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Performance and Carcass Traits of Market Beef Cattle Supplemented Self-Fed Byproducts on Pasture: A Progress Report

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Abstract
Due to rising costs of conventional feedstuffs, more focus has been put on feeding byproducts from ethanol production or further processing of grains. The effects of using these feedstuffs on live animal performance, carcass traits and the economic benefits are still under investigation. The objective of this study was to investigate the effects of feeding combinations of self-fed byproducts and corn grain to yearling cattle on grazing pasture on their growth and carcass traits.

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Introduction

Due to rising costs of conventional feedstuffs, more focus has been put on feeding byproducts from ethanol production or further processing of grains. The effects of using these feedstuffs on live animal performance, carcass traits and the economic benefits are still under investigation. The objective of this study was to investigate the effects of feeding combinations of self-fed byproducts and corn grain to yearling cattle on grazing pasture on their growth and carcass traits.

Materials and Methods

Cattle in 2007 were initially commingled, weighed, and sorted at the ISU Allee Research Farm near Newell, IA. In 2008, cattle were processed at the ISU Armstrong Farm near Lewis, IA. Half of the steers received an implant of Synovex®-S (200 mg progesterone/20 mg estradiol). After allotment to treatment groups, cattle were shipped to the Neely-Kinyon Research Farm at Greenfield, IA (Table 1). Upon arrival, cattle were put in a pasture that was predominantly tall fescue. Cattle were continuously grazed throughout the entire finishing period in 18-acre pastures within their diet treatment. Cattle were offered either a soyhulls-dried distillers grains with solubles (DDGS) diet (Diet 1) or a ground corn-dried distillers grains with solubles diet (Diet 2) as a meal in self feeders. The diets were mixed at 48% soyhulls or corn, 48% DDGS, and 4% mineral balancer that included Rumensin®.

Cattle were weighed approximately every six weeks throughout the finishing period. Body condition (BCS) and disposition scores were recorded at the initial sort, the second weighing, and the final weighing. Final live measurements (average daily gain, feed:gain) were recorded on the day that the cattle were shipped. Cattle were harvested at Tyson in Denison, IA when all had reached a BCS of 6.5 or greater. Twenty-four hours post-harvest carcass measurements (hot carcass weight, ribeye area, 12th rib fat thickness, kidney, pelvic and heart fat, marbling score) were recorded.

Results were analyzed using PROC GLM of SAS (SAS Inst. Inc., Cary, NC). Main effects of implant, diet, and year were analyzed and all interactions were investigated.

Results and Discussion

Diet. No major differences concerning performance or carcass traits were found among groups offered the two different diets (Table 2). Over the two years, cattle on Diet 1 consumed slightly more supplement (24.55 lb/d vs. 24.05 lb/d) (Table 4). Using Beef Ration and Nutrition Decision Software (BRaNDS), dry matter intake of grazed forage was 4–6 lb/day. Additionally, no digestive problems were observed with either diet. The cattle fed the soyhull-based diet required 10% more feed per unit of gain than the corn-based diet in 2007, but there was no difference in 2008. For the two years combined, 5% more of the soyhulls diet was needed per unit of gain (Table 4).

Implant. As expected, implanted cattle had greater ADG throughout the trial (P < 0.01) (Table 2). Greater gains translated into heavier final weights (P < 0.01) and heavier hot carcass weights (HCW) (P < 0.01) and larger ribeyes (P = 0.03). Despite these differences, calculated yield grades were not statistically different as fat cover and kidney, pelvic and heart fat (KPH) were not different. Although marbling scores were numerically larger for non-implanted cattle (1010 vs. 999), there was no statistically significant difference between implanted and non-implanted cattle. However, there was a difference in percentage of cattle that graded low choice or better (55% vs. 40%, P < 0.05) (Table 2). This effect on quality grade was due to the marbling scores being close to the borderline between low choice and high select.

Year. Cattle fed in 2007 gained faster (3.43 lb/d vs. 3.26 lb/d, P = 0.01), yet were lighter coming off test (1291 lb vs. 1310 lb, P = 0.12) (Table 2). The difference in performance and off-test weights was attributed to the 2007 cattle being lighter (828 lb vs. 952 lb, P < 0.01) when starting the trial.

