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## *Calf Note #218 – Walking the Farm, Part 6 - digestion*

### **Introduction**

An important aspect of walking the farm is to determine how well calves are utilizing feed they consume. Although most dairies and calf ranches don't consistently measure feed intake or calf body weight, we can get a sense for whether or not calves utilizing feed by evaluating digestion (or lack thereof) via manure quality on the farm.

This Calf Note reviews some aspects of post-weaning digestion and calves adapt to increasing feed intake, variation in feed management and competition within groups. We'll not focus on preweaning digestion, as digestion and fecal consistency in very young calves is often associated with disease.

*Solids content.* Generally, fecal consistency reflects the solids content of diets consumed. Calves (and cows) consuming a diet consisting of a lot of silage will excrete feces more liquid in nature compared to calves consuming higher fiber diets containing significant hay and concentrate. Highly liquid manure produced periodically is a good indication that something is wrong with calf digestion.

Variation is important, and often indicates problems with bunk management. In Figure 1, we see a group of heifers with several piles of manure in the lot. Some of the manure seems solid, while others are more liquid, and don't hold their form in a reasonable manner. These heifers were fed a TMR that contained lots of long hay that was easily sorted (Fig. 2, 3). Also, the pen was somewhat crowded, so not all calves had access to feed at the same time. Larger heifers were able to sort the TMR, and consumed a diet much higher in energy than formulated. Likely, increased consumption of starch resulted in lower rumen pH and acidosis, which can result in loose feces. The solution to this problem was to reduce the number of heifers per pen and to reduce the particle size of forage in the TMR so that sorting was more difficult, and heifers would consume a more consistent diet.

Fecal consistency in the pen in Fig. 4 suggests fewer problems associated with variable nutrient intake. On this farm, the TMR offered was always available and was well mixed, so that nutrient was similar throughout the day and from heifer to heifer.



Figure 1. Group of heifers in a lot with variable manure.

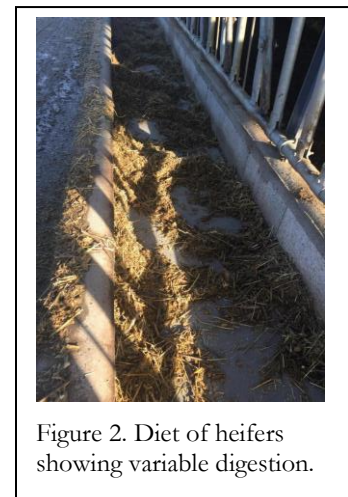


Figure 2. Diet of heifers showing variable digestion.

When calves are offered grain and forage separately, there is significant risk of variable intakes, upsets in digestion and feces that indicates digestive upset.

Figure 5 is from a farm in Asia that offered pelleted calf grower along with free choice hay. Although the intention was to offer pellets ad libitum, in at least some of the pens, the bunk was empty, indicating that calves were eating grain in meals.

Meal feeding, especially when the meal contains a lot of fermentable carbohydrate, will often cause digestive upset. Usually what happens is that calves will eat a large meal when the grain is first offered (usually in the morning) until they are full, or until the grain is gone (whichever comes first!). This large “slug” of grain and the fermentable carbohydrates it contains causes immediate fermentation and large reduction in pH. The calves will then eat the ad libitum forage in smaller amounts.

The situation above is even worse if bunk space is limited. In this case, smaller heifers will be crowded out and not consume their allotted grain. Therefore, the diets of the large heifers is higher in energy and protein and lower in fiber. The smaller heifers get the opposite. Results are variable fecal quality and, ultimately, variable growth. This is also manifested in heifers within a pen of similar age that differ in body weight and height. This variation in growth is an important indicator of feed management problems and should be evaluated on every farm.

Fecal consistency on this Asian farm is in Fig. 6. The feces is loose and there is some indication of starch fermentation. The potential solution on this farm was to consider developing a “dry TMR” wherein the forage was chopped and then mixed into a TMR so that calves could not sort grain from hay. The resulting blend results in similar intake throughout the day and from heifer to heifer. As a result, consistency of digestion improved, and heifer variability decreased.

Photo in Fig. 7 was taken on a farm in Europe that offered calves a grain that contained mostly wheat and barley as carbohydrate sources. Further, the grain was offered in meal form (not pelleted or texturized). If we only take a cursory look, we might think it’s only slightly loose feces. However, a closer examination (Fig. 8) indicates the presence of bubbles in the feces. Indeed, when we were “walking the farm”, we watched that manure for a while and watched the bubbles form and release gas into the air.

Production of bubbles (gas) in feces is a pretty good indication that starch is escaping digestion in the rumen and in the small intestine. As a result, the starch reaches the large intestine, where the resident bacteria begin fermenting it to produce volatile fatty acids and CO<sub>2</sub>. The CO<sub>2</sub> accumulates and eventually is released and forms bubbles.



Figure 3. Close-up of TMR from Figure 2.

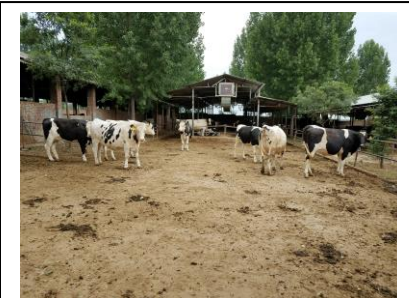


Figure 4. Pen of heifers with more consistent fecal consistency.



Figure 5. Feed bunk on a farm that offered grain and forage separately.

The metabolic implications of fecal starch fermentation isn't completely clear, though some researchers consider this a risk of production of endotoxin in the large intestine, which may be absorbed into the bloodstream due to the relative thinness of the intestinal wall in the intestine. These absorbed toxins may promote a stress response, increasing immune response and lowering efficiency. While the quantitative effect on animal efficiency is unclear, it is clear that starch in the feces represents a loss to the animal and to the farm.

Finally, the presence of whole grains in feces is another clear indication of poor digestion (Fig. 9). While we believe that very young calves do a very good job at chewing to reduce whole particles, calves >2 months of age may be less careful in breaking seed coats as dry feed intake increases rapidly after weaning.

### Summary

Variation and characteristics of feces may tell us a lot about the diet and feed management on the farm. Take a few minutes to evaluate the consistency and composition of feces of heifers – they're telling you something!



Figure 9. Undigested particles in feces from a heifer.



Figure 6. Loose feces due to high grain intake.



Figure 7. Slightly liquid feces.



Figure 8. Liquid feces with bubbles.

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