Feeding Management: Do's and Don'ts

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Feed represents the greatest proportion of the total cost of producing milk. Over the past eighteen months feed ingredients prices have increased greatly! This increase is due in part to the increased demand for corn and soybeans to produce ethanol and biodiesel and world demand. At the same time the cost of all inputs required for growing forage (fuel, fertilize, seed, chemicals, etc.) has increased because of higher oil prices. The Southeast continues to suffer from an extended drought that has reduced forage supplies and increased the cost of locally produced forage. All of these factors have significantly increased feed cost which makes it even more important than ever before to have a sound feeding management program to control feed cost and maintain profitability.

There are many factors involved in feeding management that affects milk yield, cow health, and feed cost. The first factor involves the production of high quality forage and storage to maintain quality. Certainly rations must be balance to provide the nutrients required to support milk yield and keep animals healthy which controlling feed cost. Proper mixing of ingredients, timely feed delivery, and feed bunk management are important. Other items such as providing adequate amounts of clean water and cow comfort are an important aspect of management for the cow to take advantage of the nutrient supplied by the ration. This paper will discuss several components of feeding management that can be fine tuned to improve the nutrition of the cow which can support improved milk yield and cow health.

Feed Storage

Feeds lose some of their nutrient value after harvest. These losses are typically greatest for forages because of fermentation and spoilage. The more readily digestibility nutrients are frequently lost, so the digestibility of the remaining material is lower. The goal is to minimize nutrient losses beginning at harvest and throughout storage. Researchers at the University of Maryland recently reported the results of a trial measuring the effect of plastic liners for silo walls (Table 1). The silage closest to the wall contained less DM (was wetter) and more NDF. Typically the silage closest to the wall is not packed as tightly and undergoes fermentation longer because of high initial oxygen concentrations. This is supported by the higher pH and concentrations of butyric acid (indicates poor fermentation) and lower concentrations of lactic acid. This would suggest that a large proportion of the digestible nutrients had been degraded during fermentation. When fed to growing heifers or lactating cows, the higher fiber content would limit DMI and prevent animals from achieving optimum growth or milk

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yield. The amount of silage that is potentially negatively impacted is considerable. For example, the outside two feet of a 40 ft by 155 ft bunker silo with silage pilled 12 ft high represents 10% of the total feed without counting any losses on top. We also know from previous research that DM and nutrient losses are over 30% higher if the silo is not covered.

Table 1. Effect of covering type on nutrient content and fermentation of corn silage.

	8[1]		16		24	
	A[2]	B	A	B	A	B
DM, %	19.77^{e}	29.01^{abc}	23.52^{d}	29.13^{ab}	27.80^{bc}	30.33^{a}
NDF, %	62.29^{a}	46.07^{cde}	54.86^{b}	46.44^{cd}	47.87^{c}	43.00^{e}
pH	5.20^{a}	3.97^{bc}	4.22^{b}	3.76^{c}	4.04^{bc}	3.74^{c}
Lactic acid, %	0.39^{e}	1.67^{cd}	1.09^{d}	2.21^{abc}	2.44^{ab}	2.76^{a}
Butyric acid, %	0.22^{b}	0.07^{d}	0.39^{a}	0.02^{d}	0.21^{bc}	0.08^{d}

^{abcde}Means in rows with unlike superscripts differ ($P < 0.05$).

[1]Distance from the silo wall, inches

[2]A = 6 mil black/white polyethylene plastic weighted with split-tires; B = triple co-extruded film (1.77 mm) with low permeability to oxygen, protective tarpaulin, and weighted down with reusable bags filled with pea-gravel. This treatment also included a layer of extruded film along the length of the sidewall prior to filling.

Source: McDonell et al., 2007. J. Dairy Sci. 85 (Suppl. 1):180. (Abstr.)

Almost all silos have a layer of soiled silage on top, even when covered with plastic. The amount of spoilage varies and data are limited on the impact of feeding this material to dairy cattle. Kansas State University researchers conducted a trial in which they fed different amounts of the spoiled silage to beef steers (Table 2). As the proportion of spoiled silage in the diet increased from 0 to 16%, dry matter intake (DMI) decreased. Along with the decrease in DMI, nutrient digestibility decreased significantly. With normally diets, nutrient digestibility increased when DMI is limited or decreased. The lower intake and nutrient digestibility would reduce the total amount of nutrient available to support growth of heifers or milk production in lactating cows.

