

Can You Use Alternative Feed Ingredients to Replace Corn Grain?

Faith Cullens

Extension Dairy Educator

Introduction

Feed is the single largest expense in dairy farms. Corn grain is fed to dairy cows oftentimes because of its high energy and starch contents. With high corn prices in 2011, dairy producers may be seeking alternative feeds to lower feeding costs. Because of the high energy requirements of lactating dairy cows, feed selection must include considerations of energy content and digestibility while maintaining a healthy rumen environment. Lactating dairy cows typically consume a nutrient dense ration with approximately 50% forage and 50% concentrate.

Sources of Energy

Digestible starch, fiber, sugar, and fat supply most of the energy in the ration, but ultimately cows need a certain amount of digestible starch to maximize milk lactose secretion and lactation performance. The most common source of starch in Michigan dairy rations is corn grain. The amount of starch in the ration can vary between 15 to 30% of the dietary dry matter depending on the level of milk production, stage of lactation, and animal health.

Alternative Feed Categories

When corn price is high, can other feeds substitute for corn in the ration? Alternative feeds may be available at competitive prices, but they need to be carefully evaluated as to how they might fit into the ration. It is important to decide which nutrient(s) you are seeking to replace when using alternative feeds. For example, if corn grain is to be replaced by an alternative feed ingredient, then some of the original starch will need to be replaced by the alternative feed. Alternative feedstuffs generally can be classified into several categories - fillers, starch, digestible fiber, protein, protein/fiber, and fiber/protein/fat.

- Fillers - these feeds have low nutritional value for dairy cows and would be used in situations of fiber or feed shortage. Examples are rice hulls and cottonseed hulls.
- Starch - feeds with higher starch contents include hominy, bakery by-product, and cereal by-product.
- Digestible Fiber - these feeds are useful to extend forage inventories and include citrus pulp, beet pulp, and soy hulls.
- Protein - an alternative protein source is corn gluten meal.
- Protein/fiber - wheat middlings and brewer grains provide both protein and fiber to the ration.
- Fiber/protein/fat - corn distiller grains and whole cottonseed are common sources of fiber, protein, and fat.

Often, alternative feeds are available for a limited time and need to be purchased and taken on short notice. In deciding whether or not to purchase an alternative feed consider storage time (especially for wet feeds), market availability, quality, consistency (lack of nutrient variability), storage costs, and any possible negative effects on rumen health.

The ultimate question is: can an alternative feed replace corn (or a portion of corn) without reducing lactational performance? It can be difficult to predict if an alternative feed (e.g., a by-product) is a good choice nutritionally in a particular ration without running a series of ration formulation analyses at varying prices of the by-product and different inclusion rates. This may help the user become more comfortable that the ingredient probably will work without compromising lactational performance, before incorporating the alternative feed into the ration. Additionally, an on-farm evaluation should occur.

What Informs Your Feeding Decisions?

After incorporating the alternative feed into the ration, it is important to determine if it was a good feeding decision based on responses in milk yield and components. For example, if you replace corn with a by-product feed and save \$0.30/cow per day in feed cost without changing milk yield, it may seem like a good decision and great saving; but, you must consider production of milk components, not just overall milk yield. To do this, use values from your most recent milk check (component prices, producer price differential, and premiums).

Let us work through an example in which milk yield does not change, but milk component yields decline when a feed change is made.

For this example we use:

Protein: \$2.4984/lb

Butter fat: \$2.2113/lb

Feed savings: \$0.30/cow per day

Number milking: 250 cows.

Before feeding change.

Milk production: 75 lb/day

Milk protein: 3.1%

Milk fat: 3.7%

After feeding change.

Milk production: 75 lb/day

Milk protein: 2.9%

Milk fat: 3.6%

To calculate the value of milk components before the feed change:

75 lb/cow per day x 3.1% protein = 2.325 lb of protein/cow per day

75 lb/cow per day x 3.7% fat = 2.775 lb of fat/cow per day

Milk component value=

$(2.325 \text{ lb protein} \times \$2.4984/\text{lb}) + (2.775 \text{ lb fat} \times \$2.2113/\text{lb}) = \$11.95$

To calculate the value of milk components after the feed change:

75 lb/cow per day x 2.9% protein = 2.175 lb of protein/cow per day

75 lb/cow per day x 3.6% fat = 2.7 lb of fat/cow/day

Milk component value=
 $(2.175 \text{ lb protein} \times \$2.4984/\text{lb}) + (2.7 \text{ lb fat} \times \$2.2113/\text{lb}) = \$11.40.$

Compare savings vs. income:

Feed savings $\$0.30/\text{cow per day} \times 250 \text{ cows} = + \$75/\text{day}$

Milk component income lost = $\$11.40 \text{ (after)} - \$11.95 \text{ (before)} = -\$0.55/\text{cow/day}$

$-\$0.55/\text{cow per day} \times 250 \text{ cows} = - \$137.50/\text{day}$

$\$75/\text{day in feed savings} + (-\$137.50/\text{day}) \text{ in lost income} = - \$62.50.$

Although in this example saving $\$0.30/\text{cow per day}$ and maintaining milk yield may have appeared positive for farm financials, taking a few minutes to calculate the value of the components revealed that this was not a good feeding management decision and will cost the farm $\$62.50/\text{day}$ or $\$1,875/\text{month}$. Rarely does it pay to sacrifice milk yield or milk components to save money. Other scenarios such as different prices, milk and/or component yields, may give different results.

A comprehensive calculator tool has been developed by MSUE Dairy Educator Dr. Craig Thomas to help facilitate this evaluation in your particular situation and to test different scenarios. [Click HERE to access a Feed Change Evaluator that calculates the net benefit \(or cost\) of a ration change](#)

Conclusion

The price of corn grain increased substantially during the last 2 years. The use of alternative by-product feeds may help to offset cost of the dairy ration. However, determining the marginal change in income (loss or gain) with a ration change, as in the example above, is the only way to know for sure if purchase and use of an alternative feed is a good decision or not. Also, careful consideration should be given to the handling, storage, variability, availability, and the nutrient content of alternative feeds and how the cows respond.