

Pay Attention to NFC Level in Dairy Cow Diets to Prevent Laminitis and Optimize Milk Protein

One important nutrient – NFC, or nonstructural carbohydrate – in dairy cow diets can enhance milk protein and help prevent laminitis, both of which are key variables impacting a producer’s profitability. For example, increasing the milk protein by an increment of 0.1 per cent can yield \$9,700 per 100 kg of total production quota. Preventing laminitis can improve feed intake and milk production, which may improve lactation milk yield by several hundred litres.

Thus, NFC is perhaps the most critical nutrient to dairy cow health, production, and milk components. NFC is a calculated nutrient and refers primarily to the starch, sugar and pectin content of forage or grain. NFC is calculated by subtracting the crude protein, neutral detergent fibre, fat and ash from 100%. This calculation can be easily completed by analysis of the forage or grain for all of the above components by your feed lab. Cereal grains and corn silage are good sources of NFC, while forages such as alfalfa, grass, and soybean meal are low.

Milk protein production can be increased by two methods. First, by feeding the correct level of bypass protein that contributes adequate amounts of amino acids. Secondly, by increasing the NFC content of the diet to 35-40 per cent which increases rumen bacteria production and consequently milk protein yield. Bypass protein feeding contributes to only 30 per cent of the total protein digested, whereas rumen microbial protein contributes 60-70 per cent of metabolized protein in lactating cows.

Laminitis is caused by overfeeding NFC, or by increasing the NFC concentration too abruptly. Grain overload leads to higher rumen acid production, and a lowering of rumen pH and lactate production. High lactic acid concentration in the rumen leads to laminitis. Cows in the dry period are typically fed high forage diets which are low in NFC, and produce small amounts of ruminal acid (VFA). The rumen of a dry cow therefore has a reduced ability to absorb acids produced from higher grain diets (high NFC) fed upon freshening and laminitis may develop 2 to 4 months later. The rumen papillae lengthen when diets contain high amounts of NFC, however, it is beneficial to gradually adapt cows to higher amounts of grain before calving with a transition diet. NFC guidelines have been developed for dry and lactating cow diets and are displayed in the following table. The ideal NFC content for a dry cow is 28 to 32 per cent, close up cow is 32 to 36 per cent and lactating cow is 35 to 40 per cent. Laminitis may occur when the diet increases by more than 5 per cent NFC, therefore changing the cow diet from 30 per cent to 40 per cent may induce such problems.

Stage and Recommended NFC,%

Dry cow -- 28-32

Close up dry cow -- 32-36

Lactating cow -- 35-40

Dietary NFC can be increased by several ways:

- Replace grass or alfalfa silage with corn silage
- Feed corn silage along with grass hay to dry cows
- Increase supplemental barley, corn or wheat
- Harvest grass and alfalfa earlier to reduce the NDF and increase the NFC
- Feed earlier maturity grass hay to dry cows

Feedstuffs widely vary in NFC and depend mostly on the NDF and CP level. Generally, grains have high NFC and forages have low NFC. Among forages, corn silage is moderate, however, grass and alfalfa can be low if harvested at late maturity. Dairy producers often notice a positive milk protein response when corn silage enters the diet and is attributed to the higher NFC. The table shows the range of NFC for typical feeds.

Feed and Nonstructural carbohydrate,%

Corn grain -- 75

Soybean meal, 48% CP -- 29

Corn silage -- 29 to 45

Grass hay, mature -- 11

Several other factors affect milk protein production, but improvements can be made when NFC is formulated near 40 per cent. Laminitis may occur if cows are not adapted to the lactating cow diet before calving, especially if the NFC content increases by more than 5 per cent in one day. In addition, laminitis may occur if NFC is higher than 42 per cent, especially if a rapidly digested grain such as high moisture corn, barley or wheat is fed, or if the diet can be sorted.

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