind those who are now actively engaged in agricultural pursuits. In other words, it has been the intention to make it a convenient and useful handbook on things agricultural and pertaining to the interest of the agriculturist.

While we know perfectly well that on any of the topics we have presented, a great deal more might be said than the compass of this work permits, yet should this volume prove a benefit to the progressive farmers, the labor spent in its preparation will not have been in vain

The Farmers' Friend.

(By I. C. WELTY, M. Di., A. B., Ph. B.)

THE FARMERS' FRIEND is one of the most complete and practical books ever placed into the hands of the farmer.

Following are a few of the leading subjects from which the agriculturist may obtain information that should be known by every farmer:

1. How to obtain good roads without cost to the farmer, the county or the state.
2. The advantages and disadvantages of school consolidation.
3. Laws and legal forms which every farmer should know.
4. Selecting and preparing seed corn by professors Holden of the State Agricultural College of Iowa, and TenEyck, of the State Agricultural College of Kansas, and valuable notes and suggestions from nearly all the specialists in the west central states on the proper methods of raising corn.
5. How to breed and care for horses. Also treats of the diseases of horses and remedies.
6. How to breed and care for cattle. Diseases of cattle and remedies.
7. How to breed and care for hogs. Diseases and remedies, etc.
8. How to care for sheep. Diseases, remedies, etc.
9. Poultry Department.
10. The Breeder's Table. Every stock owner should have one of these tables. By the single mark of the pencil you may keep an exact record of the expected time and age of the young stock.
11. Ready reckoner, interest tables, grain tables, short methods of measuring hay in the stack, corn in the crib, oats in the bin, shingles on the roof, lathes for a room, carpet for a floor, etc., etc.
12. Monopolies and trusts and their rapid growth.

Orders promptly filled in all parts of the United States by BUSINESS PUBLISHING Co., Nevada, Iowa.

"Agriculture, the most useful, the most healthful and the noblest employment of man."—*Washington*.

"The farmers are the founders of civilization and prosperity."
—*Webster*.

"Agriculture is the basis and strength of all national prosperity."
—*Napoleon*.

"The greatest nations of Europe strain every effort to make science the handmaid of WAR. Let it be the glory of the great American people to make science the handmaid of AGRICULTURE."—HON. JERRY RUSK, *Ex-Secretary of Agriculture*.

TWO PICTURES.

An old farm-house with pastures wide,
Sweet with flowers on every side;
A restless lad who looks from out
The porch, with woodbine twined about,
Wishes a thought from in his heart:
O, if I only could depart
From this dull place the world to see,
Ah me! how happy I would be!

Amid the city's ceaseless din,
A man who around the world has been,
Who, 'mid the tumult and the throng,
Is thinking, wishing all day long;
O, could I only tread once more
The field-path to the farmhouse door,
The old green meadows could I see,
Ah me! how happy would I be!

Why I Left the Farm.

THE old way of farming was a great mistake. Everything was done in the wrong way and at the wrong time. Many guesses were made more or less at variance with facts and theory.

It was all work and waste, weariness and want. They used to fence a quarter section of land with a boy and mongrel dog.

The farmer hauled his coal from the coal bank sometimes a distance of forty or fifty miles and hauled his grain a like distance. We had poor houses, the rain held the roofs in perfect contempt and the snow drifted joyfully on the floors and beds.

Early to rise and late with their chores was the motto that haunted every farm boy's peaceful slumber.

They had no barns, the horses and cattle were kept in rail or pole sheds covered and surrounded with straw.

Long before spring the sides would be eaten away. When stock is exposed to the storms of winter, it takes all the hay and corn it is possible to raise to prevent actual starvation.

When spring came, and often before spring, the supply of coal was exhausted. Women were supposed to know the art of making fires without fuel. The wood pile consisted as a general thing of one log upon which an axe or two had been worn out in vain. Everything about the farm was disagreeable. The wagons stood in the sun and rain and the plows rusted in the fields.

There was no leisure, no feeling that the work was done.

It was all labor and weariness and vexation.

The crops were destroyed by wandering herds or they were put too late or caught by the frost, or devoured by the grass-hoppers, or washed away by floods or rotted

in the stacks or molded in the crib or dug up by the gophers.

These were not all the pests that preyed upon the unsophisticated farmer. While the farmer was pursuing agriculture he was pursued by the lightning rod agent, the patent churn agent, the fence agent, the cheap jewelry agent, and last but not least the Bohemian oat agent; and some farmers would like to have the poor book agent associated with this list.

While in spite of all these accidents that lie in wait between the plow and reaper, they did succeed in raising a good crop and a high price was offered, then the roads would be impassible. Nearly every farmer's boy declared he would avoid farming as he would the leprosy and took an oath that he would never cultivate the soil. But time has brought its revenge. The farmer has seen the bank president abscond and the insurance company a wrecked and ruined fraud. The railroad president a bankrupt and the road in the hands of a receiver.

Towns and cities have suffered, stocks and bonds have shrunk from par to worthless paper, princes have become paupers and bankers, merchants and millionaires have passed into oblivion of bankruptcy.

The western farmer has the best soil, the greatest returns for the least labor, more leisure, more time for enjoyment than any other farmer in the world. He has the long winters in which to become acquainted with his family and with his neighbors. Books are cheap and every farmer has ample time to become well informed along the line of his vocation. There is no reason why farmers should not be the kindest and most cultivated of men. There is nothing in plowing the fields to make men cross, cruel and crabbed.

We have no hesitation in saying that nine-tenths of the worry, misfortunes and losses on a farm come from neglect. Occasionally things will go wrong, even when every care and precaution is taken. We unhesitatingly affirm that in nine cases out of ten the farmer brings his own good or bad luck.

The idea must be done away with that there is some-

thing degrading intellectually in cultivating the soil. Nothing can be nobler than to be useful. Idleness should not be respectable.

No man should be satisfied with a salary. We are lacking in true courage when for fear of the future we hire at a salary that justifies our employer in taking all the risk. We should buy a home and then have the will power and determination to pay for it. Few men have been patriotic enough to shoulder a musket in defense of a boarding house.

I had a thousand times rather have a farm and be independent, than to be president of the United States without independence; filled with doubt and trembling, feeling of the popular pulse, resorting to art and artifice, enquiring about the wind of opinion, and succeeding at last in losing my self-respect without gaining the respect of others.

There is a quiet about the life of a farmer, and the hope of a serene old age that no other business or profession can promise. A professional man is doomed sometimes to feel that his powers are waning. He is doomed to see younger men pass him in the race of life. He will be last where once he was the first.

Farmers must educate their children to till the soil. The boy must not be taught that tilling the soil is a curse and almost a disgrace. They must not suppose that education is thrown away upon them unless they become ministers, merchants, doctors or lawyers. It must be understood that education can be used to advantage on a farm.

There is no real conflict between latin and labor. Every young man educated in this way is simply ruined. Such an education ought to be called ignorance.

It is a thousand times better to have common sense without education than education without the sense.

We have the best country in the world and Iowa is the best state in that country.

For my part I envy the man who has lived on the same broad acres from his boyhood, who cultivates the fields where in youth he played.

I can imagine no sweeter way to end one's life than in

the quiet of the country, out of the mad race for money, place and power, far from the demands of business, out of the dusty highways where fools struggle and strive for the hollow praise of other fools.

Surrounded by pleasant fields and those I love, I hope to end my days. Looking from my open window upon rustling fields of corn over which will run the sunshine and the shadow.

GOOD ROADS.

HOW TO OBTAIN GOOD ROADS WITHOUT COST TO THE FARMER, THE COUNTY OR THE STATE.

DRIVING FOR PLEASURE.

Soft is the song upon the evening air,
And oh! so soft the lovey-dovey pair;
And soft the glance from some dark-eyed coquette
But roads like this, ah! they are softer yet.

NO one disputes the advantages of good roads. There is no one who does not desire good roads. But, like a good many other good things that we desire, we cannot always see our way clear to get them. We are often compelled to get along with what is inferior because we have not the means of getting something better. There has been a great deal of talk about road improvement, and the belief seems to exist among certain classes that the farmer does not know enough to know that he needs better roads, and that hence there must be a campaign of education. The farmer knows quite as well as the bicycle rider or automobilist what he needs, and he knows much better that if the entire expense of making a road that will please the bicycle and auto people is to fall on him the construction is out of the question. It would confiscate his farm to do it.

Suppose we figure the cost of graveling the alternate section lines of a township. This would make forty-eight miles of gravel or macadam road in each township.

One mile of well graveled road four feet wide and nine inches deep of good gravel—and we make a marked distinction between half dirt and half sand and good coarse gravel. Four feet is plenty wide as the gravel will in a few weeks spread over plenty of space to accommodate passing teams.

Now what will be the cost of this forty-eight miles of most excellent road? This would require about five hundred yards of gravel to the mile at the greatest possible expense of five hundred dollars. Do not stop in the midst of this article and say you know of miles of road that would cost more, wait and learn where the gravel or crushed stone is to come from then you will say we have figured the cost entirely too high.

For a township this would cost twenty-four thousand dollars. Now the question is from what sources are we to obtain this money. For the benefit of those that think we have not put the figures high enough we wish to add that we are of the opinion that at least two-thirds of the public roads could be cut down to forty feet in width instead of sixty-six feet as at present, this would give us about two hundred dollars more to add to the cost of each mile of the road.

Again for the benefit of the few “doubting Thomases”, we wish to state that fully eighty per cent of the farmers would vote in favor of having their mail every other day if the half of the money now paid for delivering mail went to pay the interest on the money needed to give us good roads.

Please do not understand us to say we are in favor of lowering the mail carriers' salary, such is not the case. We are in favor of lessening the number of carriers and giving them alternate routes instead of the same route each day.

Why could not the government appropriate one-half the amount now paid to mail carriers and decrease the number of mail carriers one-half? We desire to gravel

forty-eight miles of road in each township—this is the distance approximately covered by two average mail carriers.

Now as we have already said, diminish the number of carriers one-half. Be willing to receive your mail every other day instead of every day as at present. There is no question but that eighty per cent of the farmers would agree to this and if laws are made for the benefit of the majority, answer for me, if you please, why not have a law to this effect?

This would be a saving of seven hundred twenty dollars to each township per year. Government bonds are now sold at two per cent and a begging demand for them.

We have already said the cost of graveling forty-eight miles of road would cost on an average of twenty-four thousand dollars. The seven hundred-twenty dollars we save per year by getting our mail every other day instead of every day pays the annual interest on thirty-six thousand dollars or one and one-half times what we claim it will cost.

We throw this in also for the benefit of the sceptical for we want to eradicate every shadow of doubt from the farmers' mind.

We quite recently read an article in our home paper where it stated that our congressman from the seventh congressional district of Iowa expects to get an appropriation of five hundred thousand dollars for a public building at Des Moines. Now my dear farmer friend you have read similar articles in your home papers at different times. Did you ever read where there was an appropriation for the farmers' benefit? If Des Moines with a population of seventy-five thousand is entitled to five hundred thousand, tell us why a county of twenty-five thousand is not entitled to one third of five hundred thousand or about one hundred sixty-six thousand dollars? This amount according to our calculations would make seven townships of most excellent roads in each county.

The farmer is entitled to this money. These millions upon millions now stored up in Washington simply rep-

resent the amount of money paid for manufactured articles used by the farmers upon which there is a protective tariff, to protect whom? Not the farmer that has paid this tariff but the manufacturer. It is the farmer that has paid this tariff and from this tariff largely that these millions have been accumulated.

Now we have some excellent politicians for whom we leave the workshop, farm and factory for the purpose of listening to tariff and reciprocity arguments.

Now my democratic farmer be honest with us, you are not pinched much by our tariff. To be sure if you are an Iowa farmer you would like to see the tariff taken off lumber, so would we and, if it were not for making concessions to other states that would be detrimental to Iowa to more than equal the benefit derived from lowering the tariff on lumber, we would be most heartily in favor of lowering the tariff. Please do not charge all this high price on lumber to the tariff as the tariff has remained the same while the price of lumber has been steadily advancing.

The politician tells us we must have tariff legislation, the millions are accumulating so rapidly at Washington that an addition must be built to the United States treasury perhaps at a cost of half a million dollars.

Five hundred thousand dollars the amount the congressman from the seventh congressional district of Iowa hopes to secure for a public building in Des Moines would give us two counties in this district of as good road as were ever trodden by the feet of man. Roads that with little repairing would be here to improve the temper and sweeten the disposition of our children's children.

We do not want to be misunderstood what the congressman from the seventh congressional district of Iowa is doing is just what every congressman in the United States is trying to do. Get as large an appropriation as possible for the largest town in his district.

We have told you how this work could be accomplished without the outlay of a single dollar of the farmer's money or a single minute of his time.

To our knowledge for over twenty years, railroad com-

panies have been willing and anxious to haul gravel or other material for road improvement for less than half the regular freight rates.

Not only are they willing to haul this material but on some roads they will allow the car to stand at some convenient crossing in the country until the next train comes along and takes the car to the first station.

The cost of hauling this material and locating it at convenient places would to be sure diminish the cost of putting the material on the road but this would have to go towards paying for the hauling by the railroad company.

There are already many miles of good roads and too, if the reader of this article happens to live in a section of his state where stone or gravel is plentiful, he will say we have figured the cost entirely too high and if he happens to be in a section where there are little of either he will say we have underestimated the cost, to such we wish to say the writer of this article has been in nearly every county in the state of Iowa and in nearly every section of the west central states and he feels reasonably safe in the estimates he has given you.

In certain parts of these western states gravel is very scarce but stone plentiful. Within a distance of fifty miles to any part of the west central states and over half of the territory of these states can be found stone enough to macadamize every foot of these roads. Where it was the vote of the people and decision of the Board of Supervisors that a stone crusher could be used to better advantage than to import gravel into the county let them purchase a stone crusher.

We are in favor of every convict in jail or prison being supplied with the necessary tools for breaking rock to be used on our public roads.

Every county pays hundreds of dollars every year for board for criminals and gets nothing in return.

Suppose the cost of hauling a car load of rock into a county, even at half rates, equaled the amount received for the rock when crushed which possibly would be the result in some counties while in others it would not equal

half what could be gotten for the crushed rock. Nevertheless our object is not so much to get the rock crushed as it is to diminish the number of petty criminals. And by reducing the number of petty criminals would in time materially diminish the whole number of criminals.

What is the object of sending a man to prison or to jail? One object is to reform him. Another is to make an example by which others may profit. We firmly believe that a man on a rock-pile crushing rock for ten days for the benefit of the county would make a better example and do more towards lessening petty crimes than thirty days of idleness would with the average criminal. There would be a saving of two-thirds of the board besides giving the culprit ten days of honest work.

We do not know from experience, but from observation it does not seem to be very humiliating to the average law breaker to stay a short time in jail. If he were put in plain view with a stone hammer in his hand and compelled to labor for his daily bread we believe it would do much more towards reforming him. Sentence a man to jail so many days or months and diminish that time for good service or increase it for poor service the same as is now done in our prisons.

Do not understand us to say this law should apply only to jails. One of the questions agitated in many states today is, "what to do with the manufactured products of our prisons"? There is a fierce opposition to their employment in any kind of labor that will compete with outside mechanics.

Here is an opportunity to employ them on work that competes with nobody. In the state of Iowa the prisons are located in a section of country where rock is very plentiful. Don't you believe that the rock pile with a few good living examples upon it would do more towards reducing the county board bill and benefit the farmer more than it would to get into a mixup with reciprocity and tariff just at these, the most prosperous times this country has ever experienced?

What this country needs is road legislation not tariff legislation. Let us have some road legislation in order

that we may be able to get out to hear the tariff reformer when the time comes—and come it must in the no distant future. Until the roads were taken away from local administration in England all of the efforts to improve the roads miscarried and millions of dollars expended on the highways were wasted. So too, it is in this country today, though in Europe advantage has been taken of experience and the roads are largely under the Central Authority.

Now we hear some good neighbor say, "The cost is too great for the Central Government", but that same neighbor had nothing to say when he read of congress in a single session making appropriations amounting to over one thousand million dollars. But when one of the best states in the union wants the comparatively insignificant sum of seventeen millions to make her roads the best roads in the civilized world, somebody says it is too much. When this same good farmer read of a canal being put through the Isthmus of Panama at a cost of two hundred millions of dollars, he had not a word to say. Yet when Iowa asks for one twelfth of this amount he thinks it's too much to ask of the Central Government. With six hundred millions of dollars in the United States treasury—a part of it there to remain as long as this government stands—why is Iowa not entitled to seventeen millions of it for improving her public highways?

Again we hear some good neighbor say, "We need it there to protect us in time of war". Let me ask you how much money was in the treasury at the beginning of the civil war? If this, the greatest war in the history of the world, could be successfully fought with an empty treasury why do you want such an enormous amount of money in the treasury? Do you think we are going to have a greater war? Do not think we favor depleting the treasury at Washington. We do think they could manage to get along for a few years with a deposit of one hundred millions and let us have our share of the five hundred millions.

Our politicians tell us the money is accumulating so rapidly it will be but a short time until the treasury will

be filled again. We farmers will every one of us make a solemn vow to be good to every foreigner and every neighbor until the strong box at Washington is filled again.

Again we hear some good neighbor say, "It is a bad plan as a general rule, to help those that will not help themselves". Then if that be true let the farmer agree to do so much of the work.

Let us take it on the Carnegie library plan. In case a township does a certain amount of the work, then a certain amount of funds will be furnished to finish the work. This would be a most excellent plan as each township could be required to do the same amount of work regardless of the amount remaining to be done. Then one township could not complain that they were compelled to do more than their neighbors.

Again we hear some good village merchant say, "What are they going to do for us". The good roads are a still greater benefit to the merchant. We have never heard this disputed and we are not going to take time or space to answer it, but if any merchant thinks this, just mention it to some good farmer and he will with either brain or muscle have you acknowledge you were mistaken inside of three minutes.

Where is the farmer benefited? It is a saying as old as the Government itself that the hauling and the marketing of the produce and the hauling home of the fuel, lumber, tile and other numberless things for the farm are harder upon the horses than the actual farm work. As it is today the farmer is unable to haul his product to market during bad weather and that is the very period when he has the most leisure time to do such work. After a heavy rain is a very poor time for a farmer to try to accomplish much on the farm but with good roads it would be a most excellent time to attend to business. The expense of keeping extra horses, the time needlessly spent on the roads, the time spent unemployed on account of the bad condition of the roads, the breakage of buggies, wagons and harnesses. These would more than pay the interest on every dollar expended on the roads.

There is no gamble, no guess, no risk in this kind of development. We need road legislation. Following is an article taken from our home paper:

FIFTY MILLION FOR RIVERS.

WATERWAYS CONVENTION ASKS FOR PERMANENT APPROPRIATION.

WASHINGTON, Dec. 8, 1906.—President Roosevelt told the delegates to the national rivers and harbors convention who called on him at the white house that he would consult with the leaders in congress, and expressed the hope that something definite and effective could be done in the way of increased appropriations for the improvement of the nation's waterways. Albert Bettinger of Cincinnati, the spokesman for the convention, told the president that the convention suggested regular annual appropriations of not less than \$50,000,000 to replace the "hitherto desultory and inadequate appropriations" for the improvement of the waterways and to place their prosecution on a business basis, insuring their completion within a reasonable length of time.

Fifty millions of dollars asked for the purpose of improving the nation's waterways. Not a single appropriation but an annual appropriation.

Did you ever read of where a delegation of farmers called upon the President and asking him to recommend an appropriation of any kind for the benefit of the western farmer? Our President says he is in favor of a "square deal". If such is true—and we believe it is—why would it not be a good plan to send a good farmers' delegation down to Washington; have them inform the President that we farmers have been reading for these many years of the fifty, hundred and two hundred million dollar appropriations, and thought we would be patient, our time would surely come. But patience has ceased to be a virtue when we read that an addition had to be builded at a probable cost of five hundred thousand dollars to store the nation's surplus wealth. When the delegates to the national rivers and harbors convention called upon the President he said he would lay the matter before congress. We farmers have no need of burdening the President. We can lay this matter before

our own congressmen and in such a way that they would never return home until they had made us a fair, just and reasonable appropriation for the constructing of permanent highways. Legislators move as they are moved by the powers behind the throne. It is a perplexing wonder that a million farmers can stand by so meekly while a ring of speculators dole out to them half or quarter pay of the earnings of their own labor. The farmer is well aware of the fact that he pays more for the same machinery manufactured here in the United States than does the Mexican, Canadian, or any of the countries of South America or of any other foreign countries. Yet he murmurs not, for the politician tells him it is to protect home interests and true it is we must protect our laboring classes. The farmer is willing to protect them but if after the treasury is full then he begins to think he ought to have a little of that accumulated wealth sent back. It is his money, he is entitled to the benefit of it. That building an addition to the treasury is the straw that is breaking the camel's back.

There is surely a crying need that the brawny sons of toil here in the United States get into a brown study and do some solid thinking. If the farmer does not soon demand his rights some future poet will be singing of our farmers as Goldsmith did of the Deserted Village.

"Ill fares the land to hastening ills a prey,
Where wealth accumulates and men decay.
Princes and lords may flourish and may fade,
A breath can make them as a breath has made
But a bold peasantry, a country's pride,
When once destroyed can never be supplied."

Following is an article clipped from a recent magazine:

WHAT WE OWE TO AGRICULTURE.

"In this country the agricultural interests, including the number of people engaged and the amount of capital invested in them, are equal to all others combined; and this being true, they are certainly entitled to the good will and God-speed, and to all the assistance and comfort that every man in the state and nation can give them. We will always,

so far as I can see, be an agricultural nation; and if this is so, how can we better serve every man, woman and child than by fostering as far as possible the one interest that is equal to all other interests combined. The first step is to educate practically the farmer to follow his business in a business-like way that will bring him a reasonable, and profitable return."—J. J. HILL, *President Great Northern Railway.*

If President Hill who draws a salary of fifty thousand dollars a year would have added that we must also teach him the needs of his state and how those needs may be supplied and the needs of his county and of his township and how these needs may be supplied, we think it would have been a valuable adjunct to the valuable article he wrote to tickle the farmer's ear.

The farmer is not grumbling about the tariff. We have heard more grumbling about the poor roads in a single day than we have during our whole life time about tariff and reciprocity with the possible exceptions of when some office seeker comes along looking for public office.

We are not finding fault with the farmer because he condemns the poor roads. Many a farmer has lost his most valuable horse simply because he was obliged to abuse the poor brute to get it to pull an unreasonable amount in order that he might get home with the necessary supplies for his family.

Let the farmers demand an annual appropriation and demand it in no uncertain way and we will soon have roads that will put the builders of the roads of old England to shame. The true way for the farmers to measure men is not by their political views or their official position, but by their work. The work is a thing that can be seen and measured, the motive cannot. If any man holds an official office and champions the agriculturist's interests, he is the man for the farmer to support.

FRONT VIEW OF IOWA STATE NORMAL, CEDAR FALLS, IOWA.

School Consolidation.

Comparison made between the cost of the present sub-district plan and the consolidated school as given on the preceding page.

The writer wishes to state that these figures and estimates are made after careful investigation of the costs of consolidated schools in Iowa and adjoining states. The chief and possibly the only just objection to the consolidated schools as we now have them is, "too far to haul the children". This objection is made where the whole township has been consolidated. If you will make an examination of the diagram given on this page you

The Cross indicates location of sub-districts

The Square indicates location of consolidated school.

The Large Square indicates children living within 2 miles of consolidated school.

will see that no pupil can live a greater distance than five miles from the central school building. By this plan we consolidate six of the nine schools; the three on the north consolidate with the three on the south of the adjoining township.

There are in the state of Iowa 3661 schools that have an average of from one to ten pupils or the average of the entire number of schools is five and one-half. We also have 4410 schools with an average of from eleven to twenty. But the average for the entire number is four-

TOWNSHIP CONSOLIDATED SCHOOL.

SUB-DISTRICT SCHOOL.

SUB-DISTRICT SCHOOL.

driver will then make an average of ten stops from five of which he will get five pupils and from the other five he will get ten pupils. We consider it just and fair to assume these ten stops will be made during a drive of seven miles.

You must bear in mind at the present time neighbors living just across the road from each other send their children to different schools. This would not be the case with the consolidated school. No two drivers would be supposed to travel the same road. This gives each driver seven miles of road, farms on either side, to make up his fourteen pupils to say nothing of the children that would be within the two miles, living on other roads than the one traveled by the driver.

We are aware of the fact that there are several schools in each county that have closed for want of pupils. We also know of several townships in the state of Iowa where one competent teacher could teach the entire number of pupils that attend during the fall and spring terms. The only safe and fair way is to figure on the average townships. We will sometimes find two or three adjoining districts having an average of twenty or more pupils.

Another objection raised is, "It is too expensive." Let us figure the cost of running the central school for eight months. We expect to have four haulers and two teachers during the spring and fall and three teachers during the winter. Two teachers at \$40.00 each per month is \$640.00; One teacher four months at \$50.00 is \$200.00; Four haulers at \$30.00 per month is \$960.00; Total \$1800.00. For the same time let us hire six teachers at forty dollars per month; this would amount to \$1920.00. One hundred twenty dollars more than it takes to run the consolidated school every year.

There is not a farmer that reads this article but that will agree with us when we say that the expense of keeping up, equipping, and heating this central building will be one-third less than is required to do the same in six sub-districts.

Another objection raised is, "Too much time required on the road." After a thorough investigation we find the average rate of miles for haulers to travel per hour

in Iowa, and also in other states is six miles. There are times when they drive seven and again there are times when they cannot drive more than five. In order to suit the pessimist we must state that there are times when you could not go at all. We also stated that the average attendance was not more than two-thirds of the pupils in attendance. It would not be unfair to suppose that part of this was due to bad roads. If you will read what those say that have had experience, they will tell you the average attendance is much better in the consolidated school than it was in the sub-district. The average time for a driver to make his drive is seventy minutes. The average time for a boy or girl of six years of age to walk one mile is thirty-five minutes. A farmer living two miles from the school as is often the case would find that it takes seventy minutes for his child to walk home.

The time to get to the consolidated school is exactly the same or seventy minutes, but, while it is necessary for the driver to go to the home after the pupil, it is not necessary to haul them nearer than the cross-road in returning them. This would only make a five mile drive in the evening and get the children, that have the greatest distance to come, home before they could walk home if the distance were two miles. While we are giving an average of seven miles drive each for four drivers we realize there are nearly four thousand schools in Iowa that only have an average of five and one-half pupils. These possibly all coming from two or three families and possibly within three miles of the school.

We also realize that possibly in a district of twenty-five pupils there could be two-thirds of them farther than two miles. This district, if one hauler was obliged to haul all of them, might necessitate a drive of ten miles to the school and would require at least two hours, as a team would travel much slower the second hour than the first. This is the exception and would seldom happen and if the routes were properly arranged we doubt if it would occur at all. Even in this case there would be no need of any of the children being on the road more than one hour going home.

CONSOLIDATED SCHOOL AT ALBION, IOWA.

We have now given you our best judgment of the cost of running a central school; one that we know would be better for you and better for your children. We have given you the average and we have given you the extremes. We can see no hardship in either case.

The question is now asked, "How about the farmer now living close to a sub-district school?" To this question we wish to reply that our laws are or should be made and schools located where the greatest good may be done for the greatest number.

If many years ago it were thought that it was most convenient to locate the schools every two miles, and now know that is not the best plan, it is the duty of the public to see that the schools are located where the greatest good may be done the greatest number.

There is not on an average of one district school in ten in the state of Iowa where the school during the severe winter weather is called at nine o'clock. We have plenty of evidence, as every farmer that reads this article well knows, that more children arrive at the schoolhouse after nine o'clock than there are that get to the school by nine.

Again we wish to make the assertion that fully eighty per cent of the district schools of Iowa are not comfortable for children before ten o'clock and some of them are not comfortable during the entire day. Few farmers go to the schoolhouse to investigate the conditions of these schools. Small children sitting next to the stove with a temperature above one hundred degrees and the large boys and girls in the remote parts of the room, with the temperature a little above the freezing point, is not the best of conditions for the tax payers to expect to get value received for wages paid teachers.

There are so many advantages in the consolidated school over the old sub-district plan that we do not expect to comment on each. Think of the children that go to school with wet feet and wet clothing and are obliged to sit in the school room possibly a half day in that condition. If for no other reason than from a standpoint of health the consolidated school far surpasses the old sub-district.

Now some one informs us, "You cannot hire haulers

for thirty dollars per month as mail carriers get sixty." Twenty-five miles per day is the average route for the mail carrier, twenty-six days for a month. Twelve miles per day is the average drive for the driver of a wagon for the consolidated school. Twenty days constitute the school month. The mail carrier is busy early in the morning sorting his mail, likewise in the evening. The mail driver must stop at almost every house on the twenty-five mile drive. During the four winter months there would be no difficulty in getting plenty of haulers and in summer as a rule you could get men that were too old or unable to work on the farm.

We must accept the evidence we have and that gives us an average of thirty dollars per month. True, in some districts of only three or four children, arrangements can often be made where the children are conveyed for from three to five dollars per month. Sometimes during the winter one of the largest boys takes a team and hauls those on his road gratis. It is the custom to have barns at all consolidated schools for the convenience of all those that desire to do this.

Then there are districts that it would cost forty dollars per month. Again we wish to state the only fair way to estimate these things is to find the average and this we have tried to do in every case.

Many a farmer believing that the district school did not furnish sufficient training for his boy or girl, has sent them to town with the hope of advancing their children's interest, but to their surprise when too late they learn that this boy would have been a better man and his girl a better woman if he had only have kept them home a few years longer.

A boy or girl coming from the country into the town just at the most active time of his life and at an age when he needs the most careful guidance and assistance of the most anxious and painstaking of parents is a very serious proposition. The writer has as a teacher time and again talked to boys and girls from the country who were placed under his instruction, warning them about being in too great a hurry to become acquainted with the young folks of the town who made it a business to "run the

STATE AGRICULTURAL COLLEGE BUILDINGS, LEXINGTON, KENTUCKY

streets nights''. Has in one or two instances advised the parents to take the child home as the evil he was learning from the associates he had out of school were doing him more injury than we could do him good. We have consulted with other town and city superintendents and find our experience was not at variance with theirs.

The consolidation of the district schools in our opinion would solve the country school problem. It would give the country schools all the advantages now enjoyed by the town schools and none of their disadvantages.

There is a strong and growing sentiment favorable to consolidation and transportation in the west central states. As we have already given many advantages and benefits of consolidated schools, following this article will be the opinion and experience of some of the leading educators of the United States. Also the facts as viewed by parents and teachers where consolidation of schools has been in operation for many years.

We now wish to express our views on a new phase of the subject,

MANUAL TRAINING.

The interest in manual training in public schools is growing. The one chief thing that prevents the rapid introduction of the subject into the schools of our cities is the lack of suitable rooms. This would not be the difficulty in the consolidated school as the basement would make a most excellent place for their work. No doubt many at first thought, will object to manual training in our country schools, but upon reflection will re-consider and agree with us when we say this is the first of all places that it should be taught.

Very few of our city neighbors make much use of the valuable instruction they get along this line. In fact, trouble is about the only thing that a large per cent of our city boys know how to make.

Freely would we like to exchange our last year's information on the subject of Latin for what we could be taught in a manual training school in one week. How to drive a nail, saw a board and hang a door. Manual training is mental training through the hand and eye. So far as knowledge goes there is not an educator, a suc-

cessful professional or business man that does not most heartily approve of manual training in our public schools. Manual training is sanctioned by farmers everywhere, the only question they ask is, is it possible to be accomplished?

The mechanical drawing can be taught by the teacher of the consolidated school just as it is taught by our city school teachers. Mechanical drawing well taught is no doubt half the battle. Why would not the eye be as well trained and the judgment as well developed in this work as in the drawing that is done in the average high school with but those motives in view?

If two days out of every week, for three months were devoted to practical work in carpentry, harness making and working in iron, admitting all living in the consolidated district to attend between the age of fifteen and twenty-one; let these three months be between December and March, the instruction should consist of such mechanical work as is usually necessary to all classes of people. No attempt should be made to teach any particular trade.

Manual training will do as much to broaden the intelligence and form habits of attention, perseverance and patience as will the quite common Latin lesson that has been copied from an older pupil's note book or taken from a "key".

Did you ever know of a boy that did not like to work with tools? What a boy likes to do that he will do well. The school must become more socialized in its organization, methods and course of study. The most important activities of the life into which the child must go should be transferred to the life of the school. Manual training sets free those natural and valuable impulses which induce the child to try his strength and skill in a large number of various activities. At the same time it turns those activities and tendencies, which may, if left unused, lead the boy to destruction and crime, into useful channels. It is well known by every parent and every experienced school teacher that the most critical time in a young boy's life is from the age of fifteen to twenty-one. It is a very common saying, "if you can tide him over a few years more he will be all right", or, "if you can hold him

down", or words to that effect, "you will have no difficulty after that". Some people even go so far as to say, "a boy must sow his wild oats".

It is simply surplus energy without any proper and beneficial channel in which it may be disposed, and we firmly believe if you had some interesting, pleasant and useful occupation for our boys during the wintry months the crimes of our country would be materially lessened. It is during the time of idleness and congregation of boys that the habits of the worst are learned, the thoughts of the vilest put into execution.

If only viewed from a financial standpoint, there is not a question of doubt but that a manual training school would yield far greater returns than the money expended in equipping and maintaining them. With a small shop upon the farm, nine-tenths of the money now paid for wood, iron, and harness repairs could be done at home, done during a time when the young man for lack of something interesting to do would be off to the neighboring village.

It is a fact sanctioned by many parents that boys take particular pride in working at this kind of work. We can scarcely estimate the time and expense this would save the farmer during the busy season. Farmers all know much time and expense would be saved if things in need of repair were looked after at the proper time.

Manual training is now carried on in many of the Eastern and Southern states. Nothing but the most satisfactory reports come from those that visit them. Nearly all our leading colleges and normal schools have, during the last few years, added a manual training department to their schools.

Not only will the teachers be able to give instruction in the subjects usually taught but also in manual training. There will, no doubt, as is now the case in many of our cities, be from thirty to fifty minutes each day devoted to some kind of manual training; taught through all the grades. Such as the making of simple and useful articles; becoming acquainted with the handling of tools, etc. In the lower grades, paper folding and cut-

ting, weaving and sewing, raffia braiding and weaving into baskets and mats.

As they pass on through the grades the work will become a little more difficult; such as articles made from thin wood, by use of rule, pencil, compass, knife and fret saw; sewing, etc. The boys' and girls' work are practically the same in the lower grades. We also have connected with nearly all of our leading colleges a domestic science course where lessons in cookery and household economy are taught.

Some may think this is going to take too much time from the other and less important studies in the higher grades. It is a fact that the change of work will rest the pupil and when he goes back to his study he will accomplish more than if compelled to continue at the same kind of work. Did you put in your full time studying when you attended school?

"But won't it cost more?" Yes, we know cost is determined by supply and demand and there is going to be great demand for these teachers. In a few years the supply will become greater and in proportion reduce the wages. We don't believe the time will ever come when you can get a young Iowan equipped and qualified for school work, to go into the school room for less wages than farmers are willing to pay a smart teamster or active wood chopper, though a normal school were in session under every shade tree.

The farmer should not hope to keep his boy on the farm unless there is some inducement to keep him there. So long as we fail to provide a measure for the healthy expenditure of these pent-up activities we shall be troubled with the boys who frequent the street corners and fill the reform school for want of proper direction.

The leading arguments in favor of consolidation are:

1. It permits a better grading of the schools and classification of pupils. Consolidation allows pupils to be placed where they can work to the best advantage; the various subjects of study to be wisely selected and correlated, and, more time to be given to recitations.

2. It affords an opportunity for thorough work in special branches, such as drawing, music, and nature study. It also allows an enrichment in other lines.

3. It opens the doors to more weeks of schooling and to schools of a

higher grade. The people in villages almost invariably lengthen the school year and support a high school for advanced pupils.

4. It insures the employment and retention of better teachers. Teachers in small ungraded schools are usually of limited education, training, or experience, or are past the age of competition. The salaries paid in cities and villages allow a wide range in the selection of teachers.

5. It makes the work of the specialist and supervisor far more effective. Their plans and efforts can all be concentrated into something tangible.

6. It adds the stimulating influences of large classes, with the resulting enthusiasm and generous rivalry. The discipline and training obtained are invaluable.

7. It affords the broader companionship and culture that come from association.

8. It results in a better attendance of pupils, as proved by experience in townships where the plan has been thoroughly tried.

9. It leads to better school buildings, better equipment, a larger supply of books, charts, maps, and apparatus. All these naturally follow a concentration of people, wealth, and effort, and aid in making good schools. The large expenditure implied in these better appointments is wise economy, for the cost per pupil is really much less than the cost in small and widely separated schools.

10. And, again, it quickens public interest in the schools. Pride in the quality of the work done secures a greater sympathy and better fellowship throughout the township.

Finally, by transporation the farm again as of old becomes the ideal place in which to bring up children, enabling them to secure the advantages of centers of population and spend their evenings and holiday time in the country in contact with nature and plenty of work, instead of idly loafing about town.

We are in the midst of an industrial revolution. The principle of concentration has touched our farming, our manufacturing, our mining, and our commerce. There are those who greatly fear the outcome. There were those who prophesied disaster and even the destruction of society on the introduction of labor-saving machinery. We have adjusted ourselves to the new conditions thus introduced. Most of us believe that we shall again adjust ourselves to the new industrial conditions. The changes in industrial and social conditions make necessary similar changes in educational affairs. The watchword of today is concentration, the dominant force is centripetal. Not only for the saving of expense but for the better quality of the work must we bring our pupils

together. No manufacturing business could endure a year run on a plan so extravagant as the district system of schools.

IN OTHER STATES.

Consolidation and transportation is a settled policy in some of the eastern states and is being adopted to a greater or less extent in many of the western states, where it is rapidly growing in favor.

KANSAS.

Frank Nelson, state superintendent of public instruction in Kansas, writes:

"The consolidation of schools and the transportation of pupils to and from school is one of the really important educational movements of the times. Here in Kansas we are working along this line with much success. The last legislature enacted a law providing for the consolidation of school districts and the transportation of pupils. It is the first law of its kind ever enacted in this state and is giving great satisfaction. The people are warm supporters of the consolidation of schools because they realize that it gives them better schools, better courses of study, better teachers, longer terms and a deeper interest in the work.

"Under this plan of school administration parents are able to give their children a good education right at home at a very moderate expense. It is the duty of the state to bring the best and largest educational advantages within easy reach of the people. This is done by building up strong graded schools in the community.

"I am a firm believer in the consolidation of schools and the transportation of pupils. This movement is destined to revolutionize our entire school system and to bring greater blessings to all the people."

WISCONSIN.

L. D. Harvey, state superintendent of public instruction of Wisconsin, says:

"I believe this is one of the most important movements in recent years for the betterment of school conditions in certain communities. The small country school with almost invariable accompaniment of poorly prepared teachers has little or no value. It is expensive, when the number of persons in attendance is taken into consideration. The consolidation of districts results in better organization of the school, in stronger teaching force, and in taking pupils out of the isolation which necessarily accompanies the small school.

"One of the most important things in the education of the child is that he shall come in contact with a goodly number of children of his own age. Without this contact he is missing one of the most important

elements of an education. Experience has shown that consolidation may be effected and pupils transported without an increase in the expenses for school purposes in the district covered.

"The people in our state are very much interested in this matter and in many localities are taking steps to effect consolidation and provide for transportation of pupils."

MASSACHUSETTS.

In Massachusetts the system was adopted many years ago and has been growing in popularity. In ten years the state's expenditures for conveyance of pupils increased from \$30,000 to nearly 142,000. The report of the state superintendent of public instruction in Massachusetts in 1901 gives the following account of the working of the consolidation system in the town of Warwick:

"Six years ago Warwick maintained nine schools twenty-four weeks per year. The average attendance of pupils in the township was eighty-seven. Teachers' wages in the eight outside schools were five dollars per week, in the center school six dollars per week. With few exceptions, the teachers were young and without experience, educated in the district schools. Some were under sixteen years of age,—one term a pupil in a school, the next term a teacher. Occasionally, in recent years, a teacher of marked ability and successful experience has been employed, but the number of schools made it impossible to pay wages that would retain the services of well-qualified teachers many terms. The schools were poorly supplied with books and materials.

"Now all of the pupils in the townships are in three rooms of one modern, well-lighted, heated, ventilated building, pleasantly situated in the center of the township. The rooms are supplied with good blackboards, and with books and appliances for the use of pupils. The school has three teachers,—normal school graduates of exceptional ability. The average wage paid is nine dollars a week, the school year is thirty-six weeks. Special teachers of music and drawing visit the school each week. Pupils are conveyed to the center union school from distant parts of the townships. The average attendance last year was 96.

State Superintendent Frank L. Jones, of Indiana, in his report for 1900, says:

"The great evil of the small rural school lies in its non-social character. It is wholly unable to furnish each of its pupils that educative influence that comes from association with many of the same age and same degree of advancement; it can not have, in many classes, enough

of honest and helpful competition to establish a standard to which many a bright pupil would raise himself, and fails therefore to bring from him that supreme effort which develops and ennobles, and which comes only from a vigorous contest with his fellows. The humdrum and monotony of a recitation in a one-pupil class is discouraging to both pupil and teacher. Not only is the mental work of the school thus impaired, but the lack of enough pupils to organize a game on the schoolhouse yard prevents adequate exercise and tends to make morbid, selfish and pessimistic all who live in its atmosphere—the deadly quiet and inactivity of the small school kills the spirit. Professor Hinsdale makes a clear statement in the following words:

“The importance of this element in the rural school problem becomes obvious at a glance. In populous districts fewer schools and districts relatively are called for, while, at the same time, owing to the larger numbers and the more varied attainments of the pupils, the system can be more fully developed. The school and the home, under the present system, can not be far apart; otherwise children will attend the school with difficulty, or not at all. Once more, the interest and enthusiasm of pupils and teachers depend directly upon the number and the ability of the pupils present. For the majority of children individual instruction, or anything closely approaching it, is not to be commended. Aristotle condemned such instruction on political grounds. It may also be condemned on pedagogical grounds. Children need the inspiration of numbers. Besides, numbers contain ethical value. As a rule, you can no more make a good school out of a half dozen pupils than you can make a powerful galvanic battery with one or two pairs of plates.”

“The per capita cost in these small schools is not only much too large, but is continually increasing. In 1879 the cost of education per capita was as follows:

In townships	\$ 6.21
In towns	5.21
In cities	7.48

“In 1899, twenty years later, the cost was:

In townships (per capita).....	\$10.50
In towns (per capita).....	11.10
In cities (per capita).....	7.07

“These tables are of more than usual interest on this point, and present to the taxpayer a strong argument for a solution of the problem of the small school. It will be observed at once that the per capita cost of education is constantly increasing in the country and towns and decreasing in the cities. This condition in the rural school arises wholly from the prevalence of small schools. There were as many rural schools in 1899 as in 1879, the salaries in the former are

not substantially different from those in the latter, the investments in schoolhouses and appliances would about equal, but the attendance in them has constantly decreased. This condition makes necessary an expenditure for teachers, fuel, apparatus and repairs for the small school of today equal to that of the large one of two decades ago. In the towns the increase is due quite largely to the establishment and equipment of high schools of small enrollment. Nearly all cities show congested schools, making necessary many pupils under the direction of each teacher, thus reducing the per capita cost. Add to this a saving in fuel, repairs, buildings and appliances, and the reduced cost of education in cities is explained."

CONNECTICUT.

The legislature in 1893 authorized the transportation of children to and from school at the expense of the town (meaning township,) whenever a school shall be discontinued upon the approval of the school visitors. Within seven years about sixty towns took advantage of this, uniting schools and transporting the children to the nearest schoolhouse. The system has been generally satisfactory and has reduced the cost. In 1897-8, eighty-four schools were closed and the following year, eighty-five. The report of the state superintendent says that "expense is less than the cost of maintaining schools. The result has been:

"1. To make larger schools and provide desirable classification.

"2. To make better schools. In some cases the change has been very marked, the consolidated school at once taking high rank because a good teacher was secured.

"3. With one exception, the cost has been diminished.

"4. In every case the attendance has improved.

"5. Unpunctuality is entirely avoided, for the children must reach school on time.

"The policy of closing schools and transporting children is not popular at first. When it has been tried and properly managed it has always been approved.

"There is substantial agreement that the result, financially and educationally, has been satisfactory. The most emphatic expressions of approval come from those who were influenced mainly by the educational motives.

"Children are less exposed to storms and to bad weather and are healthier. Attendance is increased 10 to 20 per cent."

Detailed reports from the districts where the system has been tried show uniformly good results and satisfaction to patrons.

OHIO.

Alfred Bayliss, state superintendent of public instruction in Illinois, has made a personal investigation of the operation of the Ohio plan and his account of it is worth careful consideration. Mr. Bayliss says:

"I have lately seen some excellent examples of the practical working out of this plan in the state of Ohio. What has become widely known as the 'Kingsville experiment' was made possible in that state by an act which applied to 'any township which by the census of 1890 had a population of not less than 1,710 nor more than 1,715.' In other words, the legislature of Ohio was willing to let the people of Kingsville and vicinity furnish an object lesson for their more conservative neighbors, if they were willing to take the chances and foot the bill. That village and township, however, proved to be like the man who insisted 'that he was not such a fool as he looked.' The daily attendance increased. The cost per capita diminished. There was a balance on the right side of the account of over \$1,000 in the first three years. As a result the enabling act was made general and the plan is spreading. Two very notable examples came under my observation. The first was in Gustavus township, Trumbull county. There were formerly nine districts in that township, and as many small schools. Four years ago the nine districts were consolidated. A frame building, with four rooms, was erected at a cost of \$3,000. A principal, three assistants and a janitor were employed. Nine comfortable, covered spring wagons, with drivers under \$200 bonds, were engaged to convey the children to and from the central school. Before the consolidation the average school attendance in that township was 125. Last year it was 144. The school population remains about the same. The year preceding the consolidation the schools of the township cost \$2,900. The union school cost, including the wagons, \$3,156, an increase of \$256 for the township, but a decrease of \$1.29 per pupil on the average attendance.

"The other case is in the adjoining township of Green. The people of this township were divided in opinion three years ago. They, therefore, wisely waited for the result of the experiment in Gustavus. After observing it two years, they were satisfied. Public opinion crystalized in favor of the plan. Last September the people of this township opened a new, steam-heated, well-lighted and ventilated, brick building, having six large school rooms, and two smaller rooms, one of which is set apart for the library. Eight wagons convey the children.

The principal of the school told me, with pardonable pride, that there was a piano coming. Both of these schools do about three years of high school work. Public sentiment is no longer divided.

"The last statement should, perhaps, be qualified. In May, 1900, a committee of two citizens, one for and one against 'consolidation', was sent from a township in Warren county, Ohio, to investigate and report upon the facts as they found them in Gustavus township. The report, signed by both members of the committee, stated that persons known to favor the plan were purposely passed by; that fifty-four persons were questioned, and their answers were as stated in the report. Of that number, forty-three were for, seven against, and four indifferent to the plan. Of the seven who declared against it, six were without children of school age, and of the four who were indifferent, none had children of school age.

"Of all the fifty-four, we find, said the committee, but one person with children who was opposed to centralization. I talked with the citizens in six or seven country towns in which the plan is in operation, in three different counties, and failed to find a single individual who did not approve it.

"Such illustrations could be multiplied. The plan works out. The health of children is improved, because of the diminished exposure to stormy weather. School attendance is increased, both in regularity and in the number of pupils. Tardiness and truancy disappear. The school year is lengthened. Better teachers are employed. Teachers can be better paid. I asked one little fellow of ten or twelve years how he liked the union school. Oh, it's great, he said, to be where something is going on. And, perhaps, it is from this widened circle of acquaintance, extending beyond the children to the whole community, that one of the great benefits is to be derived. The isolation of small schools—ten pupils or fewer—is not favorable to intellectual, moral or social growth. The young mind grows by contact with other minds, and quite as much by contact with those of near its own strength as by the influence of stronger ones."

Mr. G. L. Fletcher, Agent Mass. Board of Education, sent out inquiries to school committees and superintendents of the state, asking for information about their experience with consolidation and conveyance. Some of the replies received were very significant. It was said that the per capita cost of education has been greatly reduced.

"In the year 1893 Seymour Rockwell, the veteran school committee man of Montague, said:

"'For eighteen years we have had the best attendance from the

transported children; no more sickness among them, and no accidents. The children like the plan exceedingly. We have saved the town at least \$600 a year. All these children now attend a well-equipped school-house at the center. The schools are graded; everybody is converted to the plan. We encountered all the opposition found anywhere, but we asserted our sensible and legal rights, and accomplished the work. I see no way of bringing the country schools up but to consolidate them, making them worth seeing; then the people will be more likely to do their duty by visiting them.'

"From another town came this suggestive statement:

"'Once when a man wished to sell his farm he advertised, "A school near". Now he advertises, "Children conveyed to good schools". Farms sell more readily now.'"

State Superintendent J. F. Riggs of Iowa, in his annual report, says:

"From personal inspection and study of some of the consolidated schools in this state, supplemented by the study of reports from other states where the system has been longer in operation and is much more general, I reach the following conclusions:

"1. Pupils in consolidated schools very generally enjoy better school privileges and are taught by better teachers than under the old district plan.

"2. Where transportation is provided for all pupils the cost of maintenance is usually but not always more than under the district plan, but the enrollment is so much larger and the attendance so much more regular that the increased benefits equal or outrun the increased cost of maintenance.

"3. Where consolidation is successfully established, the opposition at first engendered gradually disappears and bitter opponents often come to be ardent supporters of the new plan when they see the superior benefits it secures to the children.

"4. Where transportation is made the fixed policy in any district, wagons specially designed for transportation purposes should be owned by the district. This will result in the greater comfort of the children and make it easier for the board to secure competent drivers,—a matter of the greatest importance.

"5. Children should seldom, if ever, be required to ride a greater distance than five miles. The very long rides are both expensive to the district and hard on the children. It follows from this conclusion that the civil township is, in general, too large a unit for a school district maintaining but one school. The law should authorize the change of boundaries between contiguous school townships or between school townships and independent districts in such a way that consolidated

districts of smaller area than the civil township could be established. The size and outline of the consolidated district should be determined by the physical features of its area and by the location of the homes to be accommodated. The homes on opposite sides of a public highway should be in the same district; hence half section lines or quarter section lines, rather than section lines, should in the main separate school districts.

"While an area somewhat smaller than the civil township is preferable as a permanent school unit, *township* consolidation is practicable where the roads are good and the schools are small.

"6. The consolidated school should in the main be kept in the country or in the small country village. The school should be the social center of the community. Where one or more country districts are consolidated with a city district, the course of study should be made sufficiently flexible to provide for those children who can attend school only during the winter."

EDUCATION OF THE FARM BOY AND GIRL.

* * * Have the advantages for the education of the farm boy and girl kept pace with the advancement in all other lines of society? Is the little schoolhouse, with its poor equipment, with the poorly trained teacher in many instances, and with very poor work in the common branches sufficient to meet the demands of today for the common school education?

Have we not reached the period in all the central western states where nothing short of a well equipped schoolhouse, a first-class teacher and a course of study revised to meet the demands of the times, are a necessity for our children?

I believe that every farmer who reads this article will agree with me that conditions have changed since he was a boy, and that it takes a better trained mind to be a successful farmer or business man today than it did even ten years ago.

It is safe to say that the time has come when the farmer must have within comparatively easy reach of his home a well constructed schoolhouse, thoroughly equipped for giving the best of modern education. He

ought not to have to send his son or daughter away from home to school until at least two years of the work of the modern high school has been completed. The farm boy and the farm girl should be at home at nights while they are getting their general education. These conveniences may be had everywhere by the consolidation of schools in localities of mutual interests. This has already been done to a large extent in Indiana, and the plan is under good headway in Iowa and some other western states.

There is no reason why the farmers should not provide these conveniences of education for their children. It is nothing more than they are doing to provide themselves with better means of breeding and handling their stock or improving their farms, and certainly their children's welfare is of much more concern than any farm or stock improvements. * * *

The new conditions of life on the farm demand improvement in general education for the farm boy or girl. It is presumed that the course of study will contain a good course in bookkeeping, and facilities should be provided for a certain amount of industrial work. The children in the grades should be taught to make various articles, such as cardboard modeling, clay modeling, weaving of rugs and hammocks, baskets with raffia, reed and willow, doll houses with raffia furniture and various articles that may be easily made under the direction of a trained teacher, and both the children of the grades and the high school should have access to a shop where they may learn to make articles by the use of simple tools. This work is not to be carried on with the idea of making carpenters or artisans of all, but with the thought in view of cultivating a desire and an appreciation for such work and the further idea of giving the pupils the opportunity to acquire the ability to help themselves and thereby to help others. A few hours a week at such work as this will prove invaluable to any child. Parents have not come to a realization yet how much this industrial work means to their children. The expense of providing this equipment is nominal, compared to the good to be received, and the pupils need very little instruction

in order to acquire the training it is intended they shall secure from such work. * * * * The proper education of the farm boy and girl can not be neglected without bringing ruin upon the farming communities. If these advantages are not provided the farm boys and girls will drift away early into other callings. If the right kind of schools are provided for the country boys and girls they will remain at home until they receive this general education, and then if they have gifts in other directions it will be time for them to seek special schools.—PRES. O. H. LONGWELL in *Twentieth Century Farmer*.

LAWS AND LEGAL FORMS WHICH EVERY FARMER SHOULD KNOW.

DEEDS.—Laws Governing Deeds.—How to write deeds.—Warranty Deed.—Form.

CERTIFICATE OF ACKNOWLEDGMENT.—Quieting Title.

MORTGAGES.—Laws Governing Mortgages.—Acknowledgment.—Recording.—Form.—Assignment of Mortgage.—Collection of Mortgage Debt.—Redemption of Mortgage.

CHATTEL MORTGAGE.—Form.—Mortgagors' rights.—Redemption.—Sale Under Statute.

LANDLORD AND TENANT.—Lease.—Laws Governing Leases.—Form of Lease.—How to Write a Lease.

CONTRACTS.—Laws Governing all Kinds of Contracts.—Land Contracts.—Contracts for Laying Tile or Building Fence.—A Contract for the Sale of Horses, Cattle or Other Personal Property.

PROMISSORY NOTES.—Laws Governing Notes.

ACCOUNTS.—Laws Governing Accounts.

EXEMPTIONS.—Real Estate.—Homesteads.—Personal Property.

FENCES.—What Constitutes a Legal Fence.

CRIMINAL LIABILITY.—Estrays.—Estray Notices.—Payment of Fees.—Title to Estrays.—Reclaiming Estrays.—Taker Up May Use and Work the Estray.

DRAINAGE LAWS OF IOWA.—Tiling, etc.

HOW TO WRITE A DEED.

RULES:—*It must be written or printed on paper or parchment.*

2. *The names of the parties and place of residence are written first.*

3. *The property must be fully described. The description should be by bounds, or by divisions of United States surveys, or by sub-divisions into blocks and lots, as shown on the records.*

4. *It must express a consideration, also a covenant to "warrant and defend" and be signed and sealed by the grantor or grantors.*

CAUTION.—It must be completely written before delivery. Numbers should always be written in *words* followed by figures in parentheses. If the grantor is married, they both should join in the grant and in execution of the deed—signing and acknowledging. Where forms are prescribed by the Statutes of a State, they must be followed. The long form, however, is good in all the States.

THE LAW GOVERNING DEEDS.

1. The acknowledgment of a deed can only be made before certain persons authorized to take the same, such as Justices of the Peace, Notaries, Masters in Chancery, Judges and Clerks of the Courts, Commissioners of Deeds, etc.

2. A deed without consideration is void.

3. Any person of legal age, competent to transact business, and owning real estate, may convey it by deed.

4. The deed takes effect upon its delivery to the person authorized to receive it, and should be recorded at once.

5. After the acknowledgment of a deed the parties have no right to make the slightest alteration.

6. The person making the deed is called the *grantor*, the person to whom the deed is delivered is called *grantee*.

7. A WARRANTY DEED.—The grantor warrants the title to be good, and agrees to defend the same against all persons.

A QUIT CLAIM DEED releases only what interest the grantor has in the property.

8. Never purchase real estate without a careful examination of the title, either by yourself or a trusty attorney.

9. Always procure an abstract of title before advancing money or signing contract for purchase of land or lots.

WARRANTY DEED.—LONG FORM.

THIS INDENTURE, made this *Second day of March*, in the year of our Lord one thousand nine hundred and seven between *Andrew Samson and Polly Ann Samson, his wife*, of the *Village of Fernald*, in the County of *Story*; and State of *Iowa*, party of the first part, and *Ebenezer P. Stought* of the *City of Chicago*, in the County of *Cook* and State of *Illinois*, party of the second part:

WITNESSETH, That the said party of the first part, for and in consideration of the sum of *Ten thousand Eight hundred and ninety* (\$10,890.00) Dollars, in hand paid by the said party of the second part, the receipt whereof is hereby acknowledged, and the said party of the second part forever released and discharged therefrom, have granted, bargained, sold, remised, released, conveyed, aliened and confirmed, and by these presents do—grant, bargain, sell, remise, release, convey, alien, and confirm unto the said party of the second part, and to *his* heirs and assigns, forever, all the following described lots, pieces, or parcel of land, situated in the County of *Du Page*, and State of *Illinois*, and known and described as follows, to-wit:

The North-west quarter of Section Thirty-six (36) in Township thirty-eight (38) North, of Range eleven (11) East of the Third Principal Meridian, containing one

hundred and sixty acres by Government Survey. Also, an equal undivided one-half interest in Lot number one (1) in Block number three (3) of Fernald, in the County and State aforesaid.

