



Crop Residue Feeds for Beef Cattle

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Why Utilize Crop Residues

Crop residues are a source of low-cost feed for beef cattle. Cattle, particularly cows, can utilize corn stover, sorghum stover, grain straw, peanut vines, peanut hulls and soybean straw as sources of energy. Cattlemen should plan to feed available crop residue roughages to lower costs. Each acre of crops can yield 1 to 1.5 tons of roughage dry matter which is potential cattle feed.

Proper use of crop residues which are basically low quality feeds requires adequate supplementation of nutrients which are lacking. Cattlemen have often failed to realize the full potential of crop residues because of inadequate supplementation and rapid deterioration in the field due to the effects of weather and mold. Application of proper management, harvesting and feeding techniques can offset these drawbacks.

Characteristics of Crop Residues

Corn stover, grain sorghum stubble, small grain straw, peanut vines and hulls and soybean straw are the main crop residues available in Virginia. They are low in protein, vitamin A and certain minerals, especially phosphorus. They are high in fiber, medium in energy, and are not well suited for feeding to young growing cattle. They can best be used for feeding mature pregnant beef cows and older herd or feedlot replacements. When used as feed for lactating beef cows, additional energy and protein from other feed sources is a must. It is a mistake to try to winter cows nursing calves on low-quality crop residues alone.

Crop residues should not be used as the basis for a complete winter feeding program. It is better to use such feeds early in the winter for feeding dry cows and save better quality feeds for use in late winter after cows have calved.

Basic Nutrient Requirements of Beef Cows

The main concern for wintering the brood cow is to provide adequate amounts of energy (TDN) and protein in amounts of dry matter the cow will normally consume. Adequate protein is critical, since dry matter intake is reduced if the protein level is too low. This results in a lack of adequate energy intake and rapid weight loss. We also need to be concerned that cows get adequate phosphorus and vitamin A. Most crop residues have essentially no vitamin A activity and are quite low in available phosphorus. Crop residues are also low in magnesium. Magnesium oxide should be provided to cows in the late stages of gestation and early lactation to offset tetany problems.

Table 1. Daily Nutrient Requirements for Mature Beef Cows

Daily:	Dry Matter	TDN	Digestible Protein	Calcium	Phosphorus	Vitamin A
	-----lbs. per day-----			-----gm-----		IU
Dry*	15 - 22	8 - 11	0.45 - 0.55	12	12	20,000
Dry**	17 - 24	10 - 13	0.55 - 0.65	13	13	23,000
Nursing	22 - 27	12 - 15	1.10 - 1.40	26	26	26,000

*Middle third of pregnancy (NOTE: Requirements for 1000 lb. cows, adjust upward for heavier weights)
**Last third of pregnancy

Feeding Value of Crop Residues

On an air dry basis (88-90% DM) crop residues have the following nutrient values.

Table 2. Nutrient Content of Crop Residues

	TDN %	Digestible Protein %	Calcium %	Phosphorus %	Vitamin A IU/lb.
Corn Stover	53	2.0	0.44	0.08	---
Sorghum Stover	51	1.6	0.36	0.10	---
Grain Straw	40	0.4	0.45	0.08	300
Peanut Hay	47	5.4	1.12	0.13	3,200
Peanut Hulls	18.8	1.6	0.25	0.06	---
Soybean Straw	34	1.5	1.43	0.05	---

Example

As shown in Table 3, if we assume that 20 lbs. of corn stover (90% dry matter) is consumed, we can assume that the typical dry beef cow is supplied with the indicated portion of the daily nutrient requirement.

Table 3. Nutrient Requirements As Met By Feeding 20 Pounds Corn Stover Daily

	TDN lbs.	Digestible Protein lbs.	Calcium gm	Phosphorus gm	Vitamin A IU
Required	9.5	0.60	13	13	20,000
20# Corn Stover	10.6	0.40	40	7.3	---
Needed from Supplement	0	0.20	0	5.7	20,000

Prolonged feeding of crop residues as the main forage should definitely include supplemental vitamin A and a mineral mixture supplying 10 grams of phosphorus per day.

