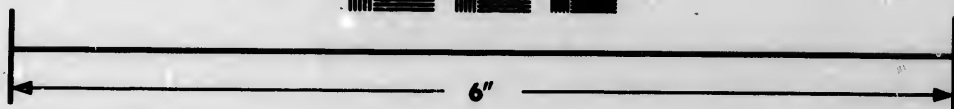
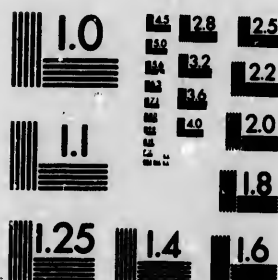


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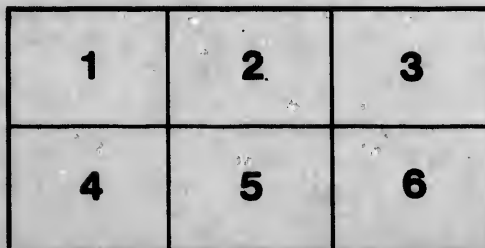
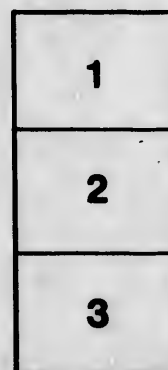
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ONTARIO AGRICULTURAL COLLEGE

EXPERIMENT STATION

BULLETIN LXXXII.

CORN ENSILAGE FOR MAKING BEEF

BY THOMAS SHAW, PROFESSOR OF AGRICULTURE, AND
C. A. ZAVITZ, B.S.A., EXPERIMENTALIST.

PUBLISHED BY THE DEPARTMENT OF AGRICULTURE

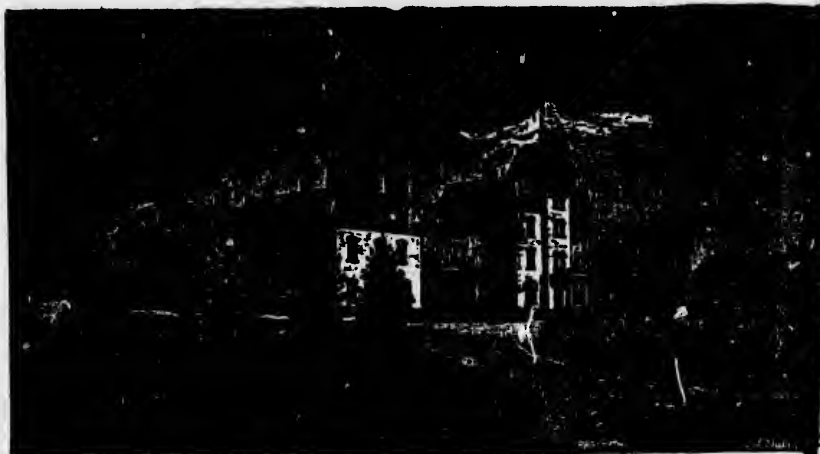
October 24th, 1892.

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BULLETIN LXXXII.

CORN ENSILAGE FOR MAKING BEEF.

This experiment began December 16th, 1891, and closed on May 13th, thus covering a period of 150 days. It is the third of a series of experiments conducted at this station having the same objects in view.

The chief objects of the experiment were (1) to ascertain the relative value of the following rations for making beef, viz., ensilage and meal; ensilage, hay and meal; and roots, hay and meal. And (2) to ascertain the cost of making beef when the values of food and meat are both considered. The animals selected were fairly good grade steers in which there was a predominance of short-horn blood. They were purchased by Mr. J. E. Storey, the farm foreman, and brought to the farm July 25th. They were then put on grass pasture and so kept until October 12th, at which date they were put in the stables. During this period, viz., while they were on pasture, the average gain per day on the whole lot was 1.5 pounds.

Period of Preparation. On November 29th six uniform animals were chosen, and divided into three groups, with two animals in each group. They were placed in double stalls, one group in each stall. They were fed for 16 days previous to the commencement of the experiment on the same rations as were given them during its continuance. The object was to accustom them to the new diet.

Food and Feeding. The animals in group 1 were fed all the ensilage they would eat clean. The aim was to give them 10 lb. of ensilage per day per animal. Those in group 2 were given 30 lb. of ensilage per day, the same amount of meal as the animals in group 1, and all the cut hay they would consume. Those in group 3 were given 45 lb. sliced roots per day, the same amount of meal as was given to each of the other groups, and all the cut hay they would consume. The hay was principally timothy, and the roots were turnips and mangels. The meal consisted of equal parts by weight of peas, oats and barley. The foods fed to the respective groups were mixed just before being fed, and were given in three feeds per day. They had salt and water at will.

