Extension Responds: Feed supplies

Handling, Feeding and Pricing Soybean Forage

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Little recent research exists to guide producers and nutrition consultants in estimating and optimizing the nutritional value of soybean forage. Even old research is scarce. Much of the following information is based on a limited number of recent experiences. Unless otherwise stated, comments in this article relate to soybeans conserved as silage.

Feeding Soybean Silage

Producers should store soybean silage in a location that allows the producer to choose when and how much soybean silage to feed. Lactating cows can use soybean silage, but producers should control the level of soybean silage fed in the diet. Flexibility in the inventory is critical. In general, feed no more than 50 percent soybean silage as part of the forage base to lactating dairy cows. You may need to reduce the amount of soybean silage even more depending on the fat content of the silage.

Soybean silage does not feed well when it is the sole source of forage for two reasons. First the high oil content in soybeans may cause erratic fermentation in the silo. There are many reports of successfully harvesting and storing soybean silage, but mixing soybean forage with another forage at ensiling usually improves silage fermentation. In many cases, mixing forages is difficult with existing farm equipment. Second, the palatability of soybean silage is average. In cases where soybean silage has been ensiled alone, it is best if soybean silage can be incorporated into a total mixed ration with another forage such as corn silage. This will aid the overall palatability of the diet.

Laboratory feed evaluations indicate that soybean silage is similar in quality to alfalfa, but field experience shows that the feeding value of soybean silage is less than alfalfa silage. Soybean silage is made up of several very different components. If soybean silage is harvested at the R7 stage (as opposed to an earlier stage), the high quality component of soybean silage is the bean itself. In contrast, the stem (especially the lower part) may have a feeding value similar to straw. Dirt is often attached to the lower parts of the stem. Dirt has no feed value. Standard feed tests also do not measure anti-nutritional factors in raw soybeans such urease, alkaloids, trypsin inhibitors and highly degradable protein. Soybean silage also contains much higher levels of fat than other forages and there are limits as to how much vegetable fat can be fed to lactating dairy cows. So while the laboratory quality of soybean silage based on standard feed test may appear to be comparable to alfalfa silage, its feeding value may be less. Research has not determined the feeding value of soybean silage precisely, but field experience suggests that its overall feeding value can be influenced by both positive and negative nutritional factors.

Evaluating Soybean Silage and More Feeding Guidelines.

Soybean silage should be sampled and evaluated in a forage testing laboratory. A wet chemistry forage test will give the nutrient profile of the silage. Many forage testing laboratories do not have specific NIR calibrations for soybean silage. At minimum, test soybean silage for DM, CP, NDF, Ash, Fat, Ca, P, K and Mg. You might want to test for NDF digestibility, but the higher fat content of soybean silage could influence the results. Testing soybean silages for fat content is extremely important. Soybean silage may contain 4 to 10 percent fat, and you should monitor carefully the amount of supplemental vegetable fat in the diet.

Soybean silage can make an excellent forage for replacement heifers and dry cows if fed with another forage. A general guideline is to feed no more than .5 to .7 pounds of vegetable fat from soybean silage. You can feed soybean silage to lactating dairy cows, but since soybean forage is not as palatable as other forages, limit soybean silage to less than 50 percent of the forage base or limit the amount of soybean silage based on fat contribution to the diet. Remember that feeding more than 1 pound of vegetable fat combined from soybean silage, whole cottonseed, distillers grains, or whole soybeans can cause milk fat test suppression or suppression in fiber digestibility. In addition, because soybean silage contains raw soybeans and the degradability of raw soybean protein is high, monitor diets for protein degradability. In general, avoid feeding roasted soybeans, cottonseed or distillers grains in combination with soybean silage because of supplemental vegetable fat limitations. Also, avoid feeding urea in combination with soybean silage because soybean silage may contain urease, which could break urea down to ammonia causing further palatability issues with the forage. Finally, because soybean silage contains soybeans, the phosphorus content of soybean silage can be slightly higher than other traditional forages. Monitor Phosphorus content carefully and avoid over supplementation.

Green Chopping

The feeding guidelines described above for soybean silage also apply to green chopped soybean forage. Field losses from shattering will be less from green chopping than from conditioning both for hay and for silage.

