Feedbunk Management: Evaluation Techniques

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INTRODUCTION

The book Feeds and Feeding, by Henry and Morrison (1928) includes a chapter titled *Counsel in the Feedlot*. Three quotes, as cited by Pritchard (1998), serve as reminders of the importance of the human element in cattle feeding, and as discussed in this paper, feedbunk management.

"Many an experienced stockman can carry steers through the fattening period without getting them once 'off feed' but yet cannot well describe to others just why he is so successful."

"As soon as the fattening process begins, the cattle should be fed at certain hours and in the same way. This cannot be varied 15 minutes without some detriment to the cattle. The extent of injury will depend upon the frequency and extent of irregularity…"

"Scouring, the bane of the stock feeder, should be carefully avoided, since a single day's laxness may cut off a week's gain. This trouble is generally brought on by over-feeding, by unwholesome feed, or by a faulty ration. Over-feeding comes from a desire of the attendant to push his cattle to better gains or from carelessness or irregularity in measuring out the feed supply. The ideal stockman has a quick discernment … which guides the hand in dealing out feed ample for the wants of all, but not a pound in excess."

Effective feedbunk management is a key component in accomplishing the goals of any feeding program. Beef cattle feedlots and large dairies are becoming more efficient by maximizing dry matter (DM) intake, which, in turn, maximizes production output. The delivery of a consistent, nutritionally balanced, fresh ration in a manner that maximizes (or nearly maximizes) DM intake and minimizes feed wastage and spoilage is an important key in feedbunk management. An easy way to remember the goals of feedbunk management are the three R's:

- Right ration,
- Right amount, and
- Right time.

RIGHT RATION

Feedbunk management does not involve feed delivery decisions alone. It also involves ration ingredient characteristics and quality control, nutrient balancing, feed processing and mixing, and other factors related to feed presentation (Loy, 1999). Superior livestock performance begins with quality feedstuffs and a sound nutritional program. All livestock producers should establish quality standards and acceptance/rejection criteria for all feed ingredients to account for and control variation in feed composition and quality. Systematic sampling, accurate analysis, and timely ration adjustments based on nutrient density and moisture content of individual feedstuffs are fundamental to ration quality control (Kuhl, 1992). Rations should be fresh, palatable, and uniformly nutritious. Spoiled and/or moldy feed ingredients should be discarded; this helps minimize ration contamination and the potential for reduced DM intake. Unfortunately, discarding of spoiled feedstuffs is not always a common practice. In a recent study at Kansas State University, growing steers were fed high-silage rations, which contained 90.0% well-preserved corn silage or 67.5% well-preserved corn silage and 22.5% spoiled corn silage (e.g., silage from the original top 3 feet in an unsealed bunker silo, Whitlock, 1999). Steers receiving the ration with the spoiled silage had significantly lower DM intake and lower organic matter, protein, and fiber digestibilities.

Delivering the wrong ration can lead to disaster. But mistakes can and do happen. In a feedlot, an alert feed truck driver knows that when "he loads that truck with grain, it's not supposed to go to a pen of bawling calves or yearlings with sale barn tags still on 'em" (Price, 1986).

Proper feed processing and mixing are essential for optimum feed utilization. Adequate and consistent feed mixing will ensure that every bite of the ration is the same. Fine particles that separate in the bunk must be avoided, because they can contain high concentrations of minerals, feed additives, or rapidly fermentable grain particles. Ration conditioners (e.g., molasses, fat, or water); high moisture feedstuffs; and uniformity of forage particle size can help reduce fines, sorting of ingredients, and rejection of feed.

RIGHT AMOUNT

Making the feed calls (determining the amount of feed to offer) involves estimating the amount of feed a pen of cattle will consume in a 24-hour period. Therefore, the effect of a given feed intake on consumption at subsequent feedings must be considered. For example, cattle might consume all of the ration offered just after an increase in the amount fed, but lose appetite and crash a day or two later (Loy, 1999).

Intake of cattle fed rations high in forage generally is limited by ruminal fill. However, cattle fed high levels of concentrates can and do overeat. This can result in a wide variety of disturbances such as acidosis, founder, and bloat. It also can be costly because of reductions in performance from reduced average daily gain and poor feed conversion. Underfeeding cattle on high concentrate rations also can result in reduced performance (Lardy, 1999).

RIGHT TIME

Feed calls should be made prior to the morning feeding, with two additional observations made: during consumption of the first feeding and one in the afternoon prior to feeding. Although the amount of feed offered never should be increased by more than 10%, decreasing feed offered by 10% might be warranted to ensure that cattle clean up feed remaining in the bunk before it spoils.

