Nutritional Stress

The Impact of Harvest on Year-Round Performance

Introduction

Stress can arise from changes in frequency or intensity. Although heat stress is frequently discussed during the summer, it is important not to overlook a critical issue that occurs in the fall: nutritional stress, which results from changes in corn silage. While it may be impossible to eliminate these variations entirely, it is still necessary to minimize their impact. This can be achieved at three key moments: during the growing season, at harvest, and during feed preparation.

1. Growing Period

One Ounce of Prevention is Worth a Pound of Cure

Silage fibre digestibility is influenced by two key factors: the type of corn species (BMR hybrids or conventional hybrids) and the environmental conditions during the growing period. It is important to take both of these factors into account because humidity levels can decline more rapidly than usual. Drought also reduces silage fibre digestibility and total energy intake. Additionally, a higher proportion of protein may accumulate in the plant, primarily in the stems rather than in the grains. Elevated nitrate concentrations can also pose a risk if they exceed levels that are typically converted into nitrogen during bacterial fermentation. To mitigate potential toxicity to cows, various strategies can be implemented during the harvest period. These strategies include monitoring weather conditions, adjusting cutting height, and avoiding extreme maturity.

2. Harvesting Season

Short Time, Big Impact

One of the key factors to consider as harvest approaches is the moisture content of the plant. Ideally, at harvest, it should fall within the range of 55 to 70%, depending on the type of storage structure (refer to Figure 1).

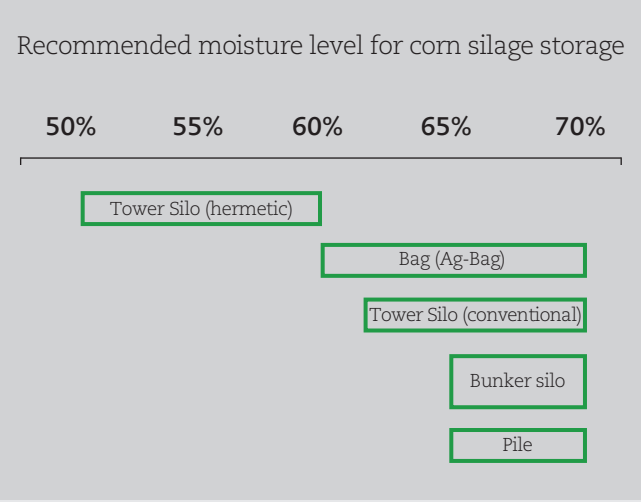

Figure 1. Moisture Content of Corn Silage by Storage Structure

To prepare for the harvesting period, it is necessary to account for the daily reduction in humidity, which typically ranges from 0.5 to 0.6% per day. However, if the corn is overly mature and dry at harvest, you may need to explore alternatives like

Table 1. Fermentation Process of Corn Silage.

Phase	Day	Description	Temperature	pH
Aerobic (with oxygen)	1	Cellular respiration producing CO_2, heat and water.	21 °C	6.0
Anaerobic (without oxygen)	2	Fermentation starts, producing acetic acid. Temperature reaches its peak, reducing heat production.	35 °C	5.0
	3	Lactic acid production starts. Acetic acid production continues.	27-29 °C	4.0
	4-7	Lactic acid production continues. Temperature drops.	27-29 °C	4.0
	8-21	Lactic acid production continues. Silage pH decreases and becomes stable.	27-29 °C	4.0
Stable	More than 21	Bacterial fermentation ends. Silage is retained until it is re-exposed to oxygen.	Cooling to room temperature	4.0

Adapted from *SP434D Corn Silage*, The University of Tennessee Agricultural Extension Service.

conditioning or a higher cutting height. Packaging involves the use of cracking rollers on the fodder. Cutting higher, between 25 and 50 cm rather than 10 to 15 cm, can also reduce the amount of lignin in the silage, enhancing its digestibility. Corn maturity also has a significant impact on its nutritional composition, particularly its starch content. While the total amount of starch increases with maturity (as shown in Figure 2), its digestibility decreases. To enhance starch digestibility in more mature corn silage, it is therefore recommended to consider grain conditioning and prolong the silage fermentation period (four to six months). This accelerates grain decomposition, facilitating access to this energy source for rumen bacteria. During harvest, it is important to pay attention to the length of the cut to avoid stems or cobs that could be sorted easily by cows. For this purpose, the Penn State Particle Separator can be employed to ensure that 3 to 8% of the silage remains on the top sieve, with a maximum of 5% ending up in the bottom pan when three sieves are used. If the results do not meet expectations, it is essential to adjust the silage harvester's settings. These adjustments made during harvest will optimize the passage of particles at the rumen level and contribute to maintaining voluntary dry matter intake. Finally, after the ensiling process, it is imperative to store the silage carefully. To do so, it is crucial to minimize exposure to oxygen and other potential contaminants such as water. Oxygen trapped between silage layers can lead to overheating, resulting in nutrient and volume losses. The absence of oxygen promotes a quicker decrease in pH, supporting anaerobic fermentation. Management practices can vary depending on the type of silo. For instance, in the case of a bunker silo, it is necessary to ensure the correct pile density, seal the top, sides, and front sections with sealed plastics, and prevent any water accumulation around these surfaces.

3. Feed Preparation

Quality Control to Preserve Cow Health

Before adding fresh corn silage to the feed, it is essential to wait for a minimum of two to three weeks to ensure proper fermentation stabilization. Additionally, it is important to confirm that the mixer is not overloaded, maintaining it at no more than 75% of its capacity. This ensures a consistent blend of ingredients and uniform distribution of corn silage among all cows in the herd. Lastly, it is imperative to remove any spoiled or moldy silage before feeding to prevent potential toxin exposure, which can lead to severe health issues for the animals.

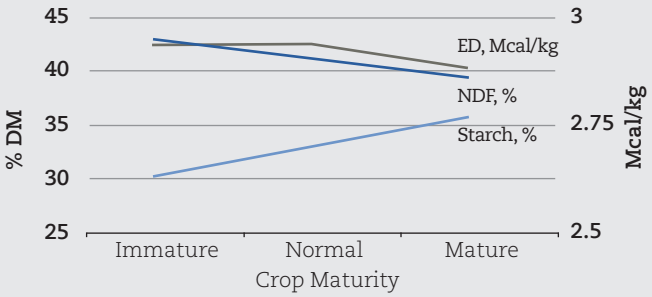

Figure 2. Relative Feed Concentration and Energy Intake of Corn Silage According to Its Maturity at Harvest.

Adapted from *Nutrient Requirements of Dairy Cattle*, 2021.

Conclusion

Poor-quality corn silage can lead to nutritional stress, often resulting in a significant reduction in milk fat.

The use of protected B vitamins supports the metabolism of dairy cows and helps compensate for the yield decrease caused by the nutritional stress described in this article.

To learn more about how Jefo Solutions can assist in reducing the impact of stress, scan this QR code:

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