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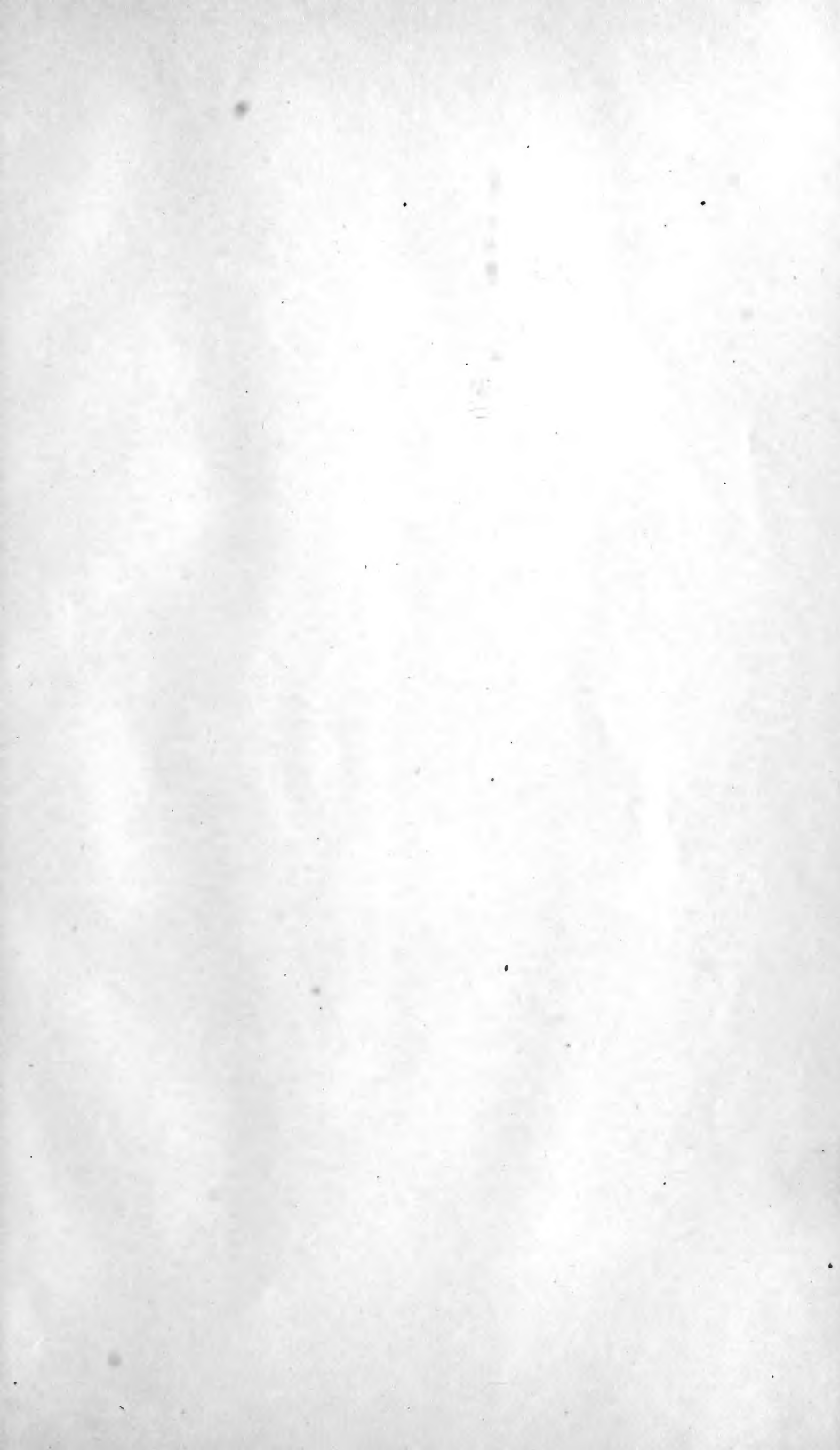
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UNITED STATES OF AMERICA.









ESSAY UPON ENSILAGE.

BY THE

AUTHOR OF THE "BOOK OF ENSILAGE."

WHAT IS A SILO, AND WHAT IS ENSILAGE AND WHAT ARE ITS ADVANTAGES?

This is what the farmers want to know when the "*New Dispensation*, or system of *Ensilage*," is presented to their attention.

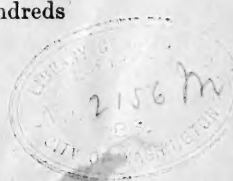
A SILO is a cistern or vat, air and water tight on the bottom and sides, with an open top, constructed of masonry or concrete. It may be square, rectangular, round or oval in shape, with perpendicular sides, used to store in their green state forage-crops, such as corn, sorgho, rye, oats, millet, Hungarian grass, clover, pea and bean vines, and all the grasses.

The structure is the SILO, which may be above ground, or partly or entirely below the surface of the ground. The fodder preserved in SILOS is ENSILAGE.

Its advantages are many and great. Its adoption means more and better stock for the farmer. It means more manure, larger and better crops. It means increased fertility and productiveness of the farms. It means saving the waste in drying forage which has so long made farming a hard struggle for a mere subsistence. It means more income, more leisure for intellectual improvement and social enjoyment. It means more comforts, carpets and conveniences in the farmer's home. It means refinement, accomplishments and pianos for the farmer's girls. It means renewed interest in farming by the boys, who under the advantages of the new dispensation will stay on the old farm. It means enjoyment and pleasure with their fine stock. It means wolf-skin robes to wrap around the girls when taking them to ride behind fine sleek colts of their own raising, while they make the winter's air jingle with the music of their sleigh bells and the echoes ring with the sound of their happy voices. It means lifting the mortgage off the old farm. It means money in the bank, and a snug sum over, to help the boy who went to the city to buy a little farm on which to regain his strength and live a life of happiness and independence, after years spent dancing attendance behind a counter or leaning over books in a hot stifling counting-room have robbed him of his health. It means a library of choice books, well read. It means a daily newspaper and two or three good agricultural papers. It means farmers' clubs, lectures and intellectual development. It means all this, and more, for as all depends upon the farmer's success, its general adoption will bring prosperity and enhance the happiness of all classes of society.

It is equally well adapted to the mechanic with one cow and one-fourth of an acre as to the dairyman or stock-raiser with hundreds of cattle.

(Billenon, Mass.
1881)



A great advance has been made within a few years in agricultural knowledge; and among the most valuable facts learned has been this, that grass contains a greater amount of nutrition when in blossom than at any time before or afterwards.

