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"CORN IS KING!"

CORN:

ITS

ORIGIN, HISTORY, USES, AND ABUSES

BEING THE SUBSTANCE OF ADDRESSES BY

Robert W. Furnas
ROBERT W. FURNAS,

*Delivered before the Cass, Adams, Kearney, Seward, Johnson, and Clay
County Agricultural Societies, Nebraska.*

1886.

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*With Compliments
Robt. W. Furnas,*

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INTRODUCTION.

As most of you are aware, I enjoyed the distinguished honor of representing the young agricultural giant, Nebraska, at the "World's Industrial and Cotton Centennial Exposition," New Orleans, La., 1884-5. When I accepted the position tendered me by the president of the United States, as commissioner, I determined to make a point on the great staple product of Nebraska, corn. The first banner I flung to the breeze in government building, had inscribed on its folds, "Corn is King." To go south and claim king for any other soil product than cotton, especially at the "Cotton Centennial," was deemed an intolerable bit of impudence, in nowise orthodox—a broad-gauge departure. Cotton, sugar, and tobacco, all elevated their nasal protuberances, saying by actions, which are said to "speak louder than words," "*How dare you!*" Minnesota, "the state with boundless wheat fields glinted," our next door neighbor at the exposition, was "to arms" "in the twinkling of an eye," pressing the superiority of wheat and invoking the muses to aid her in obliterating our banner inscription. Colorado, Kansas, Illinois, and Dakota set themselves to work manufacturing huge artificial ears to eclipse our natural growth of "Chester County Mammoth." For a time outsiders entertained doubts as to our ability to maintain the advanced position taken.

But we "fought it out on that line," and came home "with our banner still there."

And now, in calmer moments, as it were, I am bold to assert the belief that among all the factors of culture in the United States, corn takes precedence in the scale of crops, as best adapted to more soils, climates, and conditions; is used for more purposes; furnishes more nutritive food for man and beast; has more commercial, cultural, and economic value; gives more grain to the acre than any other cereal; more fodder than any other of the grasses; puts our beef in prime order; fattens our pork; is the basis of our butter and cheese supply; furnishes immense manufacturing material; has twice the value of cotton; worth fifty per cent more than wheat; its influence on the prosperity and wealth of the United States is greater than that of any other cultivated plant; and to the transportation companies, has "millions in it." The belief has been expressed that had not the Pilgrim Fathers discovered this golden grain the first winter they landed on our shores, this "land of the free and home of the brave," would to-day be an "unsolved problem." But why extend. Its uses and value are endless and incalculable.

In round numbers, the corn crop of the United States for 1885 is put down at two billions of bushels, a gain of near ten per cent on 1884. In the corn acreage of the entire country there was a gain of six per cent. In the twelve leading corn states, seven per cent; four per cent in the south, and one per cent in the New England States. A statistical calculator estimates that were all the corn crop

of 1885 put in flour barrels, and stood as closely together as possible, they would stretch sixty times across this continent.

The last National Census Report shows these figures:

	ACRES.	BUSHEL.
Wheat.....	62,368,869	459,479,535
Oats.....	16,144,593	407,858,999
Barley.....	1,997,717	44,113,495
Rye.....	1,842,303	19,831,595
Buckwheat.....	848,389	11,817,727
Total.....	83,201,871	943,101,351
CORN.....	62,368,869	1,754,861,535
Excess over all other grains.....	.....	811,760,184

That is to say, the bushels of corn grown equaled all other grains, and a *surplus of over 86 per cent.* Take the crops when other grain yields were unusually large, viz., in 1884:

	ACRES.	BUSHEL.	VALUE.
Wheat.....	39,475,885	512,765,000	\$330,862,260
Oats.....	21,300,917	583,628,000	161,528,470
Barley.....	2,603,818	61,203,000	29,777,170
Rye.....	2,343,963	28,640,000	14,857,040
Total.....	65,729,583	1,186,236,000	\$537,024,940
CORN.....	69,683,780	1,795,528,000	640,735,560
Corn excess.....	5,954,197	609,292,000	\$103,710,620

One hundred and three million dollars more in value of corn than all other grains!

