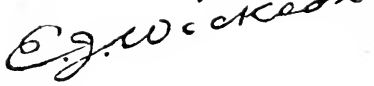
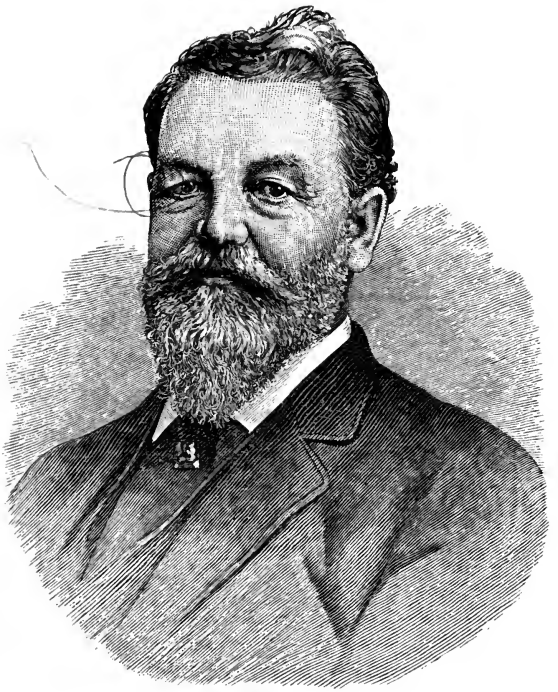
H. R. Stevens
ON
ENSILAGE
The Preserving of Green Forage Crops in Silos



"BLUNT'S PROLIFIC."



PUSELL & RICHARDSON-SC

Yours Truly

A. C. Stevens

On Ensilage

OF GREEN FORAGE CROPS

In Silos.

EXPERIENCE WITH ENSILAGE AT ECHO DALE FARM;

ALSO THE PRACTICAL EXPERIENCE OF

Twenty-five Practical Farmers

WITH ENSILAGE AND SILOS,

Giving their experience of feeding stock of all kinds with Ensilage, and the practical results, conclusively showing the undoubted success of this process, — the Ensilage of green forage crops. By this process the farmer can realize five dollars in place of one dollar as practised by the old system of farming. Also wonderful experiments of feeding poultry, at one-half the usual cost, on Ensilage.

By

H. R. STEVENS,

Proprietor of "Echo Dale Farm," Dover, Mass.

BOSTON:

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1881.

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TO

PROFESSOR J. M. M'BRYDE,

AND MY OTHER CORRESPONDENTS,

WHO HAVE KINDLY AIDED ME IN THIS WORK BY THEIR PRACTICAL EXPERIENCE, I RESPECTFULLY DEDICATE THIS BOOK.

INTRODUCTION.

In placing a publication of this kind upon the subject of ensilage, I do not claim to have invented or made any improvements upon the original practical experience as perfected, after years of many experiments, by M. Auguste Goffart of France. To him alone belongs the honor. In my opinion the dawn of day is upon us, and the sunshine will spread its golden rays upon the farmer on the practical workings of preserving our green crops by ensilage.

Mr. J. B. Brown of New York translated the publication upon the subject of ensilage, by M. Auguste Goffart. I obtained this book from the first, read it carefully and thoroughly. I then resolved to build a silo, and try the experiment. As the surrounding farmers said, after they learned what I was going to do, "You can afford to lose it if it does not work well, and I don't believe it will." With their consolation I did try it, built an experimental silo capable of holding forty tons, filled it with green-corn fodder, and it proved a complete success.

And yet many farmers say to-day, "I do not believe it will work half of the time." I then thought they needed some practical experience from a number of practical farmers. I concluded I would publish a work upon the subject of ensilage, giving the practical experience of practical farmers as well as my own. I made arrangements to find out the practical farmers who had the courage to enter into this comparatively new enterprise. I have either visited or corresponded with thirty-seven different parties, mostly farmers, who

have built silos, and filled or partly filled the same with ensilage; and, when you have read the practical experience of these men, you cannot doubt of the perfect success of preserving our green crops by ensilage; and, when you can earn two dollars at half the expense that you before earned one dollar, you will believe and practise it after you have read this book carefully, and you will build a silo, and meet with the same success as my correspondents have. You will then be as enthusiastic upon the practical workings of ensilage as they are to-day; and to the farmer of New England it will add millions, and may well be called a revolution in farming.

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H. R. STEVENS ON ENSILAGE.

CHAPTER I.

WHAT MAKES THE FARMERS HAPPY?

The reason is this, by reading this book and following the practical experience of other farmers, who say to all the farmers of the United States, The time has come, *brother farmer*, when you can earn two dollars at half of the expense that you before earned one dollar, that is, by preserving our green crops by ensilage, by turning our winters into summers for the feeding of our stock; by giving our cows, in the cold winters, food and nutrition that is equal, if not superior, to the green grass that grows in the warm sunny days of June; and the result is, in the winter months we have increased quantities of milk, richer in quality, giving us butter of rich color and fine flavor, equalled only by our June butter. And this preserved fodder makes our cattle look better, they thrive better, the young stock will thrive better, they grow faster; in fact, they do better than when turned into a good pasture in the month of June. And we can and do obtain these great advantages at less cost, less trouble and inconvenience.

The saving is so great, that we can keep four cows upon better food at no more expense than we have kept one cow. There are other advantages by preserving our green crops for ensilage.

We are not likely to lose a good part of our forage crop on account of the weather. We can cut our green crops of maize, of rye, of clover, of the grasses, and immediately, while filled with the rich

juices, they are placed in silos: there is no waiting for a bright sunny day, or a good "hay-day." They are preserved for ensilage: they not only retain, but by the slight chemical change that takes place there is an improvement over, the natural production. Our stock say so when they eat it so greedily, their looks show it: that is proof enough. There is no theory about it: the practical proof we have. For one, I believe that is what the farmer wants; and the day is near at hand for the farmer, when he will say, not as he inquires to-day, "Who has built a silo for ensilage?" but the question will be, "Who has not got a silo for ensilage?"

CHAPTER II.

"SILO," "ENSILAGE," DEFINED.

A SILO is a pit or well, vat or cistern, the sides and bottom being made water-tight, with an open top. They can be made of stone, brick, concrete, or wood. Some have been made by simply excavating the earth, sides and bottom being cemented; where the earth is compact, it has been successfully used, without any thing being done to the sides and bottom of this earth-pit, or silo. The walls are perpendicular, made so smooth upon their inner sides as to offer no obstacle to the settling or compacting of the ensilage by friction of the sides. This silo is for the preservation of the green forage crops, corn, Hungarian grass, clover, rye, oats, millet, and all the grasses. The food thus preserved in silos, or pits, is called ensilage.

The origin of the word "silo" is undoubtedly French, the term being compounded of the two words, "*en*" (in) and "*silo*" (a pit). In adopting and developing the old process, known in different countries under various names, the French re-christened it by applying the term "ensilage," both to the act or mode of preservation and its product, using the term necessarily both as a verb and a noun.

CHAPTER III.

CORRESPONDENCE FROM

J. M. M'BRYDE,

PROFESSOR OF AGRICULTURE, HORTICULTURE, AND BOTANY,

OF THE

UNIVERSITY OF TENNESSEE.

A TREATISE ON THE ORIGIN OF THE PROCESS OF ENSILAGE.

THE farming community is becoming greatly excited on the subject of ensilage. Every agricultural paper fairly bristles with notices, references, or accounts of experiments; and the process already boasts of a tolerably copious literature of its own. There seems to be, in this country at least, considerable misapprehension on this point. Two entirely distinct processes are strangely confounded, — "ensilage" and "ensilage of maize." A Frenchman, Goffart, is generally regarded as the person to whom the agricultural world is indebted, not only for the origination and development of the ensilage of maize, but also for the discovery and development of the process of ensilage itself. The gentleman himself seems to clearly distinguish between the two, advancing no claims to the discovery of ensilage, while boasting in no measured terms of having developed and perfected the ensilage of maize, speaking of it as a "monument to his fame, more enduring than brass."

I have been greatly surprised at never having seen, in any of the numerous articles upon this subject, some mention of the mode of preserving grass for forage, as practised many years ago in East Prussia. This process is fully described by Grieswald (1842); and a translation of the passage is given in Stevens's large work, "The Farmer's Guide," which appeared in 1851, the year before Goffart began his experiments. The process as therein detailed is so similar

to that which Goffart has developed, even in the minutest particulars, — if we substitute fine grass for finely-cut corn, — that I could hardly describe the French method better than by giving, as I do, the extract in full.

"A curious mode of preserving grass for forage, instead of making it into hay, has been tried in Germany, in East Prussia; and it is this: Pits are dug in the earth, ten feet or twelve feet square and as many deep. They are puddled with clay, and lined with wood or brick. Into these pits four or five hundred weight of grass, as it is cut, are put in, a layer at a time, sprinkled with salt at the rate of one pound to one hundred weight, and if the grass is dry, that is, free of rain or dew, two or three quarts of water are sprinkled over the layer. Each layer is trodden down by five or six men, and rammed firm, especially round the edges, with wooden rammers, the object of which is the exclusion of air. A little straw is then scattered over the layer to mark its dimensions afterwards. Layer is placed above layer till the pit is filled to the top, when the topmost layer is well salted, and the pit covered with boards, or a well-fitted lid, upon which is put a covering of earth of one and a half feet in thickness. Such a pit will contain five layers of grass, and should be filled in two days. The grass soon ferments, and in about six days subsides to half its original bulk. The lid is examined every day, and every crack in the earth filled up to exclude the air, which, if allowed to enter, would promote the putrefactive fermentation in the grass. When the first fermentation has ceased, the lid is taken off, and fresh grass put in, trodden down, and salted as before. The pit will now contain about ten tons of grass, equal to two or three tons of hay. The pits should remain shut for six weeks before being used, and then are used in succession. The grass thus treated has the appearance of having been boiled, and its sharp acid taste is very agreeable to cattle; and twenty pounds a day with chopped straw will keep a cow in good condition all winter, and twenty-eight pounds will cause a cow to give a rich and well-tasted milk."

After reading this passage we are almost tempted to exclaim with Solomon, "*Truly* there is nothing new under the sun." It reads as if freshly taken from the pages of Goffart. Here we have modifications and improvements only arrived at by the Frenchman after years of patient experimentation. The dimensions of the pit, the importance of the thorough exclusion of air, the puddling with clay (almost similar to cementing) in order to effect this, the use of soft, fresh

grass, the sprinkling with salt, the heavy packing down, the importance of succulent, unwilted grass, the board covering, the continuous descending pressure of the weight of earth, — which Goffart calls the grand secret of the process and the most indispensable element of success, discovered only after repeated experiments on his part, — the refilling of the pit after short intervals of time in order to economize space, the appearance of the preserved grass (ensilage), the acid taste, are all points especially noticed in this old account, written nearly half a century ago.

From all this we must conclude that the process, even in its most essential features, is undoubtedly an old one, revived after lying dormant and unnoticed for years. But, as the merit of the perfecter is but slightly inferior to that of the inventor, great praise is certainly due to those gentlemen who have by their labors in recent years brought again into prominence a system which is so full of promise. In this connection, the committee appointed by the Central Agricultural Society of France to report upon the subject of ensilage of maize, very properly observe, "The world is so old, necessity has so long compelled the efforts of human beings, that we find precedents in every line of improvement. But all experienced men who know the great difference which separates a happy suggestion, or even a successful attempt, from a practice well enough confirmed to become the base of a regular business, will admit that these precedents do not destroy the merit of any man who, like Monsieur A. Goffart, has accomplished a continued success."

Whatever question, however, may arise as to the origin of the process, there can be none as to the name. This is undoubtedly French; the term being compounded of the two words, "*en*" (in) and "*silo*" (a pit). In adopting and developing the old process, known in different countries under various names, the French re-christened it by applying the term "ensilage," both to the act (or mode) of preservation and its product, using the term necessarily both as a verb and a noun. This name to American ears is pretentious, unmeaning, and confusing. Our farmers would far more readily understand English terms more descriptive of the process and its product, — terms similar to "canning" fruits or vegetables, "preserving," "pickling," etc., and "canned" fruits, "preserves," "pickles," etc. They would all be more attracted by the terms, "to pit corn," "pitting corn," "pitted corn," "to pit clover," "pitting

clover," "pitted clover," etc., or even, "to bury corn," "burying corn," "buried corn," etc.

This system, then, is no longer an experiment: it is one approved of by the experience of years, it may be of centuries; and even its more recent application to the preservation of Indian corn has been thoroughly and successfully tried in France and elsewhere by hundreds of enterprising farmers.

CHAPTER IV.

LOCATION OF SILOS.

The location of a silo should be as near the barn as possible, for convenience and saving of labor in feeding stock. With many farmers who have a barn basement, a silo can be built in the same, and made quite convenient for feeding their stock. As many basements of this kind are not over eight or nine feet high, it would be practicable to excavate or dig to the required depth, if the surroundings will allow it; or the silo could be built up through the barn floor, say two, three or four feet, and, with an eight or nine feet basement, would give a fair depth to a silo of this kind and size.

Some have made silos under the carriage-house which is connected with their barn, and made very good ones. In locating a silo, the top part of the silo should come near the level of the barn-floor, or where the fodder-cutter will stand, so that it will drop right into the silo. If your barn is situated on a side-hill slope, and your stock are kept in the basement of the barn, by building your silo on the upper side, and, when your fodder is cut, drops into the silo, your door opening out of the silo into the basement, you have a very convenient location of silo for all work, and also a silo that will be of the right degree of temperature for the preserving of ensilage; as I consider a silo under ground, or mostly under ground, better adapted to the extreme high temperature and extreme low temperature of our climate. In a soil that is naturally dry, a silo can be placed at the required depth. In some locations where it is naturally wet, or where, by going to the depth of five or six feet, you come to water, it would be better, to get the required height, to build partly above

the surface. With many who have basements under their barns, a silo, or pit, could be made outside, close to the basement-wall, located in a place where it would be most convenient to use in the basement, or otherwise, by making a passage-way to the pit, or silo, through the foundation walls of the barn. Any form or construction of silos, or pits, which answers the location and condition may be used, such as pits or wells, open only at the top, the food being put in and taken out from the top only. Such silos, or pits, would have the advantage, that successive croppings might be put in the same pit, or silo, one above the other, each being sealed with a layer of earth when put in. The deeper the silo, or pit, the more they will contain in proportion to measurement, owing to the greater density of the contents from the weight of the mass above; and, the greater the pressure, the more thorough the exclusion of the air, and, without any doubt, the better preservation of the ensilage.

CHAPTER V.

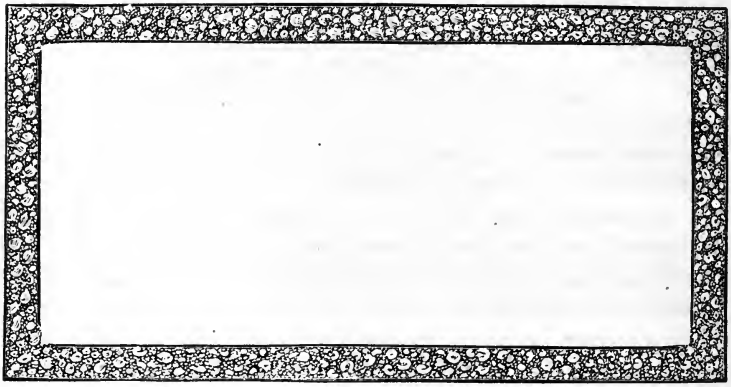
THE BUILDING OF SILOS OF DIFFERENT SIZES AND FORMS, GIVING THE CAPACITY AND CONTENTS OF SAME.

Silos can be built of stone, brick, concrete, wood, or earth. Some have been made by simply excavating the earth, sides and bottom being cemented; where the earth is compact, it has been successfully used, without any thing being done to the sides and bottom of this earth-pit, or silo. Silos, or pits, are sometimes merely trenches, a few feet in depth and width, into which the corn-fodder is closely packed, and then carried vertically upwards above ground to the height of four or five feet, and carefully covered by heaping dirt over the sides and top to the thickness of eighteen to twenty-four inches. The chief drawback to the use of such pits is their liability to cave in when emptied of ensilage in the spring. One silo is described as a well thirty feet deep, walled up and cemented, and furnished with a windlass and rope for raising the ensilage to the surface. Many build silos parallel to each other, with a common wall between, so that they can be used in succession. Another form is described as an elongated cylinder, arched over the top in the direction of its greatest length, after the manner of a cistern, and with only a narrow opening left along the crest of this arch, through which the corn-fodder is delivered; and it is closed by a single covering of earth after the pit is filled.

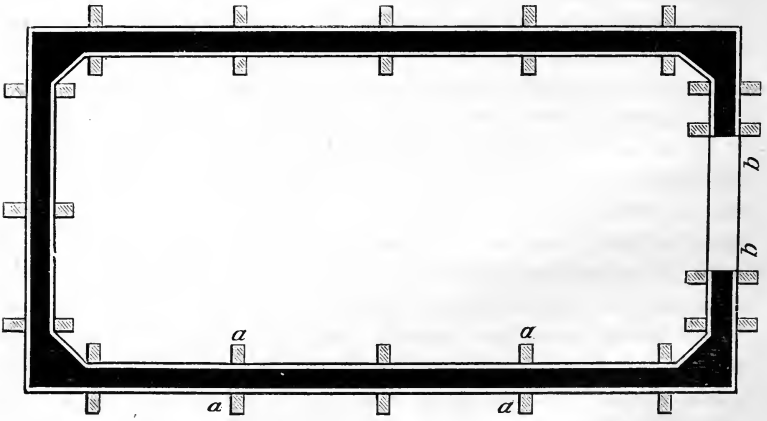
Another correspondent states here that he has experimented for a number of years past with brewers' grain, endeavoring to discover the best mode of keeping it. He has tried stone, brick, and cemented vaults, barrels, and wooden vats, and found none to compare with pits dug in a clay or other good soil. He is inclined to attribute the superiority of these to the preservative action of the soil itself.

A very good silo is one built of concrete. It costs but little more to build a good silo than it does a poor one. A well-built silo of good material is the cheapest and safest. Professor E. W. Stewart advocates to build it of water-lime concrete. First, having excavated for the silo, dig a trench all around the bottom, and fill in with

cobble-stones, and from one corner lead a drain, if possible, so as to carry off all the water; the trench under the proposed walls of silo being filled with cobble-stones as per diagram.



Place standards of scantling long enough to extend twelve inches higher than the top of the wall when it is finished. Place these standards on each side of the proposed wall as per diagram annexed:



aa. — 3 × 4 inch scantling to hold 1½ inch plank while building wall. *bb.* — Doors.

and if you desire the wall to be eighteen inches thick, then place the standards twenty-two inches apart, and place a pair of standards every five or six feet around the entire foundation. Be particular to have these standards exactly plumb and exactly in line; fasten the

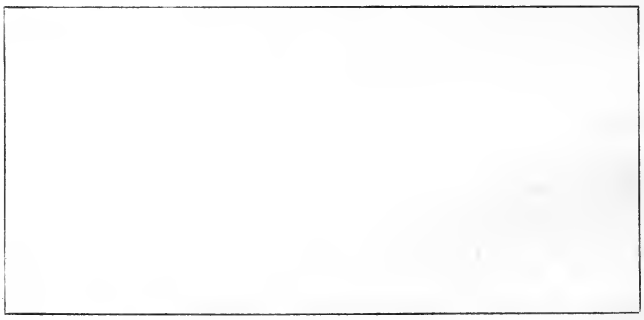
bottom of standards firmly in the ground, or by nailing a strip of wood across at the bottom of the standards, and a little below where the floor of the silo will be; fasten the tops of the standards by a heavy cross-piece securely nailed, and fasten the pairs of standards in their plumb position by shores reaching the bank outside. Now take plank an inch and a half or two inches thick and fourteen inches wide, and place them edgeways inside the standards twenty inches apart, thus forming a box fourteen inches deep, and running all along and around the entire foundation of the proposed wall. Fill this box with alternate layers of cobble-stones, or any rough stones, and mortar or concrete; first a layer of concrete, mortar, and then a layer of stones; not allowing the stones to come quite out to the boxing-plank, but having concrete over the edges, and the concrete must be stamped or rammed down solid. Prepare the concrete as follows: Take one part of good cement (Portland is the best probably), and mix with this four parts of sand (do not have the sand too fine, rather coarse), and mix the cement thoroughly with the sand while dry, and then mix four parts of clear gravel; make into a thin mortar, and use at once. Put into the box an inch or two of this mortar, and then bed in cobble-stones, then fill in with mortar, again covering the stones, and again put in a layer of stone. When the box is filled and the mortar "set," so that the wall is firm, then raise the box one foot, leaving two inches lap of plank on wall below, and go around again, raising the wall one foot each day, every second day, according to amount of labor at hand.

If one-half the bulk of finely-stocked quick-lime is added to the water-lime, it will improve it, and costs but little. If Rosendale or Akron cement is used instead of Portland, then proportions should be as follows: One barrel of good live cement, three barrels of good sand, three barrels of good clean gravel. If no gravel is obtainable, then use five barrels of sand to one of cement, and bed in all the cobble-stones possible. Stones with rough edges are better than smooth, as they bind the wall more thoroughly; but any flat stones found about fields will do as well. A layer of loose cobble-stones should be placed against the outside of the wall before the earth is brought against it, so as to have an air space, and a free passage for water. We think that stone walls two feet thick, plastered with Portland cement, are better than concrete; and, where people can afford to build of stone, they had better do so. As most farmers have plenty of stone on their farms, they can haul and lay the stones

themselves: if they hire the walls plastered with cement, it would give them a good silo at a very low price. After the walls are finished, then level the bottom of the silo, giving a coating of coarse gravel, then take the same mixture of cement, sand, and gravel, mix it well in a mortar-bed, then add the water, mixing it well to the consistency to spread well, evenly, two or three inches thick: smooth it as you spread it, give it plenty of time to harden and dry. You will have a solid bottom that will last for years, and no water will ever get through it. Leave an opening in the upper part of wall, of suitable size for a door, to take out ensilage to feed to your cows. Have matched boards or plank to fill this opening: while filling your silo let these boards bear on the inside of the wall; as you place them, have cement or mortar to bed them against the wall. The ensilage bearing upon will keep them in place. By so doing, your ensilage will be all right about the door.

If your silo is not under cover, you will want a roof over it. Have it tight, to keep out all rain and snow; any kind of a roof that will shed water will answer.

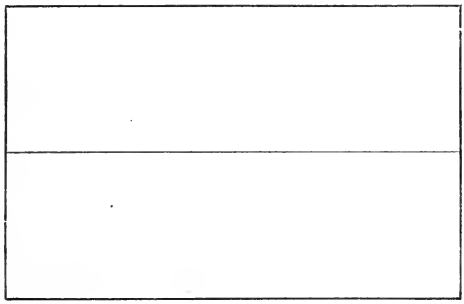
A good silo will cost from seventy-five cents to $1.25 per ton. Much depends upon the location and the convenience of getting material to build the silo. Build a good silo, or none: it will pay to do so, if you are obliged to borrow money to build.



