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SCIENTIFIC METHODS OF STACK-BUILDING

PRICE 50 Cents

SCIENTIFIC METHODS OF STACK-BUILDING

A Practical Stacker's Guide

BY
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ALVA, OKLAHOMA
RENFREW'S RECORD
1913

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PREFACE.

A correct statement of the grain produced yearly in the United States is an eye-opener to the average farmer. It shows that, after all, it is the farmer who possesses the wealth of the land. Following are the statistics taken from the Crop Reporter of Dec., 1912, published by the authority of the Secretary of Agriculture:

Crop.	Acreage.	Production		Farm Value		Dec. 1st
		In Bushels.	Per Bushel.	Per Bushel.	Total	
Wheat—	45,814,000	730,267,000	.76		\$555,280,000	
Oats—	37,917,000	1,418,337,000	.31	9-10	452,469,000	
Barley—	7,530,000	223,824,000	.50	5-10	112,957,000	
Rye—	2,117,000	35,664,000	.66	3-10	23,636,000	
		Tons.	Per Ton			
Hay—	49,530,000	72,691,000	11.79		856,695,000	

What becomes of this vast amount of product? The wheat, of course, is sold direct, and consumed by man. But most of the oats, barley, rye, and hay is consumed by stock on the farm. As a rule the average American farmer is keenly alive to any waste or loss when it involves the paying out of money direct; but careless regarding loss in his crop. This brings us to the point of view of this book, which is that of great gain by the use of correct and scientific methods, as advocated herein, or showing up the so prevalent loss, caused by the poor stacking of hay and grain.

To the best of the writer's knowledge, there has been no standard method of stacking adopted among farmers, but such knowledge has been gotten "catch as catch can." It is also true that those who have acquired a certain knowledge of stacking are seldom able to so explain it to their boys as they grow to manhood or to men hired on the place, that they can become expert stackers.

The silo and the hay barn are of great benefit, but it

still remains that a vast quantity of hay and grain must be stacked year after year. This is particularly true of wheat in the great wheat belt of our country, where barns are too inconvenient. The importance of the question, then, is readily seen.

Sometimes stacks of grain or hay are so damaged as to be almost entirely lost. It is a fairly safe estimate to say that one-tenth of the hay and grain stacked in the open, spoils and becomes a dead loss. Think what this means; especially when compared with the millions of dollars annual income, which we find in the statistics from the office of the Secretary of Agriculture! In the manufacturing world, the difference between success and failure consists in the careful handling of every by-product, that there may be no loss whatever. If you are losing one-tenth of your grain or hay through poor stacking year after year, that tenth means the loss of just so much hard cash. You have paid for producing it—you have bought the seed, paid for preparing the soil, for the harvesting of the crop, and you get nothing. If a man is just making a comfortable living as it is now, he could have a nice little sum to put into the bank every year if he secured this 10 per cent additional—simply by not allowing this great waste by improper stacking. It is to help farmers save this wasted part, which has cost them so much toil and money, that this book is written.

The writer has traveled in Kansas, Oklahoma, Iowa and Missouri, and has actually seen such a great loss and waste both of hay and grain by neglect and poor stacking, especially the latter. The greatest loss witnessed in my travels was found in Kansas and Oklahoma, in the "Golden Wheat Belt" of the United States, where wheat is headed or bound and ricked, piled or "dumped," as you might call it, for where the greatest loss occurred this expression would scarcely be an exaggeration of truth.

Scarcely one farmer out of twenty-five does his own stacking; nor does he understand the art, in most cases. Hence he is obliged to trust the preserving of his grain to others who are supposed to have the knowledge of stacking hay and grain. In many instances this trust in the other party has cost him dearly. Yet in the rush of a great harvest, where a large acreage is to be cared for, men plunge headlong into the cutting and stacking, striving each day for a big day's cutting, not thinking that the rain in one night might destroy the full day's cutting, if not the entire crop, scarcely noticing the way their wheat or other crop is stacked or cared for.

Since seeing so much damage, so much entire waste and loss in the past ten years of my life, I have given time to a special study of this work, hoping to aid in correcting this great error, and I here give to the public my work.

J. H. WHITCOMB.

INTRODUCTION.

In order to explain how to build a stack, it is necessary to present herewith some diagrams. In the stacking and preserving of bound grain, the drawings are in the form of diagrams, using numbers and letters in locating positions describing these scientific (though simple) methods of stacking.

The following work is intended to take the bundles as they leave the binder and trace them until they are threshed, giving complete information as to the proper care in handling the grain. Another introduction relative to the subjects of hay or loose grain will be given later in the book at the beginning of such work.

On account of the great amount of bound grain, and also the large amount of moisture in localities where the binder is extensively used, I have taken the time to learn the art of stacking and caring for bundle grain. Hence in my study I have adopted simple diagrams to explain in part the simple methods of caring for the bound grain, and hope to produce a work that will be of great benefit and of much saving to the many farmers who are yearly subject to loss by poor methods in preserving their grain.

