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Effect of Feeding DAS-59122-7 Corn Grain and Non-transgenic Corn Grain to Finishing Feedlot Steers

Taia J. Huls
University of Nebraska-Lincoln

Galen E. Erickson
University of Nebraska-Lincoln, gerickson4@unl.edu

Terry J. Klopfenstein
University of Nebraska-Lincoln, tklopfenstein1@unl.edu

Matt K. Luebbe
University of Nebraska - Lincoln, mluebbe2@unl.edu

Kyle J. Vander Pol
University of Nebraska-Lincoln

See next page for additional authors

Authors

Taia J. Huls, Galen E. Erickson, Terry J. Klopfenstein, Matt K. Luebbe, Kyle J. Vander Pol, David W. Rice, Brenda Smith, Mark Hinds, Fred Owens, and Matthias Leibergesell

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David W. Rice
Brenda Smith
Mark Hinds
Fred Owens
Matthias Liebergesell[1]

Summary

Sixty crossbred steers were individually fed either corn genetically modified for corn rootworm protection (Das-59122-7), a conventional non-transgenic corn hybrid, or a near isoline control for 109 days to evaluate nutritional equivalency. The corn was coarsely rolled (geometric mean diameter = 4,200 microns) and treatments offered in the finishing diet at 82% of diet (DM basis). Dry matter intakes, ADG, and F:G were similar among all three corn hybrids. Carcass characteristics showed no significant differences among treatments. The genetically modified corn DAS-59122-7 was nutritionally equivalent to a conventional corn hybrid and a near isoline control when fed to finishing steers. Feeding this genetically modified hybrid did not impact steer performance or carcass quality.

Introduction

Western corn rootworms (CRW) are responsible for more annual crop damage in the United States than all other insects (Metcalf 1986). Although pesticide treatment and crop rotation strategies have historically been used to control the impact of CRW on crop yield, the potential economic and biological benefits of CRW resistant corn grain are substantial (Oehme and Pickrell, 2003; *Biomedical and Environmental Science*).

Fed at a high percentage of many finishing diets, corn provides a large portion of the dietary energy, and genetically modified corn grain and silage are fed widely for livestock consumption. The purpose of this study was to compare corn grain from DAS-59122-7 (*Herculex® RW) with grain from a non-transgenic corn, and a near isoline corn grain. Effects of diets containing these three grains on performance and carcass characteristics were compared to assess the difference in feeding value among these grains.

Procedure

Sixty crossbred steers (BW= 873 $\pm$ 33 lb) were individually fed using Calan gates for 109 days. Dietary treatments consisted of a non-transgenic, near isoline control (CONTROL), a reference, non-transgenic Pioneer Hybrid 35P12 corn hybrid (REFERENCE), and corn grain from DAS-59122-7 (Herculex® RW; Bt-CORN). The dietary ingredients consisted of 82% of the treatment corn, 8.5% alfalfa hay, 5% molasses, and 4.5% supplement. Rumensin® and Tylan® (Elanco Animal Health, Greenfield, Ind.) were fed at rates of 300 and 90 mg/steer daily, respectively. Cattle were fed once daily at 0700 hours and feed refusals were recorded and collected weekly. Samples were dried in a forced air oven at 60°C for 48 hours to calculate accurate DMI and feed efficiencies. Prior to trial initiation, steers were trained to the Calan gate system and adapted to the facilities for a 28-day period. Steers were also grown by limit feeding at 18 lb a diet consisting of 65% dry rolled, non-transgenic corn, 20% alfalfa haylage, 11% grass hay, and 4% supplement. Steers were individually weighed on two consecutive days (day 0 and day 1) to determine initial BW. The BW collected on day 0 was stratified and steer blocked into a light (15 steers), middle (27 steers) and heavy (18 steers) weight block. Within each weight block, steers were assigned randomly to dietary treatment (20 steers per treatment). One CONTROL steer was removed from the experiment due to shoulder problems. On trial initiation (day 1) cattle were implanted with Synovex-Choice® . After being fed for 109 days, steers were harvested at Greater Omaha Pack, Omaha, Neb. where hot carcass weights and liver scores were recorded. Following a 48-hourr chill, kidney-pelvic-heart-fat (KPH), fat depth, LM area, and USDA marbling score were collected. A calculated USDA Yield Grade was derived from hot carcass weight, fat depth, KPH, and LM area. Carcass adjusted performance was calculated assuming a dressing percentage of 63%, which was used to final BW from carcass weights.