TOGETHER WITH ALL AND SINGULAR the hereditaments and appurtenances thereunto belonging, or in anywise appertaining, and the reversion and reversions, remainder and remainders, rents, issues, and profits thereof; and all of the estate, right, title, interest, claim, or demand whatsoever, of the said party of the first part, either in law or in equity, of, in, and to the above bargained premises, with the hereditaments and appurtenances: TO HAVE AND TO HOLD the said premises above bargained and described, with the appurtenances, unto the said party of the second part, his heirs and assigns forever.

And the said *Andrew Samson and Polly Ann Samson, his wife*, party of the first part, for *themselves and their* heirs, executors and administrators, do covenant, grant, bargain, and agree to and with the said party of the second part, his heirs and assigns, that at the time of the ensembling and delivery of these presents, they are well seized of the premises above conveyed, as of a good, sure, perfect, absolute and indefeasible estate of inheritance in law, in fee simple, and have good right, full power, and lawful authority to grant, bargain, sell and convey the same in manner and form aforesaid, and that the same are free and clear from all former and other grants, bargains, sales, liens, taxes, assessments, and encumbrances, of what kind or nature soever; and the above bargained premises, in the quiet and peaceable possession of the said party of the second part, *his* heirs and assigns, against all and every other person or persons lawfully claiming or to claim the whole or any part thereof, the said party of the first part shall and will WARRANT AND DEFEND.

AND the said party of the first part hereby expressly waive and release any and all right, benefit, privilege, advantage and exemption, under or by virtue of any and all Statutes of the State of *Illinois*, providing for the

exemption of homesteads from sale on execution or otherwise.

IN WITNESS WHEREOF, the said party of the first part *have* hereunto set *their* hands and seals the day and year first above written.

Signed, Sealed and Deliv-	}	<i>Andrew Samson,</i>	(SEAL)
ered in the Presence of		<i>Polly Ann Samson,</i>	(SEAL)
.....			(SEAL)
<i>Salamander S. Stone.</i>			(SEAL)

(CERTIFICATE OF ACKNOWLEDGMENT.)

STATE OF IOWA,	}	ss.
COUNTY OF STORY,		

I, John Smith, a Notary Public in and for said County, do hereby certify that Andrew Samson and Polly N. Samson, his wife, who are personally known to me to be the same persons whose names are subscribed to the foregoing instrument, appeared before me this day in person and acknowledged that they signed, sealed and delivered the same as their free and voluntary act for the uses and purposes therein set forth, inculding a release and waiver of the right of homestead.

Given under my hand and Notarial Seal this second day of March, 1907.

(Signed)
[Notarial Seal.]

JOHN SMITH,
Notary Public.

MORTGAGES AND LEASES.

A mortgage is a conveyance of property for the purpose of securing the payment of money, or the perform-

ance of some other obligation. Real estate may be mortgaged by the owner or owners for the security of a debt, or the performance of an obligation, or as an indemnity to secure another against loss. The person who makes the mortgage is called the mortgagor, and he to whom the mortgage is made is called the mortgagee.

In the absence of stipulations to the contrary, the mortgagor of real property retains the legal title and right of possession thereto. This legal title and right of possession he retains not only till the debt is due, but until the mortgage is foreclosed and the land sold and a sheriff's deed made therefor, which deed cannot be made until one year after the sale. During that year the mortgagor has the right to redeem. The legal effect, therefore, of a mortgage in this state is not to convey any estate in the land, but only to give the mortgagee a special lien or charge thereon to secure the debt. The land remains the property of the mortgagor, to all intents and purposes, the same as if no mortgage had been made. The mortgagee's interest is not real estate, but only personal property. When the mortgagor is married, the wife or husband should join in the mortgage, to the extent, at least, of relinquishing the right of dower, and if the property to be mortgaged is the *homestead*, they should both join *fully* in executing the same instrument. But if the mortgage is made by the grantor to secure the purchase money, or a part of it, the wife or husband of the purchaser need not join in it. The owner of land may mortgage it to secure the debt of another.

DELIVERY.—A mortgage does not take effect until it has been delivered and accepted.

ACKNOWLEDGING AND RECORDING.—A mortgage cannot be lawfully recorded until it has been acknowledged. An acknowledgment not complying with the law is the same as no acknowledgment at all. The purpose of recording a mortgage is to give notice to the world of the rights of the mortgagee. The statute provides that no instrument affecting real estate is of any validity against subsequent purchasers for a valuable consideration, without notice, unless recorded in the office of the recorder

of the county in which the land is situated. However, as between the parties to the mortgage, it is binding even though not acknowledged and recorded, and upon persons who have *actual notice* of it. Actual notice means either actual knowledge, or knowledge of such facts as should put a reasonable man upon inquiry, which if pursued, would result in knowledge.

FORM.—The cardinal element of a mortgage is that of security for the payment of a debt or performance of an obligation. Therefore no particular form is necessary. It may be in the form of an absolute conveyance, yet if it is intended as a security it is a mortgage. A mortgage of itself never changes its character. "Once a mortgage always a mortgage" is a legal maxim.

ASSIGNMENT OF MORTGAGE.—If the mortgage is given to secure the payment of promissory notes, the notes are the evidence of the debt, and the mortgage is but an incident thereto. A transfer of the notes by endorsement will transfer the mortgage. The mortgage may also be assigned by a writing on the back thereof, or by a separate written instrument, and if such assignment is made it will authorize the assignee to foreclose the same and to cancel the mortgage upon the records, the assignment being also recorded. If the assignment is to be recorded, it must also be acknowledged like a deed. When one purchases the note or notes secured by the mortgage, he should also take an assignment of the mortgage, duly acknowledged, and file it for record. This will prevent the mortgagee from satisfying the mortgage of record and thereby deprive the assignee of the security. The assignment of the mortgage alone, without an assignment also of the note or debt secured thereby, does not carry anything of value to the assignee. He cannot by reason thereof collect any part of the debt.

MORTGAGE CONTINUES THOUGH DEBT BE CHANGED.—It is a general rule that nothing but the actual payment of the debt secured by a mortgage, or the express return of the mortgage, will discharge the lien created thereby. The lien lasts as long as the debt, if there is no release. No change in the form of the debt is a payment of it,

and no such change will discharge the mortgage. If the old notes be taken up and new notes given for the same debt, with interest added, and an extension of time of payment, the lien of the mortgage continues unbroken.

COLLECTION OF A MORTGAGE DEBT.—When the mortgage debt, or any part of it, is due and unpaid, the holder of the debt may at his option, discard the mortgage and bring an action at law for a personal judgment against the debtor for so much of the debt as is due. However, the ordinary method of procedure to collect the mortgage debt is by the foreclosure of the mortgage. In this proceeding, usually, a personal judgment is rendered against the debtor, and, in addition thereto, there is a special order for the sale of the mortgaged property, or so much thereof as may be necessary to satisfy the judgment so rendered, with interest and costs. If the mortgaged property does not sell for enough to satisfy the debt, a general execution may be had against the debtor for the balance, unless the parties have otherwise agreed.

REDEMPTION.—The mortgagor has the same right to redeem the property from the foreclosure sale as if it were sold under a general execution to satisfy an ordinary judgment. This right of redemption continues for twelve months after the sale, during which time no title or right of possession passes by virtue of the sale. At the end of that time, if no redemption is made, a sheriff's deed is executed to the person entitled thereto and the purchaser is entitled to enter at once into the possession and control of the land.

SATISFACTION OF RECORD.—When the mortgage is paid, it is the duty of the mortgagee, or of any assignee who appears by the record to be the owner of the mortgage, to cause it to be canceled on the record, so that it no longer appears as a charge upon the land. When the mortgage is foreclosed, this duty devolves upon the clerk of the court. No specific form of realease is necessary. It may be by the marginal release, as by entering upon the margin of the record of the mortgage a statement to the effect that the mortgage is canceled by payment of the debt or that some portion of the mortgaged prop-

erty is released from the lien created by the mortgage, or it may be released and discharged by an instrument acknowledging the payment of the debt and discharge of the mortgage, which should be filed for record in the office of the recorder of deeds.

CHATTEL MORTGAGE.—Such mortgage is a sale of personal property for the purpose of securing the payment of a debt or for the performance of some other obligation, upon condition that the sale shall be void upon the payment of the debt or the discharge of the obligation according to the terms of the agreement. The possession of the property may be retained by the mortgagor, or it may pass to the mortgagee, as the parties may agree.

Any person of lawful age and of sufficient mental capacity to enter into other contracts may make a valid mortgage of personal property to which he has the legal title, but one who has the mere possession of such property, without the legal title, cannot make a mortgage upon it which will be binding upon the true owner.

FORM.—Chattel mortgages are usually in writing, signed and acknowledged by the mortgagor, and recorded in the office of the recorder of deeds. No particular form is necessary. As between the parties themselves it is not necessary that the instrument be either acknowledged or recorded, or even that the contract be in writing.

DELIVERY AND ACCEPTANCE.—As with respect to all other written contracts, so with chattel mortgages; they do not take effect until there is a delivery and an acceptance, and from the moment of such delivery and acceptance, unless there is an agreement to the contrary, they take effect.

There are many provisions of the law applicable to consideration, description of the property, description of the debt, what may be mortgaged, future acquired property and nature of the mortgagor's interest, which are too long and numerous to be treated herein.

MORTGAGOR'S RIGHTS AND REMEDIES.—Practically the same remedies are available to the mortgagee under a

chattel as under a real estate mortgage. However, with respect to a chattel mortgage he has the further remedy, that he or his agent may seize and sell the mortgaged property, or so much thereof as may be necessary, under the power given him in the mortgage. In pursuing this method, it is customary to give the mortgage to the sheriff or constable, and authorize him to proceed to seize, advertise and sell the property. However, this is not necessary. The mortgagee may do this for himself, or he may authorize any other person to do it for him; and when he employs a sheriff or constable such officer acts only as his agent, and not in his official capacity.

The mortgagee may seize and sell the property as soon as the secured debt is overdue and unpaid. He has the absolute right so to do, still he must not exercise that right unless he can do so peaceably. If nothing is said in the mortgage to the contrary, the mortgagee is by law entitled to the possession of the property. There are usually some conditions in the mortgage under which the mortgagee may take possession and sell before the debt becomes due. When the mortgage provides the manner of seizure and sale of the property, such provisions must be strictly complied with. The mortgage in such case is the authority for such acts.

REDEMPTION.—So long as the property remains unsold, the mortgagee has the right to redeem by paying the debt and the costs made to that time. The sale, to be a legal sale, must be made for cash. If the mortgagee barter the property for other property, he who then takes it still holds it subject to the mortgagor's right to redeem.

SALE UNDER STATUTE.—The statute provides a method of foreclosure and sale by notice, when there is no stipulation to the contrary agreed upon by the parties. These provisions prescribe the entire procedure for this method. The statute should be consulted when this method is intended to be followed.

NOTARIES PUBLIC.

The governor is authorized to appoint one or more persons to the office of notary public in each county as he may deem necessary. Either men or women may receive such appointment. The term is for three years, but all commissions expire on July 4, 1900, and every three years thereafter. The application should be made to the governor on blanks prepared and furnished by that office. The application must be accompanied with a recommendation stating that the applicant is a citizen of the United States, is of age, has proper qualifications in point of ability and integrity for the office, and that he has resided in the state a sufficient length of time to entitle him to vote therein. The applicant must be a resident of the county for which he seeks the appointment. When the application is presented to the governor he will either grant or refuse the application. If he makes the appointment, the applicant will be duly notified thereof and furnished with a blank bond to be executed according to law. If the applicant be a woman she must be at least eighteen years of age and possess the same qualifications as required of male applicants. The commission to the applicant will be issued under the seal of the state by the secretary of state. At the time the secretary of state sends the commission to the applicant, he also makes and mails to the clerk of the district court of the proper county a certificate of appointment, to enable such clerk to certify that the person so commissioned is a notary public for that county during the time such commission is in force. Should the commission be revoked, the secretary of state immediately notifies the clerk of such fact.

POWERS AND DUTIES.—A notary public may take acknowledgments of deeds and other written instruments, administer oaths for general purposes, take depositions, protest commercial paper, such as promissory notes, bills of exchange, checks, drafts, etc., and give notice to endorsers. He is required to keep a record of all notices with the time and manner in which the same

were given or sent by him, and the names of all the parties to whom the same were given or sent, with a copy of the instrument in relation to which the notice is served, and of the notice itself.

His jurisdiction is limited to the county within which he is appointed; except that he may administer oaths and take acknowledgments in any adjoining county, provided he has filed with the clerk of the district court of such adjoining county a certified copy of his certificate of appointment. Such certified copy is to be obtained from the clerk of the district court of the county for which he has been appointed. The removal of a notary from the county for which he has been commissioned is equivalent to a resignation of such office. No notary public should act as such in any cases wherein he is directly or indirectly interested. A notary public is liable in damages, to the person employing him, for negligence or misconduct in the line of his official duty. If such notary exercises the duties of his office after the expiration of his commission, or when otherwise disqualified, or appends his official signature to documents when the parties have not appeared before him, he shall be guilty of a misdemeanor, and fined not less than fifty dollars, and shall be removed from office by the governor.

HOW TO WRITE A CHATTEL MORTGAGE.

Use a legal printed form or write one like the copy given below.

A Chattel Mortgage is a mortgage on personal property, such as live stock, machinery, farm implements, etc.

1. A chattel mortgage must be acknowledged before a Justice of the Peace, or before the Notary of the County, in which the mortgagor resides.
2. The mortgage must be recorded.
3. Chattel mortgages may not run longer than two years.
4. Chattel mortgages are usually given to secure

notes of the mortgagor in the same way in which real estate mortgages are given to secure notes of the mortgagors. Greater strictness, however, is required in the acknowledgment, docketing and recording of chattel mortgages than in the case of real estate mortgages. A recent statute of the State of Illinois provides that notes secured by chattel mortgages must show on their face that they are secured by chattel mortgages, or they are absolutely void. Any defense which the maker of the note secured by chattel mortgage could make against the original payee is good against the note in the hands of an endorsee even though endorsed before maturity. Chattel mortgages on household goods must be signed by the wife of mortgagor and can only be foreclosed by a court proceeding.

5. A chattel mortgage is a conditional sale of property, if the debt for which it was given is not paid.

6. The property must be taken possession of by the mortgagee on the maturity of the mortgage, or it can be taken by other creditors.

7. To sell property covered by a chattel mortgage is a criminal offense.

FORM OF CHATTEL MORTGAGE.

KNOW ALL MEN BY THESE PRESENTS, That I, John Smith, of the town of Colo, in the County Story, and State of Iowa, acknowledge myself to be indebted to A. S. Barnard, of the town of Mendon, County of Monroe, State of New York, the sum of Four Hundred Dollars (\$400.00) with six per cent. interest from date, and for the security of said sum I do hereby mortgage and sell and assign to the said A. S. Barnard, One Bay Mare, 4 years old, One Wagon, One Set of Double Harness and all my Household Furniture of every description in my house in the town of Colo.

And, I hereby authorize and empower the said A. S. Barnard to take possession of said property and effects,

he to sell the same and appropriate the proceeds to the payment of said debt and interest.

Witness my hand and seal this first day of December, 1906.

John Smith. (SEAL)

Chattel mortgages in South Dakota are not acknowledged, but require two witnesses, and may run three years.

Chattel mortgages in Montana may run one year and sixty days.

HOW TO WRITE A LEASE.

RULE.—*The party granting the possession and profit is called the LESSOR, and the party to whom the grant is made is called the LEESEE.*

A Lease is a contract to be performed by both parties, and hence they both should sign it.

It is proper and best to have two copies of the lease (both alike), so that each party may hold a copy of the original agreement.

Write the lessor's name first, and his name should be signed first at the close.

Payments of rent should be entered on the back of the lease.

Care should be exercised in giving the TIME, DESCRIPTION, and the AMOUNT TO BE PAID.

1. A LEASE is a contract by which a party gains the possession, use and profit of lands and tenements, in return for which he pays the owner thereof a recompense, called rent.

2. A lease must always give a less interest in land than that of the lessor. If lessor conveys his whole interest, it is an assignment or deed.

3. A lease of lands and tenements may be by written

or verbal contract, except that there cannot be a verbal lease for a longer period than one year.

4. A written lease cannot be changed by verbal agreement made at the same time or another time. When parties reduce their agreements to writing they are bound by the writing as against any verbal declarations.

5. If no time is stated when the rent is to be paid, it is not due till the end of the lease.

A LEASE FOR RENTING A HOUSE.

KNOW ALL MEN BY THESE PRESENTS:

That I have this sixth day of September, 1906, let and rented unto B. B. Welty my house and premises, number 142 on Archer Street, in the town of Livermore, and State of Iowa, with the sole and uninterrupted use and occupation thereof for one year, to commence the first day of May next, at the monthly rent of twenty dollars, payable in advance.

Witness my hand and seal,

Harry Stein. (SEAL)

A LEASE—FOR CASH RENT.

THIS INDENTURE, made this *Fifth* day of *February*, A. D. 1907, between *Samuel E. Sport*, of the *Town of Ames*, in the County of *Story* and State of *Iowa*, of the one part, and *James R. Giddings*, of the *Town of Lisle*, in the County and State aforesaid, of the other part;

WITNESSETH, That the said *Samuel E. Sport*, for the consideration hereinafter expressed, hath demised, granted and leased, and doth by these presents hereby demise, grant and lease unto the said *James R. Giddings* and his assigns *lots one (1) two (2) and three (3) in block seven (7) of the original Town of Ames, as shown by the plat of said town on file in the Recorder's office of the said Story County. And also the Northwest quar-*

ter (N. W. ¼) of Section Eight (8) in Township Twenty (20), Range Nine (9), East of the 3rd Principal Meridian, and containing one hundred and sixty (160) acres according to government survey. All aforesaid real estate being situate in the County of Story and State of Iowa, together with all the privileges and appurtenances thereunto belonging. TO HAVE AND TO HOLD the above described premises for and during the term of five years from the date hereof.

And the said *James R. Giddings* doth covenant and agree to pay the said *Samuel E. Sport*, or his assigns, the sum of *One Thousand Dollars*, as yearly rent for said premises, in 2 equal payments of *Five Hundred Dollars* each, at the expiration of each and every *six* months from date, during the continuance of this Lease.

IN WITNESS WHEREOF, The said parties have to this and one other instrument of the same tenor and date interchangeably set their hands and seals, the day and year first above written.

Signed, Sealed and Delivered in Presence of <i>G. Handsacker.</i>	{	<i>Samuel E. Sport</i>	(SEAL)
		<i>James R. Giddings.</i>	(SEAL)

SECURITY FOR RENT.

For value received I hereby enter myself security for the full payment of the rent reserved in the within lease, and guarantee the payment of the rent and full performance of all covenants contained herein by the said party of the second part.

E. E. BROWN.

AGREEMENT TO CULTIVATE LAND ON SHARES.

This agreement, made this first day of March, 1907, between H. M. Schrepfer, of the town of Cohocta, in the

County of Livingstone, State of Michigan, party of the first part, and Richard Brown, of the City of La Salle, County of La Salle and State of Illinois, party of the second part, Witnesseth: That the said party of the first part has leased to the party of the second part the southwest quarter of Section 10, Township 33 North, Range 3, east, of the 3rd P. M., in La Salle County, Illinois, for the term of two years from March 1, 1907. Said party of the second part covenants to cultivate said land in good workmanlike manner, so as to raise the greatest amount of grain thereon which the season and the land will permit; to keep the land free from noxious weeds, haul out the manure at least once each year and keep all buildings and fences on said premises in repair, and to deliver to the party of the first part, at his residence in said City of La Salle, one-half of all hay, grain, and other crops raised on said farm, the small grain to be divided at the machine and delivered immediately after the same is threshed, the corn to be husked and cribbed on or before the first day of December in each year. Said party of the second part further agrees to pay four (4.00) dollars per acre for all lands on said premises used as pasture, such rental to be paid to the party of the first part on or before October 1st in each year. Said party of the first part agrees to furnish all material which may be necessary to make the repairs herein provided for, at the railroad station, in said City of La Salle, as the same shall be needed.

A violation of any of the covenants herein contained will authorize the party of the first part to declare this lease forfeited and recover possession of the premises hereby demised.

In witness hereof, the parties hereunto have set their hands and seals the day and year first above written.

(Signed) *H. M. Schrepfer.* (SEAL)
Richard Brown (SEAL)

N. B.—It is not necessary to go to a lawyer or notary to make a valid agreement. State what you mutually agree to in plain language. Follow the above form as near as possible.

THE LAW GOVERNING ALL KINDS OF CONTRACTS.

1. A contract is a mutual agreement between two competent parties for a valuable consideration to do or not to do a particular thing.

2. It must have, 1. Parties; 2. Subject Matter; 3. Consideration; 4. Assent of the parties. There cannot be a contract when any of these are wanting.

3. A consideration is the *thing* which induces a person to make a contract.

4. An alteration of a contract in a material part, after its execution, renders it void.

5. A contract the law forbids is void. Fraud renders all contracts void.

6. A contract made by a minor, a lunatic, or an idiot is not binding upon him, yet he can hold the party with whom he contracts, to all the conditions of the contract.

7. A contract not consistent with law or for immoral purposes is void.

8. A fraudulent contract may be binding on the party guilty of fraud, although not laying any obligation on the part of the party acting in good faith.

9. A contract for the sale or purchase of personal property over a certain amount—ranging from \$30 to \$200 in some States—must be in writing.

10. A contract which cannot be performed within a year must be in writing.

11. A guaranty must be in writing.

12. If no time of payment is stated in the contract, payment must be made on the delivery of the goods or performance of the contract.

13. A contract totally restraining the exercise of a man's trade or profession is void, but one restraining him in any particular place is not void.

14. An offer or proposal, which includes the essential parts of a contract, becomes a contract as soon as accepted.

15. A contract required by law to be in writing cannot be dissolved by verbal agreement.

16. A contract cannot be partly written and partly verbal. It must be wholly written or wholly verbal.

CONTRACT—DRUNKENNESS.

If a man enters into a contract, and afterwards attempts to avoid it upon the ground that he was drunk when he made it, he must prove that he was at the time so completely under the influence of intoxicating liquors that he was unable to understand the effect and consequences of the transaction. This is the general doctrine on the subject in all the states. It was approved recently by the supreme court of Iowa.

HOW TO WRITE A CONTRACT.

Rule:—1. The parties to a Contract are taken in the order in which they are written and referred to as "the party of the first part", "the party of the second part", without repeating their names. It matters not which name is written first.

2. After writing the date, names of the parties and their places of residence, state fully all that the first party agrees to do, and then state all that the second party agrees to do.

3. Next state the penalties or forfeitures in case either party does not faithfully and fully perform, or offer to perform, his part of the agreement.

4. Finally, the closing clause, the signatures and seals, the signatures of witnesses are written. (A seal is simply the mark of a pen around the word "seal", written after the signature.)

No particular form of legal language is necessary. Use your own words and state in a plain way just what you want *done*. Anyone who can write a letter and express his desire in an intelligent manner can write a contract.

Errors in grammar or spelling do not affect the legality of the agreement.

If the language should be obscure on certain points, the "court" will always interpret the *intent* of the parties, when they entered into the agreement, provided the intent can be gathered from the terms of the instrument itself.

When an agreement is written it must all be in writing. It cannot be partly written and partly oral.

LAND CONTRACT.

This agreement, made this first day of June, A. D. 1907, between John Brown of the City of Dunkirk, in the State of New York, party of the first part, and Norman C. Stull, of the City of Buffalo, of the same State, party of the second part, Witnesseth, That if the said party of the second part shall first make the payments and perform the covenants hereinafter mentioned on his part the said party of the first part hereby agrees to convey and assure to the said party of the second part in fee simple, clear of all incumbrances whatsoever, by a good and sufficient warranty deed the following described premises to-wit: (Here describe property to be conveyed). and the said party of the second part covenants and agrees to pay to the said party of the first part the sum of two thousand (2,000.00) dollars as follows:

Five hundred (\$500.00) dollars cash in hand paid, the receipt whereof is hereby acknowledged, balance on March 1, 1906, with interest at the rate of 6 per cent. per annum, payable annually after the date hereof, and all taxes and assessments legally levied or imposed upon said land subsequent to the year 1906. A complete abstract of title brought down to date to be furnished by said party of the first part on or before thirty days from the date hereof, in case title, on examination should prove to be defective then the said party of the first

part agrees to perfect the same within a reasonable time, and in case of failure so to do, or in case said title cannot be perfected the cash paid hereon shall be refunded and this contract shall become null and void. Deed to be delivered March 1, 1908, deferred payments to be secured by note and first mortgage by the party of the second part on the premises hereby sold. This contract shall extend to, and be obligatory upon the heirs, administrators, executors, and assigns of the respective parties.

In testimony whereof the parties have hereunto set their hands and seals the day and year first above written.

(Signed)

John Brown. (SEAL)

Norman C. Stull. (SEAL)

Witness: Geo. Fry.

A CONTRACT FOR THE SALE OF HORSES, CATTLE, OR OTHER PERSONAL PROPERTY.

This agreement, between John Smith, and Frank Jones, made this nineteenth day of October, 1906, witnesseth:

That said John Smith, for the consideration hereinafter mentioned, shall sell and deliver on the first day of November next to said Frank Jones at his residence, One Double Wagon, Two Four-Year-Old Colts and Six Yearling Heifers.

That said Frank Jones, in consideration thereof, shall pay said John Smith Three Hundred Dollars, upon the delivery of said property.

In witness whereof we have this day set our hands and seal.

John Smith.
Frank Jones.

A CONTRACT FOR LAYING TILE OR BUILDING FENCE.

This agreement made this first day of July, 1906, between H. C. Nauman of the first part, and G. C. Gasser of the second part, Witnesseth: That the said party of the first part agrees to lay upon the farm of the said party of the second part of Naperville Township, Du Page County, Illinois, 120 rods of six inch tile at such places on said farm as the said party of the first part may designate for the sum of forty cents per rod, said tile to be so laid that there shall be sufficient fall to properly drain the land through which the same is laid. And all ditches to be properly filled by the party of the first part; and the said party of the second part agrees to pay said party of the first part one-half the consideration above expressed when he has laid 60 rods of said tiling and the balance on completion of the contract.

Witness the hands of the parties hereto the day and year above written.

(Signed)

H. C. Nauman.
G. C. Gasser

FORM OF MECHANIC'S LIEN,

STATE OF IOWA, } SAC COUNTY. }	ss.	In the Circuit Court, Sac County.
JULIUS WARREN, vs. MARTIN SMITH.	}	Claim for Lien.

Julius Warren, being first duly sworn, on oath, says that he is the claimant above named, and that the attached "Exhibit A", is a just and true statement of the account due him from said Martin Smith for labor

and materials furnished said Martin Smith at the times in said statement mentioned, which various amounts are due and payable to him from and after the respective dates thereof: and affiant says that the labor and materials in said statement mentioned were used in the construction and improvement of a two-story frame building situate upon the following described premises in the County of Sac and State of Iowa, to-wit: Lot two (2), in Block three(3), of the original town of Sac City.

And affiant says that there is now due and owing to said Julius Warren from said Martin Smith, at whose request said material and labor was furnished as afore-said, after allowing to him all just credits, deductions, and set-offs, the sum of \$500, for which amount said Julius Warren claims a lien upon the above described premises.

Subscribed and sworn to before me	}	JULIUS WARREN.
this 29th day of February, A. D.		
1896.		
JOHN SMITH, Notary Public.		

N. B.—The foregoing statement should be signed and sworn to before some officer authorized to administer oaths, and filed with the Clerk of the Circuit Court of the county where the real estate is situated, and a suit to enforce the same must be begun within two years from the date of the completion of the contract.

HOW TO SECURE A MECHANIC'S LIEN ON PROPERTY.

1. A *Lien* is a legal claim. It includes every case in which either real or personal property is charged with any debt or duty. Or in other words, it is the right to hold possession of property until some claim against it has been satisfied.

2. *Possession* is always necessary to create a lien except in case of mortgages. The lien simply extends

to the right of holding the property until the debt is satisfied. The property cannot be sold without the consent of the owner, except by order of the Court.

3. *Law*: The existence of a lien does not prevent the party entitled to it from collecting the debt or claim by taking it into Court.

4. Warehouse men, carpenters, tailors, dyers, millers, printers, etc., or any person who performs labor or advances money on property or goods of another has a lien on same until all charges are paid.

5. *Hotel Keepers* have a lien upon the baggage of their guests, whom they have accommodated.

6. *Common Carriers* have a lien on goods carried for transportation charges.

7. *Agents* have a lien on goods of their principal for money advanced.

8. *How to Hold the Lien*. Never give up possession of the property until the debt is paid.

9. *Real Property*. If the debt is on a house, barn or other real property, file a lien on the whole property, and have it recorded in the County Recorder's office. The claim then partakes of the nature of a mortgage.

10. **MECHANIC'S LIEN**.—Nearly all the states have enacted special laws to protect mechanics and material men who may furnish material and labor for the erection, construction, repair and improvement of buildings situated thereon. The method of securing these liens and enforcing them in the different states varies so widely that it is almost impossible to give such a statement as will cover all states. The courts have construed such laws very strictly and in order to entitle a person to such lien the provisions of the law granting the same must be strictly complied with. Mechanics and material men desiring to avail themselves of these statutes had better consult some good lawyer and have him prepare the necessary papers. The following form is the one commonly in use in the State of Illinois:

ATTACHMENT.—This is a writ issued by the Justice of the Peace or Judge, or some other officer having jurisdiction, commanding the sheriff or constable to attach

the property of the debtor, to satisfy the demands of the creditor. This writ may be issued at the beginning or during the suit. In some States, Alabama, Illinois, Louisiana, Mississippi, Missouri and Iowa, the creditor may retain possession of the property and give a bond as a guarantee that the property will be held for the debt in case he is defeated in the suit. All attachments lose their validity in case the debtor (or defendant) wins the suit.

ARBITRATION BEST FOR FARMERS.

Arbitration is almost invariably preferable to litigation. It is not only the easiest, quickest and cheapest way to settle disagreements, but saves much vexation and subsequent dissension. Were individuals, corporations and nations to arrange their disputes by arbitration, instead of resorting to litigation and warfare, the people would be saved millions of treasure, and the world spared much shedding of blood. A peaceful settlement of difficulties is usually followed by prosperity, while "going to law" or war usually results in loss and suffering to both contestants. Indeed, litigation and warfare are twin relics of the dark ages, and so long as they continue in vogue we may look in vain for harbingers of the promised millennium. Of all classes, farmers should, so far as possible, avoid entering into litigation; for whether they win or lose, they are proverbially worsted, the lawyers usually taking the cream, and leaving only the skim-milk for the winning contestant. Truly, there is neither glory nor honor, profit nor pleasure in litigation, and the less people who profess to live "on the square", and, according to the Commandments, have to do therewith, the better it will be for both their present and future peace and prosperity. Even in the most aggravating case of trespass, and the like, no good citizen should resort to the law, until all amicable attempts at settlement have failed. Indeed, and finally, whatever may be the provocation don't get mad and impulsively prosecute your neighbor, but keep your temper.

HOW TO SETTLE DIFFICULTIES BY ARBITRATION.

Arbitration is an agreement by parties who have a controversy or difference to the decision of a third party.

Arbitration is one of the highest courts for the settlement of personal differences, and if people would only learn more of its benefits and advantages, lawyers by the thousands would not thrive and fatten upon the earnings of those who could make better use of their money.

When the matters in difference are simply those of fact, it is often more satisfactory to submit them to the decision of mutual friends, each contending party choosing one, and the two arbitrators thus chosen choosing the third, and the three parties thus chosen constituting the court.

The decision of the arbitrators is called an *award*.

The award should be specific and distinct containing the decision of the arbitrators in as clear and concise language as possible.

The following oath should be taken by the persons chosen to act as arbitrators or referees before entering upon the examination of the matters in dispute: We, the undersigned arbitrators appointed by and between Henry Smith and Richard Brown, do swear fairly and faithfully to hear and examine the matters in controversy between said Henry Smith and Richard Brown.

PETITION FOR LAYING OUT A ROAD.

*To the Commissioners of the town of Colo,
County of Story, and State of Iowa.*

Your petitioners of the town of Colo would respectfully represent that the public convenience and wants require that a road and highway should be laid and constructed, beginning at the Northwest corner of J. D. Wild's farm, in the town of Colo, and leading in a direct line South to the town of Collins.

Your petitioners would therefore ask that your honors

would view the premises, and locate and construct said road and highway, according to the laws in such cases made and provided, as shown by the Statutes of the State.

(SIGNATURES.)

(SIGNATURES.)

Note.—The places where the road commences and ends should be particularly described, but the farms and lots through which it is to pass need not be described.

This form will apply whether to the commissioners of a town or county.

PETITION FOR CHANGING A ROAD.

To the Commissioners for the County of.....

The undersigned respectfully represent that the public road and highway from the house of W. S. Waite, in the town of Barnard, passing the house of G. H. Schaefer, to the house of John Young, in the town of Diegel, is indirect, inconvenient, and out of the way; wherefore, your petitioners request your honorable body to view the premises, straighten or new locate such road, and discontinue such parts of the present highway as may be useless, or make such alterations and improvements as shall appear to your honors necessary.

(SIGNATURES.)

(SIGNATURES.)

ALL ABOUT RIGHTS OF WAY.

When one person has a right to pass over the land of another, this right is called a right of way. There are three methods by which this right can be acquired: 1st, by purchase or land grant from the owner of the land, 2nd, by long-continued use or prescription, 3rd, by necessity. To obtain a permanent right of way by the first method, there must be a complete deed of it, with all the formalities required in a deed of the land itself. It is such an interest in the land as the law requires to be

by a deed. If the bargain was an oral one, or even in writing, if not in the form of a deed, it would not hold. It should be granted under seal and acknowledged in those States where the law requires a deed to be sealed and acknowledged.

A right of way is acquired by prescription by an adverse use for twenty years.

NOTICE TO WORK ON THE ROAD.

*To Mr. H. J. Harter,
Lombard, Ill.*

You are hereby notified that your road tax of \$2.48 and poll tax of \$2.50 is now due, and if you desire to work out the same on the public road, you will report for duty on the turn-pike, just east of G. E. Gasser's residence, May 28th, 1891, at 7 o'clock A. M. A part or the whole tax may be paid in cash, if preferred.

*G. F. Diegel,
Commissioner or Path Master.*

ESTRAY NOTICE.

LOST COLT.

Take Notice!—On the 3rd day of June, 1906, there strayed onto my enclosed land in the town of Lisbon, County of Linn: One two-year old colt, a dark bay, with small star in the forehead, and left hind foot white; and one dark brown calf, with black spots on each side. Any one claiming the above described animals can obtain possession of same by furnishing sufficient proof of ownership, and paying all expense and cost.

1. The above notice may be printed in the local paper, or written out, and tacked up in three or four prominent places in the vicinity where the stray animal was taken up.

2. No one can claim a stray without advertising the same, and giving the proper notice, such as the statutes of the State require.

3. If the stray is not redeemed by the owner, it may be sold at public auction to pay cost and expense.

TRESPASSING ANIMALS.

If cattle, or horses or sheep or hogs, or chickens, or dogs, or any other animals, trespass upon the land of a neighbor, they cannot be injured or killed by the owner of the land upon which the trespass is committed, no matter how often repeated. The law regulates these matters by damages, and every innocent person is protected, and generally fully compensated for all damages caused by trespassing animals.

Many States and local authorities have laws by which trespassing animals can be taken up, and either held by the party upon whose land the trespassing is committed or placed in a public corral or pound. They are kept there at the expense of the owner and damages or fines or both must first be paid before the animals can be taken or removed by the owner.

THE FINDINGS OF VARIOUS COURTS IN THE UNITED STATES, IN IMPORTANT TEST CASES.

A PROMISE TO RELEASE A DEBT DOES NOT DISCHARGE IT.—A promise to release a debt is not the same thing as an actual release; and, if there is not sufficient consideration for the promise to release, the promise is not enforceable. And while an actual composition signed by a creditor may have the effect of releasing the debt, a refusal to sign it cannot have such an effect, although the signature was promised. Such a promising creditor might see cause to change his mind, for any sufficient reason; and if he did, the act of release is not perfected,—the discharge does not take place. The creditor still retains his lawful claim against the debtor. *McNutt v. Loney*, S. C. Pa., 25 At. Rep. 1088.

PAYMENT OF BANK CHECKS AFTER DEATH OF MAKER.—Some authorities distinguish between cases where Bank

Checks are drawn for a valuable consideration and where they are mere gifts, the holding of such authorities being that in the former class of cases death does not revoke the checks, and that in the latter it does. But in the case of gifts when the delivery is coupled with an intent to transfer a present interest, in the money presented by the check, and no revocation is attempted, it would seem that the intent of the donor should be given effect, and the transaction be held to transfer a present interest, and a right to the payment of the check after the death of the drawer, as well as before. *May v. Jones*. S. C. Iowa, 54 N. W. Rep. 231.

FENCE LAWS.

1. Fence laws are generally regulated by State Statutes or local authorities.

2. A few general laws, however, are commonly held in all the States.

3. **LEGAL FENCE.**—First find out from the State Statute or local law what constitutes a legal fence. A legal fence is generally a four foot fence with sufficient boards or wire, or both, to turn cattle and sheep.

4. If cattle or horses break through fences in any way defective or neglected, the owner of the cattle or horse doing the damage is not responsible, if it was not his fence or the injury brought about through his neglect.

5. Every man is compelled to look after his own part of the fence and keep it in good repair and look out and restrain his own animals in trespassing upon the lands of another.

6. Owners of adjoining cultivated lands are required to make division fences in common, unless there is a law to the contrary.

7. In erecting division fences according to law, half of it may be placed upon adjoining land, and the other part must pay half for erecting and maintaining it, or

the owner of the adjoining land can build it himself. No man has a right to build a fence on another man's land, unless there is a law that will permit him to do so.

8. Fences are fixtures that pass with the sale of the land. Posts or boards that have ever been used as a fence on a farm, though when the farm is sold are piled up, and not used at the time for fencing purposes, cannot be removed as personal property.

TERMS AND FACTS OF CRIMINAL LAW.

1. THE RULE, "Every man's house is his castle", only applies to civil cases. Any locked door of the house may be forced open to arrest a criminal.

2. EVERY MAN is compelled by law to obey the call of a sheriff for assistance in making an arrest.

3. EMBEZZLEMENT is a fraudulent appropriation to one's own use what is entrusted to one's care, and can only be charged against a clerk, servant, or agent.

4. THE OFFENSE OF STEALING cannot be lawfully settled by receiving back stolen property.

5. BIGAMY cannot be proven in law if one party to the marriage has been absent and not been heard from in five years.

6. PETIT LARCENY is where the value of the property stolen is less than \$15.00. Grand larceny is when the value of the property stolen exceeds \$25.00.

7. ARSON is the burning of an inhabited building by night.

8. DRUNKENNESS is not a legal excuse for crime.

9. ASSAULT AND BATTERY is where a person has inflicted physical violence; an assault however, is only an offer or attempt at assault.

10. MAYHEM applies to any injury done to a limb. It formerly applied to the injury of the face, lip, tongue, eye or ear.

11. FELONY is a crime punishable by imprisonment in a State prison.

12. AN ACCIDENT is not a crime, unless criminal carelessness can be proven.

13. BURGLARY is the entering of a house at night or at twilight, or in any darkness where it is difficult to distinguish a man's face.

14. PERJURY is false swearing wilfully done. A witness should always qualify his statements as "to the best of my belief" or "as I am informed".

15. MURDER in the first degree must be premeditated and malicious, or committed while the murderer is engaged in some felonious act.

16. DUELS. Killing a man in a duel is murder, and any person giving or accepting a challenge is guilty of a misdemeanor.

17. A POLICE OFFICER cannot arrest a person without a warrant, unless he has personal knowledge of the offense.

CRIMINAL LIABILITY.—If any person maliciously kill, maim or disfigure any horse, cattle or other domestic beasts of another, or maliciously administer poison to any such animal, or expose any poisonous substance with intent that the same will be taken by such animal, upon conviction, shall be imprisoned in the penitentiary not exceeding five years, or imprisoned in the county jail not exceeding one year; or be fined not exceeding three hundred dollars.

CRUELTY IN GENERAL.—It is made a criminal offense punishable by imprisonment in the county jail not exceeding thirty days, or by a fine not exceeding one hundred dollars, for any person to torture, torment, overdrive, mutilate, cruelly beat or cruelly kill any animal, or unnecessarily fail to provide the same with proper nourishment or protection, or to drive or work the same when unfit for labor or cruelly abandon the same.

ESTRAYS.—Any animal of an unknown owner running at large or trespassing within a lawful enclosure is an estray, and may be taken up by any householder in the county, except an unbroken animal, between the first day of May and the first day of November, where such unbroken animal is not required to be restrained by police

regulation. If such householder fails to take up such estray, any other householder may notify him of the fact, and after the expiration of five days from the giving of such notice may then take up such estray, if still at large, but proof of the giving of such notice must be made before the proper justice of the peace.

ESTRAY NOTICES.—Any person taking up an estray shall within five days thereafter, post up a written notice in three of the most public places in the township, which notice shall contain a full description of such animal and a statement as to where the same was taken. Unless previously claimed, such person shall, within ten days, go before a justice of the peace of the township in which the estray was taken up, or if there is none, then before the next nearest justice in the county, and make oath to the correctness of such notice, together with the statement attached thereto as to whether the marks or brands of such animal have been altered to his knowledge, either before or after the same was taken up, which notice shall be recorded by the justice in his estray book, and within five days forwarded by the justice to the county auditor, who shall enter the same in the estray book in his office, and shall cause a copy of said notice to be posted at the courthouse door. If the estray is stock, the county auditor shall cause notice of the taking up to be published weekly for three weeks in some newspaper in the county.

PAYMENT OF FEES.—The fees of the justice of the peace and the expense of forwarding the notice to the auditor, and the auditor's fee for entering the notice in the estray book and for posting the copy thereof, and if the estray is stock the sum of one dollar and fifty cents for the expense of publishing notice of the taking up must be paid by the person taking up the estray, to be refunded by the owner of the animal. Two or more estrays may be included in one notice. If the estrays are owned by different owners, a proportionate division of the fees must be made.

TITLE TO ESTRAYS.—If the estray be stock and be not claimed by the owner within one year, or being any other

domestic animal if it be not claimed by the owner within six months from the time it was taken up, the property therein shall vest in the taker-up if he has complied with the above provisions.

RECLAIMING ESTRAYS.—At any time before title to an estray vests, the owner of the estray may reclaim it, upon payment of the lawful fees and expenses and a reasonable allowance for keeping the estray, to be fixed by the justice before whom proceedings are had, in case the owner and taker up of the estray cannot agree. Within six months after title to an estray has vested in the taker up, the owner of the estray may recover the value thereof at the time it was taken up, not including any increased value accrued since it was taken up, after deducting therefrom the compensation, reward, fees and expenses above provided for; or the taker up of the estray may elect to receive such compensation, reward, fees and expenses and return the estray to the owner.

TAKER-UP MAY USE AND WORK THE ESTRAY.—Any person taking up an estray may use and work the same, providing care and moderation are used and no injury is done the same. But if any person unlawfully takes up an estray or fail to comply with these provisions, or use or work it in any manner contrary to this chapter or work it before having it appraised, or keep it out of the county for more than five days at any one time before he acquires title thereto, he shall forfeit to the county twenty dollars, to be sued for by any person in the county, and the owner of the estray may recover double damages and costs. Estrays adapted thereto may be bred and milked by the taker.

Taking estrays out of the state, before title has vested, subjects the finder to payment of double the value of the estray, and fine and imprisonment, but the auditor may authorize the taker up to transfer the estray to another, who shall take the place of his predecessor.

The fees for restraining animals and for keeping and selling the same and for taking up estrays are fixed by law.

FENCE-VIEWERS.—The township trustees are consti-

tuted fence-viewers. They have power to determine any controversy arising relating to fences, upon giving five days' notice in writing to the opposite party or parties prescribing the time and place of meeting, to hear and determine the matter named in such notice. Upon request of any land owner, the fence-viewers shall give notice to all adjoining land owners liable for the erection, maintenance, rebuilding, trimming or cutting back or the repairing of a partition fence, or to pay for an existing hedge or fence; at such time and place the fence-viewers shall meet and determine by written order the obligations, rights and duties of the respective parties in such matter, and assign to each owner the part he shall erect, maintain, rebuild, trim or cut back or pay for, and fix the value thereof, and prescribe the time in which the same shall be completed or paid for, and in case of repair may specify the time in which the repairs should be made. A division of the line may be made although the adjoining owner is not then liable to contribute to the erection of a fence and the adjoining owner shall contribute thereto whenever he becomes liable so to do, as hereinabove specified.

The statute fixes the fees of the fence-viewers at two dollars each per day of eight hours. Their fees shall be paid in the first instance by the party requiring their services, and in the report of their proceedings they shall direct who shall pay said fees, and in what sums respectively, and the party having advanced any fees may have his action therefor against the parties so directed to pay the same, unless within ten days after demand the party entitled thereto shall be reimbursed.

DIVISION OF LINES.—Adjoining owners may agree upon a division of the line of partition fences by an instrument in writing, acknowledged and recorded like a deed of real estate, and such instrument and all others made in writing by the fence-viewers are binding upon their makers, their heirs and subsequent grantees. If the land should cease to be a means of revenue or benefit such agreement and orders will be inoperative while not thus used.

THE RECORD.—All orders and notices must be in writing and notices must be served like a justice of the peace original notice, and the township clerk must record at length all orders, decisions, notices and returns, and such record or a duly certified copy thereof shall be competent evidence in all courts.

APPEALS.—An appeal may be taken to the district court from any order or decision of the fence-viewers in the same manner as appeals are taken from a justice of the peace, except that the appeal bond must be approved by the township clerk. The township clerk, after recording the original papers, must file the same in the office of the clerk of the district court, and certify them to be such, and the clerk of the court shall docket the case entitling the applicant or petitioner as plaintiff, and it shall stand for trial as other cases.

A FENCE ON ANOTHER'S LAND.—May be removed by the owner upon his first paying or offering to pay the owner on whose land the fence is, for any damage done to the soil and any timber used in said improvement taken from said adjoining land. Such removal shall be made as soon as practicable, but not so as to expose the crop of the other party.

LINES.—A fence may be built on the line between adjacent owners, partly on one owner's land and partly on the other's land, and may be removed as if wholly on the land of the person erecting the fence.

A LAWFUL FENCE.—Shall consist of three rails of good substantial material, or three boards of not less than six inches wide and three-quarters of an inch thick, such rails or boards to be fastened in or to good substantial posts, not more than ten feet apart where rails are used, and not more than eight feet apart where boards are used, or wire either wholly or in part, substantially built and kept in good repair, or any other kind of fence, which in the opinion of the fence-viewers shall be equivalent thereto, the lowest or bottom rail, wire or board not more than twenty nor less than sixteen inches from the ground, the top rail, wire or board to be be-

tween forty-eight and fifty-four inches in height, and the center rail, wire or board not less than twelve nor more than eighteen inches above the bottom rail, wire or board, or it shall consist of three wires, barbed with not less than thirty-six iron barbs of two points each or twenty-six iron barbs of four points each on each rod of wire, or of four wires, two thus barbed and two smooth, the wires to be firmly fastened to posts not more than two rods apart, with not less than two stays between posts, or with posts not more than one rod apart, without such stays, the top wire to be not more than fifty-four nor less than forty-eight inches in height.

HOG AND SHEEP TIGHT FENCES.—All partition fences may be made tight by the party desiring it, and at his election the added material may be removed. In case adjoining owners or occupants of land shall use the same for pasturing swine or sheep, each shall keep his share of the partition fence in such condition as shall restrain such sheep or swine.

CONTROVERSIES.—Upon the application of either owner, after notice given as prescribed in this chapter, the fence-viewers shall determine all controversies arising under the sections relating to lawful fences and partition fences made hog and sheep tight.

HOMESTEADS.

The homestead of every family, whether owned by the husband or wife, is exempt from judicial sale, unless there is a special provision of the statute to the contrary. A homestead in this state comprises a house used as a home by the owner, and if he has two or more houses thus used, he may select which he will retain, to include one or more contiguous lots or tracts of land with the buildings and other appurtenances thereon habitually and in good faith used as a part of such homestead. If within a city or town it must not exceed one-half acre in extent, otherwise it must not contain in the aggregate more than forty acres, but in either case, if the value is less than five hundred dollars, it may be increased until it reaches that amount. It must not comprise more than one

dwelling house or any other buildings except those that are proper appurtenances thereto. The owner, husband or wife, may select the homestead and cause it to be platted, but a failure to do so would not render the same liable. When it is so selected it shall be marked off by prominent and visible monuments, and the description thereof with the plat shall be filed and recorded by the county recorder in the homestead book.

Any creditor of the owner may apply to the district court and upon proper proof may have the homestead fixed and established, and the judgment therein shall be filed and recorded the same as though the selecting was done by the owner. The owner is privileged to change the limits of his homestead by metes and bounds as well as the record of the plat and description.

No conveyance or encumbrance of or contract to convey or encumber the homestead, if the owner is married, is valid unless the husband and wife join in the execution of the same joint instrument.

The homestead is liable for debts contracted prior to the acquisition, but in such case it may not be sold unless all other property of the debtor is first exhausted. It may be sold for debts created by written contract executed by the persons having the power to convey. It is subject to mechanics' lien for work or labor done or furnished exclusively for its improvement. Upon the death of either husband or wife the survivor may continue to occupy the old homestead unless it is otherwise ordered by the Court.

HOMESTEADS UNDER UNITED STATES LAND LAWS.

1.. Any citizen of the United States, the head of a family of the age of twenty-one years and over, or a person who has filed his declaration of intention to become such citizen, may secure a homestead upon the unappropriated public lands belonging to the government which are subject to pre-emption. 160 acres if such lands are subject to pre-emption at \$1.25 per acre, and

80 acres of land which is subject to pre-emption at \$2.50 per acre; such lands to be of legal subdivision of the public lands and can be located only after they are surveyed.

2. The person desiring to secure such homestead must make an affidavit before the register of the land office in which the land, upon which he desires to make his entry is located, that he is the head of a family, and is twenty-one years or more of age, or has performed service in the army or navy of the United States; that his application is made for his own exclusive use and benefit, and that his entry is for the purpose of actual settlement and cultivation and not either directly or indirectly for the use and benefit of any other person, persons or corporation. Upon filing such affidavit with the register on payment of \$5.00 for 80 acres and \$10.00 for 160 acres he shall be allowed to enter the amount of land specified.

3. No certificate or patent can be issued until the expiration of five years from the date of such entry, and within two years after the expiration of said five years the party making the application must prove by two disinterested witnesses before the register of his land office that he has actually occupied and cultivated and improved said land as a homestead for the space of five years prior to the making of such application. Upon making such proof to the satisfaction of the register he shall be entitled to his certificate and patent.

4. The homestead right may be changed into a pre-emption and the land proposed to be homesteaded paid for at the regular government rate if the homesteader so desires.

5. In case of the death of any person who would be entitled to a homestead, as hereinbefore stated, before he is able to prove up the same, his wife and children, or in case he leaves no wife, or she remarries, then his children may prove up on the land and secure the title thereto.

6. Soldiers and officers who served in the army of the United States during the Rebellion for 90 days, and

who were honorably discharged, are entitled to have the time of such service deducted from the time fixed by the statute upon which they must live upon the land.

7. Homestead lands are not liable for debts contracted prior to the issuing of the patent therefor.

8. Only one quarter section can be entered as a homestead.

9. Persons who have entered less than 160 acres are entitled to enter enough more to make up the full limit.

10. A widow, if unmarried, or minor children by their guardian, may enter homesteads.

11. Persons may be absent from their homestead claims not exceeding one year, if such absence is occasioned by the failure or destruction of crops.

12. The commissioner of the general land office may, for climatic reasons, in his discretion, allow the settler twelve months from the date of filing his application to commence his residence on his homestead.

13. At the end of the third year of residence thereon, if the homesteader shall have under cultivation for two years one acre of timber, the trees whereof are not more than twelve feet apart each way, and in good thrifty condition, for each and every sixteen acres of such homestead, may, upon due proof of such facts by two credible witnesses, receive a patent for such homestead.

14. Six months' absence from the homestead claim unexplained, forfeits the claim.

15. Persons becoming insane before securing patents to their homesteads, can have the necessary proofs made by their legally appointed guardians or conservators.

EXEMPTIONS.

There shall be exempt to an unmarried person not the head of a family, and to non-residents, their own ordinary wearing apparel and trunk necessary to contain the same.

If the debtor is a resident of this state and is the head of a family, he may hold exempt from execution the following property: All wearing apparel of himself and family kept for actual use and suitable to their condition, and the trunks or other receptacles necessary to contain the same; one musket or rifle or shotgun; all private libraries, family Bibles, portraits, pictures, musical instruments and paintings not kept for sale; a seat or pew occupied by the debtor or his family in any house of public worship, an interest in a public or private burying ground, not exceeding one acre for any defendant; two cows and two calves; fifty sheep and the wool therefrom and materials manufactured from such wool; six stands of bees; five hogs and all pigs under six months; the necessary food for all animals exempt from execution for six months; one bedstead and necessary bedding for every two in the family; all cloth manufactured by the defendant not exceeding one hundred yards; household and kitchen furniture not exceeding two hundred dollars in value, all spinning wheels, looms, one sewing machine and other instruments of domestic labor kept for use; necessary provisions and fuel for family for six months; proper tools, instruments or books of debtor, if a farmer, mechanic, surveyor, clergyman, lawyer, physician, professor or teacher; if the debtor is a physician, public officer, farmer or teamster, or other laborer, a team consisting or not more than two horses or mules, or two yoke of cattle and the wagon or other vehicle, with the proper harness or tackle, by the use of which he habitually earns his living, otherwise one horse; if a printer, a printing press and types, furniture and material necessary for the use of such printing press, and a newspaper office connected therewith, not exceeding in all the value of twelve hundred dollars:

poultry to the value of fifty dollars, and the same to a woman whether the head of a family or not, and if the debtor is a seamstress, one sewing machine. If the debtor, being the head of a family, has started to leave this state, he will have exempt only the ordinary wearing apparel of himself and family, and such other property in addition, to be selected by himself, in all not exceeding seventy-five dollars. No exemption shall extend to property against an execution issued for the purchase money of the same. The earnings of a debtor for his personal service at any time within ninety days next preceding the levy are exempt. For real estate exemptions, see "Homestead".

EXECUTORS AND ADMINISTRATORS.

The district court has original and exclusive jurisdiction in the settlement of the estate of deceased persons. The court is always open for the transaction of probate business, but the hearing of any matter requiring notice may be done only in term time, or at such time and place as the judge may appoint.

THE LAW GOVERNING THE SALE AND TRANSFER OF PROPERTY.

1. A sale is the exchange of property for money, which is either paid at once or to be paid in the future.
2. There are many complicated things pertaining to the sale of property which every thoughtful man should understand.
3. The thing sold must either exist at the time of the sale or there must be a well-founded reason that it will be in existence and in possession of the seller.

DRAINAGE.

Tile Factory, Nevada, Iowa.

The board of supervisors of any county has the power and authority at any regular or special session to establish a drainage district or districts, and to locate and establish levees, and cause to be constructed any levee, ditch, drain or water course, or to straighten, widen, deepen or change any natural water course, in such county, whenever the same will be of public utility or conducive to the public health, convenience or welfare; and the drainage of surface waters from agricultural lands shall be considered a public benefit and conducive to the public health, convenience, utility and welfare.

DRAINAGE.—Where a culvert for the drainage of water did not increase the quantity of water on plaintiff's land, or throw it thereon in a different manner than the same would naturally have flowed on it the Supreme Court of Iowa held there was no case for damages.

This was the case where one neighbor tiled his land and emptied the water into the public road which followed the road to a culvert and then flowed onto the adjoining land.

It should be well understood by every farmer that there is no law that gives a man the right to tile land in a direction other than is the natural water course. It is not lawful to increase the amount of water that naturally flows onto your neighbor's land by tiling land into a ditch that would naturally run in a different direction.

You have a right to tile a pond and empty the tile at your line fence notwithstanding your neighbor might claim, had you not tiled, a part of this water would have evaporated and a part settled into the ground. The question for you to answer is are you positive you have carried no water upon your neighbor's land but that which fell upon land naturally having its outlet across your neighbor's farm. You have no legal right to go a single inch across the line in order to connect your tile with that of your neighbors, but you have a right to empty your tile at the line fence and let it take its course. Your neighbor has no right to obstruct the water in any way. That is to your or anyone's detriment.

No individual has the right to embank against the natural flow from an inland stream when the effect may be to cast an increase volume of water upon the land of other proprietors to their injury.

He may do so but must pay the actual damages when damages are proven. The above does not apply to cities and towns as they have certain required grades which necessitates certain fills, cuts, etc.

It is impossible to set out in brief form the numerous provisions of the statutes of this state governing the ditching and draining of land.

HOW TO FIND THE CARRYING CAPACITY OF TILE.

Fall per 100 feet.

Gallons Per Minute.

SIZE OF TILE.	FALL PER 100 FEET.						
	1 in.	3 in.	6 in.	9 in.	12 in.	24 in.	36 in.
3-inch.....	13	23	32	40	46	64	79
4-inch.....	27	47	66	81	93	131	163
6-inch.....	75	129	183	224	258	364	450
8-inch.....	153	265	375	460	529	750	923
9-inch.....	205	355	593	617	711	1006	1240
10-inch.....	267	463	655	803	926	1310	1613
12-inch.....	422	730	1033	1273	1468	2076	2551

A large tile will carry more water according to its size than a small one. This is because there is less surface on the inside of the large tile compared with the size of stream, and therefore less friction. More water will flow through a straight tile than a crooked one having the same diameter.

EXAMPLES A nine-inch tile at 6 inches fall to the 100 feet will flow 593 gals. per minute.

AREA AND WEIGHT OF TILE.