CORN.

ORIGIN.

This wonderful product, which has conferred more substantial benefits on the world, as well as indirectly inflicting more ills on the human race than any or all others known to civilization, strange to say, is of unknown origin—wrapped in mystery, or at least is not definitely fixed. A learned author, after much thought and investigation, concludes with the expression: “Like that of wheat and barley, its origin is lost in the twilight of antiquity.”

Scientifically speaking it belongs to the natural order *Gramineæ*, and is a *monœcious* grass. Linnæus adopted as the specific name of his genus *zea*, “to live,” “affording sustenance to animals.” Its botanical nomenclature is *zea mays*—*maize*, more simplified, Indian corn; in common parlance, plain corn.

It was first cultivated in the United States by the English, on James river, Virginia, in 1608, the seed of which was obtained from the Indians, who claimed to be the originators, or first discoverers of the plant—receiving it direct from the hands of the Creator. Schoolcraft gives their mythological history of it: “A young man went out into the woods to fast, at that period of life when youth is exchanged for manhood. He built a lodge of boughs in a secluded place, and painted his face of a somber hue. By day he amused himself in walking about, looking at the various shrubs and wild plants, and at night lay down in his bower, which being open, he could look up into the sky. He sought a gift from the Master of life, and he hoped it

would be something to benefit his race. On the third day he became too weak to leave the lodge, and as he lay gazing upwards he saw a spirit come down in the shape of a beautiful young man, dressed in green and having green plumes on his head, who told him to arise and wrestle with him, as this is the only way in which he could obtain his wishes. He did so, and found his strength renewed by the effort. This visit and the trial of wrestling were repeated for four days, the youth feeling at each trial that, although his bodily strength declined, a moral and supernatural energy was imparted, which promised him the final victory. On the third day his celestial visitor spoke to him. 'To-morrow,' said he, 'will be the seventh day of your fast, and the last time I shall wrestle with you. You will triumph over me and gain your wishes. As soon as you have thrown me down, strip off my clothes, and bury me on the spot in soft fresh earth. When you have done this, leave me, but come occasionally to visit the place, to keep the weeds from growing. Once or twice cover me with fresh earth.' He then departed, but returned the next day, and, as he had predicted, was thrown down. The young man punctually obeyed his instructions in every particular, and soon had the pleasure of seeing the green plumes of his sky visitor shooting up through the ground. He carefully weeded the earth, and kept it fresh and soft, and in due time was gratified by beholding the matured plant, bending with its golden fruit, and gracefully waving its green leaves and yellow tassels in the wind. He then invited his parents to the spot to behold the new plant. 'It is *Mondamin*,' replied his father; 'it is the Spirit's grain.' They immediately prepared a feast, and invited their friends to partake of it, and this is the origin of Indian corn."

In 1621 the Indian chiefs Samoset and Squauto visited the Pilgrims at Plymouth, and instructed them how corn

should be planted, and the manner in which the ground should be prepared, and manured with alewives—fish. The same year Edward Winslow and Stephen Hopkins visited the Indians at Namasket and Middleborough, who received them with great joy, and regaled them with bread called *mazium*, made from Indian corn.

Rifaud claims to have found “corn” under the head of a mummy at Thebes. If it was known to the Egyptians in Pharaoh’s time, it was introduced into Palestine in a very early day. The word “corn,” however, in Biblical parlance, is known to signify all cereals. The Hebrew word *dagari* means to “increase,” and can properly be rendered “grain,” “corn,” “wheat.” In fact the term “corn,” as anciently used, is sufficiently comprehensive to include, not only all proper cereals, but various kinds of seeds and plants, in nowise belonging to grain products, says a learned writer upon this subject.

