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ENSILAGE IN DAIRY FARMING.

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ENSILAGE IN DAIRY FARMING.

The following Bulletin is put out at this time, not because of the original investigation which it records, but more as an aid to those farmers who may be thinking of adopting the silo as a means of increasing the profits of dairy farming, by decreasing the labor item in the production and storing of the required food.

The present outlook for an abundant hay crop, while not positively discouraging, is not especially flattering, and I have no hesitation, after five years of practical experience with ensilage, in saying that no dairy farmer in the State can afford to be without a silo. Even on the so-called "natural grass farms" a moderate use of ensilage will prove beneficial. Now, if this is true, and I am sure that time will fully demonstrate that it is, then the more rapidly farmers adopt the system the better, and I am led to issue this Bulletin for the purpose of calling the attention of as many as possible to the matter, at a time when it is possible to take immediate steps towards guarding against a shortage in the hay crop.

There is now time to extend the acreage of corn for the silo; even as far north as Hanover we have produced good crops of fair quality when planted as late as June 10th, and certainly throughout the greater part of the State, from the first to the tenth of June would not be too late for ordinary seasons.

ADVANTAGES OF ENSILAGE.

1st. More actual food material can be produced from an acre of corn than from any other of our common farm crops. Land capable of producing two tons of hay will, as a rule, produce twenty tons of ensilage, having at least twenty five per cent. of dry substance, or actual food material.

40,000 lbs. of ensilage equals 10,000 lbs. dry matter.
4,000 lbs. of hay equals 3,000 lbs. dry matter.

It is safe to say, therefore, that three times as much dry substance may be produced from a given area of corn as from a like area of grass.

2nd. The cost of a hundred pounds of dry matter is slightly less in corn than in hay.

In our experience we have found the following figures to be substantially true:

100 lbs. dry matter in *ensilage* cost	42 cents.
100 lbs. dry matter in *hay* cost	44½ cents.

3d. Green food is especially favorable to the production of milk. The succulent pasture grass in May and June is without an equal as a milk producing food. Mangels and other roots, when fed in combination with dry fodders, are known to have a very beneficial effect, and with ensilage the same has been observed.

In an experiment, carried on at this Station, where hay and ensilage were compared, the following averages were obtained:

Ensilage ration, containing 16.45 lbs. digestible dry matter, produced 21 lbs. milk.

Hay ration, containing 16.83 lbs. digestible dry matter, produced 18.4 lbs. milk.

There are those who claim that a pound of digestible matter in one substance is as good as a pound in any and all other substances, and that succulence adds nothing to the value of a food. This I do not regard as proven by practice. In Bulletin No. 11 of this Sation it was shown that one hundred pounds of *digestible matter* in a ration made up of *skim-milk* and *corn meal* was equal to 146.6 lbs. of digestible matter in a ration *chemically identical*, but made up of *corn meal* and *middlings*. Practically, there can be no doubt that a pound of food material in the skim-milk ration was superior to a pound in the mixed grain ration, and I believe this was due largely to the favorable condition in which the digestive and assimilative organs were kept by the former ration. This being true of skim-milk, I see no season why pasture grass, roots, or ensilage, may not be likewise more valuable than dried fodders. In fact, I am convinced that foods containing a large per cent. of water keep the animal system in such tone that it is able to make better use of the food digested. The efficiency of the steam boiler is very largely affected by the deposit of soot on its flues, not that the boiler or its flues are changed, or that the combustion of the coal is less perfect, but, rather, that the heat produced by this combustion is not utilized in steam making. So, although the same amount

of food may be digested in one ration as in another, yet the physiological condition of the animal may be such that this digested matter may in one case be utilized to far better advantage than in another. The problem, then, is not one of efficiency of food so much as of efficiency of the machine, *i. e.*, the animal, and it is this animal efficiency which succulent or watery foods increase. The fact exists, that in every day practice two hundred and fifty pounds of average ensilage will fully take the place of one hundred pounds of hay, *and in most cases the milk yield will increase on this rate of substitution:*

The 250 lbs. of ensilage will contain 41 lbs. digestible matter, while 100 lbs. of hay will contain 51 lbs. digestible matter, or, 100 lbs. of digestible matter in ensilage is fully equal to 125 lbs. in mixed hay, and as the proportion of albuminoids to non-albuminoids is not essentially different, this gain must be due to the condition of the two foods.