The following table shows the area and the weight of the different sized tile:

SIZE.	WEIGHT.	AREA.	SIZE	WEIGHT.	AREA.
3 -inch.....	5-lbs. each.	8½ sq. in.	7-inch.....	15-lbs. each.	41 -sq. in.
3½-inch.....	6 lbs. each.	9½-sq. in.	8-inch.....	18 lbs. each.	53½-sq. in.
4 -inch.....	7-lbs. each.	14-sq. in.	9-inch.....	21-lbs. each.	67 -sq. in.
5 -inch.....	10 lbs. each.	21½-sq. in.	10-inch.....	24-lbs. each.	80½-sq. in.
6 -inch.....	12-lbs. each.	30½-sq. in.	12-inch.....	28-lbs. each.	113 -sq. in.

THE AMOUNT OF PROPERTY THAT CANNOT BE TAKEN FOR DEBTS IN THE DIFFERENT STATES, AS WE FIND IT, JUNE, 1906.

1. Exemption Laws are for the purpose of protecting those who are unable to pay their debts without causing distress to themselves and their families.
2. Property covered by mortgage cannot be held.
3. A safe estimate of the property of the person desiring credit should be made before credit is given.

EXEMPTION LAWS.

PERSONAL PROPERTY			VALUE OF HOME- STEAD	EXCEPTIONS AND EXPLANATIONS
STATES	Married	Single	Married	
Alabama.....	\$1,000	\$1,000	\$2,000	
Arizona.....	1,000	none.	4,000	Earnings for 30 days prior to levy.
Arkansas.....	500	200	2,500	
California (a).....		200	5,000	Must be designated as such in writing and recorded.
Colorado (a).....			2,000	Word "Homestead" must be written on record of deed.
Connecticut (a).....		200	1,000	
Delaware (b).....			none.	
District of Columbia.....	300		none.	
Florida.....	1,000			60 acres of land in country, $\frac{1}{2}$ acre in city.
Georgia.....	\$1,000			
Idaho.....	from 100 to 500		5,000	Single, \$1,000. (f) Homestead must be designated by a writing executed and recorded like a deed.
Illinois.....	400	100	1,000	
Indian Territory.....	500	200	2,500	
Indiana.....	600			No homestead except as before stated.
Iowa (c).....				40 acres in country, $\frac{1}{2}$ acre in city. No limit as to value.
Kansas.....	800			160 acres in country, 1 acre in city.
Kentucky (c).....			1,000	
Louisiana.....	2,000			Homestead and personal property. Written declaration must be re-recorded.
Maine (c).....			500	
Maryland.....	100		none.	
Massachusetts.....	450		800	
Michigan.....	500			40 acres in country, \$1,500 in city.
Minnesota.....	500			80 acres in country, $\frac{1}{2}$ to 1 acre in city.
Mississippi.....	250		2,000	Written declaration must be re-recorded.
Missouri (c).....				From \$1,500 to \$3,000 according to size of city.
Montana (c).....			2,500	
Nebraska.....	500		2,000	
Nevada (d).....	from		\$5,000	Written declaration must be re-recorded.

EXEMPTION LAWS—Continued.

PERSONAL PROPERTY			VALUE OF HOMESTEAD	EXCEPTIONS AND EXPLANATIONS
STATES	Married	Single		
New Hampshire (c).....			500	Also \$500 homestead for single man (f).
New Jersey.....	200		1,000	
New Mexico (c).....			1,000	
New York.....	250		1,000	
North Carolina.....	500		1,000	
North Dakota.....	1,500			160 acres in country, or 2 acres in city not exceeding \$5,000 in value.
Ohio (c).....			1,000	
Oklahoma (c).....				160 acres in country, 1 acre in city.
Oregon (c).....			1,500	
Pennsylvania.....	7300			
Rhode Island.....	200		none.	
South Carolina.....	500		1,000	
South Dakota.....	750	300		160 acres in country, 1 acre in town, limit \$5,000.
Tennessee (c).....			1,000	
Texas.....	500			200 acres in country, \$5,000 in city \$1,000 for debtor, \$500 for wife, \$250 all members of family.
Utah (c).....				
Vermont.....	250		500	
Virginia (c).....			2,000	
Washington (e).....			2,000	Varies from \$500 to \$2,900 according to profession or trade.
West Virginia.....	200		1,000	
Wisconsin (c).....				40 acres in country, $\frac{1}{4}$ acre in city.
Wyoming.....	800		1,500	

(a) Articles of specific property too numerous to mention, no value fixed. (b) Exemptions vary in different counties. (*) In either personalty, realty or both. (‡) In personalty or realty. (c) Articles of specific property too numerous to mention, varying in amount in different trades and professions. (d) Articles of specific property, ranging in value from \$100 to \$500 (‡) Read or personal. (e) Varying from \$500 to \$2,000 according to trade or profession. (f) A single man can claim homestead only in Idaho and New Hampshire.

HOW TO OBTAIN WEALTH.

The way to make money is to save it. Always remember and practice the maxim, "A dollar saved, a dollar earned."

A small sum of money saved daily for fifty years will grow at the following rate:

DAILY SAVINGS.

One Cent	\$ 950
Ten Cents	9,504
Twenty Cents	19,006
Thirty Cents	28,515
Forty Cents	38,015
Fifty Cents	47,520
Sixty Cents	57,024
Seventy Cents	66,528
Eighty Cents	76,032
Ninety Cents	85,537
One Dollar	475,208

THE TIME IN WHICH DEBTS ARE OUTLAWED IN THE DIFFERENT STATES AND BRITISH PROVINCES.

Corrected up to date, June, 1906.

1. The time to sue varies in different States and in different classes of cases from one to twenty years.

2. In case the debtor makes a written acknowledgment in a note, or papers of that character, the claim is renewed.

STATES AND TERRITORIES					STATES AND TERRITORIES				
	Notes	Sealed Instruments	Judgments	Open Accounts		Notes	Sealed Instruments	Judgments	Open Accounts
	yrs	yrs	yrs	yrs		yrs	yrs	yrs	yrs
Alabama.....	6	10	20	3	Nevada.....	6	6	6	4
Arkansas.....	5	5	10	3	New Hampshire.....	6	20	20	6
Arizona.....	5	4	5	3	New Jersey.....	6	16	20	6
California.....	4	4	5	3	New Mexico.....	6	6	7	4
Colorado.....	6	6	6	6	New York.....	6	20	20	6
Connecticut.....	6	17	17	6	North Carolina.....	3	10	10	3
Delaware.....	6	20	20	3	North Dakota.....	6	6	10	6
Dist. of Columbia.....	3	12	12	3	Ohio.....	15	15	15	6
Florida.....	3	20	20	4	Oregon.....	6	10	10	6
Georgia.....	6	20	10	4	Pennsylvania.....	6	20	20	6
Idaho.....	5	5	6	2	Rhode Island.....	6	20	20	6
Illinois.....	10	10	20	5	South Carolina.....	6	20	20	6
Indiana.....	10	20	20	6	South Dakota.....	6	10	10	6
Iowa.....	10	10	20	5	Tennessee.....	6	10	10	6
Kansas.....	5	5	5	3	Texas.....	4	4	10	2
Kentucky.....	15	15	15	5	Utah.....	4	4	5	2
Louisiana.....	5	10	10	3	Vermont.....	6	8	8	6
Maine.....	6	20	20	6	Virginia.....	5	10	20	2
Maryland.....	3	12	12	3	Washington.....	6	6	6	5
Mass chusetts.....	6	20	20	6	W. Virginia.....	10	10	10	5
Michigan.....	6	10	10	6	Wisconsin.....	6	20	20	6
Minnesota.....	6	6	10	6	Wyoming.....	5	5	----	8
Mississippi.....	6	6	7	3					
Missouri.....	10	10	10	5	Canada.....	6	20	20	6
Montana.....	8	8	10	3	New Brunswick.....	6	20	20	6
Nebraska.....	5	10	5	4	Nova Scotia.....	6	2	----	6

A note is considered a contract and in Iowa is good for ten years. Judgment note, twenty years. When any sum is paid on note it renews the note which extends it ten years.

An open account in Iowa runs five years from time of last payment on same.

SEED IMPROVEMENT.

That the subject of seed improvement has been too much neglected in the past, by progressive farmers, is a fact which all will admit. However, with the increasing intelligence of the farming community, very many thinking, working farmers have been forced to acknowledge the need of more accurate information on the subject of seed-breeding by means of crossing or hybridization. It is a subject not less in importance than the production of thoroughbred stock by such crosses and intermixture of blood as will tend to perfect development in the line of the objects sought to be attained. It is upon the recognition of this fact that I have, in the following paragraphs, endeavored to compile, from the most authentic sources, a series of facts bearing upon the subject of seed-breeding, with the view of inciting a still deeper and more abiding interest in the most practical methods of seed improvement.

SEED CORN.

From my experience and somewhat extended observations in relation to the condition of seed corn after being saved, I am satisfied that carefully hanging up the corn in a crib or outhouse of any sort, even though it may not be exposed to dampness caused by storms, yet this is not sufficient to insure the best seed even when the corn is carefully selected, being the best specimens of the crop raised.

The trouble is not because the corn is not sufficiently matured to grow, for it is a well-known fact that corn may be saved while still in the milk and if cured well and kept dry will make good seed, and on the other hand, corn that is well matured, if not kept under favorable circumstances, often turns out badly. It is my belief that it is the moisture in the corn, acted upon by the intense cold that does the mischief.

Just what degree of cold such seed will stand without injury is impossible to tell correctly, and always varies

THE COOK TROPHY.

This trophy, costing \$1,600.00 was presented to the Iowa State College by Mr. A. E. Cook, of Odebolt, Iowa, and is awarded annually at the International Live Stock Exposition to the winning corn-judging team from any Agricultural College.

Under the initiative of Professor Holden and his helpers at the Iowa Agricultural college at Ames, the second Wednesday in October is hereafter to be set apart as seed corn harvest day, the object in view being to get the farmers of the state to take this day off and devote it to the selection of the earliest maturing, soundest and most perfect ears in their field. Gathered at this time, seed corn has time to dry out thoroughly before the heavy freezes come. In view of the intimate connection between timely selection of seed and vigor and germination power of the same and the effect of this upon the following season's stand and yield of corn the importance of setting aside this seed corn harvest day can hardly be overestimated.

The A B C of Corn Culture.

OR, MAKING TWO NUBINS TO GROW WHERE ONLY ONE GREW BEFORE.

BY PROF. P. G. HOLDEN—Iowa State College.

“And he gave it for his opinion, that whoever could make two ears of corn or two blades of grass to grow upon a spot of ground where only one grew before, would deserve better of mankind and do more essential service to his country than the whole race of politicians put together.—DEAN SWIFT.

THE WHITING TROPHY

PLANTING AND
CULTIVATING

TESTING AND
GRADING

HARVESTING
AND STORING

INSECTS AND
REMEDIES

Awarded annually by Hon. W. C. Whiting for the best ten ears of corn, any variety, exhibited at the Short Course, held at Ames, Iowa, the first two weeks in January, each year. Cost \$450.00.

with the condition of the seed, but one thing I do know and that is that a great deal of what is good seed, when put up, comes out in the spring as a very poor article, and in many cases but little more than one-third of it will ever sprout. In such cases the vitality has been destroyed by the cold. It may look well, and the farmer generally supposes it to be well dried out, but in this point he is mistaken.

More or less trouble with seed corn is an old complaint, but such a general failure in the vitality of this seed during the last few years has been a great loss to farmers in general. The failure of seed corn is, indeed, a matter of considerable consequence, for with most farmers it is such a large crop that if it fails to turn out well it will shatter the profits for one year, at least, on the farm.

The only safe way to insure the best seed corn in the spring is by using artificial heat. Place the corn in a comparatively tight room and dry it thoroughly by the use of a stove. This does not require much labor or expense and what little is necessary will be amply paid for by the better results realized the following season.

It should be remembered that corn that is saved early is not dry, and hanging it in the shade really retards its drying out, and if it is caught in this condition in a hard freeze while it is yet full of moisture, it will most certainly destroy the vitality of the seed and render it useless for planting purposes.

The selection of seed from the proper specimens of plants is also quite important and not always attended to as it should be. Only the very best seed should be saved, and this can only be obtained from soil that is naturally good, but not excessively rich and highly fertilized, for such rich soil always develops foliage rather than fruit, and the seed is never as perfect or hardy as that obtained from ordinary fair-sized plants that are well cultivated and in good average condition.

There seems to be a fascination about large-sized crops which interests all farmers; and this is, of course, quite a natural feeling, for the larger the yield the greater will be the profit realized, but it should be remembered right

here that excellence is not always governed by magnitude. This fact is quite noticeable with the small fruits and vegetables used on the table. Those that have received good, honest cultivation and are of a good, fair size are about as near perfect as can be obtained, but in cases where they have been cultivated on excessively rich land the vegetables grow very large and oftentimes are really not fit for table use. It would be much better to choose smoothness and symmetry rather than size.

There are thousands of careless farmers throughout the country who should by all means, consider their own interests and give this matter of selecting the proper seed corn more attention, and should be more careful to preserve the vitality of such seed, for if this is done judiciously it will save them a great amount of useless worry, as well as both trouble and expense.

The importance of selecting fifty or sixty of the choicest ears and planting them on one side of our earliest planted field cannot be too strongly emphasized. Out of this seed patch the seed for next year's crop should be selected not later than October 20th, and hung up at once where it can dry out thoroughly before any severe freeze.

Let us have a *time* and a *definite plan* for harvesting and storing our seed corn. One day devoted to the seed corn at the proper time may be worth more to us than an entire month of hard work next summer put onto a poor stand of corn

THE GERMINATION TEST.

There is no one thing which will do so much to increase the yield of corn on every farm as the making of a germination test of six or eight kernels from each ear of corn to be used for seed, and *discarding* those ears which show *weak* or *sickly* root or stem sprouts. The most common mistake is to conclude that the seed is all right and does not need testing. Of two ears of corn planted in separate rows side by side, one may yield at the rate of more than eighty bushels and the other less than thirty bushels per acre.

This hill of three vigorous stalks is from three different ears, each of which showed a strong vitality when tested in the germination box.

Four Stalks in One Hill.

Two are from ears which showed strong germination test; the two at the right are from ears which showed weakness in the germination box.

Fig. 25—By testing six kernels from each ear we are able to detect the weak and worthless ears. No. 1 shows weak germination. In No. 3 three of the kernels sent out weak stem sprouts and none of them sent out main roots. No. 2 is a good example of vigorous germination. Ears No. 1 and 3 should be thrown out. An ordinary examination of ear No. 1 would not reveal the weakness shown so plainly in the germination box. We cannot afford to plant ears like No. 1; it means eight hundred or one thousand weak stalks at best.

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Fig. 1—Root development of a single corn plant at time of "laying by." The roots do not run straight down from the stalk, as many suppose. Deep cultivation the first time over the field will not injure the corn; it will clean the ground and leave a good mulch. The experiments all show that deep cultivation after this always reduces the yield.

Of two stalks in the same hill, both having exactly the same opportunities so far as soil, cultivation, etc., are concerned, one may produce a good ear of corn weighing a pound or more, while the other stalk will produce an almost worthless ear or none at all. The ear from which one of these kernels came was strong and vigorous and the other weak. The same difference which shows at harvest time between these two stalks also showed when the kernels first began to sprout and grow in the spring. So it is that by testing a few kernels from each ear in the spring we may detect the weak ones and discard them.

One poor ear of corn discarded means not only the saving of waste land, but the saving of labor on nearly a thousand weak or worthless stalks. A few days spent during the month of March, when our time is otherwise of little value, in testing each ear of seed corn may be worth to us at harvest time more than a whole year's hard work. Let us remember, too, that we cannot injure our seed by testing it; we are running no risks; it costs but little time, and one person can put to test in one day enough to plant thirty acres.

The method here described may not be the best one, yet it has proved most satisfactory to us in testing the seed each year for more than three thousand acres, and it is followed by thousands of farmers in Iowa.

The farmer who adopts better methods this year is not only a better farmer himself in the future, but his methods, directly or indirectly, soon become the methods of the community.

PREPARING SEED CORN FOR THE PLANTER.

After the germination test, the next step is preparing the corn for the planter. First, by removing the mixed kernels. In yellow varieties it can be done better before shelling and in white varieties after shelling, as the mixed kernels often do not show in white corn until the corn has been shelled; second, by butting and tipping the ears of corn to insure the planter dropping the correct number of kernels in each hill.

To be certain of getting the drop adjusted properly,

twenty or thirty ears should be shelled separately and put into grades of large, medium and small kernels. The planter can then be tried with each grade and the proper plates selected for each grade. If the proper plates are not at hand, then those nearest may be calibrated to do the work as desired. This is very essential and it should be done before the rush of spring work begins. A small outlay for additional plates or a new planter may mean the difference between a good crop and a poor one. The planter must do the work properly. After the planter is tested and it is known what grades are wanted, the seed corn should be carefully shelled, put into sacks and properly labeled.

The planter can be adjusted to drop the different grades in a uniform manner if the grades are kept separate and the proper planter plate used for each grade, but if these different sized kernels are mixed and dropped miscellaneously it will be impossible to secure a uniform number of stalks per hill.

We cannot afford to neglect this important work. If every farmer in the state would test every ear of his seed corn this winter in the way described above the yield would be wonderfully increased. No other time will be so profitable to the farmer as that time spent in testing the vitality of his seed and in grading it to insure the planter dropping the proper number of kernels in each hill. It is possible for every one to do this work. It will cost nothing but the time, of which there is plenty at this season when the work should be done. Every farmer should realize the importance of testing every ear of his seed corn before spring work begins. No possible loss can come from it and it will insure a good stand of corn which is absolutely essential, if the best results are to be secured from the year's hard work. One day spent in March on the seed corn, may be worth more than a month of hard work in the field, later. Without good seed, the after labor is of little avail. Nothing is more depressing or discouraging than a poor stand of corn. If the seed is carefully tested and only good seed planted there are no risks to run except those made necessary to every one

GOOD SHAPES OF EARS.

Fig. 7 illustrates good form of ears. These ears are well-proportioned. Their butts and tips are good. The rows are straight and the kernels uniform. The ears are full in the middle parts, showing strength, constitution, and good breeding. It is very essential that an ear show fullness in the middle portion, as this is the place where the greatest quantity as well as the best quality of corn will be found. Ears 1 and 2 would plant well together. Ears 3 and 1 are slightly better in shape than 2 and 4.

The above cut illustrates one of the best and safest methods of storing seed corn. Ten or twelve ears are tied in a string and hung on some wires supported by other wires from the rafters.

The 21 strings of seed corn shown in the cut require a space less than six feet long by twenty inches wide, and yet this amount of seed will plant more than fifteen acres.

The advantages of this method of storing are first: that it gives better protection from mice than where it is spread on the floor or corded in piles or put in racks. Second, it gives better circulation of air which allows the corn to dry out quickly and thoroughly, thus protecting it from moulding and sprouting and from being frozen while it is sappy. The greatest enemy to good seed corn is hard freezing while it still contains moisture, consequently there is more danger from late harvesting than from too early harvesting. However, it is not a good plan to harvest the seed in September while the corn is immature, as it is more difficult to preserve, and will be chaffy and give weaker plants than corn which has been allowed to fully mature on the stalk

from the conditions of the weather, etc., which cannot be controlled. It is during the bad seasons, when conditions are unfavorable that we most need the kernels with large deep germs of a bright cheerful color well-matured, and likely to give the most vigorous germination.

It is essential to seek improved varieties of corn, but it is also important that better treatment be given to the seed that is to be planted.

DO NOT IMPORT SEED CORN.

If the test shows the seed to be weak and unreliable and it is necessary to secure other seed it should be obtained from some reliable neighbor who has a surplus.

No farmer can afford to depend upon imported seed for the main part of his crop. If he is unable to secure a variety from his neighbors that has been grown and that has matured well in his locality and it becomes necessary to import seed, it should be secured from the shortest distance possible, east or west, as such seed is preferable to that grown in the north or south, but it is safer to import it from the north than from the south. The southern varieties will produce large stalks and heavy foliage, and the large deep kerneled ears will be late in maturing. Northern grown corn will be smaller in ear and finer in stalk, but will mature earlier. Seed corn imported from a distance and especially from a southern latitude, seldom gives satisfactory results the first two or three years, even though the seed be of the best, which oftentimes is not the case.

It is well known that most of the seed corn put on the market by seedsmen is bought of farmers in crib lots, shelled, screened and sacked ready for sale, little or no attention being paid to the selection. In fact it is generally handled with a scoop shovel and is known as the "scoop shovel method of selection".

The chances are that the farmer has in his own crib better corn than that which he purchases from seedsmen at four or five times the market prices. And then he runs the risk of it not maturing in his locality.

If it were simply a matter of losing the price of the bushel of imported seed corn, it would not be so serious, but when we consider that a bushel of seed corn ought to produce four hundred bushels of corn, worth from one hundred and thirty to one hundred and sixty dollars, the serious nature of the question is very apparent.

SELECTING AND STORING SEED CORN.

One of the best plans is to begin this spring by selecting fifty or one hundred of the very best ears in your seed corn, while you are making the test of germination. These ears should then be butted and tipped and each ear shelled by itself and carefully studied. The kernels should have a bright, cheerful appearance, be full and plump at the tips and have a large clear germ, otherwise they should be discarded. It is very important that this choice seed should be planted at the time of the first planting, putting it on the south or west side of the field, unless there is danger that it would become mixed from some neighbor's corn nearby. In this case, it may be put on the other side of the field. The important thing is to get it in early and, if possible, on fall plowed ground. This will allow the corn to become thoroughly matured early next fall. The great importance of this cannot be overestimated. It is the late maturing corn that is caught by the freezes, as there is not sufficient time for it to dry out.

All the seed corn for the next crop should be selected from this patch which was planted from the very best ears. It is a very common practice to select the occasional good ears found throughout the entire husking season. There are three important reasons why this should not be done. In the first place, we are more likely to neglect the work until too late, when we find ourselves without good seed for the next year. Again, we often begin harvesting from the poorest portions of our fields first for early feeding, as this corn is more likely to be soft and will not crib well. It should be remembered that the occasional good ears which are harvested throughout the

entire husking season have necessarily been fertilized to a greater or less extent by pollen from the scrub stalks and those which are perhaps barren. In other words, we have simply selected a good female, but know nothing of the character of the male stalks from which the pollen came that fertilized the kernels. On the other hand, if our seed is all selected from the seed patch planted only from the very best ears, we are much more certain of good parents on both sides. It is a good practice and one followed by many corn growers to go through this seed patch of three or four acres planted from this fifty or sixty best ears of corn, after it has been "laid by" and before the tassels appear, and to cut out all the weak and sickly stalks and those that are too tall and late or too short and early and in this way prevent them from producing pollen to fertilize the kernels of other ears.

One of the most serious results from depending on the occasional good ear found throughout the entire husking season is that many of the fields are late and the corn immature and the husks will prevent the corn from drying out properly and, as a consequence, it is frozen before it is husked or, at least, before it has had time to dry out after husking. Again, we often begin harvesting out poorest fields first and delay saving seed until we come to our "best fields".

If every ear of corn that is to be used for seed in Iowa next year could be harvested this fall not later than October 10th, and hung up where it will dry out thoroughly before the bitter cold freezes of November it would add millions of dollars to the wealth of Iowa.

Let us go into the best and earliest planted fields, and select well matured ears from the most vigorous stalks, strip off their husks and hang in the attic at once where the circulation of air is good and protection is had from the cold freezing weather of November and December. On the 228,000 Iowa farms an average of about 40 acres is devoted to the growing of corn, and while six bushels of good seed is sufficient to plant this, let us abundantly provide ourselves and save two or three times this amount, as some pests may call upon us to replant, or our

neighbor may be needing some seed. Remember, it takes only about a dozen ears to plant an acre. Each ear should have special care.

POOR STAND OF CORN.

A "poor stand" of corn is responsible more than anything else, for the low average yield in the central west. The ground may be rich, the preparation good, and the corn receive the best of cultivation, but if the stand is poor the yield will be correspondingly poor.

Careful counts of the number of stalks per hill were made last year in more than a thousand different corn fields and it would be safe to say that there were not to exceed sixty-six per cent. of a perfect stand on an average and in some cases it fell as low as forty per cent. This means that the state devoted nearly 9,000,000 acres to corn, and produced only a 6,000,000 acre crop, or, to put it in another way, with a perfect stand the present average yield of thirty-two bushels would be increased to fifty bushels per acre or an increase to the rate of 153,000,000 bushels. This does not take into consideration the increased yield made possible through the use of improved varieties, better bred seed, elimination of barren stalks by means of breeding, better methods of cultivation, etc.

The real seriousness of the situation will be more apparent from the following counts illustrating the stand in the poorer, medium, and better fields of Iowa. The following figures illustrate the number of stalks per hill in the poorer fields: 2 2 2 0 3 2 0 1 3 0 1 1 1 3 1 1 0 2 3 0 1 2 1 0 0 2 1 3. Each of the first three hills had two stalks, the fourth hill was missing and the next had three stalks, etc.

That the results might be as accurate as possible, counts similar to the above were made in three places in each field. The hills were taken just as they came in the row and generally crosswise of the way the corn was planted. The field above represents only fifty-two per cent. of a stand of corn. Twenty-five per cent. of the hills were

missing. Thirty-five per cent. had one stalk, twenty-five per cent. had two stalks and twenty per cent. had three stalks per hill. If the poor stand was largely due to seed of low vitality, which is generally true in case of very poor stands, then the same influence which killed a portion of the seed must also have greatly weakened that which did grow, and, as a consequence, the yield is even much less than what is represented by the stand.

The above represents what is found in hundreds of corn fields everywhere in Iowa. Many fields were found in which the stand was as low as forty per cent. The following will illustrate very closely the average stand in the state: 2 3 1 2 1 0 1 1 3 3 1 3 1 2 2 2 3 0 3 1 2 0 2 1 2. On the average soil of the state this would represent about sixty-five per cent. of a stand of corn. Twelve per cent. of the hills were missing, twenty-eight per cent. of the hills had one stalk, thirty-two per cent. of the hills had two stalks, and twenty-eight per cent. of the hills had three stalks. The following represents the stand in some of the very best fields in the state: 3 4 3 2 1 3 3 3 3 2 3 3 3 3 2 3 3 3 3 3 3 3 3 3. In this field, there were no hills missing, four hills had one stalk, twelve had two stalks, seventy-six had three stalks, and eight hills had four stalks.

This represents not less than ninety-five to ninety-six per cent. of a perfect stand.

If we go into our fields at husking time and make a study of the stand of corn, we will be convinced of the serious losses to ourselves and to the state each year from a poor stand of corn.

VARIETY TEST OF CORN.

In 1905, the Agricultural Department of Iowa Agricultural College, secured seed from more than ninety different sources. The corn was all collected from farmers living within a radius of ten miles from Ames. In order to secure samples of corn actually planted, the farmers were visited and the corn taken either directly from the planter boxes in the field or from the sacks from which the seed corn was being planted.

The samples were planted by hand, three kernels per hill, and the experiment was repeated three times and treated alike in every respect, throughout the season.

The following table gives the yield per acre of the six highest yielding samples and also of the six lowest yielding samples:

Six Highest Yielding Samples.	Bushel per Acre.
Sample No. 59.....	80.5
Sample No. 58.....	80.0
Sample No. 66.....	78.5
Sample No. 71.....	77.0
Sample No. 138.....	75.0
Sample No. 68.....	75.0
Average.....	77.5

Six Lowest Yielding Samples.	Bushel per Acre.
Sample No. 44.....	31.5
Sample No. 132.....	33.5
Sample No. 36.....	34.5
Sample No. 32.....	36.6
Sample No. 29.....	37.5
Sample No. 33.....	40.0
Average.....	35.6

Note particularly the wide range in yield from 80.5 bushels per acre to 31.5 bushels or a difference of 49 bushels. The average yield of the six highest samples was 77.5 bushels, while the average of the six lowest yielding samples was 35.6 bushels, or a difference of 41.9 bushels per acre.

This great difference in yield was due largely to the difference in vitality of the seed, as in every case the low yielding samples had given a poor stand. It strongly emphasizes the great importance of knowing that the seed to be planted will give a good, strong, vigorous germination.

TESTING EACH YEAR OF CORN.

There is, perhaps, no one thing which will do so much to increase the yield of corn on every farm as the testing of each ear to be used for seed. This should be done before the rush of spring work begins or it is likely to be neglected.

POOR EARS.

No. 1 is a fairly well shaped ear, has been well fertilized and will give a good proportion of corn to cob. Its utter lack of uniformity of kernels, however, makes it a very undesirable ear for seed. Note the irregularity of the rows, the variation in the size, shape and dent of kernels. Such an ear should never be used for seed.

No. 3 shows a spiral arrangement of rows with thick blocky kernels, lacking in uniformity. The tip is weak and the whole ear, through lack of proper proportion indicates weakness and lack of breeding.

The importance of discarding ears that refuse to grow or show a weak germination is apparent when we realize that one ear will plant one-fourteenth to one sixteenth of an acre.

The most practical way for testing the germination of each ear is by using a germination box. This is a simple affair and can be made by any one in an hour's time. Any box about six inches deep and 2x3 feet in size may be used. Fill the box about half full of moist sand, dirt or sawdust, well pressed down, so that it will leave a smooth, even surface. In case sawdust is used it should be put in a gunny sack and set in a tub of warm water for half an hour or so that it will be thoroughly moistened before using. Take a white cloth about the size of the box, rule it off, checker-board fashion, one and a half inches each way. Number the checks 1, 2, 3, and so on and place it over the saw dust and tack to the box at the corners and edges. Lay out the ears to be tested, side by side on the floor; remove one kernel from near the butt, middle and tip of the ear; turn the ear over and remove three kernels from the opposite side, in like manner, making six kernels in all, thus securing a sample from the entire ear. Place the six kernels at the end of the ear from which they were taken. Use care that the kernels do not get mixed with the kernels from the ear next to it. After the kernels are removed, boards may be laid over the rows of corn to keep them in place until the germination is known. Place the kernels from ear of corn No. 1 in square No. 1 of the germination box; from ear No. 2 in square No. 2, and so on with all of the ears. Then place over this a cloth considerably larger than the box; cover with about two inches of moist sand, dirt or sawdust and keep in a warm place where it will not freeze. The sitting-room will perhaps be the most suitable place. The kernels will germinate in four to six days. Then remove the cover carefully to avoid misplacing the kernels in the squares, (a piece of thin cloth placed over the kernels before the covering is put on will prevent the kernels from sticking to the upper cover). Examine the kernels in the germinating box; for exam-

ple, the kernels in squares No. 1, 11 and 20, have failed to grow and some of the kernels in squares 2, 3, 4, 9, 12 and 15 have refused to grow or show weak germination. The corresponding ears should be rejected. The ears showing weak germination should be treated the same as worthless ears.

A FEW OF THE LEADING VARIETIES OF CORN.

BOONE COUNTY WHITE.

This corn is a standing testimony to the good work of Mr. James Riley. Mr. Riley lived in Boone County, Indiana, and has rendered a valuable service to the world by his work in the breeding of corn. Mr. Riley had a large variety of corn known as the White Mastodon. In 1876 he picked over his seed of this corn, selecting for what he believed a desirable type of corn. He planted this special seed in an isolated field, and began changing the large, coarse type of white corn by selection. After several years of careful study and selection he produced the type of white corn he desired to raise, and named it after his home county.

The kernel is a large, broad, deep kernel, approaching the broadly rounded wedge type, with a good full tip, upright attachment at cob and fitting well together in the row from tip to crown of kernel. The dent type is moderate to deep creased dent with slightly roughened projections. There should be no approach to the pinched dent, as this reduces the thickness of the kernel crown, an undesirable feature in the Boone County White. This corn is one of the largest of the white varieties, and therefore must have a longer season to mature than the Silver Mine. The shape of the ear is slowly tapering, length approaches ten inches and has an average circumference of seven and one-half inches. It matures in from one hundred and twenty-five to one hundred and thirty-five days. It is well adapted to the southern half of the corn belt—that is, south of a line drawn through Burlington, Iowa.

Mr. Riley seems to have been one of the first corn raisers who sought to increase the productiveness of his corn by cutting out the barren stalks, improving both the yield and quality of his corn. When the type he sought to fix has been modified by both the grower and the region where grown, still it remains one of the most distinct and best varieties of white corn, with well-shaped kernels, firmly set on a medium to large-sized cob. It is especially well adapted to rich, strong soils and to river bottoms. It does not stand drought as well as the Silver Mine, but is a large yielder under favorable conditions. It requires a long season to mature, but ripens well in the south half of Indiana and Illinois and in the very southern part of Nebraska, the south-western part of Iowa and through Missouri and the eastern part of Kansas.

RILEY'S FAVORITE

This variety is a yellow dent corn originated by Mr. James Riley in 1885. Mr. Riley desired a larger corn than the Pride of the North, quite generally raised in the northern portions of the dent-corn belt, yet one that would mature in his locality in Indiana. He therefore crossed two varieties, producing a hybrid corn. This he carefully planted year by year in an isolated place. Here he gave it the best of culture, cut out the diseased, weak stalks, permitting only the hardy and more vigorous stalks to bear pollen. Mr. Riley named this variety "Riley's Favorite", and sought by selection to fix a type of desirable yellow corn that would mature in but little more than one hundred days. For this reason he selected for seed a medium-sized ear with small cob from a stalk of medium height. He and others have found much trouble in fixing a definite type of this corn. There seems to be a tendency to revert to one or the other of the crossed types.

The type Mr. Riley seems to have sought was a dent corn with a slowly tapering ear nine inches long, seven inches in circumference; rows distinctly paired and

straight; number of rows fourteen to eighteen, with sixteen as an average; pinched dent, with tendency of kernels to be beaked; kernels straight, wedge shaped, with a moderately rounded tip; cob red and small; shank attachment to stalk medium to small; color of grain a clear yellow. Matures in one hundred to one hundred and fifteen days.

It is not possible, nor would it be profitable to go into an extended description of the multitude of different varieties of corn in the United States, but enough has been said to show how some of the best varieties have been developed.

Not more acres of corn, but "another nubbin of corn to each hill", should be the motto of every farmer in the corn belt.

One small ear of corn to each hill on the 3,556 hills per acre will make a yield of thirty-eight bushels.

Mr. Robert Reid moved from Brown County, Ohio, to Tazewell County, Illinois, in the spring of 1846. He brought with him a variety of corn known at that time as Gordon Hopkins corn. This was a reddish-colored corn grown quite generally in the Red Oak settlement, where Mr. Reid lived.

Mr. Reid planted this corn on his newly purchased farm near Delavan, Illinois. It was late in the spring before it was planted, and his harvest showed immature corn, though it gave a fair yield. Mr. Reid selected the best of it for seed the next year, but on account of the immaturity of the corn he had a poor stand. The field was replanted, or rather planted in with seed of the Little Yellow corn. It thus became mixed corn, but was kept pure from that time onward. Thereafter, from 1847 to date, fifty-seven years, this corn has been carefully selected for certain characteristics.

The peculiar dimple dent and shape of kernels with creased germs, the shape of ear, remarkable filling out of tips and butts, the high per cent of corn to cob and a finished or cultured appearance are among the strongest characteristics of the Reid's Yellow Dent corn.

Occasionally a very deep yellow, or even reddish yellow, appears, but generally the grain is a light or pale yellow. There is seldom but little soft corn, even the nubbins being solid. The original type shows a tapering ear, small and poorly filled out, with a small number of rows of kernels.

This offers one of the best illustrations of the value of intelligent selection. This variety is one of the best bred varieties of yellow dent corn. The original type of kernel was of the shoe peg style with the dimple dent. This seems to be giving place to a broader kernel and an elongated rather than a dimple dent. The former kernel has a smooth seed coat. There is a uniformity of color, finish and shape of ear which has made it a great favorite in the ring. During the last few years Mr. Reid has been breeding toward a rougher type, which gives a deeper kernel and a larger, later corn.

This corn has sometimes been known as the "World's Fair" corn since the Chicago Exposition in 1893, where it won first prize. During the last few years it has come into prominence, and is now extensively grown in central Illinois and is rapidly extending westward. In Illinois it is considered a medium-early corn. It seems to be well adapted to the north-central portion of the corn belt. This would be represented by the region lying between Bloomington and Chicago and by the south half of Iowa, although many parties are growing it successfully as far north as Mason City Iowa. This variety has won more premiums in the great corn contests than all the other varieties put together.

FREEZING OF CORN.

Indian corn is the most succulent of all the grains, and the fact that it is late in ripening makes it especially liable to injury by frost. Corn leaves are hurt by even light frosts if the stalks are not previously cut. Just as soon as connection with the root is severed the foliage dies out rapidly, or rather much of it is concentrated in

the ear and husk to ripen and mature the grain. Experiments made with corn stripped from the stalk after it has hardened show some gain in weight of that cut up at the same time and left on the stalks in the usual way. Probably this passing of sap from the stalk to the grain does not continue long after both are severed from the root. It is therefore safe to husk corn without fear of loss in a few days after cutting. The parting of the husks is the usual sign waited for; but this is rather to facilitate husking than because this is needed to have the corn get full development. If corn ripens late it is safer to go through it even before it is all ready to cut, and strip off enough of the best and earliest ears for seed, leaving the husks on. Hang these ears in a warm place and they will dry out before severe weather comes, so that freezing the germ will be impossible. Seed corn dried by fire heat makes unusually vigorous plants, and is worth this trouble even when crib-dried corn will grow.

CHEAPENING THE PRODUCTION OF CORN.

In all the departments of production the man who can afford to sell anything of a given quality and a given quantity, the cheapest, is the man who makes the quickest sale and the most money. Hence the problem of how to decrease the cost of the production of grass, grain and meats is the most important for the Western farmer just now. It is the solemn fact that ranchmen can produce scrubs and low grades cheaper than the granger, that is making cattle so low; that the Hindoo and the Dakota farmer can produce wheat cheaper than the farmer in the middle West, that makes wheat so low; the fact that the Nebraska farmer can produce corn so low that makes corn raising for sale unprofitable in Iowa.

It is not possible for the farmer to do as the railroads, the manufacturer, and many of the merchants, pool their issues, limit production and keep up prices.

LITTLE "NUBBINS".

Drudgery is labor without thought.

Poor seed means poor stand and weak stalks.

Getting our heads into the game is half the battle.

The farmer who makes two ears of corn grow where but one grew before is a "public benefactor".

There are many things which will reduce the yield of our corn crop even though we plant the best of seed.

Cause of low yield—poor stand; stalks "fooling around all summer doing little or nothing"; these are the greatest causes of a low yield.

The most precious thing in this world is the labor of a human being. Yet hours are wasted every day on vacant ground and worthless stalks.

To make a good crop of corn requires *good land, good seed, good care*, and back of all these must be a *great man*, a man who mixes brains with his labor.

No man has a moral right to himself and family, or to the community in which he lives, *to guess* that the 800 kernels on an ear will grow and produce strong plants.

"If the corn fields of the United States were mine and I could give but one order, that order would be, 'To test six kernels of corn from every ear of seed intended for planting'."

Poor seed means missing hills, one—stalk hills, and weak stalks, producing little or nothing. It means wasted land and wasted labor. It means less than thirty bushels of corn per acre in the "corn belt", instead of forty or forty-five bushels.

If every ear of corn intended for planting next spring was harvested not later than the middle of October and hung up in the attic where it could dry out thoroughly before the bitter cold freezes of November and December, millions of dollars would be added to the value of next year's corn crop.

CORN IS KING; AMERICA'S GREATEST CROP.

ROCK ISLAND CORN AND WHEAT TRAIN LECTURE BY A. M.
TEN-EYCK, PROFESSOR OF AGRONOMY, K. S. A. C.

Corn is distinctively an American crop, having its origin in central Mexico, where the native plant still grows wild. The United States grows 80 per cent of the corn crop of the world. and produces more bushels of corn than of all other grains. The average production of corn in the United States during the five years ending 1904 was 2173 millions of bushels, valued at 946 millions of dollars. The average farm price of corn has increased from 21.5 cents per bushel in 1896, the lowest average price ever received for corn in this country, to 44.1 cents per bushel in 1904. The average farm price of corn for the last five years, as given in the U. S. Agriculture Year-Book, is a fraction less than 45 cents per bushel. The production of corn in this country has trebled since 1870, while the price per bushel has also advanced.

The area suitable for the production of corn is to-day largely occupied; there can be no great enlargement of our corn-fields unless the ground be taken from some other crop; the only material increase over our present corn production must come through enriching the soil, improving the breeds of corn, and from better methods of tillage and cultivation. With the corn-producing area limited practically to its present acreage, with the increasing demand for corn at home for feed, food, and for the manufacture of the large number of commercial products now made from corn, with the foreign market for corn increasing, Mr. Phillips of Wall street fame is making no wild prediction when he says: "We shall never again return to the old prices of corn; in my opinion 40-cent corn will represent its lowest price for the future."

Although the total production of corn in the United States has increased three hundred per cent in the last thirty years, the average yield per acre has not increased, and as given in the Agriculture Year-Book is only 26.8 bushels per acre in 1904. The average yield per acre in the United States, for ten years, 1895-1904 was 25.0 bushels, while in Kansas for the same period the average yield was only 21.65 bushels per acre.

The opportunity for increasing the average yield of corn per acre is very great. One kernel of corn will produce an ear having from 800 to 1200 kernels. No other cereal grain is so productive. No crop which the farmer raises is more responsive to breeding and cultivation than corn. Every intelligent effort which the farmer makes in selecting seed, in fertilizing the land and in improving the methods of planting and cultivation is rewarded in both quality and quantity of grain produced. Improving the quality and increasing the yield of corn by planting well-bred seed and by practicing better methods of cultivation may be counted as almost clear profit. Mr. Luther Burbank, the great plant breeder of California, estimates that one extra grain to the head, one extra kernel to the ear, and one more potato to the hill would increase the crops of the Nation, without extra cost, by

1,500,000 bushels of barley,
11,000,000 bushels of corn,
15,000,000 bushels of wheat,
20,000,000 bushels of oats, and
21,000,000 bushels of potatoes.

An increase of three bushels of corn per acre in Kansas would pay the State and county taxes (some \$7,000,-000 per annum) and leave a margin of \$800,000 for building up our State institutions and making other public improvements.

The most important factors in the production of any crop are feed, breed, and care or culture. Without a sufficient supply of available plant food and moisture in the soil it is not possible to produce large yields of corn, no matter how well bred the seed, even with the best

of culture. The plant must be fed. Hence, one of the most important problems in growing corn is maintaining the fertility of the soil.

Much of the land of Kansas has already been cropped continuously with corn too long. Such land is "corn sick", the soil has become exhausted of its humus, compact in texture, filled with plant diseases and insects which prey upon the corn plant, and has finally reached that point where profitable crops can no longer be produced upon it without a change in the methods of farming. What the land needs more than anything else is a change of crops, and it will not do to simply sow wheat and other cereal grains for a year or two and return again to corn, since the small-grain crops are really greater exhausters of the fertility of the soil than is corn; such land must be planted to grass and perennial legumes, such as alfalfa and clover.

Grass is a soil protector, a soil renewer, and a soil maker. It increases the vegetable matter in the soil, restores the humus, and improves the soil texture; while alfalfa and clover, by means of the bacteria which grow on the roots of these plants, actually increase the nitrogen in the soil, which is the most essential element of plant food and the one most apt to become exhausted in the soil. Old worn-out land which has been seeded to grasses and legumes for a few years is largely restored to its virgin condition of tilth and fertility, and when broken will produce again large crops of corn and small-grain.

Farmers should study more carefully the subject of rotation of crops and means and methods of maintaining the fertility of the soil. Barnyard manure should be more carefully saved and used. On the Kansas Agricultural College farm, in the season of 1903, a good coat of barnyard manure applied to corn land and plowed under, increased the yield of corn 18 bushels per acre. It is not advisable to use chemical fertilizers and neglect other and cheaper means of restoring and maintaining the fertility of the soil.

I cannot here go into a detailed discussion of soil tillage and cultivation. It has been truly said that "tillage is manure" to the soil. The plant food is stored in the soil in an insoluble or unavailable condition. By tillage the conditions are made favorable for the development of the soil fertility. The cultivation allows the entrance of the air, conserves the moisture, warms the soil, and makes favorable conditions for the growth of bacteria, and thus hastens the decomposition of organic matter and favors the chemical changes by which the unavailable plant food is gradually made available for the use of crops.

Weeds are robbers; they waste the moisture and fertility of the soil, and thorough cultivation of the corn crop is necessary in order to keep the field clear of weeds. Water is the most essential part of the plant food; the rainfall, in time and amount, largely determines the yield of the crop. By keeping the surface mulch of mellow soil the water is retained in the soil and made to feed the crop.

At several experiment stations shallow continuous cultivation of corn has given the largest average yields, as opposed to deep cultivation. Too deep cultivation not only injures the corn by destroying the roots, but during the period of cultivation it prevents the roots from feeding in the most fertile part of the soil. On the other hand, the practice of shallow cultivation may be carried too far; a relatively thick mulch of soil will conserve more moisture than a thin mulch.

As regards the conservation of soil moisture, the early cultivation of corn may be shallow; a deep soil mulch is not required at that season of the year, since the weather is moist and cool and evaporation is not great; but later in the season when the hot, dry days of July and August come the deeper mulch is necessary in order to keep the soil from drying out. Shallow cultivation early in the season also clears the ground of weeds better than deeper cultivation, and a thin mulch may favor the quicker warming of the soil in the spring. Loose soil is not so good a heat conductor as firm soil, and more heat

can reach firm soil through a thin mulch than through a thick mulch. On the other hand, during the hot part of the season a thick mulch may act as a regulator of the soil temperature and prevent the soil from becoming too hot, as well as too dry.

Cultivation experiments at the Kansas, Illinois, and North Dakota Experiment Stations have given results favoring shallow cultivation early followed by *medium* deep cultivation at the close of the season. Deep cultivation as the corn was laid by seems to have conserved more moisture than shallow cultivation, and at the Kansas Station as an average for three seasons has given an average yield of 2.7 bushels of corn per acre above the yield secured by continued shallow cultivation.

It pays to prepare a good seed-bed for corn as well as for wheat or other crops. As to whether level planting or listing is best depends largely on the climate and soil. Throughout central Kansas the listing method is preferred; the roots of corn planted in lister furrows lie relatively deeper in the soil than roots of level-planted corn, and in a dry climate or light soil corn planted in this way is better able to withstand drouth than level-planted corn.

Perhaps less attention has been given to the breeding of corn and the selection of seed than has been given to the cultivation and maintaining of the soil fertility. The work of the last few years, however, demonstrates that it is just as important to breed corn and wheat and other crops as it is to breed stock. Moreover, the effect of the breeding and selection of corn is as great and the results are much more quickly secured than in the breeding of stock.

There is a great difference in the productiveness of varieties of corn. In 1903, in a test of 79 varieties at the Kansas Station, the yields of what were considered standard varieties varied from 30 to 89 bushels per acre. Similar results were secured in 1904.

Different ears of corn not only vary in appearance and quality, but are very different in their prepotency or power of reproducing. The choice selected ears from

Reid's Yellow Dent corn, which were selected for uniformity and trueness to breed characteristics, showed as much difference in characters of plants on different rows as might be observed between different varieties of corn, and in 1903 a difference of nearly 400 per cent in yield, (per cent figured on lowest yield) was produced by the same area of land planted with seed from individual ears. In 1904 the greatest range in yield with selected ears of this variety was a little over 80 per cent, while in 1905, after 3 years of careful breeding and selection a difference in the productiveness of individual ears, seed selected from the product of the best producing ears during previous years showed a variation in product of only 60 per cent. After three years' breeding, the ear test plot in 1905 yielded 18 per cent more corn per acre than was secured from the general field planted with first-grade seed selected from the general crop the year previous.

The first step in corn improvement is the choice of a variety. Choose as pure a type of corn as it is possible to secure, a variety which is adapted for growing in the soil and climate of your section of the State. Choose a type of corn that is hardy, of good quality, and that yields well. From the tests at the State Experiment Station, the "native" Kansas corns, namely, varieties which have been grown a long time in the State, prove to be better producers than the best varieties imported from other States. Perhaps you are now growing in your locality the corn which is best adapted for growing there, and which will furnish an excellent foundation for a better breed of corn.

Scientific corn breeding has only been practiced in this country since 1897, when Prof. P. G. Holden, at the Illinois Experiment Station, introduced the plan of individual ear breeding and demonstrated the importance of corn breeding to the farmers of that state and to the country at large. Among the pioneer breeders of corn are Leaming, of Ohio, Reid, of Illinois, and Riley, of Indiana, and from their efforts and work we have the Reid's Yellow Dent, the Leaming, and the Riley's Favor-

ite corn. The Boone County White is another of the old standard varieties. These varieties of corn have proved to be good producers in many parts of Kansas, after the corn has been grown for several years and become adapted to the climate and soil.

The Kansas Corn Breeders' Association, at its annual meeting, March, 1905, passed the following resolutions:

Resolved, That the following varieties of Kansas corn be recognized by the Kansas Corn Breeders' Association as possessing merits which make them worthy of distribution and propagation in this State, namely, Hildreth (yellow dent), McAuley's White Dent, Hammett (white dent), Mammoth White Dent, Kansas Sunflower (yellow dent), Griffing Calico and Hiawatha Yellow Dent.

Resolved, That the following varieties of corn originated in other states be recognized as suitable for planting in this State, provided the seed has been adapted to Kansas conditions and the corn has maintained its quality and productiveness after having been grown for five successive seasons in this State; namely, Reid's Yellow Dent, Boone County White, Silver Mine, Legal Tender, Hogue's Yellow Dent, and Leaming.

Choose a field to grow seed-corn away from other fields. Give special preparation to the soil and special cultivation to the corn. Plant at the most favorable season, using all efforts to produce as perfect a development of the corn as possible. If a field away from the general corn-field cannot be selected, then plant a strip through the middle of the large corn-field for the breeding plot. The average farmer may not be able to follow the individual ear system of breeding, but he can select out of his seed-corn a bushel or so of the choicest ears and plant this corn in a body by itself, as described above.

Better select out 40 or 50 of the very choicest ears and plant the corn from each ear on separate rows. In this way the breeder is able to determine which are the best producing ears and select seed from these for future planting.

When the corn is tasseling and beginning to silk, pass

\$150.00 EAR OF CORN.

The highest price ever paid for corn was paid January 16, 1907 at the farmers short course at the Iowa State College. A 19-ounce ear sold at \$150 for the single ear, or at the rate of \$8,850 a bushel. D. L. Pascal of De Witt, its breeder, paid this phenomenal price. The auction was started by Mrs. Nellie Kedzie Jones of Michigan at \$50. E. M. Wentworth of State Center was the next highest bidder, but compromised when the price exceeded all bounds of reason. The champion ear last year sold for \$11 and was grown by H. J. Ross of Farragut, Fremont county, Iowa.

The best ten ears ever gathered together according to Professor Holden. were those of Eddison Bennett, which sold for \$30 to Bennett Bros. of Ames.

through the field and remove the tassels from the stalks which show no appearance of a shoot and from every feeble and diseased stalk in order to breed only the best. In this way the farmer really selects his breeding corn plants, the same as he must select his breeding animals.

Seed-corn should be selected in the field so that the breeder may observe the stalk as well as the ear. Select for uniformity in stalk and ear, choosing ears which are well placed on vigorous leafy stalks. Select for uniform maturity of ears as well as for uniformity in type, size and quality.

Seed-corn should be stored, and cured in a dry, well ventilated room, and if the weather becomes damp and cold before the corn is fully dry, complete the drying by artificial heat. Corn well dried and kept in a dry place will not be injured by freezing.

During the winter the seed-corn should be carefully sorted over and the breeding ears for next season's seed field selected. We have to-day score-cards for corn, by which the perfect ears of different varieties are required to conform to a certain standard as regards size, length, type, uniformity, etc. Perhaps the breeders have not yet learned to recognize all the vital points of a good ear of corn, but some of the characteristics which indicate good quality and high yield in corn are known. The ear should be of good size, symmetrical in form, with straight rows of long, well-dented, medium wedge-shaped kernels.

A cylindrical ear allows for more kernels on a cob and a more uniform length in kernels. The tips should be well filled, and at the butts of the ears the kernels should swell out about the shank. The space between the crowns of the kernels should be narrow; also there should be no unoccupied space at the tips of the kernels where they enter the cob. The kernels should also be uniform in color, either white, yellow, or red, according to the type and variety of corn which they represent. A large germ in the kernel indicates strength, vitality and high feeding value, since the germ of the kernel contains

nearly all of the oil in the grain and is also rich in protein.

A large yield of corn depends not only on the breed of corn, the fertility of the soil, and the cultivation of the crop, but it also depends upon the germination of seed, stand of corn, and number of ears produced per acre, as well as the type of ear and the type of kernel on the ear. It therefore becomes very important to plant viable seed, and every farmer should test the germination of his seed-corn before planting.

The actual yield of corn per acre is usually far less than the estimated yield. For instance, with a perfect stand of corn, hills $3\frac{1}{2}$ feet apart, and three stalks in the hill, with one good average ear to the stalk weighing $\frac{3}{4}$ of a pound, the yield should be 128.5 bushels of shelled corn per acre. With ears weighing one pound apiece the possible production from an acre of land, under the conditions stated above, is 171 bushels.

A 30-bushel crop of corn will just pay for the growing. When we consider the fact that a bushel of seed-corn will plant 8 acres, and is capable of producing, on good soil in the average season, with good average cultivation, 400 bushels of corn, we begin to appreciate the value of this bushel of seed-corn. The farmer can afford to do a great deal of work in growing seed-corn, selecting the seed ears, grading and scoring these ears, and testing the germination of the seed previous to planting, that he may secure a good stand and insure the production of a profitable crop.

THE MAGNITUDE OF IOWA'S 1906 CORN CROP.

The real magnitude of Iowa's corn crop is sized up by Dr. A. B. Storms, president of the Iowa State College, as follows: "We will suppose that the 297 million bushels of corn produced in Iowa in 1906 is piled up in one pile in Des Moines and that it is to be loaded into wagons, allowing 50 bushels to each wagon. Let the wagons start west allowing 30 feet to each wagon so as to avoid collisions. The head wagon when going into Council Bluffs

will still be going and others will still be driving up in Des Moines to be loaded. The head wagon will go on to Denver through a pass in the mountains and finally reach the Golden Gate and yet there will be corn in Des Moines and teams will be loading. We will suppose an imaginary road across the Pacific with the head wagon approaching Hawaii; it passes on to our eastern possessions, through Japan, into Asia, through Europe, over the Atlantic and on to New York and still Iowa men will be loading corn in Des Moines. Let the head man pass up Wall street on to Philadelphia through the states of Pennsylvania, Ohio, Indiana to Chicago, on to the Mississippi and through Iowa to Des Moines and still the haulers will be loading Iowa's 1906 crop. The leader passes on through Des Moines westward towards Denver and is well on his way across the great Rockies before the last wagon is loaded and the supply of Iowa's 1906 crop is all gone."

STATE AGRICULTURAL COLLEGE OF NEBRASKA.

INCREASING YIELDS OF CORN BY SELECTION OF PLANTS.

In the past, most of the efforts to improve corn have been in the direction of improving the type of ear, and much good has been accomplished in this way. But type alone is not a sure guide to the yielding power of a variety. We may take two ears of the most approved type, looking as nearly alike as possible, plant them in separate plats, and the yield of one may be twenty-five per cent more than the yield of the other. The difference in productiveness cannot be learned by examining the ears, but only by planting each ear separately and measuring its yield. During three years past we have practiced the "individual ear" method of seed selection, each ear being planted in a row by itself and the yield

taken. To show the variation in the yield from different ears on the same soil, and under similar treatment, there is given below as an example the yield of ten adjacent rows, each planted with a different ear:

TABLE XIII.—*Yields from different seed ears.*

Row No.	16	17	18	19	20	21	22	23	24	25
Yield per acre in bushels	68.7	73.9	44.3	35.6	81.6	48.2	55.2	56.8	80.0	76.8

In these ten rows the yield varied from 35.6 to 81.6 bushels, a difference of 46 bushels per acre.

The general plan followed in this method of corn breeding is to select about 100 good ears of corn and plant each in a row by itself. Marked differences will often be noticed between the rows from the time they come through the ground until harvest time. One row may be two feet taller than the row next to it, while there may be a week's difference in the time of tasseling, and ten days' difference in the time of maturity. At husking time each row is harvested separately, and all the corn is discarded but that from about 20 of the best yielding rows. This corn from each row is kept in a separate lot and carefully looked over. Any lot that is in any way undesirable is discarded. When the rows that are to be saved have finally been selected, five or ten of the best ears are chosen from each to be planted after the same system again the next year. Many of these ears coming from the high yielding rows fail to inherit high yielding qualities, but by constantly selecting out high yielding rows from year to year the tendency becomes more fixed.

Even one year's work may produce good results, as our experiments have shown. In 1903, 82 rows were planted with different ears. The yield varied from 70 to 108 bushels per acre. From these, 17 rows were selected, all of which had yielded more than 90 bushels per acre. Six ears were taken from each of these and planted in 1904. The season of 1904 was not as good a corn year

as 1903, and the soil was not as good as that used in 1903, but an average yield of 68.6 bushels was obtained, while the yield of corn of the same variety in the same field, the seed for which had been selected in the ordinary way, yielded only 62 bushels per acre, or a difference of 6.6 bushels as the result of one year's work. It is hoped that by following this method of selection for several years the average yield may be greatly increased.

WHY OATS RUN OUT.

Almost all farmers have noticed that oats run out so badly that it is necessary to change seed frequently. Can it be avoided? Ought not seed to grow better with proper treatment than poorer? An observant farmer in the American *Cultivator* gives some very sound thoughts on this subject. He says in discussing the matter:

"I have noticed that nearly all new varieties of oats do well for a year or two, and then fall back and yield no better crops than our common oats. This deterioration I have noticed for years, and now we hardly find a crop of oats up to the legal standard of thirty-two pounds per bushel. The average in this vicinity is not more than twenty-five pounds to the bushel. I have studied for years to learn the cause of this trouble. The land is apparently just as good, we have better implements for the preparation of the seed bed, special fertilizers adapted to the wants of the crop, yet no improvement.

