

# Chapter 14: Feeding Value of Sunflower Products in Beef Cattle Diets



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## Sunflower Meal

Nutrients in sunflower meal can vary depending on several factors. The amount and composition of meal is affected by oil content of the seed, extent of hull removal and efficiency of oil extraction. The proportion of hull removed before processing differs among crushing plants. In some cases, a portion of the hulls may be added back to the meal after crushing. The amount of hull or fiber in the meal is the major source of variation in nutrients (Table 14.1).

Pre-press solvent extraction of whole seeds with no dehulling produces meal with a crude protein content of 25 to 28%, partial dehulling yields 34 to 38% crude protein content and completely dehulled sunflower meal commonly yielding 40+% crude protein. Sunflower meal is marketed and shipped as meal or pellets. Protein required by rumen microbes can be provided in the form of rumen-degradable protein from sunflower meal. Heat treatment or toasting of meal from the solvent extraction process may increase the proportion of undegradable protein. Sunflower meal is more ruminally degradable (74% of crude protein) than either soybean meal (66%) or canola meal (68%; Table 6).

Table 14.1. Nutrient content of solvent-extracted sunflower meal based on amount of hulls retained.

Item	No Hulls Removed	Partially Dehulled	Dehulled
<b>Dry Matter, %</b>	<b>90.0</b>	<b>90.0</b>	<b>90.0</b>
	<b>Percent, Dry Matter Basis</b>		
Crude Protein	28.0	34.0	41.0
Fat	1.5	0.8	0.5
Crude Fiber	24.0	21.0	14.0
Ash	6.2	5.9	5.9
Calcium	0.36	0.35	0.34
Phosphorus	0.97	0.95	1.30
Potassium	1.07	1.07	1.07
Magnesium	0.80	0.79	0.79

Hesley (ed), National Sunflower Association, 1994.

Table 14.2. Protein and energy fractions for sunflower meal, soybean meal and canola meal.

Item	Sunflower Meal	Soybean Meal	Canola Meal
	Dry Matter Basis, %		
Crude Protein	26.0	49.9	40.9
	Crude Protein, %		
Rumen Degradable	74.0	66.0	68.0
Rumen Undegradable	26.0	34.0	22.0
	Dry Matter Basis, %		
Crude fiber	12.7	7.0	13.3
Neutral Detergent Fiber	40.0	14.9	27.2
Acid Detergent Fiber	30.0	10.0	17.0
Net Energy, Maintenance, Mcal/lb	0.67	0.93	0.73
Net Energy, Gain, Mcal/lb	0.40	0.64	0.45
Total Digestible Nutrients	65	84	69

Adapted from NRC, 1996.

Sunflower meal has a lower energy value than either canola or soybean meal (Table 14.2). Energy varies substantially with fiber level and residual oil content. Higher levels of hulls included in the final meal product lower the energy content and reduce bulk density. The mechanical process of oil extraction leaves more residual oil in the meal, often 5 to 6 % or more, depending on the efficiency of the extraction process. Elevated oil content in mechanically extracted meals provides greater energy density. Pre-press solvent extraction reduces residual oil to 1 ½% or less.

### Sunflower Meal in Beef Cattle Diets

Sunflower meal can be used as the sole source of supplemental protein in beef rations. In trials comparing sunflower meal with other protein sources, equal animal performance commonly is observed based on isonitrogenous diets from different sources.

Cows consuming low-quality forages, such as winter range, crop aftermath or other low-quality forages, can utilize supplemental degradable protein to increase total intake, forage digestibility and performance. Protein can be supplemented with a number of feeds, coproducts or oilseed meals. Least costly sources are critical to profitability, and sunflower meal often is very competitively priced per unit protein. Sunflower meal has been used widely in beef cow supplementation programs but few research trials document comparative animal performance.

### Sunflower Silage

Sunflower silage can make a suitable feed for beef cows; however, high moisture levels can be a challenge since sunflowers typically don't dry down well. Consequently, dry feed must be added to the silage pile to reduce the moisture level to a point where seepage is not a major problem.

Table 14.3 gives the estimated nutrient content of sunflower silage produced from either low-oil or high-oil varieties of sunflower. Depending on what other feeds are mixed in the silage pile, nutrient contents may change.

Blending corn and sunflower silages together can help alleviate the moisture problem. Producers also may consider waiting seven to 10 days following a killing frost to facilitate dry down. Blending dry forage into the silage pile also can reduce moisture content. To minimize seepage problems, the moisture level should be 65% or less.

### Whole Sunflower Seeds

When economical, whole sunflower seeds can be used as a source of energy and protein in beef cattle diets (Table 14.3). Fat levels can be quite high in whole seeds; consequently, amounts fed should be restricted based on fat content of the seed. Typically, no more than 4% supplemental fat should be added to cow diets to reduce the potential for any detrimental effects on fiber digestion. This will result in inclusion levels of approximately 10% of the diet.

Table 14.3. Nutrient content of sunflower products.

Product	DM, %	TDN, %	%Mcal /lb	NEm, Mcal/lb	NEg, CP, %	ADF, %	Ca, %	P, %
Sunflower Hulls*	90.0	40.0	0.41	0.00	5.0	63.0	0.00	0.114
Sunflower Screenings*	87.0	64.0	0.66	0.39	11.1	29.0	0.72	0.42
Sunflower Seed, Confectionary*	94.9	83.0	0.93	0.63	17.9	39.0	0.18	0.56
Sunflower Seeds, Oil Type*	94.9	121.0	1.42	1.03	17.9	39.0	0.18	0.56
Sunflower Silage, Low-oil Variety**	30.0	61.0	0.61	0.69	11.1	42.0	0.8	0.3
Sunflower Silage, High-oil Variety**	30.0	66.0	0.35	0.42	12.5	39.0	1.50	0.3

\*Adapted from Lardy and Anderson, 2003.

\*\*Adapted from Park et al., 1997.

### Sunflower Residue

Sunflower residue is useful for aftermath grazing by beef cows. Nutritional value of the head is greater than the stalk. Supplementation may be required if the volume of residue is limited and nutrient quality decreases rapidly after head material is consumed.

### Sunflower Screenings

Sunflower screenings from both confection and oil seed plants are often available at competitive prices. Nutrient content varies widely with the amount of meats, which are high in fat and protein, and hull, which is low in nutrient content and digestibility. Screenings are best used in modest growing or maintenance diets when animal performance is not critical. The presence of sclerotia bodies does not appear to be a problem for palatability, nutrient content or animal performance.

### Sunflower Hulls

Sunflower hulls are low in protein and energy and should be used only as a bedding source.

### Summary

That sunflower meal is a useful protein source for growing and finishing cattle is apparent from the limited research. Similarly, beef cows can be provided supplemental protein effectively with sunflower meal. Sunflower meal may be especially useful in diets where degradable protein is required, such as lower-quality

forage or high corn finishing rations. The increased bulk of this relatively high-fiber meal may affect logistics, but ruminants are positioned to be more tolerant of high fiber levels than other species. Other sunflower products can be used effectively in ruminant diets, given appropriate performance expectations.

### Selected Reference

Kandel, H., Buetow, R., and Endres, G. (eds.) 2020. Sunflower production. A-1995. North Dakota State Extension Service, North Dakota State University, Fargo, ND, USA.



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