4th. Convenience and cheapness of storing: A corn crop having been produced, it must in some way be preserved for winter feeding. "Topping the stalks," binding and stooking them, leaving the ears and butt stalks to dry out, was at one time the prevalent method, but it involved too much hand labor. Stooking the entire crop as soon as the ears are well glazed, and allowing them to dry for a month or more, husking the ears and mowing away the stalks, reduces the labor, but still there is the cost of husking, grinding the grain, etc., which, at the present period of low prices for milk and dairy products, bears too heavily on the raw material item in the problem. To "reduce the cost of production" is the great problem in agricultural progress, and it must be done by reducing the amount of human labor which enters into farm products. A system of stooking corn in large stooks and leaving them in the field until wanted for feeding purposes has been, and is practiced, to some extent, it saves labor, but wastes the crop, and is inconvenient in many ways. Curing the crop and storing is practically impossible on a large scale, since the amount or water to be dried out is very great, and the weather frequently unfavorable; in a small way it can be practiced, but the disadvantages more than offset the advantages. The silo, while not an ideal storage vault, does combine more good points and less bad ones than any method yet devised for preserving the corn crop, for the following reasons:

(a). The farmer who has a silo is about as independent of the weather as any man can be. Heavy rain, it is true, will prevent the storage of ensilage, but, aside from rain, nothing interrupts this kind of harvesting: light rain and showers, while making the work disagreeable, do not put a stop to it necessarily, and when once in the silo all danger of imperfect curing, which so often injures the crop harvested in the old way, is past.

(b). The season is practically lengthened from two to three weeks, since it is not desirable to have the corn for the silo much past the "boiling or roasting" stage, hence, a variety may be planted for this purpose, which stands no show for ripening, even one year in ten, and as the later varieties of corn are of larger growth and produce more actual food per acre, this gain is by no means unimportant in the more northern parts of New Hampshire. Again, if from unfavorable weather in May, planting is delayed, as already stated, until the first days of June, there is very little risk connected with the crop for the silo, where a crop for husking would be almost certain to be cut off by the fall frosts.

(d). The early date at which the land is cleared makes it possible to either seed down to grass or winter grain. Corn for the silo should be stored at about the same time at which corn for husking should be stooked, and as the stooked corn must dry out for about a month before husking can begin, it follows, that practically the whole of this time is gained for working the land for the next crop.

(e). The cost of harvesting, provided the crop is planted within reasonable distance of the silo, is reduced to a low point. It is true a large bulk of water has to be handled, and very much depends upon the conveniences for handling; an attempt was made to determine the lowest cost at which ensilage might be handled per acre and per ton with steam power for cutting and elevating into silo, and with an abundance of help, on a two acre field, the average distance of which was seventy rods from the silo, with the following results:

Cutting the corn in field, per acre,		$2.00
Loading and drawing to barn,		3.75
Cutting and packing in silo,		2.40
Use of engine and cutter,		1.25
Yield per acre, 15 tons.	Total cost,	$9.40
Cost, per ton,		62¾

The crew consisted of three men cutting, three helping load, three teams, and four men to run the work at the silo. With this crew 24½ tons were put in the pit in 4½ hours.

In 1884, under more favorable circumstances as to distance and location, a seven acre field of corn was harvested with the greatest economy possible, and with the following results per acre:

Cutting and stooking,	$2.16
Drawing in fodder and cribbing corn,	2.56
Husking,	5.00
Drawing corn to mill,	1.50
Grinding,	1.80
Total,	$13.02

While I do not have the exact figures as to the per cent. of dry matter in each crop, yet there was not above 6,000 pounds in the husked crop, as against 7,500 pounds in the crop put in silo. Allowing then a loss of twenty per cent. for fermentation in silo, and no loss in the stored dry fodder, there would be an equal amount of dry substance to feed out.