Most research and feedlot experiences suggest that two or more feedings a day result in better bunk and cattle management and reduce the amount of stale, wasted feed (Kuhl, 1992). This is particularly true for high moisture feeds offered during hot weather and periods of precipitation. Cattle with empty or partly empty bunks should be fed first, and the remaining cattle should be fed in an organized manner so that each feeding is at approximately the same time every day (Lake, 1981).

All ration changes should be made at the afternoon feeding to eliminate the possibility of feeding hungry cattle a new, high energy ration. This also decreases the digestive upset problems and prevents associated acidosis and founder from occurring.

FEEDBUNK MANAGEMENT VARIABLES

Many variables can affect feed intake, including animal factors, weather, ration ingredients and characteristics, water supply, feedbunk design, and feeding management systems. Proper bunk management depends on the feed caller understanding how these variables affect DM intake and recognizing problems as they occur.

Animal. Several animal-related factors influence expected DM intake, including breed type, age, body weight, sex, stage of lactation, stage of pregnancy, and general health. These factors need to be considered when making feed calls. Dairy breeds can be more temperamental eaters than beef breeds, and they typically consume 8 to 10% more feed (Kuhl, 1992).

Researchers at Michigan State University (as cited by Miller, 1998a) found that first-calf heifers ate more meals, spent less time at each meal, and ate less at each meal than older cows. Thus, in large herds, separating first-calf heifers from older cows might reduce competition and improve performance (Ballantine, 1998; Schoonmaker, 1999a,b).

Body weight and sex also affect DM intake. Typically, calves consume 8 to 12% less than yearlings of the same weight, although younger calves eat a higher percentage of their body weight. Heifers often eat 4 to 5% less than steers of a similar weight (Kuhl, 1992).

As milk production goes up, DM intake increases (Miller, 1998a). During pregnancy, dairy cattle steadily decrease DM intake. At the start of

the dry period, intake falls sharply and remains low until a week to a few days before parturition.

Making feed calls for cattle fed transition rations can be especially challenging but very important in getting feedlot cattle to ad libitum intake. Newly weaned and stressed calves will increase their DM intake from 0.5% of body weight to about 3.5% in 28 days (Hutcheson, 1981, as cited by Kuhl,1988).

Health also will affect feed intake, and, thus feedbunk management. For example, deworming calves increases feed intake by about 3% (Davis, 1979, as cited by Kuhl, 1988). Conversely, bunk management observations can aid in detecting large-scale health problems.

Another factor is cattle appetite. Hungry cattle are more aggressive at the feedbunk, which leads to overconsumption and related digestive problems in aggressive cattle, whereas timid cattle remain underfed (Lardy, 1999).

Weather. Seasonal, long-term weather patterns as well as day-to-day weather changes can influence cattle performance and feed intake (Fitzgerald, 1984; Pritchard, 1992). Feed callers need to take into account the previous and predicted following days' weather when making feeding decisions. By anticipating and reacting to changes in temperature, humidity, wind velocity, barometric pressure, and precipitation, the feed caller can better predict intake, and feed wastage and bunk cleaning can be minimized.

Cattle consume the majority of their feed during the comfortable period of the day. In hot weather, cattle eat primarily during the late evening, night, and early morning. Therefore, 60% of the ration should be fed at the afternoon feeding to reduce feed spoilage. In cold weather, most eating occurs from mid-morning to late afternoon (Lake, 1981), so the largest amount of feed offered should be at the morning feeding.

Day-to-day weather changes such as rain can influence palatability of a ration, especially in warm weather. Wet feed should be cleaned out of the bunks and replaced with a fresh mix of the ration to reduce intake fluctuations. Rain also can affect feed consumption because of the secondary effects of muddy lots. When cattle must struggle to walk to the feedbunks, energy use increases, and frequency of eating decreases.

Ration ingredients and characteristics. As previously mentioned, high quality feed must be presented to cattle in a consistent and uniform manner. Fiber length is critical for healthy rumen function. A Penn State Particle Separator is an easy way to determine length of cut and mixing time, if a total mixed ration (TMR) is to be used. TMRs should contain not more than 50% moisture. Rations that are too wet can limit DM intake (Miller, 1998a).

To minimize TMR variability it is important to minimize ingredient variation. Develop an easy way to adapt the ration to whatever changes are required. Make a premix of dry, nonforage ingredients, set a mixing procedure (e.g., proper mixing time) and sequence for adding ingredients, and monitor the quality of the ration after mixing (Buckmaster cited by Franck, 1999).

Keeping fresh feed in the feedbunk is also a good management practice. Old feed remaining in the feedbunk can shorten bunk life of new feed and reduce DM intake (Ballantine, 1998). Bunk management also varies with ingredients and types of rations being fed. Some ingredients have less bunk stability than others, e.g., rations containing high-moisture ensiled grains deteriorate rapidly (Lake, 1981).

