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Dough Stage
Best for Oat Silage

Four years of research at the Experiment Station show that the dough stage is the best time to harvest oats for silage. Oats cut then produced more tons of silage, had a good aroma, and the cows liked it best.

by F. P. Gardner and R. S. Allen

OATS ARE a popular companion crop for establishing forages. The annual 4-million-acre oat crop in Iowa attests to their popularity. As a grain crop, however, oats are less popular and less profitable.

Recently, there’s been an upsurge of interest among farm operators in finding ways to use their oats crop more profitably. Some have suggested oat silage. By storing the entire oat plant as silage you can more than double the nutrient return per acre compared with harvesting the crop as grain. Another advantage of making oats into silage is that early removal of the crop stimulates growth of the legumes and grasses seeded in the oats. Also, in moist years, you can plant a second crop, such as an early soybean or sorghum, after disking the oat stubble when the crop has been removed early as silage.

With those advantages of oat silage in mind, we started a 4-year study to find efficient ways to make good silage from oats. We believed that a high-yielding crop of oats was needed. But, in addition, we needed answers to such questions as: When should you harvest oats for high-quality silage? What effect does the oats variety have on silage yield and quality?

To answer those questions, we harvested test plots of oats at five stages of maturity to determine silage yield and the percent of moisture and protein. Oat forage was harvested at boot, heading, milk, early dough and late dough stages of maturity and packed in upright silos. Later, the silage was chemically analyzed and fed to dairy cows. We observed the cows’ choice of silage and measured their milk production.

Let’s look at the results of those tests.

Silage Yield...

The tons of silage produced increased sharply as the oats advanced in maturity (see chart 1). Oats cut in the early or late dough stages usually made twice as much silage as oats cut in the boot or heading stages.

Silage made from oats cut in the dough stage contained 25-33 percent grain. Silage made from oats cut at the earlier stages contained only leaves and stalk, thus it was lower in carbohydrates and energy.

In good years, the experimental plots yielded more than 12 tons of silage per acre when harvested in the dough stage. Such high yields were made possible by using fertilizer and other management practices to produce 75-100 bushels of grain an acre and by harvesting and weighing all forage above a 1-inch stubble.

You probably wouldn’t expect as high yields on your farm because of higher stubble, greater loss with large machinery and perhaps less favorable growing conditions. By applying manure or commercial fertilizer and seeding early at a slightly heavier rate than normal, you can expect a yield of 8-9 tons of oat silage an
acre from a mid- or late-season variety that is cut in the dough stage.

**Which Variety?** The variety of oats to plant is an important consideration. At most of the stages of harvest, Garry, a late variety, produced the most forage in our tests except for 1 year when Newton was best. Garry wasn’t superior, however, when harvested before the milk stage or in the late dough stage.

In most years, late varieties such as Garry and Portage will be subject to lodging, disease and heat damage and, thus, their heads may not fill well. But even when late varieties produce less silage, they may have a place in an oat-silage program. By planting a midseason oat such as Clintland or Newton and a late variety such as Portage or Garry, for example, you can harvest over a longer period and still cut at the best stage for making silage.

The optimum dough stage of maturity for harvest may last for only 4-7 days. So, if you plant a large acreage for silage, you may need two or three varieties that differ in maturity to stretch the harvest over a longer period. In that case, you could plant Minhafer or Cherokee as early varieties, Clintland or Newton as mid-season varieties and Portage or Garry as late varieties.

**Moisture Content . . .**

A moisture content of 60-70 percent is considered best for ensiling most crops. The moisture usually will be within that range if oats are cut with a field chopper at the dough stage of maturity and put directly in the silo. Seepage and foul-smelling silage may result if the moisture content is higher than 70 percent. On the other hand, silage may mold if the moisture content is less than 60 percent and if care isn’t taken to assure good packing.

Chart 2 shows that the moisture content was as high as 88 percent at the boot stage in 1957. The 4-year average moisture percentage at the boot, heading, milk, early dough and late dough stages was 85, 82, 75, 71 and 61 percent, respectively. In other words, the best range for making silage lay between the early dough and late dough stages.

**Protein Content . . .**

With oats, like other forages, the percentage of protein decreases as the plants mature. Crude protein of the oat plants in our tests was as high as 22 percent at the boot stage but was only 11 percent at the late dough stage (see chart 3). The differences between the crude protein contents before and after ensiling were greater for forages cut at the early stages (boot, heading and milk). The losses were due primarily to seepage. There was essentially no loss of crude protein from the oat forage ensiled at the
dough stage. After ensiling, silage cut at more mature stages contained more true protein than silage cut at immature stages.

The protein of silage made from oats cut in the boot and heading stages deteriorated in the silo. The protein degraded and formed ammonia and other undesirable nitrogen compounds which contributed to an objectionable odor of the silage. With the silage made from oats cut at the dough stage, however, a more desirable fermentation resulted in formation of lactic acid which helped preserve the silage. Also, not as much protein changed to ammonia, and this silage had a good aroma.

Which Did Cows Like?

Our clipping experiments and chemical analyses suggested that the dough stage was optimum for making oats into silage. But we weren't sure that cows would "agree." To find out, we conducted a feeding test with dairy cows to study their acceptance of silage made from oats cut at various stages. Silage made from oats cut at each of the five stages was placed in adjacent feed bunks and offered to the cows free choice. Within a few minutes, they had rejected the silage made from oats cut at the immature stages and had gathered around the bunks of silage made from oats cut in the early and late dough stages and ate all of it. After 12 hours a good share of the silage made from immature oats remained in the bunks. Apparently, the presence of ammonia and other objectionable compounds, such as butyric acid, in the early-cut silages made them unpalatable to the dairy cows.

A preliminary test indicated that cows gave more milk when fed silage made from oats cut at the mid-dough stage than did cows fed silage made from oats harvested at heading.

In Summary . . .

Our tests indicate that the dough stage is the best time to harvest oats for silage for these reasons:

1. Yield is greater.
2. Moisture percentage is at the optimum of 60-70 percent.
3. Aroma and preservation of the silage is better.
4. Dairy cows prefer silage made from oats harvested in the dough stage and apparently give more milk from it.

Farm Co-ops: How "Special" a Status?

How far may farm co-ops go to gain more market power? Are they, as some believe, totally exempt from antitrust prosecution? Apparently not, and court decisions are beginning to outline the boundaries for co-op action.

by L. B. Fletcher

TO HELP relieve long-standing farm price and income problems, the possibilities of farm producers acting jointly to manage their output and marketings are attracting increased interest. Some of the thinking is this: If all producers—or large groups of them acting together—could control the amount and quality of a product going to market, perhaps they could bargain for more favorable prices or incomes.

Marketing cooperatives often are suggested as devices for wielding market power for farmers. One reason is that many marketing co-ops already exist and represent groups of farmers acting in unison to improve their economic position. Another reason given is that they have a "special" status under antitrust laws. What about those reasons?

The first reason is sound. The second needs a caution sign. Legislative measures have led some people to assume that farm cooperatives are completely exempt from prosecution for antitrust violations. This, however, isn’t so. Court decisions haven’t yet marked all of the boundaries for cooperatives under antitrust legislation. But the emerging pattern of decisions is showing that legislation has given co-ops only a limited exemption from antitrust actions.

Thus, let’s look at the background leading to co-ops’ "special" status, some pertinent court