The seed formed in the head of a stalk of timothy or other grass — while very rich and nutritious in itself — does not by any means compensate for the loss which has been sustained by the stalk and leaves while the seed is forming and ripening.

What is true of the common grasses, viz.: timothy, red-top, orchard-grass, and clover, is equally true of corn, which is but a gigantic grass.

If, then, a stalk of corn contains at the time it blossoms more nutritive value than at any subsequent time, how foolish and wasteful to let it stand for the ear to form at the expense of the stalk, while at the same time great loss is going on from the leaves and the stalk, as is the case with other and smaller grasses.

Why not take and preserve the plant when its nutritive value is the greatest? when all its valuable elements are mixed and blended in an harmonious whole exactly adapted for the healthy sustenance of our domestic animals, by that Master Chemist whose handiwork as seen in the tiniest leaf is so far in advance of our most skilful combinations that we can never even hope to comprehend *how* it was formed from the original elements?

There is no doubt in my mind that there is more *available* nutrition in a *kernel* of grain when it is fully grown, before it has had time to harden, before a part of its substance has been converted into a hard tough envelope, which is almost indigestible, than at any subsequent time. This hard protecting envelope is a wise and providential provision to protect the kernel as a *seed* for future crops. Heretofore no means have been known to preserve grain except by ripening and drying, nor to cure forage-crops except by drying: since Ensilage has been proved practical, we may now harvest all our crops when they contain the greatest available amount of assimilable nutritive elements, and preserve them unimpaired indefinitely. In this view of the object of *ripening* grain, the conclusion is irresistible that the nutritive acme in corn and other grain is to be found at or before the blossoming period, as it is in the grasses.

Green grass and other forage-crops contain over 80 per cent of water; in the process of curing by drying, about 70 per cent is evaporated. Now, this 70 per cent of water carries with it a large amount of valuable nutrition. That which passes off is just what makes the difference between June butter and winter butter. If it does not lose by drying the first time, how does it happen that it loses so much by drying the second time, after being wet? The *wetting* does not injure the forage, else cut feed would be injured by being sprinkled, and steaming fodder would be utter ruin. It is the *drying*, after the wetting, that robs the forage of its value. The water which is dried out of the forage leaves it in the shape of *hay-tea*, and the first "drawing" is the strongest.

When Ensilaging my corn-fodder, in fall of 1879, many farmers and others came to see the process of filling the Silo with the

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green corn-fodder; nearly all declared that it would spoil, mould, heat, and rot. Several said, "I guess you will have a fine lot of manure before winter."

This kind of talk had been going on for several days, and was, I confess, getting to be rather monotonous. So one day, while a number of well-meaning but incredulous neighboring farmers were present, I made up my mind I would convince them that the green corn-fodder would *keep* instead of rotting: therefore I said, "You think it will heat and spoil, do you?" "Yes, I am afraid it will," said they each and all. "Now, I tell you it won't do any such thing." "Why won't it? what makes you think so?" they asked. Said I, "Why doesn't a pile of horse-manure heat when it is left in the stable all winter under the feet of the horses, until it gets three or four feet deep? Why doesn't sheep-manure heat when it is left all winter in the sheep-folds, and becomes a foot and a half to two feet deep?" "Because it is *trod down* so solid the air can't get into it." "Just so! that is the reason this corn-fodder won't heat and spoil: it is 'trod down' so solid that the air cannot get into it," I rejoined. This was rather a staggerer. "Is there anything which is quicker to heat when it has a chance than horse or sheep manure?" I asked. "No-o-o," they reluctantly admitted. "Now, see here," said I, "haven't you all noticed in the spring, when you were getting out your hog-manure, that you often came across, in the bottom of the yards, buried under the manure, potato-vines and weeds which had been thrown into the hogs the fall before, that were just as green and fresh as when they were first pulled out of the ground?" They all replied, "Yes, we have."

"Well," said I, "my Ensilage will keep just the same way. I trample it down solid as it is put in the Silos, and put about a foot in depth of cobble-stones or boulders upon it, which will press it as solid as a cider press. No air can then get in. The air and gases already in are continually being forced out by the weight. Therefore it cannot heat any more than the horse and sheep manure can when it is trodden down compactly." They were silenced.

My explanation why it keeps, is this:—

When it is packed closely and trodden down ever so vigorously, still there is some air left in the little spaces between the pieces of the stalks; and the dried leaves, if there are any, are full of air which has taken the place of the sap which has evaporated. The oxygen in this amount of air—be it greater or smaller—immediately starts a fermentation. Fermentation, mould, decay, rot and fire are all identical. The only difference is in the degree of speed with which the combustion goes on. They all alike depend upon the presence of oxygen, and cease when this active agent of destruction is removed. The process of combustion, whether slow or rapid, consumes oxygen, and gives out carbonic acid gas.

This fermentation consumes the small amount of oxygen which is contained in the mass of Ensilage, and liberates an amount of carbonic acid gas which takes the place of the oxygen. The fermentation in its incipient stage is arrested for want of oxygen. None can get in from the top; for the compression which is con-

stantly going on is all the time forcing the gases out, and where there is ever so slight a flow *out*, none can possibly flow in. Then, as the carbonic acid gas is heavier than the atmosphere, the sides and bottom of the Silo being tight, and as the carbonic acid gas cannot leak out, the air cannot get down into the space occupied by the carbonic acid gas, any more than air can get down into a jug filled with water or other heavy liquid until the water or other liquid is poured or leaks out. *The Ensilage is thus immersed in a bath of carbonic acid gas.* Fermentation under such circumstances is an impossibility.

CHEMISTRY OF THE SILO.

THAT important chemical changes take place during the curing of green forage plants by the system of Ensilage cannot be doubted. I believe there is a formation of acetic acid to a greater or less extent in *all* cases, and that the acetic fermentation is the first change which takes place. There can be no saccharine fermentation until after acetic fermentation takes place. I doubt its being a saccharine fermentation at all: it is rather a transformation.

I understand the changes to take place as follows: the oxygen of the air in the mass acting upon the sugar in the plant converts that sugar (in corn about 11 per cent) into acetic acid; the acid acts upon the starch (in corn about 56 per cent), and converts it into grape-sugar, or glucose, in much the same manner as sulphuric acid acts upon the corn in the manufacture of glucose. The next stage of fermentation is the conversion of the grape-sugar, or glucose, into alcohol, which, being very volatile, passes off into the atmosphere. Then, and not until then, does real putrid fermentation or decay begin. The previous stages are metamorphoses or changes from one form to another of the elements of nutrition.

