



Ruminant Nutrition Notes

Extension Animal Husbandry

North Carolina State University

Soybean Hulls For Beef Cattle Fed Forage-Based Diets

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Feed cost is a high proportion of the total cost of producing feeder cattle. Supplemental energy and protein feeds are often used to optimize utilization of the forage resources in both cow/calf and growing calf (developing heifers and stocker cattle production). The cost of these supplemental feeds is high, especially to smaller producers, and alternative feeds to reduce these costs are being investigated. For example, developing a heifer from weaning to breeding (150 days) will often require 4 lb/day supplemental feed (grain) which amounts to 600 lbs. If that feed costs \$175/ton, that means \$53/head.

Reducing the cost of the supplement to \$100/ton (without reducing performance) has the potential to reduce development cost by \$22.50.

One feed that has been shown to be very well utilized in high forage diets is soybean hulls. Soybean hulls are the seed coat of the bean that is removed during the production of soybean meal and oil. Historically, the hulls were blended with soybean meal to produce 44% soybean meal, but with most meal now produced being 48% meal, there is increased availability of the hulls. There are several soybean processors located in North and South Carolina, and Georgia such that most producers are fairly close to a supplier. Most processors will sell soyhulls directly to producers in a minimum 5 ton quantity. Soybean hulls can be purchased through a commodity broker in tractor trailer loads, and are also available through many commercial feed suppliers.

Soybean hulls have traditionally been considered a fiber source, with a low energy value especially for swine and poultry, and thus their low market value. Typically soybean hulls are available at about 75% their economic value based on their published levels of energy and protein. Based on published values, soybean hulls contain 77% TDN, 12% crude protein, .5% calcium and .2% phosphorus (Dairy NRC, 1989). Most samples analyzed from North Carolina contain 14% crude protein or more making their composition ideal to be the sole source of supplemental energy and protein for high forage diets. Recently it has been shown that when substituted directly for corn and soybean meal in high forage diets, soybean hulls give performance responses equivalent to the standard feeds. This challenges the traditional published "feed tables" which show about 15% lower feed value for soyhulls than for corn. This effect is due to the effect that diet ingredients have on each other, or associative effects®.

Many factors may be involved in the observation that soybean hulls have similar apparent value to corn and soybean meal. The most feasible explanation concerns the source of energy in each feed. In corn the primary energy source is starch. Digestion of grain (starch) results in a reduced pH of the rumen, and this can result in lower digestion of the forage portion of the diet. With soyhulls, the energy is primarily in the form of highly digestible fiber. As a result they are digested more slowly than the corn and have less of an effect on the rumen environment. This then would improve digestion of the forage, and make up for the fact that they are probably digested to a slightly lower extent than corn.

Diets for growing calves or for brood cows should be formulated using the same value for energy in both soybean hulls and corn. This can be accomplished by estimating the amount of the standard grain that would be required and then substituting the soybean hulls for it. Soybean hulls in this area will run approximately 14% crude protein, and this should be adequate for situations with medium or high quality forage. If additional protein is needed it should be added. Soybean hulls should be analyzed when received if large amounts are purchased as it is not uncommon for them to contain 18% or more crude protein.

Handling and Storage

Soybean hulls are quite dusty and are usually handled in bulk. Most soyhulls are ground to increase the amount that can be loaded onto a truck. In general the coarser the soyhulls the better the feed value, although in our studies they have ranged from very fine to fairly course. There are several things to be considered that will minimize handling problems. First, soyhulls seem to work best in rations using wet ingredients because dust problems are minimized. If soybean hulls are used as a supplement, you pretty much have to put up with the dust, and it is recommended that the producer wear a dust mask if working in an area with poor ventilation.

Usually soybean hulls are surprisingly palatable to cattle, but sometimes, especially when trying to start inexperienced weaned calves on feed, several days may be required to get cattle eating desired amounts. If maximal early post-weaning performance is desired, it is recommended to start calves on a commercial preconditioner, and then gradually shift them to all soybean hulls. In areas where conditions are very windy, soybean hulls are usually fed pelleted due to loss from the feed trough. In our climate, however, this is usually not a problem.

Most producers will store soybean hulls in bulk in an open fronted shed, which facilitates unloading. They are then moved to the cattle in five gallon buckets which hold about 20 lb. Soybean hulls also store well in grain bins, and while they auger slower than grain, this is a convenient way to store them, assuming the equipment for loading and unloading the bin is available. Some processors will deliver soybean hulls

in an auger truck which will make storing even more convenient. If soybean hulls are picked up from the processor in a dump truck, make sure that small holes, etc are sealed to prevent excessive leakage. Also, make sure the truck is tightly covered with a tarp to prevent them from blowing out.

Producers should consider soybean hulls as a grain substitute for use as a supplement for forage-fed beef cattle. Due to their highly digestible fiber they have a similar energy value to corn in these types of diets, and are available at a much lower price. Use of soybean hulls and other alternative feeds has the ability to greatly reduce the cost of producing feeder cattle, and their use in North Carolina is expected to increase in the future.