J. H. WHITCOMB.

Part I

Diagram No. 1 shows a shock of bound grain in a common way of shocking, to be left some time in the field. Notice the bundles are placed with the heads of grain up, thus leaving the butt ends of the sheaves to the ground. Also notice the tops of the bundles are matted tightly together, making them firm and strong, thus being self-supporting against winds or rain, being so close together as to shed the water off the grain, not allowing it to penetrate to any noticeable depth. While the tops are matted together, the butts of the bundles are slightly spread apart, as if bracing or supporting each other. This brace-like position of each bundle not only acts as a support in holding the shock, but is of great benefit in time of storms, winds, etc. The slanting position of the bundle also acts as a drain to lead the water outward and away from the shock.

Some men carelessly pile the bundles one upon another.

er, and any way to get along, in order to keep up with the binder, sometimes even grain end down. Hence the grain will soon rot and spoil. The grain should never be placed beneath or on the damp earth, but always up so the sun can dry it. The aid of the calm, gentle breeze also is of great benefit in drying the sheaves when properly set up.

When the sheaves are laid on the ground, the mice and other field pests have a better chance to do damage, and often burrow and destroy great quantities.

Why should grain be shocked before it is stacked or threshed? In answer I would say: First, in most instances the straw is green and damp, so by shocking, the sheaves have a chance to cure thoroughly. Second, there is not time for the farmer to stop his binder in order to stack the grain. Again, it would not do to stack on account of being too green and sappy. Therefore he must wait a short time before stacking or threshing, since the sheaves should be thoroughly dry before the grain is in condition to stack or thresh, else the green straw and the moisture together would cause the grain to heat and rot either in the stack or in the bin after it is threshed.

Often when grain or hay is not shocked or stacked correctly, the wind throws it down, scattering the bundles or hay about, leaving it exposed to the rain and dirt, which do great damage in a short time. The wind naturally should help dry the sheaves, and aid in curing them out, ready to be threshed, but in order to get it's benefit, one should always be sure to get the shocks firmly built. Then the sunshine with a soft, gentle breeze, soon dries the sheaves out, and puts them in readiness to be stacked or threshed.

Before we learn about stacking, let us learn a little more about the shocks, and especially the bundles. If you should go near a shock in your field or your neighbors, and look at it closely, you would see that the bundles

may not all appear to be shaped alike; some flat, some round, while others are yet different in appearance; but if you go to where the binder is working and pick the bundles up immediately after they have been thrown from the machine, and examine them all carefully, you will see that they are all exactly (or should be, if the binder is working properly) alike. You will now ask: "What causes them to look so different in the shock?"

In order to answer your question, we will need to go back to where the bundles are freshly laid in the windrow, shortly after the binder has thrown them. Pick out three or four at least, and examine them closely. They are all alike. You will notice they all have a flat side, and also a rounding side opposite. The butts of the straw are almost even. Turn them all on their flat sides—now they all look alike. Turn some of them on their round side, some edgeways, etc. Now look at them closely, and you will observe the answer to your question, as to why they look so different in the shock.

SHOCKING BUNDLES.

In shocking grain, the round side of the sheaves or bundles should always be placed toward the outside of the shock; because the flat side of the bundles are more apt to take water. Another reason is; the bundles always place closer together when placed with the flat side in. This causes the shock to become more firmly built, and the better the shock is built, the better it will stand against storms, wind, rain, etc.

Some men never think about the storm or such damages that might occur if the shocks are not built up firmly, but hurriedly put the bundles up any way they come to them, then rush on to the next windrow to commence building another shock, and by so doing they pay little or no attention to the way the sheaves are or should be set up. In this way they get some bundles set up right,

but some wrong; hence this is why the shock is so liable to blow down, and also why the sheaves do not look alike in the shock.

After the shock has become settled, the bottoms of the bundles coming in contact with the ground, changes their shape slightly. The straw settling tightly to the earth causes the inner sides of the bundle to become shorter at the bottom than on the outer side (shorter from the twine band down only.) We will learn to use this difference in length later, when commencing to stack.

QUESTIONS ON ABOVE LESSON.

Why do we shock our grain?

Why not take the wheat, as soon as cut and bound, and stack or thresh it?

Why not place the heads of grain down to the earth in shocking?

Why not heap piles of sheaves, and then by and by by haul them to the machine or stack them?

What effect has the wind on shocks which are not built correctly?

What effect has the moist earth on all bundles that are down?

What effect has the rain? The sun? Why? How?

HOW TO STACK.

Since we have learned about the shape of the bundles, and how they should be shocked, also why we shock our grain, and about the dangers that often happen when grain is not properly shocked, and the principal ways of caring for the grain up until it should be placed in the stack or threshed, we now must learn how to preserve our grain by placing it in the stack. By learning this art of stacking, we can stack our own hay and grain without

depending on others, and by knowing how to stack our grain correctly we always can feel safe and know our hay or grain is not going to rot and spoil; while if another stacks for us we can only trust to his knowledge whether he does the work rightly or not. Thus we may, by his negligence or ignorance, sustain great loss in our crop each year. If the hay or grain is not stacked properly, it would be as well left in the field in the shock and thus save the additional loss of labor in hauling and stacking.

Men who know the science of stacking are few, and while waiting for a chance to employ a man skilled in this art, there is great loss of time, to say nothing about the chances of loss by storm, wind, or rain.

It can be readily seen, then, why one should have the knowledge of stacking and preserving his own hay or grain; then he need not depend upon others. Again, as before mentioned, to know that the work is done properly is worth a great deal.

