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CROPS FOR THE SILO, COST OF FILLING, AND EFFECT OF SILAGE ON THE FLAVOR OF MILK.

By WILBER J. FRASER.

URBANA, ILLINOIS, APRIL, 1905.
SUMMARY OF BULLETIN NO. 101.

ADVANTAGE OF SILAGE.—Corn silage is, as a rule, the most economical succulent food that can be obtained for dairy cows at a season when pasture is not available. Although not a balanced ration in itself, it tends to heavy milk production and economical milk can be made by feeding corn silage and a legume hay without the use of much grain. Page 629

VALUE OF SILAGE IN PLACE OF SOILING.—By helping the pasture out during dry periods with partial soiling, more stock can be carried on a given area than by pasturing alone. No crop will furnish more feed to the acre than corn, and with the silo this can be utilized for soiling. Page 630

CROPS TO RAISE FOR THE SILO.—In Illinois, corn seems to be the best single crop for the silo, and by combining with it cowpeas or soy beans, the feeding value is greater, ton for ton, than of corn alone. Page 632

INCREASE OF NUTRIENTS DURING MATURITY.—When corn is fully tasseled it contains less than one-fourth as much dry matter as when the ears are fully glazed. From this stage to maturity the increase is but slight. Page 632

TIME TO HARVEST.—That silage may keep well the corn should not be cut until most of the kernels are glazed and hard; if too ripe the silage will not settle well and the air will not be sufficiently excluded to prevent spoiling. Page 634

METHOD OF HARVESTING.—The corn is most easily handled by cutting with a corn binder, and using a silage cutter of large enough capacity to avoid the necessity of cutting bands. Page 636

ESSENTIALS OF SILO FILLING.—If silage is to keep well the leaves and heavier parts must be kept thoroughly mixed, evenly distributed in the silo, and well tramped next the wall. After filling, the top six inches should be wet once and the whole surface tramped every day for a week to obtain a thin, compact layer of well rotted silage which will exclude the air. Page 636

COST OF FILLING.—Records of the cost of silo filling were kept by the Experiment Station on nineteen different farms in various parts of the State, and the cost was found to range from 40 cents to 76 cents a ton, the average being 56 cents. Page 638

EFFECT OF CORN SILAGE ON THE FLAVOR OF MILK.—Of 372 comparisons made between silage and non-silage milk, 60 percent were in favor of the silage milk, 29 percent were in favor of the non-silage, and 11 percent indicated no preference. Page 644
*CROPS FOR THE SILO, COST OF FILLING, AND EFFECT OF SILAGE ON THE FLAVOR OF MILK.

BY WILBER J. FRASER, CHIEF IN DAIRY HUSBANDRY.

ADVANTAGE OF SILAGE.

The digestive organs of animals that chew the cud are so formed as to require comparatively juicy and bulky food. The cow cannot, therefore, thrive on exclusively dry food so well as can the horse. The nearest an ideal food that can be obtained for the dairy cow is good pasture; but for more than six months in the year green pasture is not available in Illinois. The best substitutes to use during this period are corn silage and such roots as mangels and turnips. Corn yields an average of twice as much dry matter per acre as do root crops; and, since the latter require much more labor, which in this country is relatively expensive, silage is far more economical.

Making corn into silage is a means of preserving the grain as well as the stalk in the best possible condition for feeding and without the expense of shelling and grinding. In feeding whole corn, either in the ear or shelled, many of the kernels are not digested. With silage, the grain being eaten with the roughage, nearly all the kernels are broken during mastication, and, since they are somewhat soft, are practically all digested.

By the use of the silo the corn is removed from the field at a time when no injury is done the land by cutting it up while soft. As the corn is cut before the blades are dry enough to shatter, there is no waste from weathering, and both stalk and grain being in good condition, the whole crop is consumed by the stock; while with dry shock corn a large percentage of the leaves and butts of the stalk is wasted.

*A bulletin on the construction of silos is now being prepared and will soon be published.
It has been determined that one cubic foot of hay in the mow contains about 4.3 pounds of dry matter, and that a cubic foot of silage in a thirty-six foot silo contains about 8.9 pounds of dry matter. From this it is evident that a cubic foot of space in a silo of proper depth will hold more than twice as much dry matter as the corresponding space in a mow. It is also true that on the average a larger amount of digestible feed can be obtained from an acre in the form of silage than in any other way at like expense. Making corn into silage is then both an economical and compact method of storing feed.

