

to be from six to ten degrees warmer at seven inches below the surface than an undrained soil at the same depth. This difference in the soil often gives the farmer a season which is from two to four weeks longer, besides giving quick and increased growth to plants.

Chemical Change.—Heat is an important chemical agent. When permitted to enter the soil with air, important changes are made. Vegetable matter, hitherto inert, becomes further decomposed and mingled with mineral matter, thus making the lower soil similar to that at the surface. Again, the ammonia furnished us by the rain is held in a drained soil and aids in this chemical work. In order to see that such changes are made, let a portion of clay or hard-pan be taken from a depth of three or four feet and exposed to the atmosphere. Instead of remaining compact and solid, it will gradually crumble and in time will become chemically changed. The same action goes on when the earth is in place and the air is allowed to find its way to it, which it can not do until the surplus water is removed.

Drought.—It is often asked "If draining makes a soil dry in a wet year will it not make it too dry in a dry time?" It has already been shown that a drained soil holds a large quantity of moisture by absorption. The soil being very much deepened, the roots of plants have access to the moisture contained in a much larger mass of soil than when undrained. Again, a soil is filled with capillary tubes, which carry moisture to the surface, where it is quickly converted into vapor. If the surface is mellow and the whole depth of soil loose, the tubes are much larger, so that water is conveyed to the surface in much less quantities. Consequently, less moisture is lost by evaporation. Still further, in dry times the soil below the surface is much cooler than the air, hence, when air containing vapor is brought in contact with it, the vapor is condensed into water and absorbed by the particles of soil. In an undrained soil the surface is made compact by standing water, is baked by the sun when the water is evaporated, is compact below, giving little depth of soil for the plants. Moisture evaporates rapidly through the hard surface, and roots, having a comparatively small range, soon feel the ill effects of dry weather. Some soils are naturally very rich and porous, producing good crops when the spring rains are light enough to allow the soil to be worked, but it has been found that such soil produces much larger crops even in dry times when well drained. In short, thorough under-draining has been found to be a most efficient preventative of drought. It also makes better tillage possible, which in itself is a great advantage, and it makes all parts of the soil available for the use of useful crops.

Silos and Ensilage.

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The use of silos and the feeding of ensilage are slowly growing in favor, and it is scarcely to be wondered at, being a change so reverse to the general practice of the farming classes, who, as a rule, from the nature of things, caused by their isolated lives, are slow to grasp and take up new lines of thought and practice. In towns where men come into contact, and the press is as necessary to them as the air they breathe, or the food they eat, anything new is thoroughly discussed and speedily taken up if found to be desirable; but with farmers it is a good deal otherwise. The papers are, after all, only taken by the few, and they have not the benefit of the attrition of mind on mind, which is had in densely populated centres.

It has been stated by a gentleman in the *Witness* (Montreal) that he found it difficult to keep more than fifty head of cattle on his farm in the ordinary way of winter feeding and summer pasture, but by the adoption of the new system he was enabled to keep three hundred and fifty, or six times more than he did before. A revolution such as this must strike any thinking man with surprise, and the question naturally arises, how can this be done?

It is fortunate for this continent that there exists a real live Bureau of Agriculture at Washington, who avail themselves of the best means of obtaining the most reliable and practical information that

can be had. From a small pamphlet, "No. 48," issued by them, we are enabled to lay before our readers the following facts: There are sixty-nine silos on the American continent, at least the Commissioner of Agriculture was able by the issue of a circular to obtain replies from that number of individuals using ensilage for the feeding of stock. It may surprise some of our readers to know that two of those sixty-nine reside in Canada, and are Geo. A. Pierce, of Stanstead, and W. B. Benson, M. P., of Cardinal, who lives a few miles below Prescott, on the St. Lawrence River, and is chiefly celebrated for his extensive starch works there. He is a large breeder of thoroughbred stock, and keeps a number of milch cows. His silos, of which he has five, four of which are 29 feet 6 inches by 16 feet 3 inches, and the fifth 34 feet by 16, and 20 feet 5 inches in depth, are built of stone; the mortar is made of sand and water lime, 12 feet 8 inches high and double board and plank, and 7 feet 9 inches higher to the roof. They are constructed quite adjacent to the feeding rooms. The forage generally used is corn or sorghum, and of this from twelve to twenty tons are grown to the acre. Mr. Benson averages his crop at fifteen tons. This is usually cut about half an inch to an inch long, generally by a horse-power machine; Mr. Benson uses steam. It is then filled into the silo, which takes three days to fill, men and boys spreading and stamping it with their feet so as to pack it as solid as possible. The cost of filling this silo was estimated at one dollar per ton, but Mr. Benson considered this too high, and hoped to reduce the amount next season. The silo being sixteen feet wide, the boards, or rather planks for covering the ensilage were cut 16 feet 2 inches, and over these were placed crossways four foot long planks, on which are placed loose stones of a convenient weight for handling, in a layer of two feet deep, to keep the mass well and solidly packed, as of course the corn stalks are put in green from the field, and it is the exclusion of air only which keeps it from heating. When taken out the stones are taken off the first four feet planks, the cross ones and those lying lengthwise are then removed, and the four feet by sixteen three are thus exposed, cut with the hay knife as required down to the bottom of the silo. This operation is again repeated, and so on till the silo is emptied, always leaving the stones and plank on what is not cut. On opening the silo it was found that eight inches was damaged at the top, but the sheep eat most of it, and four inches next the boards above the stone work was not very good, but the rest was highly relished by the stock. Mr. Benson says he prefers it to anything he has yet tried for feeding. No taste was found in either butter or milk. The steers that were fattening put on flesh rapidly, and it appeared to prevent them from getting feverish. The thoroughbred stock liked it, and their coats looked well on them. He gave the milch cows fifty pounds per day, the steers forty and the thoroughbreds from twenty-five to thirty pounds.