We have described the bundles, and also mentioned how they should be cared for up until stacked or threshed. It is now that we are ready to illustrate, and tell how bound grain should be stacked.

In Diagram 1 is shown the common method of shocking. Wishing to connect this diagram with the simple method of stacking, we may now turn to Diagram 1 and observe the picture of an ideal shock. On Diagram 2 we use the shock plan to commence our stack foundation. Begin with making a shock, then add thereto until the desired size in length and breadth is reached, when the stack bottom will be complete. Notice: The shock should always be built the shape the stack is desired to be when complete; for the additional rings of bundles only enlarge and expand the shape of shock. The shock should not be made the entire length or breadth the stack is expected to be when complete, for there must be more add-

Diagram No 2—

ed on both the ends and the sides. This will be more plainly understood later in this volume.

Beginning with letter "A" on Diagram 2, "A" represents the shock or beginning of the stack bottom. As additional rings of bundles are to be used to get the size stack bottom desired, it is convenient to use a series of circles, numbering them in rotation, beginning at "A" and numbering outward; viz. 1-2-3-4-5, etc. until the desired size of stack bottom is reached.

What we mean by circles is a ring made up of bundles set in a row extending completely around the shock or amount of stack bottom already built.

Thus beginning with the shock (A), the first ring of bundles to be added becomes No. 1, making a complete circle around the shock. (Note: This circle may be either completely round when finished, or oblong, oval, or such shape as the stack is wished to be when fully set.) This additional ring or bundles makes the shock (A) ex-

pand in which ever shape the shock may have been made.

Being now ready for another additional ring of bundles, let it be No. 2, thus forming another complete circle around No. 1, and enclosing within itself the entire amount built this far.

After No. 2, we continue Numbers 3, 4, 5, etc.—making a complete circle each time around all those before built, until the stack bottom is as large as desired.

Take note that the farther out we build from “A”, the more flat a position our bundles seem to take, until the outside ring of bundles seems to lie so flat as to lap only about half way on the next inner circle, thus making the stack bottom gradually sloping from “A” to our last number, the outer edge. It is this shed-like position of the bundles throughout the entire stack, after it is complete, that makes it waterproof through and through, thus, at all times guiding the water outward and off the grain.

BUILDING AFTER FOUNDATION IS LAID.

Now that we have completed the stack bottom, we are ready to commence building on our foundation. Let No. 8 represent the outside ring of bundles. Then, of course, No. 7 is the next to the last in rotation. Beginning at letter “W”, which always represents the wagon’s stopping place while unloading. (See Diagram 3), place a bundle half way back on No. 8, lapping half way on No. 7, with the grain end toward the inner part of the stack always; thus breaking joints, the same as a stone mason does in laying brick or rock, covering the cracks between Nos 7 and 8. This not only acts to tie the two together, but battons and covers the cracks between the two rows of bundles underneath. This will keep the water from entering the crevices below.

Now that we have laid one bundle which will be our pattern for this row or circle of bundles, which should

be placed in this position, make a complete circle around the stack from the wagon (W) returning to the wagon again.

Although we use "W" to give us the point where the wagon stops every time, we may also use the same letter ("W") to indicate the point where each circle or ring of bundles will even up, thus completing a circuit around the stack each time, returning to that same point.

Simple methods of stacking bundles.

A -- The shock or commencement point.
W -- The Wagon stop
No's -- 1, 2, 3, 4, 5, 6, 7, 8 -- The additional
rings of bundles in starting stack bottom

Diagram No. 3 —

In Bundle Grain

"A" represents the shock or commencement.
No. 1 represents the first ring of bundles.
No. 2, the second.

No. 3, the third.

No. 4, the fourth, and so on until the stack is as large as desired. "W" represents the stopping place for wagon or the evening-up place for each and every row or ring of bundles.

"D" represents the stone mason's way of covering each crack, also a shingler's way of hiding cracks; hence in stacking, D's illustration must be kept in mind, and batten each space between the bundles.

See Diagram No. 4.

In Diagram 3, we illustrate a stack bottom; "A" representing the shock for the commencement of the stack bottom, as mentioned before. The rings of bundles are represented by circular lines, numbered the same as the rings of bundles. This diagram outlines a round stack, hence the shock ("A") takes the shape of the stack as desired when completed.

In the above lesson we learned how to lay the foundation for the stack, and also had placed one pattern ring of bundles, lapping half way on No. 8, and extending the other part toward the center of the stack, thus, as before mentioned, lapping the grain end on No. 7; both together, making a complete circle from the wagon ("W") to "W" again.

We are now ready to take the next step in stack building. Since we have laid the foundation and one ring of bundles, the commencement in building, let us adopt a rotation of numbers according to each row or ring of bundles laid; which make a complete circle from the wagon at "W" to "W" again; hence inverting the use and rotation of numbers from that already used in the construction of the stack bottom. Our first pattern ring in the commencement of our building on the foundation already laid, may now be called No. 1 (Diagram 3.) cle from "W" to "W", as before, until each operation is made complete.

The next step will be making pattern bundle No. 2, which takes its name from its position in rotation. Let this bundle rest half way on pattern bundle No. 1, and expand the other half toward the center of the stack, this acting as a tie to hold the other rings underneath more firmly, and also battening the cracks as before mentioned.