Much damage has been done to the cause of silage by the extravagant claims of its over-enthusiastic friends. Although corn silage is not a complete and balanced ration in itself, it is so well relished that large quantities are consumed. Being a succulent feed, it tends to heavy milk production, and should be given an important place in the ration of dairy cows. It has proved an important factor in steer feeding as well as in milk production, but a steer cannot be finished on silage alone, any more than a cow can produce her best yield of milk on such a ration. To obtain the most economical returns, some dry roughage should be fed in connection with silage, and a legume hay, as alfalfa, clover, or cowpeas, is the best feed for this purpose, particularly for young stock and cows. Economical milk can be produced from these feeds without the addition of grain, if the cows are not giving more than two gallons of milk a day, providing the corn was well eared and both the silage and the legume hay are of excellent quality. Cows giving a larger yield must have grain added to their ration.

**Value of Silage in Place of Soiling.**

A pasture will carry much more stock during spring, early summer, and fall, than it will through the hot, dry weather of midsummer. By helping the pasture out at this season with partial soiling, the cattle not only have better feed during this critical period, but more stock can be carried on a given area than by pasturing alone. As land increases in value and farming becomes more intensive, there is greater need for soiling, and the most satisfactory method of providing a substitute is by means of the silo. It requires too much labor to cut green crops every day and haul them to the cows, and besides there is necessarily a great loss in being obliged to feed the crops before they are fully mature and after they are over-ripe.

No crop furnishes more feed to the acre than corn, and with the silo it can be utilized for soiling, thus permitting the whole crop to be harvested when at the right stage of maturity and fed when needed, saving both feed and labor.
CROPS FOR THE SILO, COST OF FILLING.

Cut 1.—Filling the Silo with Small Cutter and Large Engine. Cutter Exploded from Being Given Too Much Power.
Crops to Raise for the Silo.

In Illinois corn seems to be the best single crop for the silo. It not only produces a large quantity of nutritious feed that is easily placed in the silo, but it is of such a nature as to pack readily and keep well. The large southern varieties of ensilage corn, which give enormous yields in tons per acre, have been recommended for silage; but such varieties do not produce much grain and the total nutrients are usually less than from ordinary field corn. The best results are obtained with some variety that will give a good yield of grain, and by planting somewhat thicker than for a grain crop. Under average conditions a larger tonnage of feed can usually be obtained per acre by combining corn, sorghum, and cowpeas or soy beans, but even with this combination the greater part of the crop should be corn.

Legumes, as clover and cowpeas, have the power, through bacteria on their roots, of utilizing the free nitrogen of the air and storing up within themselves a comparatively large amount of that most necessary constituent of food known as protein. By so doing they not only produce a food rich in protein without exhausting the soil, but enrich the soil by adding to its nitrogen. While they do not benefit the crop they are grown with, they do benefit the succeeding ones. When either peas or beans are grown with the corn and the entire crop is put into the silo, the feeding value is greater, ton for ton, than that of corn alone. This is a much more economical method of obtaining protein than by purchasing it in high priced concentrates, as gluten meal, oil meal, etc.

If cowpeas are planted at the same time as the corn and in the rows with it, they will usually make a fair growth, as shown in Cut 2. Since the vines will run up the corn stalks, the entire crop can be cut with the binder the same as corn alone, making practically no extra work in filling the silo. The only difficulty in harvesting corn and cowpeas with the corn binder is that, if the corn is missing for a rod in the row, there is nothing to carry the peas back into the binder, and it is likely to clog. Where there is a fairly uniform stand of corn, all can be readily bound together. As the stalks of soy beans are much stiffer than those of cowpeas, no difficulty is experienced in cutting them with the corn.

Increase of Nutrients during Maturity.

It is of great importance to know at what stage corn should be cut to secure the best results, how rapidly nutriment is stored up in the corn plant as it approaches maturity, and when the maximum amount is reached. The following table illustrates this point:
CHOPS FOR THE SILO, COST OF FILLING.

CUT 2.—CORN AND COWPEAS GROWING TOGETHER FOR THE SILO. NORTHERN ILLINOIS, AUGUST 28.
TABLE 1. WATER AND DRY MATTER IN CORN CROP AT DIFFERENT PERIODS AFTER TASSELING. NEW YORK (GENEVA) STATION.

