



RESEARCH FACTS

RESEARCH & TECHNOLOGY DEVELOPMENT FOR THE CANADIAN BEEF INDUSTRY

Beef Science Cluster



How does forage finishing affect product quality?

Project Title:

Effect of Method of Forage Finishing and Cattle Breed on Growth Performance, Carcass Characteristics, Eating Quality, and Nutrient Composition of Forage Finished Beef Relative to a Grain Finished Product

Researchers:

Ira Mandell, Ph.D. imandell@uoguelph.ca

Ira Mandell, Ph.D. (University of Guelph), Robert Berthiaume, Ph.D., (AAFC Lennoxville), Carol Lafreniere, Ph.D., (AAFC Kapuskasing), Kendall Swanson, Ph.D. (North Dakota State University) and Stephen Miller, Ph.D. (University of Guelph)

Project Code:	FRG.04.09
Completed:	March 2013

Background:

In Canada, most cattle are raised on forages then finished on a high grain diet at under 20 months of age. Grain-finishing is typical because grains like barley and corn generally contain more energy than forages, and Canada's relatively short growing season means that forage-finished cattle require stored forage in addition to pasture.

Forage-finished beef contains more omega-3 fatty acids and may contain more conjugated linoleic acid (CLA) than grain-finished beef, which has sparked interest among some health conscious consumers. However, current levels of omega-3 fatty acid and CLA in beef do not consistently meet Health Canada labeling requirements and research has found that increasing the levels of these unsaturated fats while maintaining meat quality is challenging.

Oxidation of unsaturated fats in forage-finished beef may negatively impact flavor and odor. This has led to concerns that some forage-finishing methods may yield a premium-priced product that does not deliver on the perceived quality or potential health benefits to the consumer. This study will provide comprehensive information on the use of conserved forages for meeting consumer demands in a forage-finished beef niche market.

Objectives:

1. Determine whether the method of forage-finishing (pasture vs. hay vs. silage) affects growth performance, carcass traits, eating quality and nutrient composition of beef relative to grain-finished beef.

2. Evaluate breed differences in the above mentioned traits using cattle breeds that can produce branded-grade beef using a forage-finishing production regimen.
3. Examine how fatty acid composition of forages affects eating quality and nutrient composition of beef when method of forage finishing is varied.

What They Did:

Hereford and Angus yearlings (400 to 450 kg body weight) were purchased and delivered to the University of Guelph's New Liskeard Research Station and Agriculture and Agri-Food Canada's Kapuskasing Experimental Station. At each research station, cattle were allocated to one of four management regimens:

- high grain diet based on whole shelled corn
- forage finishing using pasture
- forage finishing using hay
- forage finishing using forage silage

with equal numbers of cattle for each breed and management classification. Forage-finished cattle (alfalfa in New Liskeard, grasses in Kapuskasing) were supplemented with a vitamin/mineral mix. Cattle were weighed every 28 days from June 1 to mid-late September, and then shipped for slaughter to the Cargill Meats Solution plant in Guelph. A section of the ribeye and eye of round muscles were collected from each carcass, and tenderness, juiciness, flavor, fatty acid composition were evaluated at the University of Guelph meat lab.

What They Learned:

Growth performance: Corn-finished cattle grew faster (3.6 vs. 2.2 lbs/day) and more efficiently (feed:gain 7.4 vs. 10.2:1) and finished at heavier live weights (1357 vs. 1202 lbs) than forage-finished cattle. Growth performance did not differ among the forage-finishing treatments, except that alfalfa-silage finished cattle gained more slowly and less efficiently and finished at lighter weights than the alfalfa hay and alfalfa pasture treatments.

Carcass data: Corn-finished carcasses were heavier (762 vs. 632 lbs) and had more intramuscular fat (marbling), but less lean meat (57 vs. 61%) than forage-finished carcasses. There were no statistical differences among the forage-finished treatments, except that alfalfa pasture-finished carcasses weighed 6-8% more than hay- and silage-finished carcasses. Forage finishing did not produce any B2 carcasses (yellow fat), but did produce more dark cutters.

Sensory evaluation: Corn-fed beef had significantly more intense beef flavor and higher flavor desirability than forage-finished beef. Silage-finished beef was juicier than pasture-finished beef. No consistent diet differences were reported among diet treatments for softness, tenderness, off-flavor, grassy flavor, chewiness or overall acceptability.

Fatty acid composition: There was more CLA and omega-3 in the marbling fat of forage-finished than corn-finished beef but because the corn-finished beef had more marbling, a serving of corn-finished beef actually had as much total CLA as forage-finished beef. Forage-finished beef had higher levels of omega-3 than corn-finished beef. However, these levels would need to be 7 to 11 times higher before forage-finished beef would be eligible for a Health Canada omega-3 "source" label claim.

Breed differences were consistent regardless of the finishing diet used.

What It Means:

Angus and Hereford cattle can be finished on pasture, hay or silage, provided nutritional quality is adequate to avoid problems with performance and carcass quality. Growth performance, feed efficiency and quality grades were lower with forage-finished cattle, but may be less important economically to producers if consumers are willing to pay a sufficient premium for forage-finished beef. Differences in sensory attributes were minimal but may help with market differentiation. Omega-3 (but not CLA) was higher in forage-finished than corn-finished beef, but levels were too low to attain a Health Canada label claim for

In forage-finished cattle, growth performance, feed efficiency and quality grades were lower; omega-3 was higher but levels were too low to attain a Health

omega-3 content.

Canada label claim.

Proudly Funded By:



The Beef Cattle Industry Science Cluster is funded by the Beef Cattle Research Council, a division of the Canadian Cattlemen's Association, and Agriculture and Agri-Food Canada to advance research and technology transfer supporting the Canadian beef industry's vision to be recognized as a preferred supplier of healthy, high quality beef, cattle and genetics.

For More Information Contact:

Beef Cattle Research Council
#180, 6815 - 8th St. NE
Calgary, AB T2E 7H7
Tel: (403) 275-8558 Fax: (403) 274-5686
info@beefresearch.ca

For More Information Visit:

www.beefresearch.ca

RESEARCH AND TECHNOLOGY DEVELOPMENT FOR THE CANADIAN BEEF INDUSTRY