"My conclusion is that the difficulty lies wholly with the seed. Fifty years ago it was not uncommon to find whole fields of oats yielding forty or more pounds to the bushel. There were no new fangled oats in those days. Scientific writers tell us the soil was new and that all crops were better, which may be true to a certain extent, yet this is not the only reason. At that time all grains were threshed with a flail, and only the best and plumpest grains were obtained, while the shrunken and imperfect grain was left in the straw. The grain was then winnowed by shaking from a shovel in a strong wind driving through the barn floor, and the head of the heap carefully put away for seed. The tail end of the heap was fed out. Since the threshing machines have come into general use, one can hardly find a farmer who threshes by hand. If a machine leaves even the semblance of an oat in the straw it will be looked upon as an imperfect machine and most likely be ordered out of the barn. There is no head of the heap coming from the machine, and good and poor are mixed together and sown year after year. Is it any wonder that oats deteriorate?

"What would be thought of a farmer who should plant all the corn that grew in the hill, nubbins and all? He would be called insane. Yet this is just what we do with oats and then wonder at their failure. Anyone can satisfy himself, if he will look over a field of oats just after it has headed out. He will find all grades of growth, from tall, well formed, stocky heads, down to plants which have not sufficient vitality to make a head. When harvested one will find all lengths of straw, from six inches to three feet, and all grades of oats from zero up to forty pounds per bushel.

"My practice of late years is to allow the machine to blow hard enough to blow over the light oats from those saved for seed, and I find my oats improving from year to year. A better method still would be to thresh the bundles lightly with a flail, and thus get the best of the grain for seed, and then, if one chooses, to run the bundles through the machine. Let brother farmers try this experiment and report the result in future years."

RUSSIAN THISTLE.

BY L. H. PAMMEL.

The widespread interest manifested in our state and elsewhere in the northwest indicates that the Russian Thistle (*Salsola kali*, variety *tragus*), is a miserable and execrable weed, doing much injury to agriculture.

At the request of the Director of the Experiment Station I have devoted a little time to the botany of this weed. Some attention has therefore been given to the study of the weed, its germination, the anatomy of the root, stem, leaf and seed. A study of the anatomy will be of interest, because its structure may best adapt it to growing on high, dry soil. Professor L. H. Dewey says:

The Russian Thistle grows best on high, dry soil, where it is not much crowded by other plants. It is seldom seen in sloughs or low land, and makes no progress in the native prairie, except where the sod has been broken by badger burrows or by the overfeeding and con-

THE RUSSIAN THISTLE.

sequent tramping of cattle on the ranges. In all places it is more abundant and more robust in dry seasons.

NATIVITY OF THE WEED.

Linnaeus, according to Dewey seems to have been familiar with the plant, as it occurred in eastern Europe. The common Saltwort (*Salsola kali* L.), is a common plant of our Atlantic coast, and many botanists, till recently, have referred the Russian Thistle to this species. The writer several years ago, in response to queries, referred it to this species, but it is quite distinct from that plant. The Russian Thistle is known as (*Salsola kali* L., variety *tragus*, DeCandolle), and is native to the plain of Southeastern Russia and Western Siberia. Senator Hansbrough* says, in regard to the thistle in Russia:

“Prince Galitzen tells me that four years ago, when he left Russia, he passed through the southwestern portion of Siberia, and there found stretches of thistle for five or six hundred miles in the most fertile parts of that country. It had driven every farmer out of that section. He also tells me that the Russian government, which has been engaged in the great work of irrigation and putting in large irrigating ditches in southwestern Siberia for some years, has abandoned the project, chiefly on account of the thistle. He states that the pest has overrun the country, largely in the provinces of Orel and Kiev, which comprise the most fertile agricultural region in Russia, and that the peasant farmers are simply fleeing in terror before it.”

In regard to the distribution of this weed in the United States, no one has looked this up more carefully than Mr. Dewey who says:

“The plant was first introduced into the United States in 1873 or 1874, in flax seed brought from Russia, and sown near Scotland, Bonhomme county, South Dakota. The land there is somewhat hilly, and corn is the chief crop raised, so that owing to the wooded ravines and the

standing cornstalks the Russian Thistle was at first slow in spreading. In 1877 it first appeared in Yankton county, east of Bonhomme; and five years later it had spread to the counties to the north and west of Bonhomme. It continued gradually to cover new territory until 1888, when it had infested most of the counties between the Missouri and James rivers south of the Huron, Pierre and Deadwood Division of the Chicago & Northwestern railway. The strong winds during the winter of 1887-88, followed by the dry summer of 1888, and probably a fresh importation of seed into the flax fields of Faulk or McPherson counties, caused the weed to spread within two years to nearly all the remaining counties between the Missouri and James rivers in South Dakota and to infest the southern tier of counties in North Dakota. At about the same time it invaded northern Iowa and northeastern Nebraska."

With regard to remedies, it is easily killed. When cut off at the surface of the ground before seeding it dies. This is the best remedy. If a field is neglected until it is seeded, repeated plowings will clean it of this and most other weeds. When the plant is not more than six inches high careful plowing with a drag chain from the end of the doubletree to the plow beam dragging back so as to have every plant dragged under the furrow, with harrowing to fill every crevice between the furrows will kill every plant that cannot get its leaves to the surface.

THE CANADA THISTLE.

BY L. H. PAMMEL.

The writer annually receives many queries in regard to noxious weeds. Some have been described in previous bulletins of the experiment station and are referred to in foot note¹ so that those who have kept the bulletins may refer to them. It is our intention to issue a bulletin containing a full account of the more important weeds

at some future time, as well as the germination of weed seeds.

Many of the queries received pertain to the Canada Thistle (*Cnicus arvensis*). Frequently specimens accompany the query so that we have been able to say whether the weed occurs. Some experiments were conducted last summer to determine whether the weed can be exterminated. The results of the experiment show that this weed can be exterminated.

WHERE FOUND?—IN ALL THE WEST CENTRAL STATES.

Description. Smooth perennial, spreading by creeping rootstocks, one to three feet high, corymbosely branched at the top; stems smooth; leaves lanceolate, sessile, and deeply pinnatifid, lobes and margins of the leaves with spiny teeth; heads small, three-fourths of an inch high, bracts appressed, the outer with a broad base, inner narrow, all with an acute tip, never spiny, somewhat arachnoid; flowers purple, dioecious in staminate flowers exerted with abortive pistils, in pistillate less so, scarcely exceeding the bracts, stamens with abortive anthers, tubes of the corolla six inches long, anther tips acute, filaments minutely pubescent, young achenium pubescent, all of the bristles of the pappus plumose.

METHODS OF EXTERMINATION.

Many methods have been suggested and tried. The following are usually recommended. To thoroughly cultivate the field or plow deep. Remove all the thistles and keep the thistles down during the summer. Prof. Beal recommends red clover in stamping it out. While this may help somewhat to hold the weed in check, it will not suffice to stamp it out. More vigorous methods must be pursued. Thorough cultivation and keeping the plants down is an excellent thing to do. In some cases failures are reported but these are due largely because the farmer tires out before the work is completed.

Recently several reports² have appeared on the chem-

ical destruction of weeds. These substances are known as herbicides. Experimenters report chemical treatment a success.

A good opportunity was offered to try the experiment since the yard of Prof. Noble on the college premises and the adjoining lot of Mr. Gray contained a vigorous, lusty growth of Canada thistles. Various treatments such as cultivation, and the use of salt failed to destroy the thistles. I therefore arranged with Prof. Noble to let two students, Mr. T. S. Hunt and Mr. E. A. Elder, try the chemical method, using crude carbolic acid in the following proportions:

Carbolic acid1 part.

Water4 parts.

The solution was agitated to have a good mixture. It was found to be very essential to keep the acid and water thoroughly agitated in order to get an even distribution. At first an ordinary garden sprinkler was used. All of the plants were sprinkled. This was found to be expensive, nor did it kill anything more than the tops of the plant. Later at the suggestion of Prof. Noble a small mechanic's oil can was used. It was found where the stems were touched with the solution the root-stocks were killed from a few to ten inches below the ground but below this point they sprouted again in some cases. Generally however they did not sprout again. Where there are many plants this method is very laborious and costly.

We tried therefore the spud method. The patch of thistles was in a blue grass lawn. The thistles were cut from six to eight inches below the ground. The thistles continued to appear, largely because the ground was thickly covered with the plants and they were not always detected. Early in June the whole patch was plowed, and as soon as the young thistles appeared the carbolic acid solution was applied with the mechanic's oil can. The dry weather helped to remove the thistles. Mr. Elder says in regard to the thistles in the yard adjoining that of

Prof. Noble, "The thistles in Mr. Gray's yard were allowed to become twelve inches high, when they were cut with a scythe. The number of shoots which appeared within two weeks was marvelous. The solution was applied with the same effect as above. Three or possibly four applications usually cleared a given patch. An examination of the ground in September showed only a few thistles remaining, and these had been hidden by the grass in such a manner as to escape detection."

Prof. Noble who has kept close watch of the thistles informs me that he has found but few this season and these were overlooked in the grass adjoining the plot. On June 25 the writer went over the patch which is now sown with oats and was able to see but a single Canada thistle; so we may conclude that this experiment was a success and that anyone who desires to have the Canada thistle removed can do so in this way.

As to expense we used about two gallons of crude carbolic acid, and the labor amounted to thirty hours at fifteen cents an hour, and the plowing seventy-five cents.

We may conclude from this experiment that Canada thistles can be destroyed by methodic removal of the plants, and crude carbolic acid.

POISONING GOPHERS.

Frequent inquiries are received asking how best to employ strychnine for poisoning gophers.

The amount of damage to farm crops by these little pests is very great. It is estimated that in 1901 the damage to the alfalfa growers of Kansas from the ravages of the pocket gopher was \$500,000. Grass, small grains, corn, vegetables, etc., suffer largely from gophers. Their damage is of two-fold character in that they not only destroy the growing grain but throw up little mounds of dirt in the fields to interfere with cutting the crops. The gophers also tramp down and destroy each season a large amount of grain, and it may be safely said that in North Dakota, the damage to

farm crops in the aggregate is greater than the estimated damage to the alfalfa growers of Kansas.

The early spring is the breeding season and gophers are very prolific, sometimes producing as many as ten or eleven young in a single litter; therefore, the destruction of one female gopher, at this season means as much as many killed later in the season.

Many complaints are made that strychnine does not seem to destroy many of the gophers, in some instances, where it has been employed. There may be two reasons for this. The strychnine is not soluble to any great extent, even in hot water, and gophers eat but little food at one time. To successfully destroy these pests the poison should be present in the food in considerable quantity and the strychnine should be soluble and in a form or mass acceptable to the animal to be poisoned.

TO PREPARE STRYCHNINE POISON.

Strychnine is readily soluble in hot acidulated water and we recommend the following method:

Bring one quart of vinegar to boiling, add one ounce of strychnine, stir with a stick until fully dissolved and then add six quarts of hot water. Pour this on twenty pounds of wheat or corn and allow to stand for eighteen hours or until the solution is entirely absorbed, but the mass must be frequently stirred and vigorously so that it will become uniformly saturated with the poison. The grain should now be spread out to dry, where it cannot be reached by animals or children, for you have a highly poisonous grain.

Now dissolve six pounds of sugar in six quarts of water and boil until one gallon remains and then allow to cool. When cold add one tablespoon of anis oil which can be secured at any drug store. You now have a thick syrup which should be poured over the nearly dry poisoned grain and the whole stirred so as to cover each grain with a layer of syrup. Allow the grain to thor-

oughly dry, stirring so as to prevent its sticking in a mass. The odor of anis oil is very attractive to the gopher and each kernel should contain enough poison to destroy one gopher. This sugar coated grain can be used at any time, but great care should be taken to prevent any possible poisoning of birds or animals. A little of this grain buried near each gopher burrow will be pretty sure to attract and destroy its victim.

FEEDING VALUE OF POTATOES.

The Michigan Experiment Station conducted an experiment in March, 1896, to ascertain whether the addition of mangels or potatoes to a ration affect the digestibility of the other factors of a ration. The experiment covered fifty-two days. Mr. C. D. Smith, the agriculturist, states that "the addition of either beets or potatoes seemed to lessen perceptibly the digestibility of the dry matter (crude protein and crude fat) of the grain and coarse feed".

In another test of the effect of feeding potatoes upon the quality of butter it appeared to give the butter an undue hardness, elevated the melting point, caused the cream to froth and to churn with difficulty, and hence was unsatisfactory.

With pork selling at \$3.80, potatoes fed to hogs were worth 7.7 cents per bushel.

At the Wisconsin Experiment Station, trials were made in feeding cooked potatoes, mixed with uncooked corn meal, fed in opposition to uncooked corn meal only, to fattening pigs. In the first trial there were three pigs in each lot and two in the second, the trials extending over a period of forty-five days. Combining these trials it is found that 441 pounds of potatoes are required to save 100 pounds of corn meal.

Prof. W. A. Henry, the experimenter, says "in general, we may say that a bushel of corn is worth $4\frac{1}{2}$ bushels of potatoes for fattening purposes when cooked and fed with corn meal".

POTATO SCAB.

Cut one shows a potato grown from a scabby seed potato not treated to a solution of corrosive sublimate.

Cut two shows a potato grown from a scabby seed potato that was treated with corrosive sublimate.

Cut three shows the potatoes raised on one row where no care was taken in selecting the seed.

Cut four shows the potatoes raised on one row of equal length and side by side with number three. It pays to select your seed potatoes at time of digging. You should take potatoes only from hills where the potatoes are large and yield well.

HOW TO PREVENT POTATOE SCAB.

The potato should be treated before cutting. Soak the seed tubers one and one-half hours in a solution of corrosive sublimate made at the rate of one ounce of powdered corrosive sublimate to six gallons of water, or in a solution of formaldehyde made at the rate of one pound to thirty gallons of water. Then cut as usual.

TREATMENT OF BLIGHT, POTATO ROT, ETC.

These diseases spread from vine to vine in the field and in a wet season destroy from one-tenth to one-half of the crop on the old lands of the Red River Valley. The vines should be sprayed just before the blossom stage, or when about one-half grown, with Bordeaux mixture and every two weeks thereafter during the growing season. Paris green may be added to the Bordeaux mixture at the rate of one-half pound to each fifty gallons. This will kill the bugs at the same time. The New York State Experiment Station sprayed a large crop seven times and after deducting all costs had a net gain of \$48.75 per acre, over the untreated crop.

The Bordeaux mixture is made by dissolving four

No. 1

No. 2

No. 3

No. 4

pounds of quick lime in a few gallons of water and six pounds of copper sulphate in another vessel of water. When all is well in solution, strain each and mix together adding enough water to make fifty gallons in all. Keep this solution thoroughly agitated while it is being sprayed upon the vines.

“NOVELTIES” IN POTATOES.

Do not pay high prices for a few pounds of tubers of some new potato that may have many claims in its favor unless you are sure of its excellence, and even then it would be well to wait until it has been given a test for several years, as many varieties may be unreliable in some sections. Novelties in seeds, fruits and vegetables are brought out every year, but they sometimes happen to be old varieties with new names. They spring into existence as novelties one year and sink out of sight in two or three seasons.

CLOVER AS A FERTILIZER.

(Mirror and Farmer.)

This subject has been widely discussed, and while it is universally admitted that great value attaches to clover as a fertilizer, there is considerable difference of opinion as to how the best results may be brought about. Some hold that the crop, being diennial, should have full possession of the ground until the second year when in full bloom, but the crop is so valuable for feed that most farmers will be loth to do it. The plowing under of the second crop is, however, considered almost as beneficial, owing to the increase in the length of the roots. There is great value from the roots of clover. Prof. Roberts, of Cornell University, had a portion of a clover crop analyzed, roots and all, and after drying it until the roots contained only ten per cent. of water, and the stalks but eleven and one-half per cent., the tops or stalks on an acre weighed 3,295 pounds, while the roots on an acre weighed 4,893 pounds. Other advantages also

come from letting the roots grow long; they penetrate the sub-soil and carry into it elements which release and utilize plant food which would otherwise lie dormant; they also smother the weeds.

BUMBLE BEES AND CLOVER.

An Indiana farmer, who told his boys to burn every bumble-bee's nest they found on the farm, and who was complaining at the failure of his clover seed crop, was surprised when Maurice Thompson, the naturalist, said, "That is why your clover seed fails you. Bumble-bees make your clover seed." It is a fact that a strong nest of bumble-bees in a big clover field is worth \$20 to the owner; for these insects are the chief agents in fertilizing the blossoms, thereby insuring a heavy crop of seed. In Australia there are no bumble-bees of our kind, and they could not raise clover seed there until they imported some.

HOW TO FERTILIZE WITH CLOVER.

It has been, since the days of Cicero, an agricultural axiom, that "feeding cattle is the most important part of agriculture", and feeding cattle has been the support of agriculture. To sell clover hay, or any hay, or even straw, has been considered very poor and wasteful farming, and if we go to the best farming localities—eastern Pennsylvania, West Virginia, New Jersey, parts of Maryland, and central and western New York—we shall find the reverse of this practice is the very basis of the excellent condition of the farms and of the wealth of the farmers. Rightly managed, clover hay is worth \$10 a ton to feed to stock for direct profit, and Dr. Lawes avers that the manure left from it is worth \$10 dollars more. If a farmer cannot make \$10 out of a ton of clover hay fed to cows in a winter dairy, or to keep cattle along with a proper ration of other feed, he is not worthy the name of a skillful farmer. And if a farmer wastes his re-

sources and cannot turn a crop of clover to a better purpose than to turn it under and let his land lie idle for two years, he is not a fit person to teach other farmers their business. The business of a farmer is to raise crops, to feed them to stock, and to turn the raw materials he produces, so far as possible, into finished products. To raise crops and to turn them under for manure, instead of feeding them and making manure, is to go back instead of forward.—*Cor. New York Tribune*.

THE MAN WHO MAKES MONEY.

It is not from the extent of one's farm that money is made, but from the labor that is put upon it. All profit comes from labor. Even a gold mine is valueless without labor. But labor, unaided by intelligence, is of little value. True, "the hand of the diligent maketh rich", but diligence involves intelligence, and this is obtained by industry; by reading and study; by observation and experiment, and by aptness to learn. One man thus equipped will make more off a farm of 100 acres than another can off one of 1000.—*Rural World*.

EX-FARMERS.

We have watched with a good deal of interest the career of well-to-do-farmers who have been elected to county offices. They in general make good officers and do well until after their second term. Then the question arises, Shall I go back to the farm, or continue to live in town? Now and then we find one goes back to the farm, the wiser and better man from having had the experience in public life that the office gave him. For the most part however, they remain in the town. They drift into land offices or insurances agencies, occasionally into merchandising, but is it seldom they are as well off in ten years as if they had remained on the farm.

Generally they develop, if they do not return to the farm, an aptitude for machine politics. They are always farmers, even if they have not touched a plow for ten years, and parade themselves as the genuine friends of

the "honest sons of toil", and on this ground claim the right to lead and direct agricultural opinion. Although they have long ceased to look at public questions from the standpoint of the farm, they produce the annual crop of hay seed and boast their ability to serve the farmer. They form naturally the very best medium through which the party bosses can manipulate the farmer.

There is an immense amount of rot and rubbish in this cant about "farmers friends" etc. The friend of the farmer is the man whose main financial interests are in the farm, who studies the social and political questions from the standpoint of the farm, who can suggest the means of advancing the agricultural interests and who does this without any ulterior object of gaining their votes. About the last man to trust is the fellow who has left the farm years ago, has lost its habits, tastes and instincts, and has no visible interest in it, and who is always putting himself forward as the friend of the farmer. This class of farmers will bear close watching.

DOMESTIC ANIMALS.

The progress that a nation is making can with reasonable accuracy be measured by the kind of live stock it raises. The general rule is, poor stock, poor people. All the prosperous nations of the globe, especially the grain-growing nations, get a large share of their wealth by raising improved stock. The stock bred by these nations is now, however, very different from the stock raised by the same nations years ago. As soon as man began to progress in the art of agriculture he became dissatisfied with inferior stock. He therefore bent his energies to raise the standard of excellence in domestic animals.

By slow stages of animal improvement the angular, thin-flanked wild boar of early times has been transformed into the sleek Berkshire or the well-rounded Poland China. In the same manner the wild sheep of the Old World have been developed into wool and mutton breeds of the finest excellence. By constant care, attention, and selection, the thin, leggy wild ox has been

No. 1. Group of Stallions at the State Horse Show, January 1, 1907. Owned by State College of Kansas.

bred into bounteous milk-producing Jerseys and Holsteins or into Shorthorn mountains of flesh. From the small, bony, coarse and shaggy horse of ancient times has descended the ponderous Norman draft horse and the fleet Arab courser.

The matter of meat production is one of vital importance to man, for animal food must always supply a large part of man's ration.

Live stock of various kinds consume the coarser foods, like the grasses, hays and grains, which man cannot use. As a result of this consumption they store in their bodies the exact substances required for the building up of the tissues of man's body.

When the animal is used by man for food, one class of foods stored away in the animal body produces muscle; another produces fat, heat, and energy. The food furnished by the slaughter of animals seems necessary to the full development of man. It is true that the flesh of an animal will not support human life as long as would the grain that the animal ate while growing, but it is also true that animal food does not require so much of man's force to digest it. Hence by the use of meat a part of man's life struggle is forced upon the lower animal.

When men feed grain to stock, they receive in return power and food in their most available forms. Men strengthen the animal that they themselves may be strengthened. One of the great questions, then, for the stock grower's consideration is how to make the least amount of food fed to animals produce the most power and flesh.

HOW TO BREED AND CARE FOR HORSES.

While we have a great many kinds of horses in America, horses are not natives of this country. Just where wild horses were first tamed and used is not definitely known. It is believed that they were first used for warfare and then gradually bred and adapted to other purposes.

Where food was abundant and nutritious and climate mild and healthful, the early horses developed large

frames and heavy limbs and muscles; on the other hand, where food was scarce and climate cold and bleak, the animals became as dwarfed as the ponies of the Shetland Islands.

One of the first recorded uses of the horse is found in Genesis, chapter xlix, verse 17, where Jacob speaks of "an adder that biteth the horse heels". Pharaoh took "six hundred chosen chariots" and "with all the horses and chariots" pursued the Israelites. The Greeks at first drove the horse fastened to a rude chariot, and later found that they could manage the animal while on its back, with voice or switch and without either saddle or bridle. This ingenious people soon invented the snaffle bit, and both rode and drove with its aid. The curb bit was a Roman invention. Shoeing was not practiced by either Greek or Roman. Saddles and harness were sometimes made of skin and sometimes of cloth.

Among the tartars of middle and northern Asia, and also among some other nations, mare's milk and the flesh of the horse are used for food. Old and otherwise worthless horses are regularly fattened for the meat markets of France and Germany. Various uses are made of the different parts of a horse's body. The mane and tail are used in the manufacture of mattresses, and the same parts furnish a hair-cloth for upholstering; the skin is tanned into leather; the hoofs are used for glue, and the bones for making fertilizer.

Climate, food, and natural surroundings have all aided in producing changes in the horse's form, size and appearance. The varying circumstances under which horses have been raised have originated the different breeds. In addition, the master's selection had much to do in developing the type of horses wanted: some desired work horses, and they kept the heavy, muscular, stout-limbed animals; others desired riding and driving horses, so they saved for their use the light-limbed, angular horses that had endurance and stamina. The following table gives some of the different breeds and the places of their development:

No. 2. Clydesdale Stallion Refiner, Glasgow, Scotland, Toronto, Canada, International Live Stock Show, Chicago, 1905. Owned by State College of Iowa.

No. 3. Etrdegant, Champion Percheron Stallion, Des Moines, Iowa, Kansas City and Chicago, 1906. Owned by State Agricultural College of Iowa.

I. Draft, or Heavy, Breeds.

1. Percheron, from the province of Perche in France.
2. French Draft, developed in France.
3. Belgian Draft, developed by Belgian farmers.
4. Clydesdale, the draft horse of Scotland.
5. Suffolk Punch, from the eastern part of England.
6. English Shire, also from the eastern part of England.

II. Carriage or Coach Breeds.

1. Cleveland Bay, developed in England.
2. French Coach, the gentleman's horse of France.
3. German Coach, from Germany.
4. Oldenburg Coach, Oldenburg, Germany.
5. Hackney, the English high-stepper.

III. Light or Roadster Breeds.

1. American Trotter, developed in America.
2. 'The Thoroughbred', the English running horse.
3. The American Saddle Horse, from Kentucky and Virginia.

There is a marked difference in the form and type of these horses, and on this difference their usefulness depends.

The draft breeds have short legs, and hence their bodies are comparatively close to the ground. The depth of the body should be about the same as the length of leg. All draft horses should have upright shoulders, so as to provide an easy support for the collar. The hock should be wide, so that the animal shall have great leverage of muscle for pulling. A horse having a narrow hock is not able to draw a heavy load, is easily exhausted, and liable to curb diseases.

The legs of all kinds of horses should be straight: a line dropped from the point of the shoulder to the ground should divide the knees, canon, fetlock, and foot in two equal parts. When the animal is formed in this way, the feet have room to be straight and square, with just the breadth of a hoof between them.

The roadsters are lighter in bone and less heavily

muscle; their legs are longer than those of the draft horses, and, as horsemen say, more "daylight" can be seen under the body. The neck is long and thin, but fits nicely into the shoulders. The shoulders are sloping and long, and give the roadster ability to reach well out in his stride. The head is set gracefully on the neck, and should be carried with ease and erectness.

Every man who is to deal with horses ought to become, by observation and study, an expert judge of forms, qualities, types, defects and excellences.

The horse's foot makes an interesting study. The horny outside protects the foot from mud, ice, and stones. Inside the hoof are the bones and gristle that serve as cushions to diminish the shock received while walking or running on hard roads or streets. When shoeing the horse, the frog should not be touched with the knife. It is very seldom that any cutting need be done. Many blacksmiths do not know this, and often greatly injure the foot.

Since the horse has but a small stomach, the food given the animal should not be too bulky. In proportion to its size, its grain ration should be larger than that of other animals. Draft horses and mules, however, can be fed a more bulky ration than other horses, because they have larger stomachs and hence greater storage capacity.

The horse should be groomed every day. This keeps the pores of the skin open and the hair bright and glossy. When horses are working hard, the harness should be removed during the noon hour. During the cool seasons of the year, whenever a horse is wet with perspiration, it should on stopping work, or when standing for a while, be blanketed; for the animal is as liable as man to get cold in a draught, or from too rapid evaporation.

(1). A person cannot practice veterinary medicine or surgery in Iowa without being registered by the state board of veterinary medical examiners, and receiving a certificate signed by the members of the board. A diploma from a correspondence school in Canada would

not answer. (2) A certificate from the state board is absolutely necessary. In order to obtain such a certificate, a person must now be a graduate of a legally chartered and recognized veterinary college, and also pass the examination required by the board.

BOTS.—THE CORRECT TREATMENT.

Many wrong ideas prevail in reference to bots. All horses that are exposed to the bot-fly, must have bots more or less in their stomachs. Dr. Adams made the following experiment: Bots, when taken from the stomach alive, will live

In strong rum, 25 hours,

In strong decoction of tobacco, 11 hours,

In strong oil of vitriol, 2 hours and 18 minutes,

In essential oil of mint, 2 hours and 5 minutes.

They will live without apparent injury in spirits of camphor 10 hours, fish oil 49 hours, tincture aloes 10 hours, in brine 10 hours.

Common-sense consequently teaches us that there is no medical remedy that will effect a cure for the bots, and there is no practicing veterinary surgeon who can tell the difference between bots and colic. Do not be misled. For colic or the bots give the following prescription:

6 ounces of whiskey,

7 ounces of new milk.

Give at one time. If not relieved repeat the dose in 30 minutes.

If the above remedy cures the horse, the disease is colic and not bots.

For bots give slippery elm tea, or potato juice. This will feed and quiet them, but they cannot be destroyed.

FOUNDER.

CAUSE.—Founder is produced by hard driving on a full stomach, and drinking large quantities of cold water when heated, or by eating large quantities of green feed, or over-eating grain or large quantities of ground feed.

SYMPTOMS.—Stiffness and a disinclination to move. The limbs appear stiffened and benumbed. A restlessness shown by the continual looking around, tenderness of the bowels on pressure by the hand.

TREATMENT.—Give one quart of linseed oil and bathe the legs with hot water. Bleeding is also recommended. A few hours after giving the linseed oil give the following prescription once a day, until cured :

Spirits of turpentine, 1 ounce,
Oil of sassafras, 1 ounce,
Alum, powdered, 1 ounce,
Warm water, 1 pint.
Mix and give as a drench.

Large doses of aloes may be given, instead of the above prescription, with very beneficial results.

HOW TO CURE THE COLIC IN HORSES.

SYMPTOMS.—Sleepy look; at times very fidgety; pawing with one foot; caution in lying down; breathing labored; walking gives relief; legs and ears natural temperature.

A HOME REMEDY.

Two common tablespoonfuls (not heaping) or saleratus mixed with $1\frac{1}{2}$ pints of sweet milk. Give in one dose.

ANOTHER REMEDY.

Take 1 pint of whiskey and add 3 tablespoonfuls of common gunpowder. Give in one dose. If not better in an hour, repeat the dose, and give a pint of raw linseed oil.

The following is an excellent remedy for any form of colic, and should always be kept on hand. It should be given as soon as possible. If the dose does not relieve, follow it in half an hour with another :

Chloroform, 1 ounce,
Laudanum, 1 ounce,
Sulphuric ether, 1 ounce,
Linseed oil, 8 ounces.

LOCK-JAW.

This is a very serious disease and cannot receive attention too promptly.

CAUSE.—Exposure to cold, standing in the rain, hard driving, then suddenly cooling, fatigue and hunger, injuries, cuts, bruises, driving of nails in sensitive parts of the foot, in shoeing, etc.

SYMPTOMS.—Stiffness, straggling gait, stiffness of the jaws, swollen tongue, flowing of saliva from the mouth and a flickering motion of the eyes.

TREATMENT.—If possible, give by the mouth one ounce of aloes and 2 drachms of calomel. Give injections of belladonna, half an ounce dissolved in a pail of water. Give upon the tongue every hour, twenty drops of the following mixture:

1 ounce of dilute hydrocyanic acid,
1 ounce of the tincture of aconite.
Mix, and shake well together.

WIND-GALLS.

Wind-galls may be cured by tying on tightly a pad and bandage and leaving it on about two hours a day, morning and evening. They will usually disappear in the course of a week or two. Sometimes, however, it may take four or five weeks.

ANOTHER METHOD.

Draw the liquid out through the nozzle of a hypodermic syringe and apply a wet bandage. Wind-galls may be also removed by applying a strong solution of oak-bark and alum.

HIDEBOUND.

CAUSE.—Hard work, neglect, and exposure.

SYMPTOMS.—The skin sticks very close to the ribs and appears immovable.

TREATMENT.—To remove the cause is the first step necessary to be taken. The following receipt will cure most cases:

2 ounces of anise seeds, in powder,
2 ounces of ginger, in powder,
1 ounce of grains of paradise,
2 ounces of mustard,
2 ounces of turmeric.

All to be powdered, and to be given in warm water, fasting, and to fast two hours after. Bleeding, tipping and physic are also good remedies.

A CURE FOR THE CURB.

Apply the following receipt morning and evening:

Pulv. cantharides, 1 ounce,
Citrine ointment, 4 ounces,
Olive oil, 1 ounce.

HOW TO CURE A FISTULA.

This disease is the same as Poll Evil, but instead of being on top of the head it is located along the raised part of the back and over the shoulders, known as withers. It is due to some violence or bruise.

TREATMENT.—Open it freely; when the bleeding has subsided, syringe it out with a ten per cent solution of corrosive sublimate. Get a druggist to prepare the solution, and use it carefully, it being poisonous. After springing it out rub well in over a large surface around the sore one ounce of cerate of cantharides. Clip off the hair and clean the skin well before applying it. After 24 hours grease it. After four days wash it and syringe it out again as before, and again after another week. If

this does not cure it, repeat the whole course as soon as the scabs of the blister come off.

FOR SORE MOUTH.

Borax, 2 drachms,
Alum, $\frac{1}{2}$ ounce,
Vinegar, 1 pint,
Soft water, 1 pint.

Shake well and wash the mouth every evening and morning. Feed little hay and feed a pint of flax-seed once a day until well.

FOR HARNESS AND SADDLE GALLS.

Wash the sore parts thoroughly with castile soap and warm water every evening. Then apply a solution of common salt and sugar of lead (equal parts) after each washing.

AN EASY WAY TO CURE GLANDERS.

1 ounce of rock alum,
1 ounce of white vitriol.

Powder these well and put them into a pint of warm vinegar, and syringe about one ounce up the nostrils every day.

A CURE FOR SWOLLEN LEGS.

Bandage the legs in cloths wrung from hot water and give one pint of linseed oil and one pint of sassafras tea.

Keep the leg bandaged for a few days, wringing out and applying cloths in hot water, whenever convenient.

Make a strong tea of equal parts of mullein leaves, mayapple roots, and poke roots, and add two handfuls of salt. Apply as hot as the horse can bear.

HOW TO MAKE OINTMENT FOR HORSES.

CRACKED HOOF OINTMENT.—Tar and tallow, equal parts melted together.

FOR GREASE.—Mix four ounces lard with one ounce white lead.

HEEL OINTMENT. To the Cracked Hoof Ointment add 3 ounces of verdigris to each pound.

FOR MANGE.—Soft soap, oil of turpentine lard, and flower of sulphur, 4 ounces each, mix well.

HOW TO DESTROY MITES THAT INFEST THE HORSE.

1. Mites are animal parasites that burrow in the skin, and under favorable conditions they can be transmitted to the mule or even to man, and may live indefinitely on the human skin. It can only be detected by a strong magnifying glass, moving among the scurf or scab of the infected skin.

The mite burrows little galleries in and beneath the scurf of the skin, where it hides and lays its eggs and where its young are hatched. The mite is wonderfully prolific, a new generation of fifteen individuals being possible every fifteen days, so that in three months the offspring of a single pair may produce a generation of 1,500,000 mites.

2. Chicken lice often infest the skin of the horse.

3. There is a parasite that attacks the heel and lower parts of the legs, especially the hind ones, and may be present for years without extending upon the body. This parasite lives on the surface, on the hairs, and among the scabs. It gives rise to great itching, stamping, rubbing of one leg with the other, and the formation of wounds, ulcerous sores and scabs. The intense itching will always suggest this parasite.

GENERAL TREATMENT.—Take two ounces of tobacco and two ounces of water; boil thoroughly and then apply to the skin after removing the scabs with a soft cloth or brush; repeat this every fifteen days. Or take 1 drachm carbolic acid, $2\frac{1}{2}$ ounces of water. Mix and apply until a cure is effected.

HOW TO STOP THE BLEEDING OF A HORSE OR OTHER ANIMALS FROM A WOUND, SNAG, CUT, or BARBED WIRE INJURY.

Make an application of dry manure, and it will stop the bleeding of a wound at once.

A CURE FOR THE ITCH, MANGE, ETC.

CAUSE.—It is a contagious disease caused by insects burrowing in the skin.

SYMPTOMS.—Dirty and rusty color of the hair, skin covered with scales and dandruff, constant rubbing, and pimples about the head and neck and under the mane. The hair falls out and the skin is dry and hard.

TREATMENT.—Wash the horse thoroughly all over with castile soap. Then apply the following mixture:

- 4 ounces of sulphur,
- 4 ounces of white copperas,
- 4 ounces of white hellebore root, in powder.

Mix together in two quarts of buttermilk, and rub the affected parts freely.

LOTION FOR MANGE.

Boil two ounces tobacco in one quart water; strain; add sulphur and soft soap, each two ounces.

HOW TO CURE CORNS IN HORSES.

These are caused by that portion of the foot being bruised which is the sensitive part of the foot. Have the foot pared away so as to admit of the shoe being fitted to the foot so as to set easy. Do not draw too close with nails. Apply a caustic to the corn, and repeat as often as necessary, keeping the foot clean and soft by hoof ointments, and all will go well shortly. Caustic, muriatic acid, chloride of zinc—either applied, will have a tendency to effect a cure.

NASAL GLEET, OR DISCHARGE FROM THE EYE AND NOSE.

The cause of this is neglect in distemper, or over-heat or cold; this is a white discharge from the nose, and is not contagious—and can be cured.

CURE.—Stop working him—give of alum $\frac{1}{2}$ pound, resin $\frac{1}{2}$ pound, blue vitriol $\frac{1}{2}$ pound; grind and mix well with $\frac{1}{2}$ pound of ginger; give one large spoonful every night and morning—bleed one gallon. Keep him out of the wet, and do not work him.

SPAVIN.

ONLY SUCCESSFULL TREATMENT FOR SPAVIN.

A SURE AND CERTAIN TEST FOR SPAVIN.

Stand close to the side of the hind foot, face backwards, place the hand that is next the horse on and above the hock joint behind, as shown by our engraving; lean your weight on this hand, while you bend over and behind the horse's leg and examine the hock on the inside from above and behind, leaving your other hand free to examine and press the inside of the hock with thumb and finger, to detect any tender spot, bony enlargement, inflammation or heat. Many horses will flinch at having their hocks thus examined, but do not mistake this for tenderness. See if there is not some particular spot that is tender and hot, with a slight enlargement. It is always best to have some person hold up the fore leg of the horse on the side you are examining, to avoid danger. This examination must not be hasty or rough.

WHAT CAN BE DONE FOR SPAVIN.

If the horse is not lame, and the lump does not increase, better not try any active treatment, or it may bring on increased action and prove more serious. If it is situated high up, and a bony deposit already taken place, the joint is incurably affected. You may burn, blister, punch, or even chisel the bunch off, but you can never restore the

delicate membranes and cartilages which have become bone, to their former state. The bunch may often be removed so that, to all appearance of the eye, the horse is sound unless tested for it.

THE MOST SUCCESSFUL MODE OF CURING IT.

On the first appearance of the inflammation which produces the spavin, certain means can be adopted which will produce a cure. It generally takes about three weeks for a spavin to develop, and the spot to become tender to pressure, and in a short time after, the spavin will be apparent to an experienced eye. During these weeks is the time to treat it, for this is the curable stage, and the destruction of the joint avoided. The first step is good food and perfect rest in the stable, with no driving of any kind. The next step is to reduce inflammation. This can be done by keeping the joint wrapped with a few thicknesses of cloth, or a sponge applied, and kept wet with water, or the following lotion:—

Sugar of Lead, 2 ounces,
Acetic Acid, 4 ounces,
Water, 1 quart.—Mix.

As soon as the inflammation has gone, apply a portion of the following blister, made as follows, and repeat it two or three times as may be necessary, at intervals of two or three weeks. When the parts have recovered from the effects of blistering, a run at pasture for six or eight weeks will be very desirable treatment:—

Biniiodide of Mercury, 2 drachms,
Powdered Cantharides, 1 drachm,
Fresh Lard, 2 ounces.—Mix.

The above should be thoroughly rubbed in. as its object is to stimulate absorption of the spavin. It will check all further growth, and render any increase in size impossible. Give internally, for three months, one drachm of iodide of potassium in a mash, daily.

A WARNING ABOUT TREATING SPAVINS.

It will be well for owners of horses to remember that

the bunch that shows on the inside of the hock, is merely the outward symptom of the disease, while the real seat of the trouble is deep within, and the taking off the bunch in an old case, will not cure the spavin, but may make a bad matter worse. Firing or actual cautery is an excellent method of treatment, but it takes good judgment and experience to do it properly. We give an article on how to fire properly, in another part of this work, which can be consulted.

CURB.

WHAT ITS CHARACTERISTICS ARE.

It consists of an enlargement, or a gradual bulging out of the rear part of the hock, which is caused by an injury to the tendon of that part. It is easily detected.

ITS TREATMENT, AND HOW TO SHOE.

If the curb has recently appeared, have the heel of the shoe made a little thicker than those in ordinary use. Fomentations should be applied, with a view of reducing the inflammation, and afterwards hand-rubbing may be employed, in order to promote the action of the absorbents of the parts, and stimulate them to remove swelling. It is never advisable to resort to any severe treatment in the first instance; but if the lameness recurs, as is occasionally the case when the animal is put to work, it will be advisable to apply a blister to the part, which may be prepared as follows:—

Biniodide of Mercury, 1 drachm,
Fresh Lard, 4 tablespoonfuls.—Mix.

Apply every night until a watery discharge exudes through the pores of the skin; foment twice a day with warm water; continue bathing for two weeks. When a young horse throws out a curb, absolute and long-continued rest are imperatively demanded; in an old horse such is not the case, unless to a limited extent. Do not work the horse for four or five months, at least. The

high-heeled shoe should be kept on for some time after the animal recovers from the lameness, and when any change is made it must be done very gradually; otherwise the animal will be liable to renew the injury.

RINGBONE.

WHAT IT IS AND ITS DIFFERENT EFFECTS.

Ringbone, splint and bone spavin all resemble each other in character, being a bony deposit or enlargement, differing only in location. The disease may affect the large pastern bone, the small pastern bone, the lower pastern joint, the joint between the small pastern and bone of the foot, or any two or all of them. It may entirely lock the joint, making it immovable; it may extend almost entirely around the part, or merely be a small enlargement in front. Sometimes the rear portions of the joint only are affected, the front being free. When the sides only are affected, it is not so serious. Ringbone, which affects the small pastern and coffin bone, is the most difficult to treat. Its size is no criterion as to the amount of lameness. The enlargement is not the disease, but an effort of nature to strengthen a part naturally weak, or that has been injured by working the animal before the bones are matured. It will thus be seen that it is of serious or minor importance, according to location, size, etc. We give an illustration of a case which involves all the bones. The joint at figure 1 is still capable of some motion, but the coffin joint at figure 2 is immovably locked.

MANY CAUSES OF RINGBONE.

It is a peculiarity of ligaments, membranes, etc., on or near any joint, when injured and inflamed, that they are liable to produce an ossification or formation of spongy bone, which attaches itself immovably to the bone or joint proper. A severe strain inflames the joint, inflammation ensues, and lymph is secreted. This is gradually changed into porous bone, and a ringbone is the consequence. There is no doubt but what it is inherited to a

certain extent. That is, the colts of a ringboned sire are very sure to become ringboned at an early age. We know of one breeder of fancy trotting stock who made a complete failure from the fact that his colts, sired by a speedy yet ringboned stallion, all became more or less ringboned at an early age and were valueless.

THE PROPER AND BEST TREATMENT OF IT.

The first thing to do in the commencement of a ringbone, is to allay the inflammation and prevent any further secretion of lymph in the part. Apply cloths to the surface, which must be kept constantly wet with the following lotion:—

Sugar of Lead, 2 fluid ounces,
Acetic Acid, 4 fluid ounces,
Water, 1 quart.—Mix.

After the inflammation and pain has subsided, apply on and around the margins of the ringbone, with smart friction, some of the following blister:—

Biniiodide of Mercury, 2 drachms,
Lard, 4 tablespoonfuls.—Mix.

As soon as blister subsides, apply again. Continue the treatment for at least two weeks.

If the opening is not large enough to allow the particles of bone to escape, it must be enlarged by the knife, and in some instances the forceps must be used to remove the dead bone. The lotion should be continued until healed.

LAMPAS.

A BARBAROUS PRACTICE.

This is a favorite disease with some stablemen, who are never so happy as when showing their skill in operating with a hot iron on the tender bars of the horse's mouth. If a young horse is "off his feed", a hot iron is their panacea.

WHAT THE DISEASE IS.

If affects young horses before they have their full com-

plement of teeth. Young horses changed from pasture to dry, hard food in the stable, will be troubled with it. The bars of the roof of the mouth slightly inflame and the horse fails to eat his food.

ITS SIMPLE TREATMENT.

Now, knowing its cause, how easy to cure. Merely give soft food, consisting of bran mashes to keep the bowels open, soaked or scalded oats, boiled roots, etc., for a few days, and the trouble will disappear. We positively assert that no other remedies need be used. In case of loss of appetite take:—

Hydrochlorate of Ammonia, 2 ounces,
Sulphate of Soda, 8 ounces,
Powdered Gentian, 4 ounces,
Powdered Linseed, 2 ounces,
Spring Water, as much as sufficient to make an electuary.

Of this give two tablespoonfuls thrice a day, smearing upon the root of the tongue with a ladle.

DON'T BURN THE HORSE'S MOUTH.

It ruins the delicate sensitiveness to the touch of the reins so necessary in a pleasant, well-broke roadster. It often destroys the palate and makes the horse a confirmed "wheezer". Of all practices descended from the dark ages, this is the worst. If humanity will not check you, remember you are taking money from your pocket in lessening the value of the horse.

BAD TEETH.

HOW THEY AFFECT A HORSE.

Sometimes a molar tooth projects up into a vacancy in the upper jaw, caused by the loss of a tooth, and having nothing to keep it worn down, finally pierces the gum of the jaw. It makes it difficult for the horse to eat, and he will sometimes throw out a mouthful after it has been partially masticated. It may so affect the face and jaw as to cause nasal gleet. In some cases the molars are worn off by uneven action,

to a knife-like edge, and wound the sides of the mouth as well as the hand when introducing a ball. These troubles can be relieved by an operation performed with a tooth rasp. For any wounds, the chloride of zinc lotion for "injuries to the mouth", will be all that is necessary. Bad teeth are often an unsuspected cause of indigestion and other troubles which puzzle the owner.

WOLF TEETH.

Many people imagine that "wolf teeth", as they are called, by some mysterious means, reach up to the eye and affect it in some manner, and many other ridiculous fancies. They are merely superfluous teeth. The idea that they are injurious has become so firmly engrafted on the public mind, that it is almost impossible to eradicate it. In the great majority of cases, horses affected suffer from recurrent ophthalmia, the teeth having nothing to do with the causation of same.

COMMON COLD.

DESCRIPTION OF THIS AILMENT.

It is caused by exposure and neglect, after which the horse is dull, the coat rough, the body of unequal temperature, in parts hot, and in others icy cold. Often tears trickle from the eyes, which may be slightly inflamed. At length a copious discharge flows from the nostrils.

WHAT TO DO IN THIS CASE.

Blanket the horse warmly, and if possible, steam the nose. The ordinary feed nose-bag is too short, but a substitute can be made from the ordinary two bushel bag, by attaching straps to its mouth to go over the head. Put a peck of bran and a handful of hops in the bottom of the bag and pour on the following mixture: Spirits of turpentine, two tablespoonfuls, solution of carbolic acid, two tablespoonfuls.

SURE AND SAFE CURE FOR LICE UPON COLTS, HORSES, CATTLE AND HOGS.

Powdered Aloes sprinkled by means of spice box or pepper box. It should be freely applied as it is to be used in a dry state. Its application is as safe in cold as in warm weather. Other remedies that are just as effective are given in another place in this book but are intended to be applied only in warm weather.

ANOTHER REMEDY.

It is evidence of bad care for any man to allow calves or colts to become lousy. (I wish to save my own reputation by saying that such a thing has scarcely ever happened to my stock, albeit I confess that I am rather a slack-twisted farmer.) But here is the remedy: Put a blanket over the animal and then blow thick clouds of tobacco smoke under it. This may best be done from a common bee-smoker, or one can be easily and simply made. This will kill every louse and every nit and the fumigation will not injure the animal. "Follow up the treatment," as the doctors say, with good care, cleanliness, etc. I saw some fine Berkshires at the late State Fair, which were very lousy, though the owners did not probably know it. An approved remedy is mercurial ointment—diluted with lard—and then better care of the swine.

A SURE CURE FOR STOPPAGE OF THE BOWELS.

Take two quarts of soft and fresh horse manure, add one quart of boiling water, strain through a common cloth strainer; give one pint as a drench. This will cure all ordinary stoppages of the bowels. In case the bowels are paralyzed there is no cure and any severe medicine would only hasten the death of the animal.

TREATMENT FOR LAZY HORSES.

Some horses are naturally lazy, but we believe it a man's own fault if he is annoyed with the slothfulness of his team while at work. The yelling and whipping that

it takes to urge some teams to move even at a moderate gait is quite trying on the constitution. A steady lashing of the whip is sometimes resorted to for the treatment of such horses, which to say the least is a cruel treatment, and seldom has the desired effect. The horse that has acquired a lazy habit, and is used to being drubbed all day, becomes so inured to the treatment that it has but little or no effect upon him. Perhaps the most successful way to break up this slothful habit, for it is a habit more than anything else, is to undertake it with a view to breaking it up thoroughly, the same as you would rid a horse of any other acquired vice. A few lessons in a wagon or breaking cart would be all that would be needed, provided they were of the right kind. The treatment would necessarily be severe, for in all probability the habit was formed on account of the kind and gentle treatment of some former master. A severe application of the whip may be necessary at first, and perhaps for some time, but if each touch of the whip is accompanied by some word that is used afterward when prompting a horse to more rapid action, the use of the whip can soon be dispensed with. A half dozen lessons of the proper kind should suffice for the laziest horse, if they are properly administered. By using certain words when a quick move is required, and using them only at the time such action is wanted, first accompanying their use with a cut or a crack of the whip, a horse will soon act as promptly at the sound of these words as he will if struck with the whip. Prompt, positive action on the part of the driver has much to do with the action of a team, and lazy men are often responsible for lazy horses.

A HALF DOZEN WAYS TO TREAT BALKY HORSES.

The following different ways of treating balky horses are recommended: First, pat the horse on the neck, examine him carefully, first one side and then the other; if you can get him a handful of grass give it to him and speak encouragingly to him, then jump into the wagon and give the word go, and he will generally obey. Second, taking

the horse out of the shafts and turning him around in a circle until he is giddy, will generally start him. Third, another way to cure a balky horse is, place your hand over his nose and shut off his wind until he wants to go. Fourth, then again take a couple of turns of stout twine around the forelegs just below the knee, tight enough for the horse to feel it; tie in a bow knot; at the first click he will probably go dancing off. After going a short distance you can get out and remove the string to prevent injury to the tendons. Fifth, again try the following: Take the tail of the horse between the hind legs and tie by a cord to the saddle girth. Sixth, the last remedy I know is as follows: Tie a string around the horse's ear close to the head; this will divert his attention and start him.—*North British Agriculturist*.

The worst way is to get angry and swear at him.

THE HORSE EPIZOOTIC.

(By Wm. Horne, V. S.)

This disease has manifested itself in most of the towns and cities of the Northwest. The present state of the weather is very favorable indeed, and will largely help to modify the attack. Should the weather change to wet and cold the conditions will be vastly different, and we may then expect a persistent attack of influenza. Should the weather so change, every precaution must be taken to preserve all the vitality by every possible device. Warm clothing, little or no work, good warm stables, with a good supply of pure air, are all indispensable. Under no circumstances should those depleting measures be resorted to, which were so disastrous in 1872. My firm conviction is that hundreds of horses were murdered outright by debilitating and exhausting nostrums and practices. I saw hundreds of horses in Chicago which were nearly blistered to death. Many of them did die. In one stable alone, I used to see daily over 60 animals which had been thus tortured and destroyed, and that too by one who assumed to be a veterinarian.

In many cases medication is absolutely necessary. In the majority of cases medicines are not, but every remedy

which will hold up and brace up the vital functions should be resorted to. One of the simplest and best is a strong decoction of caraway seeds. To one pint of this add half an ounce of tincture of ginger and four ounces of good whisky (pure brandy is better). Give twice a day, if much dejection and weakness be present. This will be very good at almost any time. Or simple stimulants may be given without fear of doing wrong, but with every reasonable hope of doing much good. Everything which has a tendency to exhaust the system will surely do harm. Everything which has a tendency to stimulate and build up the system will most assuredly do good.

COLIC IN HORSES.

One cause of colic in horses is giving cold water while they are sweating; another allowing the horse to drink a large quantity of water after a heavy feed and then driving at a fast speed, or again permitting it to draw a heavy load under similar circumstances. Another cause of colic is feeding the horse grain when very hungry. This animal generally eats very fast when hungry, and a large portion of grain thus passes into the stomach without being masticated, and finds its way into the intestines, where it swells and ferments. When a horse has traveled a long journey, it is best to give it a little hay before it is fed grain. Youatt says: "Some of the oats are imperfectly chewed by all horses, and scarcely at all by hungry and greedy ones." Careful attention to the feeding and working of horses would save them from many diseases with which they are now liable to be attacked. It is poor economy to feed grain to horses which they do not masticate, if no other evils attended it, for it is only the thoroughly masticated food which renews the energies wasted by labor. In England, horsemen are rolling oats in order to insure their mastication. New oats should not be fed to hard-worked horses, nor old musty ones; the latter should be kiln-dried before being fed.

When a horse has the colic give him perhaps two tablespoonfuls of spirits of turpentine. Put the turpentine in a saucer and add flour enough so that it can be made into

a little ball, the size of a small hen's egg. Hold up his head and put the ball as far back in his mouth as possible, when he will chew and swallow it. I have seen horses speedily relieved from a very severe attack of colic by this remedy.

BETTER BROOD MARES.

A good many farmers that pretend to raise horses are fooling their time away by the use of poor mares. Some of these are poor on account of smallness. They listen to the seductive story that a cross between a Percheron or Clyde, and a Texan pony or broncho will produce a "common-purpose horse", and conclude they may as well have a cheap mare as a good one.

Whilst there is little danger in foaling with these small mares, and while much that is claimed from this cross is true, it is all foolishness nevertheless. The farmer should not fool away his time with ponies, or mustangs, or bronchos. If you have a lot of this truck make a sale and get rid of it, and get a good, large mare, or, if possible, a grade Percheron or Clyde. One colt from this cross and a draft horse is worth two of the other, and will sell for twice the money and a great deal more readily. Don't raise two colts when you can get the same money out of one.

Next, many mares are poor because unsound. Avoid the brood mare with suspicious eyes, or bad legs, or bad morals. By bad morals we mean horse vices, such as kicking or biting or sulking or being balky. If you don't wish your boys to learn to swear, don't raise any balky horses. The habit may not be perpetuated, but the nervous, fretful disposition out of which it grows will be.

In the course of your life you will meet with enough balky men to try your patience without raising balky horses. You will find enough vice among men without turning your farm into a vice-breeding establishment.

Some mares are unfit to be used as dams, because they are not level-headed. They have not good sense and their colts will be in a measure like them. We are a stout believer in the doctrine of "original sin" in horses and

cattle, and the less of it you start with the less you will get in the young things. But the original sin is not all on the female side, either in stock or men, and therefore it is essential to avoid vicious sires as well as dams. No sire that is vicious should be used under any circumstances, nor one that has bad legs or bad eyes.

GROWING MARKETABLE HORSES.

It may be said of horses as of wheat that any and all grades are marketable, but the farmer who has, from year to year, grown wheat knows very well that when he succeeds in getting in a crop that grades No. 1, he barely gets day wages for growing and marketing the crop, after counting all contingent expenses. This being so, if his crop turns out to be of low grade there is no escaping loss upon it, because in no particular is it grown for less money per bushel than it costs to grow the best. The same rule holds good in the dairy, as shown by the fact that the butter or cheese from a given herd of cows will be first class if made by one party, while in the hands of another the lowest grade only is produced.

Horses, like wheat and butter, take rank in market according to their quality, and the good, that sell for high figures, feed in the same pastures and eat the same quality of oats and hay as the veriest plug. All horses that can do duty must be said to be marketable, but in the sense that rejected wheat is marketable, only at the lowest figures, though all the processes through which the low-grade stock is carried is as expensive in the case of the poor in quality as in the case of the best, save and except the influence of the seed used, and this of course cuts an important figure. But says one, to produce a good quality of grain of any kind you must have a good quality of seed as a foundation, and, applying this to horses, the start is more expensive if a man would have stock marketable at good figures than though he grew animals of lower grade. This, in a measure, is true, yet men who own fairly good brood mares, for the purpose of saving the paltry sum of ten or fifteen dollars in the service of a sire, will continually rear horses for which they get

only low prices. The difference that grows out of the service of a good sire, as compared to one of low grade, not infrequently makes a difference of one-third in the selling value of a mature horse, and it is fair to place it higher than this in many cases.

BREAKING COLTS.

“Educating” is a better word than “breaking” when applied to colts reared by intelligent and humane horsemen. Though many a colt is really “broken” in training, there is seldom, if ever, any necessity for such a course. Take a “sucker” when he is too young to have any very pronounced opinions of his own, and there will be found but little trouble in making him understand that his master is really his best friend. When this has been accomplished no further trouble need be anticipated, so far as an intelligent colt is concerned. Unfortunately, occasionally it happens that a horse is met with that has been a fool, and of such an animal it is difficult if not impossible to make a horse that can ever be handled with any degree of safety. It often happens that a really intelligent horse becomes possessed of a vice that is troublesome and dangerous, but such a case never presents the difficulties which characterize that of a horse that has been born a fool. As long as a horse has intelligence he can be educated, no matter how strongly unfounded prejudice may mislead him. More than 99 per cent of the foals that are dropped have quite enough intelligence to enable them to get through the world pleasantly and satisfactorily, but the reason that so many horses are addicted to troublesome and dangerous vices is to be found in faulty education.

Too often the system of handling colts is something as follows:

The young thing is allowed to run with his dam and to make no human acquaintances. All he knows about boys and men is that whenever they get near him they hit him with a whip or make some (to him) horrid noise that thoroughly terrifies him. He very quickly comes to look upon boys and men as the most dangerous and trouble-

some enemies of the equine race in general and of himself in particular. This state of affairs continues till he is two or three years old. Then some day he finds himself being chased about a paddock and worried till he is half dead with fright and fatigue, and finally from sheer exhaustion he is compelled to allow himself to be handled. He does not know what is wanted of him, and all that he learns about it comes in the way of bitter experience. After trying every other course to escape punishment and fright, with disastrous results, he gives himself over in sheer desperation to a sort of sullen despair, and allows himself to be pushed about by his tormentors or hauled about by another horse that is harnessed with him, just because he has given up all hope of escaping the persecutions of his enemies. His spirit is broken and he is pronounced broken to harness. He is now obedient so far as he knows how to be, but he is so because he dare not be anything else, and not from any desire on his part to do what is right. Such a horse may do what is required of him, but he is liable to run away if suddenly frightened, to kick if anything touches his heels, and in short, to do almost anything that is objectionable in the very emergency when his good behavior would be most highly prized by his master. That is what may properly be styled "breaking" a colt.