One hundred pounds of dry matter at time of feeding out would cost, for harvesting alone, 25 cents in the husked crop, and 15⅔ cents in the silo. Add to this the greater efficiency of the dry matter, pound for pound, and it is evident that from an economic standpoint the silo has the advantage.

It may be argued that these results are exceptionally low, but both are equally so, I think, and are fairly comparable, since the labor is charged at the same price in each.

To those who have had experience with both methods of harvesting, it will seem unnecessary to argue that a crop of corn may be disposed of quicker, with less risk on account of weather, and with less actual expenditure for labor, in the silo than in any other way.

KIND OF CORN.

The kind of corn depends upon location. A corn well adapted to southern New Hampshire might be too late for the northern part of the State. The points of importance are: 1st, to get a variety of corn that will have a large per cent. of ears fit to boil by September 5th; 2nd, to get a variety that will produce the largest possible growth, and still meet the first condition.

For a general variety for this State I know of nothing better than the Sanford corn, a white flint corn, intermediate between field and sweet corn. On good soil and with heavy manuring we have produced twenty-five tons per acre, its average product would probably be about fifteen tons. It is a leafy corn, ears heavily, keeps well in the silo, and grows very rapidly.

AMOUNT OF SEED PER ACRE.

Contrary to the practice of many, I have always believed in heavy seeding: One bushel of Southern or Western dent corn, fourteen to sixteen quarts of Sanford, and ten to twelve quarts of northern field corn per acre, have given better results than a less quantity; on poor soil I would use less, but on well fertilized land the above quantities are not excessive when planted in rows three feet apart.

THE SILO.

The day of costly silos is past, and it is this fact alone which enables the rapid extension of this system of storage. A wooden silo keeps its contents with less loss than a stone or cement one, chiefly because of the penetration of air through mortar and cement.

A silo built independent of the barn, having its own frame, roof, etc., can be built for one dollar per ton of capacity, if above seventy-five tons capacity. Contracts can be let for the construction of a one hundred ton silo, the contractor to furnish everything, for $100.00. If built in a corner of the barn the cost of material and labor will be about one-half that sum, but on most farms, where there is lumber, and where much of the work can be done by the farm help, this cost can be reduced almost, if not quite, to an actual cash outlay of $25.00.

A silo, 16x16x25 feet, will hold 100 tons. If built in a barn it will require:

40 pieces studding, 3x8, 25 feet long,	2000 feet
4 pieces, basement sills, 8x8, 17 feet long,	360 feet
Boards for inside walls,	3500 feet

The boards should not be over seven inches wide, planed on one side, and the inside course made to break joints with the outside course. Matching the boards is not only useless, but an injury. Common covering boards, free from loose knots, are good enough, and should not cost over $12.00 per thousand. In many cases the barn frame and studding can be partly util-

ized, and the above quantity of lumber be considerably reduced. A cement bottom, though not necessary, is desirable.

Don't say "you can't afford to build a silo," it is just the other way, *you can't afford to be without one.*

Don't conclude to wait until next year, build one this year, you can easily find time to do it before haying, and then when the early fall frost hits your corn crop you will have a place where it can be put *at once* and saved.

Don't waste money on a stone or cement silo—unless you want to for the fun of the thing—*a wooden one is better.*

Don't subscribe to the doctrine that ensilage is too watery to be good for anything. *Remember that bright green grass in June has more water in it than ensilage has.*

Don't plant Western corn, or Southern corn, but get some variety that will perfect the kernels and produce a good number of ears

Don't forget that you can soon double the supply of fodder by adopting this system: *more fodder means more milk, and more milk, more cash.*

THINGS TO BE DONE.

Plant two or three acres more of corn as soon as possible.

Select a place in your barn that is convenient, and see how much lumber, and of what dimensions, will be necessary.

Get the lumber, and at odd times put in a silo, and before the fall frosts come, or *immediately* after, put your corn into it; have it cut into 1½ inch lengths if you can, but if this is too much trouble pack it in whole.

To sum up: Don't throw this Bulletin aside without thinking the matter over, but consider the subject well, and build a fifty ton silo and try it, the results will convince you.

G. H. WHITCHER, *Director.*