



Ridin' Herd

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Corn residue removal by grazing

Corn residue is an excellent forage resource that can be economically included in a cow-calf system as a component that can be grazed. The amount of corn residue in the Midwest increased with the increased corn production over the years. Opportunities exist to remove the corn residue from the field for grazing with beef cattle.

Consideration

There continues to be questions as to whether residue removal affects corn grain yields in subsequent years. Removing the residue from the soil means that some nutrients associated with residues are lost. Because yields are the most important profit indicator for a grain producer, it becomes necessary to evaluate the possible change in grain yield with residue removed by grazing.

While increasing corn production acres is related to the decline in traditional forage acres, residue from corn production represents a forage resource becoming more abundant.

Cattle are selective grazers when

grazing a corn-residue field. They consume the corn first, followed by the husk and leaf and finally the cob and stalk. Nebraska grazing recommendations target cattle consuming husk and leaf as there is usually very little ear drop. There are 16 pounds (lb.) of husk and leaf per bushel (bu.) of corn, and the target is to remove half the husk and leaf by grazing.

Effect of grain yield

The University of Nebraska has research on the effect of corn-residue removal by grazing on subsequent grain yield. The research locations are near Mead in eastern Nebraska and Brule in western Nebraska. There was no interaction between tillage and spring grazing observed for either soybean or corn yield over a nine-year period (1997-2006), suggesting that spring grazing had the same effect regardless of whether no till, ridge till or spring till was used.

Across all tillage treatments, spring grazing of corn residue increased soybean

yields (58.5 bu. vs. 57.0 bu. per acre for spring grazed and ungrazed, respectively) and had no effect on corn yields (210 bu. vs. 210 bu. per acre for spring grazed and ungrazed, respectively). Similarly, during the 16-year period (1997-2013), spring grazing of strips managed under no till increased soybean yields and had no effect on corn yields.

During a 10-year period (2003-2013), fall grazing improved soybean yields over both spring grazing and no grazing, whereas spring grazing tended to increase soybean yields when compared to no grazing. No effects of grazing in either season were observed on corn yields.

Removal of residue did not affect corn grain yields during the five-year period (2009-2013) in continuous corn rotation. However, it is interesting to note corn grain yields in grazing treatments were numerically increased by 4-7 bu. per acre compared to ungrazed treatment. In summary, in long-term studies (16 years) at Mead, Neb., grazing corn residue in fall or spring resulted in an improvement in subsequent-year soybean yields and

had no effect on corn yields when an annual corn-soybean rotation was used. In a study (five years) at Brule, Neb., continuous corn rotation or fall grazing of corn residue had no effect on corn yields.

Trampling

Many crop producers have concerns that cattle trampling will adversely affect soil physical properties and subsequent crop productivity. Soil physical properties influence the ability of a plant to acquire water, nutrients and oxygen. Although some studies have shown that cattle grazing cropland in winter/early spring can compact soils, effects of grazing are usually short-lived due to amelioration through natural processes such as wetting/drying or freezing/thawing cycles and biological action of roots or soil biota that create pores and break down compacted layers.

In current studies, grazing did not cause negative impacts on crop yield, suggesting any compaction caused by cattle did not negatively impact crop growth, even when fields were managed

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under no till. With high corn yield, excessive amount of residue can be produced and can have negative impacts on the subsequent crop by impeding seed placement and insulating soil such that it remains excessively cold and wet in the spring, causing poor germination and slow emergence. Grazing of corn residue can be used to manage residue levels without tillage and its resulting loss of soil structure and soil organic matter (resulting from oxidation by soil bacteria when exposed to air).

Residue removal and corn yield

Because there are many different soil types and farming practices in Nebraska and data generated from university studies is from two locations, a Sustainable Agriculture Research and Education (SARE) grant was secured to collect data at cooperator sites across Nebraska. At each location, there were three treatments: grazed, baled and control (no grazing or baling). Data for collection at continuous corn sites included hand harvest yields of corn grain and stover. Hand harvest was done once corn reached black layer stage of maturity. The corn-grazed areas were fenced off, and cows were stocked based on corn yield and targeted to remove 50% husk and leaf components of the corn residue. The stocking rate was determined using the University of Nebraska's cornstalk grazing calculator.

Despite the differences in management and weather at each location, treatments did not differ in their effects. The weather patterns and topographic and soil characteristics among locations across eastern Nebraska made each location unique. No differences were observed among treatments for corn grain yield. The percentage ground cover by corn residue was measured in the spring following the first year. There was a difference between treatments with grazed having 77.5% cover, baled having 45.8% cover and control having 88.7% cover. These data suggest there is no evidence grazing or leaving residue alone will change the grain yield.

Across location in the present study, grain yields ranged from 152 bu. to 286 bu. per acre. In addition, there was no difference in stover yield among treatments. Stover yields ranged from 5,236 lb. to 10,656 lb. dry matter per acre across locations. Corn stover amounts were similar across treatments. There was no difference in harvest index among treatments (62.3%, 61.3% and 61.0% ± 0.62% for baled, grazed and control, respectively).

The harvest index is a measure of the percentage of grain produced in a corn plant. The proportion is roughly two-thirds of the plant aboveground biomass produced. Harvest index ranged from 55.1% to 69.0% across locations.

Final thoughts

These data suggest that the grazing of corn residue at UNL-recommended

stocking rates in the fall or in the spring will have no negative impact on subsequent soybean or corn yields. Grain producers are concerned about soil compaction. Studies have measured compaction in corn residue fields after grazing and there is no compaction. That is not to say that compaction cannot occur around watering sites in a residue field or around a bale feeder if hay is fed.

Are there some corn residue fields that should not be grazed? Absolutely — in situations of low grain yield and in fields where the landscape is highly erodible combined with low grain yields.



Editor's Note: Rick Rasby is a beef specialist with the University of Nebraska.