De Candolle and other ancient botanists assign the origin of this valuable grain to South America. Bonofous was of the opinion corn was indigenous, both in China and south-west South America. This theory was in accordance with an old idea entertained respecting many other tropical American vegetables. Humboldt maintains that corn is an American plant, and that the new world gave it to the old. Those of his opinion claim that Columbus, on his return from his first voyage, in 1493, took to Europe the first grains of Indian corn, and thence its cultivation spread into Portugal and southern Europe. The Portuguese, who were at that time the great navigators of the world, having doubled Cape Horn previously and discovered Java, in 1495. introduced it along the African coast and into Java, and thence its cultivation spread into India and China, and was correctly figured in a Chinese work on agriculture as early as 1552.

Another proof of American origin, is the fact that in several forms it is found growing wild, from the Rocky mountains in North America to the humid forests of Paraguay. In southern sugar-growing regions "wild corn," as it is called, as a weed pest, is equal to sand or cockle burr, Spanish needle, or smart-weed in the North.

Corn did not grow in that part of Asia watered by the Indus at the time of Alexander the Great's expedition, as it is not among the productions of that country mentioned by Nearchus, the commander of the fleet. Neither is it noticed by Arrian, Diodorus, Collumella, or any other ancient author. As late as 1491, the year before Columbus discovered America, Joan di Cuba, in his "*Ortus Sanitatus*," makes no mention of it. There is no satisfactory evidence that it has ever been found in any ancient tumulus, sarcophagus, or pyramid. Nor has it ever been represented in any ancient painting, sculpture, or work of art, except in America. According to Garcilaso de la Vega, one of the earliest Peruvian historians, the palace gardens of the Incas were ornamented with maize in gold and silver, with all the grains, spike, stalks and leaves. In one instance, in the "*Garden of Gold and Silver*," there was an entire corn field, of considerable size, representing the maize in its exact and natural shape, a proof no less of the wealth of the Incas, than their veneration for this important grain.

The arguments derived from vegetable physiology strongly favor its Eastern origin. Because, while further India and China contain many native plants of related genera, like sorghum and millet, very little, if anything of the kind is to be found among the botanical productions of South America. By the barest possibility, Indian corn may have been introduced into some portions of North America by the Chinese centuries ago, and the

present remote probability may become a reasonable one, if modern antiquarians succeed in establishing the fact of the discovery of America by the Chinese, at least a thousand years before its discovery by Columbus—a triumph of skillful and successful research which may not be far off.

Whatever the origin of corn may have been, whether with the Indians of North America, or “on the slopes of the Andes, or in the fertile valleys of the mountains of China,” modern botanists and naturalists are agreed that the origin was of the species *zea tunica*—clothed corn. That is, each kernel was enveloped in a separate tunic, or husk, similar to grains of wheat in the head. Descending from this type, species, classes, and varieties have become almost innumerable, each country, climate, soil, situation, and parallel having those suited to the circumstances. No plant accepts the modifications of soil, climate, and conditions, so readily and quickly as corn. No other succeeds so well from the equator to, say 50° north and south latitude. None so easily preserved through all seasons, and for such length of time. It is called both the “the poor man’s crop” and “the lazy man’s crop,” because, particularly, it can be left standing in the field almost from one year’s end to another, not requiring to be garnered at any specific period. This mode of caring for a corn crop, however, is not presented in form of a recommendation, by any means, but simply as showing a characteristic. In any event, it is the crop for the million.

RACES AND VALUE.