Data were analyzed using mixed procedure of SAS for performance and carcass characteristics. Animal was the experimental unit and individual data were analyzed as a randomized complete block design. Differences due to treatment were considered significant when the F-test statistic had a probability level of less than 5% ($P < 0.05$).

Results

Initial BW was not different for steers fed different corn hybrids, as designed. Steers in this experiment were backgrounded and weighed approximately 871 lb. Daily gain was not impacted ($P = 0.32$) by corn hybrid. Numerically, steers fed 35P12 and Bt-CORN had 5% greater DMI, 7% greater ADG, and 2% greater final BW than steers fed CONTROL, but these differences were not statistically significant. As a result, F:G was not

Table 1. Performance and carcass characteristics of steers fed non-transgenic reference (Pioneer 35P12; REFERENCE) corn grain, a near isoline, non-transgenic control hybrid (CONTROL), or Herculex® RW (DAS-59122-7; Bt-CORN).

Item	CONTROL	REFERENCE	Bt-CORN	SEM	P-value
Performance					
Initial BW, lb	871	870	873	3	0.817
Final BW, lb[a]	1220	1250	1240	15	0.365
DMI, lb/day	21.0	21.8	22.3	0.5	0.213
ADG, lb	3.20	3.49	3.37	0.14	0.319
F:G[a]	6.54	6.21	6.62	0.451	
Carcass characteristics					
Carcass weight, lb	769	788	781	10	0.365
Marbling score[b]	463	508	475	18	0.210
LM area, $inch^2$	12.01	12.42	12.53	0.23	0.266
Fat depth, inch	0.41	0.38	0.37	0.02	0.556
% KPH	1.94	1.94	1.87	0.04	0.345
Calculated YG[c]	2.99	2.85	2.77	0.12	0.425

[a]Final BW calculated from HCW/0.63.
[b]400 = Slight^{o}, 450 = Slight^{50}, 500 = Small^{o}
[bc]YG = 2.5 + (2.5* Fat Depth) + (0.2 * 2% KPH) + (0.0038 * HCW) – (0.32 * LM area) from *Meat Evaluation Handbook*, 2001.

influenced by corn hybrid. Carcass characteristics also were not influenced by corn hybrid. The different corn hybrids fed in this study did not impact fat depth and marbling score suggesting cattle were finished to similar endpoints.

Although the genetically modified hybrid was not compared with other GMO hybrids in this study, previous experiments evaluating GMO hybrids have not detected differences in steer performance. In one other experiment with a different GMO hybrid with corn rootworm protection (event MON 863), performance was not different between that GMO hybrid and either conventional or parental hybrids (Vander Pol et al., 2005; *Journal of Animal Science*).

Our results indicate that Herculex® RW corn grain (DAS-59122-7) is nutritionally equivalent to a non-transgenic, near isoline and conventional corn hybrid. These data suggest that steer performance and carcass composition will be similar for steers fed Herculex® RW corn grain compared to non-transgenic hybrids.

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[1]Taia J. Huls, graduate student; Galen E. Erickson, associate professor; Terry J. Klopfenstein, professor; Matt K. Luebbe, research technician; Kyle J. Vander Pol, former research technician, Animal Science, Lincoln. David W. Rice, research scientist; Brenda Smith[1], research associate; Mark Hinds[1], biometrician; Fred Owens[1], senior research scientist; and Matthias Leibergesell[1], Pioneer Hi-Bred International Inc., Johnston, Iowa.

*Herculex Rootworm Insect Protection by Dow AgroSciences and Pioneer Hi-Bred. Herculex is a trademark of Dow AgroSciences LLC.