If the above is correct, the presence of acetic acid, or sourness, so far from being an injury, is a positive benefit; for without the acid *the starch, which is hard to digest, could not be converted into sugar, which is easy to digest.*

ANALYSIS OF ENSILAGE FROM THE "WINNING-FARM" SILOS.

By C. A. Goessmann, Ph.D.

Professor of Chemistry, Chemist to the Massachusetts State Board of Agriculture and State Inspector of Commercial Fertilizers.

The sample of Silo corn (Ensilage) consists of:—

	PER CENT.
Moisture at 212°-220° Fahrenheit	80.70
Dry matter left	19.30 100.00

This dry matter consists of:—

	PARTS.
Crude cellulose	6.43
Fat ether abstract	0.62
Albuminoids	1.56
Non-nitrogenous extract matter	8.92
Ash (with traces of sand)	1.77 19.30

Also an average analysis of the corn-plant in the milk:—

	PER CENT.
Moisture at 212°-220° Fahrenheit	85.04
Dry matter	14.96 100.00

	PARTS.
Ash	0.82
Albuminoids	0.86
Fat	0.26
Crude cellulose	4.53
Non-nitrogenous extractive matter	8.49
	14.96

By comparing the two tables it will be seen that the Ensilage contains over 29 per cent more dry matter than the whole plant in the milk; over 41 per cent more of crude cellulose; over 138 per cent more of fat; over 81 per cent more albuminoids; over 5 per cent more of non-nitrogenous extract matter; over 115 per cent more ash (or mineral constituents).

It will also be seen that the nutritive ratio of the Ensilage is one part of albuminoids to $6\frac{1}{10}$ parts of non-nitrogenous extractive matter (digestible carbo-hydrates). This makes its nutritive ratio a little better than timothy hay, which is, according to Dr. Wolff, 1 to $8\frac{1}{10}$, but not quite as good as average clover hay, which is 1 to $5\frac{9}{10}$. By this analysis corn Ensilage would seem to be much nearer a perfect food than I have supposed. To have a perfect food rye and clover should be ensilaged together in May, and corn, millet, clover, aftermath, pea and bean vines in the fall; by mixing them together a well balanced food is obtained, which will keep animals in good condition without feeding grain.

I shall institute a series of experiments to test the correctness of this analysis; for, however satisfactory a chemical analysis may be, the real touchstone is the *feeding value* demonstrated by careful and repeated experiments.

What farmers want to know is not what an article of food is worth *chemically*, but how much it is worth *to feed to their stock*.

Chemical analysis of green forage and of Ensilage cannot be depended upon to determine their feeding value, for no account is taken of the loss in drying which is the first step in analyzation. As explained above, the water as it is evaporating carries with it the most valuable elements of nutrition. *There is a loss whether the drying takes place in the field or in the laboratory of the chemist.* When chemists give us an analysis of Ensilage or of green forage in comparison with an analysis of hay or other dry forage, they are not really giving us an analysis of Ensilage or of green forage at all, but one of Ensilage or green forage which *has been dried at a temperature of 212° in the laboratory to compare with an analysis of forage dried in the field.*

It is because they have not taken into consideration the loss which ensues while they are drying samples for analysis that they can give no good reason why it is, that in practice animals thrive so much better than upon the same amount of forage which has been dried; they find by analysis no great difference between green grass and well-cured hay, and therefore assume that there is none.

They assume that the reason why it takes a less amount of Ensilage to nourish an animal than it does of green forage fresh from the field is because the Ensilage has lost a part of its water while lying in the Silo, ignoring the *fact* that in properly constructed Silos it does not lose any weight. This is proven in three ways by me: first, the plank covering is always dry, small wedges inserted

between the plank do not become any tighter, showing that the planks do not swell; secondly, when the temperature is 20° below zero there is no signs of frost around the cracks between the plank covering, which would certainly be manifest were there any evaporation going on; thirdly, I have weighed the corn-fodder into the Silo and weighed it out, and find that there is a loss of not exceeding one per cent., which is easily accounted for by evaporation while the forage is being cut and put into the Silo. When they accept this *fact* they will then, perhaps, be able to show that 60 lbs. of Ensilage is equal in feeding value to 100 to 120 lbs. of fresh corn-fodder on account of something else except the conversion of starch into grape sugar by the action of acetic acid.

The true test is, will the cattle EAT and THRIVE upon it?

My experiments thus far satisfy me that the value of corn-fodder is doubled by the softening and fermentive process which it undergoes in the Silos; that two tons of it are worth more to feed than four tons of corn-fodder fresh from the fields, or one ton of best timothy hay.

I received the above analysis the last of April, and at once resolved to test it by experimentation. I selected two thoroughbred two-year-old Jersey bulls, and weighed them. "Rossmore" weighed 960 pounds, "Hero" weighed 890 pounds. "Rossmore" was fed 40 pounds of Ensilage daily, and *nothing else*. "Hero" was fed 40 pounds of Ensilage and three pounds of wheat-bran daily, and *nothing* more. June 2 I weighed them again, and found that "Rossmore" weighed 960 pounds, having neither gained or lost; showing, so far as one experiment could, that 40 pounds of Ensilage, containing over 80 per cent of water, was sufficient to sustain in a healthy condition the functions of the animal system, and replace the waste tissue. His hair was smooth, he appeared to be satisfied, and Sylvester thought he was gaining. "Hero" at this time weighed 943 pounds, being a gain of 53 pounds in 34 days, or $1.55\frac{1}{2}$ pounds daily: as it took the 40 pounds of Ensilage to sustain the animal, it follows, that 102 pounds of wheat-bran, fed with the Ensilage, produced 53 pounds of beef (live weight).

THE NUTRITIVE VALUE OF ENSILAGE.

That it is a highly nutritious food is proven by the fact that my cows, fed upon it during the winter, brought me very fine, large, strong calves,—upon their feet and sucking almost as soon as dropped. My Vermont Merino ewes sheared upon an average 9 pounds of wool, which I sold for 30 cents a pound at home. They also brought fine, strong, vigorous lambs. The lambs were sired, part of them, by a pure Cotswold ram, and the balance by a pure Oxford down ram. They weighed, when born, from 6 to $12\frac{1}{2}$ pounds each. Some of the Merino ewes bore twins weighing $17\frac{1}{4}$ pounds. My Cotswold ewes did equally well, bringing lambs weighing from 10 to $15\frac{1}{2}$ pounds each when born.

Some of my Cotswold ewes sheared as high as 16 pounds of wool. The whole flock averaged 11 pounds 7 ounces.

