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January 1997

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D. J. Jordon

University of Nebraska-Lincoln

Terry J. Klopfenstein

University of Nebraska-Lincoln, tklopfenstein1@unl.edu

Mark Klemesrud

University of Nebraska-Lincoln

Drew Shain

University of Nebraska-Lincoln

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Jordon, D. J.; Klopfenstein, Terry J.; Klemesrud, Mark; and Shain, Drew, "Comparative Grazing of Corn and Soybean Residue" (1997). *Nebraska Beef Cattle Reports*. 437.

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Comparative Grazing of Corn and Soybean Residue

D. J. Jordon
Terry Klopfenstein
Mark Klemesrud
Drew Shain¹

Cattle gain faster on cornstalks than on a combination of soybean stubble and cornstalks.

Summary

*A grazing trial was conducted in the fall and winter of 1995-1996 to determine the feeding value of soybean stubble relative to corn residue. Cattle on the corn residue gained faster ($P < .05$) than calves on corn residue plus soybean stubble. Residual corn and soybean estimates between treatments were not different. Characterization of irrigated and dryland soybean plant components showed no difference in *in vitro* organic matter disappearance; however, crude protein values in the irrigated components were higher.*

Introduction

Many producers use corn residue as a source of low cost winter feed for calves. Many times cattle are also allowed access to bean stubble adjacent to the corn field and animals often spend a considerable amount of time foraging in soybean residue. It is not known what nutritive value animals gain from this highly lignified bean stubble. While the nutritive value of soybeans as a standing crop is relatively high, onset of maturity drastically increases cell wall constituents and lignin. At harvest, soybean stubble contains predominantly stem and pod material and is a highly lignified forage product. A few studies have been conducted to

evaluate soybean straw as a feed source; however, no studies have been done which allow cattle to graze stubble. Therefore, the objective of this research sought to evaluate the feeding value of grazing soybean residue relative to corn residue as determined by animal gains.

Procedure

Fifty-three weaned crossbred steer calves were assigned randomly to one of four fields. Two 11-acre fields of only corn residue contained 13 head each. One field had six acres of corn residue and 12.5 acres of soybean stubble and contained 13 head. The remaining field had six acres of corn residue and 15 acres of soybean stubble and contained 14 head. All corn fields, as well as one of the bean fields, were irrigated; however, due to irrigation constraints, one of the bean fields was dryland. Soybean fields were equally stocked based on lb of available pod DM per acre. An assumption was made that the only available DM in the soybean stubble available to calves would be the pods. Beans would have been harvested, leaves would most likely have decayed, and stems would not be selected by the animal. Stocking rates for corn fields were determined based on previous irrigated corn residue grazing studies conducted at the University of Nebraska. These stocking rates were based on lb of available husk and leaf DM material. The two fields consisting of only corn residue were stocked at 1.2 animals per acre. The two fields consisting of corn residue and soybean stubble were stocked at 1.2 animals per acre to account for corn, and at 0.5 animal per acre to account for soybean stubble.

Whole bean plant samples were collected before harvest in four random 15

x 2.5 ft strips. Plants were then separated into leaf, stem, and pod components to determine crude protein (CP) content and *in vitro* organic matter disappearance (IVOMD). Crude protein was determined using a nitrogen analyzer. *In vitro* organic matter disappearance was determined using the Tilley-Terry method. Samples were digested for 48 hours *in vitro*, followed by a 24-hour pepsin digestion. Samples were then ashed to determine IVOMD. After harvest, but before cattle were placed in the fields, samples of residual grain were taken in one random 250 x 2.5 ft strip in each corn field. Whole and partial ears were collected to determine bu of residual corn per head. Four random 50 ft strips were sampled in each bean field to remove any beans and pods left on the stems which were missed by the combine head. Beans were removed from pods to determine bushels of residual beans per head. Calves were supplemented with a 36% CP supplement at 1.5 lb/hd/day (as-is). Cattle were turned out on December 5, 1995 and removed on February 1, 1996 due to a heavy snowfall.