If a man wants an "educated" horse he should begin by winning his confidence during the foal's baby-hood, the sooner the better. It does not much matter what the youngster is taught during his first summer, so long as he is thoroughly familiarized with the halter and accustomed to being handled freely (though always kindly and with gentleness). He soon learns to regard those who handle and feed him with the warmest friendship, and his highest ambition will be to merit their approval as evidenced by a kind word, a caress, or some little dainty of which he happens to be particularly fond. As he grows a little older he should be accustomed to the bit, to the harness and to other appliances to be used when he shall have arrived at a proper age to go into business. In this way the youngster really grows into his work. He is taught to carry his head properly, to draw, to turn, to

back, to be mounted, harnessed and unharnessed, all without any painful or unpleasant process. He grows up to be not the cowed slave, but the trusted, well-tried friend of his master. All that he does he does cheerfully and pleasantly; in short, he is an "educated" and not a "broken" one.

HORSE HINTS.

Being gentle with a horse will help him to be gentle.

Keep the colt fat and he will make an easy-going horse.

Sores on horses' shoulders are largely the result of ill-fitting collars.

An excess of food weakens a working animal and disables it from work.

Blood, food, care and training are the essentials necessary for producing a first-class horse.

To a very considerable extent the most costly farming is that done with poor teams.

There are few diseases to which horses are subject but are easier prevented than cured.

fort, but to its healthfulness as well.

Feeding a little wheat bran with the other grain will help to make the horse's hair sleek and glossy.

Good grooming does not only add to the animal's com-

The best farm horse is the one with a kind and tractable disposition, well broken and serviceable

The farmers will always be poor who continue to raise \$50 horses at an expense of \$100.

The feed and care necessary to raise a poor horse costs as much in every way as it does for one of the best.

A horse needs exercise every day to keep his system properly regulated and make his hair to be bright and sleek.

When the horse is brought in from work he should be given a good drink; if too warm to drink he is too warm to eat.

TAKE CARE OF THE COLTS.

A good many fine colts will be stunted this winter. They might make 1500 pound horses worth \$175; they will be

1200 pound horses worth \$100. The winter's keep or rather want of keep will do the work. The builder is wise who commences his house at the foundation. When the excavation is made full size and the stone laid well it is ready for the building. The first year is the foundation of the colt. It is a foundation that expands or contracts with food and shelter, and when once made cannot be changed. You can put additional foundation under your house, you cannot under your colt. The old notion that colts must learn to endure hardship and stand the storms and learn to love corn stalks and rye straw and thus become hardy horses is utter foolishness. That is the proper way to make plugs that are hardly salable at from fifty to seventy-five dollars.

You can raise them in that style, reader, from the best Norman blood. Keep them away from the oats bin or corn crib or stack of good hay, drive them out to the stalk field and let them sleep out during storms or in the snow drifts, and the work is done. You have knocked seventy-five dollars off the value of your future horse. If you don't believe it take two colts as near alike as possible, treat one of them in this way and give the other one gallon of oats a day or about twenty to twenty-five bushels during the winter, with plenty of good hay, good shelter at night and plenty of exercise, and the same treatment to both after the first winter, and when they are three years old you will learn a lesson in the value of oats fed to a colt with shelter and what hay it will eat.

We put in our plea for good, decent treatment in behalf of the most intelligent animal on the farm. We might add your own behalf. But we ask mercy and kindness to the colt, who in turn will put money in your purse.

STYLE IN DRAFT HORSES.

The better class of farmers have for years been breeding heavy horses. The move in this direction has been a wise one. Nothing on the farm pays better. Few things pay as well. But in this, as in all other matters, they have made mistakes. They have gone too much on mere size and awkwardness. A great big, raw-boned hulk,

with churn legs and a walking gait that would almost dislocate the joint of the luckless mortal that was forced to ride a mile, was regarded, and is yet regarded by some, as a model draft horse. Size is indispensable, but so is action and spirit to the really valuable horse. We have seen draft horses, so-called, that did not have sense enough to keep out of a wire fence. Good sense in a draft horse is almost as essential as in the roadster. Nothing is more provoking about a farm than a horse that is clumsy, awkward, and a born fool. The good horse of any type is level-headed, broad-minded, sensible. No other should be used for breeding purposes. Equally as essential is a brisk movement. There is no more need of a large horse being ungainly, awkward and slow than of a large man. Who has not noticed that some of the most graceful dancers are large men and women? Their size, instead of detracting adds grace as well as dignity to their movements. Why should it be different with a horse?

Another essential in a draft horse is spirit, courage, nerve force. We have known a span of these big, clumsy draft horses stall over a load that was pulled out by a span of plucky mules not above the average weight. What they lacked was spirit and courage.

These are matters of inheritance. Luck has nothing to do with it. When the selection of sire and dam is made, the spirit of the colt is fixed. That spirit may be perverted or spoiled by misuse, but no wise treatment can put spirit or courage in a horse whose sire or dam have been lacking in these. You can't put sense into a fool nor courage into a coward in either man or horse; courage, spirit, activity, these form style in a draft horse.

How to Breed and Care for Cattle.

CONTENTS OF CHAPTER.

BREEDS OF CATTLE.—The Short Horns, their origin and gradual improvement—The Ayrshires and their qualities as a dairy breed—Holstein and Dutch cattle and their characteristics—Unrivalled qualities of the Alderneys, Guernseys, and Jerseys as butter makers—The Devons and Herefords—Native cattle.

DIFFERENT BREEDS.

SHORT HORN CATTLE.

This breed of cattle has attained a distinction and won a substantial appreciation which no other race has so fully and widely enjoyed among the enlightened graziers of the world. From Great Britain its dissemination has extended to the continent, to Australia, to South Africa, South America, Mexico, and the West Indies, while it has secured almost a monopoly of the importations of this country and Canada. For the grass pastures of the Ohio valley, and the abundant, natural, and cultivated grasses of the broader prairies of the Mississippi region, it is admirably fitted, and held in high esteem as the most economical machine for the speediest conversion of corn and grass into meat and money.

The original short horns occupied the east of England, Yorkshire, and the valley of the Tees at the date of the earliest records of British stock-growing. They were various in size, color, and other peculiarities; the dark-skinned herds of the fens resembling the black cattle of Holland marshes, and the finer forms of Yorkshire and Durham assuming the style and quality of the noted cattle of Holstein and Jutland; and yet it may not certainly be known whether the ancient emigrants from those localities brought this stock to England, or whether

No. 1. Feed Yards Kansas Agricultural College.

No. 2. Fat Steer Challenger,
Grand Champion at International
Live Stock Show 1903. Owned
by University of Nebraska.

No. 3. Pure Bred Short Horn Cow, Roan Marvel. Owned by
University of Wisconsin.

this similarity is the result of climate and keeping. It was, at least, a race very distinct from that of Ireland and the west of England, with long horns, thick skins, and a heavy coat of hair, well suited for their protection in a climate subject to continuous seasons of rain. It is well known in later times that Dutch and Danish importations modified these cattle of the east of England, and suggested the more recent and greater improvements of Charles and Robert Colling, commencing about the era of our revolution, and continued successfully since by Messrs. Bates, Booth, Townley, and others in England, and Thorne, Alexanders, and other breeders in this country.

The story of the bull Hubback, the founder of the modern short horn, has often been told. He was purchased in 1783 by Charles Colling of his brother and a Mr. Waistell for eight guineas, and is said to have been from a cow grazed by a poor man on the highway. It has long been a matter of controversy whether he was a pure-bred Teeswater, the short horn of that day. He was somewhat below the usual size of the Teeswaters, yellow, red, and white in color, of a fine, compact form, admirable touch, and so easily fattened that he early became useless as a bull. The cow, also purchased by Colling, acquired fat very rapidly, and never again bred. Either from mere curiosity, or from a suspicion that he was impairing the constitution of his animals by continuous breeding in too small a circle, Colling attempted the experiment of infusing some of the Galloway blood, which was confined, it is understood, to a single cross upon certain individuals of his herd. At the sale of Charles Colling, in 1810, forty-seven animals produced 8,911 guineas. Robert Colling, not so renowned, but esteemed by many quite as judicious a breeder, sold sixty-one (but six of them bulls) for 7,484 guineas. High prices have been maintained by later breeders. Mr. Bates, in 1850, sold one family of Duchess stock, including calves, at an average of \$581. Lord Ducie's herd, in 1853, realized an average of \$760 for sixty-two animals. Individuals of superior excellence, from the day when

Colling's "Comet" sold for 1,000 guineas, have commanded fabulous prices. Similar prices have been obtained in this country.

There were at least five-hundred herds of pure-bred short horns in Great Britain ten years ago, and from six to seven thousand head are registered in the herd book every alternate year at that period, and these numbers are yearly increasing in accelerated ratio.

Derived from a large breed, the improved short horn is heavy, less in height than the originals of the Tees, rounder and deeper in the trunk, the limbs shorter, chest and back broader, appearing less in bulk, while really greater in weight. The skin is light colored, hair reddish brown or white or mixed, the muzzle flesh colored, the horns shorter and lighter colored than in the former breed, the skin soft to the touch, the form square, the shoulder upright, and the hindquarter large. The color cannot be characterized by a single term, varying greatly from a pure white to a rich red, a mixture being the fashion, known as roan or strawberry. The skin should be velvety and not too thin, while the hair should be plentiful and of a mossy softness. The head of the female is finer and more tapering than that of the male, the neck thinner and lighter, and her shoulder inclining to narrow towards the chin. The short horn looks smaller than he is. He excels all other stock in facility of fattening, making good and heavy beef in thirty months and even in two years.

The idea is somewhat prevalent that short horn cows are not good milkers. It has been obtained, without doubt, from the fact of the well known efforts made to perfect their fattening qualities, in accordance with Bakewell's saying that "all was useless that was not beef"; and it is true of many families of short horns. Others are superior milkers. The original Holstein blood of the Durham and Holderness districts was famous for its milking quality, and it is difficult to breed it out with all the culture which modern improved short horns have received. The modern Holderness stock at this day chiefly supplies the London dairies, and many of their

best milkers have strong strains of the improved blood. The Duchess stock, of great celebrity and purity, bred by Mr. Bates, was distinguished for its excellence in this respect. Some short horns in this country have yielded ample supplies of milk of excellent quality.

CHARACTERISTICS OF AYRSHIRE CATTLE.

The leading cattle breeders of Britain have of late years, for the most part aimed to establish in their stock some particular property in a high degree, beef or milk, according to circumstances, being the leading object. Hence it has occurred that British cattle have latterly been classed under the heads of "beaf breeds" and "milk breeds". Prominent among the latter is the Ayrshire breed, which originated in the county of Ayr, Scotland, and within the last fifty years has been disseminated over every part of that country where dairying is much practiced.

They have been introduced into the United States and the British provinces of North America, and, at the present time, are probably more extensively kept as a dairy breed than any other in the world.

Importations of Ayrshire cattle into this country were made upwards of twenty years ago, but the animals were neither numerous nor generally in the hands of persons who took much pains to increase them. It was not, therefore, until a comparatively late day that the Ayrshire were much known here, or that specimens were sufficiently numerous to indicate the permanent establishment of the breed in this country.

A few remarks in regard to the origin of this valuable breed of cattle, in connection with their comparative value for dairy purposes, may not be out of place.

It is evident that the modern Ayrshire breed presents a wide contrast to that which occupied the western portion of Scotland many years ago. It follows, therefore, that the modern breed, like various other valuable breeds of domestic animals, originated in crossing. The question as to the breeds from which it was derived will be briefly considered.

Various accounts represent that the Earl of Marchmont, some time between 1724 and 1740, introduced to his estates in Berwickshire some cattle, conjectured (their history was not positively known) to be of the Holderness or Teeswater breed, and that not long afterwards some of the stock was carried to estates belonging to the same nobleman in that part of Ayrshire called Kyle.

But it is not improbable that the chief nucleus of the improved breed was the "Dunlop stock", so-called, which appears to have been possessed by a distinguished family by the name of Dunlop, in the Cunningham district of Ayrshire, as early as 1780. This stock was derived, at least in part, from animals imported from Holland. The Dunlop cow soon became noted.

Professor Low says: "From all the evidence of which, in the absence of authentic documents, the case admits, the dairy breed of Ayrshire cows owes the characteristics which distinguish it from the older race, to a mixture of the blood of the races of the continent, and of the dairy breed of Alderney."

In addition to the foregoing evidence respecting the origin of the Ayrshire cattle, it should be stated that the present leading type of the breed was formed in part by an infusion of the blood of the Kylvie or West Highland breed. Theophilus Parton, of Swinley farm, near Dalry, Ayrshire, about fifty years ago took great pains to establish a herd of what were deemed the best Ayrshire cattle, into which he infused a strain of the West Highland blood, the particular degree of which is not publicly or generally known. The Swinley stock differs from the older Ayrshire in having a shorter head, with more breadth across the eyes, more upright and spreading horns, more hair, and that of a more mossy character, and generally better constitutions. They are also somewhat smaller boned than the old stock, though from their superior symmetry and greater tendency to fatten they are fully equal to the former in weight of carcass when slaughtered. The colors preferred are brown, or brown and white, the colors being distinctly defined.

In the competition at Ayr, in 1861, for a prize offered

by the Duke of Athol, the average weight of milk per day, for two days, from six cows, was about fifty pounds, the cows being milked twice a day. The cow which took the first prize gave an average of fifty-seven pounds per day. On this occasion, the Duke of Athol stated that the cow (then in his possession) which received the first prize of the previous year had given an average of upwards of twelve quarts of milk per day for a year, actual measurement having shown a product of one thousand one hundred and ten and a half gallons in something less than twelve months. Comparatively few accurate trials have been made with specimens of the breed in this country. One of four imported Ayrshire cows, gave in one year three thousand eight hundred and sixty-four quarts of milk, beer measure. One of the cows, imported by the Massachusetts Society for Promoting Agriculture, in 1837, was said to have afforded sixteen pounds of butter per week, for several weeks in succession. The imported cow, Jean Armour, in 1862, gave an average of forty-nine pounds of milk a day for one hundred and fourteen days, commencing June 1st; and for the month of July her average was fifty-one pounds thirteen ounces per day. Her milk for three days in July yielded six pounds of butter. Her live weight at the close of the trial was nine hundred and sixty-seven pounds.

It will be understood, from what has already been said, that the dairy is the leading object with the breeders of Ayrshire cattle. At the same time the important fact has not been overlooked, that to breed and perpetuate a profitable dairy stock, regard must be had to hardiness and strength of constitution, and also to such fattening tendencies as will insure a profitable return from calves, fattened for veal, from steers, reared for beef, and from cows, which, having served their turn in the dairy, are at last dried of their milk and prepared for the shambles.

Few trials have yet been made with the Ayrshires in reference to fattening in this country, as most of the males have been kept for bulls, and the females have seldom been turned for beef till too far advanced in years to breed.

HOLSTEIN AND DUTCH CATTLE.

The Holstein cattle are not only large and well developed, making good beef cattle, yet, at the same time, are extra good milkers for the dairy. They have not been imported in so large numbers as the short horns, nor subject to so much speculative dealing, yet of late years they are coming rapidly into notice as a very profitable breed—for the stock raiser or for dairying.

Now, properly speaking, everything from Holland is Dutch; so, with propriety, these Holsteins might be called Holland or Dutch cattle, were there not a class of breed of black and white cattle in this country, known and recognized under the name of Dutch or Belted, which are totally different from the Holstein or Holland cattle in most respects.

The Dutch or Belted cattle come from Germany. They were first raised more for their peculiar markings than their superior qualities; are almost entirely black, with a white band or stripe of white around their middles, and are generally known as Belted cattle. In answer to questions whether the so-called Belted and spotted Holsteins are the same breed of cattle, differing only in form of these color markings, we would say that most decidedly they are not the same, coming as they do from different sections of the country. Belted cattle are never seen in Holland, and are of very different form, smaller, different temperament, and yield much smaller quantities of milk than the spotted cattle. In short, the Belted cattle are not Holsteins, and are not admitted to the Holstein Herd-book.

ALDERNEYS, GUERNSEYS AND JERSEYS.

These are cattle imported from the British Channel Islands of the same names. While small in size, yet their milk is noted for exceeding richness, and the butter for its rich golden color, hardness of texture, and nutty flavor. They are emphatically butter breeds. The regulation of their breeding in their native homes is very

No. 1. Pure Bred Jersey Cow "Double Time". Record for the year ending September 24, 1906, Milk 11,357.9 lbs., average per cent fat 4.58; Butter 606.7 lbs.

No. 1. Group of Prize Winners Kansas State College.

strict; and the breed is preserved from intermixture with other breeds by strong and arbitrary laws, very carefully enforced. No cattle are allowed to enter the islands (except for slaughter within a certain number of days), with the exception of oxen for draught.

The Jersey cattle's predominant characteristic is butter qualification, and they have no superior in this. But have the extra pains been exerted to develop the size of this breed that has marked the development of the foregoing breeds? Have not the Jersey breeders rather scouted size and tried to improve only butter qualifications, to the detriment of size? The Jerseys breed very young, thus stunting growth; we have heard of instances of breeding at fifteen months old; that is dropping a calf at that age. Also have heard of Jerseys making one pound of butter from four quarts of milk; and this seems to be the great object. Those actually exported from these islands are generally from Jersey, where the cattle are much the same as those of Alderney, small, with tapering heads, and of a delicate fawn color, and occasionally a smoky grey. The Guernsey cow is esteemed by some even more highly than the Alderney; it is rather larger, coarser, and more of a red, brindled in color. The addition of one or two cows of these breeds to a dairy, materially improves the appearance of the butter made.

THE DEVONS.

This breed of cattle do not average so large as the short horns, consequently are more active, and better adapted for hilly and rolling pastures. They make the best of working cattle, being quick walkers, and docile disposition. As milkers they are not equal in quantity to Ayrshires, but the milk is rich in quality. They are a breed for general utility. They are a bright cherry red color.

THE HEREFORDS.

Bodily, this breed is one-fourth larger than the Devons.

They are shorter legged and more beefy. Their general color is red, and white, or mottled face. They are emphatically a breed for beef, being good feeders, easily kept, and possessing, when slaughtered, beautiful lean meat, largely in proportion to fat. They are fair milkers, yet not so good as the Ayrshires.

NATIVE CATTLE.

The introduction of native cattle into Mexico by the Spaniards, as early as 1525, was probably the origin of our vast Texan herds. In fact they resemble, at this late day, the native cattle of Spain, with their long horns, and leggy bodies. From 1607 to 1622 the English made an importation to their colony on the James river, Virginia; the Dutch, in New York, imported cattle commencing in 1625; importations were made by the English, in Massachusetts, in 1624, and following years; the Swedes, in New Jersey, in 1627; the Danes, in New Hampshire, in 1631; importations were made in Maryland, in 1633; in North and South Carolina, in 1660 and 1670; in Pennsylvania, in 1662; all by English. From these importations, in the main, our native stock have sprung, with no distinct breed, or specific characteristics. While they may not have been up to the standard of the heavy body and points of the short horn, yet they were of considerable merit as milkers.

The length of time elapsed, with the absence of all records render it impossible to trace any direct pedigree of our native cattle. An attempt has been made by some writers to trace the origin of our common stock to the English Devon. It is quite likely that this breed did mingle largely in the early importations, from the fact that early settlers of our country were from the South of England, or embarked from ports in that district where the Devon cattle at that time were the prevailing breed.

No. 2. Champion Aberdeen-Angus Steer Herd at the 1906 International. Fed and Exhibited by the Minnesota Agricultural College.

No. 1. Prize Winners State Agricultural College, Kansas.

No. 2. "Blackrock" International Grand Champion Steer, 1905, State College of Iowa.

No. 3. "Disclosure" Pure Bred Hereford Steer, First Prize at International, Chicago, 1906.

No. 3. Pure Bred Chevoit Yearling, First Prize International Live Stock Show, 1906, Owned by State Agricultural College of Wisconsin.

CHAPTER II.

DISEASES OF CATTLE.

THE CHEST, ABDOMEN AND URINARY ORGANS.

CONTENTS OF CHAPTER.

DISEASES OF RESPIRATORY ORGANS.—Inflammation of the Lungs and its treatment—Description and treatment of Pleurisy—Bronchitis and its remedies—The treatment of Catarrh or Common Cold—Malignant Catarrh and what to do for it—Other diseases.

DISEASES OF STOMACH AND ABDOMEN.—Bloating or Hooven and how to relieve it—Overloaded Paunch and its treatment—Impaction of the Third Stomach—Dry Murrain—Mad Staggers—Inflammation of Bowels and what to do for it—Diarrhœa—Scours—Dysentery and Bloody Flux—Scours in Calves and how to check—Spasmodic Colic—Belly-ache—Peritonitis—Choking with various articles—Worms.

DISEASES OF URINARY AND GENERATIVE ORGANS. Inflammation of the Kidneys—Inflammation of the Bladder—Bloody Urine—Red Water—Abortion in Cows—Removal of Dead Calf—Treatment of cows before calving—Milk Fever and its cause—Inflammation of Womb and how to treat it—Bloody Milk—Garget—Mammitis—Milk Stoppage—Obstruction of Teats—Leaking Milk—Sore Teats—Warts—Castration of Calves.

DISEASES OF THE RESPIRATORY ORGANS.

INFLAMMATION OF THE LUNGS.

The causes of this disease are over exertion and subsequent exposure, or exposure alone. It is ushered in

by a fit of shivering, a drooping appearance, loss of appetite, and subsequent feverishness

DESTROYING LICE ON CATTLE.

Alöes in fine powder is a specific for the destruction of lice on all animals, and as it has not poisonous properties, its intense bitterness being what kills, it can be freely applied, and as it is to be used in a dry state, its application is as safe in cold as in warm weather, consequently is free from all objections urged against other remedies. Use with a fine pepper-box, dusting and rubbing it in all over, and then curry out inside of a week. Or, take a pound of fresh lard, a fourth of a pint of kerosene oil and four ounces of sulphur powder—of flowers of sulphur; mix them thoroughly. With this mixture rub the animal's head, also along the spine, and upon the shoulder and brisket, and under the thighs, and wherever the vermin is seen. Repeat the operation once a week until the lice disappear, which will not be long. Or, take quassia chips, steep in water and wash the animal thoroughly. One application will kill the lice, and in case of nits that are not hatched, the second application, applied a few days after, will entirely rid the stock of the vermin.

GRUBS IN THE SKIN.

The grubs are produced by the eggs deposited by the gad-fly during the latter part of the summer. They may be prevented by moistening the hairs on the shoulders, back, and loins of cattle, every other day, with a decoction of white oak or walnut leaves. When present, they may be removed simply by squeezing them out with the fingers. When present in large numbers, they of course cause considerable irritation in the skin and underlying tissues, and thus may interfere with the well-being and thriving of the cattle.

SELF-SUCKING COW.

A self-sucking cow is prevented from thus indulging by an Illinoisian, who puts a halter or strap over her

head that will hold a common bridle-bit in her mouth. She eats and drinks just as well as without it after a little, and is finally cured of the propensity.

ARTICLES IN THE EYE.

Hay seed, chaff, etc., may be removed by a pair of small operating forceps, or with the rounded point of a lead pencil covered by a soft handkerchief. Lime, sand and harsh articles can be washed out with water and a small syringe. In some instances the animal may have to be cast before it can be done. The consequent inflammation may be treated the same as it is for horses, as is many other diseases such as sprains, bruises, wounds, etc.

ANTHRAX—BLACK TONGUE—BLACK LEG.

The above names, as well as many others for the same general disorder, are merely indicitive of the most prominent symptoms of a disease which has been very fatal among the young in the west, for some years. It seems to be a constitutional disorder, which changes the character of the secretions as well as the blood. While it is contagious from contact with the discharges of poisonous matter of an affected animal, often destroying nearly all the young stock in a herd, yet its origin may arise from local circumstances and surroundings, and spread over a section if not checked at once. One of the peculiarities of the disease is that it attacks the young and apparently most thriving stock; also, the suddenness with which it terminates, the animal often being found dead in the field before notice has been had of its being sick. There is no doubt but what it is, to some extent, caused by too full feeding of dry corn husks in gathered fields, combined with local influences. The first symptoms of an attack will be plethora, feverishness, a halting on one limb, and excessive tenderness of the skin in spots, to be followed by extensive swellings of those parts, and deposits of black tarry blood, which evolves gas among the tissues, which gives forth a peculiar crackling sound if the hand is pressed over the spot. Bloody, yellowish matter may

ooze forth, the spot may slough off, leaving an ichorous ulcer. It may take the form of eruptive blisters, which break, dry up with gangrenous appearance, and gradually spread over adjacent parts. It may take the same form of blisters, but appear on muzzle, jaw and tongue, leaving behind ulcerous sores, with bloody, yellowish discharge from the mouth. It may take an external form with bloody discharge from nostrils, bloody dung and black urine, and death in a short time. Animals which are affected must be separated from the well. Dead carcasses and all discharges must be buried, and stables where they have been kept disinfected, if success is to be expected. While treatment is uncertain and unsatisfactory in the worst cases, yet many can be saved by proper care, and more can be prevented from taking it. After the separation of the sick from the well, give those which are well two ounces of bisulphate of soda, each, in a mash, twice daily for three days, thereafter once each day as long as there is any danger. Give the affected animals two drachms of chlorate of potash, three times daily. Inject into the bowels, daily, a weak solution of carbolic acid and water, one part of acid to one hundred parts of water. Rub the tender spots, or those parts which show signs of swelling, with any stimulating liniment, or even turpentine. Open the blisters and the ulcerous spots and thoroughly cleanse them by the use of the following:—

Chloride of Zinc, one scruple;
Water, half a pint.—Mix.

Apply this lotion three times daily. No meat nor milk of an affected animal must be fed to anything, as it is fatal in its effects.

Another remedy for black leg.—

Black leg can rarely be cured but it may in a great measure be prevented. Whenever calves lie around and seem stupid they should be treated to hypo-sulphite of soda, at the rate of an ounce per week divided in several doses. It may be pulverized and mixed with bran. Another preventive is regularity in feeding, never allow-

ing cattle to get excessively fat nor to be greatly reduced in flesh. The only damaging effect that dry weather can have is to keep the calves from taking the needed exercise. In black leg the blood becomes over-loaded with carbon, and once it sets in there is small hope of any cure. We knew one case cured by vigorous applications of Jackson's liniment on the leg, between the affected spot and the body, making a running sore which healed in time, and we have known others relieved by bleeding in the fore foot, just above the hoof and then driving them to induce circulation of the blood. The carcass and hide of calves that die of black leg should be burned, and if they have been buried, the graves should be fenced up, as it will reappear years afterwards if such precautions are not taken. It is not safe to skin them or meddle with the carcass if there are any sores on the hands, as, if the blood comes in contact with the raw flesh or in any way enters the circulation, it is apt to produce an ugly sore.

FOOT AND MOUTH DISEASE—CONTAGIOUS APHTHA.

This disease affects cattle, swine, sheep, and is of a highly contagious nature. It is not so much to be dreaded from its directly consequent fatality as it is for its after consequences—the condition of weakness and depression in which it leaves its subjects, and from which it is said to cost, in most cases, more than the future value of the animals to recover them. The disease attacks the mouth and feet simultaneously. The mouth will be found hot and covered with blisters, the tongue and lips being also affected. These blisters burst, and the surface becomes raw, inflamed and swollen. In aggravated cases the tongue protrudes from the mouth and is covered with ulcers, which suppurate and cause the tissues to slough away. The disease frequently commences in the hind feet, in consequence of which the animal is continually stretching out first one and then the other hind foot and shaking them. On examination, blisters and watery pustules are found around the coronet and between the digits. The parts are inflamed and swollen, and the animal cannot be urged to rise. In some cases the feet becomes

ulcerated, the hoofs slough away, in part or wholly, leaving the bones exposed to view. With such a condition of things there must be much suffering, with high fever, eyes red, lungs congested, breath fetid. In milking cows the teats and udder become inflamed and ulcerated, abscesses are formed, and sloughing takes place, which of course renders the milk totally unfit for use.

The treatment consists in the separation of the sick from the well, and administering two ounces of sulphate of soda daily, to the well, as a preventive. The sick are to have a pound of Epsom salts each as a laxative, at the commencement of the treatment. An astringent mouth-wash is to be used, composed as follows:—

Borax, one ounce;
Tincture of Myrrh, one fluid ounce;
Water, one quart.—Mix.

Use twice each day. If the teats are also affected, a weak solution of half a drachm of carbolic acid in a quart of water, can be used with good effect, following with a dressing of glycerine. The feet should be thoroughly cleansed with water, then a rag drawn through between the toes, followed by an application, with a feather, of:—

Oil of Vitriol, one fluid ounce;
Water, four fluid ounces.—Mix.

Apply twice each day, and keep the feet tied up in tarred cloths. All detached pieces of horn must be removed at once, and the animals must be isolated from the rest of the herd.

EPIDEMIC OPHTHALMIA.

This is a disease of the eyes which takes an epidemic form, whether from contagion, infection or otherwise, has not yet been determined, but when once an animal in a herd becomes affected, it soon spreads with more or less severity, among the rest of the herd, as well as among the neighboring herds with which such animals may come in contact. The eye at first begins to appear raw, and after a day or two a sky blue spot appears just

below the sight, which continues to grow until it covers the whole eye, then assumes a lighter color; after this, it grows smaller and sticks out from the ball of the eye about the size of a pea. The animal appears in a great deal of pain all the time until it becomes totally blind.

To facilitate treatment, and to check its spread, the diseased ones should, as soon as anything appears amiss with the eyes, be separated from the apparently sound ones, and be placed in a roomy, airy, dry shed, which should be darkened without interfering with proper ventilation. The cattle should be kept therein during day-time, but should be given liberty on an enclosed pasture every night, away from other cattle. Then give to each one over two years old, a pound and a half, to those from one to two years old, one pound, and to younger ones according to age, from four to eight ounces of Epsom or glauber salts, dissolved in from a pint to a quart of warm water, and to which is added from one to two ounces of powdered ginger. Give sloppy food, into each ration of which is added a drachm of powdered nitrate of potassa; also give unripe fruit, sliced to prevent choking, and fresh cut grass during the day, which need not be much when they go out nights. To the root of each horn, or otherwise, fasten a folding of cloth in such a manner that it hangs over both eyes, and a few inches below them. This should be kept wet during the day with a lotion composed of

Chloride of Zinc, one drachm;
Carbolic Acid, two drachms;
Water, one gallon.—Mix.

Apply to the cheek, below each eye, to a space of about two square inches, a small portion of a blister, composed of

Spanish Flies, two drachms;
Lard, two tablespoonfuls.—Mix.

Shave off the hair and rub well in, so as not to leave any on the surface which can get into the eye. This should be applied in the morning, and be washed off six hours thereafter with soap suds and a soft sponge, and

a coat of lard applied to the blistered surface once a day thereafter.

After recovery, it will be proper to still keep the cattle for some time, say a month, away from other cattle. The shed should then be thoroughly cleaned, disinfected, and whitewashed, and not be used for at least one month thereafter for any live stock. As this disease is communicable to sheep, these should not be allowed to come near such diseased cattle.

CORN STALK DISEASE.

Western farmers have been subjected ever since there was a corn-growing west to losses, sometimes serious, among the cattle turned on to the stalk fields, which is the custom each fall and will be this fall to an unusual degree. The disease is mysterious and recent investigations by the government have not by any means cleared up the mystery. The Department of Agriculture has kept experts employed for two or three years in different parts of the west, but so far they have not been able to report anything whatever which was of any benefit to farmers. The farmer is compelled, therefore, to turn back to the old theory that the deaths were due to the change from a succulent diet to one of very dry fodder and that the deaths were occasioned by a lack of sufficient water. They have attempted to remedy this and have in many cases done so by the free use of salt which would encourage drinking large amounts of water, and more by seeing to it personally that each animal, the weak as well as the strong, actually drank the proper amount of water to soak up and digest this unusually dry substance. It should be stated that November and December, the months in which cattle are turned into the stalks are comparatively rainless months in the west, that the atmosphere is very dry the corn blades thin, and hence it is about the driest form of feed that ever goes into the animals stomach.

May it not be true that this corn stalk disease is largely indigestion and that animals that lack the proper diges-

tive power are the ones that succumb? While, however, we think that a large per cent, possibly nine-tenths, of the losses might be avoided by supplying salt and water freely and seeing that the animals actually drink the water, the observed facts seem to indicate that some fields are, entirely independent of the water supply, peculiarly fatal to cattle. It is this part of the mystery that the scientists have endeavored so far in vain to clear up, and therefore all that can be suggested to farmers is to fall back on the old ideas and methods and thus avoid as far as possible the dangers that they have known to be incident to turning cattle, especially in dry times, onto dry corn stalks. We have no doubt that some time in the future our scientific friends will be able to help us. They are not to be blamed for their inability to solve in a brief two or three years all the mysteries connected with this subject.

WHITE SCOURS IN CALVES.

One of the fatal and much dreaded diseases among calves, and one that is so lasting in its effects upon the cattle industry, is that of white scours. It attacks beef and dairy calves alike.

The disease is not fully understood as yet, but it is safe to say it is due to some form of bacteria. The disease is infectious, and when once established on a farm nothing but close attention will eradicate it.

White scours attack new born calves. It makes its appearance upon birth of the first few days after. Instead of the characteristic evacuations of a new calf, they are whitish and of a very offensive odor, it loses appetite, and is soon too sick to stand up, and soon dies. As a rule no treatment is a sure cure. The disease is too far along before the real condition is realized and treatment avails little.

Prevention is possible. When the disease breaks out it will go through the herd if nothing is done to prevent the spread.

It may last from year to year if calves are coming frequent enough to perpetuate the disease.

It is quite generally conceded that white scours is due to a bacteria and that this bacteria enters the system through the umbilical cord. There seems to be some relation between contagious abortion and white scours. But however the disease may get a start it must be checked at once.

The droppings of the sick calf must be disinfected and not tracked all over. The dead calf must be burned and the pen and wherever the calf has been thoroughly disinfected. A thorough dusting of all litter and floors with air slaked lime or a sprinkling with corrosive sublimate solution, one part to 2, 500 parts, and a thorough drainage of the stable will kill the germs. Let the sunshine in.

DIARRHOEA OR SCOURS.—Sure cure for calves.

Take one-half teacup of wheat flour and stir in water until it forms a paste. Give to the calf at one dose, this will cure the ordinary scours so common among calves fed on sour milk.

FEEDING THE CALVES.

Hon. F. D. Coburn, Secretary of the Kansas State board of Agriculture, asked the opinion of the leading dairymen of the country on feeding separator skim milk to calves. The subject is covered thoroughly and I take pleasure in reproducing the questions and answers in full for the benefit of the farmers.— *Editor*.

Are calves successfully reared on separator milk, and is it more likely than other skim milk to disagree with calves? If so, how should it be used to guard against ill effects? Also, is sweet or sour skim milk best for calves and pigs?

Hoard. Yes, provided it is fed sweet, and with sound judgment. Up to the time the calf is six weeks old, feed the milk sweet; feed it warm, and feed three or four times a day, in small quantities. A tablespoonful of flaxseed meal is a good thing to mix with each feed: scald the meal

by pouring a pint of boiling water on it, and then mix with the milk. After six weeks old feed the milk and flaxseed three times a day, with a few oats each day. Guard the calves from the torment of flies; on account of flies it is better to have the calves come in the fall.

Haecker. We rear about thirty calves each winter on separator skim milk, and find no difficulty in growing them fine and thrifty. The calf is allowed to suck once; it is then removed and one feeding period allowed to pass without offering it any milk; this is done so the calf will drink without the finger. The first week it receives a light ration of whole milk, fresh from the cow; the second week it gets half whole milk and half skim milk; the third week and until it is weaned it receives skim milk, a spoonful of ground flax and hay. We feed no grain to calves intended for the dairy, other than the ground flax meal. By flax meal we do not mean oil meal or oil cake, but the ground flax, containing all the oil there is in the flaxseed. We used to feed oats or ground barley to calves, but found that many of them acquired the habit of laying on flesh, which is a permanent injury to the dairy calf. The quantity of ground flax used daily varies from a teaspoonful to a tablespoonful in each mess of milk, according to the size of digesting capacity of the calves. The flax meal is not scalded as is usually done with flaxseed, but the meal, if dry, is stirred into the milk just before feeding. When the calf is young great care should be taken to always feed the same quantity, and at a temperature of at least 90 degrees. After the calf is a few weeks old the skim milk and flax meal may be gradually increased. Scours are generally caused by overfeeding, or by milk fed when cool. From four to six pints of milk is a fair ration for a calf the first week; feed twice a day and keep comfortable and clean, and feed from a clean tin pail.

Wallace. Calves can be reared successfully on separator milk, provided it is fed sweet. It should be balanced up for the first three or four weeks with flaxseed jelly and corn meal; the former may be omitted later. Feed milk sweet to all young stock. Study nature. The

cow and brood sow feed their young with milk sweet; they feed it warm and they feed it often.

Wilson. Calves do well on skim milk if it is fed warm, and some meal, like corn or oatmeal, added to it; oil meal is not suitable because it is too rich in protein just as skim milk is.

Dean. We feed separator skim milk to our calves with no bad results. It is largely fancy that separator skim milk injures calves. The separator does nothing to the milk to harm it, no more than if it were turned round quickly in a pail. Sweet milk for young pigs or calves; but for grown hogs, weighing 80 to 100 pounds or over, we have found that sour milk gave slightly better results in fattening.

Wing. Separator skim milk is the same as skim milk from any other source and having the same fat content. Sweet skim milk is nearly indispensable for calves, and is much better than sour for pigs.

Goodrich. Separator skim milk is all right for calves, if clean and warm and sweet; but if it is run off at the creamery into a filthy, stinking tank, then hauled home and not fed the calves for 12 to 24 hours, it may kill the calves. The remedy is take the milk fresh from the separator, and keep it clean and sweet until fed. Sweet milk is decidedly better for calves and young pigs than sour, but after pigs are two or three months old they may do fully as well if some of the milk is sour.

Alvord. Until a month old the calf must have some new milk, or separator milk must be supplemented so as to feed fat to the calf. After the calf begins to eat grass, or hay, or meal, separator milk is as good as any. Sweet separator (or skim) milk is preferable for calves under six months old.

Gurler. I raise calves quite successfully on separator milk. For calves always feed it sweet and as warm as the cow's milk, and feed no more of it than would be fed of the mother's milk. Add some oil meal or corn meal to take the place of the cream. Many calves are ruined by feeding too much skim milk. Don't have the milk too sour, if for pigs.

Curtiss. Yes, they may be reared on separator milk with entire success. It is not more likely to disagree with them than milk of similar composition prepared by other methods. Sweet milk is better than sour, but it should always be in uniform condition, and not partially sweet and partially sour, alternating. Replace the fat by a carbonaceous product—corn meal, oats and flaxseed are better than oil meal.

Dodge. Separator milk is good for calves but should be used sweet.

Dawley. We have no difficulty in rearing calves on separator skim milk, which should be fed them warm and a tablespoonful of linseed meal jelly added to each calf's portion. Feeding in this way, and not allowing the calves to gorge themselves, no ill effects have been experienced. Judging by chemical analysis and practical results, as we have been feeding sweet skim milk to our calves, we are convinced that it is of far more value than sour milk. Some experimenters, however, claim that sour milk is best for the pigs, and I am inclined to believe they are right.

Mathieson. I feed the mother's milk for a short time, until I get the calf to eat a little grain; then I feed separator milk and have no trouble with it. Never feed sour milk to calves.

Carlyle. Calves can be just as successfully reared on separator skim milk as upon any other kind of milk. It is not more likely to disagree with calves, only that they drink more of it than their stomach can hold, thus causing bowel trouble. Give a young calf a portion of its mother's milk, from a pail, three times a day, for about two weeks, and then gradually change to skim milk, feeding in small quantities, never allowing the calf to gorge itself. By mixing a little porridge, made by boiling oil meal in about six parts of water, with the skim milk, the finest kind of dairy calves will be grown. Sweet milk is always best for calves or pigs.

Adams. Yes, if kept sweet there is no disagreement. Sweet milk is most decidedly best both for calves and pigs.

Boardman. They have been successfully reared on separator milk, but great care should be exercised in feeding it, and all cans and utensils should be kept thoroughly cleaned. A small quantity should be fed at the start and gradually increased. The milk should be used as sweet as possible.

Monrad. Yes, certainly, but it should be pasteurized at the creamery, so as to be returned sweet. It should be fed at least three times a day at blood temperature, with an addition of flaxseed jelly. The first week the calf should have its mother's milk, and then tapering down to skim milk during the second week. The addition of a little rennet extract, or dissolved tablets, is a good thing.

Robertson. Sweet milk always for calves under three months, also for pigs for a month after being weaned; fed warm (90 degrees Fahrenheit) in both cases.

Fraser. Calves are raised successfully on separator milk, and it is no more likely to disagree than other skim milk. Feed warm and sweet. Sweet milk is best for both calves and pigs.

Brandt. Yes, they can be successfully reared on skim milk. Care should be exercised when first feeding the milk, gradually increasing quantity until the animal seems to have been accustomed to it. When young, it should be sweet; when calves are two months old sour milk will do as well.

Morgan. Under the gravity process of raising cream there is usually considerable butter fat left in the milk, while in separator milk, the fat is all taken out; this is the only difference we know of. Calves should be fed new milk until at least two weeks old; then gradually substitute skim milk and corn meal, giving them a run on grass as soon as possible. Many of our patrons are feeding sour milk to both calves and pigs without serious difficulty. The main point is not to begin while the animals are too young, nor overfeed at the start.

Nissley. Yes, calves can be successfully raised on it, but a little oil meal will add to its value quite materially. I would prefer it sweet for calves and sour for pigs.

Jones. Calves can be successfully reared on separator milk, if combined with oil meal, shorts, or corn meal; otherwise it will disagree with them. There are more fattening properties in sweet than sour milk, for either pigs or calves.

Eyth. For calves it is satisfactory, with the addition of a little ground feed or oil cake, if always fed one way, either sour or sweet. For pigs always use soured, mixed with ground feed. Feed the milk sparingly until the pigs weigh about 100 pounds, when all they consume may be fed with safety.

MILK FEVER.

The Scottish papers say that milk fever, which yearly causes the death of so many of our best milk cows, is caused by taking all the milk from the cow's udder soon after calving. The organs of the udder are necessarily somewhat inflamed at this period and when the warm milk is withdrawn there is great danger of these inflamed parts being chilled, thus bringing on fever. If this theory is correct, and it certainly seems reasonable, the prevention of milk fever is simply to be careful and not allow the calf to take more than one fourth of the milk from the udder at one time, until after the fourth or fifth day, when the inflammation has disappeared and all danger has past. If any part of the udder becomes unusually distended the milk should be partially removed from that part. The treatment is simple enough, and farmers would do well to practice it; it can certainly do no harm.

DEATH OF CATTLE FROM SMUT AND CORN STALKS.

We hear of a great number of losses of cattle from feeding in stalk fields. There is a great amount of smut in fields this year and it seems to be unusually poisonous. We believe this loss might all be avoided if proper precautions were taken. The precautions we regard as essential are:

First, in husking corn gather the smut and burn it.

This can be done easily by hanging a basket behind the wagon and throwing the smutted ears into it. Second, do not allow cattle to be in a stalk field more than an hour the first day or two hours the second. Accustom them to it as you should to any new feed, gradually. Third, see that they have plenty of water and that they actually drink it. It is not enough to know that they can get water. They must actually drink it and *plenty of it*. If necessary, they should be salted heavily and the owner should see that the smaller and weaker ones drink. We used to have losses with smut and corn stalks, but found they were weak cattle that were driven away by the stronger ones and did not get water.

Whether the disease is smut poisoning, and smut is simply the ergot of corn, or whether it is impaction of the stomach, causing dry murrain or mad itch, the best and readiest remedy is plenty of water. A small feed of oil cake would help matters when there is danger of impaction, and would be in addition a very profitable addition to the ration.

THE BOY AND THE SCRUB.

The farm boys of the Northwest must either drive the scrub from the farm or the scrub will drive them. In this day of schools and colleges the bright, energetic farmer boy does not propose to content himself with caring for indifferent stock of all shapes and colors while the boy on the next farm cares for stock whose beautiful forms and handsome colors suggest thrift and profit. He wants to be like his neighbor and have something that will pay for the work and drudgery that belongs to every business. He don't feel like spending his time feeding good corn to cattle which at three years old weigh little over a thousand pounds and sell at the lowest price, while his neighbor boy feeds and cares for cattle which at two years old weigh 1200 and sell for the highest price.

He wants an even chance or he will resolve to leave the farm and take an even chance in other walks of life. We have used this illustration to light up the general

proposition that if the boy is to be kept on the farm that farm must be made attractive, and attractive not merely to a cultivated taste but a cultivated intellect; that the boy must have something to think about, something to study over, and we know of nothing that will better draw out what is best in the boy than fine young stock. We don't wonder that boys who are raised on farms where grain is the only crop raised become disgusted. Nor do we wonder that boys whose sense of beauty and love of thrift and progress is never gratified by the graceful forms of well bred animals either become disgusted with the scrub stock or settle down to scrub farmers.

But what is scrub stock? Any and every kind of stock that does not pay a profit on the food it consumes. The Shorthorn man counts the Jersey or Holstein a scrub, but if they pay their way and put money in the purse of their owner they are lovely in his eyes and ought to be. Scrub is that scrub does. Any kind of stock is liable to become scrubby in the hands of the scrub farmer. In fact, the animal forms in any country and on any farm are living testimonials to the kind and quality of the owner's brain.

Now if the boy is to stay on the farm he must see profit in it, must find intellectual gratification in it, must find something in it worthy of the expenditure of force and energy; in short, something worth living for. Bear this in mind, then, that if you don't drive the scrub from the farm he will drive the bright boy from it.

THE SCRUB MUST GO.

(Western Plowman.)

Good bye, old Brindle, bony scrub,
The times demand a better breed.
You eat enough; but here's the rub,
You never pay for half your feed.
So after all those years we part,
But pray remember as you go,
If this should break your bovine heart,
You broke my purse long, long ago.

I gaze at you with tearful eyes.
Long-legged, ill-shaped, flabby Br'n,
While years of fruitless labor rise
And show me what a fool I've been.
The tons of wasted hay and feed
In loud and injured tone the while,
Complain you used them in your greed
To simply swell the barnyard pile.

With best of feed you're lank and thin,
And I've grown thin through care of you,
I've empty barn and empty bin—
My pocket book is empty too.
Well chosen was that famine sign
In Pharaoh's dream; and yet, old cow,
The seven thin ill-favored kine
Told then of want no more than now.

But grievous want shall disappear,
If I the signs can rightly read.
I'll fill my barns this very year
With cows of some good dairy breed.
I'll have the kind that's fat and sleek,
The kind that brings prosperity;
My purse shall fatten every week,
And no more scrubs shall feed on me.

THE MARKETS.

LIVESTOCK.

There is a level headed farmer in every community

who goes right along through all times and seasons and makes money—some money always. So can you. Intelligence and methods. Read up. Breed up. Feed up. There will always be blockheads enough to make intelligence pay. There will always be scrubs enough to make good breeds pay. There will always be slovens enough engaged in the production of meat to make healthful and palatable meat pay.

Upon the order of nature, there is not a farm product that cannot be produced and sold at a profit, if rightly raised. The profit may be small, but still above cost. Adapt your crops to your soil and to your market. Remember that the profit is only in good crops. Fertilize your fields, practice economy, diversify your farming, do everything in season as well and fortune will surely attend you and a hungry world will always furnish a ready and remunerative market for your products.

MARKET PRICES OF CATTLE.

PRICES OF BEEVES IN CHICAGO.

The price of beef cattle reached the highest point in 1882, when, on the 1st of June, in Chicago. "Extra beeves" sold at from \$9.15 to \$9.40 per cental of live weight, and "choice" were quoted at \$8.65 to \$8.90. On January 1, 1879, when the upward course of meat values began, the figures for the same grades were, respectively, \$4.60 to \$5.00 and \$4.10 to \$4.35.

THE BEST MILCH COWS.

If those who believe in the "general purpose cow" will consider the following description of the best milch cow which appeared originally in the (English) *Agricultural Gazette*, we think they can but admit that in many essential points it differs widely from that of the best beef animal. Either the description is at fault, or the ideas of those who think that beef and dairy qualities of a high order can be found in the same animal need considerable clearing up.

The best milch cow is of medium size and small boned.

The head is small and rather long, narrow between the horns, and wide between the eyes. The lips are long and thick, giving the muzzle a flat appearance. The ears are thin, covered with long but soft, silky hair, the inside of the ear being of a rich orange color. The eyes are large and bright, with a placid expression, the horns set on a high pate, bending outward at the base, light, clear and smooth; the neck long, clean and thin, slender and well cut under the throat, thickening handsomely as it approaches the shoulder, but entirely free from anything like a "beefy" appearance. The shoulder blades should meet narrow at the top widening gradually towards the points, which should be broad and well rounded; the ribs rather straight and wide, indicating a good digestion and constitution, for everything depends on that in a good milch cow. The loins should be broad and the hips high and wide, the rump even with the hips; the pelvis wide, giving plenty of room for the udder; the thighs thin; the hind legs a little crooked, and small below the hock, with a long large foot. The udder should be long and broad with the teats all the same size and well set apart; the belly to sag a little in front of the udder, and rise slowly as it approaches the brisket, and somewhat large as compared with the size of the cow. The tail long and slim, tapering gently to the end. The hair must be soft, indicating a mellow skin, which on taking in the hand, feels like soft kid gloves, and no coarse rough hair will grow on such skin.

The color of the skin should be of rich butter yellow. This is the first point in handling. Then, pass your hand on the belly in front of the udder and feel the "milk veins". They are an infallible mark of a good cow. The larger they are the better the indications. In extra good cows they branch out into four veins, but they all unite before reaching the udder. The more regular the courses the more sure you may be that the cow is a good milker. The udder should be covered with a short downy coat of hair. This hair should begin to turn its backward course from the front teats, then on the back part

of the udder, called the escutcheon, and on as far as the vulva, in the best cows. The wider the belt of this upturned hair the better; it should be short and velvety, covering a short orange colored skin.

SELECTING THE BULL.

Many farmers look about them during the fall for the young bull desired for use next season. This grows in part out of the leisure the fall affords, and in part out of the fact that in the fall there is a pretty good stock of weanlings, and it is generally expected that a young bull can be bought cheaper in the fall than after he has been wintered, the buyer counting the expense to himself of wintering as of nominal consequence. The added expense put on by the seller on account of having, in part or in whole, wintered the young animal, is a very uncertain sum and ordinarily amounts to but little.

The principal advantage, however, in buying the young animal in the fall rests in the fact that in a collection of uncultured young bulls, well weaned and well settled down to eating rations of grass, hay, and grain, there is excellent opportunity for selecting. The buyer has the opportunity for suiting himself in the breeding; he can judge of the feeding and growing qualities, he can scrutinize the parentage, and the young stock descended from the same strain or strains of blood; can have his choice as to age color, general make-up, and promise.

It is not every one who can tell what shape a young bull at eight months will take on at eighteen months. Novices are likely to pay undue attention to unimportant points, for instance the horn, the head, and the color. The head never gets on the dinner-plate. The horn goes to the comb-maker, the hair to the mortar-bed. The neck is a fancy point with some, yet it is neither broiled nor roasted. Good feeding qualities, growing tendency, plenty of stamina, good breeding, with a wide-spread top from end to end, are the more important points which, together, make up a good bull. Buy with these things in view and you will not be disappointed.

DON'T FORGET THE CALVES.

We have elsewhere pleaded for the colts. We now plead for the calves. The man who steals from a calf steals from himself. He imagines that he is sharp and has made money, but it is money out of pocket never to return. It grieves us to see poor little calves all over the country, Shorthorns that are trying to look like Jerseys, trying to get their bones and frames adapted to a miserably thin diet of skim milk and frosted grass, and growing a long coat of hair to keep warm this winter all because the owner thinks a calf is a calf and some fool will buy it anyhow and pay the same price that a good one should bring. They were knocked on the head with the churn dasher that the owner might make store butter to trade off to the stores at ten cents a pound, and which the merchant sells for five. They will be kept on scant fare this winter and some time next May they will come out alive and the hair will peel off and they will look like miniature bales of mildewed cotton, and at three years old go to Chicago to be sold to the canning factories to be peddled out to miners in the mountains.

This ignoble use of a calf that is born for better things is the result of the penny wise and pound foolish policy of farmers who have never once asked themselves "Why do I raise calves"? The farmer who did not feed his hogs all they wanted because he was afraid they would get fat before they had eaten up all his corn, was a wiser man. He at least gave his hogs the satisfaction of eating a good deal of corn and doing a good deal of squealing. If you raise a calf for beef then feed it. Raise a big beef that will bring a big price and will weigh well. The sooner you get the weight and the fat the more money

you will make. To feed a calf or anything else just to keep it alive is pure waste of the feed, the time, and the interest on the money. Feed given in this way simply converts grain into manure. The farmer will never get rich in this business. If you don't get the foundation, and get it this winter and send the calf out to pasture strong and healthy, you have and always will have an unprofitable steer.

LUCK.

There is no such thing as luck in this world. The idea is preposterous. The man who depends upon it will never amount to anything; will be a mere cypher. One might as well wait for the ocean to dry up and reveal its hidden treasures; fish to come ashore to be caught; grain to grow without planting or gold to come ready dug and coined.

The men called the most lucky are those who never had even a distant idea of valuable things coming for the wishing—the men who are the strongest put their shoulders to the wheel, pulled the hardest against wind and tide, dug the deepest into the earth and fought the bravest against odds.

Success is not luck—not in the least. It did not come by chance, but was the natural result of long and strenuous effort. There was no waiting no idle hoping. The probabilities were seized and the possibilities worked out to the utmost fraction. While the foolish dreamers were idle the successful man was up and doing. He knew that doomsday would come as soon as luck.

Belief in luck is the most senseless of superstitions. If the affairs of this world were dependent upon it, reasoning powers would never have been given; knowledge would not have been bestowed; the brainless faculties of beasts of the field would have been all sufficient. We would only have had to wait. Luck would have brought all we needed—that is to the fortunate—and for those cursed by "bad luck", there would have been no struggling against fate, and the sooner they bowed their mis-

erable heads to the decree and quietly ended their existence the better.

The belief in luck makes man a "tramp", existing upon the bounty, and filching the honest and hard-won substance of others. The only luck he will ever find will be a home in the poor-house and a pauper's grave. The idea of luck is disproved by everything since creation, by creation itself. Luck did not bring order from chaos, and will never produce food and clothing, and honor and a fair name. It is all moonshine of the thinnest quality.

Young man, all the luck you can find will be wrought out by brain and muscle—by effort and daring and unbending will; by plunging into the stream; by climbing the mountain; by "paddling your own canoe"; by nerve; by pushing; by a brave front and heart; by kicking hope out of doors; by resisting the temptation to sloth; by turning a deaf ear to idle dreams. Fools alone trust to any other means of acquiring reputation and fortune.

Verily believers (and followers of their belief) in luck, will find themselves in the situation of Cowper's people:

"Who spent their lives
In dropp'ng buckets into empty wells,
And growing tired of *drawing nothing up.*"

Some people call it luck to be spared damage and loss by accident or neglect or to suffer from these. The man who forgot to tie his horses when he left them in the stable at night, and consequently had a leg of one broken and the other badly cut up, or who lost a horse by colic from an overfeed of wet clover, or let a cow fall in an open cistern, or another get loose and gorge herself on meal in a bin with the cover left open, says he has had ill luck. This word luck is an old pagan heritage which should be obsolete, as belonging to the past age, when men believed the stars ruled their fortunes.

"The fault*** is not in our stars,
But in ourselves that we are underlings."

And so every unlucky accident which happens can be shown to be the result of some neglect or mistake or

No. 1. Berkshire Barrows. Winners International Grand Champions, Chicago, 1906.

No. 2. Pure Bred Poland China Barrows. Age 15 months; weight 450 lbs. Owned by University of Wisconsin.

No. 3. Duroc Jerseys at the ends. Three Berkshires in middle. Average weight 296 lbs. Owned by University of Wisconsin.

No 1. Pure Bred Poland-China Barrow. Age 15 months; weight 475 lbs. Owned by University of Wisconsin.

No. 2. "Star Masterpiece". Age 22 months; weight 750 lbs. University of Wisconsin.

No. 3. A Pure Bred Duroc Jersey Sow. Weight 400 lbs. University of Wisconsin. January 31, 1907.

avoidable fault. As the business of a farm is exceedingly intricate and varied, there is more risk of harm from false steps, but then the farmer knowing this, should be on his guard and make a study how to use precaution.

Most all doors are marked and the door to success is marked like many others—Push and Pull.

Miscellaneous Diseases of Hogs.

HOG CHOLERA CANNOT BE CURED.

The hog, like every other domestic animal, is liable to sickness. Some of the symptoms, of nearly every disease, of which the hog is liable, in some way resembles the cholera.

United States Congress twenty-one years ago appropriated one hundred thousand dollars for the purpose of making a thorough investigation of the swine plague. Some of the best veterinaries in the United States were employed. They went anywhere in the United States where they were notified that that section of the country was troubled with the cholera. In fully seventy-five per cent of the cases it was discovered that the hogs did not have the cholera, but some similar disease which by proper care and treatment, nearly the entire herds were saved.

