



by Steve Martin

## Hulls: Turning waste into milk

FOOD production systems are under attack in our modern society. It is a battle that involves everything from water use to animal housing and care, and even global warming. Advocates for food production have been working tirelessly to educate, discuss and demonstrate the true story of producing grain, fiber, meat, milk and eggs.

Among the various production systems, ruminant animals have a unique advantage as we work to feed a hungry world. It can be simply stated that they are the only cog in the food production system that is able to take mass amounts of nutrients that are not dietary options for humans, and turn them into high quality milk and meat.

Chief among them are grasses, legume forages, and even corn stalks. Those forage sources often comprise as much as 50 percent of a dairy cow's diet, and she uses the valuable carbons that are unavailable to human digestive systems.

But these are not the only fiber-rich ingredients in dairy diets. The various hulls that encapsulate many higher quality (often human-grade) foods are kept out of trash heaps thanks to the digestive ability of cows.

The peanut is an excellent example. Several restaurant chains offer whole, shelled peanuts as appetizers to diners who, oddly enough, are encouraged to throw the shells on the floor. So as the wait staff crunches around upon them, there is an opportunity to advocate for the cow:

"You know, instead of throwing those shells on the floor where they will be swept up as trash, we could gather and take them to the dairy. There we can add them to the cows' diet and convert them into nutritious milk and beef."

### Hulls differ greatly

The different types of fiber-rich hulls are often regional and, for sure, they are not created equal. If there was a contest to determine the favorite hull available for dairy feeds, I suspect almond hulls would win by a nose over cottonseed hulls. But from a volume standpoint, soy hulls likely dwarf them both.

Here lies the point: All three are outside material for a more valuable treasure inside, but they could not be more different in their nutrient composition and use in dairy rations.

Hulls are often misunderstood by dairy producers. Twice in the past month I have had clients refer to soy hulls as "filler" and give them little regard as a building block for milk. Both were shocked when I told them soy hulls have 88 percent of the energy value of corn grain. I don't think that would describe a filler.

Now would be a good time to note the difference between roughage and fiber. All of the hulls we feed are high in fiber, but they have varying levels of roughage. That range spans from very high to essentially none. Fiber values are realities of the chemical makeup of hulls. The digestibility of fiber can also range from high to low depending upon the nature of their fiber. It is the microbes in cows'

*The author is the founder of Dairy Nutrition and Management Consulting LLC, which works with dairies and heifer growers in Texas, New Mexico, Kansas, Colorado, Washington and California.*



rumens that have the ability to digest the hull and harvest the valuable carbons within.

Roughage, on the other hand, is not a chemical measure like fiber, but a designation in a diet that relates to rumen health and the support of overall cow health. In most ruminants, roughage needs are met by grazed forages. When harvested feeds are blended for delivery to cows, not only can forages meet these roughage needs, but various hulls can help.

There are three values in my nutrition formulation model that help tie these concepts together. First, every ingredient has a fiber value, namely ADF, NDF and lignin. These are useful analytical measures and are a key in a ration formulation.

The second is a bit more subjective and is called effective NDF. The goal here is to describe how much of this fiber has physical roughage properties. As an example, hay would have a 100 percent effective NDF factor, whereas soy hulls may be close to zero. Most hulls though, do have high effective fiber NDF values. They are usually coarse and they help build the rumen mat.

The last descriptor for the computer is digestibility. Various nutrition models have different names for this value, but it can be determined by measuring NDF digestibility at a forage lab. Cottonseed and peanut hulls would be the lowest in digestibility, and soy hulls would be the highest. Digestibilities are used to calculate the true energy value of an ingredient. The winners are high and the losers are low – but the losers could be winners if roughage is what you need.

The best hull for each feeding situation depends upon the goals and limitations in place for a particular farm. If traditional forages like corn silage or hay are limited or expensive, more roughage-rich hulls like cottonseed or almond hulls might

be the choice. There are limits here, but strong cud chewing and good manure health are measures of success.

In a very different scenario, forage may be abundant and nicely priced, but what if grain sources like corn are expensive? To replace the high energy contribution of corn, soy hulls would be a good choice. As I mentioned earlier, soy hulls have 88 percent of the energy of corn grain. It is possible that replacing a few pounds of corn and a touch of true forage with soy hulls will net the same milk production potential for less feed cost.

Soy hulls are also a great fit when physical roughage measures in the ration are trending too high and are thus reducing intake or encouraging sorting. But what if adding more corn is not an option due to already high starch levels? Soy hulls are a great solution in that situation. They add fiber but not roughage, and add energy but not starch.

### Different benefits

Each type of hulls has its own pluses and minuses. At times, particular properties of a hull might make it pricey compared to the budget feel of a true by-product. Cottonseed hulls have nearly magical properties in calf diets between the time calves are on a starter feed and their first TMR. The high fiber and palatability of cottonseed hulls seem to be a perfect fit for managing manure health in a growing calf. At times, adding this unique ingredient actually adds cost to the ration, but 100 years ago they simply threw them away!

Almond hulls have a special place in the hearts of west coast dairy producers. Although fiber digestibility is only moderate, their nutritive value is helped due to a significant sugar content. The net of this fiber and sugar is a great feed ingredient that is in high demand for dairy rations. They aren't much to look at, but cows love 'em.

So if you ever hear the term "hulls" come out of the mouth of a dairy producer, consider where you are, because they might be talking about very different things.

If you are in the southeast they are likely talking about peanut hulls for heifer rations. If you are in the great state of Texas you might suspect the magical cottonseed hull is about to go into a calf grower. In California, you can bet the beloved almond hull is the subject of the conversation. And lastly, if you are in the shadow of a grain elevator somewhere in America's heartland, the massive number of tons of soy hulls is certainly a topic of frequent conversation.

Each hull meets specific needs and we should never lump them all together or simply disregard them as a filler. Cows have a fantastic system of microorganisms to harvest valuable carbons out of ingredients that offer no energy to the human digestive system. Working with rumen "bugs" to get the most out of materials that were considered trash in years past is good for the sustainability of agriculture. Feeding hulls is one of the many examples of common practices in farming that are positive for both sustainability and profitability.

Looking for frequent opportunities to use hulls in dairy rations is truly feeding for the bottom line.