Silos will have to be built many times to conform to the location; but, where the location and surroundings will admit, they should be built rectangular in form, the annexed diagram giving the size and form, which is twenty-five feet long, eleven feet wide, and fifteen feet deep. This will hold one hundred and three tons, allowing forty cubic feet to the ton; which is the correct weight of a cubic foot after the ensilage has settled in the silo.

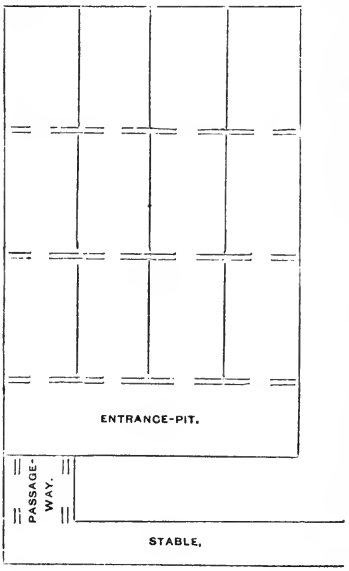
This quantity will keep nine cows for one year, allowing sixty pounds of ensilage per day, or eighteen cows six months, or during the winter season.

A very convenient form of silo is one with two compartments: one could be filled early in September with corn, second crops of grass (rowen), and the other early in June, in our climate, with rye or clover; as will be understood by annexed diagram, which represents a horizontal section of two silos, or one silo with two compartments; each compartment being thirty feet long, ten feet wide, fifteen feet deep with an eighteen-inch wall running through the centre,



making the width twenty-one feet and six inches. Both of these silos when filled will hold two hundred and twenty-five tons, or one silo will hold one hundred and twelve and a half tons. Both of these compartments when filled would feed seventeen cows for one year, or thirty-four for six months during the winter season; or one compartment filled, holding one hundred and twelve and a half tons, would feed out seventeen cows during the winter season. You will build your silo to conform to the number of stock you wish to keep. If you have ten cows, and you wish to increase to twenty, you had better build your silo of suitable size to feed twenty. To get at the exact size of silo to feed any number of cows you wish to keep, you will multiply together the length, breadth, and depth of your intended silo, which gives you the cubical contents of the silo. Multiply that product by forty, as there are forty pounds of ensilage to a cubic foot, which gives the number of pounds of ensilage in the silo when filled. Divide this product by twenty-one thousand nine hundred pounds, that being the quantity to keep one cow a year: this will give you the number of cows it will feed.

Other forms of silo can be built with more compartments, if desired. Messrs. Whitman and Burrell recommend, for one hundred cows, a silo of suitable size to divide into three compartments, by means of cross-walls, and then feed out one silo at a time: this would provide an empty silo in the spring, which would be ready for the winter rye, clover, June grass, which could be harvested early in June, cut up same as corn-fodder, and stored in silos for summer feeding. Mr. O. B. Potter of New York makes a series of silos, or pits, in sections as annexed diagram, which represents a horizontal section of pits thus constructed, taken through the doorways near the bottom of the pits.



Each one of these sections, or silos, will hold seventy-five tons. The twelve will hold nine hundred tons. The entrance-pit will hold one hundred and fifty tons. Each section is twenty feet long, ten feet wide, and fifteen feet deep. The entrance-pit is forty feet in length, fifteen feet deep, and ten feet wide.

It will be seen, from this construction, that as many tiers of piers may be made, end to end, at right angles to the first or entrance-pit, as may be required and space allow; and that, after the contents of this first or entrance-pit are fed out, each of the other row of pits may be opened and fed out, one pit at a time; and that only the surface of the food at the end of the one pit which is being fed will at any time be exposed to the air until the whole are fed out.

CHAPTER VI.

MY PRACTICAL EXPERIENCE AT ECHO DALE FARM WITH ENSILAGE AND SILOS.

After reading Mr. Brown's translation of M. Goffart's publications, I resolved to have a silo of suitable size to fairly test the preserving of green fodder corn for ensilage. As I read several articles in different agricultural papers, I became deeply interested upon the subject of ensilage. I visited, early in June last year, Dr. Bailey's farm in Billerica. The doctor's farm is some four miles from the station. Fortunately I met the doctor at the station, he having arrived on the same train. The doctor's carriage was in waiting: he invited me to ride with him to his farm. After a very pleasant chat on the way upon the subject of silos, ensilage, etc., we arrived at the farm. He was then ensilaging his rye, and mixing through it the fresh-cut grass from the mowing-field: as the rye was getting quite dry to be cut for ensilage, he had a continual stream of water running through a hose with a rose-bib on the end of the hose, and the water dropping upon the cut rye and grass as it dropped into the silo. This water discharging into the silo answered two purposes: it made the cut rye and grass more compact as it was spread and tramped down, also it helped fill the air-cells of the dry stalk of the rye; by so doing it helped to exclude the air, which, with pressure, in thoroughly excluding the air, is the success of preserving the ensilage. In company with other visitors, Dr. Bailey showed us over his farm: all seemed interested in his fine flock of Cotswold sheep, his breed of Berkshires, which are the pure clean breed. The short time there was passed very pleasantly, for all farmers take pleasure in looking at good thoroughbred stock.

On the last of June, after waiting some two weeks, hoping it might rain, I ploughed about two acres of greensward: and it seemed to me I never saw the ground dryer; it was like ashes. I prepared the ground, planted my corn in drills (which was, by the way, corn I purchased of Dr. Bailey, five dollars per bushel), rows four feet apart, kernels three and four inches apart. Considering the excessive dry weather, the corn yielded very well. From what we

weighed, I calculated we had twenty-five tons per acre. I fed a part of this, cut up green, to my cows, the balance for my silo. I planted a small piece on lower ground, where the yield was at the rate of fifty tons to the acre. The stalks averaged twelve feet in height.

I built my silo in the basement of my barn, sixteen feet long, twelve feet wide, twelve feet deep. As it was an experiment with me, I made the size of silo to conform to the location. The walls were made of brick, one foot thick, well laid in cement, with door placed near the top, six feet deep, three feet wide, facing in towards the tie-up for the cows. I made, besides this, a smaller silo one-half the capacity, to test the keeping of ensilage in small quantities; but, before I had the larger one entirely filled, I saw I should have but little left to fill the small one. I would say to the farmer, the first time you fill a silo you will wonder, and say, "I don't see where so much of it is packed away," if your silo is large or small. I then purchased a one-horse railway power, and a Baldwin fodder-cutter. My barn is located on a south-east slope side-hill, giving me a twelve-foot basement, entrance on south side, the main entrance to the first floor, north-west side; here I placed my horse-power and cutting-machine, and made a good-sized trap-door through the floor. The corn, when cut, dropped through the trap-door into the silo.

I shall mention in another part of this book in regard to power to be used.

As a great number of persons wished me to let them know when the silo was to be filled, I notified several of our Boston dailies, and the following appeared: "Dr. H. R. Stevens, of Echo Dale Farm, Dover, Mass., will be ensilaging corn every day this week; and an invitation is given to all persons interested wishing to witness the operation. Trains leave Boston and Albany Depot, 8 A.M., 12.15 P.M.; return, 1.30, 4.30 P.M.;" and, from the great numbers who came, I was surprised to see so much interest taken in this enterprise. For my railway horse-power, I built a platform of two-inch plank, nailed strips of inch boards about four inches wide across the plank, made the platform two feet wider at the bearing on the ground than the top part. In doing so you make every thing safe in getting in and out your horse. After you have once tried it, you will see the importance of it. I used a horse that had formerly been a very valuable carriage-horse: although now sixteen years old, he has as much life as any horse six years old. This horse-power was new

business to me. With care, my horse went into tread-power without any trouble. After one hour's work, you would think he was an old hand at it. Every thing worked finely.

As I did not wish to use a steam-engine, on account of sparks of fire from the boiler (for one, I am afraid of fire, around my barn, especially in very dry weather), I kept one man in the silo, treading and distributing the cut fodder; a part of the time two men, one man to feed the cutter, one to cut up the fodder, one man to haul the fodder from the field, the one cutting to help load. I used a dump-cart with quite high side-boards. By using the last, it could be tipped up by the side of the cutter, and save once handling. By so doing, all were kept at work. I mention this: perhaps some might think not important; but I think it is, as many farmers of limited means, or farmers who do not want or cannot have an engineer to run an engine, will use the horse-power. The horse-power can be put to many uses on a farm: you can saw wood enough in one day for your house to last all winter, for it gladdens the farmer's wife to see a large pile of wood drying nicely for winter use.

We continued cutting from four to five hours per day for four days. As visitors were coming every day, I was in no hurry. We were filling the silo from two to three feet each day. I found every morning, after the day's work, the cut corn-fodder would be quite warm to the depth of one to two inches. Just before I commenced to fill in the morning, I sprinkled four or five pails of water evenly over the cut fodder: it cooled it, and arrested fermentation. When the silo was filled, I spread evenly over the top oat-straw to the depth of six to eight inches. I then placed two-inch plank crosswise of the silo, leaving about half an inch play on each end of the plank, to be free while settling with the corn-fodder. I placed on the top of the plank good-sized stones, about one foot deep.

I found by trials, we could cut, with one-horse power, twenty-five tons per day. Where there are large silos to be filled, say two hunhundred tons or more, steam-power with heavy cutter will do double the work; or a two-horse tread-power, with suitable cutter, will cut forty to fifty tons per day. I think the fodder, when it is in bloom or fully tasselled, is in the best condition to cut for ensilage.

I cut my corn-fodder in one-half inch pieces: some cut three-eighths to four-tenths of an inch. The shorter it is cut. there is no doubt of its packing closer; the shorter the cut, the slower the work in cutting. The process of filling a silo is very simple and easily

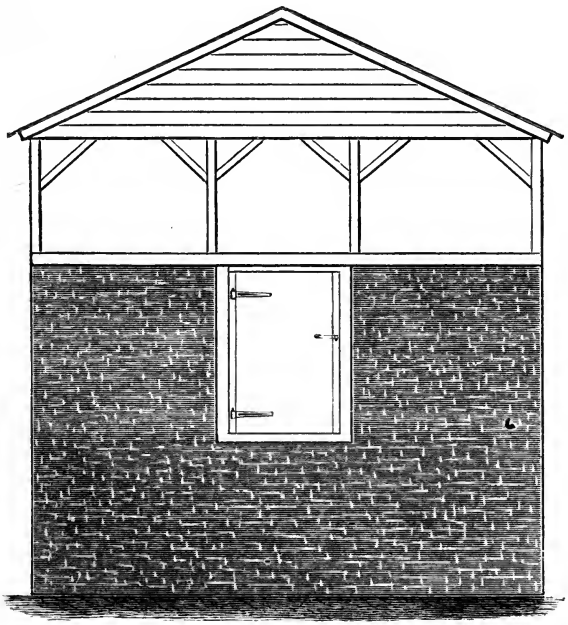
practised: have plenty of pressure; and, as the mass settles, it becomes air-tight, with the chemical change that takes place, forming carbonic acid gas, which fills the interstices, thereby preventing the oxygen from forwarding fermentation. I have no doubt the ensilage, while in this condition, may be preserved for years. I opened my silo early in December. I removed the stone and first plank near the door, then removed the straw which was next to the ensilage. The lower part of the straw, and about two inches on the top of the ensilage, had partially decayed, and was unfit to feed to cattle. I then sliced down the ensilage the width of the plank, removed it from the silo. I found the preservation of the corn-fodder good; some parts had changed to a light brown color, mostly the leaves of the stalk; the pith of the stalks were as white as when first cut for silo; after exposure to the air for a few minutes, it brightened up, the color was more of a light green, the odor and taste was alcoholic and slightly vinous, from that taken off near the top. All below this was very sweet, with the natural taste of the corn-fodder. The ensilage was in a good state of preservation throughout the silo. The slight chemical change that takes place in well-preserved ensilage in the silo assimilates, or causes the ensilage to appear slightly cooked or partly steamed. By this chemical change the ensilage, when fed and eaten by cattle, is more easily digested. For that reason, I say the ensilage is more beneficial to stock: they like it, thrive better, and do better than when fed upon the same corn-fodder cut up fresh from the field.

In feeding the ensilage to stock, they ate it very well, cows, yearlings, and calves, except one Jersey, who, in a day or two, ate it well. My cows have a good, warm, well-ventilated basement of my barn, and I thought they looked as well as they could: they have the best of care, well fed, well bedded, thoroughly carded and brushed every day, and their hide and hair as clean and sleek as any horse, and I did not expect they would look any better, if quite as well; but I must say I never saw them looking as well as they do at the present time. They have less grain than when fed upon hay. They are fat enough for the butcher, look sleek and bright, their hide is loose; and every farmer knows, with these indications it means the best of health, with an increase of milk in quantity, and the quality so much better, that the butter, with its rich golden color, is only equalled in flavor by the June grasses.

Since I began to feed ensilage, I give no hay: each cow has its

fifty to sixty pounds of ensilage per day, with six quarts of shorts; add to this, for milch cows, two quarts of corn-meal: this is for a day's feeding, fed morning and night, at noon half a peck of beets or carrots. Cows that are dry, and young cattle, no meal, turnips in place of beets or carrots. I had one Jersey cow that gave four quarts of milk per day up to the time of calving. She brought forth a fine healthy calf: the calf is now four weeks old, and has improved as well as, if not better than, when the cow was fed upon hay. The cow has been fed upon ensilage all the time, with six quarts of shorts per day, gives a good flow of milk, and looks finely.

After taking off the corn-fodder for ensilage, I prepared the ground, and sowed it to rye, with two acres additional. I shall cut the rye while green, and in blossom, put it in silo to feed out during late summer; after the rye is cut, plant again to corn for ensilage, to be put in silo early in September. I shall build, the coming season, a large silo divided in sections. Explanations given under head of "Building Silos."



END VIEW OF SILO, SHOWING DOOR.

CHAPTER VII.

FILLING THE SILO.

Will require either steam or horse power, also a powerful fodder-cutter. A good portable engine, with boiler attached, that will do all the work, and do it well, will cost from a hundred and fifty to two hundred dollars.

A good fodder-cutter will cost forty to a hundred and twenty-five dollars.

A good one-horse power, all ready to hitch to your fodder-cutter, will cost a hundred dollars. With this you can cut twenty-five tons per day, easy.

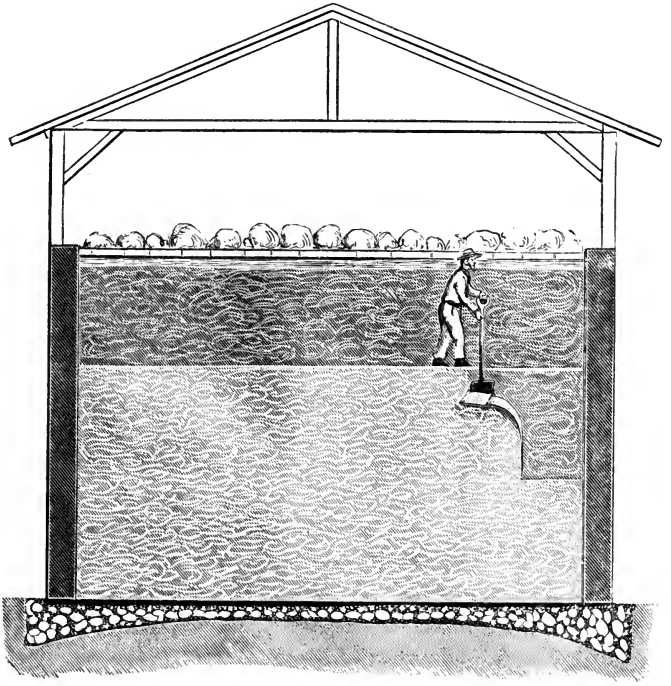
A good two-horse power will cost a hundred and sixty dollars.

This power would require a more powerful cutter, and would cut fifty tons or more in a day. If the farmer thinks it would be expensive to buy this power and cutter for the few days he would want it in the fall and early summer, to fill his silo, and if he has a small silo to start with, he could unite with others in his town or county, — say two; it would divide the expense: four would make the first cost less, six would make it very small. Or one man could own a good two-horse power with a powerful cutter, or a steam-engine, and go from farm to farm, and charge a good fair price. In this way it would come very reasonable to the farmer.

If you are ready to fill the silo, it is important to have your corn-fodder and grasses fresh-cut when taken to the silo. Do not cut any more in the field than you can take care of at the fodder-cutter, more particularly if it is a bright, sunny day. If my silo held one hundred tons or less, I should cut it three-eighths or four-tenths of an inch. I should never cut over a half-inch for any-size silo. You are perfectly safe in cutting these lengths. There is no doubt, the finer the cut, the closer the pack; and from the beginning to the end pack your fodder close, tramp, tramp, with plenty of pressure. Tramp well, close to the sides and the corners. When your silo is full, even with the top of your walls, and you have more corn-fodder or grasses, you can build a frame of plank, two or three feet high, and of the same width and length of the silo. Place this upon the walls, and fill the space to the top of the wooden feeder. Upon the ensilage a cover of plank is placed: load with heavy weights, and in two

days the cover will have pressed the ensilage below the mouth of the pit, on a level with the top of the wall. Then remove this covering, and proceed to cover the ensilage as you would if you had not put in this extra quantity; spread as quickly as possible over the top of your ensilage, rye, oat, or barley straw, to the depth of six or eight inches; then place on the top of straw the plank already cut to lengths, crossways of your silo, close together, covering the whole surface of the plank with stone or rocks, not less than one foot in depth. If stones and rocks are scarce, place bricks, iron, boxes, or bags of dirt, logs of wood, any thing that will weight down and compress the ensilage. By following these directions, you will always have good success.

I have visited, or corresponded with, thirty-seven different parties, within the past year, who have silos: all are enthusiastic on the good reports of ensilage; and the majority who have not large silos will build one — some two additional — the coming year.



TAKING ENSILAGE FROM SILO BY VERTICAL SLICING.

CHAPTER VIII.

CORRESPONDENCE FROM

MR. J. J. H. GREGORY,

MARBLEHEAD, MASS., JAN. 15, 1881.

H. R. STEVENS, ESQ.

My Dear Sir:

I have had no personal experience with silos, but think exceedingly well of ensilage. In answer to questions, would say: Would recommend "Blunt's Prolific," expressly; but any of the largest varieties of Southern corn will answer, such as "Chester County Mammoth" for example. Why I would prefer "Blunt's" is because, while it gives great stalk here North (sometimes seventeen feet high), it ears more abundantly than other Southern kinds. The best time to cut corn is when the ears are in the milk, while they are, bulk for bulk, by far the most valuable portion of the crop. I advocate the Southern in preference to Northern varieties; because, though the Northern sorts analyze a large per cent of sugar, yet their bulk of leaves and stalks is more than proportionally smaller. When to plant, for the large Southern varieties, I would recommend, for this latitude, to plant by 10th of June.

I would advocate plenty of room, have the rows three to four feet apart; also to plant and work wholly by machinery, when the area is large. We have grown stalks to weigh five pounds or more.

As regards the quantity per acre, I would say forty tons, though at rate of seventy tons per acre have been raised in small area. Ensilage meets the means of doing what we before considered impossible: saves corn-fodder on a large scale, and large variety of fodder, in better condition than when dried. It will make food more acceptable to cattle, and present it in a form advanced one stage toward digestion; and, though the nutritious qualities may be slightly diminished, the fat-making qualities are more than proportionally

increased. It will also nearly carry summer into winter in the quality it gives to the food, which cows will show in the butter and milk. There is another argument of great weight: it will, in effect, add largely to the area of our barns, by making the cellar and below ground available for fodder storage.

Yours truly,

J. J. H. GREGORY.

CHAPTER IX.

CORRESPONDENCE FROM

MR. GEORGE L. CLEMENCE.

SOUTHBRIDGE, MASS., JAN. 22, 1881.

MR. H. R. STEVENS.

Dear Sir:

In reply to your letter, asking my experience with ensilage, I would say, that I first became interested in the preservation of our green crops in silos during the winter of 1879 and 1880. In answering your request, I will repeat the questions, and answer them practicably as far as I have had experience.

QUES. — What is your method of planting and raising corn-fodder for ensilage?

ANS. — I turn under greensward about the 1st of May, and apply six to eight cords stable-manure per acre, which I spread and thoroughly mix with the soil, to the depth of four inches, by using a two-horse cultivator. I plant with an Albany corn-planter, in drills three feet apart, about the 20th of May. I run a cultivator between each row, as the corn is two inches high, then again as often as the weeds start, or the soil becomes compact.

QUES. — What kind of corn do you think best to plant for ensilage?

ANS. — Kentucky White, for the reason that it contains less sugar, thereby producing less acid while undergoing fermentation in the silo.

Ques. — What time of the year do you think most suitable to plant corn for ensilage?

Ans. — About the 20th of May.

Ques. — About what is the cost per acre of raising corn ready for ensilage?

Ans. — I can raise corn-fodder for thirty dollars per acre. This includes whole cost of labor, and one-half cost of manure, balance remaining for successive grass-crops.

Ques. — About how much corn-fodder for ensilage do you average per acre?

Ans. — I weighed a portion of my field last fall, and found I had at rate of fifty tons per acre.

Ques. — Do you plant or raise any grasses or grains for ensilage?

Ans. — I sowed three acres of winter rye last fall, which I propose to ensilage as soon as in bloom, and use it for soiling milch cows in August and September.

Ques. — What do you consider the best machine for cutting fodder for ensilage?

Ans. — The "Silver" and "Deming, No. 16," sold by Whittemore Brothers of Boston.

Ques. — What length do you consider suitable to cut the corn-fodder?

Ans. — I think three-eighths of an inch most suitable.

Ques. — Will you give me your experience with silos?

Ans. — I built an experimental silo in July, 1880, in the following manner: I took out the floor in the end of my stable, for a space of twelve feet each way; I then excavated in the basement beneath, which is nine feet deep, one foot, and placed four sticks of timber on the bottom of this excavation, so that the inside face of the timber was plumb with the inside face of the sills of stable above. I next procured twelve hundred feet one-inch pine boards, twelve feet long, planed on one side and matched: these I placed perpendicular, and nailed to the sills of stable and timbers below. After putting on one thickness of boards around the silo, we carefully papered the inside with tar-paper, and over this laid another thickness of boards, and painted the joints with thick paint: on the bottom, or floor, we laid a coat of cement, three-quarters of an inch thick.

My silo was then done: it was in the form of a cube, the sides of which were twelve feet, and the whole expense, including material and labor, was thirty dollars. I will here state, that you may under-

stand better the position of the silo, that my barn is one hundred feet long, by forty wide: the stable, in which I keep at the present time sixteen cows and eight heifers, is in the south side of the barn. There is a drive-way, or barn-floor, twelve feet wide, running parallel with the stable. In the north side of the barn, there are bays for storing hay. The silo is in the west end of the stable, the top being two feet above the level of the barn-floor.

Ques. — Your experience with cutting and packing corn-fodder for ensilage in the silos?