As soon as the farmer's hog gets sick he comes to the conclusion that the hog has the cholera. He reads of the cure that has just been discovered and hastens to purchase some of the so-called "sure cure for hog cholera". It is true that many of the medicines cure the hogs, or at least does not kill them, and the hogs get well. The use of certain medicines internally, to act as preventives, is no doubt of some value.

The alimentary canal is generally the first to be affected by the cholera. Any medicine strong enough to kill the bacteria which causes the cholera will kill the hog.

In case any doubtful disease should get among your

hogs you should always remove the well ones. It is quite a common thing for farmers to drive out the sick hogs and permit the well ones to remain to be attacked.

Following are a number of diseases which are always called cholera:

When people remember that we have no specifics for these diseases in the human family, it will be good common sense not to expect it in the porcine family. If farmers will only learn the prevailing types and symptoms of this disease and the proper remedies to be used during each, how and when to use them, and will follow it up according to directions, they will be successful. They must remember that it is necessary to commence at the first symptoms in the first cases, and keep up the fight till it is stamped out on the farm. If it is too much trouble, no further advice is necessary. We give below the symptoms of the various types of this disease, and the most successful methods of treating the same, which have been successful whenever faithfully tried. If the directions are carried out which have been given in this chapter, there need be no epidemic form of the disease. It can be controlled and wiped out, and never get beyond a few isolated cases. The treatment, as well as the hygienic advice, is from the pen of a celebrated government commissioner, appointed to investigate the causes and treatment of the disease, and has been very successful:

PUTRID ERYSIPELAS—MALIGNANT TYPHUS.

This is one of the most frequent forms of anthrax. Its outbreak is preceded by dull, weak appearance, during which the hog refuses food. There will be an unsteady walk, a lying down a good deal, rolling in the bedding, and showing a desire to bury his head, or even the whole body. The body will alternate with shivering fits and periods of feverish heat, in quick succession. The pulse and breathing will be hastened, the bowels are constipated, or are voided in hard dark-colored lumps. In some cases the hog will attempt to vomit. In about ten to twenty-four hours the symptoms become more intensi-

fied; and spots which soon become confluent, or run together, make their appearance on the inside of the legs, on the lower part of the abdomen, on the breast and neck, and soon present a swelling, which at first is crimson, afterwards purple, and if fatal, finally of bluish-black color. In some cases pustules of a corrosive and gangrenous character make their appearance on some parts of the swelled surface; the fever increases in intensity; the mucous membranes present a lead-colored appearance; the breathing is labored; the temperature of the body much increased at first, is now, by collapse, greatly reduced; the hindquarters are paralyzed; convulsions commence; and the animal dies in from six to twelve hours, yet it usually does not terminate until the second or third day from its commencement. When recovery occurs it is in those cases where the red spots are limited or do not run together; when the fever is less; and the other symptoms abate about the second day. Partial paralysis may remain, with loss of appetite, so that it is difficult to get the animal to eat enough to sustain life. Perfect recovery is seldom, and there remains behind defective digestion, which prevents thriving and fattening.

THE TREATMENT OF THIS FORM.

The first step should be to give an emetic consisting of from five to twenty grains of white hellebore in a little milk. If the hog will not drink, it may be mixed with a little flour and water in the form of a pill, and put well back on the tongue or in the throat. If the animal does not vomit freely in twenty minutes, repeat the dose. After the emetic has had its effect, administer to each hog:—

Hyposulphite of Soda, half an ounce,
Solution Carbolic Acid, ten drops,
Tincture of Aconite, five drops.—Mix.

Add enough of molasses to make a soft mass, and place well back in the throat. If the hog will eat, it may be given in a small amount of milk. For a number of hogs increase in proportion; give to all at once in milk. This

treatment should be commenced early in the disease, when it will be most successful, and should be repeated at least three times daily, or even every two hours. Injections of warm soapsuds, to which half an ounce of turpentine has been added and ten drops of carbolic acid, may be given twice daily, and materially assist a cure. The external ulcerations, on the surface of the swellings, should be opened and bathed in warm water containing half a fluid ounce of carbolic acid solution to a pint of water. Muriate of ammonia in half drachm doses in a little molasses, is an excellent remedy in the latter stages of the disease when signs of a collapse are present.

MALIGNANT PUTRID SORE THROAT.

This is a frequent form of the disease, and is very fatal in its character. It is more local in its attack than the previous form, and affects the throat larynx, air passages, etc. It may mainly affect the larynx, or it may be more diffusive and involve the adjoining parts, even into the cavity of the chest, with great congestion of the lungs. The external swellings on the throat vary with different subjects, and the breathing is obstructed in proportion to the amount of congestion and its location. While its extent may vary, yet it is the same type of the disease. The principal symptoms consist of wheezing and laborious breathing, hoarse grunting, hacking cough, great heat and dryness of the snout swelling of the tongue, brown-red color of the mucous membrane of the mouth, difficulty in swallowing food, with attempts to vomit, showing affection of the stomach. At the larynx and along the windpipe, even extending down between the fore legs, will be found a hot, hard, painful swelling, which at first presents a crimson appearance, which may change to a lead color, and finally to a dark purple. The fever is usually very high, and the animals breathe with increasing difficulty, and either lie down or sit on their haunches like a dog. Finally the difficulty of breathing becomes so great that desperate attempts are made to catch the air by opening the mouth, during which the livid and swollen tongue is protruded. The mucous membrane

of the mouth is now lead-colored; the temperature of the body has become lower than natural, and the hog may either die of strangulation, or gangrenous action internally in the throat and lungs as well as external, in one or two days. In those cases where the attack is concentrated in the larynx the patient suffocates sooner, and may choke up and die in an hour after the first appearance of the symptoms. If it does not terminate in death, which is the case if not attended with proper treatment early, the symptoms are reduced gradually, the swellings are absorbed, and the animal partially recovers. Often the later stages show those peculiar symptoms of oppressed breathing and heaving of the flanks, commonly called "thumps".

ITS TREATMENT.

To be of any avail, the treatment must be begun at the very first symptoms shown. An emetic of ten to twenty grains of powdered white helebore may be given in a little milk, or mixed with a little flour and water, and placed on the roots of the tongue. If it does not vomit in twenty minutes, repeat the dose. After the emetic has had its effect, give the following, three times daily:—

Hyposulphite of Soda, half an ounce,
Muriate of Ammonia, half a drachm,
Molasses to make a mass.

Place on the tongue. Five drops of tincture of aconite dropped on the tongue during the early stages of the disease when the fever is high, is of great assistance. In addition, the prescription below should be used in the manner prescribed. If it does not all go down the throat, it will do much good as a local remedy:—

Chlorate of Potassa, three ounces,
Solution of Carbolic Acid, half a fluid ounce,
Water, one quart.—Mix.

Give this every hour, or even every half-hour in bad cases, in tablespoonful doses, with a tablespoon. It is an excellent application for the inflamed and ulcerated

throat, as well as a powerful antiseptic and refrigerant. As the hog gets better, the periods of administration can be lengthened, or chlorate of potash can be given in his food. When this disease is present on a farm, the best preventive is twenty grains of chlorate of potash to each well hog, in a little milk, before feeding in the morning. An ounce will do for twenty-five hogs, and all be fed at once. It will frequently arrest the disease before it is recognized, and is one of the best preventives known for this form. Ten drops of solution of carbolic acid every other day, for each hog, assists its preventive power by destroying germs of the disease. It will have a better effect if the hogs are fasted some hours before, and not fed for some two hours after giving.

TYPHOID ENTERITIS—INFLAMMATION OF BOWELS.

This form of the disease partakes somewhat of a typhoid character, regarding its internal results. Its locations are the bowels, the urinary organs, the membranes lining the abdominal cavity, as well as the nervous centers. All may be involved, or but one or two in the primary stages. When the peritoneum is involved, which is almost invariably the case, there will be costiveness, the passages being streaked with muous, which may be discolored. In the fatal stages of the attack, a fetid diarrhoea may succeed, which is the forerunner of death. The first symptoms are a short, hacking cough in some instances, not so much obstruction in breathing as in the other forms. There will be an unsteady walk, with fully as high fever as is found in the other forms. If the urinary organs are affected, the animals will arch their backs in an extreme manner. The external extravasation in these cases is slight, and may be absent entirely. When the nerve centers are involved, paralysis will result. Internally there are adhesions of the intestines, alteration in the kidneys, liver, etc., with effusion of abdominal cavity.

ITS TREATMENT.

In this form of the disease an emetic is of greater value

than in the preceding forms, and should be given in the manner indicated. When there is costiveness in the early stages, which is nearly always the case, a purgative is needed, none being better than calomel, which may be given in doses of one scruple every six hours until it has its effect. It may be given in a little flour and water as a pill or in a little milk, if the hog will eat. Injections of warm soap-suds, to which half an ounce of solution of carbolic acid may be added, will aid its effects. During the early stages of the fever, drop five drops of tincture of aconite on the hog's tongue, every two hours. In addition to this the following prescription should be given after the calomel has had its effect, or may be substituted for it in the early stages:—

Hyposulphite of Soda, one-half ounce,
Chlorate of Potassa, one scruple,
Molasses to make a mass.—Mix.

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DISEASES OF THROAT AND LUNGS.

QUINSY—STRANGLES—HOG CHOLERA.

This disease sometimes assumes an epidemic form sim-

ilar to distemper in young horses, and proves fatal to large numbers of young pigs as well as older hogs. We have known it to assume so fatal a form as to be called "hog cholera" by those ignorant of its distinguishing type, yet it differs from anthrax diseases in not being so malignant, and in other respects.

Give three times daily, using the aconite as directed, between the doses. Half a drachm of muriate of ammonia may be given at a dose if symptoms of failing strength are present. Mash and sloppy food, not soured or fermented, should be given. All remedies will have better and more immediate effect by fasting the hogs twelve hours previous.

The first symptoms are swelling of the glands under the jaw, followed by rapid and oppressed breathing, and difficulty in swallowing. In the more advanced stages the neck is badly swollen, the tongue protrudes and death is caused by strangulation. Often the swelling takes the gangrenous form and becomes allied to anthrax. Quinsy is caused by exposure to sudden changes of atmosphere, and if the animal has been under the debilitating influence of bad food, impure water or filthy enclosures, mortification frequently sets in, and death results in a few hours. Allowing hogs to pile up around old straw stacks, during cold nights, is a pre-disposing cause. Any one who has seen hogs routed out in the morning, and observed how those underneath smoke and steam as they come forth and the cold air strikes them, must realize that such sudden changes produce inflammation of the lungs, quinsy, diphtheria, etc., of a fatal type, resulting in the popular "hog cholera".

Young pigs are very liable to be attacked with quinsy. They should be kept in warm, clean, well-ventilated pens, with plenty of clean straw; let them have a mess of thin gruel three times a day, into which stir one-half ounce of chlorate of potash. If the bowels are constipated, from one to two ounces of castor oil may be given each pig. In bad cases the throat may be lubricated with equal parts of cod-liver oil and turpentine.

In older hogs, also in pigs, benefit may be had by giving each hog an emetic consisting of four grains of tartar

emetic, six grains of ipecacuanah and six grains of white helebore; half this dose for young pigs. Often a deep incision into each tumor, on each side, will relieve it. Not a mere puncture with the knife, but a cut two to four inches long, and deep enough to reach the seat of the disease. Feed thin gruel for a few days, in which a teaspoonful of turpentine may be incorporated. Three to four drops of tincture of aconite dropped on the tongue every two hours is excellent in the early stages of the disease.

DIPHTHERIA.

This disease is far more prevalent than most people imagine who class all epidemics or contagious diseases under "hog cholera". It not only attacks pigs, but older hogs. It is, in a certain degree, contagious, that is, by contact with the shreds of the false membrane coughed up by those attacked, well hogs will take the disease as readily as it is communicated by the human family. It sometimes takes an epidemic form in localities owing to atmospheric causes, local condition of filthy pens, and wet pastures during inclement seasons of the year. Its symptoms are sudden illness, with a dull appearance and loss of appetite. There will be extreme weakness, feverishness, stiffness of back and loins, a crouching walk with raised head. The mouth will be dry and open, a hoarse nasal grunt, livid tongue and difficulty in breathing. On examination internally, the throat will be red and swollen, and covered with grayish-white patches of false membrane, which increase, involving all the air passages and threaten suffocation. Shreds of false membrane are coughed up during paroxysms of coughing. The animal will lie down, sit on its haunches, or lean against the fence during these attacks of coughing, and will generally perish in one.

The treatment, to be successful, must be begun early in the disease. If the drove is ranging in cold, wet pastures, they must be changed into dry yards and sheltered pens, and the well separated from the sick. Give each of the well hogs a spoonful of chlorate of potash daily in a small quantity of milk. The whole amount can be given

at once by proportioning it to the number of hogs. This will prevent its spread and arrest its incipient stages. The sick must have local as well as constitutional treatment. In the first place give the following to each hog, daily:—

Sulphite of Soda, two drachms,
Powdered Castor Bean, one drachm,
Solution Carbolic Acid, five drops.—Mix.

Give in swill to those which will eat, increasing the amount proportionate to the number of hogs. To those which cannot eat, it may be given by mixing with molasses and smearing on the back of the tongue. To remove the patches of false membrane and prevent further formation, prepare a small swab of sheep-skin with the wool on, and a flexible stick, well secured, and dipping it in the following solution, swab out the throat twice daily:—

Chlorate of Potassa, one ounce,
Solution of Carbolic Acid, two fluid drachms,
Water, one quart.—Mix.

Its virtues can be materially aided by sprinkling the swab with flour of sulphur before inserting into the throat. We have never known it to fail. Warm, sloppy food may be given, to which chlorate of potash may be added in teaspoonful doses.

INFLAMMATION OF THE LUNGS.

This disease is always caused by sudden changes, exposure to storms, piling of hogs during cold nights, etc. The pig, or hog, is taken with shivering fits, is dumpish, is drawn up in a heap, as it were, loss of appetite, hurried and short breathing generally accompanied with a cough, which is deep and hoarse. It is an inflammation of the cellular portion of the lungs. If the bowels are constipated, loosen by injections of warm soap suds. At the same time give, according to size, a half to two drachms of saltpetre, and one to three ounces of Glauber's salt.

After six hours, and then thrice daily, one powder of the following composition should be thrown on the tongue, viz:—

Tartar Emetic, twelve grains,
Powdered Opium, twelve grains,
Saltpeter, one ounce a half,
Mix, and divide into eight powders.

When the inflammatory symptoms have abated, half drachm doses of sal-ammoniac thrice daily for several days, are very beneficial. The patient should be separated from the rest of the herd, and given a warm sheltered pen, plenty of litter, water and slops which have been warmed, consisting of gruel, sour milk, etc. It is better to so manage your hogs as not to have to treat it, as prevention is far easier than the cure; yet it is often "too much trouble".

COUGH.

This is sometimes a symptom, and sometimes a local irritation. It is a premonitory symptom of one form of "hog cholera", which is really pleuro-pneumonia, and from its character and obstruction of the lungs in its later stages, is called "Thumps". This is especially the case when dropsy of the chest has resulted. When there is costiveness, it must be removed by two to three drachms of powdered castor bean mixed with molasses and smeared on the back of the tongue. One very successful breeder puts a ball of tar on the end of a paddle and places it well down their throat, for four successive mornings. Or, one grain of tartar emetic mixed with a small quantity of molasses, and smeared on the roots of the tongue, is an excellent remedy, which should be given every day for three or four days. Small quantities of swill, to which has been added a teaspoonful of chlorate of potash, may be given daily.

CATARRH—SNIFFLE DISEASE IN PIGS.

This is a lymphatic-catarrhal affection which always takes on a chronic character. It develops slowly, and is

generally not noticed before the disease is considerably advanced. It begins with an inflammation of the mucous membrane lining the passages of the nose, which, together with adjacent parts, become more or less swollen. In course of time, disorganization of the cartilaginous and bony structure of the nose takes place, and by degrees that organ becomes malshaped, and is generally drawn to one side. As the disease farther advances, appetite diminishes, and even on the best keep the animals become poor and emaciated, and a hectic fever or general consumption often ends their existence. This so-called snuffle disease is not frequently met with. It is supposed to be hereditary; at all events of a scrofulous nature. By way of treatment, the animals should be kept comfortable, on dry litter. Diet should consist of milk, boiled food, oatmeal gruel, boiled barley, mashed fruit, cabbage, etc., in short, food which does not require hard chewing. If bowels are constipated, give occasionally half an ounce of Glauber salts and a drachm of saltpetre mixed with some honey or treacle, and smeared well back on the tongue. Give, every other week, thrice daily, the following dose to each pig:—

Sal Ammoniac, half a drachm,
Camphor, eight grains,
Mix with a little treacle

and smear on the tongue. If swelling of the nose should appear, and the same be painful, it may be bathed daily with a solution of one part of Goulard's extract, and ten parts of soft water. When the disease is advanced, any treatment will prove unsatisfactory.

DISEASES OF STOMACH AND BOWELS.

DIARRHOEA—SCOURS IN PIGS.

Many thousands of young pigs die yearly from this disease, yet it may not take an epidemic form. There is hardly a farmer who escapes loss of this kind. It may

attack merely one or two out of a litter, and seem to be isolated cases of derangement of digestion, or it may attack a whole litter when one or two days old. Few people understand that this latter form is invariably caused either by what the sow has eaten, or by the method of feeding, altering the character of her milk, and thus affecting the pigs. Too much green clover, or any other green food, will do it; also strictly feeding dry corn, or musty, decayed food, will produce it. While the food given the sow may thus affect the pigs, she will apparently suffer no constitutional disturbance and be as well as ever.

Often a teaspoonful of sulphur administered to the sow in a little milk, twice each day, between the times of feeding, will produce a cure combined with care in feeding, and nothing be given to the pigs. If necessary to give the pigs remedies, there is nothing better than two or three drops of laudanum each, in a little sweet cream, administered with a teaspoon, twice daily. Change the food of the mother and see that it is of good quality. Keep the pigs in a warm, close pen, with plenty of litter, and do not allow them to run at large, but rest as much as possible. All the discharges must be scrupulously cleaned out of the pen, and the places covered with fresh earth as a disinfectant. Scald out the troughs and feeding places with boiling water to which ashes or lye has been added. If these precautions are taken it will disappear. If the pigs will eat, a few drops of the solution of carbolic acid may be added to the food of each pig.

ANOTHER REMEDY OFTEN GIVEN.

It is frequently the case that young pigs are troubled with scouring—or diarrhœa. This may be very speedily relieved by giving the sow a dose or two of Glauber or Epsom salts. The medicine—about one-half a teacupful—may be dissolved in warm water and fed to the sow in milk or any kind of swill she is in the habit of eating. This remedy never fails.

CONSTIPATION.

It is never best to allow either stock or fattening hogs to become constipated. It denotes a feverish condition

of the system, which easily becomes the first stage of some inflammatory disorder. The food should be so varied, without the use of remedies, as to prevent it. Green food is the best, or some milk or swill, to which may be added two ounces of Epsom salts for each hog, if the trouble is present. Often a cough is heard which will disappear when costiveness is removed. Stock hogs which have been running loose all summer often become seriously troubled in this way, if they are confined, and fed on dry, hard corn, preparatory for market.

KIDNEY WORMS.

Kidney worm is not of so common occurrence as people seem to believe. The presence of the worms in the spinal canal, or in the spinal marrow, may produce paralysis of the hind quarters, in which case the animal would not exhibit any such marked tenderness, on being pressed over the loins with the fingers as he would if the weakness of the hind quarters was due to a sprain or to rheumatism of the loins. Occasionally hogs may suffer from the presence of one or more worms in the kidneys; but the ailment is rarely fatal, and becomes so only after a long time of suffering and consequent disease and degeneration of one or both kidneys; it is next to impossible to diagnose the presence of worms in the kidneys of hogs, except by chance through microscopic examination of the urine. If worms are found in the kidneys of a hog that has either been slaughtered for food or died from some disease, it may then be supposed that others of the same herd, "not acting right", are infected with worms of the same species. In such cases, treatment (which is, at best, of questionable utility) may be instituted, and Fowler's solution of arsenic may be given in doses of a teaspoonful, morning and evening, during every other week for some time, to each hog. The loins also may be rubbed with spirits of turpentine every other day, and during the week when the solution of arsenic is suspended, a teaspoonful may be given every other day in its swill.

INTESTINAL WORMS.

When swine are infested with intestinal parasites they generally become unthrifty, will not fatten, and have

voracious appetites. They cough, scour, start from rest or sleep with a sharp cry, scream excessively before feeding time as though they were nearly starved, vomit, and pigs sometimes have choking fits from knotting of worms in the throat.

SURE CURE FOR WORMS IN HOGS.

To every three gallons of water take one full teaspoon of lye. In this solution place one gallon of shelled corn and allow the same to remain there at least twelve hours.

Pour off the liquid and after the corn has become thoroughly drained place on small piles and you will have no trouble in getting the hogs to eat the corn. If fed in water the lye bites the nose and some of the hogs will refuse to eat.

The amount of corn stated above would be sufficient for only a few hogs. It is necessary to repeat this dose every three days for fifteen days.

It is not an uncommon thing for farmers to complain that their fall shoats or winter pigs do not do well, if they would give them a few doses of the above remedy their hogs would fatten much better.

The average worm medicine sells from seventy-five cents to one dollar per pound and some farmers buy from two to five pounds per year. The above remedy is safe, sure and cheap.

PILES IN PIGS.

Piles may appear in hogs as well as in other animals; but unless the knots are visible externally, they are seldom discovered in this animal before the disorder has so far advanced that blood passes off with the excrements, or the hair around the anus is blood-stained. The disease is generally considered incurable in animals, in so far as treatment can only be of temporary benefit, on account of the impossibility of enforcing the necessary hygienic rules and restrictions. Enlargements of the veins will appear again from the least cause. Moreover, the disease is of no dangerous consequence when not con-

nected with any very material alterations, or attended with considerable general changes. Curative treatment consists in an entire change of food. Sour-milk, and especially light digestible substances, and, with a view of relaxing the existing state of costiveness, injections of vinegar and water, or, when considerable pain exists, of oily substances, and the internal administration of castor oil, or sulphur with cream of tartar. In case of prolapsus of the bowels, caused by piles, warm fomentations of decoctions of white oak bark, previous to replacing the gut, will be of service, and, should the presence of large piles prevent replacing, these should be injected by the use of a hypodermic syringe, with a mixture of equal parts of carbolic acid crystals and olive oil. If the anus appears very much swollen, applications of oily or greasy substances would be beneficial in relieving pain and irritations. Laudanum may be added which will relieve the pain earlier.

PROTRUSION OF BOWELS IN PIGS.

This trouble is often caused by continued diarrhœa in pigs with a lack of tone in the parts, in fact, debility. In the first place, wash the part with warm water, then apply a solution of sugar of lead and water, a drachm of lead to a pint of water, to which may be added a little laudanum, and gently press the part back, pushing up the finger a short distance. Three to five drops of laudanum may be given each sucking pig.

MISCELLANEOUS DISEASES.

PARALYSIS OF HINDQUARTERS.

This affects both young pigs and older hogs. Some think it is caused by worms in the kidneys. This is not always the case. It is true that the presence of these parasites around the kidneys may cause irritation, of the nerves of the spinal column and result in paralysis, yet

it more often is a weakness and loss of nervous power in these parts. The symptoms in either case, for they cannot be distinguished apart, are weakness of the back, wriggle of the hind parts, and finally they set down on their haunches; after some effort they get up, and run in a straight line quite fast, but swing to one side for a while, and then go over to the other side, and finally, get down so that they cannot rise, but can drag themselves about. The appetite is good until a day or two before they die.

There is no better remedy for constitutional treatment than *nux vomica*, or its alkaloid, strychnine. Apply over the loins a liniment composed of one part of cantharides, two parts of olive oil, and two parts of oil of turpentine. Internal treatment should begin with a laxative consisting of three drachms of powdered castor oil seeds, and eight ounces of rye flour, mixed in a quart of sour milk, or thin gruel, and let the animal drink it first thing in the morning. It may be repeated once a week. Half of the dose will suffice for young pigs. The following internal treatment may be repeated twice or thrice daily:—

Powdered *Nux Vomica*, four grains,
Powdered Anise Seed, half a drachm,
Powdered Ginger, half a drachm,
Mix with a little treacle

and smear the dose well back on the tongue. Half this dose for pigs under three months old. Feed sloppy or steamed food, and give plenty of sour milk and fruit. Treatment of all such cases requires considerable patience and perseverance, and recovery is slow and often uncertain.

APOPLEXY.

Fat hogs are liable to attacks of this disease if they are heavily fed by a forcing method, especially in warm weather. They appear dumpish and out of sorts for a few hours previous to an attack, and drop as if shot, having all the appearance of death, with the exception of heavy breathing. The quickest method to bring back

sensibility is to bleed. By tying a cord around the fore leg above the foot, the artery will be seen to fill above the knee, on the inside of the leg, and can be opened with a sharp knife. A pint to a quart of blood should be taken. If the hog revives, as soon as possible give something to move the bowels, either by injection, or by mouth, or both. Light food only should be given for some days thereafter.

THUMPS—PALPITATION OF HEART.

There is a common error prevalent, that the short, thumpy cough at the commencement of inflammation of the lungs is thumps. True "thumps", which is but the vulgar name for palpitation of the heart, is more of a nervous character, and is, in fact, a sign of debility and nervous derangement. This will be seen by the paroxysm being easily brought on by anything startling the animal. Its treatment is careful feeding on slops, a separation from the rest of the drove, and from two to ten grains of digitalis given twice daily in a little molasses, which can be smeared on the roots of the tongue with a paddle.

BLIND STAGGERS.

The attack is generally preceded by dullness for a day or so, with apparent tendency of blood to the head, which will be shown by inflamed eyes. The bowels are constipated, and the pulse hard and quick. If not relieved during this stage of the attack, the animal runs wildly about, generally in a circle, appears blind, will run against objects, breathing laboriously, and often dies during one of these fits. Often it is caused by indigestible food; feeding young pigs on dry corn, when they should have a mixed and sloppy diet. It is more often caused by a fit of indigestion, combined with costiveness, and can be relieved by getting the bowels to acting freely, early in the disease, by injection of warm soapsuds, accompanied with three drachms of pulverized castor bean, mixed with molasses and smeared on back of the tongue. Or, a teaspoonful of calomel may be substituted. Cold water should be frequently dashed on the head, while along the

No. 1. Prize Winning Sheep. State Agricultural College of Iowa.
Pure Bred Shropshire.

No. 2. Ram "Paragon Star" 149890. University of Wisconsin.

No. 1. Clear Lake Jute, Grand Champion Steer International Live Stock Show, 1904. Owned by Minnesota Agricultural College.

No. 3. Pure Bred Southdown Lamb. International Prize Winner, 1904.

spine may be applied turpentine or kerosene oil well rubbed in. Sulphite of soda may be added to the injection, and will materially add to its rapidity, and turpentine in small quantities added to the injections will have a stimulating as well as local effect.

SCROFULOUS DISEASES.

This is shown in young pigs by weakness of the joints, knuckling over, and reeling when walking. There seems to be a softening of the bones, or rather, the assimilation of the constituent part of the bones is deficient. Ulceration may take place externally, near the joints, diarrhœa may be present, and in young animals the navel string may remain open, through which urine will dribble. In older subjects it may take the form of tuberculous consumption. The lungs becoming diseased, and the liver full of tuberculous lumps. As the prevention of an evil is generally considered cheaper and more certain in its effects than an attempt at cure, it is evident that, in a disease of this kind, that is practically incurable, the cheaper and safer plan would be to discontinue breeding from stock thus affected. The treatment of scrofulous disease in the hog, as well as other domestic animals, when in an advanced state, is generally unsatisfactory.

Sheep Department.

GENERAL DISEASES.

GRUB IN THE HEAD.

The gad-fly of the sheep deposits its eggs in the nostrils of the sheep in the months of July and August, and these being immediately hatched by the warmth and moisture, the larvæ or young grubs crawl up into the cavities of the head, and attach themselves to the membranous linings.

They remain there until the ensuing spring, when they become thick, plump grubs, more than an inch long. They then descend from the head, drop on the ground, burrow into it, take the form of a chrysalis, and at the proper time again hatch forth gad-flies. Their effect on the sheep is a matter of considerable dispute, some eminent veterinary writers considering them entirely harmless. Others, and a much greater number, believe that the irritation they occasion produces disease and death. If the sheep begin to fall off in condition a little before spring, though previously in good flesh, and their feed kept fully up; if they wander round with movements indicative of pain in the head, and discharge mucus, tinged with blood, from the nose, though oppressed with no catarrhal difficulty, it may be suspected that they are suffering under the effects of grub in the head. Some persons have blown tobacco smoke up their nostrils from the tail of a pipe, the bowl being covered with a cloth, with asserted good effect. Others have injected tobacco water with a syringe, but this must be prevented from entering the throat in any considerable quantity. The best method is to prevent the fly depositing the eggs by smearing the nose around the nostrils during the above months with tar, to which some coal tar has been added. There has been some dispute whether the fly laid eggs or the already hatched maggot. We have been assured by several intelligent sheep-growers in the West, that all the female flies that they had examined contained not eggs, but living larvæ.

We think that these apparently contradictory statements may be easily reconciled. Many flesh-flies, or blow-flies, as they are commonly called, if they cannot find any suitable seat or carrion of any kind to lay their eggs on, retain those eggs so long in their bodies that they actually hatch them out into living larvæ, as we have ourselves repeatedly remarked. Yet the normal habit of these same flies is to lay eggs. In the same way we conceive that the normal habit of the sheep bot-fly is to lay eggs, and that it is only when she cannot find any sheep at all to prey on, or when, by any means, she is prevented from reaching their nostrils, that the eggs hatch out pre-

maturely inside her body, and are sometimes deposited afterwards in the form of living larvæ, or maggots, in the nostrils of any unfortunate sheep that she can come across.

REMEDY.

The best preventive is a little coal tar on the sheep's nostrils. The maggots of the flesh-fly are infinitely more troublesome and dangerous to sheep in sultry and moist weather. When the weather is warm the fly deposits its eggs on wet or dirty parts of the wool, and the ova are soon hatched when the maggots immediately begin to burrow into the skin of the sheep, and if left to work their will for any length of time, they will actually eat the sheep alive. Dipping with M'Dougall's sheep dip is the best preventive. A good dressing for destroying the maggots is a combination of one part of oil of turpentine to three parts of sweet oil. Various decoctions are sold for the same purpose, most of which also profess to be preventives if applied to keep the fly from depositing its eggs in the wool.

BLIND STAGGERS—STURDY.

The disease called blind staggers, is the uncommon affection called sturdy, or turnsick, which disease is caused by the pressure in the brain of a cerebral hydatid, and which, in its developed state, consists of a bladder provided with a variable number of heads. The variety of ways in which this disease manifests itself, has caused it occasionally to be confounded with other diseases—with attacks of the sheep-bot, with functional disorders of the brain, or with blind staggers. The disease is caused by the sheep picking from the pasture the ova or larvæ of the tapeworms dropped from dogs, foxes, rabbits, etc. Sturdy rarely affects sheep above two years of age. It will be found to prevail on farms with open pastures, where dogs are employed to guard the flocks, or where sheep are confined within limited space, with one or more dogs amongst them. These are the conditions

favorable to the development of sturdy, and they are those favorable to the dissemination of tapeworm eggs by dogs, and the penetration of eggs in the bodies of sheep. Sturdy generally terminates fatally, owing to the circumstances that the cause of the disease—the parasite—cannot be destroyed or expelled by any remedy administered internally. The natural method of relief, which is by the absorption of the bones of the skull and evacuation of the hydatid, is very rare. Death invariably ensues when the parasite is encysted and developed in the center of the brain. Usually but one hydatid is found within the skull, and if that one should happen to be located at the surface of the brain, the bones of the skull, through absorption, gradually become thinner as the hydatid develops, and on examining the head, a soft place may often be detected, which indicates that the fellow lies underneath. After a portion of the skin has been laid back, and the place carefully opened, the liquid from within the cyst may be extracted by a small syringe, a few drops of tincture of myrrh or tincture of aloes injected, and the opening covered by replacing the skin and sewing up the wound. If the bladder can be seized and drawn out, so much the better, and no injection is then necessary. The wound heals readily, and the animal may thus be saved—that is, if the case has been timely and properly attended to.

DIARRHOEA.

Common diarrhœa, or scours, not attended with constitutional disease, generally requires no remedies. If protracted, two or three days' confinement to dry food, or an ounce of prepared chalk given in half a pint of tepid milk, will usually put a stop to it. If the purging is severe, or accompanied by mucus slime, a gentle cathartic of an ounce of Epsom salts or oil should be administered to a sheep, and half as much to a lamb six months old, and this be followed up by the dose of chalk and milk above recommended, once a day for two or three days. But "sheep's cordial" is a better remedy than the chalk, and may be kept on hand by every farmer. It is composed of

the following ingredients: Prepared chalk, one ounce; powdered catechu, half an ounce; powdered ginger, two drachms; and powdered opium, half a drachm. Mix them with half a pint of peppermint water, and give two or three tablespoonfuls morning and night to a grown sheep, and half as much to a lamb.

DYSENTERY.

This differs from diarrhœa in various observable particulars. It is attended by fever; the appetite is irregular and generally poor; the evacuations are as thin as, or thinner than, in diarrhœa, but they are slimy, sticky and very offensive in smell. As the disease progresses, they become tinged with blood, and the animal rapidly wastes away. It sometimes dies in a few days, and sometimes lingers along for several weeks. This is treated much like severe diarrhœa, only many persons give two cathartics, instead of one, at the beginning. The English practitioners also bleed, if the malady is detected in its very first stage; but if debility has ensued, it prostrates the system too much. The "sheep's cordial" requires to be given longer, and after a short period tonics are added—more ginger and from one to two drachms of gentian daily. This last is an admirable tonic. In place of the above remedies, some American farmers give a teaspoonful of laudanum and a tablespoonful of gin or rum, mixed and put in a little diluted fluid.

COLIC OR STRETCHES.

This is occasioned by confinement to dry food. During the paroxysms the sheep stretches itself incessantly, and exhibits much pain. A cathartic of one ounce of Epsom salts or castor oil will usually effect a cure. A drachm of ginger and a teaspoonful of the essence of peppermint, put in warm water with salts, adds to their efficacy. Half of the above dose for lambs. Green feed, even if given only once or twice a week, prevents this malady.

CATARRH.

This is common in winter among unsheltered sheep, or those that are wintered in small, close, unventilated stables. In its simple form it is not dangerous, unless its

exciting causes are continued; but frequent colds, rendered chronic by mismanagement, impair the condition of sheep, and eventually lead to low forms of fever, wasting and death. An epizootic catarrh, like influenza in unusually changeable winters among human beings, occasionally rages with great violence over extensive regions, producing wide-spread destruction in our American flocks. The best course is to prevent the disease by proper management. Hardy sheep, in good condition, need not, with reasonable precaution, be exposed to taking cold, and if any number of them chance to do so, certainly the neglect causing it need not be repeated. For simple cold it is not common to do anything, though some careful farmers administer a tablespoonful of tar, and smear a little on their nose.

SORE FACE AND LIPS.

Sheep's faces occasionally become quite sore when they are at pasture in summer. It is attributed to the effect of St. John's wort, and to some other. It can be easily cured by the application of sulphur ointment, consisting of sulphur and lard. Swelled and sore lips more frequently appear about the opening of winter, and the causes are unknown. Sulphur ointment, mixed with a little tar, is a very efficacious remedy.

OPHTHALMIA.

This disease is characterized by redness of eyes, intolerance of light, and constant flow of tears. Bathe the eyes occasionally with warm water, to which a little sulphate of zink has been added—a drachm to a quart of water. A teaspoonful of laudanum may also be added with much benefit.

MODE OF ADMINISTERING MEDICINES TO SHEEP.

Sheep medicines administered internally should be in a fluid form, for otherwise they fall into the rumen or paunch, where they do not produce so much effect. Even

fluids should be poured into the throat with care and deliberation, or they are likely to take the same course. It is common, as in the case of the horse, to give sheep medicine through a horn. Some persons fasten their mouths open by means of a bit of three-quarter-inch board, about two and a half inches wide by four inches long, with an inch and a half hole through its center, and a strap attached to each end. This piece of wood is placed in the mouth so as to hold it fully distended, and is confined there by tying the straps over the back of the head. By holding up the head of the sheep and inserting a horn or tube through the hole in the wood, fluid can be poured down the throat without difficulty. A probang can more conveniently be inserted through the same aperture in case of choking.

SHEEP TICKS.

A flock of sheep infested with ticks cannot be kept in good order, and when a flock of lambs are made the prey of this parasite they become poor and weak by spring and these destructive parasites rapidly reduce them lower, and render it extremely difficult to save their lives. Ticks are found on all sheep in proportionate numbers as the flock has been neglected or properly attended. The heat and cold and the nibbling and biting to which they are exposed on newly shorn sheep, drive them to take shelter in the long wool of the lambs. Here they are so readily exterminated that it is much a disgrace as a loss to the flockmaster to suffer them to remain in the flock. About ten days or two weeks subsequent to shearing, the lambs should be dipped in decoction of tobacco strong enough to not only kill the tick, but to destroy the vitality of the eggs.

WEEDS AND SHEEP.

Of the 600 weeds and grasses growing in the Northwest, it is estimated by those who have made a study of it that sheep will eat not less than 576 of them, while horses consume but eighty-two, and cattle only fifty-six

of them. The fact is sheep prefer many kind of weeds to grasses, and weedy cattle and horse pastures are always improved by turning a small flock of sheep into them.

SULPHUR FOR INSECTS.

An agriculturist of South Braintree, Mass., has found a mixture of sulphur and fine ground tobacco, two parts of the former to one of the latter, as an excellent preventive of the ravages of insects on squash and other vines, as well as keeping lice from cattle, dog and poultry. He also recommends its use for sprinkling trees and bushes that are eaten by canker worms or currant worms. Sulphur is excellent for use in the poultry house and stable, and so is tobacco and snuff, used with care, but we are inclined to choose a mixture of plaster of paris with just enough paris green to give it a light tinge, as being cheaper and more effective for squash vines.

Varieties of Poultry.

VARIETIES OF POULTRY.

There are eighty-seven standard and a large number of promiscuous varieties of chickens raised in this country. The standard varieties are divided as follows:

1. American Class—Barred, buff, peacomb barred, and white Plymouth Rocks; silver, golden, white, buff and black Wyandottes; black, mottled and white Javas; American Dominiques and Jersey Blues.

2. Asiatic Class—Light and dark Brahmas; buff, partridge, white and black Cochin; black and white Langshans.

3. Mediterranean Class—Brown, rose comb brown, black, Dominique, buff and silver duckwing Leghorns; black and white Minorcas; Andalusians and black Spanish.

4. Polish Class—White-crested black, golden, silver,

DARK BRAHMAS.

WHITE BRAHMAS.

white, bearded golden, bearded silver, bearded white and buff lace.

5. Hamburg Class—Golden-spangled, silver-spangled, golden-penciled, silver-penciled, white and black Hamburgs; redeaps; silver and golden Campines.

6. French Class—Honudans, Crevecœurs, and colored Dorkings.

7. English Class—White, silver, gray and colored Dorkings.

8. Game and Game Bantam Class—Blackbreasted red, brown red, golden duckwing, silver duckwing, red pyle, white, black and Birchen games; the same varieties for game bantams. Cornish and white Indian games; Malays and black Sumatra games.

9. Bantam Class, Other than Game—Golden and silver Sebrights; white and black rose comb; booted white; buff partridge, white and black Cochins; black-tailed, white and black Japanese, and white crested white Polish.

10. Miscellaneous Class—Russians, silkies, Sultans, frizzles and rumpless.

For practical purposes the above ten classes may be grouped into four general classes, as follows:

1. The general purpose breeds: The American class.
2. The meat or table breeds: The Asiatic class.
3. The egg breeds: The Mediterranean class.
4. The ornamental breeds: The Polish, exhibition games, miscellaneous, and bantam classes.

CHICKEN CHOLERA.

What has been said of hog cholera may with equal truth be said of chicken cholera. There is no cure for the genuine chicken cholera. But the chicken, like the hog, has a score or more of ailments that are generally termed cholera that are no kin to this dreaded disease.

If the raisers of poultry would be more careful about doting their chickens and put the money spent into suitable quarters for the chickens they no doubt would find chickens more profitable.

Following are the most common diseases of the chicken:

ROUP.

(Poultry World.)

"Misfortunes never come singly." This is especially true of the roup, for very seldom is it, either because the disease is contagious or because the same cause operates to produce this effect upon quite a number of the fowls, that the roup attacks a single fowl. Generally several are attacked at once, and the breeder has plenty of trouble on hand without borrowing any. Vigorous measures are strictly in order, but after the removal of the affected fowl or fowls, the first thing to be done is to seek for the cause of the disease, and when found to remove it.

Roup may generally be traced to want of cleanliness, improper ventilation or undue exposure; and the poultryman who has provided against these causes is reasonably safe against the roup. But it sometimes happens that the cause is obscure and difficult to find. In such cases the wants of the fowls should be carefully looked after, and a little tonic given in the food, with a few drops of aconite in the water.

The diseased fowls, separated from the rest, should be given comfortable quarters and properly treated. Perhaps as sensible a treatment as any would be first of all to cause them to inhale the fumes of cresoline; then to open the bowels with a good dose of castor oil; after which keep the eyes and nostrils washed out with chlorinated soda diluted in water, and administer German roup pills according to directions. A few drops of aconite may be added to the drink. If a fowl is treated in this way it will recover from the roup if the case is curable. But no medicine and no system of treating can cure every case of roup. Some will die, do whatever you may.

GAPES.

The Gapes is a very common ailment of poultry and domestic birds. More common among the young than the old.

Cause.—The disease is caused by the presence of little red worms in the wind-pipe, about the size of a small cambric needle.

Symptoms.—Gaping for breath with beak wide open, yellow beak, tongue dry and feathers ruffled on the head and neck.

Treatment.—Give a pill each morning made of equal parts of scraped garlic and horse radish, with as much cayenne pepper as will outweigh a grain of wheat, mix with fresh butter.

If a good many are affected, put from 5 to 10 drops of turpentine to a pint of meal.

Treatment must be given in the early stages of the disease, or all remedies will fail.

ASTHMA.

Symptoms.—The fowls labor for breath, opening the beak often and for quite a time, and sometimes drops of blood appearing on the beak.

Treatment.—Take the disease in hand as soon as discovered, keep the fowl warm, and give equal parts of sulphur and fresh butter (or fresh lard) thoroughly mixed.

GOOD REMEDIES FOR THE CHICKEN CHOLERA.

Symptoms.—The symptoms of chicken cholera are greenish droppings, prostration, and intense thirst. It should not be mistaken for indigestion. Cholera kills quickly, and this is a sure indication.

Remedy.—The best remedy is to add a teaspoonful of carbolic acid to a quart of water and give no other water to drink. The remedy is not a sure cure, but is one of the best. When cholera puts in an appearance, everything on the place should be thoroughly cleaned and disinfected, the remedy mentioned above being also an excellent disinfectant.

Another Good Receipt.

$\frac{1}{2}$ pound madder,
 $\frac{1}{2}$ pound sulphur,

2 ounces antimony,
2 ounces saltpetre,
 $\frac{1}{4}$ pound cayenne pepper.

Mix a tablespoonful in feed for 30 chickens.

A correspondent of the *London Live Stock Journal* wrote that paper: Last May, I preserved 200 eggs in the following way:— $1\frac{1}{2}$ lbs. unslacked lime, 1 lb. salt, 4 gallons water. Boil together for quarter of an hour, strain through a colander, and pour over the eggs when cold. I began to use the eggs in October, and have not yet quite finished them. I have not had one bad egg, but they were all fresh laid when pickled, that is within a week. I have preserved 200 at a time in this way for four years, and have only found two bad eggs amongst them. They are very good poached, but do not boil well. I put them in a deep crockery pot, without a cover, but care must be taken that the eggs are entirely covered with the pickle. The editor adds: This is a very good way, and the method with lime and salt is very largely used, as it deserves. If you add to your present mixture about $\frac{1}{4}$ lb. cream of tartar, and leave the whole to blend and temper together for a week before using, I think you will find that the quality for boiling is improved.

CHICKENS IN HOT WEATHER.

The sudden dying of young chicks in hot weather is almost always caused by lice. Look around the head and neck, and a few big fellows may be seen which torment the chicken so that it cannot be thrifty. Rub some grease of any kind about the head and neck and under the wings. This is sure death to the pests and does the chicks no harm. It is well to use it as a preventive, for if lice get on the chicks in hot weather, many chicks will die before the remedy can be applied.

“POULTRY RAISERS' EGG FOOD POWDER.”

(TO MAKE HENS LAY EGGS.)

Red pepper powdered, 2 ounces,

Allspice powdered, 4 ounces,

Ginger powdered, 6 ounces.

Mix them by sifting.

One tablespoonful to be mixed with every pound of food, and fed 2 or 3 times a week. Also feed chopped-up fresh meat.

RAISING CHICKENS.

He who expects to raise poultry without devoting constant care and attention to them will generally score a failure. “Eternal vigilance” is the price of chickens! Not exactly the kind of vigilance that liberty requires, but a painstaking and sensible application to the needs and requirements of the incubating eggs and the growing chickens. The hen must be watched and attended to while sitting, and the eggs looked after every few days; for if one is broken in the nest all the others are smeared over the surface, and it should be soaked awhile in water, and carefully cleaned before replacing in the nest. Moisture is another great essential in the hatching process, and the eggs should be sprinkled with tepid water about once or twice a week.

Some people have a “wholly horror” about meddling with eggs after they have been set; but this is only a superstition, and what we might denominate a “sentimental notion”, for art has as much to do in bringing out a little chicken as nature, that is, it comes in as a valuable help in supplementing nature's work.

The first two or three days of a chicken's life are the most critical, and as they are very young and feeble, great care must be exercised in attending to them. While they then require very little nourishment, yet what is given them should be very fine, corn meal baked in a pan in the oven, with two or three eggs mixed in, but no salt, as salt is injurious to the young chickens. A shallow

dish of water should be kept in reach of the hen and brood. The corn bread should be soaked in hot water as wanted, and fed quite often.

Since lice are the great pest of the chickens, as soon as the hen comes off with her brood she should be caught and her body inverted, while abundance of Persain Insect Powder (Delmatian) must be sprinkled well through her feathers, and worked in close to the skin. The coop should also be well dusted on the bottom, and this operation repeated once or twice a week during the time the hen is allowed to carry the chickens. After the mother is taken away, the young chickens should be sprinkled with the same powder occasionally after they have gone up in the evening.

There is really no more efficient foe to insectivorous life than the Delmatian powder, and hence it is a necessity about every chicken house, and should be used freely, as it has no injurious effect on the chickens, only destroying lice and other insects.

The cleaning of the coops and chicken houses is another matter of much importance. The mother, with the chickens, should be placed out doors after the latter are a day or two old, and the coops moved every other day, or else well cleaned out and disinfected. Should the weather be very inclement it is always best to bring the brood in the house, or in some clean dry place until the bad weather is over.

The early care is of the most importance, and they should be most carefully watched and guarded during the first week or two. Many young chickens are very frail and tender—especially new breeds which through more or less inbreeding, do not possess the inherent vigor of the old established breeds. We had a very fine flock of twenty Golden Wyandottes which were placed out doors too soon this summer, and wet weather coming on they fared badly, every morning finding one of them keeled over on its back and about to die. After removing the hen and brood to our wareroom floor, they all seemed to do better, and no more of the little “goldens” were lost. But this bit of experience cost us six chickens, only four-

teen now remaining of the lot. So we must understand that in trying to raise these new breeds—the new white breeds of others, extra care must be exercised at all times.

Look out for lice. They are often the cause of the spread of contagious diseases, it is said. Place a few tobacco stems in the nest under the straw and it will keep the lice away.

One of the best materials for making hens' nests is the outside peel of onions. It will drive away if it does destroy hen lice. These peelings, or a piece of the onion itself, ought to be always in nests where hens are sitting on eggs. The warmth of the hen's body will so scent her feathers that the lice will be glad to clear out, and the hen will be equally glad to have them do so. With a good place for rolling in the dust under cover, so that the dust will not be turned into mud, it is not difficult to keep hens free from vermin.

THE CHICKEN MITE.

HOW TO DESTROY MITES.

One of the most formidable enemies of chickens is unquestionably the chicken mite, scientifically called *Dermanyssus gallinae* Redi. My observations have demonstrated that chickens infested with mites are exceedingly unprofitable. The cost of keeping them is increased and the income from them is very much reduced. Indeed, when very badly infested they are totally incapacitated for performing work.

The hens will cease laying.

Hatching hens will often either die on the nest as a result of the mite infestation or will leave their eggs, literally driven away by the vast hordes of mites which accumulate upon them.

Another very important feature of the evil effects of mites is the injury they do to newborn chicks. If the hen survives the ordeal to which she is subjected while hatching, the young chicks are attacked by the mites in great swarms as soon as they leave the protection of the shell, and, as a rule, the majority of them will succumb. I have

known the loss of newborn chicks from this cause to reach ninety per cent.

KEROSENE EMULSION WILL DESTROY MITES. HOW MADE.

Take one-half pound of hard soap and shave it into a gallon of *soft* water and put it on the fire and bring it to a boil. By this time the soap will have dissolved. Then remove the soap solution from the fire and stir into it at once, while hot, two gallons of kerosene. This makes a thick creamy emulsion which is made ready for use by diluting with ten volumes of *soft* water and stirring well. It can be utilized as a spray, dip or wash.

Make up as much of the stock emulsion as it is thought will be needed. This can be kept in a suitable vessel and a portion taken out and diluted as needed. If the bucket or holder attached to the spray pump holds five gallons, one-half gallon of the stock emulsion should be taken and put into the bucket or holder and four and one-half gallons of soft water added and the whole well stirred. It is then ready to be sprayed on the places occupied by the mites. A beginning should be made at a particular place and the whole habitation of the mites sprayed in a regular order of which account should be taken so that the same order may be followed in subsequent sprayings. The spray should be directed with special care into all crevices, holes, joints, or other hiding and breeding-places of the mites. The first spray of kerosene emulsion will kill within five minutes all of the mites and eggs with which it comes into contact, but many mites will be left in the hiding-places unaffected by the spray. Hence the spraying should be repeated as soon as the first spraying is completed. Even this will not kill all of the mites, hence a third spraying should be done as soon as the second is completed. At each repetition the beginning should be made at the same place and the same order followed as in the first. These three sprayings done in one day and in rapid succession will destroy nearly all of the mites, but, as my researches have shown, many eggs are left in places untouched by the spray. If mites are seen crawling about the building the next day, it should be sprayed

again. One might ordinarily suppose that he had now exterminated the mites. But such is not the case, for, in about three days, a crop of young mites will be found hatched from the eggs which escaped the first spraying. If these would be allowed to go undisturbed, it would not be long until the building would be as badly infested as at the beginning. Therefore the spraying should be repeated once every three or four days, spraying two or three times on each occasion, for about two weeks.

You will have no more bother from mites during that season.

The cost of the remedy is very small. The cost of making thirty gallons of the emulsion is as follows:

Two gallons kerosene at 18c.....	36c.
One-half pound hard soap at 8c.....	4c.
Labor	5c.

Total	45c.
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This will be enough to spray the ordinary farm hen-house once.

PRESERVING EGGS.

E. F. LADD, AGRICULTURAL COLLEGE, N. D.

At the present time eggs are largely packed in lime, salt and other products, or are put in cold storage for winter use, but such eggs are very far from being perfect when they come upon the markets, and frequently one-half of them are unfit for use, if we are to judge from the condition of the Fargo market. A method to be generally employed must be simple, cheap and the eggs, when wanted for use, must be of good quality.

There was need for a simple method of preserving eggs, one which would enable the farmers or the consumers to put away their eggs during the summer months when they are plentiful and command but a small price, to be used in times of scarcity when the price of eggs rules exceptionally high. For this reason six years ago we were led to make experiments in preserving eggs by various means. Of the methods tested, waterglass was the most promising and our experiments continued through several seasons with most satisfactory results.

The shell of an egg has a very thin coating of mucilagenous, albuminous matter upon its surface that seems to protect the egg for a considerable time from atmospheric action or the introduction of the germs of decomposition. If this coating be removed immediately after the egg is deposited, while still warm, the keeping quality seems to be much reduced, or if eggs that become soiled in the nest are washed, this albuminous coating is softened and the life of the egg shortened thereby.

It is believed that in waterglass we have a preservative which will, when used for preserving eggs, give better satisfaction than any other method available for those who desire to keep eggs for any great length of time.

Eggs put down by this method have been kept for from three to nine months and the eggs have come out in better condition than by any other method tested. When strictly fresh eggs only, have been put down, at the end of six months they have invariably come out in better shape than the average market eggs supposed to be fresh.

This method has been tested, in a commercial way, in nearly every state and part of our country and we have not had to exceed eight adverse reports. One party in Maine reports that during the summer of 1903 he put down, by this method, 6,000 dozen of fresh eggs, and, in the following December and January, he was selling these eggs, receiving the highest prices paid for strictly fresh eggs and was frequently told that they were the best to be had. We might quote from such trials made, during the past three years by parties in North Dakota, California, Carolina, New York, etc., but the general tenor of all are about the same.

After experiments made with solutions of various strengths, and under varying conditions, we found that an eight to ten per cent solution of waterglass would preserve eggs very effectually, so that at the end of eight months eggs that were preserved the first part of the summer appear to be perfectly fresh. In most packed eggs, after a little time, the yolk settles to one side, and the egg is then inferior in quality. In boiling eggs preserved for eight months in waterglass the yolk retained

its normal position in the egg, and in taste they were not to be distinguished from fresh, unpacked store eggs. Again, most packed eggs will not beat up well for cake-making or for frosting, while eggs from a solution in waterglass seemed quite equal to the average fresh store eggs of the market. It should be borne in mind that in these experiments only fresh eggs were used for preserving; no egg was more than four days old. Eggs that have already become stale cannot be successfully preserved by this or any known method so as to come out fresh.

WHAT IS WATERGLASS?

Waterglass (Sodium Silicate) is a very cheap product that can usually be procured at not to exceed fifty cents per gallon, and one gallon will make enough solution to preserve fifty dozen of eggs, so that the cost of material for this method would only be about one cent per dozen. Waterglass is sodium and potassium silicate, sodium silicate being usually the cheaper.

NECESSARY PRECAUTIONS.

1. The eggs to be put down by this method must be fresh and not stale store eggs. A few stale eggs will soon injure the entire lot. One party reports that he put down two lots of eggs, fifty gallon jars in each case; one lot strictly fresh eggs, the other contained some stale store stock, and the first was a complete success while the second lot came out about like the ordinary packed eggs, some fair, some spoiled.

2. A good grade of waterglass must be used. Some of the cheap waterglass contains so much of free, uncombined alkali that the eggs preserved in such solutions become watery and acquire a bad flavor. I prefer waterglass in the form of heavy white jelly which flows like heavy cold molasses. Of this grade of waterglass somewhat less is needed than when the thinner product is employed. The dry powder waterglass has not as a gen-

eral rule dissolved fully in hot water, and for that reason has not proven as satisfactory as the first named product.

3. Galvanized iron vessels, crocks, jars, etc., may be used in which to preserve the eggs. Wooden kegs of good quality are satisfactory, but these must be thoroughly sweetened by scalding with boiling water. There have been a few complaints that barrels have not been entirely satisfactory as the waterglass dissolved some products which deposited on the eggs. I am inclined to think this may have been due to the presence of glue used as sizing for the barrel. When the barrels have such a coating it might be well to char the inside of the barrel by placing in it a few shavings saturated with kerosene oil and then throwing in a lighted taper and allowing the sides of the barrel to become charred. This barrel, well-burned and then thoroughly washed, should be free from any glue-like products.

DIRECTIONS.

For those who may desire to test this method I give the following directions:

Use pure water that has been thoroughly boiled and then cooled. To each ten quarts of water add one quart or slightly less of waterglass. When the heavy jelly-like solution is used, three-fourths of a quart of waterglass will be ample.

The solution may be prepared, placed in the jar and fresh eggs added from time to time until the jar is filled, but, be sure that there is fully two inches of waterglass solution to cover the eggs.

Keep the eggs in a cool, dark place and well covered to prevent evaporation. A cool cellar is a good place in which to keep the eggs.

If the eggs are kept in too warm a place the silicate is deposited and the eggs are not properly protected. Do not wash the eggs before packing, for by so doing, you injure their keeping quality, probably dissolving the mucilaginous coating on the outside of the shell.

For packing use only perfectly fresh eggs, for stale eggs will not be saved and may prove harmful to the others.

All packed eggs contain a little gas and in boiling such eggs they will crack. This may be prevented by making a pin-hole in the blunt end of the egg. To do this hold the egg in the hand, place the point of a pin against the shell of the egg at the blunt end and give the pin a quick, sharp blow just enough to drive the pin through the shell without injury to the egg.

NOTE:—The author of this book wishes to say he has been preserving eggs by this method during the past three years. It is impossible to distinguish the eggs from fresh ones.

The egg and poultry industry of the United States produced a revenue in 1900 of not less than \$305,000,000, a sum that passes the average man's comprehension altogether. Roughly estimated there are 350,000,000 hens in this country. In round numbers they laid 14,000,000,000 eggs in 1900, the value of which "fruit" was \$175,000,000. The value of the poultry actually consumed last year in the United States is placed at \$130,000,000 and the actual worth of the 350,000,000 biddies at 30 cents per head is \$105,000,000. With such an array of colossal values, truly the "business hen" richly merits her title.

One of the secrets of success with poultry is not to keep any unprofitable birds; sell them as soon as possible.

Forty hens can no more eat from one plate than forty people. Broadcast grain and provide long troughs for feeding soft food.

A feather pulling flock is almost worthless because it requires more food to produce more feathers, and the supply of eggs falls off correspondingly.

That poultry can be made a business has been demonstrated at several points, but success has generally attended those who did not confine themselves to one ob-

ject, but sold poultry and eggs, as well as taking advantage of the high prices for early chicks.