My Oxford downs averaged over 12 pounds of wool each. The weight of lambs and of fleeces given above proves that no food

could be better for sheep. I have never seen young cattle and calves grow as rapidly in summer upon good pasture as they do in winter in a warm stable and fed upon Ensilage and oil-meal. The mixture is easy to digest; the animal does not have to work for it; there are no flies to annoy; there is nothing to do but to grow.

I believe colts can be brought forward to maturity in less than two-thirds of the time required to raise them upon summer pasture and the usual winter food, and at less than one-half the cost, if fed upon corn, millet and clover or field peas ensilaged together. See extracts from letters of C. W. Garrett and Otis Bisbee, page 13.

METHOD OF FEEDING, WARM WATER FOR STOCK, ETC.

In the fall of 1879 I had three yearling steers come down from New Hampshire, where they had been at pasture, "spring poor," as the saying is,—grade Jerseys and a native. They were very thin,—so reduced in flesh that I thought it very doubtful about their living through the winter. From their return, Oct. 15 until Dec. 3, I tried, with the best of hay, roots, and grain, to make them gain, but with no perceptible success. On December 3d I commenced to feed them with Ensilage and a small quantity of wheat-shorts and oil-meal. I gradually increased the ration, feeding no more than they would eat up clean. They soon began to gain; their hair looked better; they handled better. The improvement, at first slow, rapidly increased until, on the ninth day of March, I sold them for beef. Upon being slaughtered the next day, they dressed 1,486 pounds.

On the 12th of October, 1880, I opened my Silo, which was filled the preceding month. The Ensilage was found to be perfectly preserved,—in color a much darker green than my Ensilage of the previous year,—owing to the corn being packed in the Silo in a younger and more succulent stage.

My method of feeding is as follows: I remove from the Silo 50 pounds of Ensilage (about one cubic foot) for each grown animal daily, mixing one-pound of oil-meal and wheat bran to every 10 pounds of Ensilage. I have a large box standing upon the barn floor, in which I mix it and let it stand about twenty-four hours before feeding. By that time it is quite warm: the grain addition has had time to become soft, and its digestibility is undoubtedly increased to a greater degree. There is in every 50 pounds of Ensilage about 40 pounds of water,—nearly all the animal requires. It is a great advantage to have this amount of water *warm* when taken into the stomach. There has been no labor or fuel expended in warming it, which is quite an item. When animals are allowed to drink ice-cold water in winter, there is quite a large percentage of the food which would produce fat consumed in raising the temperature of the water they drink from freezing cold to blood heat.

When I opened my Silo, Oct. 12, 1880, I weighed 20 head of stock, and commenced to feed them upon the Ensilaged corn. They were all quite thin, having been upon a very poor pasture all summer. They could by no means be called a thrifty lot of cattle, or one from which we could confidently expect much gain.

The age, breed, and condition of each is given in this table, as well as their weight at different periods.

	DESCRIPTION.	AGE.	WEIGHT IN POUNDS.	WEIGHT IN POUNDS.	WEIGHT IN POUNDS.	WEIGHT IN POUNDS.	CONDITION.
			October 12.	November 15.	December 15.	January 4.	
1	Grade Jersey, in milk, fair condition, -	14	1,047½	1,052½	1,040	1,060	Fair.
2	Jersey cow, 7 months in calf, fair condition, -	15	945	967½	1,020	1,050	Good beef.
3	Jersey cow, calved Oct. 24 (calf weighed 65 lbs.), since which she has given 14 to 16 quarts of milk daily, -	4	1,000	875	940	950	Fair.
4	Grade Hereford, thin condition, -	2	790	890	965	990	Fair, 1,015 lbs. Extra beef.
5	Native heifer, fair condition, -	2½	925	927½	970	970	Good.
6	Native cow, due in February, very thin, -	15	900	925	1,000	1,035	Fair beef.
7	Jersey bull, thin, -	4	1,205	1,250	1,290	1,330	Fair.
8	Jersey heifer, fair, -	10 mos.	345	365	435	435	Fair.
9	Jersey cow, thin condition, due in Jan. -	4	750	780	830	825	Good.
10	Jersey and Ayrshire heifer, in milk, thin condition, -	2	715	730	812½	Sold.	-
			October 18.				
11	Grade Jersey, very thin condition, -	2	620	682½	755	795	Good beef.
12	Native heifer, due in Jan., fair condition, -	2	900	922½	1,015	Calved.	Good beef.
13	Jersey heifer, thin condition, -	1½	490	520	580	625	Fair.
14	Grade Jersey heifer, fair condition, -	6 mos.	280	300	350	350	Good.
15	Grade Jersey heifer, very thin condition, -	2	550	612½	695	730	Good beef.
16	Grade Ayrshire, very thin condition, -	1½	570	640	700	725	Good.
17	Jersey bull, very thin condition, -	2	950	1,005	1,075	1,080	Fair beef.
18	Jersey bull, very thin condition, -	2	880	960	1,042½	1,097½	Fair.
19	Jersey bull, thin condition, -	6 mos.	190	210	240	Not weighed.	Fair.
20	Native heifer, in milk, thin condition, -	2	730	745	810	810	Sold for 6c. d. wt. Slaughtered.
21	Jersey calf, dam No. 3, born October 24, weight at birth 63 pounds, -	-	-	90	140	170	Fair.

From the beginning there was fed to the 21 head, up to January 4th, 1881,—

91,306 pounds Ensilage,	@ \$1.50 per ton,	\$68.48
4,850 " cotton seed meal,	@ 25.00 " "	60.62
2,490 " wheat bran,	@ 18.00 " "	22.41
2,990 " malt combings,	@ 12.50 " "	17.62
Total cost of keeping,		\$169.13
Cost per day, per head,		9½c.
No. 3 has given since Oct. 26, 71 days,	988 quarts milk,	
Cost of Jersey milk per quart,		9½ mills.
Total gain on the 21 head,	2,352½ pounds.	
Gain per day,	29.04	"
Gain per head,	112.00	"
Average gain per head per day,	1.33½	"
Greatest gain per day,	2.78	"
Greatest gain per head,	217½	"
No. 4 being weighed Jan. 17 was found to have gained	225	"
During the first 33 days she gained	100	"

In the above the value of the manure is calculated to pay for the care and attendance.

These results are not guess work, but are correct, everything being carefully weighed upon Fairbanks' standard scales.

The gain in weight, however satisfactory under the circumstances, does not convey an accurate idea of their real improvement. It is a well-known fact that there is a much larger proportion of water in a poor animal than in a fat one. The first change which takes place when fattening begins is a decrease in the amount of water contained in the tissues of the animal; and the increase in fat, however considerable, does not always make up for this loss of weight.