Harvesting and Feeding Crop Residues

Corn Stover

Corn stover includes the stalks, leaves, husks and cob left in the field after combining and accounts for 50-55% of the weight of the corn plant. This amounts to 2-3 tons of dry matter per 100 bushels of corn grain. The energy requirement of a pregnant beef cow is met by consumption of 16-18 lbs. of corn stover dry matter per day. There is considerable waste in feeding harvested stover amounting to about 30%. Therefore, cows should be offered at least 25 lbs. per day.

A. Grazing

The easiest way to utilize corn stover is to graze stalk fields. Two acres of corn yielding 100 bushels will supply enough feed to carry a cow for 100 days. Cows will only utilize 20-30% of the available feed by grazing. Stocking rates should be adjusted to match corn yields. No supplement other than minerals and vitamins is needed for the first 30 days as cows will get sufficient protein from dropped corn grain and selective grazing of leaves and shucks. After 30 days, supplementation is essential to maintain cow weights. Ten lbs. of good hay (10% crude protein) per day, which could be fed in larger quantities 2 or 3 times per week, is one method of supplying extra nutrients. Free-choice liquid supplement, protein blocks or range cubes are other ways to supplement cows grazing corn stover. Limited access to small grain pasture or stockpiled fescue while grazing stalk fields is another way to extend the use of these feeds and provide supplemental protein.

B. Harvesting Corn Stover

1. Stalklage or Corn Stover Silage

Harvesting corn stover as silage or dry forage can increase utilization of available feed by as much as 80%. Corn stover silage should be harvested with a regular forage harvester or field chopper as soon as possible after the grain is harvested. The moisture content of corn forage is usually about double the moisture

level in the grain. Thus, high moisture grain (25-30%) harvest will permit direct ensiling of the corn forage without adding water. When grain moisture is low (15-20%), it will be necessary to add water to properly ensile the corn stover. For safe keeping without excess mold formation, the moisture level should be brought back to 60% (40% DM). Corn stover silage can be stored in any type of silo. Fine chopping and adequate packing are extremely important. Stalklage can be fed to beef cows in the same manner as regular silage. Cows maintain their weight well on stalklage when properly supplemented with required minerals, vitamins and protein. A forage test should be used to determine the level of protein required.

2. Stacks and Bales

Stackers and large round balers can be used to preserve and extend the utilization of corn stover. Combining early grazing with later feeding of stored corn stover is a good program. With either type of large packaging, farmers should consult their operators manual for suggestions on corn stover harvesting techniques.

a. Stacks

Stacking is preferred to large round bales because fewer operations are required. Stackers eliminate the need to mow and rake the stalks. Stacks are also less dense which permits packaging at a higher moisture content. Midwest reports suggest corn stover should contain not more than 35% moisture to avoid mold in the stacks. When making stacks, wait 4-5 days after harvesting the grain until the moisture content has dropped below 35%. Rainfall or cloudy weather during this period will extend the time required to reach a safe moisture level for stacking. Make well packed and shaped stacks to avoid weather damage. Stacks should be placed in dry, well drained locations and sheltered from prevailing winds, if possible. Higher quality corn residue forage can be harvested by removing the straw spreaders from combines and running the stacker along each combine swath. Stacks made in this manner are higher quality feed since they contain more leaves and shucks relative to stalks.

b. Bales

If corn stover is to be packaged in large round bales, a flail harvester or rotary mower should be used to cut the stalks. Some flail harvesters form a windrow directly but with most other equipment, raking will be necessary. Wheel rakes are more satisfactory for this purpose than conventional side delivery rakes. To prevent excessive chopping, flail and rotary cutters should be operated at low PTO speeds. Select gears that give higher ground speed while keeping the tractor engine throttled back.

Moisture content should be 30% or less to minimize spoilage in large round bales; a 7-10 day waiting period after combining is suggested. Packaging corn stover in this form is usually more difficult than stacking. The baler may require more adjusting and the operation causes more wear on machinery.

