



# Extension FactSheet

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## Grazing Corn Residue

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Within Ohio, more than three million acres of corn are harvested each year. Most of those acres are harvested for grain with the remaining plant parts redistributed on the soil. In addition to the value of the grain, one acre of corn residue can supply enough forage to sustain a 1,000-pound cow or animal equivalent for 1.5 to 2 months.

Considering that Ohio's beef herd consists of more than 280,000 head, enough feed is going out the back of combines to feed the total cow herd in Ohio for at least 16 months. Snow, mud, and the need to plant next year's crop make that calculation unrealistic, but there is enough feed remaining on corn fields after harvest to significantly increase the grazing days for ruminant livestock.

Livestock producers do not take advantage of this vast feed resource for various reasons — the location of the animals in relation to the harvested fields, lack of fencing and water supply, concerns about compaction and residue compliance. In spite of these obstacles, grazing corn residue can be an important part of many livestock operations. The use of corn residue offers producers increased flexibility for fall and winter pasture and helps reduce the overall feed costs.

### How Much Forage Can I Expect?

Approximately 50 percent of the weight of the total corn plant is residue left after harvest. This residue consists of stalk, leaf, cob, and husk. The stalk, which is typically the last plant part consumed by livestock, contains the most moisture and is one-half of the dry matter weight of the total residue material (Table 1).

It is estimated that for each bushel of shelled corn produced per acre, 50 pounds of residue are also produced. At that level, an acre yielding 120 bushels of corn will produce 6,000 pounds of residue. An added benefit for grazers is that corn grain is also lost in the harvesting process. It is estimated that at least three bushels of grain per acre are left on the field during harvest. This means that more than 150 pounds of corn per acre are also available for the animals to consume.



Grazing corn residue can be an important part of many livestock operations. One acre of corn residue can supply enough forage to sustain a 1,000-pound cow or animal equivalent for 1.5 to 2 months.

**Table 1. Dry Matter Distribution in Corn Residue.**

Corn Residue	% Moisture	% of Residue D.M. Basis
Stalk	70-75	50
Leaf	20-25	20
Cob	50-55	20
Husk	45-50	10

Source: Myers, D. and Underwood, J. 1992.

### How Good Is the Residue?

Corn residue is not a high-quality feed (Table 2) and would not be adequate for growing animals or maintaining producing females year-round unless supplemental feed was provided. However, if grain is available in the residue, then the consumed feed quality may be adequate for some stages in the livestock production cycle (Table 3). The feed quality of corn residue is lower 60 days after harvest, indicating some weathering and

**Table 2. Crop Residue Composition (Dry Matter Basis).**

Corn Residue	
Total Digestible Nutrients (TDN) %	65.85
Crude Protein %	6.5
Neutral Detergent Fiber (NDF)	65
Calcium %	0.62
Phosphorus %	0.09

Source: NRC 1996 Nutrient Requirements of Beef Cattle.

**Table 3. Average Composition of Residue Components (Dry Matter Basis).**

	% Crude Protein	% In Vitro Dry Matter Digestibility
Grain	10.2	91
Leaf	7.0	58
Husk	2.8	68
Cob	2.8	60
Stalk	3.7	51

Source: Rasby, R. and R. Selley. 1992.

loss of nutrients. The greatest loss is from deterioration of the husk and leaves, with cobs and stalks less affected. Rain can accelerate the decomposition process. Also, snow cover will limit an animal's ability to find the smaller plant parts, further limiting the quality of feed available.

### How and When Should Livestock Graze?

Corn fields should be used immediately after harvest for 30 to 60 days to take maximum advantage of the feed value of the residue. This would allow the permanent pastures to "stockpile" additional days of fall growth that could be grazed after the animals come off the corn fields. Grazing corn fields for an extended period, even all winter, is also an option if supplemental feed is provided and the fields remain dry.

Livestock will selectively graze the most palatable portions of the residue first, starting with the grain, leaves, and husks and then the cobs and stalks. Generally, animal grazing will leave 75 to 80% of total residue in the field, especially if animals are rotated to new areas before much of the cob and stalk material is consumed. With this in mind, one acre of corn residue will yield approximately 60 animal-unit grazing days. This means that one acre of corn residue will provide 60 days of grazing for a 1,000-pound animal, or 30 days for two animals.

Limiting access by strip grazing will allow for an increased stocking rate and greater utilization of the residue. This can be accomplished by using portable electric fencing. Either a single break wire to the front, or double wires with one in front and one to follow can be used effectively, depending on the layout of the field and water sources. However, if strip-grazing practices are used, and snow cover arrives before the field is grazed through, some of the best feed may be lost if the grain and husks cannot be recovered.

The easiest fit for grazing crop residue is with non-lactating, mature beef cows or ewes that are in the middle trimester of gestation and are in desirable body condition. Animals that have grain to select will consume a diet that is probably above 7% crude protein and as high as 70% Total Digestible Nutrients (TDN). If corn is visible in the manure, supplementation with anything other than vitamins and minerals is probably not needed. However, when most of the grain has been consumed, or little grain was left in the field, protein supplementation will probably be needed. Several studies have shown that dry cows will at least maintain body weight and may gain up to 1.0 pound per head daily while grazing corn stalks that have grain, husk, and leaves to select.

For other classes of livestock — first-calf heifer; ewe lambs; fall-calving beef cows, lambs, and calves — supplementation will be needed. These classes of animals have higher nutritional needs than average corn residue can provide, and producers cannot afford to ignore those needs.