The Spanish and Leghorn fowls are the best foragers among the different breeds of fowls.

To cleanse the poultry house and yard use white wash, lime, copperas, and carbolic acid water freely.

POULTRY-HOUSE SHOULD BE PROPERLY VENTILATED IN ORDER TO MAINTAIN HEALTH OF FLOCK AND SECURE FULL YIELD OF EGGS.

One of the most interesting of station bulletins is one issued by Professor Rice of the Cornell (N. Y.) station. This bulletin shows the science and value of ventilating the hen coop, and it is worth the time of every reader who has a few chickens to read it. Speaking of the science of ventilating, the bulletin contains the following thoughts:

“The hen’s normal temperature is 105 to 106. She does not suffer as much on a cold day as a human being. But she can only keep warm by keeping alive those natural fires within her that are kept burning by respiration, or, practically, combustion. The temperature is maintained only by the passage of pure air into the lungs, which act as a rapidly worked pump, and it is this pumping, or breathing, that keeps up the proper degree of warmth. This is the secret of it all. Hence a man who shuts his hens up in tight houses where the air becomes vitiated and stale, can hardly expect to get anything but poor production and vitality as a result. As an example of this, take any two flocks of birds. Put one in a tight, vitiated pen and the other where plenty of good pure air can circulate. The former flock will be the colder, and if the frost comes it will be found that the hen or rooster that has its comb frozen will in the majority of cases come from the pen where the ventilation was poor.

HOUSE NEED NOT BE LARGE.

A henhouse does not have to be large. It should simply be large enough for the hens to heat it comfortably. As to the ventilation, it should be reasonably open in front, so as to get air without a draft. The old theory that a henhouse should be built on a hill is exhausted, and a new one, that the more sheltered the spot the better, has come into existence. Allowing a cubic foot of air space for every pound of live weight, and figuring on the basis of a dairy stable, the henhouse only needs to be one foot high. The main thing is to get a good and uniform circulation of fresh air. It is just as essential as corn, meal, meat, scraps, or anything else. It feeds the lungs, and they, through the process of breathing, cleanse the whole body. By ducts running through the entire body the hen can inflate herself with air. These passage ways or pipes run through bones, muscles, and organs, so that it is essential, when they are used, that the air be pure instead of vitiated and stale."

HEALTH EXPERIMENTS.

In considering the value of ventilation, the station found that proper ventilation greatly assisted in maintaining the health of the flock. Two coops were used in finding the value of ventilation upon the health of the birds. One had a glass front and the other a muslin front. Fifteen white Wyandotte cockerels were put in each coop. Speaking of the result, the bulletin has the following to say:

"They were kept there some months, and each day readings were taken as to temperature, density of sunlight, dampness, etc. At the end of that time it was found that in the glass house, there was one with a bright red, and fourteen with lop, dull combs. In the muslin fronted coop it was just the reverse, fourteen had bright combs and only one had a lop comb. White Wyandottes were used because of their well known trait of showing their condition by the appearance of the comb."

VENTILATION AND EGG PRODUCTION.

In the production of eggs the muslin front coop had the

decided advantage. The bulletin describes that experiment as follows:

“The next experiment was to determine the effect of ventilation on egg productiveness. An equal number of brown leghorn pullets were put into each of the houses, and at the end of the specified time it was found that four of the pullets in the glass front house had died, and that the birds in the muslin front coop had laid eighty-six eggs more than their competitors. In general, it was found that it was only one and one-half degrees colder in the muslin fronted house than in the house with a glass front.”

BREEDERS' TABLE.

Table giving the periods of gestation of different animals:

Mare	340 days
Cow	283 “
Ewe	150 “
Sow	112 “

THE PERIOD OF GESTATION IN COWS.

A recent bulletin of the New York Cornell Experiment Station reports observations since 1889 on the period of gestation of all of the cows of the university herd, which, “has contained an average of about 20 cows, about two-thirds Holstein and high grade Holstein, one-third Jersey and high grade Jersey, and a few native, mixed and cross-bred cattle. Nearly all the animals were bred and raised on the farm from dams so bred and raised, so that observations were taken from a single herd and its descendants. In all 194 observations have been made; of these, 9 terminated in the birth of dead calves prior to

253 days of pregnancy and 3 more were doubtful, so that the 12 have been excluded and the average confined to the 182 births that may be considered normal”.

“Of the 182 births, the average period of gestation was almost exactly 280 days.

The period of gestation was the same for male and female calves. The period of gestation where twins were born was five days less than the general average, and eight days less than the average of the single births of the same cows. Many cows show a well marked individual characteristic as to period of gestation, which may be several days longer or shorter than the average.” Farmers’ Bulletin No. 103.

One of the most important things for the farmer to know is when he should give special care to his stock. It is too late when you find the pigs dead out with a drove of hogs. The calf frozen to death in the corn stalks. The colt dead and the mother tied by the head to the manger. The ewe bleating for the lamb that the old sow is feasting upon.

No farmer will deny that this table alone is worth many times the price of the book to any farmer.

It is true there is a slight variation in the periods of gestation and in the case of mares some times a whole month.

The following table gives you the time when you should prepare a suitable and comfortable place for the animal.

HOW TO USE THE BREEDERS’ TABLE.

On the left of the page you will find numbers one, two and three. These are the places where you may put the names of three different animals just preceding the month when bred, then in a straight line across to where you find the kind of animal here make a check with the pencil and the record is made. If it were a mare you make the check in the first column. A cow the check comes in the second column, etc.

NAME OF ANIMAL.			Time of Service		Horses	Cattle	Sheep	Hogs	REMARKS.	
1	2	3	Jan.	1	Dec.	1	Oct.	1	May 21	Apr. 23
1	2	3	1	2	2	2	2	22	24	
1	2	3	1	3	3	3	3	23	25	
1	2	3	1	4	4	4	4	24	26	
1	2	3	1	5	5	5	5	25	27	
1	2	3	1	6	6	6	6	26	28	
1	2	3	1	7	7	7	7	27	29	
1	2	3	1	8	8	8	8	28	30	
1	2	3	1	9	9	9	9	29	May 1	
1	2	3	1	10	10	10	10	30	2	
1	2	3	1	11	11	11	11	31	3	
1	2	3	1	12	12	12	12	June 1	4	
1	2	3	1	13	13	13	13	2	5	
1	2	3	1	14	14	14	14	3	6	
1	2	3	1	15	15	15	15	4	7	
1	2	3	1	16	16	16	16	5	8	
1	2	3	1	17	17	17	17	6	9	
1	2	3	1	18	18	18	18	7	10	
1	2	3	1	19	19	19	19	8	11	
1	2	3	1	20	20	20	20	9	12	
1	2	3	1	21	21	21	21	10	13	
1	2	3	1	22	22	22	22	11	14	
1	2	3	1	23	23	23	23	12	15	
1	2	3	1	24	24	24	24	13	16	
1	2	3	1	25	25	25	25	14	17	
1	2	3	1	26	26	26	26	15	18	
1	2	3	1	27	27	27	27	16	19	
1	2	3	1	28	28	28	28	17	20	
1	2	3	1	29	29	29	29	18	21	
1	2	3	1	30	30	30	30	19	22	
1	2	3	1	31	31	31	31	20	23	

NAME OF ANIMAL.		Time of Service		Horses		Cattle		Sheep		Hogs		REMARKS.
		Feb.	1 Jan.	1 Nov.	1 June	1 Nov.	1 June	1 Nov.	1 June	1 May	24	
1	2			2		2		2		22	25	
1	2			3		3		3		23	26	
1	2			3		3		3		24	27	
1	2			3		3		3		25	28	
1	2			3		3		3		26	29	
1	2			3		3		3		27	30	
1	2			3		3		3		28	31	
1	2			3		3		3		29	June 1	
1	2			3		3		3		30	2	
1	2			3		3		3		31	3	
1	2			3		3		3		12 July	4	
1	2			3		3		3		2	5	
1	2			3		3		3		3	6	
1	2			3		3		3		4	7	
1	2			3		3		3		5	8	
1	2			3		3		3		6	9	
1	2			3		3		3		7	10	
1	2			3		3		3		8	11	
1	2			3		3		3		9	12	
1	2			3		3		3		10	13	
1	2			3		3		3		11	14	
1	2			3		3		3		12	15	
1	2			3		3		3		13	16	
1	2			3		3		3		14	17	
1	2			3		3		3		15	18	
1	2			3		3		3		16	19	
1	2			3		3		3		17	20	
1	2			3		3		3		18	21	
1	2			3		3		3		19	22	
1	2			3		3		3		20	23	
1	2			3		3		3		21		
1	2			3		3		3		22		
1	2			3		3		3		23		
1	2			3		3		3		24		
1	2			3		3		3		25		
1	2			3		3		3		26		
1	2			3		3		3		27		
1	2			3		3		3		28		
1	2			3		3		3		29		
1	2			3		3		3		30		
1	2			3		3		3		31		
1	2			3		3		3				

NAME OF ANIMAL.		Time of Service	Horses	Cattle	Sheep	Hogs	REMARKS.
1	2		March 1	1 Dec.	1 July	1 June	21
1	2		2	2	2	22	22
1	2		3	3	3	23	23
1	2		4	4	4	24	24
1	2		5	5	5	25	25
1	2		6	6	6	26	26
1	2		7	7	7	27	27
1	2		8	8	8	28	28
1	2		9	9	9	29	29
1	2		10	10	10	30	30
1	2		11	11	11	31	July 1
1	2		12	12	12	Aug.	1
1	2		13	13	13	2	2
1	2		14	14	14	3	3
1	2		15	15	15	4	4
1	2		16	16	16	5	5
1	2		17	17	17	6	6
1	2		18	18	18	7	7
1	2		19	19	19	8	8
1	2		20	20	20	9	9
1	2		21	21	21	10	10
1	2		22	22	22	11	11
1	2		23	23	23	12	12
1	2		24	24	24	13	13
1	2		25	25	25	14	14
1	2		26	26	26	15	15
1	2		27	27	27	16	16
1	2		28	28	28	17	17
1	2		29	29	29	18	18
1	2		30	30	30	19	19
1	2		31	31	31	20	20
1	2					21	21

NAME OF ANIMAL.			Time of Service		Horses		Cattle		Sheep		Hogs		REMARKS.
			April	1	March	1	Jan.	1	Aug.	21	July	22	
1	2	3											
1	2	3	2						2	22	23		
1	2	3	3						3	23	24		
1	2	3	4						4	24	25		
1	2	3	5						5	25	26		
1	2	3	6						6	26	27		
1	2	3	7						7	27	28		
1	2	3	8						8	28	29		
1	2	3	9						9	29	30		
1	2	3	10						10	30	31		
1	2	3	11						11	31	Aug. 1		
1	2	3	12						12	Sept. 1	2		
1	2	3	13						13	2	3		
1	2	3	14						14	3	4		
1	2	3	15						15	4	5		
1	2	3	16						16	5	6		
1	2	3	17						17	6	7		
1	2	3	18						18	7	8		
1	2	3	19						19	8	9		
1	2	3	20						20	9	10		
1	2	3	21						21	10	11		
1	2	3	22						22	11	12		
1	2	3	23						23	12	13		
1	2	3	24						24	13	14		
1	2	3	25						25	14	15		
1	2	3	26						26	15	16		
1	2	3	27						27	16	17		
1	2	3	28						28	17	18		
1	2	3	29						29	18	19		
1	2	3	30						30	19	20		
1	2	3	31						31	20	21		

NAME OF ANIMAL.				Time of Service	Horses	Cattle	Sheep	Hogs	REMARKS.
1	2	3		May	1 April	1 Feb	1 Sept	21 Aug, 21	
1	2	3		2	2	2	22	22	
1	2	3		3	3	3	23	23	
1	2	3		4	4	4	24	24	
1	2	3		5	5	5	25	25	
1	2	3		6	6	6	26	26	
1	2	3		7	7	7	27	27	
1	2	3		8	8	8	28	28	
1	2	3		9	9	9	29	29	
1	2	3		10	10	10	30	30	
1	2	3		11	11	11	31 Sept.	1	
1	2	3		12	12	12 Oct.	1	2	
1	2	3		13	13	13	2	3	
1	2	3		14	14	14	3	4	
1	2	3		15	15	15	4	5	
1	2	3		16	16	16	5	6	
1	2	3		17	17	17	6	7	
1	2	3		18	18	18	7	8	
1	2	3		19	19	19	8	9	
1	2	3		20	20	20	9	10	
1	2	3		21	21	21	10	11	
1	2	3		22	22	22	11	12	
1	2	3		23	23	23	12	13	
1	2	3		24	24	24	13	14	
1	2	3		25	25	25	14	15	
1	2	3		26	26	26	15	16	
1	2	3		27	27	27	16	17	
1	2	3		28	28	28	17	18	
1	2	3		29	29	29	18	19	
1	2	3		30	30	30	19	20	
1	2	3		31	31	31	20	21	

NAME OF ANIMAL.			Time of Service	Horses	Cattle	Sheep	Hogs	REMARKS.
1	2	3	June 1	May 1	March 1	Oct. 21	Sept. 21	
1	2	3	2	2	2	22	22	
1	2	3	3	3	3	23	23	
1	2	3	4	4	4	24	24	
1	2	3	5	5	5	25	25	
1	2	3	6	6	6	26	26	
1	2	3	7	7	7	27	27	
1	2	3	8	8	8	28	28	
1	2	3	9	9	9	29	29	
1	2	3	10	10	10	30	30	
1	2	3	11	11	11	31 Oct.	1	
1	2	3	12	12	12 Nov.	1	2	
1	2	3	13	13	13	2	3	
1	2	3	14	14	14	3	4	
1	2	3	15	15	15	4	5	
1	2	3	16	16	16	5	6	
1	2	3	17	17	17	6	7	
1	2	3	18	18	18	7	8	
1	2	3	19	19	19	8	9	
1	2	3	20	20	20	9	10	
1	2	3	21	21	21	10	11	
1	2	3	22	22	22	11	12	
1	2	3	23	23	23	12	13	
1	2	3	24	24	24	13	14	
1	2	3	25	25	25	14	15	
1	2	3	26	26	26	15	16	
1	2	3	27	27	27	16	17	
1	2	3	28	28	28	17	18	
1	2	3	29	29	29	18	19	
1	2	3	30	30	30	19	20	
1	2	3	31	31	31	20	21	

NAME OF ANIMAL.		Time of Service		Horses		Cattle		Sheep		Hogs		REMARKS.
		July	1	June	1	April	1	Nov.	21	Oct.	20	
1	2				3			2	22	21		
1	2				3			2	22	21		
1	2				3			3	23	22		
1	2				3			4	24	23		
1	2				3			5	25	24		
1	2				3			6	26	25		
1	2				3			7	27	26		
1	2				3			8	28	27		
1	2				3			9	29	28		
1	2				3			10	30	29		
1	2				3			11	Dec.	1	30	
1	2				3			12	12	2 Nov.	1	
1	2				3			13	13	3	2	
1	2				3			14	14	4	3	
1	2				3			15	15	5	4	
1	2				3			16	16	6	5	
1	2				3			17	17	7	6	
1	2				3			18	18	8	7	
1	2				3			19	19	9	8	
1	2				3			20	20	10	9	
1	2				3			21	21	11	10	
1	2				3			22	22	12	11	
1	2				3			23	23	13	12	
1	2				3			24	24	14	13	
1	2				3			25	25	15	14	
1	2				3			26	26	16	15	
1	2				3			27	27	17	16	
1	2				3			28	28	18	17	
1	2				3			29	29	19	18	
1	2				3			30	30	20	19	
1	2				3			31	31	21	20	

[illegible]

NAME OF ANIMAL.			Time of Service		Horses	Cattle	Sheep	Hogs	REMARKS.
			Sept.	1 Aug.	1 June	1 Jan.	21 Dec.	21	
1	2	3		2	2	2	22		
1	2	3		3	3	3	23		
1	2	3		4	4	4	24		
1	2	3		5	5	5	25		
1	2	3		6	6	6	26		
1	2	3		7	7	7	27		
1	2	3		8	8	8	28		
1	2	3		9	9	9	29		
1	2	3		10	10	10	30		
1	2	3		11	11	11	31		
1	2	3		12	12	12 Feb.	1 Jan.	1	
1	2	3		13	13	13	2	2	
1	2	3		14	14	14	3	3	
1	2	3		15	15	15	4	4	
1	2	3		16	16	16	5	5	
1	2	3		17	17	17	6	6	
1	2	3		18	18	18	7	7	
1	2	3		19	19	19	8	8	
1	2	3		20	20	20	9	9	
1	2	3		21	21	21	10	10	
1	2	3		22	22	22	11	11	
1	2	3		23	23	23	12	12	
1	2	3		24	24	24	13	13	
1	2	3		25	25	25	14	14	
1	2	3		26	26	26	15	15	
1	2	3		27	27	27	16	16	
1	2	3		28	28	28	17	17	
1	2	3		29	29	29	18	18	
1	2	3		30	30	30	19	19	
1	2	3		31	31	31	20	20	

NAME OF ANIMAL.			Time of Service		Horses		Cattle		Sheep		Hogs		REMARKS.
			Oct.	1 Sept.	1 July	1 Feb.	1 Jan.	20					
1	2	3	2	2	2	22	21						
1	2	3	3	3	3	23	22						
1	2	3	4	4	4	24	23						
1	2	3	5	5	5	25	24						
1	2	3	6	6	6	26	25						
1	2	3	7	7	7	27	26						
1	2	3	8	8	8	28	27						
1	2	3	9	9	9	29	28						
1	2	3	10	10	10	30	29						
1	2	3	11	11	11	31	30						
1	2	3	12	12	12								
1	2	3	13	13	13								
1	2	3	14	14	14								
1	2	3	15	15	15								
1	2	3	16	16	16								
1	2	3	17	17	17								
1	2	3	18	18	18								
1	2	3	19	19	19								
1	2	3	20	20	20								
1	2	3	21	21	21								
1	2	3	22	22	22								
1	2	3	23	23	23								
1	2	3	24	24	24								
1	2	3	25	25	25								
1	2	3	26	26	26								
1	2	3	27	27	27								
1	2	3	28	28	28								
1	2	3	29	29	29								
1	2	3	30	30	30								
1	2	3	31	31	31								

NAME OF ANIMAL.		Time of Service		Horses		Cattle		Sheep		Hogs		REMARKS.
		Nov,	1	Oct,	1	Aug.	1	Mar.	21	Feb.	20	
1	2			2	2	2	2	22	21			
1	2			3	3	3	3	23	22			
1	2			3	4	4	4	24	23			
1	2			3	5	5	5	25	24			
1	2			3	6	6	6	26	25			
1	2			3	7	7	7	27	26			
1	2			3	8	8	8	28	27			
1	2			3	9	9	9	29	28			
1	2			3	10	10	10	30	Mar.	1		
1	2			3	11	11	11	31	2			
1	2			3	12	12	12	Apr.	1	3		
1	2			3	13	13	13	2	4			
1	2			3	14	14	14	3	5			
1	2			3	15	15	15	4	6			
1	2			3	16	16	16	5	7			
1	2			3	17	17	17	6	8			
1	2			3	18	18	18	7	9			
1	2			3	19	19	19	8	10			
1	2			3	20	20	20	9	11			
1	2			3	21	21	21	10	12			
1	2			3	22	22	22	11	13			
1	2			3	23	23	23	12	14			
1	2			3	24	24	24	13	15			
1	2			3	25	25	25	14	16			
1	2			3	26	26	26	15	17			
1	2			3	27	27	27	16	18			
1	2			3	28	28	28	17	19			
1	2			3	29	29	29	18	20			
1	2			3	30	30	30	19	21			
1	2			3	31	31	31	20	22			

NAME OF ANIMAL.			Time of Service	Horses		Cattle	Sheep	Hogs	REMARKS.
				Dec. 1	Nov. 1	Sept. 1	April 21	Mar. 21	
1	2	3		2	2	2	22	22	
1	2	3		3	3	3	23	23	
1	2	3		4	4	4	24	24	
1	2	3		5	5	5	25	25	
1	2	3		6	6	6	26	26	
1	2	3		7	7	7	27	27	
1	2	3		8	8	8	28	28	
1	2	3		9	9	9	29	29	
1	2	3		10	10	10	30	30	
1	2	3		11	11	11	May 1	April 1	
1	2	3		12	12	12	2	2	
1	2	3		13	13	13	3	3	
1	2	3		14	14	14	4	4	
1	2	3		15	15	15	5	5	
1	2	3		16	16	16	6	6	
1	2	3		17	17	17	7	7	
1	2	3		18	18	18	8	8	
1	2	3		19	19	19	9	9	
1	2	3		20	20	20	10	10	
1	2	3		21	21	21	11	11	
1	2	3		22	22	22	12	12	
1	2	3		23	23	23	13	13	
1	2	3		24	24	24	14	14	
1	2	3		25	25	25	15	15	
1	2	3		26	26	26	16	16	
1	2	3		27	27	27	17	17	
1	2	3		28	28	28	18	18	
1	2	3		29	29	29	19	19	
1	2	3		30	30	30	20	20	
1	2	3		31	31	31	21	21	

NAME OF ANIMAL.		Time of Service		Horses		Cattle		Sheep		Hogs		REMARKS.
		Jan.	1	Dec.	1	Oct.	1	May	21	Apr.	23	
1	2			2	2	3	2	22	24			
1	2			3	3	3	3	23	25			
1	2			3	4	4	4	24	26			
1	2			5	5	5	5	25	27			
1	2			6	6	6	6	26	28			
1	2			7	7	7	7	27	29			
1	2			8	8	8	8	28	30			
1	2			9	9	9	9	29	May 1			
1	2			10	10	10	10	30	2			
1	2			11	11	11	11	31	3			
1	2			12	12	12	12	June 1	4			
1	2			13	13	13	13	2	5			
1	2			14	14	14	14	3	6			
1	2			15	15	15	15	4	7			
1	2			16	16	16	16	5	8			
1	2			17	17	17	17	6	9			
1	2			18	18	18	18	7	10			
1	2			19	19	19	19	8	11			
1	2			20	20	20	20	9	12			
1	2			21	21	21	21	10	13			
1	2			22	22	22	22	11	14			
1	2			23	23	23	23	12	15			
1	2			24	24	24	24	13	16			
1	2			25	25	25	25	14	17			
1	2			26	26	26	26	15	18			
1	2			27	27	27	27	16	19			
1	2			28	28	28	28	17	20			
1	2			29	29	29	29	18	21			
1	2			30	30	30	30	19	22			
1	2			31	31	31	31	20	23			

NAME OF ANIMAL.		Time of Service	Horses	Cattle	Sheep	Hogs	REMARKS.
1	2	Feb. 1	1	1	1	1	May 24
1	2	2	2	2	2	2	25
1	2	3	3	3	3	3	26
1	2	4	4	4	4	4	27
1	2	5	5	5	5	5	28
1	2	6	6	6	6	6	29
1	2	7	7	7	7	7	30
1	2	8	8	8	8	8	31
1	2	9	9	9	9	9	29 June 1
1	2	10	10	10	10	10	2
1	2	11	11	11	11	11	3
1	2	12	12	12	12	12	4
1	2	13	13	13	13	13	5
1	2	14	14	14	14	14	6
1	2	15	15	15	15	15	7
1	2	16	16	16	16	16	8
1	2	17	17	17	17	17	9
1	2	18	18	18	18	18	10
1	2	19	19	19	19	19	11
1	2	20	20	20	20	20	12
1	2	21	21	21	21	21	13
1	2	22	22	22	22	22	14
1	2	23	23	23	23	23	15
1	2	24	24	24	24	24	16
1	2	25	25	25	25	25	17
1	2	26	26	26	26	26	18
1	2	27	27	27	27	27	19
1	2	28	28	28	28	28	20
1	2	29	29	29	29	29	21
1	2	30	30	30	30	30	22
1	2	31	31	31	31	31	23

NAME OF ANIMAL.		Time of Service	Horses				Cattle	Sheep	Hogs	REMARKS.
			March	1	Feb.	1	Dec.	1	July 21	June 21
1.....	2									
1.....	2		2			2	2	22	29	
1.....	2		3			3	3	23	23	
1.....	2		4			4	4	24	24	
1.....	2		5			5	5	25	25	
1.....	2		6			6	6	26	26	
1.....	2		7			7	7	27	27	
1.....	2		8			8	8	28	28	
1.....	2		9			9	9	29	29	
1.....	2		10			10	10	30	30	
1.....	2		11			11	11	31	July 1	
1.....	2		12			12	12	Aug. 1	2	
1.....	2		13			13	13	2	3	
1.....	2		14			14	14	3	4	
1.....	2		15			15	15	4	5	
1.....	2		16			16	16	5	6	
1.....	2		17			17	17	6	7	
1.....	2		18			18	18	7	8	
1.....	2		19			19	19	8	9	
1.....	2		20			20	20	9	10	
1.....	2		21			21	21	10	11	
1.....	2		22			22	22	11	12	
1.....	2		23			23	23	12	13	
1.....	2		24			24	24	13	14	
1.....	2		25			25	25	14	15	
1.....	2		26			26	26	15	16	
1.....	2		27			27	27	16	17	
1.....	2		28			28	28	17	18	
1.....	2		29			29	29	18	19	
1.....	2		30			30	30	19	20	
1.....	2		31			31	31	20	21	

NAME OF ANIMAL.		Time of Service		Horses		Cattle		Sheep		Hogs		REMARKS.
1	2	3	April 1	March 1	Jan.	1 Aug.	21 July	22				
1	2	3	2	2	2	22	23					
1	2	3	3	3	3	23	24					
1	2	3	4	4	4	24	25					
1	2	3	5	5	5	25	26					
1	2	3	6	6	6	26	27					
1	2	3	7	7	7	27	28					
1	2	3	8	8	8	28	29					
1	2	3	9	9	9	29	30					
1	2	3	10	10	10	30	31					
1	2	3	11	11	11	31 Aug.	1					
1	2	3	12	12	12 Sept.	1	2					
1	2	3	13	13	13	2	3					
1	2	3	14	14	14	3	4					
1	2	3	15	15	15	4	5					
1	2	3	16	16	16	5	6					
1	2	3	17	17	17	6	7					
1	2	3	18	18	18	7	8					
1	2	3	19	19	19	8	9					
1	2	3	20	20	20	9	10					
1	2	3	21	21	21	10	11					
1	2	3	22	22	22	11	12					
1	2	3	23	23	23	12	13					
1	2	3	24	24	24	13	14					
1	2	3	25	25	25	14	15					
1	2	3	26	26	26	15	16					
1	2	3	27	27	27	16	17					
1	2	3	28	28	28	17	18					
1	2	3	29	29	29	18	19					
1	2	3	30	30	30	19	20					
1	2	3	31	31	31	20	21					

NAME OF ANIMAL.			Time of Service	Horses	Cattle	Sheep	Hogs	REMARKS.
1	2	3	May	1 April	1 Feb	1 Sept.	21 Aug. 21	
1	2	3	2	2	2	22	22	
1	2	3	3	3	3	23	23	
1	2	3	4	4	4	24	24	
1	2	3	5	5	5	25	25	
1	2	3	6	6	6	26	26	
1	2	3	7	7	7	27	27	
1	2	3	8	8	8	28	28	
1	2	3	9	9	9	29	29	
1	2	3	10	10	10	30	30	
1	2	3	11	11	11	31 Sept.	1	
1	2	3	12	12	12 Oct.	1	2	
1	2	3	13	13	13	2	3	
1	2	3	14	14	14	3	4	
1	2	3	15	15	15	4	5	
1	2	3	16	16	16	5	6	
1	2	3	17	17	17	6	7	
1	2	3	18	18	18	7	8	
1	2	3	19	19	19	8	9	
1	2	3	20	20	20	9	10	
1	2	3	21	21	21	10	11	
1	2	3	22	22	22	11	12	
1	2	3	23	23	23	12	13	
1	2	3	24	24	24	13	14	
1	2	3	25	25	25	14	15	
1	2	3	26	26	26	15	16	
1	2	3	27	27	27	16	17	
1	2	3	28	28	28	17	18	
1	2	3	29	29	29	18	19	
1	2	3	30	30	30	19	20	
1	2	3	31	31	31	20	21	

NAME OF ANIMAL.		Time of Service		Horses	Cattle	Sheep	Hogs	REMARKS.
1.....	2.....	3.....	June 1	May 1	March 1	Oct. 21	Sept. 21	
1.....	2.....	3.....	2.....	2.....	2.....	22.....	22.....	
1.....	2.....	3.....	3.....	3.....	3.....	23.....	23.....	
1.....	2.....	3.....	4.....	4.....	4.....	24.....	24.....	
1.....	2.....	3.....	5.....	5.....	5.....	25.....	25.....	
1.....	2.....	3.....	6.....	6.....	6.....	26.....	26.....	
1.....	2.....	3.....	7.....	7.....	7.....	27.....	27.....	
1.....	2.....	3.....	8.....	8.....	8.....	28.....	28.....	
1.....	2.....	3.....	9.....	9.....	9.....	29.....	29.....	
1.....	2.....	3.....	10.....	10.....	10.....	30.....	30.....	
1.....	2.....	3.....	11.....	11.....	11.....	31.....	Oct. 1	
1.....	2.....	3.....	12.....	12.....	12.....	Nov. 1	1.....	
1.....	2.....	3.....	13.....	13.....	13.....	2.....	2.....	
1.....	2.....	3.....	14.....	14.....	14.....	3.....	3.....	
1.....	2.....	3.....	15.....	15.....	15.....	4.....	4.....	
1.....	2.....	3.....	16.....	16.....	16.....	5.....	5.....	
1.....	2.....	3.....	17.....	17.....	17.....	6.....	6.....	
1.....	2.....	3.....	18.....	18.....	18.....	7.....	7.....	
1.....	2.....	3.....	19.....	19.....	19.....	8.....	8.....	
1.....	2.....	3.....	20.....	20.....	20.....	9.....	9.....	
1.....	2.....	3.....	21.....	21.....	21.....	10.....	10.....	
1.....	2.....	3.....	22.....	22.....	22.....	11.....	11.....	
1.....	2.....	3.....	23.....	23.....	23.....	12.....	12.....	
1.....	2.....	3.....	24.....	24.....	24.....	13.....	13.....	
1.....	2.....	3.....	25.....	25.....	25.....	14.....	14.....	
1.....	2.....	3.....	26.....	26.....	26.....	15.....	15.....	
1.....	2.....	3.....	27.....	27.....	27.....	16.....	16.....	
1.....	2.....	3.....	28.....	28.....	28.....	17.....	17.....	
1.....	2.....	3.....	29.....	29.....	29.....	18.....	18.....	
1.....	2.....	3.....	30.....	30.....	30.....	19.....	19.....	
1.....	2.....	3.....	31.....	31.....	31.....	20.....	20.....	
1.....	2.....	3.....				21.....	21.....	

NAME OF ANIMAL.		Time of Service		Horses	Cattle	Sheep	Hogs	REMARKS.
1	2	July	1	June	1	April	1	Oct. 20
1	2		2		2	22	21	
1	2		3		3	23	22	
1	2		4		4	24	23	
1	2		5		5	25	24	
1	2		6		6	26	25	
1	2		7		7	27	26	
1	2		8		8	28	27	
1	2		9		9	29	28	
1	2		10		10	30	29	
1	2		11		11	Dec. 1	30	
1	2		12		12	2	Nov. 1	
1	2		13		13	3	2	
1	2		14		14	4	3	
1	2		15		15	5	4	
1	2		16		16	6	5	
1	2		17		17	7	6	
1	2		18		18	8	7	
1	2		19		19	9	8	
1	2		20		20	10	9	
1	2		21		21	11	10	
1	2		22		22	12	11	
1	2		23		23	13	12	
1	2		24		24	14	13	
1	2		25		25	15	14	
1	2		26		26	16	15	
1	2		27		27	17	16	
1	2		28		28	18	17	
1	2		29		29	19	18	
1	2		30		30	20	19	
1	2		31		31	21	20	

NAME OF ANIMAL.

						Time of Service		Horses	Cattle	Sheep	Hogs	REMARKS.
						Aug.	1 July					
1	1	2	3					1	1	1	1	
1	1	2	3			2	2	2	2	2	2	
1	1	2	3			3	3	3	3	3	3	
1	1	2	3			4	4	4	4	4	4	
1	1	2	3			5	5	5	5	5	5	
1	1	2	3			6	6	6	6	6	6	
1	1	2	3			7	7	7	7	7	7	
1	1	2	3			8	8	8	8	8	8	
1	1	2	3			9	9	9	9	9	9	
1	1	2	3			10	10	10	10	10	10	
1	1	2	3			11	11	11	11	11	11	
1	1	2	3			12	12	12	12	12	12	
1	1	2	3			13	13	13	13	13	13	
1	1	2	3			14	14	14	14	14	14	
1	1	2	3			15	15	15	15	15	15	
1	1	2	3			16	16	16	16	16	16	
1	1	2	3			17	17	17	17	17	17	
1	1	2	3			18	18	18	18	18	18	
1	1	2	3			19	19	19	19	19	19	
1	1	2	3			20	20	20	20	20	20	
1	1	2	3			21	21	21	21	21	21	
1	1	2	3			22	22	22	22	22	22	
1	1	2	3			23	23	23	23	23	23	
1	1	2	3			24	24	24	24	24	24	
1	1	2	3			25	25	25	25	25	25	
1	1	2	3			26	26	26	26	26	26	
1	1	2	3			27	27	27	27	27	27	
1	1	2	3			28	28	28	28	28	28	
1	1	2	3			29	29	29	29	29	29	
1	1	2	3			30	30	30	30	30	30	
1	1	2	3			31	31	31	31	31	31	

NAME OF ANIMAL.		Time of Service		Horses		Cattle		Sheep		Hogs		REMARKS.
		Sept.	1	Aug.	1	June	1	Jan.	21	Dec.	21	
1.....	2							2	22			
1.....	2		2		2			3	23			
1.....	2		3		3			4	24			
1.....	2		4		4			5	25			
1.....	2		5		5			6	26			
1.....	2		6		6			7	27			
1.....	2		7		7			8	28			
1.....	2		8		8			9	29			
1.....	2		9		9			10	30			
1.....	2		10		10			11	31			
1.....	2		11		11			12	1 Jan.			
1.....	2		12		12			13	2			
1.....	2		13		13			14	3			
1.....	2		14		14			15	4			
1.....	2		15		15			16	5			
1.....	2		16		16			17	6			
1.....	2		17		17			18	7			
1.....	2		18		18			19	8			
1.....	2		19		19			20	9			
1.....	2		20		20			21	10			
1.....	2		21		21			22	11			
1.....	2		22		22			23	12			
1.....	2		23		23			24	13			
1.....	2		24		24			25	14			
1.....	2		25		25			26	15			
1.....	2		26		26			27	16			
1.....	2		27		27			28	17			
1.....	2		28		28			29	18			
1.....	2		29		29			30	19			
1.....	2		30		30			31	20			
1.....	2		31		31							

NAME OF ANIMAL.		Time of Service		Horses		Cattle		Sheep		Hogs		REMARKS.
		Nov.	1 Oct.	1 Oct.	1 Aug.	1 Mar.	21 Feb.	20				
1	1	2		2	2	2	2	2	2	2	21	
1	1	2		3	3	3	3	3	3	3	22	
1	1	2		3	3	3	3	3	3	3	23	
1	1	2		3	4	4	4	4	4	4	24	
1	1	2		3	5	5	5	5	5	5	25	
1	1	2		3	6	6	6	6	6	6	26	
1	1	2		3	7	7	7	7	7	7	27	
1	1	2		3	8	8	8	8	8	8	28	
1	1	2		3	9	9	9	9	9	9	29	
1	1	2		3	10	10	10	10	10	30 Mar.	1	
1	1	2		3	11	11	11	11	11	31	2	
1	1	2		3	12	12	12	12	12	1 Apr.	1	3
1	1	2		3	13	13	13	13	13	2	4	
1	1	2		3	14	14	14	14	14	3	5	
1	1	2		3	15	15	15	15	15	4	6	
1	1	2		3	16	16	16	16	16	5	7	
1	1	2		3	17	17	17	17	17	6	8	
1	1	2		3	18	18	18	18	18	7	9	
1	1	2		3	19	19	19	19	19	8	10	
1	1	2		3	20	20	20	20	20	9	11	
1	1	2		3	21	21	21	21	21	10	12	
1	1	2		3	22	22	22	22	22	11	13	
1	1	2		3	23	23	23	23	23	12	14	
1	1	2		3	24	24	24	24	24	13	15	
1	1	2		3	25	25	25	25	25	14	16	
1	1	2		3	26	26	26	26	26	15	17	
1	1	2		3	27	27	27	27	27	16	18	
1	1	2		3	28	28	28	28	28	17	19	
1	1	2		3	29	29	29	29	29	18	20	
1	1	2		3	30	30	30	30	30	19	21	
1	1	2		3	31	31	31	31	31	20	22	

NAME OF ANIMAL.		Time of Service		Horses		Cattle		Sheep		Hogs		REMARKS.
		Dec.	1	Nov.	1	Sept.	1	April	21	Mar	21	
1	2	3		2		2		22				
1	2	3		3		3		23				
1	2	3		4		4		24				
1	2	3		5		5		25				
1	2	3		6		6		26				
1	2	3		7		7		27				
1	2	3		8		8		28				
1	2	3		9		9		29				
1	2	3		10		10		30				
1	2	3		11		11	May 1	April 1				
1	2	3		12		12		2				
1	2	3		13		13		3				
1	2	3		14		14		4				
1	2	3		15		15		5				
1	2	3		16		16		6				
1	2	3		17		17		7				
1	2	3		18		18		8				
1	2	3		19		19		9				
1	2	3		20		20		10				
1	2	3		21		21		11				
1	2	3		22		22		12				
1	2	3		23		23		13				
1	2	3		24		24		14				
1	2	3		25		25		15				
1	2	3		26		26		16				
1	2	3		27		27		17				
1	2	3		28		28		18				
1	2	3		29		29		19				
1	2	3		30		30		20				
1	2	3		31		31		21				

NAME OF ANIMAL.			Time of Service		Horses		Cattle		Sheep		Hogs		REMARKS.
			Jan.	1	Dec.	1	Oct.	1	May	21	Apr.	23	
1	2	3		2	2	2	2	2	22	24			
1	2	3		3	3	3	3	3	23	25			
1	2	3		4	4	4	4	4	24	26			
1	2	3		5	5	5	5	5	25	27			
1	2	3		6	6	6	6	6	26	28			
1	2	3		7	7	7	7	7	27	29			
1	2	3		8	8	8	8	8	28	30			
1	2	3		9	9	9	9	9	29	May 1			
1	2	3		10	10	10	10	10	30	2			
1	2	3		11	11	11	11	11	31	3			
1	2	3		12	12	12	12	12	June 1	4			
1	2	3		13	13	13	13	13	2	5			
1	2	3		14	14	14	14	14	3	6			
1	2	3		15	15	15	15	15	4	7			
1	2	3		16	16	16	16	16	5	8			
1	2	3		17	17	17	17	17	6	9			
1	2	3		18	18	18	18	18	7	10			
1	2	3		19	19	19	19	19	8	11			
1	2	3		20	20	20	20	20	9	12			
1	2	3		21	21	21	21	21	10	13			
1	2	3		22	22	22	22	22	11	14			
1	2	3		23	23	23	23	23	12	15			
1	2	3		24	24	24	24	24	13	16			
1	2	3		25	25	25	25	25	14	17			
1	2	3		26	26	26	26	26	15	18			
1	2	3		27	27	27	27	27	16	19			
1	2	3		28	28	28	28	28	17	20			
1	2	3		29	29	29	29	29	18	21			
1	2	3		30	30	30	30	30	19	22			
1	2	3		31	31	31	31	31	20	23			

NAME OF ANIMAL.												
		Time of Service		Horses		Cattle		Sheep		Hogs		REMARKS.
		Dec.	1	Nov.	1	Sept.	1	April	21	Mar	21	
1	1	2			3			2	22			
1	1	2			3			2	22			
1	1	2			3			3	23			
1	1	2			3			4	24			
1	1	2			3			5	25			
1	1	2			3			6	26			
1	1	2			3			7	27			
1	1	2			3			8	28			
1	1	2			3			9	29			
1	1	2			3			10	30			
1	1	2			3			11	11 May	1 April	1	
1	1	2			3			12	12	2	2	
1	1	2			3			13	13	3	3	
1	1	2			3			14	14	4	4	
1	1	2			3			15	15	5	5	
1	1	2			3			16	16	6	6	
1	1	2			3			17	17	7	7	
1	1	2			3			18	18	8	8	
1	1	2			3			19	19	9	9	
1	1	2			3			20	20	10	10	
1	1	2			3			21	21	11	11	
1	1	2			3			22	22	12	12	
1	1	2			3			23	23	13	13	
1	1	2			3			24	24	14	14	
1	1	2			3			25	25	15	15	
1	1	2			3			26	26	16	16	
1	1	2			3			27	27	17	17	
1	1	2			3			28	28	18	18	
1	1	2			3			29	29	19	19	
1	1	2			3			30	30	20	20	
1	1	2			3			31	31	21	21	

NAME OF ANIMAL.			Time of Service		Horses	Cattle	Sheep	Hogs	REMARKS.
			Jan.	1 Dec.	1 Oct.	1 May 21	Apr. 23		
1	2	3		2	2	22	24		
1	2	3		3	3	23	25		
1	2	3		4	4	24	26		
1	2	3		5	5	25	27		
1	2	3		6	6	26	28		
1	2	3		7	7	27	29		
1	2	3		8	8	28	30		
1	2	3		9	9	29	May 1		
1	2	3		10	10	30			
1	2	3		11	11	31			
1	2	3		12	12	June 1			
1	2	3		13	13	2			
1	2	3		14	14	3			
1	2	3		15	15	4			
1	2	3		16	16	5			
1	2	3		17	17	6			
1	2	3		18	18	7			
1	2	3		19	19	8			
1	2	3		20	20	9			
1	2	3		21	21	10			
1	2	3		22	22	11			
1	2	3		23	23	12			
1	2	3		24	24	13			
1	2	3		25	25	14			
1	2	3		26	26	15			
1	2	3		27	27	16			
1	2	3		28	28	17			
1	2	3		29	29	18			
1	2	3		30	30	19			
1	2	3		31	31	20			

NAME OF ANIMAL.		Time of Service.		Horses		Cattle		Sheep		Hogs		REMARKS.
1.....	2	3	Dec. 1	Nov. 1	Sept. 1	April 21	Mar 21					
1.....	2	3	2	2	2	22	22					
1.....	2	3	3	3	3	23	23					
1.....	2	3	4	4	4	24	24					
1.....	2	3	5	5	5	25	25					
1.....	2	3	6	6	6	26	26					
1.....	2	3	7	7	7	27	27					
1.....	2	3	8	8	8	28	28					
1.....	2	3	9	9	9	29	29					
1.....	2	3	10	10	10	30	30					
1.....	2	3	11	11	11	May 1	April 1					
1.....	2	3	12	12	12	2	2					
1.....	2	3	13	13	13	3	3					
1.....	2	3	14	14	14	4	4					
1.....	2	3	15	15	15	5	5					
1.....	2	3	16	16	16	6	6					
1.....	2	3	17	17	17	7	7					
1.....	2	3	18	18	18	8	8					
1.....	2	3	19	19	19	9	9					
1.....	2	3	20	20	20	10	10					
1.....	2	3	21	21	21	11	11					
1.....	2	3	22	22	22	12	12					
1.....	2	3	23	23	23	13	13					
1.....	2	3	24	24	24	14	14					
1.....	2	3	25	25	25	15	15					
1.....	2	3	26	26	26	16	16					
1.....	2	3	27	27	27	17	17					
1.....	2	3	28	28	28	18	18					
1.....	2	3	29	29	29	19	19					
1.....	2	3	30	30	30	20	20					
1.....	2	3	31	31	31	21	21					

NAME OF ANIMAL.			Time of Service		Horses	Cattle	Sheep	Hogs	REMARKS.
			Jan.	1 Dec.	1 Oct.	1 May 21	Apr. 23		
1	2	3		2	2	22	24		
1	2	3		3	3	23	25		
1	2	3		4	4	24	26		
1	2	3		5	5	25	27		
1	2	3		6	6	26	28		
1	2	3		7	7	27	29		
1	2	3		8	8	28	30		
1	2	3		9	9	29	May 1		
1	2	3		10	10	30	2		
1	2	3		11	11	31	3		
1	2	3		12	12	June 1	4		
1	2	3		13	13	2	5		
1	2	3		14	14	3	6		
1	2	3		15	15	4	7		
1	2	3		16	16	5	8		
1	2	3		17	17	6	9		
1	2	3		18	18	7	10		
1	2	3		19	19	8	11		
1	2	3		20	20	9	12		
1	2	3		21	21	10	13		
1	2	3		22	22	11	14		
1	2	3		23	23	12	15		
1	2	3		24	24	13	16		
1	2	3		25	25	14	17		
1	2	3		26	26	15	18		
1	2	3		27	27	16	19		
1	2	3		28	28	17	20		
1	2	3		29	29	18	21		
1	2	3		30	30	19	22		
1	2	3		31	31	20	23		

NAME OF ANIMAL.		Time of Service		Horses		Cattle		Sheep		Hogs		REMARKS.
		Feb.	1 Jan.	1 Nov.	1 May	1 Nov.	1 May	1 June	21 May	24		
1	2	3	2	2	2	2	2	22	25			
1	2	3	3	3	3	3	3	23	26			
1	2	3	4	4	4	4	4	24	27			
1	2	3	5	5	5	5	5	25	28			
1	2	3	6	6	6	6	6	26	29			
1	2	3	7	7	7	7	7	27	30			
1	2	3	8	8	8	8	8	28	31			
1	2	3	9	9	9	9	9	29	June 1			
1	2	3	10	10	10	10	10	30	2			
1	2	3	11	11	11	11	11	31	3			
1	2	3	12	12	12	12	12	July 1	4			
1	2	3	13	13	13	13	13	2	5			
1	2	3	14	14	14	14	14	3	6			
1	2	3	15	15	15	15	15	4	7			
1	2	3	16	16	16	16	16	5	8			
1	2	3	17	17	17	17	17	6	9			
1	2	3	18	18	18	18	18	7	10			
1	2	3	19	19	19	19	19	8	11			
1	2	3	20	20	20	20	20	9	12			
1	2	3	21	21	21	21	21	10	13			
1	2	3	22	22	22	22	22	11	14			
1	2	3	23	23	23	23	23	12	15			
1	2	3	24	24	24	24	24	13	16			
1	2	3	25	25	25	25	25	14	17			
1	2	3	26	26	26	26	26	15	18			
1	2	3	27	27	27	27	27	16	19			
1	2	3	28	28	28	28	28	17	20			
1	2	3	29	29	29	29	29	18	21			
1	2	3	30	30	30	30	30	19	22			
1	2	3	31	31	31	31	31	20	23			

NAME OF ANIMAL.		Time of Service	Horses	Cattle	Sheep	Hogs	REMARKS.
1.	2	3	March 1	Feb. 1	Dec. 1	July 21	June 21
1.	2	3	2	2	2	22	22
1.	2	3	3	3	3	23	23
1.	2	3	4	4	4	24	24
1.	2	3	5	5	5	25	25
1.	2	3	6	6	6	26	26
1.	2	3	7	7	7	27	27
1.	2	3	8	8	8	28	28
1.	2	3	9	9	9	29	29
1.	2	3	10	10	10	30	30
1.	2	3	11	11	11	31	July 1
1.	2	3	12	12	12	Aug. 1	2
1.	2	3	13	13	13	2	3
1.	2	3	14	14	14	3	4
1.	2	3	15	15	15	4	5
1.	2	3	16	16	16	5	6
1.	2	3	17	17	17	6	7
1.	2	3	18	18	18	7	8
1.	2	3	19	19	19	8	9
1.	2	3	20	20	20	9	10
1.	2	3	21	21	21	10	11
1.	2	3	22	22	22	11	12
1.	2	3	23	23	23	12	13
1.	2	3	24	24	24	13	14
1.	2	3	25	25	25	14	15
1.	2	3	26	26	26	15	16
1.	2	3	27	27	27	16	17
1.	2	3	28	28	28	17	18
1.	2	3	29	29	29	18	19
1.	2	3	30	30	30	19	20
1.	2	3	31	31	31	20	21

NAME OF ANIMAL.		Time of Service		Cattle	Sheep	Hogs	REMARKS.
		April	March	Jan.	1 Aug.	21 July	
1	2	3	2	1	2	22	
1	2	3	3	3	3	23	
1	2	3	4	4	4	24	
1	2	3	5	5	5	25	
1	2	3	6	6	6	26	
1	2	3	7	7	7	27	
1	2	3	8	8	8	28	
1	2	3	9	9	9	29	
1	2	3	10	10	10	30	
1	2	3	11	11	11	31 Aug.	
1	2	3	12	12	12 Sept.	1	
1	2	3	13	13	13	2	
1	2	3	14	14	14	3	
1	2	3	15	15	15	4	
1	2	3	16	16	16	5	
1	2	3	17	17	17	6	
1	2	3	18	18	18	7	
1	2	3	19	19	19	8	
1	2	3	20	20	20	9	
1	2	3	21	21	21	10	
1	2	3	22	22	22	11	
1	2	3	23	23	23	12	
1	2	3	24	24	24	13	
1	2	3	25	25	25	14	
1	2	3	26	26	26	15	
1	2	3	27	27	27	16	
1	2	3	28	28	28	17	
1	2	3	29	29	29	18	
1	2	3	30	30	30	19	
1	2	3	31	31	31	20	

NAME OF ANIMAL.		Time of Service	Horses	Cattle	Sheep	Hogs	REMARKS.
1	2	May 1	April 1	1 Feb	1 Sept. 21	Aug. 21	
1	2	2	2	2	22	22	
1	2	3	3	3	23	23	
1	2	3	4	4	24	24	
1	2	3	5	5	25	25	
1	2	3	6	6	26	26	
1	2	3	7	7	27	27	
1	2	3	8	8	28	28	
1	2	3	9	9	29	29	
1	2	3	10	10	30	30	
1	2	3	11	11	31 Sept.	1	
1	2	3	12	12 Oct.	1	2	
1	2	3	13	13	2	3	
1	2	3	14	14	3	4	
1	2	3	15	15	4	5	
1	2	3	16	16	5	6	
1	2	3	17	17	6	7	
1	2	3	18	18	7	8	
1	2	3	19	19	8	9	
1	2	3	20	20	9	10	
1	2	3	21	21	10	11	
1	2	3	22	22	11	12	
1	2	3	23	23	12	13	
1	2	3	24	24	13	14	
1	2	3	25	25	14	15	
1	2	3	26	26	15	16	
1	2	3	27	27	16	17	
1	2	3	28	28	17	18	
1	2	3	29	29	18	19	
1	2	3	30	30	19	20	
1	2	3	31	31	20	21	

NAME OF ANIMAL.			Time of Service	Horses	Cattle	Sheep	Hogs	REMARKS.
1	2	3	July	1 June	1 April	1 Nov.	1 Oct.	20
1	2	3	2	2	2	22	21	
1	2	3	3	3	3	23	22	
1	2	3	4	4	4	24	23	
1	2	3	5	5	5	25	24	
1	2	3	6	6	6	26	25	
1	2	3	7	7	7	27	26	
1	2	3	8	8	8	28	27	
1	2	3	9	9	9	29	28	
1	2	3	10	10	10	30	29	
1	2	3	11	11	11 Dec.	1	30	
1	2	3	12	12	12		2 Nov.	1
1	2	3	13	13	13	3	2	
1	2	3	14	14	14	4	3	
1	2	3	15	15	15	5	4	
1	2	3	16	16	16	6	5	
1	2	3	17	17	17	7	6	
1	2	3	18	18	18	8	7	
1	2	3	19	19	19	9	8	
1	2	3	20	20	20	10	9	
1	2	3	21	21	21	11	10	
1	2	3	22	22	22	12	11	
1	2	3	23	23	23	13	12	
1	2	3	24	24	24	14	13	
1	2	3	25	25	25	15	14	
1	2	3	26	26	26	16	15	
1	2	3	27	27	27	17	16	
1	2	3	28	28	28	18	17	
1	2	3	29	29	29	19	18	
1	2	3	30	30	30	20	19	
1	2	3	31	31	31	21	20	

NAME OF ANIMAL.			Time of Service		Horses	Cattle	Sheep	Hogs	REMARKS.
			Aug.	1	July	1	May	1	
1	2	3			2		2		Nov. 20
1	2	3			3		23		21
1	2	3			4		24		22
1	2	3			5		25		23
1	2	3			6		26		24
1	2	3			7		27		25
1	2	3			8		28		26
1	2	3			9		29		27
1	2	3			10		30		28
1	2	3			11		31		29
1	2	3			12		1		30
1	2	3			13		2		Dec. 1
1	2	3			14		3		2
1	2	3			15		4		3
1	2	3			16		5		4
1	2	3			17		6		5
1	2	3			18		7		6
1	2	3			19		8		7
1	2	3			20		9		8
1	2	3			21		10		9
1	2	3			22		11		10
1	2	3			23		12		11
1	2	3			24		13		12
1	2	3			25		14		13
1	2	3			26		15		14
1	2	3			27		16		15
1	2	3			28		17		16
1	2	3			29		18		17
1	2	3			30		19		18
1	2	3			31		20		19
1	2	3					21		20

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NAME OF ANIMAL		Time of Service		Horses		Cattle	Sheep	Hogs	REMARKS.
		Oct.	1 Sept.	1 July	1 Feb.	21 Jan.	20		
1	2				2	2	21		
1	2				3	3	22		
1	2				3	3	23		
1	2				4	4	24		
1	2				5	5	25		
1	2				6	6	26		
1	2				7	7	27		
1	2				8	8	28		
1	2				9	9	29		
1	2				10	10	30		
1	2				11	11	31		
1	2				12	12	1		
1	2				13	13	2		
1	2				14	14	3		
1	2				15	15	4		
1	2				16	16	5		
1	2				17	17	6		
1	2				18	18	7		
1	2				19	19	8		
1	2				20	20	9		
1	2				21	21	10		
1	2				22	22	11		
1	2				23	23	12		
1	2				24	24	13		
1	2				25	25	14		
1	2				26	26	15		
1	2				27	27	16		
1	2				28	28	17		
1	2				29	29	18		
1	2				30	30	19		
1	2				31	31	20		

NAME OF ANIMAL.			Time of Service				Cattle				Sheep				Hogs				REMARKS.
			Nov.	1	Oct.	1	Aug.	1	Mar.	21	Feb.	20							
1	2	3		2	2	2	2	2	22	21									
1	2	3					3	3	23	22									
1	2	3						4	24	23									
1	2	3						5	25	24									
1	2	3					6	6	26	25									
1	2	3					7	7	27	26									
1	2	3					8	8	28	27									
1	2	3					9	9	29	28									
1	2	3					10	10	30	Mar.	1								
1	2	3					11	11	31		2								
1	2	3					12	12	12	Apr.	1	3							
1	2	3					13	13	13		2	4							
1	2	3					14	14	14		3	5							
1	2	3					15	15	15		4	6							
1	2	3					16	16	16		5	7							
1	2	3					17	17	17		6	8							
1	2	3					18	18	18		7	9							
1	2	3					19	19	19		8	10							
1	2	3					20	20	20		9	11							
1	2	3					21	21	21		10	12							
1	2	3					22	22	22		11	13							
1	2	3					23	23	23		12	14							
1	2	3					24	24	24		13	15							
1	2	3					25	25	25		14	16							
1	2	3					26	26	26		15	17							
1	2	3					27	27	27		16	18							
1	2	3					28	28	28		17	19							
1	2	3					29	29	29		18	20							
1	2	3					30	30	30		19	21							
1	2	3					31	31	31		20	22							

NAME OF ANIMAL.		Time of Service		Horses	Cattle	Sheep	Hogs	REMARKS.
		Dec.	1 Nov.	1 Sept.	1 April	21 Mar	21	
1	2	3	2	2	2	22	22	
1	2	3	3	3	3	23	23	
1	2	3	4	4	4	24	24	
1	2	3	5	5	5	25	25	
1	2	3	6	6	6	26	26	
1	2	3	7	7	7	27	27	
1	2	3	8	8	8	28	28	
1	2	3	9	9	9	29	29	
1	2	3	10	10	10	30	30	
1	2	3	11	11	11 May	1 April	1	
1	2	3	12	12	12	2	2	
1	2	3	13	13	13	3	3	
1	2	3	14	14	14	4	4	
1	2	3	15	15	15	5	5	
1	2	3	16	16	16	6	6	
1	2	3	17	17	17	7	7	
1	2	3	18	18	18	8	8	
1	2	3	19	19	19	9	9	
1	2	3	20	20	20	10	10	
1	2	3	21	21	21	11	11	
1	2	3	22	22	22	12	12	
1	2	3	23	23	23	13	13	
1	2	3	24	24	24	14	14	
1	2	3	25	25	25	15	15	
1	2	3	26	26	26	16	16	
1	2	3	27	27	27	17	17	
1	2	3	28	28	28	18	18	
1	2	3	29	29	29	19	19	
1	2	3	30	30	30	20	20	
1	2	3	31	31	31	21	21	

SUCCESS—WHAT IS IT?

A Kansas woman, Mrs. A. J. Stanley, of Lincoln, has been awarded a prize of \$250.00 by a Boston firm for the best answer to the question, "What constitutes success"? She writes: "He has achieved success who has lived well, laughed often and loved much; who has gained the respect of intelligent men and the love of little children; who has filled his niche and accomplished his task; who has left the world better than he found it, whether by an improved poppy, a perfect poem or a second soul; who has never lacked appreciation of earth's beauty or failed to express it; who has always looked for the best in others and given the best he had; whose life was an inspiration; whose memory a benediction."

HOW TO USE THE INTEREST TABLES.