Cattle in 2007 were fatter at the 12th rib (0.60 in. vs. 0.47 in., P < 0.01), had smaller ribeyes (12.2 in.^{2} vs. 13.6 in.^{2}, P < 0.01), and markedly poorer calculated yield grades (3.6 vs. 2.9, P < 0.01) (Table 2). This translated into a greater percentage of cattle with yield grade 4s in 2007 (17.0% vs. 1.3%, P = 0.01) than in 2008 (Table 2).

However, cattle in 2007 had higher marbling scores (1023 vs. 985, P < 0.01) and a greater percentage of cattle graded low choice or better (63% vs. 33%, P < 0.01) (Table 2). Though the difference in marbling score was not great, as was the case for implanted and non-implanted cattle, the fact that marbling scores were close to the borderline between high select and low choice led to the difference in this benchmark.

Differences in the performance and carcass traits from year to year can be attributed to a number of factors in addition to the major difference in initial weights. First, the genetic make up of the cattle differed. In 2008, the cattle had more continental breed influence, which led to larger framed cattle that were leaner and heavier at harvest. Secondly, cattle were harvested in mid-September in 2007 and late August in 2008. The hot weather experienced just prior to harvest in 2008 could have negatively affected marbling scores (Table 3). Cattle were on feed for 135 days and 111 days in 2007 and 2008, respectively (Table 1).

Costs. Feed cost/ton was $148 and $202 for Diet 1 in 2007 and 2008, respectively. For Diet 2, cost/ton was $160 and $234 in 2007 and 2008, respectively. A more thorough discussion concerning the economics of this type of feeding system can be found in another report entitled, *Economic Comparison of Finishing Steers on Grass with Self-Fed By-Products to Finishing Cattle in a Conventional Feedlot* (Busby et al., 2009).

Using a diet that is 48% corn did not improve performance or quality grade. The diet using soybean hulls as its energy source produced the same results as the corn. This implies that a finishing system using an energy source that is minimal in starch can provide the same favorable results in regard to performance and quality grades.

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Table 1. Allotment of cattle by treatment.

	2007	2008
Soyhulls-DDGS Diet		
Non-implanted, n	20	20
Implanted, n	21	20
Corn-DDGS diet		
Non-implanted, n	20	20
Implanted, n	21	20
Feeding period, d	135	111

Table 2. Performance and carcass traits of grazing steers self-fed byproducts.

	Year		Diet		Implant	
	2007	2008	Soyhulls/DDGS	Corn/DDGS	No	Yes
On test wt, lb	828[a]	952[b]	890	890	889	891
Harvest wt, lb	1291	1310	1296	1306	1278[a]	1324[b]
Overall ADG, lb/d	3.43[e]	3.26[f]	3.30	3.38	3.17[a]	3.52[b]
HCW, lbs	810	817	809	818	800[a]	827[b]
Dressing %	62.7	62.4	62.5	62.6	62.6	62.5
REA, in^2	12.2[a]	13.6[b]	12.9	12.9	12.7[c]	13.1[d]
12^{th} rib fat, in	0.60[a]	0.47[b]	0.54	0.53	0.55	0.53
KPH fat, %	2.3[e]	2.1[f]	2.2	2.2	2.2	2.2
Calculated YG	3.6[a]	2.9[b]	3.2	3.3	3.3	3.2
Marbling score[1]	1023[a]	985[b]	1002	1007	1010	999
Low choice, %	63[a]	33[b]	47	48	55[c]	40[d]

Values with different superscript are statistically different.

[ab] $P < 0.01$.

[cd] $P < 0.05$.

[ef] $P < 0.10$.

[1] Marbling scores: 900 = select, 1000 = small.

Table 3. Interaction of implant and year on quality grade.

	2007 Non-implanted	2007 Implanted	2008 Non-implanted	2008 Implanted	P-value
Marbling score[1]	1031.0	1015.9	988.0	981.8	0.64
Low choice, %	77.5	47.6	32.5	32.5	0.05

[1] Marbling scores: 900 = select, 1000 = small.

Table 4. Feed intake and efficiency of grazing steers self-fed byproducts.[1]

Daily feed intake, lb/d	Soyhulls/DDGS	Corn/DDGS	Year means
2007	24.44	23.16	23.78
2008	24.75	24.88	24.82
Overall ADFI, lb/d	24.55	24.05	
Feed:Gain, lb/lb			
2007	7.28	6.59	6.94
2008	7.61	7.63	7.62
Overall F:G, lb/lb	7.45	7.11	

[1] F:G does not include grazed forage dry matter intake.