MILK FAT DEPRESSION CHECKLIST

Arm & Hammer Animal Nutrition

NOTES

peNDF ~ 23%

Does the ration contain adequate effective fiber?

- Shaker Box/Screen manure (see Penn State particle size screening information)[1]
- Feed efficiency/dry matter intake/rumen passage rate
- Lbs. dry matter from by-products
- Possible Solutions
  - Add 1 lb. of high-quality oat hay or wheat straw chopped to 2 – 3 inches in length
  - Reduce total lbs. by-products fed to <20% of total ration DM
  - Increase forage by formulating concentrates with more dense energy and protein

Bunk Management/Slug Feeding/Sorting

Are dry matter intakes varying day to day?

- Review FeedWatch®/EasyFeed records
- Times fed/times pushed up/feeding time in relation to milking time
- Mixing order and times
- Possible Solutions
  - Feeder Training
  - TMR Sampling
- Crowding and bunk space (ability for cows to have ideal feeding behavior)

Intake of Unsaturated Fatty Acids (UFA)

What is the total grams/cow/day intake of UFA and what are the sources?

- If Milk Fat Depression (MFD) is present verify that total rumen available UFA is <2% of total DM (See ARM & HAMMER® Optimum Dietary Fat Calculator)
- Mature vs. immature forages (immature are high in UFA)
- Pasture availability (generally high in UFA)
- Variability of fat in by-products (must conduct acid hydrolysis fat determination to assess true level of fat in by-product commodities)
- Source of fat—Basal diet vs. cottonseed vs. dry distillers grains (DDG) vs. other corn by-product vs. tallow vs. vegetable oil vs. rumen inert fat
  - Be aware that corn silages and corn grain can contribute high amounts of UFA to the diet due to quantities fed

- Possible Solutions
  - Reduce intake of ruminally available UFA to <2% of ration DM in herds experiencing MFD
  - If intake of UFA is appropriate, evaluate the potential for mild bouts of acid rumen conditions (starch and highly digestible NDF) and alter the diet accordingly or buffer the diet
  - Change source of UFA (minimally processed oilseed vs. ground; rumen inert fat vs. tallow or oilseed; oilseed meal + inert fat vs. whole oilseed
    - Commodity by-product UFA (DDG, gluten meal and feed, etc. have high rumen-active fat because they are usually free fatty acids)
- For those using a ration-balancing software system that calculates biohydrogenation intermediates (trans 18:1), herds that have a predicted trans 18:1 (shown as T18:1) at the duodenum of <100g/day are at less risk for MFD.

Ration Starch and Sugar Levels

What are the levels of starch and sugar in the ration? Assess the potential rate and extent of fermentability of the starch/sugar ingredients.

- Processed vs. unprocessed corn silage
  - Evaluate consistency and completeness of processing
- Cracked vs. steam flaked vs. ground vs. high-moisture corn
- Variability of starch and sugar in by-product feeds
- Possible Solutions
  - Reduce inclusion rates of by-products high in soluble fiber like almond hulls and soy hulls
  - Adjust processing of corn to raise or lower starch availability
  - Goal for starch in high-lactating ration 23 – 25%
  - Total starch and sugar ~ 30%
  - Feed adequate starch to match the level of soluble protein, thus maximizing the rate of rumen microbial production. Use of modeling software will assist in this effort.
  - The rumen bacteria that flow to the small intestine are the mammary glands' best source of amino acids for solids production.

Metabolizable Protein

What is the level of predicted metabolizable protein reaching the small intestine and what are the levels of Lysine and Methionine (ration-balancing software dependent)?

- Methionine 2.4%
- Lysine 7.2%

- Ration Lys:Met range of 2.9:1 to 3:1
- Possible Solutions
  - Utilize sources of rumen bypass Methionine and Lysine
  - Reduce the crude protein fed and nitrogen excreted into the environment through urine and feces (RDP as a % of total ration DM at 10 – 11%)

Mineral Levels

What are the levels of potassium, sodium, magnesium and chloride in the ration?

- K:Mg ration of 4:1 is considered ideal. Excessive K ties up Mg, which is necessary for fatty acid uptake by the mammary gland and for fatty acid synthesis enzymes in the gland (aim for Mg levels of ≥0.4% of total ration DM pre- and postpartum).
- Although there is little research, it appears that as Cl starts exceeding 0.35% of DM the risks for MFD, and reduced DMI and milk, increase. This can be corrected with DCAD (see next section).
- Possible Solutions
  - Test forages using wet chemistry to determine levels of Na, K, Cl, S and Mg vs. using book values
  - Add magnesium oxide to mineral mix
  - Reduce salt (NaCl) levels in the diet to 0.1 lb./cow/day
  - Increase sodium bicarbonate in mineral mix (do not exceed .8% Na in the diet)
  - Increase dietary K (without Cl) to 1.8% of total DM

DCAD Levels

- If MFD is not primarily caused by excessive UFA feeding (i.e., UFA may be a factor, but not the overriding factor) a DCAD of >35meq/100g DM has been shown to increase milk fat % and yield.
- Outside of the DCAD equation, dietary K has a ruminal effect in reducing some biohydrogenation intermediates and forcing completion of the biohydrogenation process, thereby increasing milk fat.
  - Dietary K above 1.8% is indicated
- Irrespective of DCAD, excessive dietary Cl has a negative impact on milk fat production.
  - Try to keep dietary Cl levels at or below .35% of DM (lower in summer). It appears that levels of Cl >.5% of DM become problematic for milk fat.
  - If forage Cl is the source of high total dietary Cl and dilution is not possible, raise DCAD as much as possible without exceeding total dietary Na of 0.8% of DM and dietary K at 2.2% of DM.

NOTES

Rumensin

- While Rumensin® is not necessarily a primary causative fact of reduced milk fat, it can be a contributing factor along with the factors outlined above (dietary fiber, rumen pH, starch fermentability, feed bunk management, UFA intake, etc.).
- If you are feeding Rumensin verify that inclusion rates are according to manufacturers' recommendations.

Positive and Negatives of Making Interventions to Improve Butterfat Percentage

- Milk fat responses to ration changes are relatively quick—fewer than 21 days.
- Interventions that increase milk fat often improve milk yield and feed efficiency.
- Most interventions increase total cost of the diet, but will usually increase income over feed costs.

While all the factors elucidated above can contribute to MFD, the single most precipitative factor, irrespective of the above, is rumen pH.

- Short bouts of reduced rumen pH during the day, even without any signs of clinical or subclinical acidosis, can cause MFD.

This checklist is not meant to be an exhaustive list of all possible milk fat depression issues, but to serve as an aid in the investigation of problems and in improving day-to-day management.

1 Evaluating particle size of forages and TMRs using the New Penn State Forage Particle Separator. Department of Dairy and Animal Science. The Pennsylvania State University. Available at: http://www.das.psu.edu/research-extension/dairy/nutrition/pdf/evaluating-particle-size-of-forages.pdf. Accessed on Oct. 19, 2010.