Ans. — I placed the cutter (which, by the way, was home-made, costing only six dollars) on the barn-floor, so that the corn, as fast as cut, fell directly into the silo. The cutter was run by a one-horse sweep-power placed in basement of the barn. We began ensilaging corn Sept. 13, put in two feet per day for three days, when the corn that I designed for ensilage was all in the silo. Sept. 16, mowed two acres of rowen, which we put in the silo as fast as mowed, without running it through the cutter: this filled the silo within three feet of the top. I then put on six inches of dry hay, and put on plank cover, on which we piled cobble-stones to the depth of two feet. The whole mass settled two feet after putting on the stones: there never was any steam, or smell of any kind, escaping from it.

Ques. — What do you consider it costs per ton to raise the corn-fodder from the seed, and have it thoroughly packed for ensilage in the silo?

Ans. — I can raise corn-fodder for sixty cents per ton, and the expense of ensilaging is about fifty cents per ton; making a total expense of one dollar and ten cents per ton.

Ques. — What do you think would be the most practical size and form of silo?

Ans. — I think a silo sixteen feet long, twelve feet wide, and fifteen feet deep, the most practical.

Ques. — What do you consider the best and cheapest material for building silos? Some are built of brick, some of stone and cement, some of concrete, and some have been built up of plank with quite good success.

Ans. — In sections where good building-stone are plenty, I think a smooth stone wall, plastered on the inside with cement, would be the cheapest.

Ques. — Have you opened your silo to feed ensilage to stock? if so, did it come out satisfactory?

Ans. — I opened the silo Dec. 4; found the hay that we placed on top mouldy; the rowen was a brownish color and very fragrant, smelling quite like new-mown hay, but not just like it, more like the smell of honeycomb.

The cattle all ate it greedily the first time it was given them, not one of the twenty-four refusing it.

We got to the corn ensilage Dec. 24; found it had changed to a light brown color, and had an agreeable smell, in which I could detect a slight flavor or smell of alcohol.

Ques. — Please give me your experience in feeding to stock, and kind of stock.

Ans. — Previous to the opening of the silo, I had fed my milch cows two fodderings dry hay, one of the rowen, and one of dry corn-fodder, per day, with one quart corn-meal and three quarts shorts per cow. I then omitted the dry rowen and corn-fodder, and gave two fodderings rowen ensilage; and in three days the cows increased one-eighth in their flow of milk.

For experiment, I kept an accurate weight of the milk from one cow. For the week before opening the silo, she gave an average of nineteen pounds and three-fourths per day; for the week after opening the silo, an average of twenty-one pounds and a half per day.

I then gave her rowen ensilage without any dry fodder, except the meal and shorts, the same as she had during the season; and she gave an average of twenty-four pounds and a half per day, for the week, showing a gain of four pounds and three-fourth per day, in favor of ensilage. The cows ate during the week four hundred and forty pounds, an average of sixty-three pounds per day.

Jan. 1 we put the cow that I previously experimented with on corn ensilage, without any dry fodder except the meal and shorts. She gave, for seven days, an average of twenty-five pounds per day: she ate, during the week, an average of seventy pounds per day ensilage. Corn ensilage weighs forty-eight pounds per cubic foot. Rowen ensilage weighs thirty pounds per cubic foot.

Ques. — What quantity, and how often, do you feed ensilage?

Ans. — My supply of ensilage being small, I am unable to feed, at the present time, as much as I should like; but from careful experiment I find my cows give the most milk, and appear the best satisfied, when fed the following rations: at six o'clock in the morning, directly after milking, I give each cow thirty pounds corn ensilage, with one quart cotton-seed meal; at eight o'clock, four

pounds dry hay to each cow; at noon, fifteen pounds rowen ensilage; at half-past three, four pounds dry hay; and at six, thirty pounds corn ensilage, with one quart meal to each cow.

Ques. — What is the effect of ensilage, compared with hay, upon the milk and butter?

Ans. — The milk looks and tastes like milk made in summer: the butter is higher colored, and has an excellent flavor.

Ques. — When you first began to feed your stock on ensilage, did your cattle like it? Did they eat it as though they were hungry for it?

Ans. — The first time we fed it to the cattle, they all took readily to it, except two; and they did not refuse it more than five minutes. The cattle now all refuse the best English hay or dry rowen when there is any ensilage within their reach. The flow of milk has kept up the same as when fed on rowen ensilage.

Ques. — What quantity of ensilage do you consider will keep a cow six months, or through the season for feeding?

Ans. — I think a cow can be kept through the winter on seven tons and a half corn ensilage, and four hundred pounds shorts; but think a cow would thrive the best, to feed her five tons and a half of ensilage, fourteen hundred pounds hay, and five hundred pounds corn-meal.

Ques. — What is the general appearance of cattle fed upon ensilage?

Ans. — My cattle all look better, and appear more contented, than when fed on dry fodder.

Ques. — What do you consider the difference in the cost of labor, by feeding and caring for the stock, by ensilage and the same by hay?

Ans. — If the silo is convenient to the stable, there is no difference.

Ques. — In regard to the success of ensilage, or preserving of our green crops for fodder for our stock, in what way is it going to be of great benefit, profit, or saving to our farmers?

Ans. — First, it will enable us to make milk and butter in winter as well as summer.

Second, it will enable us to winter our stock at one-half the expense of dry fodder.

Third, we can keep, on the same amount of cultivated land, a much larger stock of cattle, which will increase our supply of manure, so that our farms will increase in fertility and value.

In conclusion, I will say that I am so thoroughly convinced that ensilage will be of great value to me, that in the spring I shall build three silos, sixteen feet long, twelve feet wide, fifteen feet deep. Two of them I shall fill with corn-fodder, the third with clover and rowen. I remain yours respectfully,

GEO. L. CLEMENCE.

CHAPTER X.

CORRESPONDENCE FROM

MR. B. AUSTIN AVERY.

SYRACUSE, N.Y., FEB. 5, 1881.

H. R. STEVENS, *Boston, Mass.*

Dear Sir:

Your letter of 29th ult. is received, and contents noted. I have been very busy since the receipt of your letter, or I would have answered your numerous inquiries earlier. I seize the opportunity to-day to reply to your inquiries *seriatim*.

I consider the Mammoth Sweet Corn and horse-tooth corn the best to plant for ensilage.

I plant with a drill, three feet apart.

I have considered the cost per acre of raising the corn ready to cut for the silo, including the value or worth of the land, at seven dollars per acre.

Without actual measurement of the land, which I considered was eleven acres, it yielded twenty-two tons per acre.

This being my first experience with ensilage, I have not tried to preserve any grasses, or other food than corn. This coming summer, however, based on my present experience, I intend to construct another and larger silo than my present one, and preserve a large quantity of both orchard-grass and clover, as well as fill my present silo again with corn.

I used one of Bradley & Co.'s reaping-machines for the purpose of cutting the corn, and which did its work in an admirable manner. They are manufactured at Syracuse, N.Y.

I am fully satisfied that ensilage needs to be cut fine. I would say, under no circumstances cut more than half an inch long.

I commenced cutting my corn about the 1st of September last, and immediately conveyed the same to the silo, where, on a platform, I had erected two Daniels cutting-machines, run by a small stationary engine, and so arranged that the corn dropped into the silo as it left the cutters, where I had men stationed to spread it evenly, and to insure thorough packing. I introduced a pair of small mules to tramp the same, keeping them constantly stirring, and close to the sides and ends of the silo. I had men and boys to tramp where the mules could not reach.

My silo is seventy feet long, twelve feet wide, and twelve feet deep, containing, as per measurement, ten thousand and eighty cubic feet, or two hundred and forty tons at forty-two feet per ton; and the actual cost (exclusive of constructing the silo) of the ensilage in the silo is sixty cents per ton; and with the benefit of last year's experience, I feel confident I can reduce the expense of again filling the silo, at least one-third, making the actual cost for the coming year not to exceed forty cents per ton.

My silo is constructed on a level with the cow-stalls, in the basement of the barn. I think it would be full as well, if in dry soil, that the silo be eighteen or twenty feet deep.

I am not fully prepared to say that wood would not answer the purpose in constructing a silo; but I am fully satisfied that stone or concrete is the more available, with smooth sides to allow the weight on the top of the silo to press evenly, and exclude all the air possible. I regard the short cutting, thorough tramping, and heavy pressure on the top, the great essentials in preserving the food in good condition to feed to advantage.

I opened my silo about the 1st of November last, and commenced to feed about one hundred head of cattle out of same at once. Not one of any kind of stock on the farm refused it: and all, with the exception of the pair of mules, ate it very greedily. (I think the mules must have been disgusted with the part they were obliged to play in tramping it.) Previous to opening the silo, I had been feeding my cows on good hay; and, after three days feeding of ensilage, they had each increased, on an average, a quart of milk per day. I commenced feeding about forty pounds per day, and increased to about sixty, and just about what they would eat clean without waste.

My mode of feeding the ensilage has been, to take out the same

from the silo, and expose to the air from eight to ten hours before feeding, a part of the time, and then feeding direct from the silo while yet warm. I have found, by the experiment, that the cattle enjoy it either way, and I think perhaps as well, if not better, when given them directly from the silo, and with full as great advantage to the stock.

My mode of feeding has been, in the morning, to give a feed of corn cut and steamed, which was cut and left standing in the field at same time the corn was cut for the silo. This the cattle will eat in the morning very well. At noon I give each cow about sixty pounds of ensilage, and in the evening I give a small quantity of hay from the mow.

I feed ensilage without any thing else mixed with it, and obtain equally good results as when I fed hay and grain; yet I believe still better results might be obtained by feeding about three quarts of oil or cotton-seed meal, or corn-meal and shorts: but whether enough better results might be obtained in producing milk, to pay for the expense, I doubt; but for the laying-on of flesh, or fattening for the stall, I am convinced it would pay well.

It certainly costs me one-half less labor to feed ensilage than either hay or corn-stalks, as ordinarily cured.

The horses, calves, milch cows, turkeys, ducks, and chickens (all except the mules, true to the very stubbornness of their nature, even on ensilage) have eaten it from the very first, feed with avidity and relish I have seldom witnessed. The turkeys and chickens, etc., have not been fed an ounce of grain this winter, except such as they have obtained from the silo, and a finer plumaged set of birds I never saw; and I have never succeeded in getting as fat turkeys as I now have, even by the most skilful feeding.

The milch cows have eaten it with equally great if not even better relish than the young cattle, and have kept up their full flow of milk all the while.

I consider, from my present experience, that from five to five tons and a half of ensilage, on an average, will keep a cow through six months without grain, in good fair condition.

I have now fed my milch cows and young stock on ensilage since the 1st of November last; and I challenge, not only the county of Onondaga, but the entire Empire State, to produce a practical working dairy of milch cows, with better forms and condition, brighter, healthier eyes, softer skins, sleeker coats, and more extended udders,

than mine. Hence, I say, that ensilage properly preserved is a healthful food, and very digestible; and every farmer knows that cows cannot maintain a full and healthy flow of milk, good forms and general condition, sleek coats, soft skins, and bright eyes, unless the food given assimilates, which is necessary to produce the above qualities.

I do not keep any sheep on my farm, and therefore cannot state the cost of keeping same.

I have never practised soiling cattle.

I know of no reason why cattle would not do well fed on ensilage the year round, with a slight run at pasture occasionally for a change; although my experience, so far, is limited by my present feeding of ensilage this winter.

I have farmed it now for over thirty years on my present farm; and, for over twenty years, I have never sold a ton of hay off the farm, having always deemed it necessary to feed the same on the farm to keep up the average flow of milk during the winter, and, in addition, feed for six months of the year grain — costing me never less than a hundred dollars per month, and often as high as a hundred and fifty dollars per month — with this hay. This year I have already drawn to market fifty tons of hay, which I have sold from twelve to eighteen dollars per ton, according to quality and change in market, and intend to sell fifty tons more before spring, or as soon as I can market it; and have, since the first day of November, fed the ensilage without a pound of grain of any kind; and my stock to-day are certainly in as good, if not better, condition, as any winter in twenty years, when I fed the grain and hay combined; and the flow of milk is fully up to the standard of any period under the old system of feeding.

Now, in closing this letter, let me state what I consider justly due to my friend, the Hon. Daniel Bookstaver, ex-mayor of Syracuse, who first gave me encouragement to build a silo, and kindly gave me the benefit of his extended reading, and a goodly portion of his time in supervising the construction and filling of the silo; and who was the only man in the whole county of Onondaga who insisted upon it that it would be a success; and whose faith never wavered a particle, when it seemed as if not only my neighbors, but all who came to see it, would go away to publicly pity me that I was making such a fool of myself. But Mr. Bookstaver always calmly replied to these *wise men*, "Wait and see: they laugh longest who laugh last;" "It has succeeded in France, it will succeed here;" and bolstered me up

always with his invincible courage and belief; and his every prophecy in relation to the silo has been fully verified, and I am reaping the benefit in a golden harvest.

I am fully convinced from my success, and the number who now come to see the silo, and watch the cattle as they are fed, and their surprise and conviction against their previous prejudice, that there will be, instead of my single silo in this county another year, at least fifty next year, and in less than five years more than one thousand.

If the information I have so hurriedly given you will prove of any benefit to my countrymen, I am only too glad to have been enabled to give it to you.

Yours, etc.,

B. Austin Avery.

It appears by the statement of Mr. Avery, the gain in feeding his stock with ensilage, compared with former years, will be the sale of a hundred tons of hay, which would average fifteen dollars per ton (fifteen hundred dollars); also the saving of a hundred and twenty-five dollars, the average per month of grain, six months (seven hundred and fifty), making a total of $2,250; also the increased quantity of milk, which was an average of one quart per day per cow, after three days feeding, and also saves one-half the labor, in feeding with ensilage; and his cattle are in better condition than they have been for twenty years.

CHAPTER XI.

THE ADVANTAGES AND VALUE OF GREEN FORAGE CROPS BY ENSILAGE, OVER THE SAME IN THEIR NATURAL OR GREEN STATE.

BY PROFESSOR M'BRYDE.

Ensilage gives the farmer the means of readily preserving such crops in the cheapest and easiest manner. No other method can compare with it on the score of economy. Goffart, in an itemized statement, shows that the cost of gathering and "ensilaging" about two hundred and fifty tons of Indian corn does not exceed twenty cents per ton. His laborers, men and women, cost him from twenty cents to thirty-seven and a half cents each by the day. Another French agriculturist, M. de Beauquesne, puts the cost at twenty cents for the long ton, 2,250 pounds. Both these gentlemen use steam-power. Another, who uses horse-power, estimates the cost at sixty cents for the long ton. Dr. Bailey states that the cost of cutting down the corn, hauling it to the cutter, cutting it up, and packing it in the silo, was not far from seventy-five cents. The same work at the University farm costs sixty-eight and three-fourths cents per ton. We put up about seventeen tons: the labor was charged at seventy-five cents per day for each hand. It should also be observed that the cutting is properly no part of the cost: it should be done whether the corn is green or dry, as a measure of economy, to avoid waste in feeding, and to save the animal as much muscular exertion in the act of eating as possible. It can be done cheaper, once for all, than from day to day, as required by the usual practice of feeding. Third, the value of the food so preserved is beyond all question. It comes out of the silo green and succulent, and as fresh as when first put in, — the slight changes which it undergoes being all for the better. After repeated trials, under various conditions, and with different kinds of stock, many French farmers declare that three hundred pounds, not a few that two hundred pounds, of this ensilage, are fully equal to one hundred pounds of the very best hay. Goffart (and

after him Dr. Bailey) draws attention to the fact that a given weight of grass, amply sufficient when green to fatten an animal, will hardly suffice to keep him alive when it is cured up into even first-class hay; that grass fattens, while hay will not; that grass gives rich milk and golden butter, hay inferior milk and pale, insipid butter; that the odor of a new-mown meadow shows that the elements of nutrition are escaping from the grass during the process of desiccation.

Such observations, however, are neither new nor original. More than thirty years ago Bousingault observed of the value of green food, "Breeders have long suspected that green fodder is more nutritious than dry; that grass, clover, etc., lose nutritious matter by being made into hay."

That the thing is so, in fact, appears to have been demonstrated by a skilful agriculturist, M. Perrault de Jotemps, who found that nine pounds of green lucerne were quite equal in foddering sheep to three and three-tenths pounds of the same forage made into hay; whilst he at the same time ascertained that nine pounds of green lucerne would not, on an average, yield more than two and two-hundredths pounds of hay. In allowing each sheep three and three-tenths pounds of lucerne hay as its ration, consequently, it was as if the animal had had fourteen and thirty-four hundredths, or more than fourteen and one-fourth pounds of the green vegetable, for its allowance. These practical facts are obviously of great importance: they prove, beyond the shadow of a doubt, that the belief of agriculturists in general, as to the immense advantages of consuming clover and lucerne (and he might well add Indian corn), "as green meat, is well founded." Green-corn forage is not a perfect or concentrated food, a large amount being required to sustain life; still, as experience demonstrates, it is a very valuable one, and its cheapness allows of its being fed in large quantities. Analysis, not always a safe guide, supports the conclusions of practical men. In the following table the first two analyses, of green corn and ensilage from the silo of Dr. Bailey, are by Professor Goessman, of the Massachusetts Agricultural College; the others, of French maize and ensilage, by M. Grandeau, director of one of the leading experimental stations of France: —

	American-grown Indian corn (or maize).	Ensilage (maize) from silo of Dr. Bailey.	French-grown maize.	Ensilage (maize) from silo at Burtin.	Ensilage (maize and straw mixed) from silo at Cercay.
Water	85.04	80.70	86.20	81.28	60.71
Crude cellulose. . .	4.53	6.43	3.67	4.91	8.70
Fats	0.26	0.62	0.18	0.36	1.50
Ash	0.82	1.77	0.95	2.25	8.43
Non-nitrogenous matters.	8.49	8.92	8.10	9.73	16.48
Nitrogenous matters .	0.86	1.56	0.90	1.24	3.74
Acid	. . .	. . .	. . .	0.23	0.44

It will be seen that the American samples of green corn and ensilage compare very favorably with the European. European feeding-stuffs generally show higher percentages of nutritive elements than the American. The sample of American ensilage is richer than the French in albuminoids. In both the value of the process is clearly shown in the increased richness of the food.

It is contended by some, that the process of ensilage cannot change the character of the material used, or make corn richer. But such a change really occurs. All persons acquainted with chemistry know, that, of two substances identically alike in composition, one may be nutritious and the other not. Crude cellulose, like the lint of cotton, cotton or woollen rags, saw-dust, paper, etc., are rather unpalatable, as well as indigestible, articles of food for man; and yet their treatment with sulphuric acid converts then into glucose, or molasses, an article in daily use on our tables. Such transformations take place in the corn subjected to ensilage, according to Grandeau: parts of the starch and celullose are transformed into sugar, and the albuminoids are increased at the expense of the carbo-hydrates. The subsequent fermentation on exposure to air imparts to the corn an acidity or alcoholic taste very acceptable to animals. Any thing sour is not only more relished, but, such is the part played by the imagination in digestion, also more nutritious. Again, the softness of the food saves the muscular exertion in mastication.

The French committee already referred to in their report dated April, 1875, observe that the cows of Goffart had been fed exclusively on ensilage during the winter. "We were struck by the healthy appearance of the twenty-eight or thirty cows: their eyes were

bright, their skin soft, and they were in good condition. But the point that above all attracted our attention was the sucking calves, which are the most delicate, and always the first to suffer from any deficient or bad food given to their mothers. We did not see a single one that had hair in bad condition, or that was scouring. The fodder that produced this excellent result contained neither salt nor oil-cake, and one would naturally inquire if it would be sufficient in all cases. For very good milkers it would be necessary to add some meal or oil-cake to the rations of maize which we saw distributed, and which weighed about sixty-one pounds per day; but for the cows in the stable of M. Goffart, weighing alive eight hundred and eighty pounds to eleven hundred pounds, this ration seemed to be sufficient for them and their calves."

It is contended by no one that ensilage will fatten an animal: it must be enriched by the addition of nitrogenous matters, or the albuminoids, furnished by corn-meal, wheat-bran, ship-stuff, oil-cake, etc. A successful Scotch farmer, Mr. Hunter, settled in Hanover County, Virginia, fed twice daily to each of his twenty head of fattening steers, two quarts of corn-meal, and a bushel basket of ensilage (about twenty-seven pounds). The effects of this ration were exceedingly marked and satisfactory; the animals making rapid and large gains during the continuance of the experiment, which lasted six weeks. It would seem, therefore, that from fifty-five to sixty-five pounds of ensilage (corn) daily to the thousand pounds of live weight will be abundantly sufficient to keep animals in good store condition, and that forty-five to fifty pounds mixed with three or four pounds of corn-meal will rapidly fatten them. Its effects upon the flow of milk have been remarked on by all writers on the subject. The general testimony of dairymen is, that no feeding-stuff will compare with green Indian corn in increasing the yield of milk: it is decidedly superior to roots.

Hence an abundant supply of such food in greatly improved condition, during the winter months, is so great and so obvious as to challenge the attention of every one. In this great department of agriculture, dairying, it indeed promises a revolution.

Another advantage of no small importance to the farmer is, that by this process he is rendered comparatively independent of the weather. He knows, to his cost, the trouble and worry of hay-making, — how that his crop may be seriously damaged, perhaps destroyed, by a single day's rain. In this process, he would almost

welcome rain, in moderate quantity, as much as in hay-making he would dread it. The secret of the process lies in the thorough exclusion of air from the vegetable mass in the pit, or silo. The tissues of which all plants are composed are made up of minute closed cells, or elongated tubes of very small calibre: these are hollow within, and the cavities must be filled either with air or water. When the plant is fresh and green, it is surcharged with moisture which penetrates its tissues, and fills these cavities: when wilted, the water escapes by evaporation, and air takes its place. This air is retained with great tenacity, and its expulsion is a matter of much difficulty. Hence the importance of packing away the corn, or other green matter, in as fresh and succulent a condition as possible, and the advisability of sprinkling it with water if wilted, in order to keep it moist, and so prevent the entrance of air.

Again, in a dry spring the hay crop may fail; but corn can be sown at any time, in this latitude, between the middle of May and 10th of July, and, if need be, in continued succession. Very rarely is the whole season unpropitious: if the spring is too dry, the late summer is more favorable: hence, with such a crop as corn, the chances are greatly multiplied.

CHAPTER XII.

CORRESPONDENCE FROM

CAPT. G. MORTON.

ESSEX, VT., FEB. 2, 1881.

MR. H. R. STEVENS.

