Corn Silage

(Continued from Page C10)

ing date in Lancaster county, Pennsylvania, corn silage planted after harvest of barley also averaged 11 tons per acre. Both studies indicate that corn silage can produce reasonable and profitable forage yields in many areas, even when planted in late June.

Soil Fertility Program

Nutrient removal rates by corn for silage are higher than those by corn for grain and by most other commonly grown crops (Table 1). Consequently, on soils with low-to-optimum soil-test levels, fertilizer recommendations for corn grown for silage are 20, 30, and 115 lb/A higher for N, P_2O_5, and K_2O, respectively, than for corn for grain with comparable yields. Because of these higher nutrient requirements, fertility programs can be expensive and monitoring of soil nutrient levels by regular soil testing is critical. The higher nutrient recommendations are made to replace nutrients removed, not because the crop will respond to higher fertilizer applications. Where the use of a corn crop is uncertain (grain or silage), lower corn for grain nutrient recommendations will suffice, provided soil nutrient levels are monitored in the future.

Table 1. Plant nutrients contained in a crop with 150-bushel corn grain per acre (25-ton silage).

Nutrient	Grain	Stover	Total
N	115	55	170
P	28	7	35
K	35	140	175
Ca	1	34	35
Mg	10	30	40
S	11	9	20
Zn	0.17	0.17	0.3

Barber and Olson, 1968

Since corn silage is usually produced on farms with livestock, soils planted to corn for silage often receive manure applications and are rotated with forage legume crops. This frequently results in optimum-to-high soil nutrient levels and relatively low fertilizer requirements. The key to developing plant nutrient recommendations is to soil test and to account for manure applications and for previous crops in the rotation. This strategy will minimize fertility program costs and maintain the potential for high yields.

Weed And Insect Management

Control strategies for weeds and insects in corn for silage are similar to those used in corn for grain. These strategies are discussed in detail in "The Penn State Agronomy Guide." Silage yields are more sensitive than grain yields to insects that reduce stands because corn plants have difficulty compensating completely for missing plants. Corn for silage, because of its earlier harvest, is impacted less by insects and diseases that promote lodging, such as European corn borer, corn rootworms, and stalk rot. Late-season scouting can identify fields with these problems while they can still be harvested for silage.

Harvest Considerations

One of the most important factors influencing corn silage quality is stage of growth or moisture content at time of harvest. Ideally, corn silage should be harvested at the moisture content appropriate for the type of silo used. Recommended moisture contents are 65-70 percent for horizontal silos, 63-68 percent for conventional tower silos, and 55-60 percent for limited-oxygen silos. Between the moisture levels of 60 and 70 percent, crop quality and dry matter yield are maximized and losses during feeding, storage, and harvesting are minimized (Table 2).

Table 2. Expected dry matter losses of whole-plant corn silage harvested at different moisture contents.

Moisture	Harvest	Storage	Feeding	Total
≥70	4.0	13.4	4.0	21.4
61-69	5.0	6.3	4.0	15.3
<61	16.2	6.3	4.0	26.5

Corn that is ensiled too wet will ferment poorly and lose nutrients by seepage, which also has potential to damage the silo. Silage that is too dry will result in air pockets that prevent anaerobic fermentation and allow development of molds. In dry, overmature, corn silage, the stover portion of the plant is less digestible and contains lower amounts of vitamins A and E than corn ensiled at the recommended moisture levels. In addition, the overmature kernels become harder and less digestible.

Silage moisture at harvest is not difficult to determine and should be monitored, if possible, to prevent harvesting of the crop outside of the desired moisture range. A commerciai forage moisture tester or a microwave oven can be used to determine the moisture content fairly rapidly.

Moisture content can also be estimated by the stage of kernel development, as characterized by the position of the kernel miik line. The kernel milk line appears as a whitish line separating the kernel starch and milk. This appears near early dent stage and moves down the kernel as the grain matures. Data from studies conducted at Penn State indicate silage moisture contents at full dent (all kernels dented), half milk, and black layer stages average 68, 61, and 53 percent, respectively. These are only estimates, however, and may vary by about plus-or-minus 4 percent, depending on the year and hybrid. Consequently, the moisture content should be monitored, if possible, to ensure accuracy.

As a general rule, harvest should begin at the full dent to one-third milk line stage. This will usually maximize digestible dry matter yields and help to avoid harvest of fields that are overmature. Avoid moisture levels of less than 62 percent because they may increase the risk of abnormal fermentation, higher dry matter losses, lower energy content from hard grain, and silo fire. When corn silage provides over 65 percent of the forage dry matter, harvest at the early dent stage should be considered to provide more forage fiber and fat soluble vitamins.

A tactic that helps predict harvest date is to chop a sample of plants one to two weeks before the crop is ready. The moisture content can be measured then and optimum harvest date can be predicted, using a drying rate of about 0.5 percentage points per day.

Care should also be taken not to chop the corn silage too fine. Average particle size should range from 3/8 to 3/4 of an inch in length with 15 percent of the particles 1 to 1.5 inches in length. Particle size should be monitored during harvesting because it can change as crop moisture content varies. Chopping too fine has been shown to use more fuel in harvesting and to result in a silage which may depress milk fat test values.

Once harvesting has begun, fill the silo as rapidly as possible and continue until it is filled. Loads should not stand overnight, because they can heat and spoil.

Frosted corn

Corn is occasionally damaged or killed by frost before it reaches the desired maturity for ensiling. If the frost is early and green leaves remain on the plant, the crop will continue to accumulate dry matter and should be left in the field until it reaches the appropriate moisture content. Plants that are killed and still immature will likely contain too much moisture for immediate ensiling. These plants will dry slowly and dry matter losses will increase as the dead plants drop their leaves in the field. The best option is to leave the crop in the field to dry to an acceptable level, unless it appears dry matter losses are becoming too high or harvesting losses will increase dramatically.

Drought-stressed corn

When corn is so drought stressed that it may not resume growth, it should be ensiled. Corn in this condition usually has few

(Turn to Page C12)