Having placed pattern bundle No. 2, let us make another complete ring of bundles, same as pattern, from the point "W" returning again to "W", to even and finish our ring of bundles. The next number adopted is No. 3, taking its position, lapping half way on No. 2, that has just been laid, and extending the other half of the bundle toward the center of stack, same as the other rows laid before. After laying the pattern bundle, the entire circle of bundles should be laid in like position from "W", returning to "W", to even and finish each circle.

The next number in rotation is No. 4. Placing this pattern bundle half its length on No. 3, and extending the other half toward the center of the stack; after laying the pattern bundle make another complete circle, placing the bundles in like position with the pattern, beginning at "W" and ending there, as usual.

This method of completing circles of bundles must be continued until at last the center of the stack and the bundles of the last circle meet at ends, after which, place a row of bundles tying the last center ring together, thus completing one operation in stack building.

The above is a description of one operation in stack building, which must be remembered, as there will be like operations in the continuing of building after the stack foundation is laid.

Now return to the outer edge of the stack.

See Diagram 4 for illustration of the 1st, 2nd, 3rd and 4th operations. Note that 1st and 3rd are alike; also that 2nd and 4th are alike; thus repeated throughout all remaining operations necessary for the completion of

the stack. We have made stair-steps all along; but have battened each and every crack, and the center is become so full there could no water get in as it is now; yet we have not finished our stack; rather only well commenced.

We are at the outer edge of the stack at "W", the

Diagram No. 4 —
Separate Layers of Bound Grain Stack.

wagon stop, and are ready to proceed in building; hence let us lay another pattern bundle, but before we go any further let us again examine the bundles. You will remember (in first part of book) that the settling of the straw in the shock caused the bundle to become slightly

shorter on one side than on the other. Now we wish to take advantage of this short and long side in our building. Remembering that we had gotten to the outer edge of the stack after completing the first operation in stack building, and ready for another pattern bundle, place a bundle with the long side UP (thus leaving, necessarily, the short side down) to the entire outer edge of the stack.

This will mean that the bundle will lap half way, or nearly so, on No. 1 of the above operation, and extend to the entire outer edge of the stack (butts out.) By laying the short side down, and the long side up, the difference in the length of the straw tends to widen and expand the stack slightly. This plan, being simple, will, if continued, build a nice bulge or swell on the stack; hence by this knowledge, one does not need to make a large stack bottom in order to preserve an average amount of grain. Naturally the bottom of the stack, which generally rests on the damp earth, will often rot to some extent, so you see the advantage in a small stack-bottom; then bulging the stack spreads it wider so it will hold a greater quantity of grain. Yet no one should widen to a greater extent than is necessary, because of winds. Too small a stack bottom for that body might cause the stack to be blown down.

Remember each ring of bundles that is placed to the outer edge of the stack should be carefully placed with the long side up in order to gain the proper bulge at a desired height according to size of stack. After this height is accomplished, turn the bundles of the outside rings over, with the short side up. This will draw the stack in. This method of drawing in will bring the stack gradually to a top. This can be gauged as desired.

Having mentioned the pattern bundle at the outer edge of the stack, and described how it should be laid, with the long side up and to the entire outer edge of the

stack, we have thus begun another operation in stack-building, and by so doing cancelled the other operation just laid or built. Let us now make a complete ring of bundles like the pattern bundle at the outer edge, and by so doing make a neat outline of the outer edge of the stack, beginning at "W" and evening up at "W" again (at wagon stop) each time as before. Naming this new start of a new operation in building, after having cancelled the old, we will call this first ring of bundles No. 1.

The next pattern bundle, No. 2, will take its position half way its length on No. 1, newly laid, and extend the other half toward the center of the stack, the same as the method used in the foregoing operation. After laying the pattern bundle, proceed each time to make a complete circle from "W" to "W", to even up each time ready for another pattern bundle.

The next pattern bundle will be, No 3; its position will be half its length on No. 2, and the other half toward the center of the stack the same as before. Make a complete circle from "W" to "W" again. This method must be continued until the center of the stack is filled the same as the previous operation. This completes the second operation in stack building of bundle grain. See Diagram 4, showing first and second operations.

The next operation in stack building will take the same position as the entire first operation, which began on the foundation. Thus its first pattern bundle, taking its position half a bundle's length on No. 1, of the second operation, which is fresh before us, and lapping the other end toward the center of the stack. After this pattern bundle is laid, we remember each time to complete a cir-

Circle after circle of bundles is made around the stack until the center is made, and tied there: after which we return to the outer edge of the stack to commence another operation in stack building.

By this method we break joints, batten cracks, and

tie the rows of bundles together like a stone mason strengthens his wall, until our stack is firmly built. Now we have completed the third operation, but found it exactly like the first one built, after and on the foundation. We are now ready for the fourth.

The fourth operation will be like the second, hence we remember the shape of the bundles, and how they are used to either widen or draw the stack in, according as we desire. Also remember that the pattern bundle to start the second operation began at the extreme outer edge, in order to make and build up the sides (or form) so we place the pattern bundle with the long side up to widen and bulge the stack slightly, the same as in operation No. 2. After this pattern bundle is laid we know how to proceed to make a complete circle each time the same as before; hence naming the first ring of bundles of each operation No. 1; numbering each new operation in proper rotation until all operations in stack building are completed. Repeating this method of starting each operation with the pattern (or first) bundle half a bundle's length in from the outer edge of the stack, then secondly to the outer edge to make the form—back and forth, first one and then the other position chosen, until the stack is completely built.