Preventing spoilage of feeds, especially wet feeds, and keeping them out of the ration is a very important aspect of feeding management. To prevent spoilage, forage should be stored properly. Hay should be stored in a barn or covered to minimize mold formation and spoilage. For silage this begins with packing the entire silo aggressively to remove all air from the silage so it ferments quickly. Based on the research

summarized in Table 1, the use of plastic on the sidewalls plus a good cover on the top of the silo is a practice worth incorporating to maintain silage quality even better than just covering with plastic. When opening the silo, do not uncover anymore silage than can be fed in two days. Oxygen can penetrate into the silage up to three feet stimulating any yeast or aerobic bacteria to start nutrient breakdown. Any spoiled silage on top of the silo should be discarded to maintain DMI and nutrient content of the diet. These practices will preserve the nutrients in forage and maintain palatability.

Table 2. Effect of feeding spoiled silage to steers on intake and nutrient digestibility.

	% of spoiled silage in the diet			
	0	5.4	10.7	16.0
DMI, lb/d	17.5[a]	16.2[a]	15.3[bc]	14.7[c]
		---------- Digestibility, % ----------		
Organic Matter	75.6[a]	70.6[b]	69.0[b]	67.8[b]
Crude Protein	74.6[a]	70.5[b]	68.0[b]	62.8[c]
NDF	63.2[a]	56.0[b]	52.5[b]	52.3[b]
ADF	56.1[a]	46.2[b]	41.3[b]	40.5[b]

[abc]Means in the same row with unlike superscripts differ ($P < 0.05$).

Source: Whitlock, et al., 2000.

Monitoring Dry Matter Content of Feedstuffs

The dry matter content (DM) of wet feeds changes, sometimes daily. These changes affect the composition of the ration unless the amounts included in the mix are adjusted for the change in DM. An example of the changes that can occur in wet feeds is illustrated in Figure 1. This example comes from a research trial we recently conducted in Tifton. Both the corn and ryegrass silage were harvested from one field on a single day and were stored in bags which should reduce the daily variation in DM. There was not much daily variation in the DM content of the corn silage, but the DM content of the ryegrass varied much more. The variation in the ryegrass most likely represents differences in the moisture content of the forage in one area of the field at harvest. The wet brewers' grain was stored on a concrete pad with loads received every five days. It is easy to spot when some of the new loads of wet brewers' grain were received and when drier brewers' grains were sampled from the pile.

Identifying the changes in DM content of all wet ingredients and adjusting the ration to account for these changes should be part of the feeding management

protocols. The DM content of feeds can be easily determined using a Koster tester or microwave oven. The key is to actually run the analysis routinely rather than assume that there are no changes. If the results of the analysis seem to be out of line, a second sample should be run to verify that the DM actually changed and rule out a mistake. This is especially true for microwave readings because of greater the potential for error with this method. Once the DM content of the ingredient has been measured, the rations should be changed to reflect the correct DM content of the ingredient. Failure to adjust rations results in rations that are different from those formulated. Depending on the actual change in DM content, the final ration could have higher or lower concentrations of nutrients which may explain the variation in daily milk yield on most dairies.

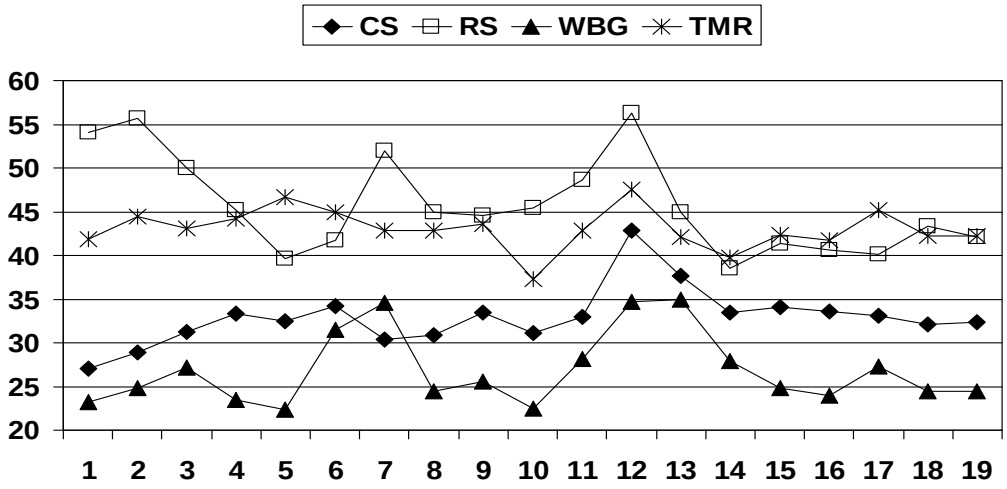

Figure 1. Change in dry matter content of corn silage (CS), ryegrass silage (RS), wet brewers grains (WBG) and the resulting TMR ration used in a 2007 research trial at the UGA Dairy Research Center in Tifton, GA.