There are at least five distinct races or species of corn: Dent, flint, sweet, pop, and soft. These divisions are plainly marked, and easily distinguished by inspection of either, or both, ears and kernels. The number of what may be properly termed varieties are unlimited almost,

the names principally local, few only having become of general use. White Dent, yellow Dent, Yankee flint, calico, bloody butcher, late sugar, early sugar, red pop, white pop, squaw, Chester county, or Pennsylvania mammoth, and others that might be named, are known in almost all sections. In the collection I had on exhibition at New Orleans, there were seventy-five distinct varieties grown in Nebraska. There are different types of growth under each of the principal divisions named, showing distinct characteristics, and which invariably produce ears true to their type, when kept free from others; such as pure white, pure yellow, pure red, regular mixtures, eight-rowed, and other numbered rows. The Indians have, by close attention, a marked corn of precise and exact mixtures of different colored grains on the same ear, each band having its peculiar mixture. For instance, one band has all red and white grains, another all black and yellow grains, another all pure white, another all pure black, and so on, with various distinctions, said to have originated as a means of detecting theft by one band from another. All may be simplified under these heads, viz., Dent, flint, etc., races; yellow, white, etc., classes; and large, medium, and small types.

After all, nomenclature is of secondary importance when compared with a standard of excellence. The first prime point in an ear of corn is its nutritive substance. It should show a proper proportion of *protein*, *carbo-hydrates*, and *fat*. It is generally considered that the flint and sugar varieties show a higher nutritive ratio than the Dents. The latter, however, are in more general use commercially, and therefore regarded as the standards. The average of a given number of analyses of the Dent varieties show:

	WATER.	ASH.	ALBUMIN- OIDS.	FIBRE.	CARBO- HYD- RATES.	FATS.
Average.....	11.23	1.48	10.49	1.91	70.15	4.74
Maximum.....	15.24	1.79	11.75	2.95	75.26	6.28
Minimum	6.22	1.28	8.105	1.25	66.26	3.80

These analyses fairly represent the composition of Dent corn. A more evenly balanced ratio of this great stock food would be desirable. A maximum of *albuminoids* should be maintained, even at sacrifice of *carbo-hydrates*. Kernels which contain the greatest amount of *corneous* matter, are considered richest in *albuminoids*, say chemists. The matter of first importance is, that the per cent yield of kernel be as large as possible without injuriously weakening the cob, which sustains, and through which it directly receives its nourishment.

The "Ohio Experiment Station" has established a scale of points of excellence, of what Prof. Lazenby is pleased to term an ideal ear of corn, as follows:

<i>Points.</i>	<i>Value of each.</i>
Greatest per cent of shelled corn.....	40
Trueness of type.....	10
Evenness of diameter.....	10
Length of ear	10
Number of rows	5
Size and shape of kernel.....	10
Hardness of kernel.....	15
Total	100

It will be seen the prominent points in the scale are yield and hardness of kernel. Hard kernels, as in the

flints, are believed to contain a larger per cent of *protein*, an important desideratum.

SEASON.

The corn season—that is, the time required to mature, is not of as much importance with us in Nebraska as in other sections. We are in the corn belt proper, and almost any of the valuable races or varieties will ripen without risk. One hundred and ten days from date of vegetation to date of ripening or security from frost is about the average season in the corn belt. Here we are quite sure of at least one hundred and twenty days, say from first to fifteenth of May, our corn planting season, usually to first to fifteenth of September, the ordinary period of security. While the dates given are those observed by thrifty, intelligent farmers as a rule, there is much variance in time of planting. Some are slow naturally, and others, at times, governed by uncontrollable circumstances, do not get corn in the ground until the middle of June, and yet, more frequently than otherwise, escape early frosts. It will be remembered by those who were residents of this state when we were overrun with spring grasshoppers, that no corn stand was obtained before the twentieth of June planting. Planting was continued along until as late as the fourth of July. Near all the June planting matured well, and that in July made excellent soft corn for stock feeding. It was remarked that stock never did so well as the winter following, thus showing that corn can be depended on with a favorable ninety day season. I speak of the Dent varieties, because, as said, they are our standards.

The fewer-rowed varieties generally have longer ears, yield less per acre, have over an average cob weight, and mature somewhat earlier. The many-rowed varieties have shorter ears, increased kernel yield and weight, and de-

crease in weight of cob, and ripen a few days only later. The standard legal weight for cobs per bushel of shelled corn is fixed at fourteen pounds. Standard varieties in Nebraska seldom exceed twelve pounds of cob, and run as low as ten and nine.