<table>
<thead>
<tr>
<th>Date of cutting</th>
<th>Stage of growth</th>
<th>Corn per acre</th>
<th>Water per acre</th>
<th>Dry matter per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 30</td>
<td>Fully tasseled</td>
<td>Tons. 9.0</td>
<td>Tons. 8.2</td>
<td>Tons. .8</td>
</tr>
<tr>
<td>Aug. 9</td>
<td>Fully silked</td>
<td>12.9</td>
<td>11.3</td>
<td>1.5</td>
</tr>
<tr>
<td>Aug. 21</td>
<td>Kernels watery to full milk</td>
<td>16.3</td>
<td>14.0</td>
<td>2.3</td>
</tr>
<tr>
<td>Sept. 7</td>
<td>Kernels glazing</td>
<td>16.1</td>
<td>12.5</td>
<td>3.6</td>
</tr>
<tr>
<td>Sept. 23</td>
<td>Ripe</td>
<td>14.2</td>
<td>10.2</td>
<td>4.0</td>
</tr>
</tbody>
</table>

In the last column is shown the dry matter per acre in corn at different stages. When the corn is fully tasseled it contains but eight-tenths of a ton of dry matter per acre, or only one-fifth what it contains when fully ripe. When in the milk it contains nearly three times as much dry matter as when fully tasseled. Only seventeen days were occupied in passing from the milk to the glazing stage, yet in this time there was an increase in the dry matter of 1.3 tons per acre. This shows the great advantage of letting the corn stand until the kernels are glazed. After this period the increase in dry matter is but slight.

TIME TO HARVEST.

To have the silage keep well the corn must be cut at the proper stage of maturity. If cut before it is sufficiently matured, too much acid develops. If too ripe, it does not settle properly and the air is not sufficiently excluded to prevent spoiling.

Corn should not be cut until the ears are out of the milk and most of the kernels glazed and hard. In Cut 3, ear No. 1 is in the soft dough stage; No. 2 is beginning to dent; No. 3 is nearly all dented, but a few kernels are still in the milk; No. 4 shows all of the kernels dented. When corn is put into the silo it should usually be as ripe as ears No. 3 and 4. In case the weather has been so hot and dry that the lower leaves have fired, the corn should be cut before the ears are quite so far advanced. Much riper corn will keep at the bottom of the silo than at the top because of the greater pressure which excludes the air more completely. It is, therefore, important that the ripest corn be cut first and placed in the bottom of the silo.
CROPS FOR THE SILO, COST OF FILLING.


No. 2. Half the Ears Dented. All Kernels Dented.

No. 3. Nearly all Dented. All Kernels Dented. Providing Leaves are Still Green.

No. 4.
Method of Harvesting.

The corn should be cut with a corn binder, as it is much more easily handled when bound in bundles. If the silage cutter is large and the work is pushed with a good force of men, the corn binder should have a start of half a day. If enough horses are used on the binder to keep it moving at a good pace the corn can usually be cut down as fast as it can be put into the silo.

It is always wise to have a silage cutter of large capacity, as much less labor is required in feeding it, and if the bundles are small, the bands need not be cut. Using a small cutter with a large engine is dangerous unless great care is exercised in controlling the power. Cut 1 shows a small-sized cutter filling a silo in the center of a barn. The day following the taking of this picture the machine was given too much power and the cutter wheel exploded. A piece of the wheel was found twenty rods distant and another piece was thrown through the inch siding of the barn, but fortunately no one was injured.

The chain elevator, as shown in Cut 5, is still occasionally used, but is likely to cause trouble. Where a carrier of this kind is desired, the single chain gives the best satisfaction. The customary, and usually the most satisfactory, way of elevating the cut material is by means of the blower, as shown in Cuts 6 and 7. To obtain the best results and not to be annoyed by clogging, the blower pipe should be run as nearly perpendicular as possible.

Essentials of Silo Filling.

If silage is to keep well it must settle evenly. To this end the leaves and the heavier parts of the corn must be kept thoroughly mixed and evenly distributed in the silo. Owing to the great lateral pressure of silage, friction with the sides of the silo has a tendency to make the silage less compact at the edge, and for this reason it should be kept thoroughly tramped next the side. Every time three or four inches of cut material is added to the silo it should be tramped thoroughly around the edge, taking short steps and packing the silage as much as possible next the wall. These precautions must be observed during filling to obtain perfect silage.

