GUEST COLUMN

Protecting Your Feed Investment During Hot, Humid Weather

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Hot, humid weather imposes physiological challenges on lactating dairy cows, leading to lower feed intake, reduced milk production and lower pregnancy rates. Depressed feed intake during heat stress is compounded by yeast and mold growth destroying the energy and protein present in the total mixed ration (TMR). Increased feed microbial growth and mycotoxin production may be involved in lower animal production and health observed during heat stress conditions. Strategies can be employed to enhance feed aerobic stability and to reduce yeast and mold impacts.

Improper management of fermented feeds will start microbial growth before the ingredients are added to the TMR. The combination of high environmental temperatures, the nutrients present in a moist, properly-balanced lactating cow ration, oxygen introduced as forage is removed from storage, and microbes create a perfect storm for microbial growth and nutrient destruction in the feed. Mold growth in the TMR can potentially lead to mycotoxin production, which reduces animal health and performance. Physiological changes in an animal's digestive tract during heat stress may allow for easier entry of mycotoxins into the animal's blood stream. Excessive heating of the feed during this period of rapid microbial growth can reduce ruminal protein digestibility.

A Cargill research study evaluated nutrient loss from a lactating cow TMR over a 12-hr period. After feed mixing, the TMR was spread in a manner to duplicate feed bunk conditions. Study results are displayed in Table 1. During the 12-hr test period, aerobic instability resulted in a loss of 6% of the ration dry matter (DM), 2% of the protein component, and 14% of the non-fiber carbohydrate (NFC) content. If the test TMR had been fed at 50 lbs of DM per cow, the nutrient losses over a 12-hr period would have equaled 0.2 lbs of crude protein (equivalent to 0.45 lbs of soybean meal), and 2.8 lbs of NFC (equivalent to 4 lbs of corn).

Table 1. Nutrient loss from a lactating cow TMR over a 12-hour period (Project #2620-133).

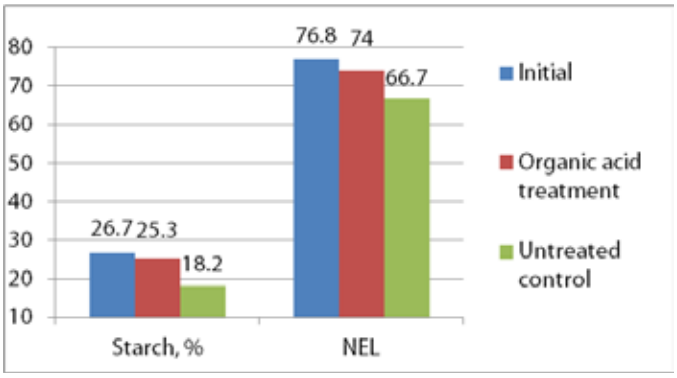
Nutrient	Loss, %
Total dry matter	6
NDF	0
Ash	0
Protein	2
Non-fiber carbohydrates	14

A number of factors should be evaluated to determine the TMR aerobic instability risk:

- **Temperature** – Elevated environmental temperatures enhance the growth rate of yeast and molds, as well as reduce the transfer of TMR heating to the environment to further exacerbate heat destruction of the protein in the feed.
- **Humidity** – Greater humidity enables a TMR to retain moisture for ideal yeast and mold growth conditions.
- **Grain particle size and moisture** – Fine grinding of grains allows yeast and molds greater access to starch as a nutrient source. Higher moisture grains typically have greater starch degradability than dry grains, and are, therefore, more readily available to foster yeast and mold growth.
- **Yeast and mold content** – Stressed crops and improper fermentation can result in higher yeast and mold counts in fermented feed ingredients and consequently increase the yeast and mold load in the TMR for faster microbial growth. Inoculation with heterofermentative bacteria can improve the aerobic stability of fermented feeds.
- **Feed-out management** – Cracks allowing oxygen to penetrate into a silage bunker will initiate yeast and mold growth and increase aerobic instability. Similarly, not removing sufficient feed daily from a bunker face or silo top will foster microbial growth and increase the yeast and mold load at the time of TMR mixing.
- **Feeding frequency** – The longer a TMR remains in the feed bunk, the greater the opportunity for yeast and mold growth. A deep mound of feed in the feed bunk is ideal for maintaining moisture and warmth to support rapid microbial growth.

The aerobic stability of a TMR can be enhanced by the use of oxygen-scavenging compounds to reduce oxygen availability to yeast and molds. In addition, the popularity of organic acids to enhance aerobic stability is growing amongst dairy producers and nutritionists. Common organic acids utilized for this purpose include propionic, benzoic, sorbic, acetic, and citric acid. Propionic, benzoic, and sorbic acids are effective for mold control; benzoic, sorbic, and acetic acids are better known for yeast suppression. Applying combinations of these organic acids can have synergistic effects for enhancing aerobic stability.

Figure 1. Comparison of an organic acid combination to preserve TMR nutrient content.



The ability of a buffered propionic and benzoic acid combination to preserve TMR nutrients was evaluated in a 12-hr Cargill research study. The results displayed in Figure 1 indicate that the TMR treated with the organic acid mixture had a higher starch and Net Energy for lactation (NEL) content after 12 hours vs the untreated control TMR.

Excessive yeast and mold growth during hot, humid conditions can deplete TMRs of their energy and protein content, as well as produce mycotoxins to reduce animal performance and health. Understanding the risk factors leading to aerobic instability allows dairy producers to employ management practices to protect their feed investment and animal production.