Dear Sir:

I am glad you are starting to do something towards giving farmers reliable, practical information on the, to them, most important matter, the preservation of green crops in silos for ensilage. I receive many letters from the South, in fact, from all parts of Florida, Alabama, Georgia, New York, Maine, and Vermont, — all wanting the same information you propose giving to them. I am an old sea-captain; was placed on the retired list a few years ago, after forty-five years of seafaring life; and all I know about farming had to be learned from the agricultural papers. Two years ago I first read Mr. Morris's report, of Maryland, about silos: I concluded to dig one in the ground. I dug a trench four feet wide, and about as deep, extending it to hold what I had of sowed corn on a half-acre, packing it into the trench without cutting, rounded up the top, put a length of boards on lengthwise, put on a few stones, then ploughed and shovelled dirt on to the pile, well rounded up to make it shed water; opened in winter, and found it preserved perfectly, except at the upper corners, where it was badly frozen; but the cows ate it all up clean. Last year I saw Dr. Bailey's letter, also Mr. Potter's, on silos; and, out of the stone of an old wall about the barnyard, I built a silo sixty-three feet long, twelve feet wide, nine feet high, with partition-wall in the centre: wall laid up dry, and pointed with lime-mortar outside, and banked up six feet all around, pointed and plastered with lime inside, with cement floor. My reason for building it so long was that I struck water after excavating four feet near the barn, and I feared it would trouble me, so I lengthened it out into dryer ground; but I

am happy to say, the cement floor kept out the water, and I shall this year build it to twelve feet high, and finish by a good lot of cement on the inside walls. The cheap way of building a silo has demonstrated that any farmer can build a stone wall with inside smooth, bank up against it so as to keep the air from sides, put on plenty of weight, at least half a ton to square yard, and he has a silo that will preserve fodder as well as a more expensive one for the first year or two; and he will then have a good foundation to build higher as he wishes. Of course, the proper principle to build on is two alongside, the central wall answering for both; which I intend to do another year.

My method for raising corn-fodder is to haul thirty tons of manure to acre, and plough it under, four inches deep; then thirty tons more, and well harrowed in; and plant as early as we do for corn, in this climate, latter part of May to middle of June, with a planter, in drills about two feet apart, and three kernels to the foot in the drill. I should also say, and very important it is, to use phosphate. I used Bradley's in the drill, at the rate of three hundred and fifty pounds to acre, to give it a start, and as much more sowed broadcast; for I have found out that I can raise as much from one acre well manured and cultivated as from *three* half done. I use no other cultivation after planting than the Thomas smoothing-harrow, and go over the ground once a week, after planting and before coming up, without regard to rows: harrow as if there was nothing planted until the corn is a foot high. The whole cost by this method will not exceed five dollars per acre, ready for cutting up. Average quantity per acre last year, thirty tons. Half of it was not manured: the best part averaged seventy-five tons to the acre, and taught me to make the ground rich. I used with best results Blunt's Prolific and Southern White, called the "horse-tooth." It will take, as I planted, about five pecks to the acre, put into silo what grew on two acres. The best machine, by all odds, that I used, and I had three of them, is a Baldwin cutter. Mine is No. 14, costing sixty dollars, plenty large for a common farm. I cut into one-fourth inch cuts; and, when cooked in the silo, it comes out soft and delicious. I have anticipated your question about my experience with filling silos. The cost per ton did not exceed fifty cents from the seed until thoroughly packed in silo. The best form to build is undoubtedly deep and short; but we must be governed by the circumstances and location. Stone, I think, is best and cheapest when they can be had; next, brick and cement. About here, where stone is

plenty, whole cost of mine was about a hundred dollars. I would not recommend plank; for I find, where the plank comes in contact with the ensilage, it is decomposed three inches. I opened my silo 6th of last November, and found the preservation perfect. All the stock took hold of it at once as if they were hungry; and horse, cows, yearling calves, and shotes have eaten since with increased relish.

I saw to-day the calves picking the bits of ensilage up, instead of meal fed with it. Not having enough ensilage to winter all my stock, I have, since the first month, fed corn-meal and bran: mixed seventy pounds per day to the twenty-seven head, — thirteen cows, eight yearlings, six calves, five shotes, and one horse. When fed alone I gave forty to sixty pounds to cows, and in proportion to young cattle, one bushel to the swine, with one-tenth corn-meal and bran, and increased quantity of grain until I now feed to the whole stock, including horse, two hundred and fifty pounds ensilage, a hundred and fifty pounds corn meal and bran, a hundred and thirty pounds of hay cut fine, same as I cut the ensilage, the whole mixed up in a mess for the twenty-four hours, at night; and all the cattle are in extra good order. This has been remarked by the many, at least a hundred, that have been to visit the silo this winter, I being pioneer in the new departure in these parts. Before I forget it I wish to say that cutting my hay fine has reduced the quantity of both it and ensilage one-half. I learned this from reading an article in "The Country Gentleman," where a farmer had cut hay for twenty-five years with same result; and the advanced thinkers amongst those who have been here consider this cutting hay and straw, and mixing all together, a very important matter.

The long time that I have fed in this way satisfies me that it is an excellent plan to feed ensilage. I am still milking seven of the cows, and they give more than they did on the 6th of November, when I commenced feeding ensilage; milk and cream looks like it did in June, as does the butter. I use the language of a leading farmer, a few days since, when examining the butter: it goes to a grocer who supplies the officers of the Boston Navy-yard. It netted us thirty-three and one-third cents per pound, when other best winter butter was selling for twenty-two to twenty-six.

I wish also to state that as soon as I commenced feeding ensilage the cows doubled their milk. Please bear in mind that I had fed green fodder night and morning, from middle of July, and after September two quarts of meal and bran, the pastures being dry. Of

course nothing but the ensilage could have made this difference. My wife, who has made butter on this, the old homestead, for forty years, says she never saw cows give such a quantity of milk in winter. Last winter I fed the same quantity of meal with hay, and the cows were all dry before January; and yet, with all these facts, I have neighbors who will advocate feeding corn in the bundle, without husking, so tenacious are some people of old customs. I told a man to-day, "Why, you might just as well have told me, when I was master at sea, to heave shingles overboard, to find my way back with, instead of using sextant and chronometer."

I take the ensilage out of silo any time of day, sometimes feed immediately after taking out. I don't see any difference in its effects, and cattle like it equally well either way.

One part of silo, when I had a heavy weight of stone, — three-fourths ton to square yard, — it was very little acid; and even what I am now feeding has a pleasant smell and taste. I think ensilage is worth as much, ton for ton, as hay fed with grain as I am now feeding, better than either alone. I intend to put into our silo this spring, or by the first of June, green rye, oats, and grass enough to fill it for summer and fall feeding, and plant corn after. I shall then have my first crop to put into the other silo in August, and also plant our small corn after haying, to help fill in. I intend to build the other silo, giving me three, and keep cows up nights, feeding twice in summer. I am satisfied that other crops, with grass mixed with the ensilage, will supply its deficiencies and stop the everlasting going to mill; from my experience this winter, I think forty pounds of mixed ensilage (I mean put into silo green) per day, for average-sized cows, will keep them fat the year round. I know I have some small cows that do not need that quantity of ensilage alone, and they are the best milkers in the stable. The cattle all like it better than the best of June-cut hay: this I have proved many times, by seeing hay left, but ensilage never. I will repeat that our cattle look better than ever before, when fed on hay and grain; and such experienced farmers as Talcot and Whitney of Williston, and Taylor in charge of Col. Cannon's stock farm of Burlington, said they had not seen any stock looking better, and few as well, this winter. I give the credit entirely to ensilage, for I had no more meal than usual. I learned long since that we cannot expect *something* from *nothing*, and, by reading as well as observation, that the farmers who are in the advance are those who feed stock well. In conclusion, I would only say to farmers,

Go on, and build your silos, and you will be as enthusiastic as those who have already tried it. I am keeping three times the number of cattle that was ever before kept on this, the old homestead; and I could have had one hundred tons more, without interfering with my other farming, by simply planting five acres more of common corn after haying.

Respectfully your obedient servant,

CAPT. G. MORTON,
Essex, Vt.

CHAPTER XIII.

REPORT FROM

MR. CLARK W. MILLS.

POMPTON, N.J.

FOR NEW YORK TRIBUNE, Feb. 12, 1881.

REVOLUTION IN DAIRY FARMING.

ENSILAGE used for food instead of hay. Successful experiments near Pompton, N.J.

No proposed change in time-honored methods of agriculture has excited so deep an interest among progressive farmers as the recent experiments in preserving green forage crops in silos, or cement-lined pits. One of the earliest adventurers in this new field was Mr. Clark W. Mills, of Arrareek Farm, near Pompton, N.J.; and his silos are now as extensive as any in the county, and this success last year was so encouraging that he is now wintering one hundred and twenty head of horned cattle and twelve horses, without a pound of hay; and he is confident that he will bring his entire stock through until May weather furnishes grazing. His store of ensilage (or "cow-kraut," as facetious farmers style the preserved fodder) was gathered from less than thirteen acres of land; and it is simply the stalks of Indian corn, cut when green into half-inch lengths, and

packed in silos, under pressure so tightly as to exclude the air. Mr. Mills estimates the entire cost of his supply of about six hundred tons, including seed, tillage, gathering, cutting and packing ready for feeding, at less than five hundred dollars; and when it is remembered that a sufficient amount of hay to answer the same purpose would have cost something like seventy-five hundred dollars, the value of the new process will be recognized.

Yesterday a number of gentlemen from various parts of New Jersey visited Arrareek Farm to make a personal inspection of the method of preparing the ensilage, and its results. In the party were the Hon. James Bishop, chief of the State Bureau of Statistics; Professor George H. Cook, of the Agricultural College, and State Geologist; Theodore West, superintendent, and A. T. Neale, chemist of the State Experimental Farm, besides several prominent stock-raisers, like Messrs. Holly and Ahrens of Plainfield; Nelson of New Brunswick; Ridgeway, Hutchinson, and Taylor of Burlington County. In the barn, which is eighty feet long, there was not a wisp of hay, but two pits, each forty feet long, thirteen feet wide, and twenty feet deep, with strictly perpendicular walls of concrete. One silo had been emptied; and from the other a section of the cover had been removed, and the ensilage cut out to the bottom, having a perpendicular wall for inspection.

Mr. Mills has found, by experiment, that the freshly-cut maize can be compressed in volume nearly one-half; and therefore he places a frame of plank fifteen feet high, and of the same width and length of the silo, upon the concrete wall, and fills the space to the top of the wooden feeder. Upon the mass a cover of plank is placed, loaded with heavy weights; and in a few days the cover will have pressed the mass below the mouth of the pit, on a level with the floor when the frame is removed. The cover is of two-inch plank, made in sections of four feet in width ploughed and grooved, firmly battened, with the battens of each section projecting, and fitting into those of the next one, so that, under equally distributed weight, the whole moves downward together. The sections are an inch shorter than the width of the pit, leaving a space for air and gases to escape as the cover is pressed downward. The weight used is about fifty tons of grain in sacks, which is ground for feed as it is taken from each section.

The ensilage yesterday inspected was perfectly preserved, from the top layer to the bottom. When cut from the solid mass it is of a brownish-green color, and the juices have a slightly acid taste. It

has gone through no "heating" process; but, before feeding, it is laid in a heap for a few days, to ferment slightly, when it emits a pleasant vinous aroma. The cattle devour it eagerly; and their appearance seems to prove that it is healthful, while the abundant milk they produce is of the best quality.

Mr. Mills feeds less grain than farmers ordinarily use in hay-fed dairies. A tall variety of Southern corn is planted closely in drills; and it is cut after the tassel appears, and the ears begin to set. Professor Cook, who has analyzed ensilage from a dozen localities, pronounces the Pompton product of the first quality; and he thinks the various devices here used have reduced the system to a state approaching perfection. All the experts present were convinced that the new process would work something like a revolution in dairy-farming and stock-raising; which will be readily believed when it is remembered that more than thirty million tons of hay are now needed every year to supply the horses and cattle of the country through our long Northern winters.

CHAPTER XIV.

CORRESPONDENCE FROM

DR. L. W. CURTIS.

GLOBE VILLAGE, MASS., JAN. 7, 1881.

MR. H. R. STEVENS.

Dear Sir:

Your request has been received: but if I were not much interested in silos, and believe they are to renovate the New-England farms, I should hesitate to answer so many questions, as it taxes a tired brain to write, while it is just fun to go to the barn and see the cows eat ensilage; but, believing they are to add millions to the farmers of New England, I accept your invitation, and proceed to answer your questions in detail.

QUES. — What is your method of planting and raising corn-fodder for ensilage?

Ans. — I have usually planted my fodder-corn between the rows of early peas, cabbages, and potatoes, and, when those crops were taken off, run a cultivator or horse-hoe between the rows once only. Never put a hoe into a field of fodder-corn. Last summer we ploughed up some where the grass had been taken off, put some manure in the rows, and planted July 14; cultivated with horse-hoe once, and had a good crop. Last fall, after I took off my fodder-corn, I sowed winter rye, which I shall put in my silo, and then plant with fodder-corn. I think farmers should aim for two crops a year.

Ques. — What time of year do you think best to plant for ensilage?

Ans. — Should sow fodder-corn from June 10 to July 4, or even later.

Ques. — About how much do you plant an acre?

Ans. — I have usually planted one and a half bushels to the acre, but think it will stand up better, and perhaps do as well, to plant only one bushel of the Southern White, but more of any other kind. I have planted thick, so the stalks would not be too large.

Ques. — How much corn-fodder for ensilage do you think is an average yield per acre?

Ans. — I think we can raise from thirty to fifty tons to the acre, according to the condition of the ground.

Ques. — Do you plant or raise any grains or grasses for ensilage?

Ans. — I put in my field corn-fodder first, mostly mixed with corn-fodder; next came Hungarian, and finally rowen.

Ques. — What do you think is the best machine for cutting corn-fodder?

Ans. — I do not think there is much difference between a Baldwin or Lyons machine. I think either will do good work. My preference would be for the "Silver and Deming." I have come to the conclusion it stands at the head.

Ques. — What length do you consider most suitable to cut corn-fodder?

Ans. — Should cut it two-fifths of an inch long.

Ques. — Will you give me your experience with silos?

Ans. — My silo is built on the back side of my barn, the top being on a level with the floor where my cows stand. To get fourteen feet, I had to excavate about four feet. As I had no time to draw stones, and had a sand and gravel bank within ten rods, I built my walls of stone, gravel, sand, and cement, — three parts cement, four parts sand, and one gravel. In commencing I found I was using too fine

sand, and finally discarded the use of sand, and used gravel, size of a pea down to very coarse sand. I also found that some barrels of cement were not good; which makes a great difference in the setting of cement, gravel, etc. I shall build two more silos the coming summer. There are many farmers who have no gravel near, and have a good place in their barn cellars. If so, they can make a good one out of plank and matched boards, or two thicknesses of matched boards, with tarred paper between. One of this kind can be put in very cheap. There are hundreds of farmers who could raise up their hay-floors, and make silos in their barn-cellars, like my friend Clemence, whose fodder has kept just as well as mine. It would cost them very little.

Ques. — Your experience with cutting and packing corn-fodder for ensilage in the silos?

Ans. — I think a silo should be filled as rapidly as possible; certainly not less than one foot a day. It should be spread evenly, the stalks and leaves well mixed. It should be well trodden. I should keep one man there all the time; and, if I was filling fast, I would put in two. I say *tread, tread:* you cannot do too much of it.

Ques. — What do you consider would be the most practical size and form of silo?

Ans. — My silo is twenty-four feet long, fourteen deep, and twelve wide. I would not build a larger one, unless I run a partition through the middle. I supposed it would hold from forty-five to fifty tons, but I now think it holds more than seventy-five tons. No man who never saw one filled would believe they would hold one-fourth as much as they do.

Ques. — About how much did your silo cost?

Ans. — The help employed cost me sixty dollars; cement, forty-five dollars. I had the gravel and stone, and supplied the brain-work myself. This is for the walls. The excavating cost but little, as a large share was done with a scraper. I do not think my whole cost of every thing, except brain-work and sand, was over a hundred and twenty-five dollars, and believe if I had nothing else to do, with my present experience, could put one up like it for a hundred dollars. I should want plenty of time, so that I could select my days, and give it time to set, at the bottom particularly.

Ques. — What do you think is the best and cheapest material for building silos?

Ans. — If the materials are handy, build a concrete wall, of stone, gravel, coarse sand, and cement.

Ques. — Where and what do you consider the best location ?

Ans. — The location should always be convenient to the stable: a side hill is far preferable. It should always be placed where the ensilage could drop from the cutter into the silo.

Ques. — Have you opened your silo to feed ensilage to stock? If so, did it come out satisfactory?

Ans. — The silo was opened Dec. 3. Although cold, the cows increased in milk a quart a day, and some two quarts. I would add, that the rowen that was the dryest had a very fragrant smell, while that which was put in when very wet has a very agreeable smell; but the cattle eat it just as well, and it does not make the milk taste, unless it lays in the stable while milking. I should not fear to put in any kind of grass uncut, but should want heavy pressure, say a foot and a half of stones.

Ques. — When you first began to feed your stock with ensilage, did your cattle like it? Did they eat it as though they were hungry for it?

Ans. — My man said they acted like a hungry boy eating pie. They will eat this in preference to hay.

Ques. — Did your milch cows, when you first fed them with ensilage, eat it as well as young cattle?

Ans. — It makes no difference what kind of stock, — cows or young cattle.

Ques. — What quantity of ensilage do you consider will keep a cow six months, or through the season for feeding?

Ans. — I should say, five or six tons of corn-fodder, but two less of rowen or early-cut grass.

Ques. — What is the general appearance of cattle fed upon ensilage?

Ans. — Cattle look healthy and sleek. My cows have roots, and a full pint dish of cotton-seed meal. They seem more contented, and look better than usual.

Ques. — In regard to the success of ensilage, or the preserving of our green crops for fodder for our stock, in what way is it going to be of great benefit, profit, or saving, to our farmers?

Ans. — In the first place, he can soon double his stock, and, in the second place, employ less help, — making a double profit.

Suggestions. — I would not let corn-fodder wilt. Should prefer a dry day; but should, after I began, work any day that was fitting for man to work. If my field-corn fodder was a little dry, should mix it with my fodder corn. Almost any land will grow winter rye:

ensilage this, and put the manure on the fodder corn. Any ground will raise a good crop of fodder-corn. The manure made from this, put on the next crop of rye. It will increase that crop, and leave the ground in a condition to grow a good crop of fodder-corn without any more manure. A farmer can put in his first or second crop of hay without any drying, thus saving a great deal of trouble.

Yours respectfully,

DR. L. W. CURTIS.

CHAPTER XV.

CORRESPONDENCE FROM

PROFESSOR J. M. M'BRYDE.

KNOXVILLE, TENN., JAN. 18, 1881.

DEAR SIR:

Although much over-crowded with pressure of work, my interest in the subject of ensilage prompts a hasty reply to your questions. My experimental report will give you all the practical experience I possess. I shall attempt no theoretical discussion, but only supplement the report by recent results of experiments.

You will see that I put up last summer and fall nearly seventy-five tons.

Silo No. 3 (the most unpromising of the three built, because in digging it it we found the upper layers of soil loose and crumbling, — consisting of made earth, — and were only prevented from abandoning the work by the fact that the silo adjoined the basement of the barn in which our cattle are stabled) was opened Dec. 27. It was only three parts full, and the walls, in consequence of the long-continued rains, had fallen in from the top; yet we found the preservation of the ensilage absolutely perfect. I could desire no greater success.

Fed to all kinds of stock.

Was eaten by all greedily, and with every appearance of relish, — horses, mules, cattle, pigs, all enjoyed it. I believe, if you have a

good, firm, dry, and compact clay subsoil, that a simple earthen pit makes the very best silo. Science supports this conclusion, the result of my experience, for the antiseptic and absorbent powers of soils are now well known; and the earth-walls permit the ready escape of the air forced out by the enormous pressure from above. The location should be near the barn for convenience in feeding, on the upper side of a hill-side barn, in order to be on a level with the basement in which the cattle are stalled (such is the position of our No. 3).

I have only experimented with the large Southern field-corn: from the liability of all varieties to mix, I confess I have my doubts as to the superior merits of the much-lauded mammoth varieties. Seed imported from Central America would be probably the best. I expect to have numerous experts this season, testing, not only different varieties of corn, but every other forage-plant grown. There can be no question as to the superior feeding value of ensilaged clover; and I believe the several cuttings, afforded by certain forage-plants during season, will equal amount of corn. Ensilage is, at at least, fifty per cent cheaper than hay.

Finally I will give you a few practical hints. In taking ensilage from pit, it is best to only uncover a very narrow section of end, and to cut the slice, not more than a foot or so wide, down to bottom from top. Remove this, and spread loosely and thinly on barn-floor: it keeps perfectly for ten days and upwards, becoming slightly more acid, and is more relished by stock, and the loss of weight by evaporation is slight. The thin spreading prevents any rapid changes and consequent loss.

Such management is more economical, as a large quantity can be more cheaply moved at once; and also by removing whole slices, it prevents loss that will follow if only several layers are removed, and some left without covering and weight; for, in this case, the upper remaining layers are spoiled by contact with the air for a few inches down. We have had some thus loosely spread for three weeks, without any deterioration or change, except the increased acidity mentioned above, being visible.

Finally, again, one writer contends, I see in a recent article, that the acetic fermentation first takes place. A sample of ensilage taken with great care from the interior of the pit, and excluded from the air, and immediately placed under the field of the microscope, revealed not only the characteristic fungi of the acetic fermentation, but also those of the alcoholic. No doubt both processes occur simultaneously.

Bacteria, etc. (living organisms), were also visible in considerable quantities. The fungi and the organisms were exactly similar to those found in the yeast, etc., examined at same time.

I will communicate later on the results of my numerous, and I can say accurate experiments, as they are ascertained. I will be glad to furnish you any further assistance desired.

Respectfully,

J. M. M'Bryde.

CHAPTER XVI.

CORRESPONDENCE FROM

MR. F. E. LOUD.

WEYMOUTH, MASS., JAN. 5, 1881.

Mr. H. R. Stevens,

Dear Sir:

My attention was first attracted to the subject of ensilage by an article in "The Country Gentleman," in November, 1879, which referred to the subject in general terms, and alluded to the translation of the work of M. Goffart by J. B. Brown of New York. I immediately set about getting the work, and read it with increased interest. My experiments are made in all respects according to the experience and suggestions of that writer; who, by the way, I consider to be the only reliable authority so far published. I take pleasure in answering your inquiries, as far as my limited experience allows, in as brief a manner as possible.

Ques. — What is your method of planting and raising corn-fodder for ensilage?

Ans. — On May 20, 1879, I planted a hundred and fifty square rods of land well adapted to growing corn, which had been in grass for several years; ploughed it in the fall, and, as soon as the frost was out of the ground and it was dry enough, spread the manure,— eight cords to the acre, — and harrowed it in thoroughly; after that, until the time of planting, run over it with a cultivator, to keep the

weeds down, and to mix thoroughly the manure with the soil. The corn was planted in drills, four feet apart, the kernels from five to six inches apart in the drills. This was done with an Albany corn-planter; and, as often as the weeds began to show themselves, run over it with a Thomas smoothing-harrow, until the corn was a foot high: this kept them down, and the ground light. The season being dry, I cultivated, once a week, till the corn covered the ground, then used the hoe to keep the weeds out.

Ques. — What kind of corn do you think best to plant for ensilage?