The interest tables that have heretofore been placed before the public were so complicated that the farmer did not take the time to study the table. Many a farmer today has an interest table in his home to which he pays no attention. Following we give you a table that by adding three columns of figures will give you the interest on any amount of money from ten cents to one thousand dollars.

The interest on ten cents for one year is less than one cent for any rate of interest that is allowed by law, hence we start with that amount.

What is the interest on one hundred dollars and seventy cents for six months and thirteen days, at eight per cent?

Interest on one hundred dollars for six months is \$4.00

Interest on one hundred dollars for thirteen days

is29

Interest on seventy cents for six months is.... .03

Interest is.....\$4.32

The legal rate of interest in Iowa is six per cent. Eight per cent if note or contract specifies that amount.

INTEREST TABLE—5 PER CENT.

[illegible]

INTEREST TABLE—6 PER CENT.

[illegible]

INTEREST TABLE—7 PER CENT.

	10c	20c	30c	40c	50c	60c	70c	80c	90c	\$1	\$2	\$3	\$4	\$5	\$6	\$7	\$8	\$9	\$10	\$20	\$30	\$40	\$50	\$60	\$70	\$80	\$90	100	1000	
1 da	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.00	.01	.01	.01	.01	.01	.01	.02	.02	.19	
2	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.00	.01	.02	.02	.02	.02	.02	.03	.04	.39	
3	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.01	.01	.02	.03	.03	.03	.03	.04	.05	.06	.58	
4	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.01	.02	.03	.04	.04	.04	.05	.06	.07	.08	.78	
5	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10	.97	
6	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.01	.02	.03	.04	.05	.06	.07	.08	.09	.11	.12	1.17
7	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.01	.02	.03	.04	.05	.06	.07	.08	.10	.11	.12	1.36
8	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.02	.03	.05	.06	.08	.09	.11	.12	.14	.16	.18	1.56
9	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.02	.04	.05	.07	.09	.11	.12	.14	.16	.18	.175	1.75
10	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.02	.04	.06	.08	.10	.12	.14	.16	.18	.19	.194	1.94
11	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.02	.04	.06	.08	.11	.13	.15	.17	.19	.21	.214	2.14
12	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.02	.05	.07	.09	.12	.14	.16	.19	.21	.23	.233	2.33
13	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.03	.05	.08	.11	.13	.15	.18	.20	.23	.25	.253	2.53
14	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.03	.06	.08	.11	.14	.16	.19	.22	.25	.27	.272	2.72
15	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.03	.06	.09	.12	.15	.18	.20	.23	.26	.29	.292	2.92
16	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.03	.06	.09	.13	.17	.20	.23	.26	.30	.31	.31	3.1
17	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.04	.07	.10	.13	.17	.20	.23	.26	.30	.32	.32	3.31
18	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.04	.07	.11	.14	.18	.21	.25	.28	.32	.35	.35	3.50
19	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.04	.08	.12	.16	.20	.23	.27	.30	.33	.36	.36	3.69
20	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.04	.08	.13	.17	.21	.25	.29	.32	.35	.38	.38	3.89
21	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.04	.08	.13	.18	.22	.26	.30	.33	.37	.40	.40	4.08
22	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.04	.09	.14	.19	.23	.27	.31	.35	.39	.42	.42	4.27
23	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.10	.15	.20	.24	.28	.32	.36	.40	.44	.44	4.46
24	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.10	.16	.21	.25	.30	.34	.38	.42	.46	.46	4.65
25	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.11	.16	.22	.26	.31	.35	.40	.44	.48	.48	4.84
26	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.11	.17	.22	.27	.32	.37	.42	.46	.50	.50	5.03
27	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.11	.17	.23	.28	.33	.38	.43	.48	.52	.52	5.22
28	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.12	.18	.23	.28	.33	.39	.44	.49	.53	.53	5.41
29	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.12	.18	.24	.29	.34	.39	.45	.50	.54	.54	5.60
1 m	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.12	.19	.24	.29	.34	.40	.45	.51	.56	.56	5.79
2	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.13	.20	.25	.30	.35	.40	.46	.51	.56	.56	5.98
3	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.13	.20	.26	.31	.36	.41	.47	.52	.57	.57	6.17
4	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.13	.21	.27	.32	.37	.42	.48	.53	.58	.58	6.36
5	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.13	.21	.27	.33	.38	.44	.49	.54	.59	.59	6.55
6	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.13	.22	.28	.34	.39	.45	.50	.55	.60	.60	6.74
7	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.13	.22	.29	.35	.40	.46	.51	.56	.61	.61	6.93
8	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.13	.23	.30	.36	.41	.47	.52	.57	.62	.62	7.12
9	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.13	.23	.30	.37	.42	.48	.53	.58	.63	.63	7.31
10	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.14	.24	.31	.38	.44	.50	.55	.60	.65	.65	7.50
11	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.14	.24	.32	.39	.45	.51	.56	.61	.66	.66	7.69
12	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.14	.25	.32	.40	.46	.52	.57	.62	.67	.67	7.88
13	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.14	.25	.33	.40	.47	.53	.58	.63	.68	.68	8.07
14	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.14	.26	.33	.41	.48	.54	.59	.64	.69	.69	8.26
15	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.14	.26	.34	.42	.49	.55	.60	.65	.70	.70	8.45
16	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.14	.26	.34	.42	.50	.56	.61	.66	.71	.71	8.64
17	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.14	.27	.35	.43	.51	.57	.62	.67	.72	.72	8.83
18	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.14	.27	.35	.43	.51	.58	.63	.68	.73	.73	9.02
19	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.14	.27	.36	.44	.52	.59	.64	.69	.74	.74	9.21
20	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.14	.28	.36	.44	.52	.60	.65	.70	.75	.75	9.40
21	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.05	.14	.28	.37	.45	.53	.61	.66	.71	.76	.76	9.59

INTEREST TABLE—8 PER CENT.

INTEREST TABLE — 8 PER CENT.																													
	10c	20c	30c	40c	50c	60c	70c	80c	90c	\$1	\$2	\$3	\$4	\$5	\$6	7%	\$8	\$9	\$10	\$20	\$30	\$40	\$50	\$60	\$70	\$80	\$90	100	1000
1 da	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.00	.01	.01	.01	.01	.02	.02	.02	.22	
2	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.01	.02	.02	.02	.03	.03	.04	.04	.44	
3	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.01	.02	.03	.03	.04	.05	.06	.07	.76	
4	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.01	.02	.03	.04	.05	.06	.07	.08	.89	
5	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.02	.03	.04	.04	.05	.06	.07	.08	.11	
6	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.02	.03	.04	.05	.06	.07	.08	.09	.11	
7	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.03	.04	.05	.07	.08	.09	.11	.12	.13	
8	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.03	.05	.06	.08	.09	.11	.12	.14	.16	
9	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.04	.06	.08	.10	.12	.14	.16	.18	.178	
10	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.04	.06	.08	.10	.12	.14	.16	.18	.200	
11	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.05	.07	.09	.11	.13	.15	.17	.20	.22	
12	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.05	.07	.09	.11	.13	.15	.17	.20	.22	
13	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.06	.09	.12	.14	.16	.19	.22	.25	.28	
14	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.06	.09	.12	.14	.16	.19	.22	.25	.28	
15	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.07	.10	.13	.15	.17	.20	.23	.27	.30	
16	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.07	.11	.14	.18	.21	.25	.28	.32	.36	
17	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.08	.11	.15	.19	.23	.26	.30	.34	.38	
18	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.08	.13	.17	.21	.25	.28	.32	.36	.40	
19	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.09	.13	.18	.22	.27	.31	.36	.40	.44	
20	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.09	.14	.19	.24	.29	.34	.39	.44	.49	
21	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.10	.15	.20	.26	.31	.36	.41	.46	.51	
22	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.10	.15	.20	.26	.31	.36	.41	.46	.51	
23	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.11	.16	.21	.27	.32	.37	.43	.48	.53	
24	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.11	.17	.22	.28	.33	.39	.44	.50	.56	
25	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.12	.18	.24	.29	.35	.40	.46	.52	.58	
26	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.12	.19	.25	.31	.37	.44	.50	.56	.62	
27	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.13	.19	.26	.32	.39	.45	.52	.58	.64	
28	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.13	.20	.27	.33	.40	.47	.53	.60	.67	
29	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.13	.27	.40	.53	.67	.80	.93	1.07	1.20	
1 m	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.13	.27	.40	.53	.67	.80	.93	1.07	1.20	
2	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.13	.27	.40	.53	.67	.80	.93	1.07	1.20	
3	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.13	.27	.40	.53	.67	.80	.93	1.07	1.20	
4	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.13	.27	.40	.53	.67	.80	.93	1.07	1.20	
5	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.13	.27	.40	.53	.67	.80	.93	1.07	1.20	
6	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.13	.27	.40	.53	.67	.80	.93	1.07	1.20	
7	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.13	.27	.40	.53	.67	.80	.93	1.07	1.20	
8	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.13	.27	.40	.53	.67	.80	.93	1.07	1.20	
9	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.13	.27	.40	.53	.67	.80	.93	1.07	1.20	
10	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.13	.27	.40	.53	.67	.80	.93	1.07	1.20	
11	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.00	.13	.27	.40	.53	.67	.80	.93	1.07	1.20	
1 yr	.008	.016	.024	.032	.040	.048	.056	.064	.072	.080	.160	.240	.320	.400	.480	.560	.640	.720	.80	1.60	2.40	3.20	4.00	4.80	5.60	6.40	7.20	8.00	

TRUSTS.

No complete list of trusts has ever been published. The Year Book of the "Journal of Commerce and Commercial Bulletin" for 1899 gives a list of 353 "Trusts and Combinations", with a total capitalization of \$4,247,918,981 of common stock, \$870,575,200 of preferred stock in addition to a bonded indebtedness of \$714,388,661, making a total of \$5,832,882,842.

A LIST OF THIRTEEN OF THE LARGEST TRUSTS.

	Capital.
American Ice Co.....	\$ 60,000,000
American Steel and Wire Co.....	85,250,000
Central Lumber Co.....	70,000,000
Carnegie Steel Co.....	625,000,000
Chemical	50,000,000
Continental Tobacco Co.....	92,690,000
Cotton Yarn	80,000,000
Federal Steel Co.....	99,251,000
National Tube Co.....	65,000,000
Reading Co	150,000,000
Standard Oil Co.....	97,000,000
United States Leather Co.....	125,108,000
Wholesale Grocers	75,000,000
13 Standard	

The trust is a modern invention. "It was conceived in sin and brought forth in iniquity." Its object is to control by combination the price of the necessities of life and thus levy black-mail from the laboring millions. As civilization progresses the necessities of life become cheaper. This is the law of social growth. The loaf of bread and the beefsteak is cheaper in New York than in Chicago, cheaper in Chicago than Des Moines. The farmer can get a better meal in Chicago or San Francisco than he can for the same money in his nearest county seat. The American beefsteak, better than any that graces the tables outside of the large cities, is retailed in

country towns in the north of Ireland at about the same price of cheap cow beef that the farmer sells at two cents per pound. The beef on the foot brings twice as much, but the retailer sells at the smallest profit and every scrap is utilized.

The older America becomes the cheaper should be the necessities of life. The object of all trusts is to suspend the law of competition and arrest this working of the law of civilization. It was first bred in coal oil. When petroleum was poured out of the wells of Pennsylvania in volumes sufficient to light the world, the Standard Oil Company secured a practical monopoly of the means of transporation, thus closing out rival wells and dictating prices. Had it not been for special rates or the doctrine of wholesaling in transporation this could not have been possible. The Standard oil is the legitimate result of the doctrine of "ten cents apiece or three for a quarter" when applied to transporation. Whenever any man, firm or corporation secures a special rate on account of the number of car loads he ships, the germ of the Standard Oil combinations is planted and will grow. The success of Standard Oil has encouraged other trusts—cotton seed oil, anthracite coal, natural gas, sugar, etc., etc. The natural ally of the trust is the railroad combination and special rates. Take, for instance, anthracite coal. Many a poor child shivers in the cold in every storm because the anthracite coal companies which own the mines and the roads limit the output, raise the rates and levy black-mail. The hardware stores of Iowa are full of hard-coal stoves for sale at one-third of their cost because their owners will not submit to the dictation of the anthracite coal trust or ring. The question of what shall be done is a serious one. This artificial limitation of the necessities of life is a crime against society and should be so treated. A term of breaking stone in a striped suit would make the robbers realize the enormity of the crime against society. The absolute removal of the tariff from every article that has been limited in production by a trust would strike terror to the conspirators who artificially enhance the

necessaries of life. Let this robbery be made as odious and disreputable as any other form of robbery.

It is useless, however, for journalists to inveigh against the trust and advocate the principle of wholesaling in transportation. Notice how it works. Three-fourths of the sugar refineries combine and form a trust, and one-fourth stay out. The trust goes to one railroad and says, we will give you our entire traffic if you will give us a secret rebate. The railroad gives them ten cents reduction. The trust says to the jobber, we will sell ten cents per hundred weight under any competition. The outside refinery reduces the price, the trust goes ten cents lower, and the outside makes another reduction. Soon there is nothing left but the trust, and prices are raised and the people robbed. So it is in everything. The trust cannot succeed unless the railroad helps it. It is well for the people to see where the roots of the trust extend, to see also the specious sophistry that is used to deceive them as to the partners in the conspiracy against society. There is no solution of the problem short of a recognition of the fact that the railroad is a public highway on which the man who ships a car-load of stock for a way station has equal rights and equal freights per car-load with the trust that ships a thousand car-loads. Competition will bring most of the trusts to terms if it is unlimited. Severe laws and an enlightened public opinion will bring the rest when the facts are brought clearly before the people.

Let the legislature of Iowa do its duty. Let the people have a cat-o'-nine tails ready for use next fall on the member of congress that fails to do his duty. Let the farmer resolve that hereafter he will vote for his farm, and all will be well.

HOW TO MEASURE EAR CORN IN THE CRIB.

Measuring corn in the crib is at best an estimate. Much depends upon the condition of the corn. A bushel of corn means either a bushel of shelled corn or ear corn enough to make a bushel of shelled corn.

RULE.—Multiply the length in feet by the height in

feet and that again by the width in feet, multiply the result by 4 and cut off the right hand figure and you have the contents in bushels of shelled corn.

Example: How many bushels of shelled corn in a crib of corn in the ear, 20 feet long, 10 feet high and 8 feet wide?

Solution: $20 \times 10 \times 8 \times 4 = 640.0$ bushels. Ans.

This rule is not only very simple but is very frequently used. It will hold out in good dry corn.

When the crib is flared at the side multiply half the sum of the top and bottom widths in feet by the perpen-

dicular height in feet, and then again by the length in feet. This gives the number of cubic feet. Then proceed as above.

HOW TO MEASURE HAY IN THE MOW OR STACK.

A ton of dry hay is variously estimated from 400 to 500 cubic feet to the ton.

To be on the safe side, it is best to estimate about 500 cubic feet to the ton.

HAY IN A MOW.

Rule.—Multiply the length in feet by the height in feet, and this by one-half the height, and divide the product 500, and you have the number of tons.

Example: How many tons of hay in a mow 20 feet long, 12 feet high, and 15 feet wide?

Solution: $20 \times 6 \times 15 \div 300 = 6$ tons. Ans.

HOW TO ESTIMATE THE NUMBER OF TONS IN A STACK.

Rule.—Multiply the length in feet by the width in feet, and this by the breadth in feet, and divide the result by 300.

Example: How many tons of hay in a stack 20 feet long, 10 feet high, and 15 feet wide.

Solution: $20 \times 10 \times 15 \div 500 = 6$. Ans.

HOW TO ESTIMATE THE CONTENTS OF A ROUND STACK.

Rule.—Multiply the square of the distance around the stack in yards by 4 times the height in yards, and point off two places from the right, and this will be the number of cubic yards in the stack, which divided by 20 will equal the number of tons.

Example: How many tons of hay in a stack, distance around the bulge, 25 yards, and height, 9 yards?

Solution: $25 \times 25 = 625$, then $625 \times 36 = 22,500$, pointing off two places makes 225, then $225 \div 20 = 11\frac{1}{4}$ tons.
Ans.

HOW TO FIND THE AMOUNT OF PAPER TO PAPER A ROOM.

Measure the distance around the room; deduct the width of each window and door; take $\frac{2}{3}$ of the result, and it will equal the number of strips required. Divide the result thus found by the number of strips that can be cut from one roll, and it will equal the number of rolls required to paper the room.

Each roll is $1\frac{1}{2}$ feet wide, 24 feet long and contains 36 square feet or 4 square yards.

HOW TO FIND THE CONTENTS OF A WAGON BOX.

A common Wagon Box is a little more than ten feet long and three feet wide, and will hold about two bushels for every inch in depth.

Rule.—Multiply the depth of the wagon box in inches by 2, and you have the number of bushels.

If the wagon box is 11 feet long, multiply the depth in inches by 2, and add one-tenth of the number of bushels to itself.

Example: How many bushels of grain will a wagon box hold 22 inches deep and 10 feet long?

Solution: $22 \times 2 = 44$. Ans.

N. B.—A bushel to the inch is calculated for corn on the cob.

HOW TO FIND THE NUMBER OF BUSHELS OF GRAIN
IN A BIN OR BOX.

Rule.—Multiply the length in feet by the height in feet, and then again by the breadth in feet, and then again by eight, and cut off the right hand figure. The last result will be the number of bushels.

Example: How many bushels in a bin 12 feet long, 10 feet wide, and 6 feet high?

Solution: $12 \times 10 \times 6 \times 8 = 5760$. Ans.

NOTE.—For exact results multiply the length in inches by the height in inches, and that again by the width in inches, and divide the result by 2150.4, the number of cubic inches in a bushel.

BUSHELS.

The dimensions of the bushel are $18\frac{1}{2}$ inches inner diameter; $19\frac{1}{2}$ inches outer diameter, and 8 inches deep; and when heaped, the cone is not to be less than 6 inches high; which makes a heaped bushel equal to $1\frac{1}{4}$ struck ones. To reduce U. S. dry measure to British ones of the same name, divide by 1.031516; to reduce British ones to U. S., multiply by 1.031516; or for common purposes use 1.032.

HOW TO FIND THE CONTENTS OF A ROUND TANK.

Multiply the square of the diameter in feet by the depth in feet, and multiply this result by 6 and you have the approximate contents of the tank in gallons. (For exact results multiply the product by $5\frac{7}{8}$, instead of 6.)

Example: How many gallons will a tank hold 6 feet in diameter and 8 feet deep?

Solution: $6 \times 6 \times 8 = 288$.

$288 \times 6 = 1728$ gallons. Ans.

NOTE.—If the tank is larger at the bottom than at the top, find the average diameter by measuring the middle part of the tank, half way between the top and bottom.

FOR MORE EXACT RESULTS.

Rule.—Multiply the square of the diameter in feet by the depth in feet, and multiply this result by 47, and divide the product by 8, and you will have the number of gallons.

NOTE.—In calculating the capacity of tanks, $31\frac{1}{2}$ gallons are estimated to one barrel, and 63 gallons to one hogshead.

A TABLE FOR CIRCULAR TANKS ONE FOOT IN DEPTH.

Five feet in diameter holds....	$4\frac{1}{2}$	barrels.
Six feet in diameter holds....	$6\frac{3}{4}$	“
Seven feet in diameter holds....	9	“
Eight feet in diameter holds....	12	“
Nine feet in diameter holds....	15	“
Ten feet in diameter holds....	$19\frac{1}{2}$	“

N. B.—To find the contents of a tank by the table, multiply the contents of one foot in depth by the number of feet deep.

SHORTER FORMS OF HOW TO FIND THE CONTENTS
OF CYLINDRICAL CISTERNS, TANKS, ETC.

If you cut the largest possible square from a circle drawn on paper, the square will be a little more than $\frac{3}{4}$ of the whole circle. Therefore, to find the area of a circle, take $\frac{3}{4}$ of the square of the diameter (or for exactness .78) and the result will be the area of the circle.

Rule.—Multiply the square of the diameter of the cistern in feet, by the height in feet, and divide this result by 5, and it will equal the number of barrels the cistern will hold (approximately). Or for exact results, instead of dividing by 5, take 3-16 of the product.

Example: A cistern is 5 feet in diameter, and 8 feet deep. How many barrels will it hold?

Solution; $5 \times 5 \times 8 = 200$.

$200 \div 5 = 40$ barrels. Ans.

To find the number of gallons, multiply by $31\frac{1}{2}$.

TO FIND THE NUMBER OF BARRELS IN A SQUARE CISTERN.

Multiply the height, width and depth together, and divide the product obtained by 4 (or for exactness, by 4.2), and the result will equal the number of barrels of 31½ gals. each, the cistern will hold.

Solution: $4 \times 8 \times 5 = 160$.

$160 \div 4 = 40$ barrels.

HOW TO FIND THE CONTENTS OF A WATERING TROUGH.

Rule.—Multiply the height in feet by the length in feet, and the product by the width in feet, and divide the result by 4, and you will have the contents in barrels of 31½ gallons each.

Example: What are the contents of a watering trough 8 feet long, 4 feet wide, and 3 feet deep?

Solution: $3 \times 4 \times 8 \div 4 = 24$ barrels.

NOTE.—For exact results multiply the length in inches by the height in inches, by the width in inches, and divide the result by 231, and you will have the contents in gallons.

TABLE FOR FINDING THE CONTENTS OF SQUARE TANKS.

A Tank Five feet by five feet holds. .	6	barrels.
“ Six feet by six feet holds. .	8½	“
“ Seven ft. by seven ft. holds. .	11½	“
“ Eight ft. by eight ft. holds. .	15½	“
“ Nine ft. by nine ft. holds. .	19½	“
“ Ten ft. by ten ft. holds. . .	23¾	“

The above table is for one foot of depth only.

To find the contents of a trough, measure its depth in feet and multiply it by the contents of one foot in depth.

HOW TO FIND THE NUMBER OF SHINGLES REQUIRED FOR A ROOF.

Rule.—Multiply the length of the ridge pole by twice the length on one rafter, and, if the shingles are to be exposed $4\frac{1}{2}$ inches to the weather, multiply by 8, and if exposed 5 inches to the weather, multiply by 7, and you have the number of shingles.

NOTE.—Shingles are 16 inches long, and average about 4 inches wide. They are put up in bundles of 250 each.

HOW TO FIND THE NUMBER OF LATHS FOR A ROOM.

Laths are 4 feet long and $1\frac{1}{2}$ inches wide, and 16 laths are generally estimated to the square yard.

RULE.—Find the number of square yards in the room and multiply by 16, and the result will equal the number of laths necessary to cover the room.

HOW TO FIND THE NUMBER OF CORDS IN A PILE OF WOOD.

A cord of wood is a pile 8 feet long, 4 feet wide and 4 feet high and contains 128 cubic feet.

Rule.—Multiply the length in feet by the width in feet and that result by the length in feet and divide the product by 128 and you have the number of cords.

Example: How many cords in a pile of wood 4 feet wide, 7 feet high, 24 feet long.

Solution: $4 \times 7 \times 24 = 672$ cubic feet. $672 \div 128 = 5\frac{1}{4}$ cords. **Ans.**

BOARD AND PLANK MEASUREMENT—AT SIGHT.

This table gives the sq. ft. and inches in boards from 6 to 25 in. wide, and from 8 to 36 ft. long. If a board be longer than 36 ft., unite two numbers. Thus, if a board is 40 ft. long and 16 in. wide, add 30 and 10 and you have 53 ft. 4 in. For 2 in. plank double the product

Feet Long	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	11 in.	12 in.	13 in.	14 in.	15 in.
	w. ft. in.	w. ft. in.	w. ft. in.	w. ft. in.	w. ft. in.	w. ft. in.	w. ft. in.	w. ft. in.	w. ft. in.	w. ft. in.	w. ft. in.	w. ft. in.
8	2 8	3 4	4 0	4 8	5 4	6 0	6 8	7 4	8 0	8 8	9 4	10 0
9	3 0	3 9	4 6	5 3	6 0	6 7	7 4	8 1	8 9	9 6	10 3	11 0
10	3 4	4 2	5 0	5 10	6 8	7 6	8 4	9 2	10 0	10 10	11 8	12 6
11	3 8	4 7	5 6	6 5	7 4	8 3	9 2	10 1	11 0	11 11	12 10	13 0
12	4 0	5 0	6 0	7 0	8 0	9 0	10 0	11 0	12 0	13 0	14 0	15 0
13	4 4	5 5	6 6	7 7	8 8	9 9	10 10	11 11	12 12	13 13	14 14	15 15
14	4 8	5 10	6 12	7 2	8 10	9 12	10 14	11 16	12 18	13 20	14 22	15 24
15	5 0	6 3	7 6	8 9	10 11	11 13	12 15	13 17	14 19	15 21	16 23	17 25
16	5 4	6 8	7 10	8 12	9 14	10 16	11 18	12 20	13 22	14 24	15 26	16 28
17	5 8	7 1	8 4	9 7	10 10	11 13	12 16	13 19	14 22	15 25	16 28	17 31
18	6 0	7 4	8 8	9 10	10 12	11 15	12 18	13 21	14 24	15 27	16 30	17 33
19	6 4	7 11	8 14	9 17	10 20	11 23	12 26	13 29	14 32	15 35	16 38	17 41
20	6 8	8 4	9 10	10 11	11 13	12 15	13 17	14 19	15 21	16 23	17 25	18 27
21	7 0	8 9	9 12	10 15	11 18	12 21	13 24	14 27	15 30	16 33	17 36	18 39
22	7 4	9 2	10 12	11 15	12 18	13 21	14 24	15 27	16 30	17 33	18 36	19 39
23	7 8	9 11	10 14	11 17	12 20	13 23	14 26	15 29	16 32	17 35	18 38	19 41
24	8 0	10 0	11 0	12 0	13 0	14 0	15 0	16 0	17 0	18 0	19 0	20 0
25	8 4	10 5	11 6	12 7	13 8	14 9	15 10	16 11	17 12	18 13	19 14	20 15
26	8 8	10 10	11 12	12 15	13 18	14 21	15 24	16 27	17 30	18 33	19 36	20 39
27	9 0	11 3	12 6	13 9	14 12	15 15	16 18	17 21	18 24	19 27	20 30	21 33
28	9 4	11 8	12 14	13 17	14 20	15 23	16 26	17 29	18 32	19 35	20 38	21 41
29	9 8	12 1	13 4	14 7	15 10	16 13	17 16	18 19	19 22	20 25	21 28	22 31
30	10 0	12 6	13 12	14 18	15 24	16 30	17 36	18 42	19 48	20 54	21 60	22 66
31	10 4	12 11	13 18	14 25	15 32	16 39	17 46	18 53	19 60	20 67	21 74	22 81
32	10 8	13 4	14 16	15 22	16 29	17 36	18 43	19 50	20 57	21 64	22 71	23 78
33	11 0	13 9	14 21	15 28	16 35	17 42	18 49	19 56	20 63	21 70	22 77	23 84
34	11 4	14 2	15 14	16 21	17 28	18 35	19 42	20 49	21 56	22 63	23 70	24 77
35	11 8	14 7	15 19	16 26	17 33	18 40	19 47	20 54	21 61	22 68	23 75	24 82
36	12 0	15 0	16 0	17 0	18 0	19 0	20 0	21 0	22 0	23 0	24 0	25 0

	16 in.	17 in.	18 in.	19 in.	20 in.	21 in.	22 in.	23 in.	24 in.	25 in.	26 in.	27 in.
8	10 8	11 4	12 0	12 8	13 4	14 0	14 8	15 4	16 0	16 8	17 4	18 0
9	12 0	12 9	13 6	14 3	15 0	15 9	16 6	17 3	18 0	18 9	19 6	20 3
10	13 4	14 2	15 0	15 10	16 8	17 6	18 4	19 2	20 0	20 10	21 8	22 6
11	14 8	15 7	16 4	17 1	17 11	18 9	19 7	20 5	21 3	22 1	22 11	23 9
12	16 0	17 0	18 0	19 0	20 0	21 0	22 0	23 0	24 0	25 0	26 0	27 0
13	17 4	18 5	19 6	20 7	21 8	22 9	23 10	24 11	25 12	26 13	27 14	28 15
14	18 8	19 10	20 12	21 14	22 16	23 18	24 20	25 22	26 24	27 26	28 28	29 30
15	20 0	21 3	22 6	23 9	24 12	25 15	26 18	27 21	28 24	29 27	30 30	31 33
16	21 4	22 8	24 0	25 4	26 8	27 12	28 16	29 20	30 24	31 28	32 32	33 36
17	22 8	24 2	25 6	26 10	27 14	28 18	29 22	30 26	31 30	32 34	33 38	34 42
18	24 0	25 6	27 0	28 6	29 12	30 18	31 24	32 30	33 36	34 42	35 48	36 54
19	25 4	26 11	28 0	29 18	30 26	31 34	32 42	33 50	34 58	35 66	36 74	37 82
20	26 8	28 4	30 0	31 12	32 24	33 36	34 48	35 60	36 72	37 84	38 96	39 108
21	28 0	29 9	31 18	32 30	33 42	34 54	36 6	37 18	38 30	39 42	40 54	41 66
22	29 4	31 3	33 6	34 18	35 30	36 42	37 54	38 66	39 78	40 90	41 102	42 114
23	30 8	32 14	34 36	35 48	36 60	37 72	38 84	39 96	40 108	41 120	42 132	43 144
24	32 0	33 6	35 12	36 24	37 36	38 48	39 60	40 72	41 84	42 96	43 108	44 120
25	34 4	35 13	37 24	38 36	39 48	40 60	41 72	42 84	43 96	44 108	45 120	46 132
26	35 8	36 18	38 30	39 42	40 54	41 66	42 78	43 90	44 102	45 114	46 126	47 138
27	36 0	37 9	39 18	40 30	41 42	42 54	43 66	44 78	45 90	46 102	47 114	48 126
28	37 4	38 14	40 24	41 36	42 48	43 60	44 72	45 84	46 96	47 108	48 120	49 132
29	38 8	39 19	41 30	42 42	43 54	44 66	45 78	46 90	47 102	48 114	49 126	50 138
30	40 0	41 12	43 24	44 36	45 48	46 60	47 72	48 84	49 96	50 108	51 120	52 132

Size in Inches.	LENGTH IN FEET									
	12	14	16	18	20	22	24	26	28	30
2 x 4.....	8	9	11	12	13	15	16	17	19	20
2 x 6.....	12	14	16	18	20	22	24	26	28	30
2 x 8.....	16	19	21	24	27	29	32	35	37	40
2 x 10.....	20	23	27	30	33	37	40	43	47	50
2 x 12.....	24	28	32	36	40	44	48	52	56	60
3 x 4.....	12	14	16	18	20	22	24	26	28	30
3 x 6.....	18	21	24	27	30	33	36	39	42	45
3 x 8.....	24	28	32	36	40	44	48	52	56	60
3 x 10.....	30	35	40	45	50	55	60	65	70	75
3 x 12.....	36	42	48	54	60	66	72	78	84	90
4 x 4.....	16	19	21	24	27	29	32	35	37	40
4 x 6.....	24	28	32	36	40	44	48	52	56	60
4 x 8.....	32	37	43	48	53	59	64	69	75	80
4 x 10.....	40	47	53	60	67	73	80	87	93	100
4 x 12.....	48	56	64	72	80	88	96	104	112	120
6 x 6.....	36	42	48	54	60	66	72	78	84	90
6 x 8.....	48	56	64	72	80	88	96	104	112	120
6 x 10.....	60	70	80	90	100	110	120	130	140	150
6 x 12.....	72	84	96	108	120	136	144	156	168	180
8 x 8.....	64	75	85	96	107	117	128	139	149	160
8 x 10.....	80	93	107	120	133	147	160	173	187	200
8 x 12.....	96	112	128	144	160	176	192	208	224	240
10 x 10.....	100	117	133	150	167	183	200	217	233	250
10 x 12.....	120	140	160	180	200	220	240	260	280	300
12 x 12.....	144	168	192	216	240	264	288	312	336	360
12 x 14.....	168	196	224	252	280	308	336	364	392	420
14 x 14.....	196	229	261	294	327	359	392	425	457	490

THE ACTUAL WEIGHT OF DRY PINE LUMBER.

Timber 3 lbs. per ft.

Joists 2.8 " " "

Inch Lumber (rough)..... 2.6 " " "

Inch Lumber (dressed)..... 2.3 " " "

White Pine Flooring..... 1.9 " " "

Norway flooring 2.3 " " "

Shingles 250 " " M

Laths 500 " " M

THE FARM PEST.

One of the painful nuisances to which the farmer is subjected is unreliable help.

While it is true that the farm produces some of the grandest men in the world, it is equally true that it tolerates some of the meanest men, who could not earn a support in any other occupation on earth, and have been kicked from one kind of business to another till they dropped down to a piece of land and, because it held them up they thought they were farmers; men who do not take to honesty any more than a mule to offsprings;

men, who under employment are interested in but three things, meal-time, sundown and pay-day. They excel in prompt attendance at the circus, in finding the easy end of a job, the soft side of a plank, a good excuse for neglect of duty. They are splendid marksmen, can kill time at five hundred yards, center shot, never miss. Such kind neighbors; they know every bee tree on your premises; they get their wood on your farm, pick apples in your orchard and secure all your nuts and berries simply to patronize you; they keep three or four dogs to exercise your sheep and a one horned cow to browse the highway and act as fence examiner. Such trifles as watermelons, grapes and cherries are picked on shares, sometimes leaving the farmers' share on the tree, and sometimes on the ground.

Seriously, the labor problem is greater than all others upon the farm. It is a tax which industry can ill afford to pay to shiftlessness. It precludes the farmer from doing any more work than he can personally superintend and force to completion, and it drives from the farm every man who, by impaired health, is unable to lead his work.

There are noble exceptions to this state of things, but such soon own farms of their own.

Possibly this condition of things cannot be remedied till the land is dearer and there is a more equitable system of rental.

If farms could be cheaply, but durably improved and well stocked, rental upon equitable terms, would seem to form a basis for future prosperity to the enterprising laborer than the slow process of paying for a farm from the annual products.

A higher condition of farm labor involves more intelligence honesty and thrift in the laborer and more science, liberality and business management on the part of the farmer.

SYSTEMATIZE THE WORK.

Systematizing the farm work more thoroughly will give good results in both time and amount of work done. Ten hours a day in the field, keeping steadily at it, ex-

cept occasional stops of a minute or two to rest the horses, with a little brain work will accomplish more in the run of the season than fourteen hours of aimless toil.

MONTHLY WAGES TABLE.*

HOW TO CALCULATE THE WAGES OF HIRED HELP AT SIGHT.

*26 working days in a month.

Compare the following figures with those on previous pages, the average weekly wages being given in each case:

	Brick- layers.	Masons.	Carpenters.	Black- smiths.	Hod- carriers.	Porters.
England,—						
	\$7.56	7.68	7.66	7.37	4.94	4.70
Germany,—						
	4.21	4.67	4.11	4.00	2.92	3.11

HOW TO USE THE GRAIN TABLE.

The heavy type column represents the weight of the load, and the number of bushels and pounds are at the right under the kind of grain.

Example: How many bushels of oats in 2490 pounds?

Answer: 77 bushels and 26 pounds.

Example: A timber 12 by 14 inches, 18 feet long, contains 252 square feet.

TABLE OF WAGES BY THE WEEK GIVEN BY THE DAY AND HOUR.

EXAMPLE: What will the wages for 4 days and 7 hours amount to at \$9.00 per week? Ans., \$7.05.

The above table is based on 10 hours a day. To find the amount for any number of days, 8 or 9 hours a day, multiply the number opposite 8 hours or 9 hours, as the case may be, by the number of days.

Thus, 8 days and 6 hours at \$11.00 a week, working 9 hours a day, will amount to $\$1.65 \times 8 = \$13.20 + \$1.10$, amount for 6 hours = \$14.30.

Eight days and 6 hours at \$11.00 a week, working 8 hours a day will amount to $\$1.46\frac{2}{3} \times 8 = \$11.73 + \$1.10$, amount for six hours = \$12.83.

MONTHLY WAGE TABLES.

Time.	\$1	\$3	\$7	\$10	\$11	\$12	\$13	\$14	\$15	\$16	\$17	\$18
1	.04	.12	.27	.38	.42	.46	.50	.54	.58	.62	.65	.69
2	.08	.23	.54	.77	.85	.92	1.00	1.08	1.15	1.23	1.31	1.38
3	.12	.35	.81	1.15	1.27	1.38	1.50	1.62	1.73	1.85	1.96	2.08
4	.15	.46	1.08	1.54	1.69	1.85	2.00	2.15	2.31	2.46	2.62	2.77
5	.19	.58	1.35	1.92	2.12	2.31	2.50	2.69	2.88	3.08	3.27	3.46
6	.23	.69	1.62	2.31	2.54	2.77	3.00	3.23	3.46	3.69	3.92	4.15
7	.27	.81	1.88	2.69	2.96	3.23	3.50	3.77	4.04	4.31	4.58	4.85
8	.31	.92	2.15	3.08	3.38	3.69	4.00	4.31	4.62	4.92	5.23	5.54
9	.35	1.04	2.42	3.46	3.81	4.15	4.50	4.85	5.19	5.54	5.88	6.23
10	.38	1.15	2.69	3.85	4.23	4.62	5.00	5.38	5.77	6.15	6.54	6.92
11	.42	1.27	2.96	4.23	4.65	5.08	5.50	5.92	6.35	6.77	7.19	7.62
12	.46	1.38	3.23	4.62	5.08	5.54	6.00	6.46	6.92	7.38	7.85	8.31
13	.50	1.50	3.50	5.00	5.50	6.00	6.50	7.00	7.50	8.00	8.50	9.00
14	.54	1.62	3.77	5.38	5.92	6.46	7.00	7.54	8.08	8.62	9.15	9.69
15	.58	1.73	4.04	5.77	6.35	6.92	7.50	8.08	8.65	9.23	9.81	10.38
16	.62	1.85	4.31	6.15	6.77	7.38	8.00	8.62	9.23	9.85	10.46	11.08
17	.65	1.96	4.58	6.54	7.19	7.85	8.50	9.15	9.81	10.46	11.12	11.77
18	.69	2.08	4.85	6.92	7.62	8.31	9.00	9.69	10.38	11.08	11.77	12.46
19	.73	2.19	5.12	7.31	8.04	8.77	9.50	10.23	10.96	11.69	12.42	13.15
20	.77	2.31	5.38	7.69	8.46	9.23	10.00	10.77	11.54	12.31	13.08	13.85
21	.81	2.42	5.65	8.08	8.88	9.69	10.50	11.31	12.12	12.92	13.73	14.54
22	.85	2.54	5.92	8.46	9.31	10.15	11.00	11.85	12.69	13.54	14.38	15.23
23	.88	2.65	6.19	8.85	9.73	10.62	11.50	12.38	13.27	14.15	15.04	15.92
24	.92	2.77	6.46	9.23	10.15	11.08	12.00	12.92	13.85	14.77	15.69	16.62
25	.96	2.88	6.73	9.62	10.58	11.54	12.50	13.46	14.42	15.38	16.35	17.31
1 mo	1.00	3.00	7.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00
2	2.00	6.00	14.00	20.00	22.00	24.00	26.00	28.00	30.00	32.00	34.00	36.00
3	3.00	9.00	21.00	30.00	33.00	36.00	39.00	42.00	45.00	48.00	51.00	54.00
4	4.00	12.00	28.00	40.00	44.00	48.00	52.00	56.00	60.00	64.00	68.00	72.00
5	5.00	15.00	35.00	50.00	55.00	60.00	65.00	70.00	75.00	80.00	85.00	90.00
6	6.00	18.00	42.00	60.00	66.00	72.00	78.00	84.00	90.00	96.00	102.00	108.00
7	7.00	21.00	49.00	70.00	77.00	84.00	91.00	98.00	105.00	112.00	119.00	126.00
8	8.00	24.00	56.00	80.00	88.00	96.00	104.00	112.00	120.00	128.00	136.00	144.00
9	9.00	27.00	63.00	90.00	99.00	108.00	117.00	126.00	135.00	144.00	153.00	162.00
10	10.00	30.00	70.00	100.00	110.00	120.00	130.00	140.00	150.00	160.00	170.00	180.00
11	11.00	33.00	77.00	110.00	121.00	132.00	143.00	154.00	165.00	176.00	187.00	198.00
1 yr	12.00	36.00	84.00	120.00	132.00	144.00	156.00	168.00	180.00	192.00	204.00	216.00

Time.	\$19	\$20	\$21	\$22	\$23	\$24	\$25	\$26	\$27	\$28	\$29
1	.73	.77	.81	.85	.89	.92	.96	1.00	1.04	1.07	1.12
2	1.46	1.54	1.61	1.70	1.77	1.85	1.92	2.00	2.08	2.15	2.23
3	2.19	2.31	2.42	2.55	2.65	2.77	2.88	3.00	3.12	3.23	3.34
4	2.92	3.08	3.23	3.38	3.54	3.70	3.85	4.00	4.15	4.30	4.46
5	3.65	3.85	4.04	4.23	4.43	4.62	4.81	5.00	5.19	5.38	5.58
6	4.38	4.62	4.85	5.08	5.30	5.54	5.77	6.00	6.23	6.46	6.69
7	5.12	5.38	5.65	5.92	6.20	6.46	6.74	7.00	7.27	7.54	7.81
8	5.85	6.15	6.46	6.77	7.08	7.38	7.69	8.00	8.31	8.62	8.92
9	6.58	6.92	7.27	7.62	7.96	8.31	8.64	9.00	9.35	9.69	10.04
10	7.31	7.61	8.08	8.46	8.85	9.23	9.62	10.00	10.38	10.77	11.15
11	8.04	8.46	8.88	9.31	9.73	10.15	10.58	11.00	11.42	11.84	12.27
12	8.77	9.23	9.69	10.15	10.62	11.08	11.53	12.00	12.46	12.92	13.38
13	9.50	10.00	10.50	11.00	11.50	12.00	12.50	13.00	13.50	14.00	14.50
14	10.23	10.77	11.31	11.85	12.40	12.92	13.46	14.00	14.54	15.08	15.61
15	10.96	11.54	12.12	12.70	13.28	13.85	14.42	15.00	15.58	16.15	16.73
16	11.69	12.31	12.92	13.54	14.15	14.77	15.48	16.00	16.61	17.23	17.84
17	12.42	13.08	13.73	14.38	15.05	15.69	16.35	17.00	17.64	18.30	18.96
18	13.15	13.85	14.54	15.23	15.92	16.61	17.31	18.00	18.68	19.38	20.07
19	13.88	14.62	15.35	16.08	16.80	17.54	18.26	19.00	19.73	20.46	21.19
20	14.62	15.38	16.15	16.92	17.70	18.46	19.24	20.00	20.76	21.54	22.30
21	15.35	16.15	16.96	17.77	18.58	19.38	20.19	21.00	21.79	22.62	23.42
22	16.08	16.92	17.77	18.62	19.46	20.30	21.15	22.00	22.84	23.69	24.53
23	16.81	17.69	18.57	19.46	20.34	21.23	22.12	23.00	23.88	24.77	25.65
24	17.54	18.46	19.38	20.31	21.23	22.15	23.08	24.00	24.92	25.84	26.76
25	18.27	19.23	20.19	21.15	22.12	23.08	24.04	25.00	25.96	26.92	27.88
1 mo	19.00	20.00	21.00	22.00	23.00	24.00	25.00	26.00	27.00	28.00	29.00
2	38.00	40.00	42.00	44.00	46.00	48.00	50.00	52.00	54.00	56.00	58.00
3	57.00	60.00	63.00	66.00	69.00	72.00	75.00	78.00	81.00	84.00	87.00
4	76.00	80.00	84.00	88.00	92.00	96.00	100.00	104.00	108.00	112.00	116.00
5	95.00	100.00	105.00	110.00	115.00	120.00	125.00	130.00	135.00	140.00	145.00
6	114.00	120.00	126.00	132.00	138.00	144.00	150.00	156.00	162.00	168.00	174.00
7	133.00	140.00	147.00	154.00	161.00	168.00	175.00	182.00	189.00	196.00	203.00
8	152.00	160.00	168.00	176.00	184.00	192.00	200.00	208.00	216.00	224.00	232.00
9	171.00	180.00	189.00	198.00	207.00	216.00	225.00	234.00	243.00	252.00	261.00
10	190.00	200.00	210.00	220.00	230.00	240.00	250.00	260.00	270.00	280.00	290.00
11	209.00	220.00	231.00	242.00	253.00	264.00	275.00	286.00	297.00	308.00	319.00
1 yr.	228.00	240.00	252.00	264.00	276.00	288.00	300.00	312.00	324.00	336.00	348.00

MONTHLY WAGE TABLES—CONTINUED.

Time.	\$30	\$31	\$32	\$33	\$34	\$35	\$36	\$37	\$38	\$39	\$40
1	1.15	1.19	1.23	1.27	1.31	1.35	1.38	1.42	1.46	1.50	1.54
2	2.31	2.38	2.46	2.54	2.62	2.69	2.77	2.85	2.92	3.00	3.07
3	3.46	3.57	3.69	3.81	3.92	4.03	4.15	4.27	4.38	4.50	4.62
4	4.62	4.77	4.92	5.08	5.23	5.38	5.53	5.69	5.84	6.00	6.15
5	5.77	5.96	6.15	6.35	6.54	6.73	6.92	7.12	7.30	7.50	7.69
6	6.92	7.15	7.38	7.61	7.84	8.08	8.31	8.54	8.77	9.00	9.23
7	8.07	8.34	8.62	8.88	9.15	9.42	9.69	9.96	10.23	10.50	10.77
8	9.23	9.54	9.85	10.15	10.46	10.77	11.08	11.38	11.69	12.00	12.31
9	10.39	10.73	11.08	11.42	11.77	12.11	12.46	12.81	13.15	13.50	13.85
10	11.54	11.92	12.30	12.69	13.07	13.46	13.84	14.23	14.61	15.00	15.39
11	12.69	13.11	13.54	13.96	14.38	14.81	15.22	15.65	16.07	16.50	16.93
12	13.85	14.31	14.77	15.22	15.69	16.15	16.61	17.07	17.53	18.00	18.47
13	15.00	15.50	16.00	16.50	17.00	17.50	18.00	18.50	19.00	19.50	20.00
14	16.15	16.69	17.23	17.77	18.31	18.85	19.38	19.92	20.46	21.00	21.54
15	17.31	17.88	18.46	19.04	19.62	20.19	20.77	21.35	21.92	22.50	23.07
16	18.46	19.07	19.69	20.31	20.92	21.54	22.15	22.77	23.38	24.00	24.62
17	19.62	20.25	20.92	21.58	22.23	22.89	23.53	24.19	24.84	25.50	26.15
18	20.77	21.44	22.15	22.85	23.54	24.22	24.92	25.61	26.30	27.00	27.69
19	21.92	22.64	23.38	24.12	24.84	25.57	26.31	27.03	27.77	28.50	29.23
20	23.07	23.84	24.62	25.39	26.15	26.92	27.69	28.46	29.23	30.00	30.77
21	24.23	25.03	25.85	26.66	27.46	28.27	29.08	29.88	30.69	31.50	32.31
22	25.39	26.22	27.08	27.93	28.77	29.62	30.46	31.30	32.15	33.00	33.85
23	26.54	27.41	28.30	29.20	30.07	30.96	31.84	32.72	33.61	34.50	35.39
24	27.69	28.60	29.54	30.47	31.38	32.31	33.23	34.15	35.07	36.00	36.93
25	28.85	29.81	30.77	31.73	32.69	33.65	34.62	35.57	36.53	37.50	38.47
1 mo	30.00	31.00	32.00	33.00	34.00	35.00	36.00	37.00	38.00	39.00	40.00
2	60.00	62.00	64.00	66.00	68.00	70.00	72.00	74.00	76.00	78.00	80.00
3	90.00	93.00	96.00	99.00	102.00	105.00	108.00	111.00	114.00	117.00	120.00
4	120.00	124.00	128.00	132.00	136.00	140.00	144.00	148.00	150.00	156.00	160.00
5	150.00	155.00	160.00	165.00	170.00	175.00	180.00	185.00	190.00	195.00	200.00
6	180.00	186.00	192.00	198.00	204.00	210.00	216.00	222.00	228.00	234.00	240.00
7	210.00	217.00	224.00	231.00	238.00	245.00	252.00	259.00	266.00	273.00	280.00
8	240.00	248.00	256.00	264.00	272.00	280.00	288.00	296.00	304.00	312.00	320.00
9	270.00	279.00	288.00	297.00	306.00	315.00	324.00	333.00	342.00	351.00	360.00
10	300.00	310.00	320.00	330.00	340.00	350.00	360.00	370.00	380.00	390.00	400.00
11	330.00	341.00	352.00	363.00	374.00	385.00	396.00	407.00	418.00	429.00	440.00
1 yr	360.00	372.00	384.00	396.00	408.00	420.00	432.00	444.00	456.00	468.00	480.00

TABLE OF WAGES BY THE WEEK GIVEN BY THE DAY AND HOUR.

	u \$1	\$2	\$3	\$4	\$5	\$6	\$7	\$8	\$9	\$10	\$11	\$12	\$13	\$14	\$15	\$16	\$17	\$18
$\frac{1}{2}$ hr.	1	1	2	3	4	5	5	6	7	8	9	10	10	11	12	13	14	15
1 hr.	3	3	5	6	8	10	10	13	15	16	18	20	21	23	25	26	28	30
2 hrs.	6	6	10	13	16	20	20	26	30	33	36	40	43	46	50	53	56	60
3 hrs.	9	9	15	20	25	30	30	40	45	50	55	60	65	70	75	80	85	90
4 hrs.	12	12	20	26	33	40	40	53	60	66	72	80	86	93	1.00	1.06	1.13	1.20
5 hrs.	15	15	25	33	41	50	50	66	75	83	91	1.00	1.08	1.16	1.25	1.33	1.41	1.50
6 hrs.	18	18	30	40	50	60	60	80	90	1.00	1.10	1.20	1.30	1.40	1.50	1.60	1.70	1.80
7 hrs.	21	21	35	46	58	70	81	93	1.05	1.16	1.28	1.40	1.51	1.63	1.75	1.86	1.98	2.10
8 hrs.	24	24	40	53	66	80	93	1.06	1.20	1.33	1.46	1.60	1.73	1.86	2.00	2.13	2.26	2.40
9 hrs.	27	27	45	60	75	90	1.05	1.20	1.35	1.50	1.65	1.80	1.95	2.10	2.25	2.40	2.55	2.70
1 day.	30	30	50	66	83	1.00	1.16	1.33	1.50	1.66	1.83	2.00	2.16	2.33	2.50	2.66	2.83	3.00
2 days	33	33	50	66	83	1.00	1.16	1.33	1.50	1.66	1.83	2.00	2.16	2.33	2.50	2.66	2.83	3.00
3 days	50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50	8.00	8.50	9.00
4 days	66	1.33	2.00	2.66	3.33	4.00	4.66	5.33	6.00	6.66	7.33	8.00	8.66	9.33	10.00	10.66	11.33	12.00
5 days	83	1.66	2.50	3.33	4.16	5.00	5.83	6.66	7.50	8.33	9.16	10.00	10.83	11.66	12.50	13.33	14.16	15.00
6 days	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00

EXAMPLE: What will the wages for 4 days and 7 hours amount to at \$9.00 per week. Ans., \$7.05.

The above table is based on 10 hours a day. To find the amount for any number of days, 8 or 9 hours a day, multiply the number opposite 8 or 9 hours, as the case may be, by the number of days.

Thus, 8 days and 6 hours at \$11.00 a week, working 9 hours a day, will amount to $\$1.65 \times 8 = \$13.20 + \$1.10$, amount for 6 hours = \$14.30.

Eight days and 6 hours at \$11.00 a week, working 8 hours a day will amount to $\$1.46\frac{2}{3} \times 8 = \$11.73 + \$1.10$, amount for six hours = \$12.83.

HOW TO FIND THE NUMBER OF BUSHEL IN A LOAD OF GRAIN AT SIGHT.

Weight	Oats 32 lbs.		Corn, rye 50 lbs.		Barley 48 lbs.		Wheat 60 lbs.		Weight	Oats 32 lbs.		Corn, rye 50 lbs.		Barley 48 lbs.		Wheat 60 lbs.	
	Bus.	Lbs.	Bus.	Lbs.	Bus.	Lbs.	Bus.	Lbs.		Bus.	Lbs.	Bus.	Lbs.	Bus.	Lbs.	Bus.	Lbs.
1500	46	28	26	44	31	12	25	00	2000	62	16	35	40	41	32	33	20
1510	47	06	26	54	31	22	25	10	2010	62	26	35	50	41	42	33	30
1520	47	16	27	08	31	32	25	20	2020	63	04	36	04	42	04	33	40
1530	47	26	27	18	31	42	25	30	2030	63	14	36	14	42	14	33	50
1540	48	04	27	28	32	04	25	40	2040	63	24	36	24	42	24	34	00
1550	48	14	27	38	32	14	25	50	2050	64	02	36	34	42	34	34	10
1560	48	24	27	48	32	24	26	00	2060	64	12	36	44	42	44	34	20
1570	49	02	28	02	32	34	26	10	2070	64	22	36	54	43	06	34	30
1580	49	12	28	12	32	44	26	20	2080	65	00	37	08	43	16	34	40
1590	49	22	28	22	33	06	26	30	2090	65	10	37	18	43	26	34	50
1600	50	00	28	32	33	16	26	40	2100	65	20	37	28	43	36	35	00
1610	50	10	28	42	33	26	26	50	2110	65	30	37	38	43	46	35	10
1620	50	20	28	52	33	36	27	00	2120	66	08	37	48	44	08	35	20
1630	50	30	29	06	33	46	27	10	2130	66	18	38	02	44	18	35	30
1640	51	08	29	16	34	08	27	20	2140	66	28	38	12	44	28	35	40
1650	51	18	29	26	34	18	27	30	2150	67	06	38	22	44	38	35	50
1660	51	28	29	36	34	28	27	40	2160	67	16	38	32	45	00	36	00
1670	52	06	29	46	34	38	27	50	2170	67	26	38	42	45	10	36	10
1680	52	16	30	00	35	00	28	00	2180	68	04	38	52	45	20	36	20
1690	52	26	30	10	35	10	28	10	2190	68	14	39	06	45	30	36	30
1700	53	04	30	20	35	20	28	20	2200	68	24	39	16	45	40	36	40
1710	53	14	30	30	35	30	28	30	2210	69	02	39	26	46	02	36	50
1720	53	24	30	40	35	40	28	40	2220	69	12	39	36	46	12	37	00
1730	54	02	30	50	36	02	28	50	2230	69	22	39	46	46	22	37	10
1740	54	12	31	04	36	12	29	00	2240	70	00	40	00	46	32	37	20
1750	54	22	31	14	36	22	29	10	2250	70	10	40	10	46	42	37	30
1760	55	00	31	24	36	32	29	20	2260	70	20	40	20	47	04	37	40
1770	55	10	31	34	36	42	29	30	2270	70	30	40	30	47	14	37	50
1780	55	20	31	44	37	04	29	40	2280	71	08	40	40	47	24	38	00
1790	55	30	31	54	37	14	29	50	2290	71	18	40	50	47	34	38	10
1800	56	08	32	08	37	24	30	00	2300	71	28	41	04	47	44	38	20
1810	56	18	32	18	37	34	30	30	2310	72	06	41	14	48	06	38	30
1820	56	28	32	28	37	44	30	20	2320	72	16	41	24	48	16	38	40
1830	57	06	32	38	38	06	30	30	2330	72	26	41	34	48	26	38	50
1840	57	16	32	48	38	16	30	40	2340	73	04	41	44	48	36	39	00
1850	57	26	33	02	38	26	30	50	2350	73	14	41	54	48	46	39	10
1860	58	04	33	12	38	36	31	00	2360	73	24	42	08	49	08	39	20
1870	58	14	33	22	38	46	31	10	2370	74	02	42	18	49	18	39	30
1880	58	24	33	32	39	08	31	20	2380	74	12	42	28	49	28	39	40
1890	59	02	33	42	39	18	31	30	2390	74	22	42	38	49	38	39	50
1900	59	12	33	52	39	28	31	40	2400	75	00	42	48	50	00	40	00
1910	59	22	34	06	39	38	31	50	2410	75	10	43	02	50	10	40	10
1920	60	00	34	16	40	00	32	00	2420	75	20	43	12	50	20	40	20
1930	60	10	34	26	40	10	32	10	2430	75	30	43	22	50	30	40	30
1940	60	20	34	36	40	20	32	20	2440	76	08	43	32	50	40	40	40
1950	60	30	34	46	40	30	32	30	2450	76	18	43	42	51	02	40	50
1960	61	08	35	00	40	40	32	40	2460	76	28	43	52	51	12	41	00
1970	61	18	35	10	41	02	32	50	2470	77	06	44	06	51	22	41	10
1980	61	28	35	20	41	12	33	00	2480	77	16	44	16	51	32	41	20
1990	62	06	35	30	41	22	33	10	2490	77	26	44	26	51	42	41	30

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IT PAYS TO KNOW WHEN AND FOR WHAT YOU PAY OUT YOUR MONEY.

CASH PAID OUT.

[illegible]

CASH PAID OUT.

[illegible]

ACCOUNT WITH HIRED HELP

Commenced Work		At per Month		NAME	Month
Month	Date	Dollars	Cts.		190...
Jan.					
Feb.					
March					
April					
May					
June					
July					
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Jan.					
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Nov.					
Dec.					

Every farmer should keep an exact account with his hired help.

You have on this page space to keep an exact record for two hired hands for one year. A single cross X will show the day lost. A check mark will show the day the hand commenced. No writing necessary, yet you have a complete record.

ACCOUNT WITH HIRED HELP

Commenced Work		At per Month		NAME	Month
Month	Date	Dollars	Cts.		190_
Jan.					
Feb.					
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Jan.					
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[illegible]

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Month	Date	Dollars	Cts.		190 . . .
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