The Bottom Line on Feeding and Managing for Components

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In my practice I am regularly being asked to lower fat %, increase fat % or increase protein % in a herds' milk; the decision is usually based upon quota usage, the "Milk Cheque" or cow health.

Diets that cause low fat tests may also cause acidosis, laminitis, displaced abomasums and feed intake problems. However, milk protein content is being emphasized as milk fat price differentials decline due to the public's demand for low-fat dairy foods.

How can milk solids be altered? Factors that affect milk composition include genetics, stage of lactation, level of milk production, age of cow, environment, disease (for example mastitis), nutrition and feed additives/medications (for example sodium bicarb and Rumensin).

55% of the variation in milk solid composition is due to heredity, while 45% is due to environmental factors such as feeding management.

Feeding Strategies to Maximize Milk Solids

The following points are critical to maximizing solids in milk:

1. **Proper ration formulation.**
2. **Maximum feed intake.**
3. **Monitoring diet composition (routine forage and feed analysis).**
4. **Harvesting &/or buying high quality forage.**
5. **Properly feeding protein, energy, fibre, mineral and vitamins.**

Maximize Feed Intake

The importance of maximizing feed intake is related to minimizing negative energy balance during early lactation. As cows move into positive energy balance, body weight is regained, losses of body condition score are minimized and cows produce milk of normal fat and protein composition. Increased dry matter intake (DMI) can improve milk protein by 0.2 to0.3 units. This increased milk protein % may be due to overall increase in balanced energy intake as total feed intake increase.

If your cows are consuming less than 3.5% to 4.0% of their body weight, consider the following factors that will impact upon the DMI of your herd:

1. **Feed bunk management (bunks must be clean, adequate in size 0.8 metre/cow, shaded etc.).**
2. **High quality feed should be in front of cows 24 hours a day.**
3. **Rations should contain 50% moisture or less.**
4. **Social interactions (boss cow problems when heifers and mature cows are mixed together in one group).**
5. **Sudden ration changes without rumen adaptation will cause extreme drops in DMI.**
6. **Proper housing including flooring and ventilation. Cows will drop drastically in DMI and production when temperatures exceed 21' C.**

Concentrate Feeding

Properly feeding concentrates primarily involves maintaining adequate, but not excess, fibres both as NDF, ADF and effective fibre, as well as monitoring forage to concentrate ratios. In addition, non-fibrous carbohydrates (NFC or NSC) must be maintained between 35 to 40% for milking animals.

Over feeding NFC (i.e.>40%) often leads to increases in milk protein % of 0.2 to 0.3% with an associated depression in milk fat %. However, this can be extremely dangerous in terms of the metabolic health of the cow and is often highly associated with acidosis, laminitis, displaced abomasums etc.

Guidelines for managing concentrates include:

- ✓ **Limit grain to a maximum of 2 kg per feeding to avoid "slug feeding"**
- ✓ **Manure with high levels of undigested grain or a pH < 6.0 indicates that grain is being over fed or soluble protein levels and NFC levels are out of balance resulting in poor rumen fermentation.**
- ✓ **Grain processing can also influence milk composition; rolled or ground barley or flaked corn causes a rapid and severe decrease in milk fat; flaked corn may increase milk protein %.**
- ✓ **Oats may decrease milk protein by 0.2% compared with barley.**

<u>Fibre Levels</u>

The cow's fibre requirements consist of 2 types of fibre: chemical fibre (ADF & NDF) and fibre from particle size. Both the level of the chemical fibre and particle size contribute to the effectiveness of a fibre source for stimulating rumination, salivation and maintaining normal milk fat and protein levels.

- ✓ **Minimum ADF levels are between 17-21%.**
- ✓ **NDF levels should not fall below 28%.**
- ✓ **To assure adequate particle length, forage should not be chopped to less than1 cm theoretical cut length. Chopping finer would dramatically decrease fat % and increase milk protein % by 0.2 to 0.3%. *The cow and her rumen are not healthy*.**
- ✓ **Rations too *high* in fibre (i.e. too low in energy) limit milk protein production because energy is limited.**

<u>Protein Levels</u>

Meeting the cow's requirement for both CP and by-pass protein is essential to maintaining normal milk protein %. High production dairy cows require a CP level of at least 18%, almost half of which should exist in the by-pass component.

- ✓ **Dietary CP levels affects milk yield but not milk protein %, unless the ration is deficient in CP.**
- ✓ **Excessive degradable protein (i.e. urea) can reduce milk protein %.**

<u>Feeding Fat</u>

It is essential to follow certain precautions when feeding fat to avoid a drop in milk protein level. Fats should be added to the ration slowly, take 2 to 4 weeks to reach the maximum fat level in the diet.

- ✓ **3% of ration DM should come from fats found in forages, grains etc.**
- ✓ **2 to 4% should come from natural fat sources such as tallow and vegetable oils**
- ✓ **2 % should come from protected fats such as Megalac or Boosterfat.**
- ✓ **The Total fat content of the ration DM should not exceed 7%.**

<u>Feed Additives/Medications</u>

Certain feed additive will alter the volatile fatty acid (VFA) fermentation patterns in the rumen thereby changing the milk fat and milk protein levels in the milk. The 2 most common products used in Canada are buffers, specifically sodium bicarb, and the ionophore Rumensin (monensin) by Eli Lily.

Buffers shift the VFA levels over to favouring acetic acid, thereby promoting the manufacturing of milk fat.

Rumensin, on the other hand, favours propionic acid production and can narrow the fat/protein ratio in milk. Rumensin has several other features in which make it popular amongst Canadian dairy producers.

Summary of Feeding Management Changes Which Alter milk Solids Production

MANAGEMENT FACTOR	***MILK FAT %***	***MILK PROTEIN %***
MAXIMUM INTAKE	**INCREASE**	**INCREASE 0.2 TO 0.3 UNITS**
INCREASED FEEDING FREQUENCY OF GRAIN	**INCREASED 0.2 TO 0.3 UNITS**	**MAY INCREASE SLIGHTLY**
UNDERFEEDING ENERGY	**LITTLE EFFECT**	**DECREASE 0.1 TO 0.4 UNITS**
HIGH NSC (>40%)	**DECREASE BY 1.0% >**	**INCREASE 0.1 TO 0.2 UNITS**
NORMAL NSC (35 TO 40%)	**INCREASE**	**MAINTAIN NORMAL LEVEL**
EXCESSIVELY HIGH FIBRE	**MARGINAL INCREASE**	**DECREASE 0.1 TO 0.4 UNITS**
LOW FIBRE (<26% NDF)	**DECREASE BY 1% OR MORE**	**INCREASE 0.2 TO 0.3 UNITS**
SMALL PARTICLE LENGTH	**DECREASE BY 1% OR MORE**	**INCREASE 0.2 TO 0.3 UNITS**
HIGH CP	**NO EFFECT**	**INCREASE IF PREVIOUS DIET WAS DEFICIENT**
LOW CP	**NO EFFECT**	**DECREASE IF DIET IS DEFICIENT**
BY PASS PROTEIN ADEQUATE	**NO EFFECT**	**INCREASE IF PREVIOUS DIET WAS DEFICIENT**
ADDED FAT >7% OR FAT INTRODUCED TOO	**VARIABEL**	**DECREASE BY 0.1 TO 0.2%**