3. Feeding Corn Stover Stacks and Bales

Stacks and large bales should be fed so as to minimize feeding losses. Free choice feeding and electric fence arrangements are not usually satisfactory. Some type of feeding fence, bunk, wagon, or slatted panel is suggested to improve utilization and prevent excessive waste due to tramping and soiling of the feed. Provide supplements as suggested above for grazing corn stover.

Grain Sorghum Stubble

Grain sorghum stubble is particularly well suited for harvesting as silage. After combining, the stalks and leaves remain upright and retain moisture for several weeks. Ensiling can be done without adding moisture. Sorghum stubble can also be harvested as dry forage by mowing, drying in the field and then baling or stacking the dry forage. Grazing can also be practiced after all growth has been stopped by hard freezes, thereby eliminating the danger of prussic acid poisoning.

Small Grain Straw

Immediately following harvest, small grain straw should be raked and packaged in either conventional square bales, round bales or stacks. Storage under cover will prevent excessive weather loss until feeding time. Small grain straws are lower in TDN

and protein than corn stover. Oat straw is slightly higher in digestibility and protein than wheat, barley or rye straws. Small bales can be fed along with limited hay or silage to supply added energy. Stacks and large bales should be surrounded by some type of feeding panel to reduce waste. As a general rule of thumb, grain straws should not be depended on for more than one-half of the daily dry matter intake and adequate energy, protein, minerals and vitamin A should come from other sources.

Peanut Vines and Hulls

Peanut vines, available to cattlemen in the peanut area of southeastern Virginia, are a useful crop residue. Peanut vine hay is usually produced at the rate of one ton per ton of unhulled peanuts. Peanut vines are often baled using conventional balers and can be fed in the same manner as other hays. Peanut vines should be baled or stacked as soon as possible after harvesting the peanuts to prevent excessive loss of nutrients. Cattlemen should be aware of any pesticide restrictions that would limit the use of peanut vines as cattle feed because of prior application of pesticides during the growing season.

Peanut hulls have 60% fiber and are very low in TDN and protein. Their main usefulness is to add needed bulk and fiber to concentrate rations.

Soybean Straw

Soybean tailings collected directly from the combine are similar to corn residue in feed value. This is due to the high content of shattered beans, leaves and pods. However, soybean residue collected by a stacker or baler is very poor quality feed due to the high proportion of stems. Soybean stems are high in lignin and are low in protein and TDN. Therefore, harvesting of soybean residue other than that discharged directly from the combine should be done only if other crop residues are unavailable. Feeding soybean straw will definitely require supplemental energy, protein, minerals and vitamin A.

Supplementation of Crop Residues

Limited feeding of good quality hay or liquid supplements fed free choice are generally satisfactory. Be sure cows get adequate energy needed to utilize urea protein. Range cubes and protein blocks can also be used. Feeding hay, range cubes or blocks every other day can reduce labor. In late winter, supplemental energy in the form of grain feeding may be necessary if crop residues are the only available forage. In late stages of pregnancy, it may be necessary to feed 5-10 pounds of grain plus one pound of 40-50% protein supplement to cows being wintered on crop residues. The added energy is necessary to meet the heavy energy demand just prior to calving. Cows nursing calves will need increased energy and protein as well as adequate minerals and vitamins.

A complete supplement to feed with low quality forage should provide the following amounts of nutrients daily:

- a. 0.5 lb. crude protein
- b. Calcium and phosphorus in a 1:1 or 1:2 ratio to supply a minimum of 10 grams of phosphorus. Keep a complete mineral mix before the cattle at all times.
- c. Trace minerals which can be supplied by trace mineral salt.
- d. Vitamins, specifically at least 20,000 - 25,000 I.U. of vitamin A unless provided by one-time injection of one million units of A.

Additional Points and Suggestions

1. Avoid harvesting areas that are heavily infested with toxic weeds such as cocklebur, nightshade or jimson weed.
2. Each ton of corn stover harvested removes about 15 lbs. N, 15 lbs. K₂O and 5 lbs. P₂O₅ from the field. The cost of returning these nutrients is much less than the feed value of the stover.
3. If dropped corn is abundant, mature cows will sometimes founder when first turned in to graze stalk fields. Some prefer to turn stocker cattle into stalk fields first and follow with cows.