There is difference of opinion as to the number of rows a standard or ideal ear of corn should contain. Sixteen may be called a safe compromise. The size and shape of an ideal kernel is of importance. It should be of good depth, wedge shape, filling up the ear compact, with a smooth square surface, well glazed, well filled at the end, simply a round dimple or slight depression. Too much wrinkling at the end indicates a lack of *corneous* matter.

SEED AND YIELD.

In my humble opinion, farmers as a rule do not attach sufficient importance to corn yield. When our average yield the state over is put down at forty bushels to the acre, we are apt to say, "that is good." But the careful intelligent corn grower should not be content with a less average yield than seventy-five bushels to the acre. Exercising care in matters of seed, adaptation of soil, tillage, and garnering, there is no good reason why this yield should not be had. Our State Board of Agriculture has awarded premiums on as high as one hundred and fourteen bushels per acre. "Less acres and more bushels," is a good agricultural motto. "A maximum yield with a minimum of human toil" and we "become lenders and no longer borrowers."

I speak of care in selecting seed. Orange Judd, in his admirable paper before our State Fair last fall, treated this subject forcibly and in detail, showing that fully one tenth of our whole corn crop is lost annually by the use of bad seed—failure to select and preserve good seed. I am in-

formed by grain dealers that it is very rare that Nebraska or any western corn goes into the market as grade No. 1. There is a reason somewhere for this, as well as a remedy. The season, climate, and soil in Nebraska will produce No. 1 corn if the conditions are made equal. No. 1 seed of a No. 1 type, with No. 1 care and attention, will produce No. 1 corn.

The most successful corn farmers are those who, as it were, have made their own varieties. First select of the corn in their own locality the best obtainable type. From this choose annually the best seed ears, until it is bred to a desirable or required standard. It has been demonstrated that too frequent exchange of seed corn over any wide extended region usually works harm. The idea that there must be a mixture of types planted together to secure crosses as a means of improvement is erroneous, for out of the chaos of types resultant from any cross, a pure type must again be selected before you are on the road to success. "Selecting from existing types, and keeping the types pure," should be the watchword of the farmer who aspires to highest success.

[After the delivery of this paper at Seward, J. H. Purdum, one of the most successful corn growers of that county, informed me that four of the principal corn premiums awarded at that fair were from a line of seed he had followed for thirty years in the states of Illinois and Nebraska.]

We are prone to talk of the old worn-out soil in the east sometimes derisively. True, that comparatively a few years since the corn grown on the exhausted soils of New York and New England were yielding five to ten bushels to the acre, and those farming seemed content with that. The same soil, well manured, now brings fifty and seventy-five bushels per acre. The farmers of those regions are claiming that corn now is their most profitable crop. I have

the authority of T. S. Gold, Secretary of the Connecticut Agricultural Society, that one T. B. Wakeman of that state has secured the enormous yield of one hundred and seventy-nine bushels and twenty-three quarts shelled corn from an acre of ground. This, of course, is an exceptional yield, but shows the possibilities of the crop under scientific management, and should teach us in the west, with the rich fertile soil we are heir to, not to be plodding along with a forty bushel yield.

TIME AND MANNER OF PLANTING.

Time of planting, depth and number of kernels to the hill, are all subjects of much discussion and speculation. As to time of planting, there is no little force in the reply said to have been given by the late Horace Greeley, to an enquiry said to have been made him. When asked, "When is the best time to set a hen?" The reply was: "When the hen is ready." The best and proper time to plant corn or any other seed, is when the soil is ready. That is, when sufficiently warm and otherwise in condition to at once embrace the seed entrusted to its care, hasten to vegetation, and forward as rapidly as possible to completion of cycle. With us, this condition seldom occurs before the date I have indicated for planting—first to tenth of May—often the latter part. When planted before the soil possesses the essential warming influences, much of the seed rots outright or becomes enfeebled, and a poor or delicate stand is the result. I have in my mind's eye two adjoining fields planted in corn the same year. One the latter part of April and the other late in May. The May planting by far, in all respects, excelled the April planting. It came up quick and went along rapidly without hindrance. The April planting never got out of a stunted strata.