Note: When the stack is bulged wide enough by the lead of the bundle's length, one should not forget to turn the bundles over with the short side up, so as to draw in, and by drawing in we make a nice, neat top on the **stack**. Thus, by repeated operations as described the stack is completed.

Note: After this method is understood and practiced awhile, one can as readily lay two rows of bundles at a time as to lay one; hence (by laying two rows or circles at a time) much speed can be added so the above knowledge and the expertness in the art of stacking will

at the same time be accomplished.

This means a saving of the grain, a saving of time, a saving of money paid out for hired help; and it means too, that the farmer may be independent of such help, which is—at best—uncertain and apt to be inefficient.

Part II

HAY OR LOOSE GRAIN.

Introduction.

In order to explain how to build a stack, it has

Diagram No. 1.

come necessary to present some diagrams or charts. In the study of Geography, we learn of the horizontal and perpendicular lines, both used in locating places on the globe, and dividing distances either east or west; north or south. As the horizontal lines run east and west on the maps, and the perpendicular lines are drawn north and south, it is convenient for us to use the same names to describe in part these simple methods of stacking and preserving both hay and grain.

See Diagram No. 1 in "Hay or Loose Grain."

N. B. In the following diagrams we place the letter "p" in connection with those letters (A, B, C, etc.) which are at the base of perpendicular lines, in order to indicate "perpendicular." A similar use is made of the "h" to indicate "horizontal."

In all stacking herein described, the letter "A" represents the center of stack from bottom to top. As most hay or loose grain is stacked or built in a rick-like form, the diagrams are drawn so as to apply to the end of the rick; this would mean either end or throughout the entire rick from end to end. (See Diagram No. 2.)

We use the perpendicular lines in our diagrams for the purpose of calculating the height, their stations for evening up points, in the averaging up of the width of the rick or stack; hence they are not only used in height but in width. For example: from "A" to "F" is 7 1-2 feet; then from F-p to F-p is 15 feet; etc.

Diagram No. 1 is drawn for the purpose of introducing the horizontal lines, only giving three perpendicular lines, A-p and F-p—F-p on either side of the center A-p.

As we have become acquainted with the "operation"—our use of it—used to describe a certain course of work accomplished, we now desire to use it in the stacking of hay or loose grain.

The horizontal lines are used to describe the amount of hay or straw placed in and where it should be placed,

and when to place it to make the work a success; hence they are numbered in rotation from 1 to 5 (see Diagram No. 1) and all are different lengths. Their positions differ, except at the center of the rick, at "A" where all balance. Diagram No. 2 shows all the lines, both horizontal and perpendicular. The horizontal lines by numbers from 1 to 5, take their places according to stations at the perpendiculars.

The perpendicular lines running up and down are

Diagram No. 2.

set 1 foot 6 inches apart, and are named alphabetically A, B, C, D, E, F, on either side, being 1 1-2 feet apart, making the stack 15 feet wide. This width would be called rather too wide in some places, while in others would be only an average width. The width and size of the stack may be gauged to any chosen size. The Diagram is only for the purpose of introducing the proper—scientific—methods for building stacks.

First notice the horizontal line, No. 1, extending from F-p to F-p, the entire width of the stack; from outside to outside. This is for the purpose of impressing an idea: that the straw should be strewn evenly from side to side, completing the stack bottom, always outlining the form of the stack or rick. This is the description of one step in stack building. New beginners in stacking should take great care to always get the straw placed evenly. Remember, if in doubt as to its evenness, for a safeguard against mistakes there may be a slight amount added to the center to make sure the outer edge is not too full.

Next notice horizontal line No. 2, which only extends as far out as E-p on either side; hence giving an illustration as to how far out a layer of straw should be placed from the center on either side. Since the position has been chosen for a layer of straw, we may proceed to spread the straw evenly as far out as the outline. The object in spreading the straw evenly is to not leave any wads or bunches, which would cause holes, or indentations, in the stack, which naturally would result in great danger of both settling incorrectly and taking and retaining the water from rainfall. This outlines and describes the second step in building stacks of Hay or Loose Grain.

The third step is like the second. The horizontal line No. 3 only extends from D-p to D-p, on either side from A-p, the center perpendicular. We notice D-p is another

chosen distance toward the center. After the outline has been determined, in mind, we may proceed to complete a layer of straw within its bounds, this time being only from D-p to D-p.

It is always found best to make a filling of each layer at the center of the stack first, then continue out as far as the chosen distance.

The next step in stack building is horizontal line "II" (No. 4), its boundary line being at perpendicular C-p, and extending to C-p on the opposite side. We now complete another layer in the same steps before outlined, after which the horizontal line No. 5, will be our next step. Its outline or boundary is at perpendicular B-p, extending only the width from B-p to B-p, showing how far out from the center A-p the straw should be placed in each step. Its outline or boundary is at perpendicular B-p, extending only the width from B-p to B-p, showing how far out from the center A-p the straw should be placed in each step of stack building. Horizontal line No. 5 shows the center filling, and it should be more full in the center at A-p than at its boundary lines at B-p on either side.