If the corn is so ripe that none having green leaves at the bottom of the stalk can be obtained to finish the last four or five feet at the top of the silo, water should be run into the carrier and the corn well soaked. If the corn is green, only enough water need be used to soak the upper six inches of silage.
CUT 4.—CUTTING CORN FOR THE SILO WITH A CORN BINDER.
Many different forms of covering for silage have been advocated, but it is usually found most practical to finish with the same material as that with which the silo is filled. Frequently a saving can be made by snapping off the ears and using the stalks alone, or by running enough straw, chaff, or weeds through the cutter to cover the silage from four to six inches deep. If pressure is available, water can be run into the carrier to saturate this material. The top must be thoroughly soaked once and the whole surface well tramped every day for a week to exclude the air as much as possible. This trampling should be especially well done around the sides, so that the air cannot gain access next the wall. The object of wetting the surface is to obtain as quickly as possible a thin layer of thoroughly rotted silage, which will seal the top, thus excluding the air and preserving the silage below.

If water is not added to the top, the heat dries out the silage, which may then "fire fang" to considerable depth, entailing a great loss.

**Cost of Filling.**

The data on the cost of filling silos, from which the Table 2 has been prepared, were secured by representatives of the Experiment Station, who went to different parts of the state when men were filling silos and kept accurate records of the work in progress.

In these records the time work began in the morning and stopped at night was noted, allowance being made for whatever time was taken at noon. With the exception of a few cases on dairy farms, where some of the men quit early to milk, no allowance was made for time lost after the cutter started and men and teams were ready for work, a full day being counted unless for some reason all work stopped and men and teams were at liberty to leave.

To reduce the cost of filling the different silos to a like basis, the charge made in these records for each of the various operations was uniform, and as near as possible to the average price paid. The labor of the men was charged at $1.25 and of the teams at $1.00 each for a day of ten hours. This was considered a fair price, as the time of year in which silos are filled is not usually an especially busy season on the farm. In most cases the man who had the silo also owned an ensilage cutter, and a uniform charge of $2.00 a day was made for wear on the machine and interest on the money invested. The engine, including the engineer, was charged for at $5.00 a day; fuel at $3.00 a ton for coal and 15 cents a gallon for gasoline; twine at 11 cents a pound. The charge for machine and engine, fuel, twine, and labor of men and teams, gives the total expense of filling the silo.

To determine the capacity of the different silos the diameter of each and the depth of the silage after settling forty-eight hours were carefully measured. From these dimensions the number of tons of silage was estimated from a table on the capacity of silos. Having the acres
CUT 5.—FILLING THE SILO: CHAIN CARRIER.
### Table 2.—Data on Cost of Filling Silos.

