Maintain Silage Quality and Inventory

Livestock producers should analyze the quantity and quality of forages and grains in their silage. Silage and mycotoxin analysis are valuable tools in determining silage quality and developing balanced feed rations. Producers should maintain feed quality and reduce the risk of herd health problems with good silage management practices. A feed inventory can help producers control feed costs and maximize profit potential.

Evaluate Silage Nutrition

Energy content, intake potential, and protein and mineral content make up corn silage quality. Silage pH and lactic acid content are important as they affect fermentation. These factors should be confirmed by a laboratory analysis before rations are blended and balanced. The primary challenge in balancing rations is confirming the analyzed sample represents the ration being fed. Samples should be analyzed 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 of moisture content and seepage occurs. This can cause 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 samples were not collected prior to ensiling, wait until fermentation is complete (usually about 3 weeks) and sample below any spoiled material at the top.

Forage Analysis

Corn silage analysis results can be used to balance rations and to improve future crop management decisions. Five important analyses results are: acid detergent fiber (ADF), dry matter (DM), neutral detergent fiber (NDF), NDF digestibility (NDFD), and crude protein (CP).

- **Acid detergent fiber (ADF)** is commonly used in predicting silage energy content.
- **Dry matter (DM)** is the percentage of the sample that is not water. To balance rations properly, the dry matter content must be known. 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 when determining silage quality.

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

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Inventory Management and Storage Losses

A carefully monitored feed inventory can help livestock producers control feed costs (one of their largest expenses) and maximize profitability. The feed inventory can be a valuable tool for determining available feed supply, estimating total feed needs for the planned herd size, and adjusting herd numbers or planning feed purchases when prices are favorable. The inventory should be adjusted as needed to account for storage and feeding 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 a silo significantly affects dry matter loss during feedout due to the amount of exposed surface area—the smaller the silo, the higher the loss. Average losses of dry matter associated with harvest, storage, and feeding also vary depending on corn silage moisture content (Table 1).

Table 1. Expected dry matter losses in corn silage harvest, storage, and feeding.

	Dry Matter Loss (%)				
Corn Silage Moisture (%)	Harvest	Storage	Field Tonnage to Feeding	Total	Tons to Grow to Obtain 1 Ton Feedable Silage*
70+	**4.0**	**13.7**	**4.0**	**21.7**	**1.26**
60-69	**5.0**	**6.3**	**4.0**	**15.3**	**1.17**
Under 60	**16.2**	**6.3**	**4.0**	**26.5**	**1.33**

*Figures show tons of corn silage that must be grown for every ton of corn silage to be fed.
Source: Roth, G., et.al. 1995. Corn silage production, management, and feeding. NCR574. American Society of Agronomy.

Silage must be fed soon after removal from storage to avoid spoilage due to oxygen exposure. 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.

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), xearalenon, T-2 toxin, fumonisin, and orchratoxin. 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.

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