After the center is filled, at the fifth step in our stack-building, we find we have completed one operation in stacking. This is the adoption of the "Scientific Methods in stacking." Either hay or loose grain may be stacked according to the above rules.

One operation having been made complete, we notice we have completed the watershed (See Diagram No. 3.) In Diagram No. 3, each operation in stack-building is accompanied by watershed lines, showing how the stack, when built according to the "Scientific Methods of Stacking," always sheds the water.

Since we have laid the foundation, and have an idea as to why this manner of illustration is taken; also that we have completed one operation in stack-building, we

are now ready to begin another operation in building, which will be exactly like the first (See Diagram No. 2.) Beginning with the horizontal line No. 1, spreading the straw from side to side, outlining the stack, next horizontal No. 2, one point in at E-p, the next No. 3 at D-p, the next No. 4 at C-p, the next B-p No. 5, the filling of the center from B-p to B-p, completing another operation. In this manner one operation after another may be completed, the watershed lines established throughout the entire stack. This simple method of stacking makes the stack waterproof from bottom to top.

The topping out of the stack is only a drawing in at a desired height for the square, and does not interfere with the plan of the use of the horizontal lines and operations in building, but only shortens their length to suit the slope of the top.

The steep, high top is not the kind of a top desired, as it has proven more apt to tilt by winds, and is very inconvenient to build. The oval shaped top on a stack is far better, on account of its durability in storms, and also its convenience to build.

The adoption of the "Scientific Methods of Stacking" is the plan to make a stack waterproof throughout, from bottom to top. The water lines show the drainage of every operation in the building of the stack.

After each operation in this simple method of stack-building, the stack appears still to be almost level, and an observer, who does not understand this method, would think there was fully as much straw at the outer edge as toward the center. (See Diagram No. 4.) The straw being tread in, forms a greater degree of compactness toward the center than at the outer edge, hence the latter is loose and fluffy. Being webbed together, it holds the form of the stack; yet, when settled, the straw at outside droops far below that of the inner straw, and drains the water off the entire stack.

Diagram No. 3 -

The point is, the outside being not tread upon, remains unsettled during the time of building, hence naturally holds its web-work fluffed up only a short time; so we see why there appears to be as much straw on the outside as toward the center.

The builder remembers where every forkfull has been placed, and if he be in doubt at any time, there is one way to be sure of how the stack is going up, and that is to "see as the blind man sees"; the way of determining this is to walk over the straw and by its firmness or looseness find the places where more straw is needed.

This may be done at any time of doubt, and if followed will save many mistakes; such as leaving holes in the stack, or too much straw in some places. Naturally, the more evenly the straw is placed, the nicer the stack will settle and as a result a better job of stacking will follow.

Diagram-No. 4

By this plain method we provide for the drainage of the water always toward the outer edge of the stack, and by draining the water off the grain, we leave no chance for it to penetrate into the stack deeply enough

to do any damage. The wind and sun soon dries the outer edge of the stack, and the inside is always dry and fresh.

As it has been remarked for an illustration, the hair of a horse or cow is short but, since it slants downward, the water of a shower only follows the hair which slopes down and soon runs off, leaving the horse or cow dry in a very short time.

Before taking up the work any further, we wish to make plain the use of the horizontal and perpendicular lines, which will be a great benefit in stack building. We have learned their names and numbers—the perpendiculars: A, B, C, D, E, and F, alphabetically; the numbers: 1, 2, 3, 4, 5, in rotation—and why they are used, to some extent, but we will learn more to profit by their use.

Calling your attention to Diagram No. 4. This diagram is drawn to show an illustration of the denseness and amount of straw tread in at the given points. Also to give an idea as to how the straw should be built before it settles. The horizontal lines show the position of the straw while the perpendicular lines are placed in to magnify the denseness of the straw at given points.

Bear in mind the denseness of the straw should be greatest at the center of the stack; the builder making a gradual blend in compactness from center to the outer edge of the stack. The center being already compact and settled to some extent, the outside is yet unsettled. The denseness is caused by the use of more straw in the center. The outer edges of the stack will soon settle, thus mashing the straw together firmly, and while settling will droop below the inner straw and drain the water off the grain. See Diagram 5.

Not forgetting that A-p always represents the center of the stack, or rick, we notice from A-p to B-p shows the densest part of the stack, more dense at "A". Again, from B-p to C-p is slightly thinner, thus showing a less amount of straw required to be built in at this point.

Diagram No. 5—

Then from C-p to D-p is still thinner; or less compact, showing a less amount of straw required to be built in, etc., the better, so long as the outside form may be held, but one should always guard this in building. Each step from the center of the stack toward the outer edge there should be less straw filled in, and less compact in building, so as to leave the outer parts room to settle below those inside the stack. Then after the straw settles, the straw at the outer edge will droop outwardly and

thus drooping will cause the water to follow the slant of the straw, and by so doing, drain the water off the grain.

The above illustration (Diagram No. 4) shows how close the straw is built in toward the center, also that it becomes gradually thinner toward the outer edge of the stack. Yet it appears to hold its position on a level because the straw has not yet settled. Now that the building is new, the form is so webbed together as to hold its position on a level with that of the inner parts. One who does not understand the simple method of stacking here outlined, would look at a stack thus built and think there was as much straw at the outer side of the stack as there was in the center, but the builder knows where the straw is all placed.