It is the opinion of all who inspected the above animals at the beginning of the experiment, as well as since Nov. 15, that the increase in weight does not equal the improvement in the quality of the beef. It should also be borne in mind that the season is the most unfavorable for gain, being at the commencement of cold weather, when cattle generally shrink in weight.

I am feeding my store hogs upon about 8 pounds of Ensilage and one pound of middlings, to each animal weighing over 200 pounds. They are doing well, and the cost does not exceed two and one-half cents per day. Clover preserved by Ensilage would be excellent, and require no grain added to it. Poultry of all kinds eat it greedily. No hen fancier should be without a small Silo in which to preserve green food for his fowls if he wants eggs in winter, or to keep his fowls healthy.

I feed it occasionally to my work and driving horses. It has as good an effect as an occasional feed of carrots or other roots.

In taking the Ensilage out of the Silo it is not necessary to replace the weights, neither does the Ensilage require to be protected from freezing. There is sufficient starch, sugar, and alcohol to keep it from freezing. Neither does the summer's heat affect it. From April 15 to the 6th of June, 1880, I fed only three animals from Ensilage which was not protected from the air. I frequently left some portion of the surface of the mass undisturbed for four days, at the end of which time it was warm to a depth of about four

inches, and a white mould began to appear on the outside; all was consumed, however, with the greatest relish. Out of all the Ensilage that I have preserved not one-half of one per cent has been wasted.

HOW TO RAISE THE MAXIMUM CROP OF FODDER CORN.

A great amount of labor is lost by sowing fodder corn too thick, as well as a large amount of seed wasted. Many sow three bushels to the acre; some sow but two bushels; and a few sow but one. I sow but one-half bushel, and my corn is always too thick. The man who has raised the largest crop the past season sowed but 12 quarts of seed to the acre. Make the drills at least four feet apart, and sow one-half bushel of Mammoth Ensilage seed-corn to the acre; then, when it is about a foot high, thin it to 6 and 8 inches between stocks, and I can assure you, with a good corn season, if the land is suitable for corn, is well manured and given frequent cultivation, a crop weighing from 40 to 75 tons to the acre. When corn is planted too thick, those plants which do not attain their full growth are nothing more than weeds. As dirt is only matter out of place, so a weed is only a plant out of place. No plant is so far out of place as when it is crowded by other plants of the same kind so that its growth is impaired: it then becomes a mere weed, and only serves to injure the growth of the proper number of plants in the hill or drill.

The possibilities of Ensilage can hardly be over-estimated. When I said in the first edition of the "Book of Ensilage" that 40 to 75 tons of green-corn fodder could be raised upon an acre of land provided proper seed was used, sufficient manure was applied, and the right kind of cultivation bestowed, many doubted, and some ridiculed the statement; "but he laughs best who laughs last;" and I am happy to be able to state that J. G. Wolcott, who procured his seed corn of me, has raised corn-fodder this year weighing at the rate of 72 tons to the acre, and that his whole crop averaged over 50 tons to the acre. Some of the stalks were 19 feet 6 inches tall, and weighed 12 pounds each. Several others report for the same seed crops varying from 45 to 75 tons per acre. With such crops from 4 to 7 cows can be kept throughout the year upon an acre of land, provided a small ration of grain be fed daily while in milk. A very ordinary crop will keep two cows to the acre. Do not fail to read the following extracts from letters received from well-known gentlemen, whose experience corroborates my statements and are a valuable portion of this essay. I have not done as well as many of these but it should be borne in mind that I am experimenting upon an old, run-down farm, which, in 1877, could keep but 6 cows and one horse. I had in my barn (Dec. 1, 1880) sufficient hay to keep 6 horses and Ensilage in my Silos ample for the sustenance of 40 head of horned cattle, nearly 200 sheep, and 60 swine. I may state, also, that during the past three years, I have bought no hay or manure. This much Ensilage has benefitted me; and there is no reason why it should not benefit every farmer in like manner. That it may do so, is the earnest wish of my heart.

Very respectfully,

JOHN M. BAILEY.

READ WHAT IS SAID OF ENSILAGE,

And the success of those who have followed my directions.

"I beg to express my gratitude to you for the noble efforts you are making in behalf of the cause of agricultural science. Ensilage is to prove a great blessing to the world. . . . I am very glad that you have given us the results of your experience in so neat a volume and in so clear a manner, that *he who runs may read.*"—MARSHALL P. WILDER.

"A work of incalculable importance to American farmers."—LEVI STOCKBRIDGE, *President Massachusetts Agricultural College.*

"A valuable contribution to our progress in rational stock feeding."—C. A. GOESSMANN, PH.D., *Professor of Chemistry, Amherst College.*

"I have been greatly interested in the book."—EDWARD ATKINSON.

STATE OF NEW JERSEY, DEPARTMENT OF STATE,
TRENTON, N. J., July 6, 1880.

My Dear Sir,—I consider the subject of Ensilage of the utmost importance, and trust your book will be widely read.

Yours truly, HENRY C. KELSEY.

Ex-Gov. Talbot, of Massachusetts, writes:—

DR. J. M. BAILEY : BILLERICA, Aug. 3, 1880.

Dear Sir,—I have been watching the results of your experiments in preserving green food for stock, for winter use, with great interest.

If you can demonstrate to them that your method of preserving this cheap food is half what your experiments promise, you have done a great and noble work, not only for the agricultural interests of New England, but for all interests upon which depend the prosperity of our Commonwealth.

Very truly yours, THOMAS TALBOT.

Ex-Gov. Price, of New Jersey, writes:—

RAMSEY'S, BERGEN COUNTY, N. J., Nov. 27, 1873.

My Dear Sir,—I have no doubt that the preservation of corn stalks green for winter fodder will soon become the great resource of our farmers.

Mr. Bailey is to be congratulated upon giving the first public exhibition of Ensilage, which promises such important changes.

I am, with great respect, your obedient servant, RODMAN M. PRICE.

DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C., July 28, 1880.
JOHN M. BAILEY, ESQ., "Winning Farm," Billerica, Mass.:

Sir,—I return you my hearty thanks for the beautiful copy of *The Book of Ensilage*, with which you have honored me. I admire the zeal and energy with which you have striven, amidst doubts and prejudices, to introduce it among us, and congratulate you upon the measure of success which has already attended your praiseworthy efforts.

