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

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Summary and Implications

Over a two year period (2007 and 2008), 162 head of beef steers were finished with self-fed byproducts on cool season grass pastures. Yearling steers were continuously grazed at the Neely-Kinyon Farm in southwest Iowa on cool season grasses that were predominantly fescue at a stocking density of 2.25 head/acre. Half of the cattle were implanted (with Synovex®-S) or and half were not. Cattle received a diet of either soyhulls-dried distillers grain with solubles or corn-dried distillers grains with solubles (DDGS) that was offered as a meal through self-feeders. The rations were mixed in at 1:1 with a mineral balancer that included Rumensin®.

Live cattle performance and carcass traits were not affected by diet. Implanted cattle outgained non-implanted over the entire finishing period (3.52 lbs/d vs. 3.17 lbs/d). This led to implanted cattle coming off test heavier (1324 lbs vs. 1277 lbs) and railing with heavier carcasses (826 lbs vs. 800 lbs). Ribeye areas were greater (13.1 in^2 vs. 12.7 in^2) for implanted cattle; which was probably due to the heavier carcass weights. Non-implanted cattle had superior quality grades (55% vs. 40%) of low choice or better.

Year differences in quality grade (1023 vs. 985 in 2007 and 2008, respectively) were observed. This difference was attributed to factors that include genetic makeup of cattle, initial weights of cattle, time of year when cattle were harvested and grading technology.

In conclusion, pasture rearing cattle, when given access to self-fed by-products, provides for excellent performance on both live performance and carcass traits. Some considerations should be made by the feeder in regards to time of year when marketing cattle and the cattle's genetics. This system is an alternative to high-grain conventional beef finishing production in feedlots.

Introduction

Due to rising costs of conventional feedstuffs, more focus has been put on feeding byproducts, albeit 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 finishing yearling type cattle on pasture utilizing combinations of self fed byproducts and corn grain on 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. One-half of the steers received an implant of Synovex®-S (200mg progesterone/20mg estradiol). After allotment to treatment groups in both years, cattle were shipped to the Neely-Kinyon Research Farm in Greenfield, IA. Upon arrival, cattle were turned out onto 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 (referred to as Diet 1) or ground corn-dried distillers grains with solubles (referred to as Diet 2) diet as a meal in self feeders. The diets were mixed at 48% byproduct; 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 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, 12^{th} 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 significant differences concerning performance or carcass traits were found among groups offered the two different diets. Over the two years, cattle on diet 1 consumed more supplement (24.55 lbs/d vs. 24.05 lbs/d). Using Beef Ration and Nutrition Decision Software (BRaNDS), dry matter intake of grazed forage was 4-6 lbs/day. Additionally, no digestive problems were observed with either diet.

Implant. As expected, implanted cattle had greater ADG throughout the trial ($p<0.0001$). Greater gains translated into heavier final weights ($p=0.0001$) and hot carcass weights (HCW) ($p=0.0009$) and measured with larger ribeyes ($p=0.03$). Despite these differences, calculated yield grades were not significantly 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 significant difference between implanted and non-implanted cattle. However, there was significant difference in percent of cattle that graded low choice or better (55% vs. 40%, $p=0.05$). This effect on quality grade was due to the marbling scores being so close to the break line of low choice and high select.

Year. Cattle fed in 2007 gained significantly faster (3.43 lbs/d vs. 3.26 lbs/d, $p=0.01$), yet were lighter coming off test (1291 lbs vs. 1310 lbs, $p= 0.12$). The difference in performance and off-test weights was attributed to the 2007 cattle being significantly lighter (828 lbs vs. 952 lbs, $p <0.0001$) when starting the trial.

Cattle in 2007 were fatter at the 12th rib (0.60 in vs. 0.47 in, $p<0.0001$), had smaller ribeyes (12.2 in^2 vs. 13.6 in^2, $p<0.0001$) and markedly poorer calculated yield grades (3.6 vs. 2.9, $p<0.001$) as a result. This translated to greater percentage of cattle with yield grade 4's in 2007 (17.0% vs. 1.3%, $p=0.003$) than in 2008.

However, cattle in 2007 had higher marbling scores (1023 vs. 985, $p<0.0001$) and a greater percentage of cattle graded low choice or better (63% vs. 33%, $p<0.0001$). Though the spread 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 break line for high select and low choice led to the significant difference in this benchmark.

Significance in the performance and carcass traits from year to year can be attributed to a number of factors besides the major difference in initial weights.

First, the genetic make up of the cattle were different. In 2008, 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 2008 could have negatively impacted marbling scores. Cattle were on feed for135 days and 111days in 2007 and 2008, respectively.

Costs. Feed cost per ton was \$148 and \$202 for Diet 1 in 2007 and 2008, respectively. For Diet 2, cost per 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 industry 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. Diet 1, which used soybean hulls as its energy source produced the same results as corn. This implies that a finishing system using an energy source that is minimal in starch can provide the same favorable results in regards 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, lbs	828[a]	952[b]	890	890	889	891
Harvest wt, lbs	1292	1310	1296	1306	1278[a]	1324[b]
Overall ADG, lbs/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 superscript are significantly 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		2008		
	Non-implanted	Implanted	Non-implanted	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, lbs/d	Soyhulls/DDGS	Corn/DDGS	Year means
2007	24.44	23.16	23.78
2008	24.75	24.88	24.82
Overall ADFI, lbs/d	24.55	24.05	
Feed:Gain, lbs/lb			
2007	7.28	6.59	6.94
2008	7.61	7.63	7.62
Overall F:G, lbs/lb	7.45	7.11	

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