There are advocates of both deep and shallow planting, each claiming superior success. My thirty years' experience and observation in the soil and climate of this state, warrants the belief that the sooner corn can be gotten above the surface up, the better. In other words, plant shallow, get the corn up, and give roots depth with after culture. It is important, under our hot suns, that roots be well down in the soil, with a downward tendency, at least, until the top has sufficiently advanced to shade the roots. While it is true the atmospheric conditions are not the same on similar dates for different years, the effect on plant growth is as important as though the seasons obeyed fixed laws. I repeat, the sooner both the functions of root and leaf are brought into joint exercise and duty, the better.

Another somewhat vexed problem, but which I think practical experience has solved, is, how close shall corn be planted to secure best results in matter of yield? The old rule when I was a boy on the farm—corn was planted four feet by four, marked off by an old-fashioned bull tongue plow, dropped by hand, four to six kernels in a hill, and covered with a garden hoe. Now, with the modern improved planters, rows three and a half feet apart, kernels can be put in any distance apart and as many in a hill as desirable. It has been demonstrated that a stock of corn requires about fifteen inches by three and a half feet. The highest yields have been produced with rows three and a half feet, two kernels in a hill, fifteen inches apart. The next best yield, one kernel in a hill nine inches apart, and the next, two kernels in a hill twenty-four inches apart, rows all the same distance—three and a half feet. The highest ear development was produced from the single grain hill nine inches apart.

MILK AND BUTTER FACTOR.

Believing that the time is in the very near future when dairy products will become a prime factor among our valued industries, I present the following regarding corn as a milk and butter-producing factor.

I quote in substance from a series of experiments made by Prof. Henry of the Wisconsin Agricultural Experimental Station. These experiments were made to ascertain: *First*, The relative values of corn fodder and mixed hay for producing milk and butter. *Second*, The relative values of corn fodder and clover hay for producing milk and butter. *Third*, The amount of milk and butter an acre of corn will make when fed to milk cows. *Fourth*, The value of an acre of corn when turned into milk and butter.

Four excellent butter cows were selected and divided into lots of two each, of equal capacity for producing milk and butter as near as could be judged. In the first trial, the ration of lot one was five pounds of corn meal and seven pounds of bran per cow daily, in two feeds, fed dry, and as many corn-stalks as they would strip. The ration for lot two was the same as that of lot one, except for the corn-stalks, mixed hay was substituted. After feeding carefully for a week, the ration was continued and the milk and butter product saved for fourteen days. At the end of this period the hay and corn-stalks of the two rations were changed about for the two lots, and the trial repeated.

Six weeks were required to complete the test with mixed hay and corn-stalks, and, this done, the whole trial was repeated, except that clover hay was substituted for the mixed hay, the corn-stalk ration being continued.

Comparing corn-stalks with the mixed hay, when sup-

plemented by 280 pounds of corn meal and 392 pounds of bran, we find, 2374 pounds of corn-stalks yield 1120 pounds 12 oz. milk, making 57 pounds $\frac{1}{2}$ oz. butter; 755 pounds of mixed hay yield 1063 pounds 15 ozs. milk, making 56 pounds $1\frac{1}{2}$ ozs. butter, or 56 pounds 13 ozs. milk, and 15 ozs. of butter more from the stalks than from the mixed hay.

Comparing corn-stalks with clover hay, as in the previous instance, we find 1867 pounds corn stalks yield 1079 pounds 3 ozs. milk, making 52 pounds $2\frac{1}{2}$ ozs. butter; 6421 $\frac{1}{2}$ pounds clover hay yield 1059 pounds 1 oz. milk, making 54 pounds $8\frac{1}{2}$ ozs. butter, or 20 pounds 2 ozs. more milk, and 2 pounds 6 ozs. more butter from the corn-stalks than from the clover hay.