Results

Cattle grazing soy/corn residue gained less ($P < .05$) than cattle grazing only corn residue (Table 1). Observa-

Table 1. Cattle performance and residual grain.

	Corn	Soy/corn
Initial weight, lb	492	498
Final weight, lb	569	564
ADG, lb ^a	1.17	1.00
Residual corn, bu/head ^b	3.54	2.07
Residual beans, bu/head ^b	—	1.13
Residual grain, bu/head ^b	3.54	3.20

^aCorn > soy/corn ($P < .05$).

^bIncludes 15% moisture.

Table 2. IVOMD^a and CP^a content of irrigated and dryland bean components.

	Crude Protein, %DM		IVOMD ^a	
	IR ^a	DL ^a	IR ^a	DL ^a
Pods	7.13	5.73	64.8	63.5
Stems	6.03	5.67	38.7	41.5
Leaves	12.75	11.94	38.7	39.6

^aIVOMD = in vitro organic matter disappearance; CP = crude protein; IR = irrigated; DL = dryland.

tions throughout the trial showed that initially, calves spent considerable time in bean fields eating residual beans off of stems. As time progressed, cattle began to spend more time in corn fields. Even though calves were allowed an adaptation period before the beginning of the trial to acclimate themselves to grazing cornstalks, it is likely that the beans were more readily available initially, therefore calves removed the soybeans first. Residual corn values (Table 1) showed calves grazing only corn had slightly more corn per head compared to cattle on the soy/corn; however, due to sampling variation there was no statistical difference. Corn fields in both treatments should have been relatively equal in terms of downed corn. Cornfields for both treatments were actually one large field divided by an electric fence. Residual bean values showed that calves on the soy/corn treatment had access to soybeans to make the overall residual grain values closer; however, the soybeans did not entirely make up the difference.

Table 2 shows the characterization of soybean material from irrigated and dryland fields. Components from the irrigated fields were consistently higher in CP than dryland components. Higher CP values typically correspond to higher intakes depending on diet; however, because calves also had access to corn residue, it is doubtful there were any intake differences between bean fields. Excluding pods, IVOMD for dryland soybean plant components were greater

than those of the irrigated. Irrigated stems and leaves may have been less digestible because of irrigation, thereby lowering IVOMD values. Legumes are known to deposit more structural carbohydrates during periods of adequate water in contrast to periods of moisture stress. The summer preceding the trial was relatively dry, causing a water deficit in the dryland beans compared to irrigated beans. *In vitro* organic matter disappearance for the leaves was lower than values for other components. This finding was surprising; however, it may have been due to weathering that occurred after the leaves had dropped from the plant.

The assumption made about the bean fields was that calves would only consume pod material. Even though pod CP values were low, IVOMD values for both dryland and irrigated beans support the idea that cattle would benefit from this highly digestible material.

Comparison of IVOMD values for both corn plant components and soybean plant components show them to be similar. Corn husks are much like pods with an IVOMD of roughly 70 percent. Corn leaves compare to bean stems and leaves with an IVOMD of approximately 42 percent. While values are similar, the corn residue would supply more lb of available DM per acre.

¹D. J. Jordon, graduate student; Terry Klopfenstein, Professor; Mark Klemesrud and Drew Shain, research technicians, Animal Science, Lincoln.

Grazing Corn Residues in Conventional and Ridge-Till Planting Systems

D. J. Jordon
Terry Klopfenstein
Mark Klemesrud
Gary Lesoing¹

Cattle perform similarly on either tillage practice; however, yearly circumstances may affect overall performance. Calves grazing winter stalks will not adversely affect corn yields.

Summary

A grazing trial was conducted in the fall and winter of 1995-1996 to compare how conventional and ridge-till systems would affect animal performance. Calves on each treatment performed similarly showing no differences in gains. These results closely follow three previous years of data that show cattle can be expected to gain equally on each tillage practice. A year x treatment interaction ($P < .05$) was detected when data from all four years

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