<table>
<thead>
<tr>
<th>Farm number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter silo, feet</td>
<td>18.25</td>
<td>18</td>
<td>22</td>
<td>18</td>
<td>19</td>
<td>18.8</td>
<td>11.8x12.9 (square)</td>
<td>20</td>
<td>*20</td>
</tr>
<tr>
<td>Depth silage, feet, after settling 48 h.</td>
<td>31</td>
<td>23.5</td>
<td>24</td>
<td>27</td>
<td>33</td>
<td>29.5</td>
<td>22.7</td>
<td>22</td>
<td>38</td>
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<tr>
<td>Tons silage estimated from above dimensions</td>
<td>162.7</td>
<td>106.4</td>
<td>163.7</td>
<td>129.8</td>
<td>193.1</td>
<td>161.5</td>
<td>61.2</td>
<td>119.6</td>
<td>785.7</td>
</tr>
<tr>
<td>Acres cut</td>
<td>27.3</td>
<td>15.5</td>
<td>25</td>
<td>15.4</td>
<td>20</td>
<td>24.25</td>
<td>10</td>
<td>16</td>
<td>67.7</td>
</tr>
<tr>
<td>Tons per acre</td>
<td>5.96</td>
<td>6.86</td>
<td>6.55</td>
<td>8.5</td>
<td>9.65</td>
<td>6.66</td>
<td>6.12</td>
<td>7.47</td>
<td>11.6</td>
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<td>Distance hauled, rods</td>
<td>100</td>
<td>110</td>
<td>160</td>
<td>60</td>
<td>60</td>
<td>80</td>
<td>60</td>
<td>20</td>
<td>100</td>
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<tr>
<td>Teams hauling</td>
<td>6</td>
<td>5.5</td>
<td>6.5</td>
<td>4</td>
<td>3.5</td>
<td>2.5</td>
<td>3.5</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Days' labor, teams, 10 h</td>
<td>24.5</td>
<td>13.6</td>
<td>24.9</td>
<td>12</td>
<td>20.25</td>
<td>16.55</td>
<td>7</td>
<td>9.3</td>
<td>70.4</td>
</tr>
<tr>
<td>Days' labor, men, 10 h</td>
<td>36.3</td>
<td>17.7</td>
<td>36.4</td>
<td>19.3</td>
<td>33.3</td>
<td>25.9</td>
<td>15.75</td>
<td>16.5</td>
<td>145.25</td>
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<tr>
<td>Kind of cutter</td>
<td>Papes</td>
<td>Belle City</td>
<td>Belle City</td>
<td>Star 18</td>
<td>Star 17</td>
<td>Star 16</td>
<td>Blizzard</td>
<td>Blizzard</td>
<td>Porter Bros.</td>
</tr>
<tr>
<td>Kind of elevator</td>
<td>Blower</td>
<td>Blower</td>
<td>Blower</td>
<td>Carrier</td>
<td>Carrier</td>
<td>Carrier</td>
<td>Carrier</td>
<td>Blower</td>
<td>Blower</td>
</tr>
<tr>
<td>Length of cut, inches</td>
<td>.75</td>
<td>.5</td>
<td>.5</td>
<td>1.25</td>
<td>1</td>
<td>1</td>
<td>.5</td>
<td>.5</td>
<td>2</td>
</tr>
<tr>
<td>Size of engine, h. p.</td>
<td>15</td>
<td>20</td>
<td>20</td>
<td>12</td>
<td>8</td>
<td>8</td>
<td>17</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>Engine hire</td>
<td>$16.50</td>
<td>$10.50</td>
<td>$16.00</td>
<td>$11.00</td>
<td>$23.75</td>
<td>$20.00</td>
<td>$8.00</td>
<td>$7.50</td>
<td>$39.00</td>
</tr>
<tr>
<td>Use of cutter</td>
<td>6.60</td>
<td>4.20</td>
<td>6.40</td>
<td>4.40</td>
<td>9.50</td>
<td>8.00</td>
<td>3.20</td>
<td>3.00</td>
<td>15.60</td>
</tr>
<tr>
<td>Cost of fuel</td>
<td>6.30</td>
<td>3.75</td>
<td>6.00</td>
<td>2.25</td>
<td>6.75</td>
<td>7.05</td>
<td>1.95</td>
<td>4.05</td>
<td>16.50</td>
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<tr>
<td>Cost of twine</td>
<td>6.87</td>
<td>7.15</td>
<td>12.00</td>
<td>5.72</td>
<td>7.15</td>
<td>6.87</td>
<td>2.09</td>
<td>6.05</td>
<td>34.75</td>
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<tr>
<td>Labor, $1.25 a day</td>
<td>45.37</td>
<td>22.14</td>
<td>45.50</td>
<td>24.12</td>
<td>41.62</td>
<td>32.37</td>
<td>19.69</td>
<td>20.62</td>
<td>181.56</td>
</tr>
<tr>
<td>Teams, $1.00 a day</td>
<td>24.50</td>
<td>13.60</td>
<td>24.90</td>
<td>12.00</td>
<td>20.25</td>
<td>16.55</td>
<td>7.00</td>
<td>9.30</td>
<td>70.40</td>
</tr>
<tr>
<td>Cost of filling silo</td>
<td>106.14</td>
<td>61.34</td>
<td>110.80</td>
<td>59.49</td>
<td>109.02</td>
<td>90.84</td>
<td>41.93</td>
<td>50.52</td>
<td>357.81</td>
</tr>
<tr>
<td>Cost in cents per ton</td>
<td>.65</td>
<td>.58</td>
<td>.68</td>
<td>.46</td>
<td>.56</td>
<td>.56</td>
<td>.68</td>
<td>.42</td>
<td>.46</td>
</tr>
</tbody>
</table>

*Three silos same size.*
Table 2—Continued.—Data on Cost of Filling Silos.