Taking into consideration the fact that the milk and butter yield are both larger from stalks than from the mixed hay, it is fair to say that the corn-stalks were worth one-third as much as the mixed hay—that is, one ton of mixed hay is worth three tons of stalks fed as these were.

From the second trial we see that one ton of clover hay was worth somewhat more than three tons of corn-stalks fed as described.

In the two trials 4,241 pounds of stalks were fed, and 1450 pounds weighed back as coarse parts that the cows refused to eat. This is over 34 per cent of the whole amount of the stalks, by weight, lost by feeding in this manner.

Arranging figures in another form, we have the following: Food required for 100 pounds of milk when feeding corn-stalks—193 pounds of corn-stalks, 25 pounds of corn meal, 35 pounds of wheat bran. Food required for 100 pounds of butter when feeding corn-stalks—3,880 pounds of corn-stalks, 514 pounds of corn meal, 719 pounds of wheat bran. Food required for 100

pounds of milk when feeding mixed hay—71 pounds of mixed hay, 26 pounds of corn meal, 36 pounds of wheat bran. Food required for 100 pounds of butter when feeding mixed hay—1348 pounds of mixed hay, 500 pounds of corn meal, 700 pounds of wheat bran. Food required for 100 pounds of milk when feeding clover hay—60 pounds of clover hay, 26 pounds of corn meal, 37 pounds of wheat bran. Food required for 100 pounds of butter when feeding clover hay—1179 pounds of clover hay, 513 pounds of corn meal, 718 pounds of wheat bran.

From the data here given one can easily calculate the cost of food necessary to produce one hundred pounds of milk or butter. Supposing hay is worth \$8 per ton, then the corn-stalks would be worth \$2.66, or one-third the value of the hay, as shown by these experiments. Suppose further that bran can be had for \$12, and corn meal for \$15 per ton—assuming these prices, we will find that the food necessary to produce one hundred pounds of milk costs, as the average of the before detailed experiments, about sixty-six cents, and the food to produce one hundred pounds of butter costs about \$12.84.

With these facts and those of experiments before us, let us attempt to estimate the butter that can be produced from an acre of corn land.

For this purpose let us assume that 4,491 pounds of ears from an acre would make 4,000 pounds of corn meal, allowing for shrinkage and grinding about twenty per cent, which is fully enough for corn as dry as this at husking.

Now most farmers would be unwilling to trade a ton of corn meal for a ton of bran, but let us substitute bran for corn meal, pound for pound in part, so as to have seven pounds of bran for each five of corn meal. The two tons

of corn meal then would give us 2,334 pounds of bran and 1,666 pounds of corn meal.

By our experiments we have shown, that by feeding as described, 193 pounds of corn stalks made 100 pounds of milk, and for 100 pounds of butter 3,874 pounds were required; also, that 25 pounds of corn meal and 35 of bran were required in addition to the corn-stalks for 100 pounds of milk, and 514 pounds of meal and 718 pounds of bran for 100 pounds of butter.

From this we see that an acre of land produced sufficient grain food for 6,664 pounds of milk, or 324 pounds of butter, and sufficient corn-stalks for 2324 pounds of milk, or 115 pounds of butter.

Valuing milk at \$1.00 per 100 pounds and butter at 20 cents per pound, we find that one acre of land produced sufficient corn-stalks for \$23.24 worth of milk, or \$23.00 worth of butter, and meal sufficient for \$66.64 worth of milk, or \$64.88 worth of butter.

ABUSES.