Respectfully, E. A. CARMAN, *Acting Commissioner.*

Hon. Benj. P. Ware, says in an address before the State Grange :

The experience of these gentlemen (naming several who have built Silos after my plan) seems to prove that when proper care has been taken success has followed. One acre of land by this system will winter 6 to 8 cows. It is perfectly practicable, and cannot fail of success if carried out in a careful and judicious manner, without which no man can succeed in anything.

BENJ. P. WARE.

J. M. BAILEY, ESQ. : LAKEVIEW, ERIE CO., N. Y., Jan. 28, 1881.

Dear Sir,—I think your book will do much good and cause many to build Silos. Ensilage is destined to work a great change in animal agriculture.

It will enable the farmers of New England to renew their worn out farms. By its service New England may produce her own meat of every kind. I think 200 ton Silos can be built of concrete complete for \$300.

I believe Ensilage will fatten as fast as the best of pastures when a variety of grasses are used.

Truly yours, E. W. STEWART.

DR. JOHN M. BAILEY :

RANDOLPH, VT., May 14, 1880.

Dear Sir,—Gen. Thomas and myself enjoyed our visit to "Winning Farm" very much; we hope to repeat it some time when you have not only settled Ensilage, but several other important things for agriculture. It promises much for the future when such men as yourself are giving their time and means to so valuable an end, J. B. MEAD, *Supt. Agr. for Vt.*

COMMONWEALTH OF VIRGINIA,

Department of Agriculture, RICHMOND, Aug. 13, 1880.

DR. JNO. M. BAILEY :

Dear Sir,—I am much pleased with the Book of Ensilage.

Yours truly, THOMAS POLLARD, *Commissioner.*

From the author of "Walks and Talks."

"MORETON FARM," ROCHESTER, N. Y., July 30, 1880.

DR. J. M. BAILEY :

Dear Sir,—I thank you for your *Book of Ensilage*. I have read it through with great interest. It is a very valuable and *instructive* book. You are a charming and enthusiastic writer. Respectfully, JOS. HARRIS.

DR. JOHN M. BAILEY :

ANTRIM, N. H.

Dear Sir,—I am highly pleased with your *Book of Ensilage*. I think it must work a revolution in Eastern agriculture. Farmers' sons and daughters will be satisfied to stay on the old homesteads in New England.

Truly yours, D. H. GOODELL.

JOHN M. BAILEY, ESQ. :

SOUTH FRAMINGHAM, May 1, 1880.

Dear Sir,—I am glad you are calling attention to Ensilage, and I have been reading accounts of your system with interest.

Very truly, E. LEWIS STURTEVANT.

BROOKLYN, N. Y., Feb. 2, 1881.

Dear Sir,—I have read your "Book of Ensilage." It is more interesting than a novel.

Yours respectfully, T. MILLER.

DR. J. M. BAILEY, "Winning Farm:" WASSAIC, N. Y., Aug. 2, 1880.

Dear Sir,—I am in receipt of the *Book of Ensilage*; and am much pleased with it. . . . When at "Winning Farm" last April I was so fully impressed with the value of Ensilage that I resolved to try it myself. Therefore I put in eleven acres of corn fodder; the last of June I built me a Silo of concrete 50 feet long, 12½ feet wide and 16 feet deep. With many thanks for the courtesy shown me while at "Winning Farm," I am, very respectfully,

JAMES S. CHAFFEE.

MR. BAILEY :

WEST HANOVER, N. H., Jan. 2, 1881.

Dear Sir,—My Silo opened all right. Cows eat the Ensilage greedily.

Yours, J. H. BURRELL.

DR. J. M. BAILEY :

WHITINSVILLE, MASS., Jan. 26, 1881.

Dear Sir,—I must say that I think your book gives much instruction which will be useful to any one who wishes to try the experiment of preserving green fodder for animals. I had so much confidence in it that I have built two Silos which will hold 500 tons. I commenced feeding last week. I can see the quantity of milk increases by feeding the Ensilage. I think well of the Mammoth Ensilage Seed Corn. Yours truly, J. C. WHITIN.

McDonough's Institute, BALTIMORE Co., MD., Aug. 2, 1880.

DR. J. M. BAILEY :

My Dear Sir,—I have read your book with much interest. It contains much valuable information and will do good. Yours truly, W. ALLEN.

Early in the spring of 1880, D. H. Burrull, of Whitman & Burrull, Little Falls, N. Y., spent a day at "Winning Farm," perfecting plans for their Silos; later he writes as follows:—

Dear Sir,—I have received the *Book of Ensilage*, with which I am greatly pleased. I have my Silo, 56 feet long, 16 feet wide and 20 feet deep, completed, and have ten acres of the finest corn growing I have ever seen. . . .

Yours truly, D. H. BURRULL.

DOCTOR BAILEY: WALTHAM, MASS., Jan. 11, 1880.

Dear Sir,— . . . To you belongs the credit of bringing this important improvement before the farmers of America. A. B. BERRY.

FELCHVILLE, VT., Jan. 18, 1881.

My Dear Doctor,—Enclosed find check for Mammoth Ensilage Seed Corn. . . . A word about Silos. I opened mine on the 16th instant; I don't know whether it is well preserved or not, but the cows will eat it in preference to best timothy or clover hay I cut, and there is a noticeable increase in the flow of milk. Yours, etc., S. B. PIERCE.

DR. BAILEY: HOLLISTON, CAL., Dec. 31, 1880.

Dear Sir,—I have built a Silo after your plan and filled the same with corn fodder, which is all right. Stock of all kinds eat it with the greatest relish. I am feeding 10 head of 4 year old steers, each eating 60 lbs. per day, and they are doing finely. I shall want some of your corn to plant next season. . . . Yours truly, JOHN W. GREEN.

DR. J. M. BAILEY: POUGHKEEPSIE, N. Y., Jan. 26, 1881.

My Dear Sir,—One thing I have been rather surprised to find, and that is that my horse kept on Ensilage for two months, with a daily allowance of five quarts of oats, two quarts of corn meal and two quarts of wheat bran, has never before been in so good spirits as he is now, and I can't discover any failure in endurance. He has eaten in the time not a particle of hay. I wish you to save for me 2½ bushels of the Mammoth Ensilage Seed Corn. Yours truly, OTIS BISBEE.

LITTLETON, HALIFAX Co., N. C., Dec. 16, 1880.