Now that the entire stack must settle, we notice from A-p to B-p that there is not much room to settle (See Diagram No. 4). Then from B-p to C-p the straw has slightly more room to settle, and from C-p to D-p there is still more room to settle, etc. Yet the greatest space to settle is the outer edge from E-p to F-p, which is the most essential part to be sure of.

Some stackers use the outside web, altogether, for the protection and drainage for the entire stack: they fill the center as though they were dumping in a load, then shielding it by the outer edge; the dropping of the straw at the outer edge, only, being used as a safeguard. This plan is not advisable at any time. To the new beginner, I would say: Do not depend upon any such methods, but take the simple methods outlined as a whole. (See correct way of stacking, Diagram 6, the drainage being always to the outer edge. Notice the water lines, roof-like in position.) Note that at ANY height you find this perfect roof-like form of building to be the same.

Since by these simple methods of stack-building and preserving grain we have shown a correct way of stack-

Diagram No. 6.

ing. I wish now to call your attention to the wrong and dangerous ways of stacking, so often supposed to be all right, and even good, but which are not, but often deceive many farmers.

The so-called "Form without a Principle." Calling your attention to Diagram 7, we show the outside form of a stack completed, apparently the ideal type; yet in its principle of stacking it is exactly upside down, the outer edges having been carried up neatly, being tread upon, causing them to become compact and settled, while the middle of the stack has been left to be filled up as it may

Diagram No. 7-

happen, "take care of itself," as some term it; hence as the stack must yet settle, we then find, after the center has settled, that the water lines run IN, leading the water into the center of the stack. This is the cause of much of the great damage that farmers often experience. The water sinks into the stack and spoils the grain or hay. How could anyone expect his hay or grain to keep when built up in such a manner? Yet you may say: "The man, whoever he may be, built me a nice, neat looking stack." True, the stack may have a very neat

shape when finished, but this is not the question. Will the grain or hay keep? No, no, I say a thousand times NO! The moisture is what causes the hay or grain to rot and spoil, and if let into the stack, will certainly spoil the grain or hay. See Diagram 7 for illustration. Now turn the plate over top side down, and see if the stack has not been built, in principle, upside down, after it has settled. See the water lines in particular, showing the drainage toward inside instead of having thrown drainage all to the outer edge, as per Diagram 6.

We have been learning about ricks principally, for ricks are most commonly used, and have been showing the Diagrams in end views of ricks, but you will readily perceive that the principles in these drawings will apply just as well to round or oval stacks.

The drawings are as though we could see the contents of the entire rick or stack all through, from end to end, which is true according to the diagrams. One end should not differ from the other, except for a slight difference at each end which will be mentioned independently from the foregoing illustrations.

In order to get a more thorough and complete idea of how to build the ends and sides combined, and how to stack more accurately, it has become necessary to introduce another diagram in connection with the ones already in use. See Diagram 8. This diagram illustrates the entire bottom of a rick.

N. B. If round stack is preferred, the lines would necessarily take a circular position in proportion to the shape of stack desired. See round stacks, bound grain, etc.

The ends should be built with a web-like arrangement into the sides, but may be trod upon near the outer edge. When speaking in this manner in regard to the sides as compared with the ends, the ends would be like the sides, except that in a rectangular stack the sides

Diagram No. 8—

Flat Illustration of Stack Bottom.

must draw in to make a top, while the ends should be carried up full and straight.

The lines used in the Diagram 8 all lay flat on the ground, outlining the bottom of the stack. The letters: A, B, D, and F are chosen to represent the setting of corresponding perpendiculars (A-p, B-p, etc.,) thus leaving out the perpendiculars C and E, yet using the ones chosen for the purpose of locating positions. The lines in the

diagram are horizontal in position, yet only are used for a base, or setting, for the corresponding perpendiculars used; hence the line "A" running from end to end, represents the center of the rick or center setting for A-p; the letter B representing the setting for B-p; then, omitting C, we next have letter D, which is for the setting of D-p; then, omitting E, we next come to letter F, which, according to all digrams in hay or loose grain, represents the outer edge of the stack. The line across the end is for the purpose of getting an idea how close one should come to the end without breaking it out, thus making the end more compact than the sides at the outer edges of the stack. The ends need to settle slightly as well as the sides, in order to give drainage, but not as much is required as for the sides. Remember to be sure and build the end up straight; do not drain it like the sides while forming a top on the stack.

We have learned the principle of how much straw or hay, should be tread or placed in their proper places and how it should be stored in the stack.

Now, I wish to introduce you to a more quick and accurate method; holding to the knowledge we have gained of the simple methods of stacking. I wish to introduce to you the "Hurl Fork Method." This is why the above diagram has been introduced. (See Diagram 8.) Thus explaining all the secrets of quick and accurate building of stacks without doubting our own work, for we know that we cannot see how many straws are in the stack, or just where the most are. We have learned that some of the most perfectly shaped stacks have proven to be stacked altogether wrong (Diagram 7), upside down in principle, yet they appear from a distance to be the real ideal (See Diagram 6 for the ideal way and compare the two together.) The "Hurl Fork" will come to us later in the volume as we have need of it.