Mixing the Correct Ration

A common expression used by nutritionist is that there are four rations on most farms. The one provided by the nutritionist, the one given to the feeder, the one the feeder actually mixes, and the one the cow consumes. All four rations should be the same, but often there are differences that occur in each step so that the ration the cow receives and eats is quite different from that formulated. The following items should be incorporated into the normal feed management protocol.

- Check all rations to ensure that the ration formulated is the same as that used by the feeder for mixing.
- Make sure all feed ingredients are labeled and the feeder knows the differences in the ingredients.

- Add ingredients to the mixer in the order recommended by the manufactor. This information can be found in the owner's manual and differs according to the type of mixing system.
- Use scales to add ingredients to the mixer and strive to put the correct amount in the mix, no more or no less. Do not estimate the amount of an ingredient by volume.
- Check the mixer scales for accuracy routinely when the mixer is empty and full.
- Follow the mixing times recommended by the manufactor to avoid over mixing.
- Check the particle size of the final mix to determine if the mixing times need to be adjusted.
- Consider grind grass hay before mixing to improve uniformity of the TMR, especially if the mixer is not designed to process hay.
- If the mix is dry, consider adding water so that the smaller particles will stick to the larger particles.
- Premix any ingredients used in small amounts to improve the accuracy of mixing and reduce labor requirements. If necessary, purchase a small scale.
- Perform routine maintenance to prevent breakdowns. Replace knives as needed and clean magnets daily.

Feed Bunk Management

Feed bunk management is important for getting the cows to consume the ration that has been formulated and mixed in amounts necessary to support growth and milk yield. The following items should be reviewed to identify any factors that may limit intake.

- Fresh feed should be available immediately after milking. Cows typically eat more after milking and this also keeps them from laying down so that the teat sphincter muscles have time to close.
- The only time a feed bunk should be empty is just after it has been cleaned each day. Target refusals at 4 - 5% of the amount offered for fresh and high producing cows and 2 - 3% for lower producing cows.
- Calculate daily dry matter intake based on the amount of TMR offered, the amount of TMR refused, and the DM content of the ration. Plot the daily values for each group along with milk yield to monitor any changes.
- Evaluate the ration in the feed bunk immediately after feed deliver to make sure it was properly mixed.
- Use 100% of the feed bunk space for feed delivery. Offer more at the ends of the bunk and near waterers.
- Provide a minimum of 18 to 30 inches of feed bunk space per cow. Fresh cows should have more space than lower producing cows. Multiple feed deliveries should be made when the amount of bunk space is limited to less than 24 inches per cow.
- Evaluate the ration approximately 4 to 6 hours after feeding and before the bunk is cleaned to determine if the cows are sorting the ration.

- Push feed at least 4 to 6 times each day, depending on the number of feeding, to keep feed in easy reach of the cows.
- Feed approximately 65% of the ration during the cooler parts of the day during the periods of heat stress and increase the number of feedings.
- If feed in the bunk is heating, add an organic acid or mold inhibitor to prevent secondary fermentation.
- If bunks are pitted, consider refitting with a plastic liner or resurfacing the surface. This will encourage higher intake and reduce spoilage.
- Design feed bunks properly. Dry matter intake is better when the cow eats with her head down as in grazing, curb heights are no higher than 21 inches, and neck rails are 46 to 48 inches above the floor and provide the cow room to reach feed on the outside of the feed bunk.

Water

Dairy cattle require plenty of fresh, clean water with the ration. Water availability and quality is frequently not considered when troubleshooting problems, but it should be one of the areas we routinely monitor. Water constitutes 60 to 70% of an animal=s body and milk is 86% or more water, any reduction in water consumption decreases growth and performance. Water intake ranges from 2 gallon/day for young calves to more than 35 gallon/day for high producing lactating cows. To meet these needs lactating cows should have water available as they leave the milking parlor as well as adequate water space in the free stall barn, dry lot, or pasture.

Water troughs should be checked daily to ensure that they are working properly. All water troughs should be cleaned every week to prevent growth of algae and buildup of solids. When cleaning, be careful not to leave any concentrated chorine or other sanitizers in the water trough as this may kill of the bacteria in the rumen resulting in animals going off feed.

Summary

Good habits related to feeding management will provide positive results and all employees should be encouraged to follow protocols. This not only impacts growth and production, but animal health as well. Given the fact that feed represents the primary cost of raising replacements or producing milk, feeding management is also very important for maintaining profitability.

Notes