Corn Silage Quality and Inventory Management

Corn harvested for silage is an important feed crop for livestock producers. Corn silage serves as a high-energy forage for dairy cows and is also well adapted for use in low-cost rations for fattening beef cattle. To develop an efficient feeding program, livestock producers should know the quantity and quality of forages and grains available and the nutrient needs of their livestock during the feeding period.

Nutritional Quality of Silage

Silage Sampling. The quality of corn silage is determined by energy content, intake potential, as well as the content of protein and minerals. A laboratory analysis can help determine the quality of a forage for balancing rations. The main problem in balancing rations is whether the analyzed sample represents what is being fed. Ideally, sampling will occur prior to ensiling. While some fractions can change during fermentation, crude protein (CP), and fiber fractions remain stable when good fermentation occurs. Analysis can change when:

- Forage is ensiled at too high a moisture content and seepage occurs. This can cause crude protein (CP) and non-fibrous loss resulting in higher fiber content.
- Forage is ensiled too dry and heats excessively causing acid detergent fiber (ADF) and acid detergent insoluble nitrogen (ADIN) to increase.
- Fermentation is faulty and excessive mold growth occurs.

If sampling wasn’t done prior to ensiling, wait until fermentation is complete (usually about 3 weeks) and sample below the spoiled material at the top.

Using Forage Analysis. Results from corn silage analysis can be used to balance rations and to improve future crop management. Four important analyses results are dry matter (DM), neutral detergent fiber (NDF), NDF digestibility (NDFD), and (CP).

- **Dry matter (DM)** is the percentage of the sample that is not water. In order to balance rations properly, you need to know the dry matter content. Lower moisture contents are typically found with more mature plants, which can alter silage digestibility and energy content.

- **Crude protein (CP)** is an estimation of total protein based on nitrogen in the feed. CP is 6.25 times the nitrogen content for forage and 5.7 times the nitrogen content for grain. Overfeeding or underfeeding protein can be costly to production and possibly animal health.

- **Neutral detergent fiber (NDF)** represents the slowly digestible and indigestible components of plants (cellulose, hemicelluloses, lignin, and ash). NDF gives the best estimate of the total fiber content and is closely related to feed intake. An increase in NDF means less of that forage will be consumed.

- **NDF digestibility (NDFD)** is the portion of NDF that is digested in the rumen. A higher NDFD value indicates a high quality forage.

- **Lignin and digestibility** are also important factors.

For more information on analysis and rations, contact your local agronomist, silage nutritionist, or veterinarian.
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Mycotoxins in Silage

Mycotoxins are toxic substances produced by molds growing on grain or feed. The majority of molds that grow on silage are harmless, but a few species can produce mycotoxins. The most common mycotoxins in silage are aflatoxin, deoxynivalenol (DON or vomitoxin), xeralenon, T-2 toxin, fumonisins, and ochratoxin. Contaminated feed is rarely fatal, but can reduce growth rate, lower feed conversion and reproductive rate, impair disease resistance, and reduce vaccination efficacy.

Proper silage preparation creates conditions where further mold growth and mycotoxin production can be controlled. However, some molds can survive even in these extreme conditions and still produce mycotoxins. Toxins that are present prior to ensiling will be present even after proper ensiling.

Mycotoxins can occur both in the field as well as later in storage with potential adverse effects to the herd’s health and production. If mold/mycotoxins are suspected, testing is recommended to confirm the potential levels.

Managing Inventory and Storage Losses

Feed costs are the largest expense for livestock producers. In order to maximize profitability, farm feed inventories should be closely managed. A feed inventory can be a valuable tool when planning your feeding program for the upcoming year. A feed inventory will allow you to determine your available feed supply, estimate the total feed needs for your planned herd size, and adjust herd numbers or plan feed purchases when prices are favorable. Once you have established your feed inventory, adjustments are needed for storage and feeding losses.

Storage losses. Silage storage losses can be high if crops are not harvested at the proper moisture content, facilities are inadequate, the crop is not chopped correctly and packed well, and/or silos are not sealed properly. Dry matter loss during ensiling is an important factor to consider when selecting a storage system. The capacity of the silo significantly affects dry matter loss during feedout due to the amount of exposed surface area—the smaller the silo, the higher the loss. The average losses of dry matter associated with harvest, storage, and feeding also vary depending on the corn silage moisture content (Table 1).

Potential spoilage. Silage must be fed soon after removal from storage to avoid spoilage due to exposure to oxygen. Storage facilities with an exposed silage surface must be sized to match the feeding rate to prevent spoilage. Loose silage is more porous and allows greater air infiltration which increases the rate of aerobic growth. Maintaining a firm face and cleaning up loose silage that has fallen to the floor during feedout will help minimize aerobic losses. Also, when silage feeding is discontinued for a long period, resealing is required to avoid greater storage losses and spoilage problems.

Conclusion

Producing high-quality silage requires intensive management of all aspects of the ensiling process. Poor silage management practices can result in reduced feed quality, low milk production, and increased risk of health problems. Proper management practices help to limit these risks.

Sources:

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