Ans. — The variety planted was "Blunt's Prolific;" which grew twelve feet high, on an average, when tasselled out.

Ques. — What time of the year do you think most suitable to plant corn for ensilage?

Ans. — I would state, that it is practicable to grow two crops on the same land, by sowing winter rye in the fall, after the corn is harvested; which will be ready to cut by the 1st of June, in season to plant corn for the fall.

Ques. About how much corn-fodder for ensilage do you average per acre?

Ans. — The product of the field was twenty-five tons. Several different square rods of the crop being weighed, the average of the field would make that amount. On 12th of August began to cut and pack in silo.

Ques. — What do you think is the best machine for cutting fodder for ensilage?

Ans. — The machine I used was the "Baldwin Hay Cutter, No. 15," driven by a portable steam-engine. All was cut and deposited in fifteen hours' working time. There was some delay, as the machine was new and untried.

Ques. — What length do you consider most suitable to cut corn-fodder?

Ans. — The corn was cut three-eighths of an inch long, and, as fast as cut, well trodden down by two men constantly walking over it.

Ques. — Will you give me your experience with silo?

Ans. — A word about silos. They should be built one-half or more underground, for the reason that the temperature is lower and more even.

Ques. — Your experience with cutting and packing corn-fodder for ensilage in the silos?

Ans. — As regards the storing of the corn, one man with a grass-

hook will cut it down as fast as two teams will cart it to the silo; one man to feed the cutter, and one to tend the engine, and two to tread it down. I think another year I can store the crop for seventy-five cents per ton.

Ques. — What do you consider it costs per ton to raise the corn-fodder from the seed, and have it thoroughly packed for ensilage in the silos?

Ans. — The expense of cultivation, including one-half the cost of manure taken up by the crop, was $2.08 per ton; the cost of putting into silo was one dollar per ton: making $3.08 per ton all packed in silo.

Ques. — What do you consider would be the most practical size and form of silo?

Ans. — The size will have to correspond with the number of cattle to be fed, say five hundred cubic feet to a full-grown animal for the year. The form, a parallelogram twice as long as it is wide. I should prefer a silo with two compartments, each twenty-five feet long, ten feet wide, and fifteen feet deep, to one twenty-five feet long and twenty feet wide, for this reason: it will cost but a little more to build a partition-wall; and with this arrangement you can fill one side with corn in the fall, and the other with rye, clover, or Hungarian, in the late spring. Such a silo, of the size named, will hold enough to keep fifteen cows a year.

Ques. — What do you consider the best and cheapest material for building silos? Some are built of brick, some of stone and cement, some of concrete, and some have been built up with plank with quite good success.

Ans. — The walls should be of dry stones faced with concrete.

Ques. — Have you opened your silo to feed ensilage to stock? If so, did it come out satisfactory?

Ans. — Opened the silo Nov. 27, and found the experiment a perfect success. The top of the mass, about two inches thick, was a little affected by fermentation; which might have been prevented by covering it deeper with rye-straw before weighting it down, say about eight inches thick. After getting into it, the ensilage proved highly satisfactory. In order that you may fully understand my way of estimating the contents of my silo, and manner of feeding, I would say, that, when fully pressed down, the twenty-five tons occupied nine hundred and sixty cubic feet, or thirty-eight and a half cubic feet to a ton, provided there was no loss of weight.

Ques. — Please give me your experience in feeding to stock, and kind of stock.

Ans. — In one month I fed to three cows, one of them in milk, one hundred and twenty-four cubic feet of ensilage, which should weigh something over three tons. By other experiments, I find that I am feeding about sixty-six and two-thirds pounds per cow daily. What the exact loss of weight is, I have not yet determined.

Ques. — What time of the day do you take the ensilage from the silo?

Ans. — We go to the silo every afternoon.

Ques. — How long do you let it stay exposed to the air before feeding it to stock?

Ans. — Take out sufficient for twenty-four hours.

Ques. — What quantity, and how often, do you feed?

Ans. — Feed night and morning. With this, I have given two quarts of wheat-bran per cow, and have now commenced feeding the same quantity of cotton-seed meal, with a little of the shorts per cow daily.

Ques. — What do you think is the comparative cost of ensilage of corn or maize with hay ?

Ans. — In comparing the cost of feeding ensilage and hay, I find it to be as follows: —

COST OF ENSILAGE PER DAY.

66⅔ pounds of ensilage cost	10¼ cents.
3½ pounds of cotton-seed meal costs . . .	4¾
	15 cents per day.

COST OF HAY PER DAY.

25 pounds English hay at $22 per ton costs . .	27½ cents.
3½ pounds cotton-seed meal	4¾ cents.
	32¼ cents per day.
Cost of ensilage	15 cents per day.
Difference	17¼ cents per day.

The price of good English hay has averaged with us twenty-two dollars per ton for several years in the market, and is now worth from twenty-five to twenty-eight dollars per ton. By the above, it will be seen that it costs double to feed with hay, while the difference of the product of an acre cultivated to ensilage crop or hay is still more striking.

Ques. — What is the effect of ensilage, compared with hay, upon the milk and butter?

Ans. — The result has been an increase in the quantity of milk, without any deterioration in the quality or flavor of the milk or butter produced.

Ques. — When you first began to feed your stock with ensilage, did your cattle like it? Did they eat it as though they were hungry for it?

Ans. — All kinds of stock eat it with relish and without waste.

Ques. — What quantity of ensilage do you consider will keep a cow six months, or through the season for feeding?

Ans. — This experiment proves that an acre of corn ensilage is capable of keeping two cows a year; while the average quantity of land required to keep a cow in the usual way is six acres of mowing and pasturage, as by agricultural reports; and, besides, it is not half the labor to feed the stock in the barn.

Ques. — What is the general appearance of cattle fed on ensilage?

Ans. — The condition of my cows is much better than when fed on hay, being in a thrifty state, and with the addition of cotton-seed or oil-cake will take on fat readily.

Yours truly,

F. E. Loud.

It appears by Mr. Loud's experiments in feeding, ensilage shows a saving of fifty-four per cent, compared with the cost of hay, with a greater flow of milk, and other advantages, in favor of ensilage.

CHAPTER XVII.

CORRESPONDENCE FROM

MESSRS. WHITMAN & BURRELL.

DEAR SIR:

Your favor at hand. We send you by this mail, report containing description of our silo. Hope this will be satisfactory. We will gladly furnish any further information that we can.

Our silo is on the hill-side next to the barn. The bottom of the silo is on a level with the cow-stable floor, and there are entrances into silo from both the cow-stable and the floor above. The top of the silo is on a level with the upper or main floor of the barn, so that the fodder can be taken out on to either of the three floors of the barn. You will appreciate the convenience of this arrangement. The silo is built of stone; the walls are three feet thick next to the bank, and two feet thick next to the barn; the roof of barn extends over silo. All around the walls twelve inches of cobble-stone are filled in from top to bottom, so as to prevent any water lodging against the walls. Capacity of entire silo, about four hundred tons, or two hundred tons for each compartment. On June 1st we put in about seven acres of corn, with a drill, rows twenty-one inches apart, and dropping six or eight kernels to a foot; in September we cut same, hauled to the silo as fast as we cut in the field; and with a feed-cutter of largest size, or next to largest size, we cut at the rate of over one hundred loads per day, into pieces three-sixteenths to one-fourth of an inch in length, which was evenly distributed in the silos, and trodden down. The corn was large, stalks twelve to fourteen feet high, single ones weighing five to five pounds and a half, with ears on full of milk. Into one silo we put sixteen feet, and into the other eleven feet; as soon as filled (one taking three days, and the other four) we put on the covers. These are of plank, three feet wide, sixteen feet long, and two inches thick, fitting together

closely; and upon these covers we put fifty tons of stone to each silo (stone picked up on the farm). Within a week one had settled to twelve feet and a half, and the other to eight feet and a half. On the 26th of October we opened the silo having the eight feet and a half of ensilage, and found the fodder as green and sweet as when first put in; we used no straw under the covers, and yet right next to the boards the corn was all right. We have fed the stock since Oct. 26; and they are all right, looking and feeling well. One cubic foot of ensilage weighs forty-seven pounds: we are feeding sixty-five pounds to each cow per day, with four pounds of middlings and a half pound oil-meal (cotton-seed meal). We had, before we began feeding the ensilage out to the stock, two hundred and twelve tons; and the exact cost of harvesting it, filling the silos, putting on stone, etc., was two hundred and seventeen dollars, allowing full wages for our own time, etc. We are now going to feed fifty to fifty-five pounds to each cow per day, and increase the grain to about six or seven pounds for the cows still giving milk, and half as much to the dry ones. This two hundred and twelve tons from seven acres, or a little over, is a large result, and is equal to seventy-odd tons of hay, costing but three dollars per ton, or ten tons to the acre. We believe that by putting all the manure back on the seven acres of land, that we can get up to forty, and possibly fifty, tons to the acre. We see no reason now why the cows that are being fed on ensilage will not continue to do well in condition and product; and our plan now is to raise about fifteen acres of corn next season (1881), and this will be sufficient to fill the silo full, giving us four hundred tons, and this will keep forty cows three hundred and sixty-five days; but as we shall pasture all of the side-hill during the summer season (about twenty acres), the pasture will also grow better, because the cows drop more upon it than they take from it. We think we can give the cows all they will eat, morning and night, of the ensilage, and keep in this way fifty head, the year round, on fifteen acres of corn, and twenty acres of hill-side pasturage. We, however, immediately after taking off the corn early in September, ploughed up the stubble, and put in winter rye. This came up finely, and we will top-dress it this winter, and early in the spring give it a good bushing-in. We expect to cut the rye by June 1 or 5, and cut that up the same as we do the corn, and store it in one of the silos, then immediately plough the same seven acres, and put in corn; whether this will work, remains to be seen. But we have full confidence in the

perpetual fertility of this corn-land, because it is to be replenished, not only with what grew upon it, but from the grain fed with the ensilage; for, by the plan we have adopted, the liquid manure is as perfectly saved as the solid, and the most accurate experiments show that the fertilizing matter of the liquid is greater than in the solid manure. Professor Stewart reports that he has found the manure from one cow standing upon the self-cleaning platform, carried fresh to the field, the liquid all absorbed by the soil, equal to the manure from three cows saved in the old way, by throwing into a pile and carried to the field months afterwards. In fact, there is no fertilizing matter wasted or lost, except that carried off in the milk.

The beauty of this system is, that, instead of spreading the manure from forty or fifty cows over two hundred acres, we use it all on the fifteen acres that furnish the fodder; and shortly the land must become very rich, and then we can use the manure on other land. If we were to build a silo on level land, we would excavate ten or twelve feet below the surface, and then let the walls of silo run up ten feet, using the earth that was excavated to make a bank about the walls above ground; we would locate the silo close to the barn, making the top of silo on a level with the barn-floor, over the cows; then, in feeding out of the silo, the fodder could be easily raised with any of the same appliances used for raising and carrying hay; and, with a track running to the shutes, the car could be dumped so that the fodder would be deposited in front of the stock. The walls of the silo should be perfectly plumb and parallel, so that the followers, although fitting closely, can settle without binding when loaded with stone. As you build the silo walls, point up as you proceed, both inside and outside, and then plaster the entire inside (bottom as well as sides) with Portland cement, as it is necessary that the silo should be water-tight like a cistern.

In regard to size of silo, we would make them twenty feet deep, and put them as much below ground as possible, if good drainage can be had, banking up around the outside with the earth that is excavated, as before stated. A silo thirty feet by sixteen feet, and twenty feet deep, will be large enough to contain two hundred tons of pressed ensilage; and this would keep thirty-five cows six months, feeding about sixty pounds per day. For one hundred cows, we would advise building a silo one hundred feet long, dividing it into three compartments by means of two cross walls, and then feed out one at a time. This would provide an empty silo in the spring, which

would be ready for the winter rye, clover, June grass, etc. (Hungarian can't be grown early); which could be harvested early in June, cut up same as corn-fodder, and stored in the silos for summer feeding. Our ideas are, that it is best to give the stock a good feed from the silos every morning and night during the summer, in addition to pasturage. Now, as to whether people can afford to put in silos, etc., we can only say that on our upland farm we had, at the beginning of winter, two hundred tons of hay. If we had put in fifteen or twenty acres of corn, and cut and stored it in the silos, we would now have been able to have spared all of the two hundred tons of hay; and, as the price is now extreme (twenty dollars per ton), we would have received for it enough to have paid all expenses of building both barn and silo, besides raising and harvesting the corn-fodder, and we should have had fully as much manure to put back on the farm as we will have now by feeding the hay. The stock would be kept as well upon the ensilage as upon hay, and yield as much manure; and the hay that could be sold at eight to ten dollars per ton would pay all expenses the first year. The right kind of corn for seed costs eighty-five cents to one dollar per bushel; and we hope to get a feed-cutter capable of cutting ten to twelve tons per hour, or a hundred tons per day, for about a hundred and fifty dollars, and not require over a two-horse tread-power to run it. Corn-ensilage is probably not a perfect food for cows in milk. Linseed meal, or cotton-seed meal, with bran or oatmeal, will produce a good flow of milk. Fifty-five or sixty pounds of ensilage-food, with three pounds of linseed-meal and four pounds of bran, will answer satisfactorily. We submit all this for what it is worth. Every one had better investigate thoroughly for himself.

Yours most truly,

WHITMAN & BURRELL.

It seems that Whitman & Burrell planted seven acres, on which they raised two hundred and twelve tons, allowing the cost to be two dollars per ton: they say, if they had planted fifteen acres of corn, and put it into silo for ensilage, they would have been able to have spared and sold the two hundred tons of hay. Allowing these fifteen acres to produce four hundred and twenty-four tons green corn-fodder, costing two dollars per ton, eight hundred and forty-eight dollars, and allowing they sold the two hundred tons of hay at twenty dollars per ton, which would be four thousand dollars, deducting the

cost of four hundred and twenty-four tons of ensilage (which is more than equal to the two hundred tons of hay), it leaves a very handsome margin, or gain of $3,152 in favor of ensilage. Can any Western farmer show such margins of profit for same amount of money invested?

CHAPTER XVIII.

CORRESPONDENCE FROM

MR. J. P. GOODALE.

WEST PEABODY, MASS., JAN. 10, 1881.

MR. H. R. STEVENS, *Boston.*

My Dear Sir:

In reply to your letter of Dec. 31, I will write a few lines, as far as I have had experience, to answer your numerous inquiries.

QUES. — What is your method of planting and raising corn-fodder for ensilage?

ANS. — I have raised corn-fodder for several years by planting in drills.

QUES. — What kind of corn do you think best to plant for ensilage?

ANS. — The kind of corn I think best to plant is what some call the large ensilage corn. It grows more fodder to the acre than any other corn that I know of.

QUES. — Will you please give me your method of labor in raising corn-fodder for ensilage?

ANS. — My method last year was to plough the ground, and harrow it, furrow it, making the rows four feet apart, plant from twelve to sixteen quarts of ensilage corn per acre.

QUES. — What time of the year do you think most suitable to plant corn for ensilage?

ANS. — Plant the first part of June.

QUES. — About what is the cost per acre of raising corn-fodder for ensilage?

Ans. — The cost per acre would be: I should allow one-half the cost of manure, — I use fertilizer, Stockbridge, cost twenty dollars per acre; the labor would be ploughing, planting, and cultivating, which would be about ten dollars. As to hoeing, it needs none. If planted in June, the corn will grow so fast it will kill all weeds.

Ques. — About how much corn-fodder for ensilage do you average per acre?

Ans. — I raised, I think, about forty tons per acre.

Ques. — How many acres do you plant for ensilage?

Ans. — I planted four acres.

Ques. — Do you plant or raise any grains or grasses for ensilage?

Ans. — I cut several tons of second crop (rowen) for ensilage.

Ques. — What do you think is the best machine for cutting fodder for ensilage?

Ans. — I used Baldwin's improved fodder-cutter, said to be the largest in New England, that would cut it short enough.

Ques. — What length do you consider most suitable to cut corn-fodder?

Ans. — We cut a part three-sixteenths of an inch, and a part three-eighths of an inch. It is slow work to cut it so short.

Ques. — Will you give me your experience with silos?

Ans. — I began to build my silo about the 20th of July. It was built the same as a house-cellar, of stone, forty feet long, fifteen feet wide, and fifteen feet deep. If we allow forty cubic feet to the ton, it would hold two hundred and twenty-five tons of ensilage when filled.

Ques. — Your experience with cutting and packing corn-fodder for ensilage in the silos?

Ans. — I finished my silo the last of August. Every thing worked to a charm. I cut my corn-fodder with steam-power; and in packing I kept one man in the silo all the time tramping, and a part of the time a man with horses tramping it down. When it was all in the silo, and well tramped, I put on a covering of straw over the whole of the ensilage, then planks on the straw, and stone and small rock on top of the planks. This was done as soon as possible after I got it filled.

Ques. — What do you consider it costs per ton to raise the corn-fodder from the seed, and have it thoroughly packed for ensilage in the silos?

Ans. — The cost of packing in the silos is from one dollar to one

dollar twenty-five cents per ton. Allowing twenty dollars for Stockbridge fertilizer, ten dollars for labor, and one dollar per ton for putting in the silos (and I have no doubt I raised forty tons to the acre), and now allow ten dollars per acre for any extras there might be, which added makes it cost eighty dollars per acre, or two dollars per ton, packed in silo.

Ques. — What do you consider would be the most practical size and form of silos?

Ans. — For size and form, it would be best to suit the location.

Ques. — What do you consider the best and cheapest material for building silos? Some are built of brick, some of stone and cement, some of concrete, and some have been built up with plank with quite good success.

Ans. — About the building material, I should say what is handy and the cheapest.

Ques. — Have you opened your silos to feed ensilage to stock? If so, did it come out satisfactory?

Ans. — I opened my silo the first part of November; and the ensilage came out nice, as good as I could wish to have it.

Ques. — Please give me your experience in feeding to stock, and kind of stock.

Ans. — We feed two bushels to a milch cow, with grain, cotton-seed, and shorts, per day, and no hay. The dry cows, no grain. The oxen, the same as milch cows. We are feeding five fall calves on ensilage with grain: they look first-rate. We are feeding eleven cows, one bull, five calves, and one pair of oxen, with ensilage.

Ques. — What time of day do you take ensilage from the silo?

Ans. — We take it from the silo morning and night. We take the rocks off from the planks, and throw the ensilage up on the planks, and take it from there into the barn as wanted.

Ques. — How long do you let it stay exposed to the air before feeding it to stock?

Ans. — It is taken out sometimes two or three days ahead, and sometimes right from the solid ensilage.

Ques. — What quantity, and how often, do you feed?

Ans. — We feed two bushels to a milch cow, with grain and shorts, per day.

Ques. — What do you think is the comparative cost of ensilage of corn, or maize, with hay?

Ans. — We are using nine hundred pounds of ensilage per day.

If we fed English hay, it would take more than three hundred pounds per day: I think a saving of one-half.

Ques. — What is the effect of ensilage, compared with hay, upon the milk and butter?

Ans. — I think ensilage is good for milk: as to butter, we make none.

Ques. — When you first began to feed your stock upon ensilage, did your cattle like it? Did they eat it as though they were hungry for it?

Ans. — My cows did not all eat it the first day, but by the third day they all ate it. I have a pair of new oxen just bought to-day that will not eat it. Some horses that come here will dive into a basketful up to their eyes.

Ques. — What quantity of ensilage do you consider will keep a cow six months, or through the season for feeding?

Ans. — I think sixty pounds per day will keep a cow.

Ques. — What is the general appearance of cattle fed upon ensilage?

Ans. — The general appearance of cattle is that they gain flesh, and generally look better than when fed on hay.

Ques. — In regard to the success of ensilage, or the preserving of our green crops for fodder for our stock, in what way is it going to be of great profit, benefit, or saving, to our farmers?

Ans. — In regard to profit, it will be in raising a large amount of fodder on a small quantity of land.

Quite a number of questions you ask, I am not prepared to answer.

Yours respectfully,

Jacob P. Goodale,
Peabody, Mass.

Box 206.

It seems Mr. Goodale is feeding about twenty head of cattle in all his stock. He feeds nine hundred pounds of ensilage per day. He feeds grain with his ensilage, and would give same if he were feeding hay; perhaps not as much with ensilage as with hay. If he fed with hay, it would take, as he says, over three hundred pounds per day to take place of ensilage. His ensilage cost him two dollars per ton packed in silo, making cost of nine hundred pounds, ninety cents, — a day's feed for his stock. If he fed three hundred pounds of hay, — twenty-five dollars per ton is now a low price, — the cost per day

would be $3.75, making a gain per day of $2.65 in favor of ensilage. In six months' time, or during the feeding season, the gain would be, in favor of ensilage, $518.70; and, if fed on ensilage the year round, would show a very handsome gain, which would be $1,037.40, to say nothing of other advantages, — increase of milk, butter, and better condition of stock.

CHAPTER XIX.

CORRESPONDENCE FROM

BUCKLEY BROTHERS.

PORT JERVIS, N.Y., JAN. 27, 1881.

MR. H. R. STEVENS.

Dear Sir:

I have not the time or the ability to answer all of your inquiries, as we have them come from all quarters. We send you the enclosed report: —

"This morning the Buckley Brothers of this village opened one of their silos on the farm of Charles Buckley, between Port Jervis and Sparrowbush. The ensilage was found to be in fine condition; and, when fed to the cows, they ate it readily. There had been much speculation as to whether the ensilage would be fit to eat when the silos came to be opened, but there can no longer be any doubt on this subject.

"Last summer Messrs. Buckley built two silos, to give the ensilage system a test. The silos were put under the cow-stables; and each was nine by twenty-two feet, and fifteen and a half feet deep, built side by side, with a two-foot wall between them. Into these were put the green corn from about eight acres of land, making between one hundred and twenty and a hundred and forty tons of fodder. The corn-stalks were cut green at the tasselling, and were chopped about half an inch in length. When the silos were filled, a layer of straw was put upon them, and the planks were laid close together,

running crosswise; and, to press the air out, tons of stone were placed upon the planks. The fodder had settled two feet. When the planks were removed, a vinous or alcoholic odor arose. The surface was found to be spoiled to the depth of about two inches. When this was removed, the fodder was found to be sweet and nice; and a very pleasant odor saluted one. The fodder was warm, not too much so, and seemed to preserve the same temperature as far down as we could penetrate.

"The only thing which disappointed us was in the color of the fodder. We had vaguely supposed it would preserve its green color; but, where we got the idea, we do not know. The ensilage, however, is not green, but of a light brown or dark straw color. This is all proper, we believe.

"Mr. Buckley had given his cattle their usual supply of hay in the morning. When the silo was opened, the cattle were fed the ensilage. Nearly all of them ate it with evident relish at once, Mr. Buckley said; and *all* ate it in time. When we visited the stables the cows had eaten all the better part of the ensilage, in fact, all except the spoiled coating before alluded to; and they were licking the floor where it had lain. We threw some of it to them, and they ate it eagerly.