<table>
<thead>
<tr>
<th>Farm number</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter of silo, feet</td>
<td>14</td>
<td>20.6</td>
<td>*14, 13.3</td>
<td>15.25</td>
<td>14</td>
<td>9.75</td>
<td>16</td>
<td>16</td>
<td>16.3</td>
<td>†20, 12</td>
</tr>
<tr>
<td>Depth silage, feet, after settling 48 h.</td>
<td>27</td>
<td>34.7</td>
<td>29</td>
<td>20.5</td>
<td>19.75</td>
<td>28</td>
<td>22</td>
<td>20</td>
<td>34.5, 18</td>
<td>28.8, 24</td>
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<tr>
<td>Tons silage estimated from above dimensions</td>
<td>78.6</td>
<td>244.28</td>
<td>166</td>
<td>65.8</td>
<td>24.5</td>
<td>108.1</td>
<td>76.5</td>
<td>69.86</td>
<td>260.4</td>
<td>224.85</td>
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<tr>
<td>Acres cut</td>
<td>13.75</td>
<td>33.25</td>
<td>17.5</td>
<td>3.6</td>
<td>11.5</td>
<td>6</td>
<td>6</td>
<td>40</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Tons per acre</td>
<td>5.71</td>
<td>7.34</td>
<td>9.48</td>
<td>6.8</td>
<td>9.4</td>
<td>12.75</td>
<td>11.64</td>
<td>6.51</td>
<td>9.36</td>
<td></td>
</tr>
<tr>
<td>Distance hauled, rods</td>
<td>68</td>
<td>295</td>
<td>160</td>
<td>30</td>
<td>215</td>
<td>80</td>
<td>100</td>
<td>60</td>
<td>360</td>
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<td>Teams hauling</td>
<td>5.5</td>
<td>7</td>
<td>6</td>
<td>4</td>
<td>7</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>7</td>
<td>6</td>
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<td>Days' labor, teams, 10 h</td>
<td>8.7</td>
<td>37.4</td>
<td>22.6</td>
<td>9.5</td>
<td>4.35</td>
<td>11.38</td>
<td>5.25</td>
<td>5.25</td>
<td>43.6</td>
<td>31.6</td>
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<td>Days' labor, men, 10 h</td>
<td>13.7</td>
<td>54.9</td>
<td>44.2</td>
<td>15.8</td>
<td>7.2</td>
<td>19.4</td>
<td>11.4</td>
<td>12.7</td>
<td>69.9</td>
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<tr>
<td>Kind of cutter</td>
<td>Ohio 18</td>
<td>Ohio 18</td>
<td>Ohio 18 Blizz'd 12 Blizz'd 14 Ohio 18 Ohio 18 Blizz'd 14 Blizz'd 14</td>
<td>Ohio 18</td>
<td>Ohio 18 Blizz'd 14 Blizz'd 14</td>
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<td>Kind of elevator</td>
<td>Blower</td>
<td>Blower</td>
<td>Blower</td>
<td>Blower</td>
<td>Blower</td>
<td>Blower</td>
<td>Blower</td>
<td>Blower</td>
<td>Blower</td>
<td>Blower</td>
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<td>Length of cut, inches</td>
<td>.5</td>
<td>.5</td>
<td>.5</td>
<td>.5</td>
<td>1</td>
<td>.75</td>
<td>.5</td>
<td>.5</td>
<td>1.25</td>
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<td>Size of engine, h. p.</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>17</td>
<td>18</td>
<td>15</td>
<td>20</td>
<td>20</td>
<td>18</td>
<td>20</td>
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<tr>
<td>Engine hire</td>
<td>$5.50</td>
<td>$20.00</td>
<td>$15.00</td>
<td>$8.50</td>
<td>$2.25</td>
<td>$7.00</td>
<td>$4.38</td>
<td>$4.38</td>
<td>$21.50</td>
<td>$18.50</td>
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<td>Use of cutter</td>
<td>2.20</td>
<td>8.00</td>
<td>6.00</td>
<td>3.40</td>
<td>.90</td>
<td>2.80</td>
<td>1.75</td>
<td>1.75</td>
<td>8.60</td>
<td>7.40</td>
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<tr>
<td>Cost of fuel</td>
<td>3.00</td>
<td>9.00</td>
<td>6.00</td>
<td>2.70</td>
<td>1.00</td>
<td>3.00</td>
<td>3.00</td>
<td>2.25</td>
<td>14.02</td>
<td>9.00</td>
</tr>
<tr>
<td>Cost of twine</td>
<td>4.18</td>
<td>8.80</td>
<td>5.94</td>
<td>3.30</td>
<td>1.10</td>
<td>5.10</td>
<td>1.65</td>
<td>1.65</td>
<td>10.72</td>
<td>6.05</td>
</tr>
<tr>
<td>Labor, $1.25 a day</td>
<td>17.12</td>
<td>68.62</td>
<td>55.25</td>
<td>19.75</td>
<td>9.00</td>
<td>24.25</td>
<td>14.25</td>
<td>15.87</td>
<td>87.37</td>
<td>66.62</td>
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<tr>
<td>Teams, $1.00 a day</td>
<td>8.70</td>
<td>37.40</td>
<td>22.60</td>
<td>9.50</td>
<td>4.35</td>
<td>11.38</td>
<td>5.25</td>
<td>5.25</td>
<td>43.60</td>
<td>31.60</td>
</tr>
<tr>
<td>Cost of filling silo</td>
<td>40.70</td>
<td>151.82</td>
<td>110.79</td>
<td>47.15</td>
<td>18.60</td>
<td>53.53</td>
<td>30.28</td>
<td>31.15</td>
<td>185.81</td>
<td>139.17</td>
</tr>
<tr>
<td>Cost in cents per ton</td>
<td>.52</td>
<td>.62</td>
<td>.67</td>
<td>.72</td>
<td>.76</td>
<td>.50</td>
<td>.40</td>
<td>.45</td>
<td>.71</td>
<td>.62</td>
</tr>
</tbody>
</table>