Water supply. Many producers overlook the importance of water availability as it relates to bunk management, including the amount of water, space provided, and the location of water sources. Problems that limit water intake also can limit feed intake, and this, in turn, can reduce milk production and overall cow performance (Ballantine, 1998; Miller, 1998b). Poor water quality or lack of water can cause cattle to go off feed quickly. Feed callers need to recognize this problem before making any drastic changes in the amount of feed offered.

In free-stall barns, 3 inches of linear water trough space per cow and one watering space (or 2 feet of tank perimeter) for each 15 to 20 cows are recommended (Brett, 1999). A water depth of 6 to 8 inches is suggested to help keep the water fresh and easier to clean, because less debris accumulates (Miller, 1998a).

As temperature and humidity go up, more water is required. During months of hot weather, water supply becomes an important issue. Cows drink most of their daily water requirements around milking time. They should have access to water in holding pens during milking or right after

(Ballantine, 1998). Adding water tanks for the summer can help in both feedlot and dairy operations (Miller, 1998a).

Feedbunk design. Good feedbunk design is also essential to optimizing DM intake. Dairy cows should have 24 to 30 inches of bunk space each to allow all of them to eat at the same time. Some designs such as 3-row and 6-row barns limit the space per cow. The feedbunk should be 4 to 6 inches higher than the alley, so the cow can have a natural grazing position when eating (Miller, 1998a,b). Cows consuming feed at ground level waste less feed, and this position also helps the cow to produce more saliva and improves the buffering capacity in the rumen (Ballantine, 1998).

In addition, the condition of the feeding surface can affect DM intake. Feedbunks must have smooth surfaces. Surfaces without grooves or holes that can trap feed are easier to clean and help reduce buildup of waste feed, mold growth, and odor (Ballantine, 1998; Miller, 1998). Avoiding muddy conditions and manure buildup on bunk aprons is also important (Lake, 1981). These conditions can decrease palatability of the ration as well as increase disease transmission.

Feeding management and systems. Because cattle are animals of habit, they like routine. Once a schedule is developed, stick to it. If a change is needed, cows must have time to adjust. Monitor DM intake to see if the change improved consumption or did not affect it at all. Deliver enough ration so that 5 to 10% is left over each day or feeding period. Make sure that the feed left over is similar to the TMR or the feed that is being fed. Feed as many times as possible (Miller, 1998a,b). It is important to keep feed available any time the cattle are willing to eat, which could be 20 to 22 hours a day (Ballantine, 1998). Research results with dairy cattle for the optimal number of feedings vary depending on season of year, bunk life of the ration, types of feed ingredients, and milk yield (Miller, 1998a).

Because these variables that affect DM intake vary from day-to-day and month-to-month, feedbunk management goes through an evolutionary process. Systematic approaches to a highly subjective decision can reduce large fluxes in a cattle feeding program.

One feedbunk management system has been developed and implemented by South Dakota State University. The bunk scoring sheet takes into account the many variables that have been discussed previously and provides additional information that might help when making a feeding decision: 1) pen number, 2) lot number, 3) head count, 4) in weight, 5) current weight, 6) days on feed, 7) days on ration, 8) indication of slick bunks, 9) indication of when bunk was last cleaned, and 10) amount of feed fed in the last 5 to 7 days.

South Dakota State University also developed a specific 4-point feedbunk scoring system (Table 1). By providing a detailed description of the feed remaining in the bunk, this system decreases variability of feed calls (Pritchard, as cited by Loy, 1999). These records are used at each feed call and at least 4 days of records can be kept to determine cattle response to a feed change. Keeping records for the complete duration of days on feed will help to determine feed conversions, seasonal variability, production costs, and to evaluate feed callers.

Table 1. South Dakota State University 4-Point Feedbunk Scoring System

Score	Description
0	No feed remaining in bunk.
½	Scattered previous feed remaining. Most of bottom of bunk exposed.
1	Thin uniform layer of previous feed across bottom of bunk. Typically, about 1 kernel deep.
2	25 to 50% of previous feed remaining.
3	Crown of previous feed is thoroughly disturbed. More than 50% of feed remaining.
4	Crown of previous feed is still noticeable. Feed is virtually untouched.

CONCLUSION

Although the variables discussed above constitute the basis of feedbunk management, an effective system depends on teamwork between feed callers, feed truck drivers, feed mill operators, nutritionists, veterinarians, and the office staff. Scientific guidelines can decrease some of the variability, but unless they are used in cooperation with good personnel management, efficiency goals will not be met.

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