The milch cows had besides oat straw; some bran and cotton seed meal were mixed with their ensilage. The fattening cattle had a little hay, but he preferred the ensilage mixed with ground oats, cotton seed meal, and bran.

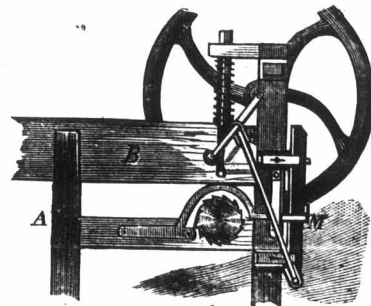
It was found so satisfactory in all respects that he proposes planting fifty-one acres of corn, and intends mixing some clover in part of it, as it is put in the silo. This shows that the matter has, with Mr. Benson, gone beyond an experiment. The fifty-one acres will produce seven hundred and sixty-five tons of ensilage, besides the clover. The corn is usually sown in drills, from thirty inches to three feet six apart, and harrowed and cultivated between the rows until too high for the horse to get between it. Corn, though yielding such a weight of fodder per acre, is not considered an exhaustive crop, as it obtains a large amount of nourishment from the air. It is usually cut when in full bloom, as with the drill mode of planting it would not head out. If the man deserves the praise of his country for making two blades of grass grow where one only grew before, how shall we honor the individual who enables us to raise seven head of cattle where one only could be fed?

In conclusion it must be borne in mind that ensilage cannot come into general use unless it is cheaply obtained. Costly machinery and extensive silos are difficulties which the ordinary small farmer cannot obtain. Mr. Morris, of Oakland Manor, Ind., U. S., one of the first to undertake this mode of feeding on this continent, appears to have solved this difficulty. He makes a ditch or cutting presumably into a bank, or where it can be well drained, eleven feet wide at the top and

seven at the bottom, deep as convenient, and any length required. Living in Maryland, where there is little or no frost, he believes in having his silos in the field where the crop is grown. His ensilage was analyzed at the New Jersey Agricultural Experiment Station, and took rank as No. 2 of nine fodder samples exhibited. He seeds in drills twenty inches apart, and grows from ten to twenty tons to the acre. He considers the feed worth \$10 per ton, or from \$100 to \$200 per acre. The analysis shows that an earth silo is quite as good for the preservation of the ensilage as either stone, brick or planks. He backs his cart into the silo, dumps the load and treads down with horses. The filling is carried several feet above the ground, rounded up, covered with roofing felt, and earth thrown on top of all. He says turnips doubled the grain crop of England. Ensilage will change the agriculture of all maize producing countries and increase their products in a much greater ratio.

Straw Cutter.

A new and improved straw cutter is shown in the accompanying engraving. A is the frame of the machine, and B is the feed box. The front posts of the frame rise above the top of the feed box, and to their upper parts are attached bearings in which a shaft revolves. To one end of the shaft is attached a large balance wheel, and the other end is a crank, by which the machine is turned. Upon the middle of the arm of the crank is formed a second crank, and to the spoke of the balance wheel, at the same distance from the axis of the shaft, is attached a crank pin. The crank and the crank pin are connected to the lower corners of the knife frame by two connecting rods, and



the knife frame is kept in place by slides and gibs placed on the forward end of the frame, which slides up and down carrying a knife attached to it in an inclined position. To the side bars of the knife frame are attached lugs, which, as the frame moves upwards, strike against and raise the projecting ends of the levers, M, the levers being pivoted to pawls that engage with ratchet wheels attached to the ends of the upper and lower feed rollers. The levers, M, are kept in place, and are made to operate in vertical planes by keepers attached to the opposite sides of the machine through which the levers pass. To the forward side of the frame, A, is attached a steel plate in such a position that the straw, while being cut, will rest upon the upper edge of the plate, which thus serves as a stationary knife.

Feeding inferior grades of small grain mixed with corn is a practice rapidly gaining in favor. It is cheaper and better in some respects than a pure corn diet.

The prices which were paid by the National Short-horn Association for the various Herd Books were as follows: American Short-horn Herd Book, \$25,000; American Short-horn Record, \$13,000; Ohio Short-horn Record, \$1,000.

The wool product of the world is 1,155,000,000 pounds, and of this amount more than two-thirds is owned and grown by British subjects. It is such as these that make England the power she is among the nations of the earth.

An exchange says that sheep manure is of but little if any value as a fertilizer unless the sheep be fed hay, grain or oil cake. The effects of regular feeding are almost as noticeable on the lands as on the stock.

A correspondent of The Germantown Telegraph makes his granary distasteful to rats by "daubing all the angles on the outside of the building with hot pine-tar for the width of three or four inches, and also any seam or crack where a rat or mouse can stand to gnaw."