It is said, and truly, that none of us are without a fault of some kind. The Good Book says, "There is none good; no, not one." While enumerating the countless good offices of corn, permit brief dealing with one of its mischievous powers. Of the two billion bushels crop of 1885 eighteen million nine hundred and twenty-seven thousand nine hundred and eighty-two bushels, or a trifle over seven-tenths of one per cent, was used for distillation. A bushel of corn sells for thirty cents with us, and when converted into intoxicating drink represents seventeen quarts. The distillers receive forty cents a gallon for converting it into whiskey. It thus represents the original 30 cents, and \$1.70 for the distiller, making its value at this stage \$2. Then the government tax of 90 cents a gallon adds \$3.85

to the value, swelling it to \$5.85. By the time it reaches the retailers it has been "reduced" in strength and increased in quantity by the admixture of water, and some more harmful substances, so that its measure has at least been doubled; and the corn, when it begins to drop into the drinkers' glasses on the bar, represents about eight and one-half gallons of drink. Allowing 60 drinks to the gallon, the official bar average, the bushel of corn will furnish 270 drinks, which, at an average of 15 cents to the drink, will take \$40.50 from the pockets of the consumers. This, added to the \$5.85 put into the corn up to the time of reaching the jobbers, making a total of \$46.35. Subtract the 30 cents which the farmer received for the corn, and the balance, \$46.05, will show the amazing profits made by those who do not till the soil to raise the corn, but who multiply infinitely by scientific means the evil powers of the grain, and who from this hurtful multiplication reap easy, large, and reliable profits. The original price of the bushel of corn is contained 155 times in the ultimate receipts from it. In this way the enormous wasting power of alcoholic drink can be easily understood. Political reformers and statisticians, who talk so learnedly about "hard times," appear to have skipped such calculations as these. It may not be out of place to state that in 1880 there were 99,997 insane persons, 76,891 idiots, 88,665 paupers, 59,255 prisoners, or 316,812 persons, every one of whom can trace a portion, at least, of his trouble to liquor.

CONCLUSION.

It was originally my intention to have prepared, in connection with this paper, a chapter relating to soil, particularly as to the importance of keeping up its maximum producing power; but it is already of quite sufficient length for one sitting of an audience. Suffice it now to

say, the thrifty, successful manipulator of the soil will not permit its desirable quality to deteriorate—will keep it up.

We once had, in connection with one of our leading state institutions, one who taught the doctrine publicly that use and tillage of Nebraska soil would not detract from its productive characteristics, or in any way impoverish it. He is not now with us, thanks to better and more intelligent management.

While I believe, with good treatment, the soil peculiar to the great slope reaching from the base of the Rocky mountains to the Missouri river will continue to reward the intelligent husbandman with crop yield in abundance, and longer without perceptible diminution than almost any other, the Creator never made a soil that would not depreciate and eventually wear out, without recuperative efforts on the part of the tiller. To expect otherwise would be to ask Him to set aside His fixed laws to accommodate an already bounteously provided for section of country. We may as reasonably expect that a single bank deposit might be drawn from for all time without replenishing. In plain parlance, soil needs to be fed the same as cattle and hogs, if like results are sought to be obtained.

FIG. A.

* **Fig. A.**—This is a transverse or cross section of the Corn Kernel shown in Fig. A, and the figures refer to the same parts: 1, a cutting through the Epicarp, highly magnified to show its structure; 2, the same of the Endocarp; 3, the Glutinous or interior shell cover; 10, the Testa, as described under Fig. B;—4, two starch Cells, one filled and one empty; 5 a magnified section showing the structure of the Scutellum; 6, shows the cell structure of the Plumule.

Fig. B.—(See following page). A kernel of Flint Corn shown in natural size at the lower left hand corner —The larger engraving exhibits a kernel of **DENT CORN**, cut perpendicular through its middle, and highly magnified.—1, 2, 3 are the shell or skin of the kernel, 1 and 2 being the pericarp divided into, 1, the Epicarp, or outer cuticle, and 2, the Endocarp; 3 is the interior wall next to 4, which is the starch depositary or Endosperm. (10 in Fig. A. is the Testa, a fibrous coating between 2 and 3);—5 is the Scutellum, or shield of the Plumule 6 (or cotyledon); 7 is the Primary Root; 8 the Root Sheath; 9 the covering of the Embryo.

FIG. B.

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