"The opening of this silo convinces us that the proper way to preserve fodder for cows, horses, sheep, and all farm-stock, is in the form of ensilage. The nutritious qualities of all green food are preserved unimpaired, and it is relished by the cattle. For these reasons it makes a superior fodder. Added to this is the fact, that it 'goes farther' than all other foods furnished, and enables the farmer to keep at least one cow to every acre of land, and do it nicely and advantageously.

"He will next summer build two more silos, and let ensilage be the main fodder for his stock. We think it must in time become the most economical way of keeping stock. Are well pleased with it. Put eight cows on it for eight days, fed them their usual allowance of feed and turnips the same as we fed with hay; and at the end of the eighth day, the cows had increased one and a half quarts a day each."

Yours truly,

BUCKLEY BROTHERS.

CHAPTER XX.

PRACTICAL EXPERIENCE WITH ENSILAGE.

BY

PROFESSOR M'BRYDE.

THE history of my first experiment with ensilage is as follows: — My attention having been particularly drawn to the process by the published accounts of the French experiments, and being convinced of its great agricultural promise, I determined, soon after my arrival here last September, 1879, to test the matter experimentally for myself. To follow the directions laid down by Goffart, was simply out of the question: the expense would have been too great; and the experiment, even if successful, would have possessed but little practical value for the farmers of the South. Not one in a thousand would be able to build silos costing hundreds of dollars, and to buy cutters and engines footing up hundreds more. It has ever been my declared aim to make my experiments as simple and practical as possible, — such as would have immediate value for the agricultural public, and such as could, with moderate care and outlay, be successfully undertaken by any intelligent farmer. My ensilage experiment was, therefore, purposely of the very simplest description.

A pit was prepared on the northern side of a small grove, and on the edge of a dry knoll, nine feet long, six feet wide, and six feet deep. The soil was a strong, firm clay, over a close, dry, and compact red clay subsoil. The sides of the pit were neither bricked up nor cemented. Owing to the long-continued drought, the corn at the time of cutting was dry and wilted. It was cut down when the ears were beginning to fill, with sickles, about the middle of September, and immediately carted to the pit after being weighed. It was carefully laid lengthwise in the pit, and closely packed, layer by layer.

The mass was carried up vertically six feet above the surface of the pit, in order to allow for its settling. About three feet of the clay

was then thrown on top, and it was allowed to stand for twenty-four hours. At the expiration of that time it had settled down almost to the surface. It was then heavily trampled, and more clay thrown on the top and sides. In a day or so more the mass had settled down well within the pit. The pit was closely watched for some time, and all cracks covered up. It held thirteen thousand pounds of the green corn. As its capacity was three hundred and twenty-four cubic feet, the ensilage must have weighed about forty pounds to the cubic foot. When opened on the 13th of December last, three months after it was filled, the mass within was found to be sound and fresh, and but slightly changed in appearance; the edges and top alone, to the depth of an inch or so, being somewhat damaged.

One end only of the pit was opened. The soil was taken off from this end, and the ensilage removed by cutting a slice out vertically downwards. An axe had to be used for this purpose, so great was the compression of the mass. After a few hours' exposure to air, alcoholic fermentation set in. This food was greatly relished by the stock. The end of the pit was left uncovered, except that a little straw was thrown on top of the opened section. The ensilage was fed out during the months of December, January, and February, remaining sound and unaltered to the last. The plan pursued the present season differed somewhat from the one just described. Two additional silos were prepared. No. 2 (last year's silo being called No. 1) was made and filled in the following way: —

Like No. 1, it was simply a pit ten feet deep, ten feet wide, and twenty feet long, dug in a dry and compact subsoil. The corn was cut down (Aug. 4 and 5) with sickles, and immediately hauled to the pits in carts, where it was dumped, after being weighed in an adjoining scales-room. It was then passed through a No. 11 Sinclair feed-cutter driven by a one-horse railway (tread) power. This cutter repeatedly sliced up a cartload weighing five hundred pounds, into pieces one-half inch in length, in five minutes time. All the machinery used was simple, and comparatively inexpensive, and such as would be useful for many other farm purposes. The corn fell from the cutter directly into the pit, where it was packed down by heavy trampling. About thirty-five thousand pounds of corn were thus packed away.

The upper part of the pit was filled with thirty-three thousand pounds of green clover treated in the same way; this crop packing more closely than corn, and hence promising a more perfect protec-

tion from the air. The mass was carried up vertically, three feet above the surface of the pit. The pit was open three days, and the ensilage had settled down very much during that time. The clover was covered with a few inches of chaff, boards were placed transversely across this, and above all the required weight (about one hundred pounds to the square foot of surface). This weight was furnished by a covering of red clay. Clay generally weighs about eighty pounds to the cubic foot. In a few days the mass had settled down to the surface. A rough shed gives protection from the weather. The whole cost of "pitting" the corn, cutting it down, hauling it to the cutter, slicing it up, packing it away in the pit, etc., as before stated, was only $11.25 for 17.45 tons (the yields of sixteen experimental plats), or about sixty-eight and three-fourths cents per ton. The cost of "pitting" the clover, where the mower could be used to cut it down and the horse-rake to gather it up, was something less. The weather was overcast during the whole process, and hence very favorable. After the lapse of several weeks the mass is only an inch or so below the surface of the pit, and it will settle no more.

As the pit had a capacity of two thousand cubic feet, and held but sixty-eight thousand pounds of corn and clover, and was about full, and could hold but little more, the pitted food, or ensilage, must have weighed from thirty-four to thirty-five pounds to the cubic foot.

The old pit, No. 1, was filled this year in the same manner as No. 2, after being enlarged and made eight feet deep, six feet wide, and nine feet long. Its capacity was three hundred and ninety-six cubic feet. It was filled entirely with green clover, cut up and packed down like the corn. It held fifteen thousand four hundred pounds. The settling after the same lapse of time is no greater than in the case of No. 2. Hence, the weight of a cubic foot of "pitted" clover is about thirty-five pounds, the same as that of corn. A cubic foot of the corn put up last year weighed about thirty pounds. Hence, it is safe to put the weight of ensilage at from thirty-five to forty pounds to the cubic foot. It is generally estimated as high as fifty pounds.

Silo, or pit, No. 3 was eleven feet and a half deep, twenty feet long, and ten feet wide, with a capacity of twenty-three hundred cubic feet. It was our original intention to cement it within, the cement to be applied directly to the clay walls. This method is generally followed in the vicinity of this city in making cisterns, and nearly always with success. But the pressure of other work,

and more especially the unfavorable nature of the soil, interfered with this plan; and the silo is merely a pit like the others, but with one end formed by the brick wall of a hill-side barn. The cattle are stabled in the basement of this barn, and a door will be cut through the partition wall so as to allow of convenient access to the pit. It was filled in the same manner as the two preceding. The corn was cut down Sept. 14 and 15. The weather was clear and dry during the operation, and hence rather unfavorable. 43,538 pounds of corn were first put down. For the sake of experiment, a thousand pounds of common hay, five hundred pounds of clover hay, and five hundred pounds of straw, were packed down in alternate layers with the corn in different portions of the silo. The upper part was filled with 5,165 pounds of German millet, treated in the same way as the corn. The millet was cut on the 16th of September. It was just out of bloom. The filling took four days, and the mass settled down greatly during that time. The pit was not quite full. A layer of about six inches of straw was put on top of the ensilage; boards laid above this, in the manner already described, and twenty-one thousand six hundred pounds of old brick placed above all, to give the desired weight. This weight gave a pressure of one hundred and eight pounds to the cubic foot. The pit is covered by a simple shed.

From a careful comparison of the published results of numerous experiments, I have every reason to believe that corn will keep as well in pits dug in the naked clay, as in bricked-up and cemented silos, provided the clay is dry and compact. The chief drawback to the use of such pits is their liability to cave in when emptied of the ensilage in the spring. If this can be prevented by temporary supports, props, etc., then my experience and observation, thus far, is in favor of this kind of silo, — the cheapest and the simplest yet described. A correspondent of "The Country Gentleman" contends that ensilage will keep better in such pits. He states that he has experimented for a number of years past with brewer's grain, endeavoring to discover the best mode of keeping it. He has tried stone, brick, and cemented vaults, barrels and wooden vats, and found none to compare with pits dug in a good clay or other dry soil. He is inclined to attribute the superiority of these to the preservative action of the soil itself.

There may be something in this. Soils are known to possess remarkable absorptive and antiseptic properties. It is more than

probable, however, that the earthen walls allow of the more easy and rapid escape of the air enclosed in the mass of vegetable matter, the superincumbent pressure being sufficient to force it out into the interstices, which are found even in the most finely comminuted clays. In cemented silos this air can only escape at the top, through the covering of straw and boards. A few words as to the *rationale* of the process. The great object to be attained is the thorough exclusion of air, which contains oxygen, the great agent of decay. Goffart, until quite recently, held that the ensilage underwent some kind of fermentation which preserved it from further decay. Within the last few years, however, he has "become convinced," — he does not give us the grounds of his conviction, — that the ensilage is preserved absolutely unchanged, and that it does not ferment until after its removal from the silo, and its subsequent exposure to air. Others, notably Dr. Bailey, contend, as before remarked, that the oxygen of the small amount of air left in the mass unites with the carbon of the vegetable matter, and forms carbonic acid, which bathes the mass, and expels, by its superiority of weight, the scanty residuum of air, and prevents its re-entrance.

All this seems to be mere hypothesis: what we want are facts. But, even in a theoretical point of view, such changes do not necessarily occur. No one, not even Goffart, would contend that there is a perfect exclusion of air, and that all has been expelled from the vegetable matter. Now, it is highly probable that the oxygen of this included air, instead of combining with the carbon of the ternary principles of the plant, unites with its albuminoids. It is well known that nitrogenous matters, such as flesh, white of eggs, blood, fibrin, gluten, etc., are the first to decay or putrefy. This putrefaction is induced by their union with the oxygen of the air. In the presence of the sugar, starch, and other amylaceous principles of the corn, its decaying albuminous matters act as ferments, and convert the sugar, etc., into alcoholic and carbonic acid; in other words, induce alcoholic fermentation. But, as the corn, etc., has but a small content of albuminoids, the fermentation is soon arrested, for want of material (ferment). Hence the fermentation is slight, and the mass remains comparatively unchanged. In my experiment of last year, the pitted corn, or ensilage, at the opening of the pit, was not altogether unchanged. There was every evidence of some alcoholic fermentation: the mass was slightly discolored, presenting the boiled appearance of the grass preserved by the East Prussian method before described, and possessed an alcoholic taste and odor.

CHAPTER XXI.

CORRESPONDENCE FROM

MR. JAMES S. CHAFFEE.

WASSAIC, N. Y., FEB. 7, 1881.

MR. H. R. STEVENS, *Boston, Mass.*

Dear Sir:

Yours of the 31st ult. at hand. In reply, I will endeavor to partially answer your questions, thus stating what little I know about ensilage, and thus fulfil the requests made by you.

I consider the variety of Southern corn known as "White Norfolk" to be best suited for ensilage. "Blunt's Prolific" may be better, but I have had no experience with it. The corn should be a large-stalk-producing variety; as large stalks, beside giving a larger yield per acre, are much better suited for ensilage than smaller ones.

Plant in drills, with sufficient width between the rows to permit of horse cultivation, and use not to exceed one bushel of seed per acre.

Upon a piece of five acres that I raised last season, I compute the whole cost per acre of planting and cultivation, exclusive of fertilizers, to be about seven dollars and thirty cents; and, as the average product was thirty tons, it makes the cost of labor per ton less than twenty-five cents.

I have not as yet raised any grains or grasses for ensilage, other than corn.

I have used for cutting ensilage the Telegraph fodder-cutter, manufactured by Willson Brothers & Co., of Harrisburg, Penn. I like this machine very much: it does its work thoroughly and easily, although its capacity (about five tons per hour) may be too limited for some.

The ensilage should be cut a half-inch in length, or less. I cut, last season, about five-eighths of an inch in length, at the rate of twenty-five to thirty tons per day; packed and tramped it down

thoroughly, in a silo fifty feet long, twelve feet wide, and sixteen feet in depth. When the ensilage was all in, six inches of uncut wheat straw was placed on the top, the whole being covered with an inch and a quarter spruce plank, of sufficient length to reach across the silo, and fit closely between the walls. These planks were weighted with stone, at the rate of a hundred pounds to the square foot. The ensilage was about fourteen feet deep: it settled some three feet.

When the plank and stone were taken off at one end, two months after they were placed thereon, there was found to be a little at the top unfit for use; but the remainder of the mass, nearly eleven feet in depth, had fermented somewhat, was brown in color, of a slightly alcoholic odor. On being placed before the cattle, some ate it at once, with an evident relish; and, in a day or two, every animal of a herd of fifty would eat ensilage in preference to any other forage.

I think the cost should not exceed two dollars per ton, all expenses told, to grow ensilage, pack it in the silo, and place it before the animal for consumption. I should advise a parallelogram, — the length three or four times the width, depth sixteen to twenty feet, corners rounded, or filled in, to make the angles as obtuse as possible, — as being the most practical form of silo.

It should be constructed of masonry; and, if cobble-stones and gravel are easily obtained, concrete walls will be the cheapest, and as durable as any other. For one month I fed thirty milch cows twice daily upon ensilage, giving them from sixty to seventy pounds each per day, with about ten per cent of that weight additional in oil-meal, wheat, shorts, and hominy-chop. There is nothing I have ever used, unless it may be roots, and plenty of them, that will make a flow of milk equal to ensilage of fodder-corn, for winter feeding.

I am now feeding ensilage but once per day, as I have not sufficient to last until spring without supplementing with hay.

The ensilage is fed in the morning; being taken from the silo the previous day, and exposed to the air for fifteen to eighteen hours, with no bad results, and apparently no change as to its chemical properties. It is fed to milch cows, and the same rations grains are used as when feeding hay or other forage. I do not think it will cost more than one-half as much to winter a cow with ensilage as it will with dry fodder, while the milk products will be certainly five per cent greater.

A neighbor of mine has made the experiment of feeding a portion of his dairy upon ensilaged corn, while another portion were fed

upon hay; and the milk of the cows fed upon ensilage being tested by experienced parties, was found to be much superior in quality to the milk made from hay, the ration of grain being the same in both cases. I have cut and steamed my dried forage for my stock for a number of years; but I find the silo effects a great saving of labor, compared with the steam-box, while the product of the latter is in every way inferior to the well-preserved contents of the former. I think a ton of ensilage, with ten per cent of its weight additional of oil-meal, wheat, shorts, etc., is sufficient feed, and will keep an average milking-cow in good condition and flow of milk for one month; and, being fed at that rate, the cow wintered upon ensilage will thrive better, look sleeker, drink less water, and spring-time will find her in better condition, than when fed upon hay, while the flow of milk will be considerably greater.

I keep no sheep, but have had some experience with them in past years, and should consider ensilage a valuable food for them.

Ensilage, or the preserving of green crops for winter feeding, will be of great benefit to stock; as it will give them a juicy, succulent food, easily masticated and digested, in place of the dry, hard, and woody forage furnished by the mow or stack.

Ensilage will be a great profit, and effect a great saving, to the farmer, as it will certainly permit of his keeping double the animals in winter kept by the old method, and at the same expense.

I do not as yet know how successfully ensilage may be used as a summer food: time and experiment will tell that.

I have practised soiling somewhat; and possibly ensilage will so supplement soiling that we may keep our cattle at the barn the year round. Ensilage is a subject to-day of more importance to the farmers of the older States than all others combined, and I cannot commend it too highly to my brother farmers: at the same time, I do not wish to give such rose-colored accounts of the results of feeding ensilage as will tend to raise doubts, and make the statement seem improbable. I should be pleased to see your work when published; and, if any thing I have written is of any service to you, you are welcome to use it; or, if I can aid you any further in the matter, advise me, and I shall be happy to respond.

Respectfully yours,

JAMES S. CHAFFEE.

CHAPTER XXII.

CORRESPONDENCE FROM

MR. O. B. POTTER.

NEW YORK, N.Y., JAN. 31, 1881.

H. R. STEVENS, ESQ.

Dear Sir:

Though I think my address before the State Agricultural Society, which I mail you, gives pretty fully my experience, I will try to answer your inquiries further, as well as my experience enables me.

I have practised this system for three years; have applied it to common fodder-corn, red clover, pearl-millet, West-India millet, or Guinea-corn, green rye, green oats, and mixed grasses in which clover predominated, with entire success in every case. The last year I preserved about one hundred tons; and during this summer I have put down about two hundred tons, and have added sorghum and sugar-cane to the varieties of fodder I have before preserved. I have never lost any fodder whatever thus preserved; but, during the whole experiment, it has been perfectly preserved, and better than when fed fresh and green from the field. As the first fermentation is passed in the process, the food thus preserved has no tendency either to scour or bloat the animals fed. It is eaten up eagerly and clean, leaf and stalk, without any loss whatever; and stock thus fed exhibit the highest condition of health and thrift. For milch cows, to which I have mainly fed it, it surpasses any other food I have ever tried. It increases the quantity of milk much beyond dried food, and the quality is better than that produced from the same fodder when fed fresh and green from the field.

As you will see by my report, I cure all my corn, clover, green rye, green oats, by this process. I always cut my clover twice, and sometimes three times, in a season. I put down last year — the past summer — four acres green rye, two acres green oats, about twenty acres clover, and five to six acres of corn.

I use the Daniels large-sized cutter, and thus far have used a one-horse-power to drive it. I intend trying to get the maker of that cutter to make one larger, to be driven by a two-horse-power; but his present largest size cutter, with single horse-power, will cut the fodder as fast as two men can feed the machine.

The finer the fodder is cut, the closer and better it will pack. I cut mine about one inch.

Make the silos narrow, not more than ten feet wide, air-tight, weather-sealed, and the deeper the better. The bottom of the pit will hold and turn out much more than the top, because the fodder becomes more compact, like hay in a deep haymow.

It costs less than half, in time and labor, to raise and make ready for feeding a fodder crop by this process, than to cure the same by drying; and I think the same crop, cured by this process, worth more than twice it would be if dried.

Silos should be made from seven to ten feet wide, and as deep as possible, with close walls, and doors dividing them, as shown in my report. The reason of this arises from the fact, that, when you fill a silo, it is best to fill it up as soon as possible, — not more than one to two days, — and then cover it from the air, and leave it to ferment and settle as fast as it will, while you fill the next. If your silo is so large that you can put but a foot or two in depth in it by one day's work, it will not ferment as well as if filled and covered and left to ferment. Sections should not be more than twenty feet long, ten feet wide, and fifteen feet deep. It will take about seventy-five tons of green corn, before cut, to fill one section, and from one to two days to fill it the first filling.

It is also important the sections be small, in order that when opened for second, third, or fourth fillings, as each must be, the fermented and heated mass then in the pit be exposed to the air as little as possible, and, when only a small pit is opened, the new fodder can be at once poured in, and the air will yet be excluded from the heated mass below.

The green fodder is drawn from the field as fast as cut, and may be cut in any weather, except during rain. After running through the cutting-machine, it is deposited and trod into the pit firmly, until the pit is full. The doorway at the end of this pit, having already been closed by placing boards across it upon the inside as the filling progressed, is now sealed tightly by placing other boards properly fastened across it upon the outside of the jambs, and filling the space

between the jambs with well-compacted earth, so that no air can pass into the pit through this doorway.

In feeding out the pits, when made in short sections, all chance of deterioration from exposure to the air is avoided by opening one small pit at a time.

All ensilage I have put down, came out more than satisfactory. This is the fourth year I have practised ensilage, and I never lost ten pounds in putting down several hundred tons.

I have fed moving milch cows with ensilage, because I cannot spare this food to dry stock.

I take out the ensilage usually when I feed it.

I cut down a slice one to two feet wide as wanted, and feed as cut, and have not found reason to expose it more than it is exposed in distributing in the mangers. I always give my milch cows about three quarts meal per day, corn or barley, or sometimes two quarts other, and one quart cotton-seed meal. Sometimes I put the meal on the ensilage, but usually on the cut hay, moistened, which I feed at night. This is best; as no meal is needed to make the cow eat the green fodder clean, while it is often needed to make her eat the hay clean. I can't compare cost of corn-fodder with hay, better than any one else. I have sowed fodder-crops, corn, clover, grass more than half clover, yard-millet, West India millet, sorghum, and sugar-cane. I am certain it costs less than half to raise and prepare for feeding by this process, than by drying and cutting afterwards, and are worth twice as much.

Two fodder-crops per year are easily grown the same year on the same ground, unless it be sorghum and cane; and there are no exceptions here and farther South, the first being sown early, and no time lost in putting in the second crop after first is off. My cows always ate ensilage from the start willingly without urging. I have not fed my cattle much with ensilage. I can't spare it for them till I get more pits. I have computed how much ensilage will feed a cow six months: it will depend on the cow, the kind of ensilage, and how well you feed her. The same food cured this way will make more milk and flesh than if dried.

Cattle fed on ensilage as I feed them are sleek and fat and healthy, and always fit for the butcher when milked dry. They look better and do better than when fed on dry food only. I do not keep sheep, but fed six on corn ensilage for several weeks, and they did finely; never saw any do better, and all brought fine lambs, and both dams

and lambs were healthy. Don't know what it costs to keep sheep; less than on same crops fed dry, because they ate all stalk and leaf clean. I think sheep thrive fully as well on ensilage as on hay: can't say further.

I practised "soiling" until I learned ensilage, but not since, as I consider this method of feeding much the best.

In addition to the fact that fodder thus preserved has no tendency to scour or bloat cattle, another important advantage is gained by this process. These fodder-crops may be allowed to attain a much larger and more substantial growth before cutting than is practicable when the same crops are fed fresh from the field.

During my absence from home in the summer of 1879, my foreman had inadvertently allowed a field of about four acres of pearl-millet to attain so large and hard a growth that my cows wholly rejected the stalks, and would eat only the leaves when the millet was offered them green.

By way of experiment, and without much confidence in the result, I cut about one-fourth of this field, and filled one of my pits with it. The remainder of the field was cured by drying in shocks in the ordinary way. This last was found so near worthless for feeding dry, that it was used for litter in the barnyards, and for covering ice. That preserved in the pit was opened and fed in April last. My cows ate it all, leaf and stalk, eagerly, without any loss or waste whatever; and it was fully equal in value to the same quantity of the best corn-fodder preserved in the pits.

First, — The preserving pits must be wholly air-tight, so that when sealed the air cannot come in contact with the food preserved.

Second, — The pits should be of such form and dimensions as will best facilitate the settling and compacting of the food into a solid mass, and when opened for feeding will expose as small a part of the surface to the atmosphere as practicable.

Third, — The fodder must be cut green, when in the best condition or in bloom, passed immediately through the cutting-machine to reduce it to uniform short lengths of not more than one inch, and at once be deposited and trod firmly into the pit; sufficient salt being used to render it palatable, but no more. As fermentation, which will commence at once, proceeds, and the mass settles, the cutting and treading-in of fresh fodder must be continued at intervals of thirty-six to forty-eight hours (depending upon the rapidity with which fermentation and settling proceeds), until settling has ceased, and no more can be trod into the pit.

