Proceedings of the Organic Agriculture Research Symposium
LaCrosse, WI February 25-26, 2015

Effect of Growth, Meat Quality, Profitability, and Consumer Acceptability of Organically Raised Dairy-Beef Steers

Bradley Heins[1] and Elizabeth Bjorklund[2]

Abstract

A study was conducted at the University of Minnesota West Central Research and Outreach Center (WCROC), Morris, Minnesota to determine the effect of growth, meat quality, profitability, fatty acid profiles, and consumer acceptability of organically-fed dairy steers compared to conventionally-fed dairy steers. Dairy bull calves born from March 18 to May 27, 2011 were randomly assigned to one of three replicated groups at birth; conventional (CONV), organic (ORG), and organic-grass only (GRASS). CONV steers were fed a diet of 80% concentrate and 20% roughage and received hormone implants. ORG steers were fed a diet of organic corn, organic corn silage, and at least 30% of their diet consisted of organic pasture during the grazing season. GRASS steers grazed pasture during the grazing season and were fed high quality hay or hay silage during the non-grazing season. The GRASS steers had greater days to slaughter, lower slaughter weights, and had lower average daily gains than CONV steers. Average daily gains from birth (lb/day) were 2.43 (CONV), 1.81 (ORG), and 1.37 (GRASS). GRASS steers had fat higher in omega-3 fatty acid and lower in monounsaturated and saturated fats. Consumers found no significant difference for overall liking for the conventional and organic beef. Organic beef had significantly higher flavor liking than the conventional beef. However, consumers rated the GRASS beef the lowest in overall liking and flavor. For profitability, grain costs were substantially higher for the ORG steers, and therefore, resulted in a net loss per group of 8 steers (-$5,773.67). The GRASS steers had the highest profit ($4,394.89 vs. $3,539.25) compared to CONV steers because of lower feed costs, mainly pasture. CONV steers had some advantage over GRASS steers, and the CONV dairy steers grew much faster and required less time to slaughter. However, GRASS steers required fewer resources than CONV steers. Organic dairy producers seeking relief from high grain prices, with a little "extra" pasture may be able to make a profit from feeding organic dairy steers versus selling them to conventional markets.

Introduction

There is an increase in global demand for organic products, especially grass-fed and finished. Bull calves may represent a potential additional source of revenue for organic dairy producers. Currently, with the high price of organic grains in the United States, the male offspring of organic Holstein and crossbred dairy cattle represent a potential resource for pasture-raised beef in the Midwest.

With the extreme drought conditions in the Upper Midwest during 2012, many dairy producers were worried about high grain and hay prices. Therefore, producers are reducing the amount of grain fed to cattle to reduce feed costs and maintain profitability. At the WCROC organic dairy, we have recently completed a study where we evaluated conventionally raised dairy steers compared to organically-raised dairy steers. The objective of this study was to compare the growth, carcass characteristics, profitability, fatty acid profiles, and consumer acceptability of organic dairy steers and conventional dairy steers.

Methods

The research study used bull calves born from March to May 2011 from the WCROC dairy, and they were subsequently evaluated for growth, meat quality, consumer acceptability, and profitability over the next 14 to 20 months. The bull calves were assigned to one of three groups at birth: conventional, organic

[1] West Central Research and Outreach Center, University of Minnesota, 46352 State Hwy 329 Morris, MN, USA 56267 hein0106@umn.edu

(pasture plus concentrate), and organic-grass only (100% pasture). Dairy bull calves (n = 49) were born from March 18 to May 27, 2011. Calves were randomly assigned to 1 of 3 replicated groups at birth; conventional, organic, and organic-grass only. The CONV steers were fed a diet of 80% concentrate and 20% roughage and received Component E-S implants. The ORG steers were fed a diet of organic corn, organic corn silage, and at least 30% of their diet consisted of organic pasture during the grazing season. The GRASS steers grazed pasture during the grazing season and were fed high quality hay or hay silage during the non-grazing season. The CONV steers were sent to slaughter July 24, 2012 to the Tyson Fresh Meats plant in Dakota City, NE and the ORG and GRASS steers were sent to Lorentz Meats, Cannon Falls, MN on September 19, 2012 and November 13, 2012, respectively. Strip loins were collected for a consumer taste panel, which allowed 100 beef consumers to rate the beef for overall liking and flavor. Profit was defined to include revenues and expenses for beef value, feed cost, pasture cost, health cost, and yardage.

Results and Discussion

The GRASS dairy steers had greater days to slaughter, lower slaughter weights, and had lower average daily gains than CONV steers (Table 1). Average daily gains from birth (lb/day) were 2.43 (CONV), 1.81 (ORG), and 1.37 (GRASS). The slaughter weights for the GRASS steers was lower than expected; however, the steers were slaughtered once the grazing season had ended in November 2012. As expected, steers fed higher amounts of grain and concentrate had carcasses with greater fat thickness, larger ribeye area, and higher yield grades than steers fed higher amounts of pasture. The organic beef markets prefer not to slaughter large carcasses because, currently, there is no marketing potential for large cuts of organic beef.