Food Eaten. One of the animals in group 1 died on January 4th, 40 days after the commencement of the experiment. He was removed off his feed on January 23rd and died two days later. Dr. J. Hugo Reid, of Guelph, was called in the absence of Dr. Storey. He at once gave it as his opinion that the steer would not recover, and furthermore, that the ensilage fed was concerned

in his illness. A *post-mortem* examination was made by Dr. Reid the same day on which the steer died, and the next day, January 26th, he forwarded the following report: "By *post-mortem* held by me on steer that died on this farm yesterday, I wish to state that I found a rupture in the fourth or true digestive stomach, with an escape of a portion of the contents. There was inflammation of the peritoneum and slight inflammation of the small intestines. The rupture of the stomach was caused by gases formed from the food in the stomach, which when fed in large quantity appears to be of an indigestible nature. Death was no doubt caused by said rupture. One of the animals also in group 2 occasionally refused food. For 20 days in succession, in the month of March, he would not eat ensilage, and his gains in consequence were unsatisfactory. Because of these experiences we decided that it would be more satisfactory to use but one animal in each group for purposes of comparison. As we have thus far in this series of experiments used the tern group, we shall continue to use it as a matter of convenience although the reference in future will be to but one animal.

The following amounts of food were consumed daily by each animal:

| — | Ensilage. | Roots. | Hay. | Meal. |
|---------------|-----------|-----------|-----------|----------|
| Group 1 | 53.5 lb. | lb. | lb. | 9.64 lb. |
| Group 2 | 28.39 " | " | 7.22 " | 9.55 " |
| Group 3 | | 41.43 " | 10.39 " | 9.67 " |

Weights of the Animals. Fasted weights were used both at the commencement and the close of the experiment. The fast consisted in withholding food from 6 p.m., after the evening meal had been given until the animals had been weighed the following morning. Natural weights were taken frequently throughout the experiment, for the reason, among others, that in case of mishap we would have the necessary data for calculations. It may be mentioned here that the average shrinkage in weight from fasting was 42½ lb. at the commencement of the experiment and 31 lb. at its close.

Table 1 gives the analysis of weights of the animal in each group

| — | Group 1 | Group 2 | Group 3 |
|---|-----------|-----------|-----------|
| Weight at commencement | 1,298 lb. | 1,399 lb. | 1,364 lb. |
| Weight at close | 1,581 " | 1,601 " | 1,607 " |
| Increase per animal | 283 " | 202 " | 243 " |
| Average daily increase per animal | 1.89 " | 1.35 " | 1.62 " |

The animal in No. 1 group made the largest gains, notwithstanding that he was off his feed on two or three different occasions for

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short season. That in No. 2 group was also off his feed occasionally, but only for a brief interval at one time. The steer in group 3 had uniformly good health all the time.

The Estimated Value of the Food. The meal, the roots, and the hay were estimated at the current market values in Guelph, less the cost of marketing from an Ontario farm under average conditions. The home value put upon the oats therefore was 26 cents per bush., peas 50 cts., barley 40 cts., roots sliced 6 cts., per bush., and hay, when cut, \$9 per ton. Corn ensilage was valued at \$1.75, as in the corresponding experiment of last year. The grinding of the grain was put at 6 cts. per 100 lb. The cost of the daily ration given was: To the animal in group 1, 13.07; in group 2, 14.04; and in group 3 17.24 cts.

The ensilage ration therefore was the cheapest of the three. If that were the only consideration, we would have no hesitancy in recommending it before the others, but various weighty considerations claim our attention, such as its effects upon the life of the animals. On the other hand if the cost only were to be considered, we would pronounce against the root ration, but it has important advantages which must not be ignored.

Table 2 gives the financial result of the experiment:

| | Group 1 | Group 2 | Group 3 |
|---|------------|------------|------------|
| | \$ c. | \$ c. | \$ c. |
| Cost of animals at commencement of test | 51 92 | 55 96 | 54 56 |
| Cost of food | 19 60 | 21 06 | 25 86 |
| Cost of attendance | 3 13 | 3 13 | 3 13 |
| Total cost | 74 65 | 80 15 | 83 55 |
| Value of animals at close of test | 92 88 | 94 06 | 94 41 |
| Value of manure | 6 75 | 6 75 | 6 75 |
| Total value | 99 63 | 100 81 | 101 16 |
| Gain per animal | 24 98 | 20 66 | 17 61 |

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VALUES. At the commencement of the experiment the animals were valued at 4 cts. per lb. live weight, which was the average market price paid for steers of this class at the time. At the close they were sold to go to Great Britain for $5\frac{7}{8}$ cts. per lb. on May 18th, 1892, two days after the experiment closed. The cost of attendance was computed on the assumption that one person at 25 per month would feed and care for 40 head under ordinary conditions. This was the estimate used in the corresponding experiment of the previous year.

The manure was estimated at \$1.50 per ton, as in the corresponding experiments of the previous years, and the value of the bedding was deducted therefrom as in the experiments referred to.

The total net cash gain on the three animals used in the experiment was \$43, equal to a cash gain of 18.04 per cent. on the investment. The total gain on the five animals was \$54.75, equal to a cash gain of 13.07 per cent. on the investment. The total loss on the six animals of the experiment, including the dead one, was \$7.09. This estimate includes the food eaten by the animal that died, and all other outlay for the six animals and for the food consumed by them, but it does not include the cost of attendance or the value of the manure.