Fourth, — The pit as soon as completely filled, and settling has ceased, must be securely sealed to exclude the air wholly and arrest fermentation, and must be kept so sealed until opened for use.

The pits being now full, and settling having nearly or quite ceased, must be immediately and thoroughly sealed over the whole top surface of the fodder by a well-compacted layer of clean earth not less than six inches thick. This covering of earth should be afterwards examined at least twice, at intervals of a week or ten days, and any cracks that appear be closed with fresh earth. A covering of straw or hay not more than two inches thick may be laid over the fodder before the earth covering is applied, but this is immaterial other than as a matter of neatness. In feeding, the fodder should be cut down and fed from one end of the pit in sections of convenient width, the earth being first removed from each section. If open pits are used, a layer of hay or straw may be put over the pit when filled and sealed, to protect the contents from frost in winter, if necessary. I have not found any pressure or weight upon the fodder other than the earth-covering required. If additional weight is desired, a heavier covering of earth will accomplish this, and make the sealing at the same time more perfect.

MIXING FODDER IN THE PITS.

Much advantage will be gained by mixing clover and grass, in which clover predominates, in the same pit through fodder-corn, millet, or sorghum. The clover becomes, after the first fermentation, a putty-like mass, which fills the interstices in coarser and more fibrous fodder, and thus makes the whole much more compact and weighty than it would otherwise be, while it improves the quality of the food.

By this system, red-clover, fodder-corn, pearl-millet, or Guinea-corn, hitherto the most uncertain, difficult, and expensive, to cure and preserve of all our crops, become the easiest and least expensive in these respects, while their value as cattle-food is greatly increased over the same crops cured by drying in the usual mode. This system, when understood and practised throughout the country, may become no mean factor in our national prosperity.

By it, through the great increase of the best cattle-food, which may be produced at greatly-diminished cost upon the worn lands of the Eastern and Middle States, these lands may be renewed and enriched, and their owners be materially aided, especially in dairying,

in their now difficult competition with the cheaper and richer lands of the West.

By it, also, the Southern States, below the line of our Northern grasses, are enabled to feed and fatten their cattle in winter and summer as well, and nearly or quite as cheaply, as where tame grasses abound.

If I can aid the farmers of Massachusetts any by my opinions, I shall be glad. I was bred upon a farm in Charlemont, Mass.; and if the same energy, attention, and pluck were in operation there now, upon the farms, the hills would be green and covered with flocks to their tops, and that State would be less dependent than now on the West and South, while we would continue to be the nursery of hardy manhood for business and the nation. I shall be glad to see and read your book.

Very truly yours,
O. B. POTTER,
26 Lafayette Place (Farm at Sing Sing, N.Y.).

CHAPTER XXIII.

CORRESPONDENCE FROM

MR. JACOB PUGSLEY.

WASSAIC, N.Y., FEB. 5, 1881.

MR. H. R. STEVENS.

Dear Sir:

Yours in relation to ensilage is just received. Your questions are very comprehensive to be answered by one who has had but one season's experience, and that by no means thorough: consequently, I must first confess that on many points I should be a very blind guide, and can support my opinions by very few facts.

I will take up your questions in order.

I am quite sure that the large-growing Southern corn is best adapted for the purpose of ensilage; but new varieties with stronger tendency

to great size and product of sugar may soon be produced, or perhaps are already to be found.

The cost varies so much in different localities, owing to price of labor and quality of soil, that my statement is worthless, except for this vicinity. For me, about five dollars per acre is the cost of getting the corn ready for the sickle, then about seventy-five cents per ton for putting in the silo, if it is not to be hauled more than one-fourth mile. This does *not* include any fertilizers.

My corn was on a poor field, with no manure. It yielded about twelve tons per acre. The season was rather favorable to a large growth of stalks.

I have not ensilaged any thing but corn. Shall put up some clover and grass next year.

I used a Daniels cutter, which worked very well. I have no knowledge of other machines, but think that a much larger one with more powerful feed-rollers would be better.

A length of less than three-fourths inch has proved satisfactory. I would advise cutting shorter rather than longer. I have built one silo of two compartments, each twenty-five by sixteen feet, and ten feet deep; shall raise the walls to fourteen feet next season. I commenced the work late, and the walls were not properly hardened when it was full, so that I did not dare put on more than six inches of stone.

The ensilage was a little more sour than I expected, owing, I think, entirely to the air not being sufficiently driven out by pressure. Still the cattle eat it well, and do well on it, though not as greedy for it as in other cases reported.

I employed four men to cut the corn, and lay it on wagons, which were driven close beside the corn, three men at the cutter (I do not doubt that in a year or two we shall get on just as well with only one at the cutter), and two men in the silo to level and pack the ensilage, the silo standing with one end in side hill, so that the cutter was at the top, also a boy to drive teams; in all, ten men and four teams. Part of these I hired for the job, and part were my own men and teams. We put up twenty tons per day, working about four-fifths of the day. Counting my own men and teams at the same rate as those I hired, the cost was seventy-five cents per ton, including board of men and teams. The cost per ton of ensilage varies so much with the quality of land, and the season, that one year's trial is hardly a safe basis for an opinion. Allowing six per cent on twice the selling

value of the land, my own cost me about two dollars per ton in the silo.

In regard to size and shape of silo, every thing would depend on the size of farm and the method of using ensilage. If one intended to make the ensilage merely a small adjunct to the other farming, then a comparatively large single silo would be best; but my own opinion is, that, where ensilage is practised, the whole arable portion of the farm will be devoted to it; and in this case smaller silos, holding about a hundred and twenty-five tons each, will be far better, as we shall have a succession of crops to put in. Also, one of the smaller silos can be filled sooner, which I regard as of much importance. To hold the above amount, a silo must be twenty-five feet long, sixteen feet wide, and fourteen feet deep, and must be filled a second time after the first filling has settled. Six such silos in a set will hold feed for a hundred cows, allowing one each for rye and millet, and two each for clover and corn. Then, in feeding, a variety can be given each day. If built in this way the silos would, of course, be placed side by side; being, in fact, one great silo with partitions, each compartment having its own opening into the stable.

In nine cases out of ten, concrete of water-lime, sand, and small stones, will be far cheaper and better than any other material.

I have been feeding ensilage once a day to cows for three months; have fed no other stock.

The cows eat it clean, and do well on it. Some that I have fed for two weeks on ensilage three times a day, and no other food except about eight pounds of corn-meal and bran, have gained fully ten per cent in milk; previously, they were fed the same grain, ensilage once a day, and good hay *ad libitum*.

It is immaterial as to what time of the day it is fed. I do not expose the ensilage to the air before feeding, as fermentation has already progressed a little too far, owing to the air not being thoroughly expelled by pressure immediately after filling the silo.

No perceptible change takes place in the ensilage, if thrown down in a heap for two or three days before feeding. This may be owing to the cold weather; though I think not, but suppose the ensilage to be in a condition which does not specially induce further decomposition.

I feed about twenty pounds once a day to each of my cows, eight pounds grain, and what hay they will eat.

I think six tons of ensilage can be put up as cheaply as one ton of

good hay, including in expenses all labor and interest on land. Good hay cannot be produced at less than twelve dollars per ton, and I think ensilage can be as easily furnished at two dollars.

My milk is sold to a condensing factory: the inspector could not detect any marked difference between that made on ensilage and that made from hay.

The difference in cost of feeding on ensilage or on hay would not be important, probably rather in favor of ensilage, if stables and silos were properly arranged.

Nearly all my cows ate the ensilage at the first feeding, and all of them after the second or third ration.

I have no sheep.

I am convinced that we shall soon be feeding our cattle upon ensilage in the summer, as well as in winter, though I have never practised soiling.

After weighing my feed with some care, I am satisfied that fifty-five pounds per day of ensilage, with eight pounds of grain, is a full feeding for a cow of ordinary size, giving not more than ten quarts of milk per day. Heavier milkers should have more grain, which should not be corn, but oats, bran, linseed or cotton-seed meals. This refers to corn ensilage; probably clover, rye, or millet would take much less of both grain and ensilage.

I do not see any marked difference in the appearance of cattle fed on hay or on ensilage. I think the chief points for most farmers to bear in mind in going into this system are: First, good walls to the silo. Any farmer can make these by getting clean sand and good cement, and following the directions given for mixing and laying walls; and this should be done in the spring, so as to allow plenty of time for the walls to harden, before any strain is put on them. Second, cutting the ensilage short. I think a very large cutter, and steam-power for driving it, will be found best and cheapest in the end. Small farmers could combine to purchase these, and also in the labor of filling their silos. Third, quick filling of silos, not more than three days at most.

Indeed, wherever practicable, I should advise that the silo be filled, and the stone put on, in one day, even at some extra expense. This point is not insisted upon by writers on the subject, but I shall need considerable experience to convince me that it is not a very important matter. Fourth, heavy pressure, not less than one foot of stone and more, if possible, should be placed on the ensilage, instantly after

filling. Whoever will carry out thoroughly these four demands of the system, will be more than satisfied with ensilage.

The advantages of ensilage are several. In the first place, it will enable any active farmer to keep twice his present amount of any kind of stock, and, within three years, to raise fodder for a cow on every acre of arable land, and also to increase this amount thereafter indefinitely; being practically limited only by his personal capacity and judgment. At present prices of cheese and butter, there would be twenty dollars per acre net profit for every acre, which would keep a cow, after paying for all labor and grain.

The system being equally adapted to feeding sheep, or hogs, or making beef, will prevent any undue increase of dairying. The remoter consequences of the greatly-increased production of the soil are incalculable: the lessening of labor, the improvement of food, and many like advantages, will soon follow the general inauguration of this system.

It will also assist enormously in making mankind independent of the weather; for the constant use of the plough and cultivator, and the raising of strong, growing crops, will greatly obviate the difficulties from drought; while the serious loss and expense of harvesting crops in wet seasons will be very greatly diminished by this method of preserving. Very great improvements will, doubtless, soon be made in all the machinery for harvesting crops, so as to reduce the labor necessary as much proportionately as it is done in manufacturing, compared with the processes of thirty years ago. It is quite probable, too, that farming on this system will become attractive to men of executive capacity, and that organizing faculty which has hitherto sought its fields of action everywhere except on the farm, to the great detriment of agriculture. If I have omitted any thing essential, you can write me again. I expect to increase my silos materially next season.

Yours,

J. Pugsley.

CHAPTER XXIV.

CORRESPONDENCE FROM

MR. F. S. PEER.

E. PALMYRA, N.Y.

MY DEAR SIR:

In reply to your request concerning the result of my experience with "ensilage," it may not be out of place to say that I did not adopt the system because it was a new thing, nor as an experiment; for I have neither time to devote nor money to expend on uncertainties, but because through the evidence of my five senses I was convinced that it was practical. I *saw* stock of all kinds eating and thriving. I *tasted*, and found nothing disagreeable. In *smelling* could detect nothing offensive; and when I *heard*, from men on whose word and judgment I could rely, the same universal testimony of its merits, I began to *feel* that it was no longer an experiment, but the legitimate offspring of the mother of invention, which like other great improvements are born to the day of necessity.

It was therefore without a misgiving that I set to work overhauling an old stone carriage-house. It was easily converted into a silo by taking out the hay-loft floor and stalls before walling up the doors and windows, except one in the gable end, through which the silo was filled; another in the opposite end on the ground, nearly level with the bottom of the silo, which we find very convenient in taking out the ensilage. The walls were given a coat of water-lime, the floor of cement. The building was eighteen by twenty-eight feet and fifteen feet deep, inside measurement; capacity three hundred tons.

Were I to build new, should make the building longer and narrower, say fourteen by forty feet, and fifteen or eighteen feet deep. The deeper the better. It takes no more plank or weight to press ensilage that is fifteen feet in depth than it does five, and requires no more roofing.

My experience in growing corn-fodder is, that it is much better sown in drills, three or three and a half feet apart. It then can be cultivated, which will add at least one-third to its growth.

As the broad leaves of the growing corn receive from the air and sun a large per cent of its feeding value, it is therefore very essential that the stalks should have plenty of room for the full development of its leaves; for in them is contained the principal virtue of the plant as a food. Therefore, in determining what kind of corn is best to grow for fodder, the most leafy variety should be selected. I find the Western Dent to be better in this respect, than our common field-corn.

Last season we sowed at the rate of two, two and a half, and three bushels of corn per acre. I am convinced that two are sufficient. We put it in with our common field-grain drill, letting the tubes of tooth No. 1 and 3 discharge into No. 2, closing No. 4, letting 5 and 7 into No. 6, closing 8, uniting 9 and 11 into No. 10.

In a nine-tooth drill begin by closing No. 1, and proceed as above described. The eleven-tooth drill puts in 3, the nine-tooth drill 2, rows at a time, the wheel-tracks serving as a guide on return bouts.

Began harvesting the fodder, one man managed the reaper, two to bind, assisted occasionally by the one who reaped. Two men, each with a one-horse lumber-wagon, drew the fodder to the silo, one loading in the field while the other was unloading at the cutter, a "Silver and Deming," manufactured at Salem, O., with a twelve-foot carrier attached, to convey the fodder into the silo.

After cutting it three-eighths of an inch long, which it did as fast as two men could feed it, it was run by an eight-horse-power threshing-engine, thirty to forty pounds of steam being sufficient to run it, four knives making five hundred and fifty to six hundred revolutions per minute. A man was employed in the building, to spread and tread down the fodder. Besides the engineer, eight men were four days doing the work, putting in five and a half acres at the rate of forty tons per day. We supposed that five acres would be enough to fill the silo; but, with the addition of a half-acre, it was then but half-filled.

When through cutting, we covered the fodder with a foot and a half of uncut straw, on which we placed a covering of rough two-inch hemlock plank: on them was piled stone a foot or more in depth. The silo was opened Nov. 12; and the fodder was found in a good condition, except up and down the door-jamb some ten or twelve

bushels were spoiled. We began forthwith to feed ensilage to all my stock, sheep, colts, calves, and milch-cows, at the rate of fifty bushels per day.

Having no personal knowledge of the chemical analysis of ensilage, I do not propose to enter upon a hair-splitting discussion of its value as compared with other feed. The question that every practical farmer wants to know is, "What is the result?" I will state as briefly as possible what I have found to be its influence as a feed for milch-cows, upon the quantity, quality, and color of butter.

Before opening the silo, we fed corn-stalks, having no hay, morning and night, wheat-straw at noon. As may be supposed, the butter was white, lacked flavor, and the grain more inclined to be salvy: it was poor stuff. After a few days we added two quarts of meal, with roots (yellow cord beets) at noon. The quantity of milk was somewhat increased, but not as much as I expected it would be. On opening the silo, Nov. 12, we began feeding ensilage twice a day, morning and night. The fourth day the quantity of milk was nearly double: as to the butter, it was nearly equal in flavor and color to that made in summer from grass. We send it to our regular customers without a particle of coloring. We continued feeding in this way for five or six weeks with the same pleasing results. When, in order to dispose of our coarse fodder, we substituted corn-stalks and barley-straw for the morning feeding of ensilage, the change in the amount of milk and butter was very marked, shrinking about quarter: the color was considerable lighter. Hoping to make up for this deficiency, we added two quarts of corn-meal per head to the ration of dry fodder; but it did not *fully* compensate for the feeding of ensilage in the quality and color of the butter, while the amount was increased to about the same as from the two feedings of ensilage.

We have now been feeding ensilage for three months to milch cows, colts, young cattle, and sheep, at the rate of forty bushels per day. The one hundred and sixty tons is about half gone, requiring less than three acres to keep eighty head, fifty-five of which are long-wool sheep; total, equivalent to thirty-five head of cattle.

The following is the table of cost of five and one-half acres of ensilage fodder or one hundred and sixty tons: —

Harvesting, Cutting, Packing, and Pressing.	Total.	Per Acre.	Per Ton.
Eight hands, $1.00 per day, four days	$32 00	....	...
Engine and engineer, $4.00 per day	16 00	....	...
Fuel for engine, $1.20 per day	4 80	....	...
Total cost of labor to secure 160 tons ensilage . .	$52 80	$9 60	.33
Cost of seed, filling ground, and cultivating . .	27 50	5 00	.17
Total cost	$80 30	$14 60	.50

This does not include use of building and tools. I feel sure that I can do the work for less another season. I cannot speak too highly of the reaper that we used to cut the fodder, a "D. M. Osborn, No. 3," manufactured at Auburn, N.Y. It did the work in a most satisfactory manner without a break. The corn had attained an enormous growth, from nine to ten feet high, cutting two rows at a time, throwing off bundles with every other rake.

It is also needless to add that I am well pleased with my first trial, and expect to ensilage more next fall.

Yours respectfully,

F. S. Peer.

CHAPTER XXV.

CORRESPONDENCE FROM

MR. W. C. STRONG.

NONANTUM HILL NURSERY, BRIGHTON, MASS., FEB. 22, 1881.

Mr. H. R. Stevens.

Dear Sir:

My experiments with ensilage were limited to Hungarian grass during the season of 1880. Noticing the statements of Dr. Faxon, in regard to his success with grass cut very early in the season, and in a succulent state, packed away without passing through the cutter, I made inquiries of him and of Dr. Bailey and others as to

the probable result of putting down Hungarian in a silo without cutting. It was the opinion of all, that, if carefully done, it would keep. Wishing to avoid the expense of a cutter and steam-power, I determined to venture a trial. I filled a silo, twenty feet by twenty feet and ten feet deep, with perfectly clean Hungarian, when in just the condition to cut for hay, spreading it evenly, and treading with great care, filling about two feet in depth daily. When finished, it was covered, and weighted after the most approved manner. The result is, that I am now carting the contents of the silo to the manure-heaps, to work in as compost. It is now plain to see, that, notwithstanding the thorough treading and weighting, enough oxygen would remain in the stems and small spaces to keep up the fermentation until the ensilage was ruined. Of course, every one is now wise enough to see that I ought to have known better than to make the trial; but I can comfort myself with the credit of a voluntary martyrdom for the public good.

This first experiment was at my house-farm in Newton; but I also had a twelve-acre lot in Brighton sowed with this seed, and designed for hay. Immediately after sowing, the weather was hot and dry; which checked the seed in starting, but developed a prodigious crop of rag-weed (*Ambrosia artemisiæ folia*). As a consequence, the grass was largely choked out, the enormous growth being at least sixty per cent of weeds. What to do with this burden, was the question. Having a deeper-seated water-tank and also a good engine, all at hand, I had only to buy a Baldwin cutter, and at little expense I could determine what the new process would do for weeds. Of course we cut them fine, and a man on horseback packed them down solid. We averaged about two feet in depth per day, and somewhat over one hundred tons within the week of cutting. The heat was so well driven out as the work proceeded, that there was not much doubt that the stuff would keep. Its value was another question, which could only be answered by trial. If you say it is unreasonable to expect to take out any better than you put in, I will simply give facts in reply. Having no cattle to feed, I sold the ensilage to a milkman at six dollars per ton; he doing the carting for a distance of four miles, and paying the weigh fees. As the feed is dripping wet, it weighs well, and turns out to be worth a good deal more than if it had been pure Hungarian and had been made into hay. The very strange thing is this: that the cows are wild to get the fodder, — lick up the last vestige of it, — give a good flow of

excellent milk, and seem to be in excellent condition. The cows are emphatic in their agreement with their owner and myself, that the food is better than when it went in. It will keep several days without injury after taking it out, and is considered by the purchaser to be the cheapest food he can give his cows. Of course, it is a little mortifying to make public my first failure, and second *quasi*-success; but it is only by these various trials that we can determine the true value of this new process. With corn as the material, and a fine cut and solid pack to follow, the result need not in any case be doubtful. That Hungarian will keep perfectly when cut, I have no doubt; neither do I doubt its high value for fodder; but, of course, it will not yield any thing like the weight per acre that can be obtained from corn. Taking into consideration the enormous yield which can be expected, the ease and certainty in harvesting in any weather, the great economy in stowage, the ease with which the fodder can be taken out and distributed, and, last and chiefest, the high value which this succulent food possesses, — taking these and other minor advantages into account, it is safe to predict a new era in agriculture, destined to produce changes which no one can foretell. The importance of the subject cannot be over-estimated; and, if you can throw light upon it, you will be a public benefactor.

Yours very truly,

W. C. Strong.

CHAPTER XXVI.

REPORT FROM

HON. CHARLES WILLIAMS,

NASHUA, N.H.

Last summer Hon. Charles Williams built a silo, and filled it with green corn-fodder. The silo is twenty feet long, nine feet wide, and thirteen feet deep, and will hold about fifty-eight tons. It is built of cement and stone, the interior sides being perfectly smooth and per-

pendicular, and cost about a hundred and forty-four dollars, besides the labor of excavation. The silo was filled last summer by Mr. Williams, with green corn-fodder cut into pieces about half an inch long. It was covered over with close-fitting plank nine feet long, and weighted down with pig-iron. Mr. Williams did not use any straw on top or under the planks. He used a Daniels cutter made at Woodstock, Vt., to chop up the feed; the cutter being operated in the building over the silo, and the power communicated by a belt from his engine.

Mr. Williams began to feed from his silo on the 1st of November last. The ensilage was found to be slightly acid, and alcoholic fermentation had taken place to a certain extent. His horses showed no great liking for it, but would eat it readily when mixed with meal. His cows took to it with great relish, and immediately began to increase their milk, which he claims was improved in quality as well as quantity. In addition to the ensilage, the cows were fed about six quarts of shorts a day throughout November, and grew fat, and looked neatly. For hogs and poultry Mr. Williams thinks this kind of fodder is unsurpassed; and for milch cows he regards it far better than any crop of roots or corn, both of which he has tried. The ensilage settled about two feet.

CHAPTER XXVII.

REPORT OF

DR. W. H. TANNER,

AMENIA, DUTCHESS CO., N.Y.

Dr. Tanner built his silo thirty-five feet long, fifteen feet wide, twenty feet deep. There were twelve acres of corn sowed for ensilage, of the horse-tooth variety. His silo is placed against the barn. The barn is large and well-equipped, broad stalls for about seventy cows. The silo was filled within three feet of the top. The ensilage

settled about three feet. When the silo was opened, the ensilage was in a perfect state of preservation; and his success in feeding cattle, and the increased quantity of milk, is the same as others, and very pleasing to the doctor. He will build more stables another year, keep more cattle, and make more room for ensilage. As the doctor says, "Ensilage with me is a success in every particular. The more I feed, the more I am pleased. It is only a question of a little time about farmers all building silos. They must do so, or starve. I am feeding a hundred cows two feeds a day, with the best results."

CHAPTER XXVIII.