For profitability (Table 2), grain costs were substantially higher for the ORG steers, and therefore, resulted in a net loss per group of 8 steers (-$5,773.67). The GRASS steers had the highest profit ($4,394.89 vs. $3,539.25) compared to CONV steers because of lower feed costs, mainly pasture. A higher organic beef premium dramatically increased profit for the GRASS steers, and reduced the significant loss for profit of the ORG steers. The CONV steers had some advantage over the GRASS steers, and the CONV dairy steers grew much faster and required less time to slaughter. However, GRASS steers required fewer resources than CONV steers. Therefore, a low grain ration may reduce feed costs without sacrificing profit in an organic dairy system, assuming the grass-fed steers can be marketed at a premium price based on the production system.

The fat from the GRASS steers was higher in Omega-3 fatty acid and lower in monounsaturated and saturated fat (Table 3). The omega-6 to omega-3 ratio was lower for the GRASS (1.4%) steers compared to the ORG (10.0%) and CONV (12.9%) steers. The increased forage intake may have increased the omega-3 fat and decreased the omega-6:omega-3 ratio for GRASS steers. Fatty acid composition may be altered by inclusion of pasture grass and more forage in the diet.

Consumers who rated the beef found no significant difference for overall liking for the CONV and ORG beef (Table 3). The ORG beef had significantly higher flavor liking than the CONV beef. However, consumers rated the GRASS beef the lowest in overall liking and flavor.

Conclusions

The CONV steers had some advantage over the GRASS steers, and the CONV dairy steers grew much faster and required less time to slaughter. However, GRASS steers required fewer resources than CONV steers. Organic dairy producers trying to seek relief from high grain prices, with a little “extra” pasture may be able to make a profit from feeding organic dairy steers versus selling them to conventional markets. The most important point for reducing inputs and increasing profits in organic dairy systems is to produce high quality forages and maximize dry matter intake on pasture.

References

Bjorklund, E. A., B. J. Heins, DiCostanzo, A., and H. Chester-Jones. 2014. Fatty acid profiles, meat quality, and sensory attributes of organic versus conventional dairy-beef steers. *J. Dairy Sci.* 97: 1828-1834

Bjorklund, E. A., B. J. Heins, DiCostanzo, A., and H. Chester-Jones. 2014. Growth, carcass characteristics, and profitability of organic versus conventional dairy-beef steers. *J. Dairy Sci.* 97: 1817-1827

Appendix

Table 1. Results for conventional dairy steers compared to organic (pasture plus concentrate) and organic grass-only (100% pastures) dairy steers for growth and carcasses traits.

	Steer Group		
	Conventional	Organic	Grass-only
Slaughter age (d)	466[a]	528[b]	584[c]
Slaughter weight (lb)	1,263[a]	1,037[b]	884[c]
Avg. daily gain from birth (lb/d)	2.43[a]	1.81[b]	1.37[c]
Hot carcass weight (lb)	752.0[a]	553.8[a,b]	419.8[b]
Fat thickness (in)	0.38[a]	0.11[b]	0.10[b]
Rib-eye area (in^2)	11.7[a]	10.2[b]	7.7[c]
Dressing percentage (%)	61.3[a]	54.5[b]	49.0[c]
Marbling score[1]	3.1[a]	2.1[b]	1.5[c]
Yield Grade	2.9[a]	1.3[b]	1.0[c]

Rows with common superscripts are not significantly different ($P < 0.05$)

[1]Slightly Abundant = 5, Moderate = 4, Small = 3, Slight = 2, Traces = 1

Table 2. Results for conventional dairy steers compared to organic (pasture plus concentrate) and organic grass-only (100% pastures) dairy steers for profitability.

	Steer Group		
	Conventional	Organic	Grass-only
Net profit ($)[2]	3,539.25[b]	-5,773.67[b]	4,394.89[a]
Cost /gain ($/kg)	2.10[b]	4.96[a]	1.97[b]
Organic beef price, ($), $0.99/kg premium	3,539.25[b]	-3,221.57[c]	6,665.14[a]
Organic beef direct-market price, ($), $7.12/kg	3,539.25[b]	9,976.19[b]	18,405.00[a]

Rows with common superscripts are not significantly different ($P < 0.05$)

[1]Slightly Abundant = 5, Moderate = 4, Small = 3, Slight = 2, Traces = 1

[2] = Profit or loss is per pen of 8 steers

Table 3. Results for conventional dairy steers compared to organic (pasture plus concentrate) and organic grass-only (100% pastures) dairy steers for fatty acid analysis and consumer acceptability.

	Steer Group		
	Conventional	Organic	Grass-only
Monounsaturated fat (%)	40.4[a]	42.1[a]	21.9[b]
Polyunsaturated fat (%)	2.7	2.3	1.2
Saturated fat (%)	35.2	27.2	26.1
Omega-3 fat (%)	0.19	0.21	0.50
Omega-6 fat (%)	2.5[a]	2.1[a]	0.68[b]
Omega-6/Omega-3 ratio	12.9[a]	10.0[a]	1.4[b]
Overall liking[1]	69.2[a]	71.3[a]	56.3[b]
Flavor liking[1]	69.2[a]	73.3[b]	56.8[c]
Toughness[2]	7.4[b]	8.0[b]	10.1[a]
Off flavor[2]	4.1[b]	3.9[b]	6.3[a]

Rows with common superscripts are not significantly different ($P < 0.05$)

[1] = Overall and flavor liking/disliking: 0 = greatest imaginable disliking; 120 = greatest imaginable liking

[2] = Toughness and off flavor :0 = none; 20 = extremely tough, or extremely juicy, or extremely intense