### Are There Any Health Concerns?

There can be some health concerns with grazing corn residue. Livestock should not be allowed unlimited access to corn residue if they have had limited feeds available and are going into the fields on an empty stomach. Special care should be given where high levels of grain (eight to 12 bushels per acre) remain following harvest. Where this is the case, hungry animals may consume high amounts of grain in a short period of time, resulting in digestive upsets and even founder. It is recommended that hungry animals be permitted to fill on hay or other roughage before entering these fields. Strip grazing is also recommended for limiting the animals' foraging area.

Another consideration for grazing crop residue is the herbicide program that has been used. With most popular weed control programs, there should not be a concern. The current edition of the *Weed Control Guide for Ohio Field Crops*, Bulletin 789, contains a listing of grazing restrictions for different corn herbicides. It is always best to read all herbicide labels to determine if any grazing restrictions need to be followed.

### Will Grazing Affect My Cropping Practice?

Many producers who could graze residue cite the need to maintain at least 30% ground residue cover as a restriction. This plant residue reduces soil erosion during the winter until the establishment of the new crop. However, grazing residue is still possible since animals seldom consume more than 25% of the residue. Since a 120-bushel-per-acre grain yield should also produce 6,000 pounds of residue, the removal of 1,500 pounds should allow for a sufficient amount of residue remaining to provide the required cover. This is especially true where adequate stands of taller-growing corn hybrids were grown and livestock grazing is limited to consumption of unharvested grain, leaves, and husks. These tender plant tissues generally decompose

rapidly and are not present in large quantities the following spring.

Soil compaction is also cited as a reason not to graze corn residue. Livestock can cause soil compaction, but the compaction they cause is generally shallow. Studies in Illinois, Iowa, and Nebraska indicate that soil compaction from cows grazing corn residue is limited to the top 6 inches of soil. Shallow compaction can be corrected by disc, chisel-plow, or the freeze-thaw action of the soil. The two main factors that affected the severity of compaction were soil moisture and soil type. In each of those studies, no significant difference was found in the yield of the soybeans following the residue grazing, even using no-till (Table 4).

Producers concerned about compaction could graze the residue immediately after harvest, removing the livestock after 60 days to allow the soil's freeze-thaw action to minimize surface compaction. Producers should pay attention to the soil types of the crop fields and remove livestock when the fields are muddy. Growing no-till soybeans after grazing corn residue may require more management to minimize compacted paths and water-filled hoof tracks.

Controlling livestock is another issue that concerns many crop producers. Fencing around many crop fields has been removed for various reasons. Portable electric fencing that can be removed before field work begins is an attractive option. The use of single-strand electric fencing may be the least expensive method for controlling livestock; however, location should be taken into consideration when determining the type of fencing to be used. Liability is always a concern with pastured livestock. OSU Extension's Legal Educator Peggy Kirk Hall writes, "A livestock owner who did not fence in his livestock and keep the animals from running at large was liable for resulting property damage." In other words, fences that border roadways or other landowners should be permanent in nature and constructed to meet the requirements of Ohio's line-fence laws. See *Ohio Fence Line Law*, Ag Law Fact Sheet ALS-1001-00, for more details. Interior fencing systems that utilize single-strand portable electrified fences may be suitable and can work well if the livestock are trained to respect it.

**Table 4. Comparison of No-till Soybean Yields Following Grazing of Corn Residue.**

<b>Trial Location</b>	<b>Yield (bu/ac) in Grazed Plots</b>	<b>Yield (bu/ac) in Ungrazed Plots</b>
Nebraska	58.4	56.9
Iowa - Atlantic	55.65	56.11
Iowa - Chariton	35.04	35.35

Adapted from: Clark, J., *et al.* 2000, and Erickson, G., *et al.* 2000.

## What Is the Value of Corn Residue?

The real economic advantage of using corn residue in a livestock operation is that the cost of producing the feed is paid for by the grain operation. In contrast, when using an annual forage crop for grazing, the cost of establishing and growing the feed needs to be paid for by the livestock operation.

Like all grazing programs, determining the true value must be done on a case-by-case basis. One method, and probably the simplest way to place a value on grazed corn residue, is to determine a daily feed cost based on similar quality or average grass hay. Here's how:

A mature cow will consume from 2.5 to 3.0% of her bodyweight in dry matter each day. If that cow weighs 1,000 pounds, she would eat between 25 to 30 pounds of dry matter per day. At that rate, one ton of hay would provide feed for about 60 days, if you include 10% loss in spoilage and waste. Assuming the market value of the hay is \$65 per ton, then the immediate savings would be \$65 spread over 60 days or about \$1.08 per head per day. Even after applying a lease charge of \$7 per acre for the corn residue (lease rates range from \$3 to \$7 per acre), the resulting \$0.12 per day charge provides a \$0.96 savings per head per day.

An added bonus to the feed value is the contribution of nutrients to the soil. A 1,000-pound cow produces about 63 pounds of manure each day. It is estimated that the value of those recycled nutrients amounts to about \$0.10 per head per day or \$6 over the 60-day grazing period.

Obviously, purchased fertilizer inputs can be reduced by grazing corn residue.

## Summary

The cost effectiveness and flexibility of grazing corn residue make the practice an important feed source for livestock in the fall and winter. The abundance of corn residue in Ohio makes this an attractive option. The compatibility with permanent pastures will provide more grazing options and decrease winter feed cost.

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