Drawing your attention again to Diagram 8, let "A"

line represent the center of the rick, then from A to B represents a margin over a foot in distance. From B to B, say 2 1-2 feet; then, skipping C, we find from B to D is—on each side of the rick—about 2 3-4 feet, and from D to F is 3 feet, making the stack 14 feet wide from F to F. We have learned that the straw should be more compact at the center of the stack, at “A”; and less so at the edge—F; thus giving the outer edge more opportunity to settle. The lines A, B, D and F are for the setting of the corresponding perpendiculars A-p, B-p, D-p and F-p, as introduced in the foregoing chapters. Now we are ready to commence stack-building.

Let the first load of straw or hay extend from F to F, the entire width of the stack desired to be built. This will form the outline for the size of stack wished for, laying it nicely and evenly throughout. If uncertain as to the evenness of the amount, you may feel more safe to place a little heavier layer at the center, A. Next load may be placed from E-p to E-p, spreading evenly throughout the entire circle between the above parallels. The next load or layer should be placed from D-p to D-p. (See Diagram 8 for D-p’s setting, also others mentioned.) The settings represent points on the stack for circuits for walking, except the outer one, (F-p) which should not be tread upon at any time during stack-building, but only be a form built up with a fork. The setting of D-p is as far out, commonly speaking, as one should ever tread. The next circuit of walking will be found at B-p, and the last of an operation in building at A-p, the center of stack or rick. (See Diagram 1 and 2.)

The next layer is from C-p to C-p and the next from B-p to B-p; thus after filling center we find we have completed one operation.

Note: By the use of the circuits, Diagram 8, showing the only places necessary to walk in quick stacking, much time and work may be saved.

and dependable; but to the new beginner this method possibly would not be readily understood, or its sleight learned at once; hence the simple methods adopted will gradually develop one's knowledge to the point where the whirl fork will come "handy and natural," learning its use without realizing when or how; only accepting the motto: "Learn to Do by Doing."

In order to use the whirl fork through the stack, it is always necessary that the hay or straw should be pitched in the center of the stack, thus heaping full the middle at A-p, like the topping out of a stack, only not so great a slant; then working enough loose straw to the edge by the use of the fork, to bring the edge to a level with the middle, and by the turn of the fork making a tangled mat, composing the outer form of the stack, this mat always being tangle-tied with the straw toward the center. Bear in mind the outer edge should never be tread upon, but left to settle and droop the straw to form a drainage for all rainfall.

Some men mistake what the whirl fork is used for, or how it should be used. They grasp with their fork a large wad-like bunch and carry it to the edge of the stack, placing it there to outline the form; they even tread upon it to be sure their edge is solid. By this unthoughtful manner many a loss has occurred. Placing a wad of straw at the outer edge will cause the edge to settle unevenly. Moreover, it will pack spots on the edge so it will hold its position, leaving the inner parts to settle, thus as spoken of before, the water will follow the slant of the straw and will enter the stack, causing much damage by rot; and consequently much loss. In the matter of this very erroneous method causing much loss in the stacking of grain and hay; we call your attention to the water lines, Diagram 7, for instance. Now, notice the right way, Diagram 6, and you will see plainly the difference.

Another mistake in stacking is caused by the laziness

Now, we have laid the foundation, which is the greatest part, for without a good foundation the building would be rather uncertain, as in any other instance of building. Not only has the foundation been laid, but one operation in stack-building been completed, and we are ready to begin another, which will be in like manner as the one just finished.

Beginning with a complete layer from F-p to F-p, next layer from E-p to E-p, the next will be at D-p to D-p, this being our walking circuit (see Diagram 8), and as near the outer edge as one need to tread in quick, accurate stacking. Outside of this point all straw may be placed with the scattering hurl fork, so as to form a mat, holding the form firmly together. The next step we will be at our circuit B-p, placing our straw out as far as C-p, making a complete layer from this point to the inner center of stack; This layer being complete, we may place a layer up and down the center, reaching from B-p to B-p, treading this time on what is laid, this being the center of rick from end to end.

Now that this method has been adopted, we will continue in like manner of walking our circuits and filling each operation, beginning with 1, 2, 3, 4 and 5, which are the horizontal fillings (See Diagram 1 and 2.)

THE HURL FORK.

The so-called Hurl Fork is the process of working the straw or hay from the center of the stack toward the outer edge; and by this turn of the fork always evening the outer edge. Not only making the outward form from F-p to F-p, but levelling the stack ready for more straw or hay.

Some men who are greatly skilled in stacking, adopt the whirl fork theory altogether, and depend upon it throughout the entire stacking. This is, to the scientific stacker, a remarkable way of stacking, being accurate

or carelessness of so many neglecting their work, instead of evenly scattering their hay so it will settle evenly. They push great wads or bunches here and there throughout the stack, leaving it to settle full of holes and uneven, thus leaving indentations for the water to settle in and damage the grain or hay.

As mentioned before, there is only one way to tell correctly if the stack is being evenly built—a proper amount of straw in its proper place; and that is to “See as the blind man sees.” This way may be accomplished only by treading the entire stack, except on the outer edge, which should never be tread upon until it settles of its own accord. Always remember and refer to the diagrams for amount of straw placed, and where.

The topping out is not all at once, but a gradual oval-like drawing in of the edges, a continuing of the operation of this “Scientific Method” plan until at last the top becomes a perfect mat, the joining together of the two mat edges. After the stack has once settled, wind or rain has almost NO effect.

J. H. WHITCOMB.

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