



## Importance of NDF digestibility in dairy cows

*Kai Yuan, Ph.D. PAS - QLF Dairy Technical Services Manager*

*Stephen M. Emanuele Ph.D. PAS - QLF Senior Scientist-Technical Advisor*

Dairy cows require sufficient NDF in diets to optimize rumen function and milk yield. Cows should generally be fed with a minimum of 25% NDF with 80% of the total NDF come from forages. In fact, forage NDF level and digestibility directly affect feed intake, chewing activity, rumen pH, animal health, and milk production.

### Why do we care about NDF digestibility (NDFd)?

#### 1. *NDFd affects feed intake*

Dairy cows consume more forages when forages are high in NDFd. Research from Michigan State University (Oba and Allen, 1997 J. Dairy Sci.) demonstrated that for every unit rise in total diet NDFd, there is a DMI increase by 0.37 lb./d/cow. One explanation is when NDFd is improved, NDF is digested more quickly in the rumen, which in turn allows cows to consume more DM. For early lactation cows where energy balance status is negative, feeding forages with high NDFd encourages greater DMI, decreases BW loss, and reduces the excessive need for supplemental grains and fats.

#### 2. *NDFd affects energy intake*

The NDFd content of forage can have a large impact on the energy value of the diet. As the NDFd content increases the TDN content of the forage increases, which results in an increase in dietary energy content and potential milk yield. High NDFd forages provide greater energy density and allow cows to consume more NDF from forages, which is usually more economical than other options.

#### 3. *NDFd affects milk yield*

The meta-analysis by Oba and Allen (1997 J. Dairy Sci.) also concluded that per unit increase in NDFd was associated a 0.55 lb. increase in 4% fat-corrected milk. Consistent to this finding, University of Wisconsin researchers (Hoffman and Bauman, 2003 Prof. Animal Sci.) fed cows a range of different forage NDFd content (about 45, 50 and 55 % of NDF) and observed that cows had greater DMI and milk yields when fed forages that had a higher NDFd.

### What can be done if forages are low in NDFd?

The NDF content and digestibility of forage varies widely, depending on species, maturity, regions, and growing environment. When forage NDFd is low, dietary energy can be a limitation. In most cases the maximum amount of grain or fat is already included in the diet, supplementing more concentrates in an attempt to improve energy density is not feasible. However, there are a few strategies to help improve a diet in which the forage has low NDFd.

#### 1. *Replace low NDFd forages with higher NDFd forages*

This strategy is only effective if higher NDFd forages are available and accessible on the farm. In many cases, limited forage inventory does not allow for the implementation of this strategy.

**PROFIT POINTS****2. *Replace low NDFd forages with byproducts***

If byproducts that are high in NDFd are available, they can be used to partially replace low NDFd forages. Byproducts that are high in NDF and NDFd such as soy hulls and beet pulp may be effective because of their potential to replace some of the lower NDFd forages with a source of NDF that is more rapidly and completely digested.

**3. *Add sugar liquid supplements***

Research has shown that dietary sugar liquid supplements improve fiber digestion. A recent meta-analysis containing data from 34 publications found that when total dietary sugar is between 6.75 to 7.5% DM, cows have the best NDF digestibility, fat-corrected milk yield, and milk efficiency. In another word, cows should be fed between 1.5 and 2.0 lb. of added sugar to optimize NDF digestibility, which equals to 4 to 5 lb. of QLF products.

In summary, optimization of NDFd can directly improve feed and energy intakes and milk production. When forages are low in NDFd, partial replacement with high NDFd byproducts or supplementation with sugar liquid supplements can help improve forage digestion and milk production and efficiency. These strategies may take 1 to 3 weeks to see the responses in DMI or milk yield, and any implementations should be tried and evaluated short term before making long-term changes in feed supplies and inventories.