DR. J. M. BAILEY, *Billerica, Mass.*:

Dear Sir,—Presuming you will recollect our meeting on the boat between Baltimore and Norfolk, Va., in August last, I will state the result of our conversation, and the perusal of your "Book of Ensilage," caused me to make the experiment, and, I am pleased to add, with entire success. I built two Silos, 15 ft. long, 12 wide and 8 deep each, and filled them, mixed all through with pea vines $\frac{2}{3}$, corn and pearl millet together $\frac{1}{3}$. This was done in September; after settling, was refilled about Oct. 15. The 7th of November I opened one of them and found the contents in fine condition, my stock, horses, mules and cows eating it readily, and I have fed them no other long forage since I opened it. I have been working my mules and horses as usual; and they have greatly improved in flesh since I have been feeding Ensilage. Very truly yours, C. W. GARRETT.

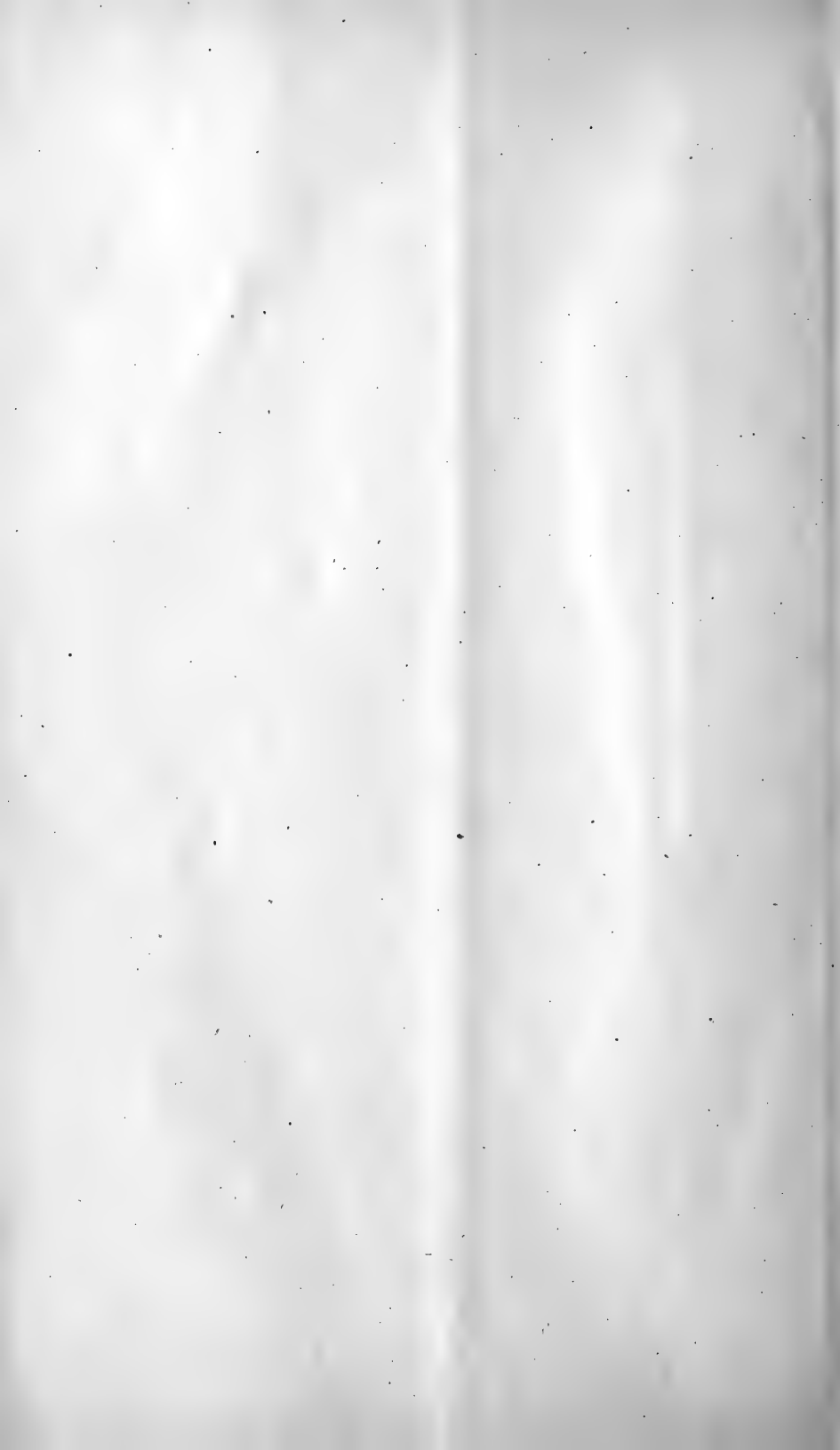
DR. BAILEY: ALEXANDRIA, ALA., Nov. 28, 1880.

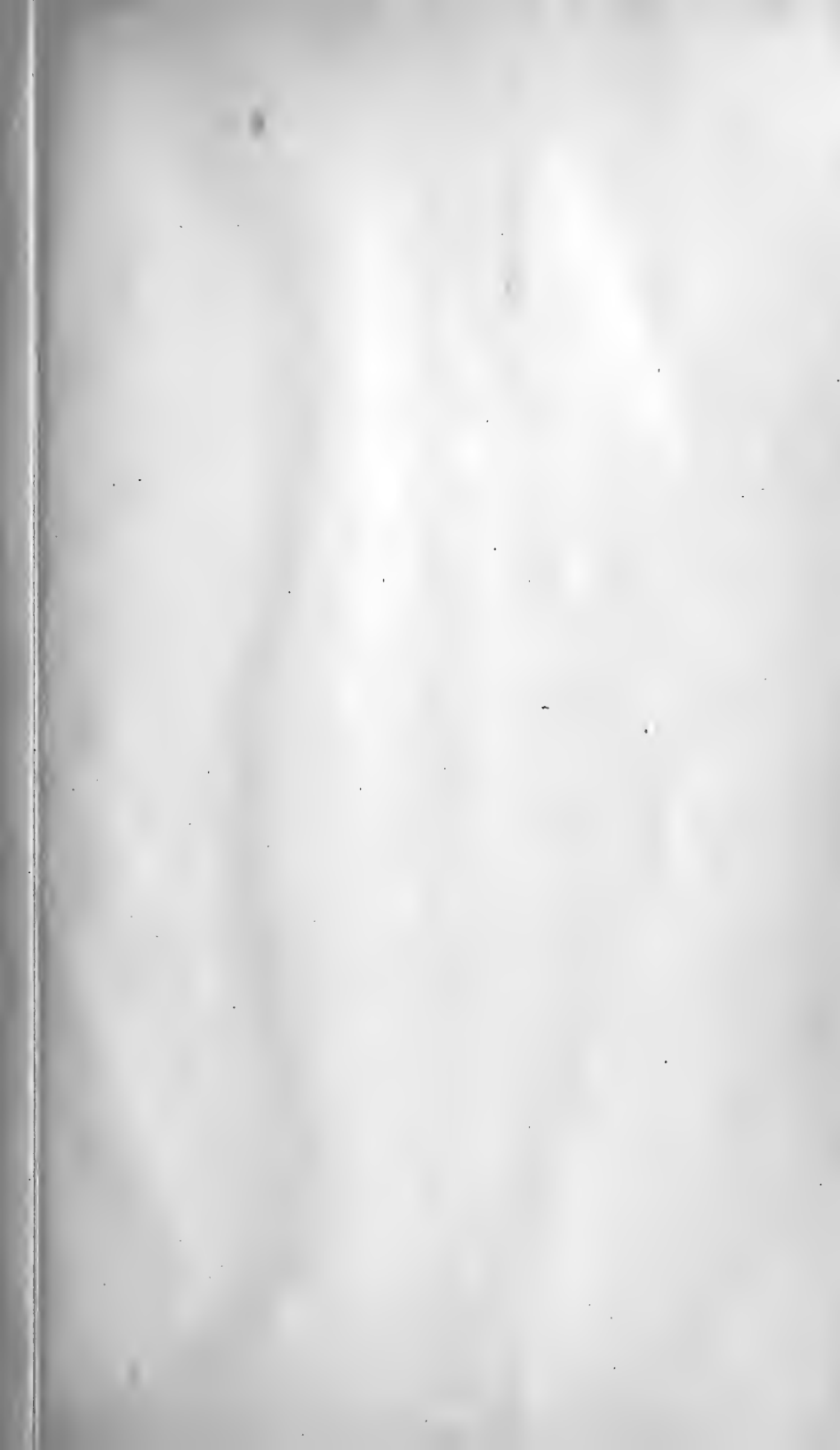
Dear Sir,—We opened one of our Silos the middle of October, and have been feeding regularly since. We find the Ensilage better than we expected. The pea vines kept well in the Silo and make excellent food.