When the manure is included the total gain on the three animals of the experiment was \$63.25, on the five animals sold at its close \$88.50, and on the six animals \$27.32.

The amount received for the three animals of the experiment, when sold on May 18th, was \$281.35, which was within 65 cts. of being twice the sum paid for them on July 25th, 1891, when they reached the farm.

Conclusions from the Experiment.

1. That the total cash gain on the investment when the three animals are taken into the account, without including the manure and the cost of attendance, was \$43, and the average gain on each animal \$14.33. When these items are included the total gain is \$63.25, or an average of \$21.08 on each animal.

2. That in this experiment the cost of food in making 100 lb. of increase in live weight from the ration of ensilage and meal was \$6.93, from that of ensilage, hay and meal \$10.48, and from the ration of roots, hay and meal \$10.64.

3. That in this experiment an average individual daily gain was made of 1.62 lb. at an average cost of 14.78 cts. for food used.

4. That there is some hazard in feeding a full ration of ensilage to animals that are being fattened when it is fed with meal only.

5. That in this experiment the value of animals for beef purposes was increased by the fattening process an average of $1\frac{1}{2}$ cts. per lb. live weight.

6. That while the shrinkage in weight from a 12 hours fast in the stable was 42 $\frac{3}{4}$ lb. per animal at the commencement of the experiment it was but 31 lb. at its close.

Conclusions from the three Experiments of 1890, 1891 and 1892.

These conclusions give the results from the three experiments for three consecutive years, and from five animals with the three different rations used.

That the daily average cost of each ration was as follows :

| | |
|------------------------------|------------|
| Ensilage, hay and meal | 16.78 cts. |
| Ensilage and meal | 16.90 cts. |
| Roots, hay and meal | 19.10 cts. |

2. That the average daily increase of live weight from each ration per animal was as follows :

| | |
|------------------------------|----------|
| Ensilage and meal | 1.88 lb. |
| Roots, hay and meal | 1.74 lb. |
| Ensilage, hay and meal | 1.63 lb. |

3 That the average selling price of each animal fed on the different rations, with the cost of food added, exceeded the buying price as stated below :

| | |
|------------------------------|---------|
| Ensilage and meal | \$12 65 |
| Ensilage, hay and meal | 10 95 |
| Roots, hay and meal | 8 22 |

4. That from the behaviour of the animals fed ensilage and meal, we do not consider this ration a perfectly safe one for finishing live stock in beef-making, as out of the six animals fed upon it two died and three were occasionally off their food.

5. That from the behaviour of the animals fed ensilage, hay and meal, we conclude that these food factors form a much safer ration than that of ensilage and meal only, although the animals fed upon it gave some trouble by occasionally refusing to take their food.

6. That from the behaviour of the animals fed roots, hay and meal, we conclude that this ration is a very safe one to use in finishing live stock for beef-making, as the six animals fed upon it had uniformly good health all the time.

7. That steers 1,200 lb. and upwards, standing in the stable during the finishing period, shrink in the neighborhood of 40 lb. per animal with a fast of 12 hours ; that the shrinkage decreases somewhat as the fattening period progresses ; that it is considerably greater when they are at liberty in a yard while being fasted ; and when thus fasted the shrinkage will be less when the animals are given exercise occasionally.

Note. The sources of information from which these conclusions are drawn are Bulletin XLIX., the Annual Report for 1891, p. 106, and the experiment narrated above.

General Observations.

1. The principal object for which these experiments were undertaken has not been completely realised as yet. This object was "to discover the relative value of ensilage and meal; ensilage, hay and meal; and roots, hay and meal in beef-making." As the results have not been uniform, there is necessity for further experiment.

2. Some progress has been made in reference to the solution of the second object of these experiments, viz.: "To ascertain the cost of making beef when the values of food and meat are both considered." These experiments have demonstrated that beef can still be made at a cash profit where suitable grade animals were carefully purchased and judiciously fed, for in these tests we have still a net cash profit of \$37.03 when we have thrown the two dead animals into the compost heap. This profit does not include the items of attendance, bedding and manure.

3. These experiments have demonstrated two things, however, and both are important. First, they have made it pretty clear that ensilage and meal only do not furnish a ration that is altogether safe in finishing beef cattle; and second, they have proved in a comparative sense the great safety in feeding a ration of which roots is an important factor. Our advice therefore in the meantime to those who are growing roots for this purpose would be to continue to grow them, and to grow corn in addition where this is practicable.

4. While we have discovered some things from these experiments, there are many things regarding which we have yet to learn. They will be continued, therefore, though in a somewhat modified form. While there are elements of much excellence in ensilage corn for making beef, we are yet in some uncertainty as to the very best way of feeding it. In the hope of securing this information along with other facts that are of much moment, we will continue these investigations.

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