*Two silos same depth.
†Two silos
CUT 6.—FILLING THE SILO: SHOWING POSITION OF BLOWER PIPE.
Cut 7.—Filling the Silo. Blower Pipe should be as nearly perpendicular as possible.
cut, total cost of filling and tons of silage, the tons per acre and average cost per ton of putting up silage were computed.

The cost of filling ranged from 40 cents to 76 cents per ton, the average for the total number of tons put up being 56 cents. This variation was caused by the distance the corn was hauled, and the ability of some farmers to arrange the work more systematically and push it with greater energy than others.

Effect of Corn Silage on the Flavor of Milk.

Ever since silage has been used as a feed for dairy cows, there has been more or less controversy over its effect upon the flavor of milk, the objection being occasionally raised that milk from silage-fed cows had an unpleasant, if not a disagreeable, flavor. To determine what foundation, if any, there was for this belief, the experiment herein described was undertaken and conducted in the following manner:

The University dairy herd was divided into two lots, one of which was fed forty pounds of corn silage per cow per day, which is the maximum amount for economical feeding, together with a small amount of clover hay and grain. The feed for the other lot consisted entirely of clover hay and grain.

The milk from both lots was cared for in exactly the same manner, being removed from the barn as soon as drawn and taken to the dairy building, where it was cooled. After standardizing to four percent butter fat, that there might be no difference in flavor of the milk from the two lots on account of a variation in this respect, the milk was put in half-pint bottles and sealed.

In each case, before asking for a comparison, a bottle of milk from each lot of cows was agitated to incorporate the cream thoroughly, and the milk in each bottle was poured into a separate glass. Three questions were then asked the person whose opinion was desired: First, "Is there any difference in the two samples?" Second, "Is there anything objectionable about either?" Third, "Which do you prefer?" The answers are summarized in Tables 3, 4, 5, and 6. In every case the milk was known by number only and those whose opinions were obtained were not told concerning the manner of production, that their judgment might be unbiased by any prejudice they might have had as to the use of silage in milk production.

The people whose tastes were consulted were divided into three classes, ladies, men of the faculty, and men students. In the first case, as reported in Table 3, the silage had been fed one hour before milking. Of the 29 ladies, 10 preferred the silage milk, 14 the non-silage, and 5 had no choice. Of the men of the faculty, 27 preferred silage milk, 20 the non-silage, and 7 had no choice. Of the students, 20 preferred silage milk, 4 non-silage, and 4 had no choice.
A preference for silage milk was indicated by 51 percent of the 111 tests made when silage was fed one hour before milking. When silage was fed at time of milking, 71 percent preferred silage milk, and when fed after milking, 51 percent reported the same preference.