GEN. STEPHEN THOMAS,

OF VERMONT,

Says he raised several acres of corn the past season, and built a silo of stone, forty feet in length, fifteen feet wide, and the same in height. The walls were heavy, and laid in cement: the bottom and sides were plastered with cement also. He commenced in September to cut up the fodder with a Baldwin No. 18 fodder-cutter, which makes it very fine, driven with horse-power. Thinks he could cut, and put in the silo, cheaper than to bind in the field, and, when dry, draw to the barn. This fodder kept finely, and was liked by all his stock, including the pigs. He is sanguine he can raise corn and beef cheaper than it can be produced at the West, and brought here; thinks two tons of the ensilage will be worth one of hay; is satisfied that this preserved fodder will keep the year around; would raise two crops on the land if possible, — one of winter rye, and one of corn, — and ensilage both; believes, if well kept, as good milk will be obtained in winter as in summer, if some grain is fed in connection. He prefers cotton-seed meal for this purpose. Such a silo as he built would not cost two hundred dollars. Feeds about fifty pounds of this to a cow, a day.

CHAPTER XXIX.

REPORT FROM

HON. J. B. BODWELL.

PINE GROVE FARM, HALLOWELL, ME.

We visited Pine Grove Farm, Hallowell, to examine the ensilage now being taken from Mr. Bodwell's silo. About sixty-five tons of corn-fodder were put into this silo last summer, and all the rules laid down by those who had experimented with it carefully observed. Nearly half of this amount has already been fed out, and a daily feed is now given to each of the cattle and sheep. They eat it well, and thrive upon it. When this food was first given, the daily feed of corn-meal was reduced one quart, and this has been followed since; and the cattle thrive better than with the full feed of corn-meal. Mr. Bodwell, by his experiment, has settled three points in his own mind with regard to the ensilage of green fodder: viz., that the fodder can be preserved in the silo, that cattle and other animals eat it with apparent relish, and that they thrive upon it. He noticed in the milch cows a marked increase in the flow of milk soon after the feeding of ensilage was commenced. Mr. Bodwell has preferred to build a silo that will last for all time. A temporary silo, one that will answer for a season or two, can be very cheaply built.

CHAPTER XXX.

REPORT OF

MR. E. D. WORKS.

FITCHBURG, MASS.

Last year I planted about an acre, and ensilaged it in August. I procured a Baldwin cutter, which cut fodder seven-eighths of an inch long, and put in about twenty-five tons. I covered the fodder with straw, and then with plank, and weighted it with stones. A few days later a slight odor was perceptible, which continued four or five weeks. I took out a specimen at cattle-show, found it keeping well. I commenced feeding, the 2d of December, and have enough to last till March. Cattle do very well on it; better than on hay. The ensilage should be put in hard. Stone and cement should be used in constructing silos. The walls should be sixteen inches thick. I am intending to put in ensilage enough to fill my barn with cattle. I can raise ensilage at two dollars per ton. I would build the silo under my barn if convenient. I think ensilage will take the front rank as feed. I have made a failure of curing corn-fodder, and feeding it to stock. My cattle did not eat ensilage readily at first, but in a few days some of my cows would leave hay and rowen to eat ensilage. If I had a supply, I would feed seven-eighths ensilage, and would prefer all ensilage to all hay. Clover, Hungarian, and other grasses can be used for ensilage, but I should not ensilage good English hay. I took a piece of grass-land, ploughed it, put on twelve loads of manure and half a barrel of phosphate, and sowed corn in rows. It grew so fast, and shaded the ground so, I was not troubled with weeds; did not touch the crop till I harvested it. I should sow the seed five or six inches apart, let it grow as large as it will; should sow from first of June till July; the early part of July is early enough if the land is rich.

CHAPTER XXXI.

REPORT FROM

COL. R. H. DULANEY.

OF LOUDOUN COUNTY, MARYLAND.

(From Southern Planter and Farmer.)

I prepared fifteen acres of sod-land, by top-dressing it with all the manure from the cellar of my cattle-barn, where I had fed eighty-two cattle and twelve horses four hundred and fifty barrels of corn, besides their long food, during the winter. After the land was ploughed, and thoroughly harrowed and rolled, I drilled in three bushels of corn and four hundred pounds of bone to the acre. By stopping alternate tubes of the drill, the rows were eighteen inches apart, and there were from eight to twelve to the foot in the row. I had intended to plough this crop three times; but after one ploughing with single-shovel plough there came several hours of rain, after which the corn grew so rapidly that it soon met across the row, and could not be ploughed again. I dug a pit seventy-eight feet long, twenty feet wide, and twelve feet deep, and lined it with a two-foot stone wall, which was continued for three feet above the ground, and cemented the sides and bottom.

I should have cut the corn, which was the heaviest I ever saw, as soon as the ears began to form; but had to wait until I finished the pit.

When I commenced, some of the corn was too old for roasting-ears, and the blades near the ground had lost their green color. The field was four hundred yards from the pit. It required three and sometimes four first-rate hands to cut the corn; two ox-carts and one four-horse wagon, with an extra hand to assist the drivers to load, to haul the corn, which was being cut up into five-eighth-inch pieces, by two eighteen-inch cutting-boxes. It required one man at each box to feed, and two men to keep each supplied with the fodder.

The boxes were at the side, equally distant from each end of the pit, and driven by an eight-horse engine. The ensilage was kept equally distributed over the floor, and six large farm-horses were ridden over it from ten to twelve, and from five to seven o'clock, to pack it. As the horses could not pack that against the walls, and at the angles at the ends, that had to be trodden down by the men, when the engine was stopped.

We were fourteen days with fourteen men in filling the pit to within three feet of the top. I then ran enough straw through the cutting-box to cover the whole mass three inches deep; then covered with two-inch boards laid across the pit, and the boards with stone two feet deep.

On the 10th of January I opened the pit by taking off six feet of stone and plank. When I saw the straw black and rotten, I feared that the prophecy of my neighbors, "that I would have an immense quantity of rotten fodder to haul out in the spring," had been fulfilled. But, on getting to the fodder, I found only an inch deep a little moulded, and all the rest, except in the angles of the building, and against a part of the wall (from which the cement had fallen), in perfect order. Eighty-two cattle are eating with great relish thirty-seven pounds each day, and two hundred ewes one and a half pounds each.

I have now fed for three weeks, and have only used about one-sixth of the ensilage. At this rate it will keep my cattle and sheep until April 20, at which time I usually turn on grass. From a flock of one hundred sheep that have been fed on ensilage since the pit was opened, I have lost but one; whilst from two hundred and fifty fed on corn, straw, and fodder, I lost thirty in two weeks. These ewes were heavy with lambs, and the change from grass to entirely dry food caused constipation, and that, inflammation, which caused their death. For the last week I have been feeding most of my sheep on ensilage; and, except some that were sick when I commenced, I have lost none.

The fifteen acres of ensilaged corn would have fed eighty cattle one hundred and twenty-five days, the usual length of our winter, with the addition of one gallon of corn a day to each steer. If fifty cubic feet make a ton, then I had two hundred and eighty-three tons, which cost to cut, haul, and pack away, two hundred dollars, — less than one dollar a ton.

CHAPTER XXXII.

MADAME RUDERSDORFF,

THE WELL-KNOWN TEACHER AND SINGER,

says, "I am well pleased with the result of my little silo. All my cattle eat ensilage with great relish, leaving good English hay for the ensilage maize. The quality and quantity of milk have improved since the cows have been fed on ensilage."

CHAPTER XXXIII.

E. M. WASHBURN,

AN EXTENSIVE FARMER OF BERKSHIRE COUNTY,

says, "I have never seen a cow eat the best of hay when offered ensilage: it is always ensilage first, and hay afterward. It is the most profitable investment I ever made, and there is no reason why thousands of farmers may not make it as profitable as I have."

CHAPTER XXXIV.

THE FEEDING OF STOCK.

Each and every farmer has his own mind and way of feeding stock upon the farm. Some feed with hay and shorts, some with hay and corn-meal; some hay, meal, and shorts; and others hay, roots, and

grains, etc. Have you ever tried the cutting of the dry fodder by running through a fodder-cutter, cutting it into short pieces? Wet the dry fodder enough to moisten, take enough for one day's feed, mix this evenly with the kind and quantity of grain you use, and feed; if it stands several hours before feeding, your cattle will like it all the better. By this way of feeding you will save fifteen per cent of dry fodder, and those who have tried it say a larger per cent. If you are feeding on ensilage in part, and wish part dry fodder, cut in short pieces, mix ensilage, cut fodder, and required quantity of grain; this makes a good feed. Sixty pounds ensilage from corn-fodder, or forty-five pounds of clover ensilaged, is good feed for one cow per day. This quantity is a fair average. These quantities will keep a cow in good condition, with an increased flow of milk, with better health than when fed on hay. With six quarts shorts and sixty pounds of ensilage per day, your cows will gain flesh, and do better than when fed on ensilage alone; add to this feed one quart of corn-meal, — you get a good feed; and I think this quantity of grain with ensilage is not only the most economical, but is better for cows than to feed a larger quantity. To fatten cattle, sixty pounds ensilage (more or less as they eat up clean), with four pounds corn-meal per day, will rapidly fatten them. I believe corn-fodder ensilage fed with clover, rowen, or any of our grasses ensilaged, is a better and more natural food for our stock than the corn ensilage alone.

CHAPTER XXXV.

ENSILAGE FOR POULTRY.

The feeding of ensilage to poultry is eaten and relished as well as when fed to horses, cows, and pigs, and, by various experiments, has proved to be as nutritious for poultry as for cows. When ensilage is fed to poultry they not only eat it greedily, but it makes them smart and active: have a healthy look and a fine bright plumage, which is a sure indication of good health. During the winter season ensilage, when fed to poultry, mixing with it a proportional part of shorts or corn-meal, will increase the laying of eggs, and fatten them very

readily. As ensilage and corn-meal fatten cattle, so with poultry they lay on fat very readily.

Experiments tried prove that poultry fed on ensilage, with a sufficient quantity of grain, will do better in every particular than when fed in the old way upon grains, at one-fourth the cost, or at a saving of about seventy-five per cent. One hundred fowls, take them as they run, large and small, will cost, to feed them one year, about one hundred dollars. To feed the same on ensilage and the required quantity of grain would cost not to exceed twenty-five dollars. Ensilage alone is self-sustaining: the poultry will do well and lay well. To feed on ensilage alone would cost about fourteen dollars; and to add to this shorts, corn-meal, buckwheat mixed with the ensilage, occasionally scraps, plenty of gravel, ashes, etc., they will do better than by any known way of feeding. One hundred fowls should produce, at a low estimate, eight hundred and thirty-three dozen eggs in one year, besides laying eggs to set about thirty hens. These eight hundred and thirty-three dozen eggs at twenty cents per dozen would equal $166.60, and, by fair success, should raise a hundred and fifty chickens. The reason I discuss this subject, *poultry*, is to show that hundreds of mechanics, laborers, etc., who are owners of a small house, with an acre or two of land, by properly preparing an acre of land, and planting it to corn for ensilage, can raise twenty-five tons to the acre; average cost would be about two dollars per ton in the silo; can build a small silo, not to cost over twenty-five to forty dollars, and less than that if they can do the work themselves; fill this silo with the ensilage. You can keep a cow the year round on ten to twelve tons of ensilage, or, if fed with some hay or grain, less ensilage. With the balance of the twenty-five tons you can keep from a hundred and fifty to two hundred fowls. Turkeys, geese, and ducks are greedy for ensilage.

Practical experiments prove these results; and, for a small investment, I know of no investment that will surely bring such good results.

CHAPTER XXXVI.

CORRESPONDENCE FROM

PROFESSOR J. M. M'BRYDE.

KNOXVILLE, TENN., FEB. 12, 1881.

DEAR SIR.

I send you the results of my first month's experiments in feeding. I regret those with the milch cows are not yet determined. I think the results speak well for the new food.

The first set (I.) will be continued this month, and I think with better results, as all the loss occurred in the first part, during the change from dry to green food. Notwithstanding the loss of weight, the animals are sleek and healthy looking, and with hearty appetites. This month I am allowing them as much as they will eat of ensilage.

Sets 4 and 5 were not only designed to test the relative values of hay (good timothy and clover mixed) and ensilage, but also those of corn, cotton seed, and rice-corn meal. This rice, or Egyptian corn, is the cereal attracting so much attention in Kansas. It is really the Dhoura, a variety of *Sorghum vulgare*. The animal fed on it in Set 4, No. 2, gave the best results of any in the set; No. 10, in Set 5, the worst in its set (5).

All kinds of stock are exceedingly fond of it; and I have no hesitation, not only from these experiments, but from my general experience with it, in pronouncing it fully equal in feeding value to Indian corn.

No. of Animal.	Daily Rations per 1,000 Pounds Live Weight.	Weight Jan. 2.	Weight Feb. 1.	Gain per Month.	Gain per Day.	Gain per Cent.	Remarks.
				(I.)			
		Lbs.	Lbs.	Lbs.	Lbs.	Per Ct.	
15	20 lbs. hay	687	700	13	0.43	1.8	As much as two animals will eat (mixed timothy and clover).
14	40 lbs. ensilage	825	805	20	0.66	2.4	Cow dry for four weeks when experiment began. In eight days thereafter in full flow of milk, hence loss of weight.
9	50 lbs. ensilage	965	957	8	0.26	0.8	
16	60 lbs. ensilage	900	875	25	0.83	2.7	Young short-bull — a vicious, restless, and unthrifty animal.
				(II.)			
6	10 lbs. hay, 20 lbs. oat-straw	700	720	20	0.66	2.8	Animal older by several months than other two — ate rations freely.
1	10 lbs. hay, 20 lbs. ensilage	580	540	40	1.33	6.8	Yearlings weaned a week before Jan. 2, and much pampered — previously fed on meal and hay, besides milk, hence refused rations of forage only for some time, and never ate ensilage clean during continuance of Experiments, No. 1 also very unthrifty.
4	10 lbs. oat-straw, 20 lbs. ensilage	535	537	2	0.06	0.3	
				(III.)			
7	10 lbs. hay, 20 lbs. oat-straw, 6¼ lbs. corn-meal	505	525	20	0.66	3.9	
12	10 lbs. hay, 20 lbs. ensilage, 6¼ lbs. corn-meal	555	595	40	1.33	7.2	
13	10 lbs. oat-straw, 20 lbs. ensilage, 6¼ lbs. corn-meal	450	480	30	1.00	6.6	
				(IV.)			
2	20 lbs. hay, 6¼ lbs. rice-corn meal	800	860	60	2.00	7.5	
3	20 lbs. hay, 6¼ lbs. corn-meal	865	915	50	1.66	5.7	
5	20 lbs. hay, 6¼ lbs. cotton-seed meal	705	745	40	1.33	5.6	
				(V.)			
10	40 lbs. ensilage, 6¼ lbs. rice-corn meal	590	607	17	0.56	2.8	
8	40 lbs. ensilage, 6¼ lbs. corn-meal	680	750	70	2.33	10.2	
11	40 lbs. ensilage, 6¼ lbs. cotton-seed meal,	640	705	65	2.16	10.1	

Animals used in experiments, the stock ones of farm. Ages in last four sets varying from one to three years; also some difference in blood, — majority short-horn or Devon grades. In Set 1, animals stabled all the time, all others allowed to run out during day. No. 14 greatly in favor of ensilage, as showing its milk-producing qualities: cow not only came back to her milk, but gave a good flow during its continuance. Bull No. 16 was an animal singularly savage and unprofitable; we have been anxious to get rid of him for some time. With these allowances, and the further facts, that, for the first week, the animals ate the ensilage freely, but not as greedily as afterwards; that they were (as will always be the case in changing from dry to green food) scoured for three or four days; that the month was the coldest ever known, and that all the loss was in the first ten days; that No. 9 virtually held her own, — the experiments even of this set are favorable to ensilage. Still if one wishes to do more than merely "maintain" his animals, the ensilage must be enriched (as I hold) by albuminous food. Hence, if due allowance be made for previous treatment of Nos. 1 and 4, Set II. gave better results, as these two animals did not eat more than one-half of the rations allowed them. In Set III., Nos. 12 and 13 more than doubled No. 7; the difference in favor of this set over II. showing the value of albuminous matters. Set V. compared with IV. again gives results decidedly in favor of ensilage; No. 8 more than doubling No. 3, and No. 11, No. 5. No. 10 was a grade Devon; No. 2 a grade short-horn; hence the latter had the advantage of blood. The results on the whole are very favorable to ensilage.

Wishing abundant success to your new work, I am

Yours respectfully,

J. M. M'Bryde.

CHAPTER XXXVII.

FROM CHARLES L. FLINT'S BOOK ON GRASSES AND FORAGE-PLANTS (A VALUABLE AND INSTRUCTIVE WORK).

Red Clover (*Trifolium pratense*), though not included in the family of grasses, is not only extensively cultivated, but is found to be one of the most valuable and economical forage-plants. It belongs to

the pulse-family, or Leguminosæ, which includes the larger portion of forage-plants called "artificial grasses," in distinction from the Gramineæ, the only true, and often called the "natural," grasses. The generic name trefoil, or trifolium, is derived from the Latin "*tres*" (three) and "*folium*" (a leaf); and the genus can be very readily distinguished by the number and arrangement of its leaves in three leaflets, and flowers in dense oblong or globular heads.

The stems of red clover are ascending, somewhat hairy; leaflets oval or obovate, often notched at the end, and marked on the upper side with a pale spot; heads ovate, and set directly upon the stalk, instead of upon branches. This species is regarded as by far the most important of the whole genus for the practical purposes of agriculture. It has passed into a number of varieties, one of which is biennial, another perennial; the latter by long cultivation becoming biennial, while the former, as is true of most biennial and many annual plants, assumes, to some extent, the character of a perennial, and can be made to last three or four years, or even more, by simply preventing it from running to seed. The introduction of clover into England, it is often said, produced an entire revolution in her agriculture; and, indeed, when we consider how important a part it plays in our system of farming, we can with difficulty imagine how our ancestors ever got on at all in farming without it. Be this as it may, it is certain that it led to many of the most important improvements in the rotation of crops. Clover is very properly regarded as a fertilizer of the soil. The action of its long and powerful tap-roots is not only mechanical, loosening the soil, and admitting the air, but also chemical, serving to fix the gases important to enrich the earth; and when these roots decay, they add largely to that black mass of matter we call soil. It serves also, by its luxuriant foliage, to destroy annual weeds which would spring up on newly-seeded land, especially after imperfect cultivation. But one of the most valuable uses of it, and one too often overlooked, is to shade the surface of the soil, and thereby increase its fertility.

RED CLOVER.

Another great advantage in favor of the cultivation of clover consists in its rapid growth. But a few months elapse from the sowing

of the seed before it yields, ordinarily, an abundant and nutritious crop relished by cattle of all kinds.

Clover-seed should always be sown in the spring of the year in the climate of New England. It is often sown upon the late snows of March or April, and soon finds its way down to the soil, where, aided by the moisture of early spring, it quickly germinates, and rapidly shoots up its leaf-stalks.

HUNGARIAN GRASS.

Hungarian grass, Hungarian millet (*Panicum Germanicum*), has been cultivated to considerable extent in this country from seed received from France through the United-States Patent Office.

COMMON MILLET.

It is an annual forage plant, introduced into France in 1815, where its cultivation has become considerably extended. It germinates readily, withstands the drought remarkably, remaining green even when other vegetation is parched up; and, if its development is arrested by dry weather, the least rain will restore it to vigor. It has numerous succulent leaves, which furnish an abundance of green fodder, very much relished by all kinds of stock.

It flourishes in somewhat light and dry soils, though it attains its greatest luxuriance in soils of medium consistency, and well manured. It may be sown broadcast, and cultivated precisely like the varieties of millet. This grass

is thought to contain a somewhat higher percentage of nutriment than the common millet, though I am not aware that it has been analyzed. It is a leafy plant, and remains green until its seed matures, and is no doubt valuable for fodder, both green and dry, growing and maturing in about the same time as common millet. From twenty-five to thirty bushels of seed to the acre have been obtained.

Common millet (*Panicum miliaceum*), flowers in large, open, nodding panicles; leaves lance-shaped, broad; stem one to two feet high; native of Turkey.

Many varieties of millet have at times been cultivated in this country, and its culture is gaining favor every year. Millet is one of the best crops we have for cutting and feeding green for soiling purposes, since its yield is large, its luxuriant leaves juicy and tender, and much relished by milch cows and other stock. Cut in the blossom, as it should be for feeding to cattle, the seed is comparatively valueless. If allowed to ripen its seed, the stalk is no more nutritious, probably, than oat-straw.

Millet requires good soil, and is rather an exhausting crop, but yields a produce valuable in proportion to the richness of the soil, and care and expense of cultivation.

CHAPTER XXXVIII.

PREMIUMS OFFERED BY H. R. STEVENS.

I WILL give to the party who raises the greatest number of tons of fodder-corn per acre, *not less than one acre*, from seed planted called *Blunt's Prolific*, one hundred dollars in cash; to the party who raises the next in quantity, fifty dollars in cash; to the party who raises the next in quantity, twenty-five dollars in cash, — making three *premiums*. First, one hundred dollars; second, fifty dollars; third, twenty-five dollars.

The kind of corn planted to compete for these premiums must be "Blunt's Prolific." These premiums are offered to any or all parties in the New England States. Mr. J. J. H. Gregory, the seed man of the United States, says, "there is no better corn to plant for fodder-corn than *Blunt's Prolific*." Blank certificates, with conditions to compete for the three premiums offered by me, will be furnished upon application. Address,

H. R. STEVENS,
Boston, Mass

CONCLUSION.

In conclusion, I think the reader will say I have given in this work all I promised in the introduction, the practical experience of practical farmers with silos and ensilage, and I have reason to believe it is the practical information the farmers want, that will give practical results with profit for their labor. Is there any doubt of the success of preserving our green forage crops by ensilage? There is no doubt! Then I think I have shown the success is a profitable one. When the farmer with one silo to-day says, "I must build larger, I must have two or three additional silos the coming year," it is practical proof that it is a success, and a profitable one. Farmers are not apt to be very enthusiastic over their labors unless there are some profits. I must say I have never seen so much enthusiasm shown as expressed by those who have built silos for ensilage. When a farmer says, "I have saved more money the past year than I have for twenty years," it does seem as though the golden harvest is to be reaped by the farmer; and, for one, I think it is the farmer's turn to meet with this success. Who can foretell the results when, in less than five years, there will be thousands of silos in the United States, whereas to-day there are about forty-three? Does it not seem as though a new interest was awakening among our New-England farmers? Has not the time arrived when our deserted farms will all be wanted, and will be cultivated? Is there not a bonanza in the farms with this new enterprise? Will it not give the farmer such profits, with less labor, as will enable him to be more independent? Is it not going to create new interest with our sons when they can find a more profitable employment, with less hard labor, than can be found in any business in our cities? This enterprise will create a new interest in farming: it will increase our stock in such large numbers, our farms will be enriched, the soil more productive, crops increased; and with the great labor-saving, improved, agricultural implements, instead of millions of New-England money going West to purchase grain for our farmers, with our enriched farms, we should raise all the grain we consume on the farm.

Again, with the increase in stock, the increase in productions of beef, butter, cheese, wool, in quality, as well as quantity. With these results, instead of our New-England towns decreasing in population, they must double their numbers. These results can be obtained by the farmer from this new enterprise, — the preserving of our green forage crops by ensilage.