



Vet Call

► by **Bob Larson and K.C. Olson**

Using cottonseed products

Cottonseeds, a byproduct of cotton fiber production, can be an attractive supplement for beef cattle. The four products most commonly used are whole cottonseeds, cottonseed meal, cottonseed hulls and cotton gin waste (or gin trash).

Cottonseed does not need to be ground or rolled to be utilized by beef cattle; however, cottonseed can be de-linted, which improves its handling characteristics.

Properties

Whole cottonseed is high in protein (22%), high in energy [96% total digestible nutrients (TDN)], and very high in fat (17.5%). Because of the high oil content, daily amounts should not exceed 5 pounds (lb.) in yearlings and 6-7 lb. in adult animals. Moreover, cottonseed should not be fed to cattle less than 2 months old.

Cottonseed that has not been de-linted bridges easily in bins and does not flow well in feeders, nor does it auger well. De-linted cottonseed is denser and flows with significantly greater ease through feed-handling systems.

The oil removed from whole cottonseed is used in salad dressings, margarines and other foods; the remaining product is called cottonseed meal and is a common supplement for cattle. Cottonseed meal is high in energy (77% TDN) and protein [36% or 41% crude protein (CP), depending on the processing method].

The protein is low in a number of amino acids (cystine, methionine and lysine), which limits its use in poultry and swine diets, but it provides a good protein source for ruminants.

Cottonseed meal is low in calcium and high in phosphorus. If high levels are fed, additional calcium may be needed in the diet.

Cottonseed meal, in most circumstances, can be used to meet the entire protein

requirement of beef cattle. As with whole cottonseed, it should not be fed to cattle younger than 60 days of age due to concerns with gossypol, which are toxic pigments present in cottonseed.

Cottonseed hulls are often available as an inexpensive energy source (42% TDN), but they are low in protein (4% CP). Cottonseed hulls do not flow well through augers and some feed-handling equipment unless pelleted.

Cotton gin trash is also useful as an inexpensive energy source. It is composed of short-fiber cotton unsuitable for processing into yarn. It also includes cotton burrs, leaves, stems and soil particles. Like cottonseed hulls, it is low in protein and characteristically difficult to handle.

Both cottonseed hulls and cotton gin waste are useful as palatable and nutritious roughage sources in beef cattle diets. When their costs are favorable relative to other feed options, hulls and gin waste can replace all or part of the roughage in feedlot diets and rations fed to growing cattle. In diets intended for breeding females, cotton fiber from hulls or gin waste has been successfully used to replace up to 20% of the diet dry matter.

Gossypol toxicity

Pigments (gossypol) present in cottonseed are very toxic to young chicks, pigs, dogs and other simple-stomach animals. They are less toxic to adult chickens and swine, but because of the still-present danger of toxicity and the deficiency in several amino acids, cottonseed meal is not utilized to a great extent in poultry and swine diets.

Because of the ability of the rumen environment to

bind and inactivate gossypol, cattle are much more resistant to gossypol toxicity than are nonruminants. However, problems can become apparent if large amounts are fed for several weeks. The effects of gossypol toxicosis appear to be worse if high environmental temperatures or other stressors are present.

Gossypol content of cottonseed meal is influenced by the species of cotton plant, the temperature and rainfall during the growing season, and the method of oil extraction. Storage of cottonseed meal does not reduce gossypol content. Whole cottonseeds do not appear to be as likely to cause problems as cottonseed meal, and cottonseed hulls should not cause gossypol toxicity.

Most reported cases of gossypol toxicity in cattle have been either in calves before their rumen is functioning or in cattle fed high-concentrate rations with a high percentage of cottonseed meal.

Effect on fertility

Signs of gossypol toxicosis are poor performance and heart failure. The incidence of severe gossypol toxicity causing death is rare in cattle. However, fertility can be reduced in bulls, and probably in cows, with no signs of illness or reduced production.

In cows, the action appears to be directly on the early embryo. In bulls, gossypol damages testicular tissue, which reduces the number of sperm produced and causes a defect in the sperm mid-piece (tail) that results in poor motility.

The toxic dose for free gossypol to cause reproductive problems in bulls appears to be around 31 mg./lb. daily for several weeks (10 or more). Research has shown that feeding 4,000 international units (IU) of vitamin E daily prevented the negative effects on sperm production caused by gossypol.

Cottonseed products are commonly fed to cattle with no ill effects. Producers should consider cotton byproducts as a supplement when they can be delivered at a cost advantage to other protein and energy sources. Use of large amounts of cottonseed meal in the diets of bulls and cows leading up to and during the breeding season should be done cautiously, because of the potential (although not common) negative effects of gossypol on fertility.

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Table 1: Nutrient profile of cottonseed feeds

	TDN	NE _m , Mcal/lb.	NE _g , Mcal/lb.	CP
Cottonseed hulls	42%	0.25	0.04	4%
Cottonseed meal	77%	0.73	0.47	41%
Whole cottonseed	96%	1.10	0.77	24%
Cotton gin waste	44%	0.39	0.30	7.4%

NE_m = Net energy for maintenance
NE_g = Net energy for gain