The following tables give the time of feeding silage, class of people tasting milk, number of tests made, and the milk preferred:

**Table 3.—Silage Fed One Hour before Milking.**

<table>
<thead>
<tr>
<th>Number of people tasting milk.</th>
<th>Kind of milk preferred.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Silage</td>
</tr>
<tr>
<td>Ladies</td>
<td>20</td>
</tr>
<tr>
<td>Men of the faculty</td>
<td>54</td>
</tr>
<tr>
<td>Men students</td>
<td>28</td>
</tr>
<tr>
<td>Total</td>
<td>111</td>
</tr>
</tbody>
</table>

**Table 4.—Silage Fed at Time of Milking.**

<table>
<thead>
<tr>
<th>Number of people tasting milk.</th>
<th>Kind of milk preferred.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Silage</td>
</tr>
<tr>
<td>Ladies</td>
<td>30</td>
</tr>
<tr>
<td>Men of the faculty</td>
<td>17</td>
</tr>
<tr>
<td>Men students</td>
<td>121</td>
</tr>
<tr>
<td>Total</td>
<td>168</td>
</tr>
</tbody>
</table>

**Table 5.—Silage Fed Immediately after Milking.**

<table>
<thead>
<tr>
<th>Number of people tasting milk.</th>
<th>Kind of milk preferred.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Silage</td>
</tr>
<tr>
<td>Ladies</td>
<td>22</td>
</tr>
<tr>
<td>Men of the faculty</td>
<td>43</td>
</tr>
<tr>
<td>Men students</td>
<td>28</td>
</tr>
<tr>
<td>Total</td>
<td>93</td>
</tr>
</tbody>
</table>

**Table 6.—Summary of Results.**

<table>
<thead>
<tr>
<th>Total number of people tasting milk.</th>
<th>Kind of milk preferred.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Silage</td>
</tr>
<tr>
<td>Ladies</td>
<td>81</td>
</tr>
<tr>
<td>Men of the faculty</td>
<td>114</td>
</tr>
<tr>
<td>Men students</td>
<td>177</td>
</tr>
<tr>
<td>Total</td>
<td>372</td>
</tr>
</tbody>
</table>
The summary of all results shows that of the 372 tests made, 223 or 60 percent, preferred silage milk; 40, or 11 percent, had no choice; and 109, or 29 percent, preferred the non-silage milk. The people who chose the non-silage milk were, as a rule, those who do not drink milk, hence their opinion is not so important as is that of the people who consume milk more freely.

Samples of silage and non-silage milk were sent to five milk experts in Chicago and other cities, accompanied by a letter asking the same three questions. One of these experts had no choice, one decided in favor of the non-silage, and three preferred the silage milk.

It will be noticed from the tables that most people could detect a difference in the flavor of the two samples of milk, but it was expressly stated in every case that there was nothing objectionable about the flavor of either sample.

To determine further whether the public generally objects to silage milk, twelve half-pint bottles of such milk were delivered at the best hotel in the Twin Cities each day for a month, making 360 samples in all. These were served to guests who drank milk and no complaint or criticism of any kind was made.

For the past nine years the Department of Dairy Husbandry at the University has delivered from 100 to 150 quarts of milk a day to people in the two cities. During this time the cows have been fed an average of about forty pounds of silage per day, except when on pasture, and no complaints of a bad flavor in the milk have been received.

Mr. H. B. Gurler of DeKalb, who is one of the most progressive dairymen of the state, has been producing certified milk for the past ten years and selling it in Chicago at 12 cents a quart. All of this time Mr. Gurler has been feeding silage to his cows, excepting during the season of the year when pasture was abundant, and with the best of results.

This is strong evidence that if the silage is of good quality and used in reasonable amounts, in connection with other feed, it is one of the best feeds obtainable for dairy cows when pasture is not available. It must be remembered that in all of this work nothing but good silage was fed and no spoiled silage was allowed to accumulate in or around the silo. When silage imparts a bad or disagreeable flavor to the milk produced from it, almost invariably the cause is that the silage has not been fed properly, or that spoiled silage has been used.

It should not be understood from this discussion that the time of day a food is fed which may impart a bad flavor to the milk is of no consequence. All feeds of this nature should be fed after milking and not before, to avoid the possibility of producing an unpleasant flavor in the milk.
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