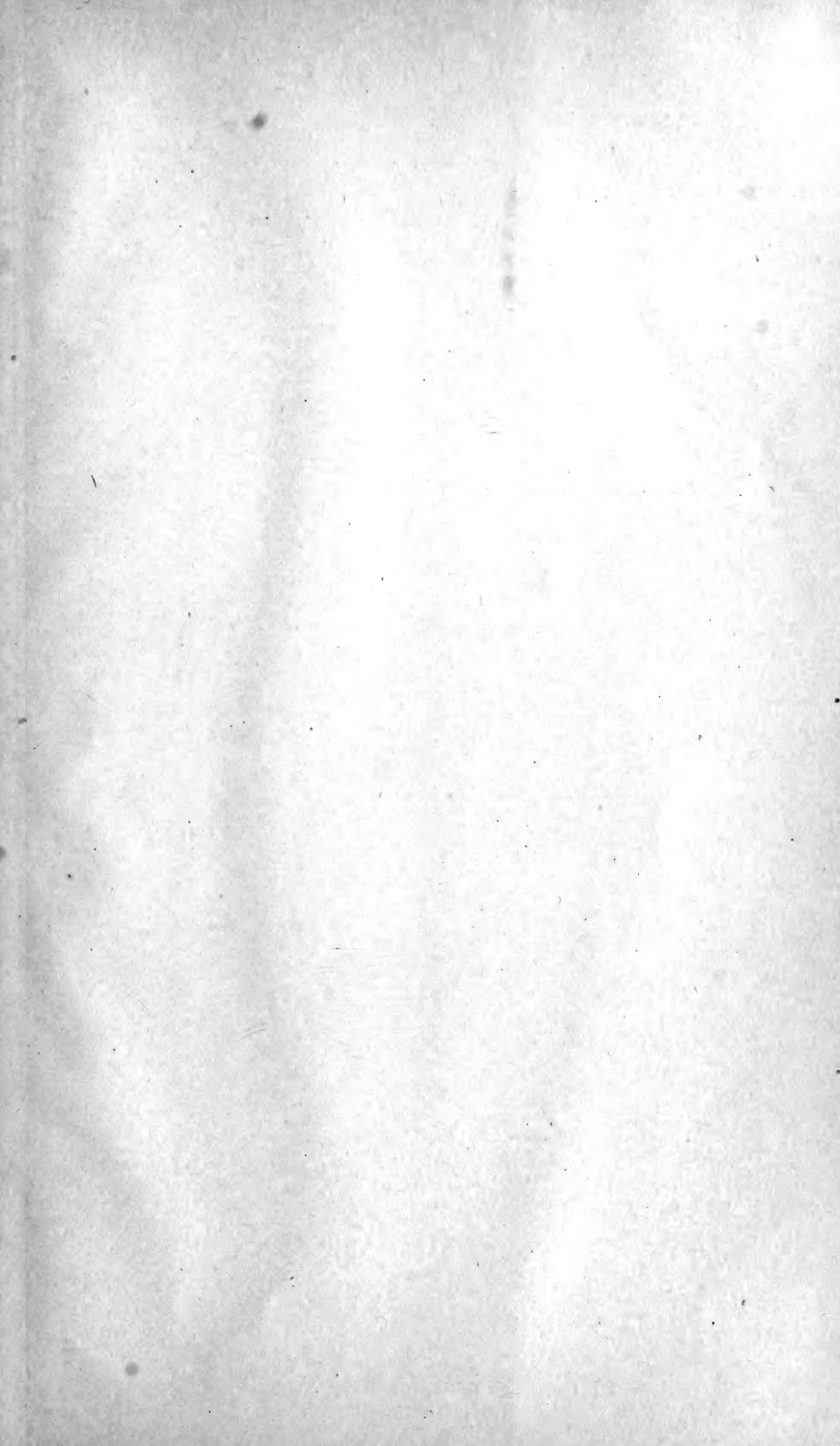
BOWLDING & CO.

DR. JOHN M. BAILEY: CLAIRMONT, N. H., Jan. 27, 1881.

Dear Sir,—From one bushel of Mammoth Ensilage Seed Corn, which I bought of you last June, I raised 60 tons of corn fodder. [Weight ascertained by weighing a cubic foot of Ensilage.] I built my Silo according to directions in your book, opened it November 1st, found the Ensilage perfectly preserved. I fed 20 milch cows for 80 days upon it, with no hay or other dry food. I was milking 16. In less than three days there was an average gain of one quart per cow. The color and quality of the milk was the best I ever saw, summer or winter, and I have been in the milk business five years. I fed the same kind and amount of grain with the Ensilage











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