Harvesting

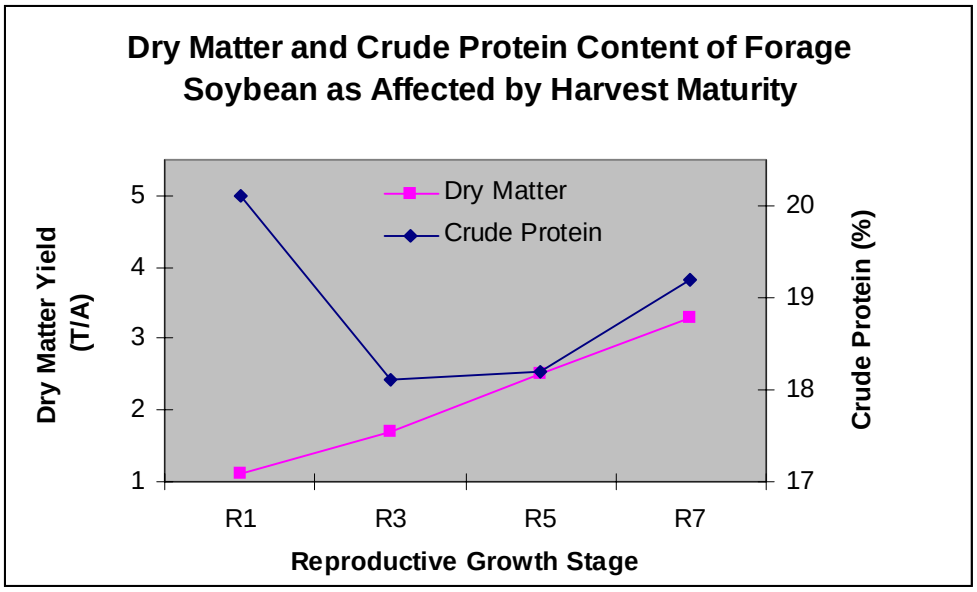
Producers should consider the herbicides that were applied to the soybeans because many herbicides labels do not allow using treated soybeans as forage. The forage restrictions for the common pre-emergence and post emergence soybean herbicides are summarized at this website.
http://ipcm.wisc.edu/wcm/pdfs/2004/04-22weeds1.html

You can harvest soybean forage as silage or hay. Harvesting as hay requires much longer field drying times, increases shattering losses and can produce very dusty hay. It is more practical to harvest soybean forage as silage. If harvested as silage, allow the

forage to wilt to approximately 60 percent moisture before ensiling alone or mixed with corn forage. Haybines and dicbines used to wilt the soybeans involve conditioning that will cause some loss of leaves and grain even for silage purposes. In most parts of the Upper Midwest, you can time a simultaneous harvest of soybean forage and corn silage. Research conducted at Ohio State indicates a mix of 1/3 soybean forage and 2/3 corn silage stored well and significantly improved the corn silage quality. However, with the number of TMR mixers in use, it is generally more practical to mix soybean silage with corn silage coming out of storage. Although research is extremely limited, it is recommended that soybean silage be treated with a homo-fermentative inoculant to enhance fermentation.

When should I harvest to maximize the tonnage and protein content of soybean forage?

Studies conducted by the University of Wisconsin agronomy department in the late 1980s showed that soybeans can make forage similar in quality to alfalfa. However, it is critical to observe the proper development stage of the soybean in order to maximize its feed value. Early in the growing season, soybean has high digestibility. Later in the growing season, tonnage will be greater. For instance, at R7 growth stage (when the first pod naturally turns brown) soybeans are likely to produce about three times the tonnage expected at R1 (when soybean starts to flower). So, how to decide the best compromise between quality and quantity? Fortunately, the green soybean grains can make up for the loss of tissue quality. The grain is rich in protein of high quality and easily digestible. In a normal year, during the grain filling phase, the soybean grain would grow from 1 to 1.5 bushels per acre per day. The fast growth will compensate for loss of tissue quality until the soybean plant starts to senesce. So, the optimum soybean forage quality/quantity compromise is typically reached just before the plants start to turn and drop leaves. Conversely, the lowest quality will be achieved at R5 growth stage (just before the plants start filling the seeds). At R5 the vegetative part of the soybean plant already lost some of its digestibility and the grain is still not there to boost the protein content.



Pricing

While there isn't adequate research to pinpoint the feeding value of soybean forage, at the R3 or R7 stage, it is likely to have a range from 50 to 75 percent of the value of prime alfalfa hay. If we assume that the yield is 2.0 tons per acre and prime hay is worth $120.00/ton, the value of an acre of soybean forage would be $120 to $160 minus harvest cost. If the cost of harvesting (assuming ensiling by the buyer) is $50.00 per acre, a buyer could justify paying in a range from $70 to $110 per acre for soybean silage.

As is the case with pricing corn silage, there are many variables (yield, stage of maturity, etc.) in soybean forage pricing that keep it from being a "one size fits all" or precise process to determine the optimum price for each situation.

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