

FEEDING WHOLE SOYBEANS TO FEEDLOT CATTLE

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Growing Diets: Davenport et al. (1988) observed in several trials that soybeans were an acceptable protein supplement for growing cattle. However, the calves consuming corn silage and supplemented with soybeans did not perform as well as calves supplemented with soybean meal. Soybeans are highly degradable in the rumen which results in a possible deficiency of protein reaching the small intestine. Growing cattle diets supplemented with soybeans may benefit from blending in a "high-bypass" protein source. However, an Oregon study did not detect calf body weight gain difference in supplementing a hay-based diet (6.5% crude protein) with 3 pounds of whole raw soybeans or 2 pounds of soybean meal plus 1 pound of barley. Roasting soybeans can increase their "by-pass" potential (Cosby et al., 1995).

Finishing Diets: The University of Missouri recently completed a 58-day feeding trial using whole soybeans to replace all or part of the soybean meal (Felton et al. 1998). Eighty steers were allotted to one of four dietary treatments. The following were the four diets tested.

Table 1. Composition of whole soybean diets (Percent of Dry Matter)

| Diet | WS-0 | WS-8 | WS-16 | WS-24 |
|-------------------------------------|-------|-------|-------|-------|
| Corn | 72.57 | 70.27 | 68.00 | 65.87 |
| Corn Silage | 8.00 | 8.00 | 8.00 | 8.00 |
| Soybean Meal | 17.30 | 11.60 | 5.80 | 0.00 |
| Whole Soybeans | 0.00 | 8.00 | 16.00 | 24.00 |
| Limestone | 1.50 | 1.50 | 1.50 | 1.50 |
| Salt | 0.50 | 0.50 | 0.50 | 0.50 |
| Vitamin/Mineral | 0.10 | 0.10 | 0.10 | 0.10 |
| Rumensin TM | 0.02 | 0.02 | 0.02 | 0.02 |
| Tylan TM | 0.01 | 0.01 | 0.01 | 0.01 |
| Average Daily Gain, lbs/day | 3.4 | 3.5 | 3.2 | 3.2 |
| Feed to Gain | 6.0 | 5.7 | 5.7 | 6.0 |
| Cost of Gain ^a , cent/lb | 37 | 37 | 38 | 41 |

^aSoybean meal = \$185.70/ton; Whole Raw Soybeans = \$6.25/ton; Corn = \$2.82

Average daily gain and feed efficiency were unaffected by treatment. Initial body weight, final body weight, and carcass weight were similar for all steers across dietary treatment. Ribeye area, kidney-pelvic-heart fat, backfat, dressing percent and yield grade were also similar.

The two higher levels of whole raw soybeans (WS-16 and WS-24) were not economically beneficial. However, Felton et al. (1998) concluded that whenever the cost of whole raw soybeans are at or below 94% of the cost of soybean meal, higher dietary inclusion rates of whole raw soybeans would be economically beneficial. Keep in mind though that moisture level in beans will affect their economic value and beans with mold should not be used.

Iowa researchers (Trenke et al. 1995) observed that steers supplemented with soybean meal or soybeans (ground or extruded) gained more weight and were more efficient during the first 70 days on feed compared to steers supplemented with urea. However from 70 days to 204 days on feed, the urea supplemented steers gained more weight and were more efficient. Economic returns were similar for soybeans, urea, and soybean meal. Therefore soybeans must also be price competitive with supplements containing urea to be economically feasible.

I have not come across any trials feeding blends of urea and raw soybeans to cattle and perhaps for good reason. Raw soybeans and urea are both highly degradable in the rumen so there may be no particular nutritional advantage. Soybeans would probably need to be ground to maintain a mixture of urea with soybeans. Raw soybeans contain the enzyme urease, which breaks down urea to ammonia. Cattle don't like the taste or smell of ammonia and cattle would probably would find the mix less palatable. Heating soybeans is required to destroy the urease enzyme if they are to be used as a protein source for pigs.

Carcass Composition: Felton et al (1998) did not observe significant differences in marbling between steers fed whole raw soybeans or soybean meal. However, they noted a numerical trend towards increasing the quality grade with increasing levels of whole raw soybeans. Cosby et al. (1995) observed a slight numerical decrease in quality grade when feeding roasted whole soybeans. Trenkle et al. (1995) noted that feeding soybeans increased the amount of polyunsaturated fat. Unsaturated fats are preferred to saturated fat in human diets. A targeted marketing alliance may be able to merchandise possible carcass composition differences.

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