

Comparison of fatty acids in ground beef from cattle fed on pasture or stored feed.

Amy Lassen, Heather Karsten, Douglas D. Archibald
Department of Crop and Soil Sciences, the Pennsylvania State University

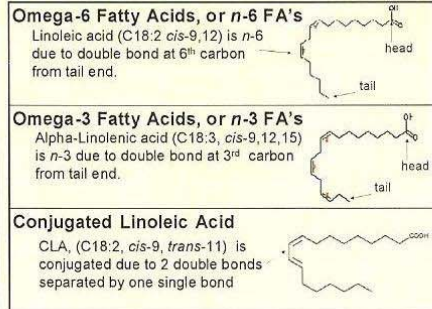


Introduction

•Research has revealed differences in healthful fatty acids (FAs) and fat-soluble vitamins between beef finished on pasture or stored feeds.

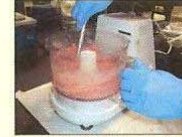
•The fat composition of beef that consumers can purchase has not been compared.

•We compared the Omega-3 FAs, the ratio of Omega-6:Omega-3 FAs, and Conjugated Linoleic Acid concentration of pastured and retail beef marketed in Pennsylvania.



Methods

- Three 450g ground beef samples were collected from PA producers that finished their cattle on either:
 - i) pasture
 - ii) grains & stored feeds
 - iii) a mixture of pasture, stored forages, & grains.



Ground beef samples were:
•homogenized & stored at -20°C until analysis.
•saponified with KOH and Sulfuric acid.

Fatty-acid methyl esters (FAMES) were:
•extracted in hexane.
•identified with Gas Chromatography and quantified with Mass Spectroscopy.

- Producers were surveyed to determine feeding & management strategies

- Samples were collected from local markets and processors

- Herbage samples were collected from farms feeding pasture.

Feeding Strategies

Feed	Summer	Fall
Pastured	11	10
Retail	4	5
Pastured & Stored	5	5
PA-Stored Feed	6	6
Total	26	26

Data analyzed using Mixed model of SAS;
Fixed effects: feeding strategy & season
Random: sources nested in feeding strategy.

Pre-planned contrasts compared feed strategies.
Differences significant at $p < 0.05$.

Conclusion

•None of the three fatty acid concentrations differed between summer and fall.

•Omega-3 FAs in ground beef from pasture groups were almost 4 times higher than beef from retail stores, and over 2 times higher than the PA-stored feed group.

•Omega-6 FAs in ground beef tended to be higher in the retail & PA-Stored feed group.

•Ratio of Omega-6:Omega-3 in ground beef from pasture groups was more than 5 times lower than the retail group, and almost 4 times lower than the PA-stored feed group.

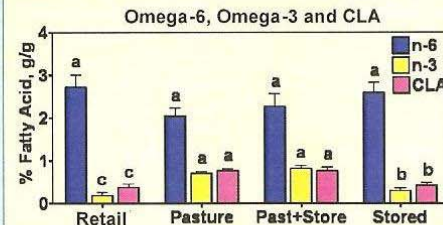
•CLA in pasture groups was 2 times higher than retail and PA-stored feed groups.

"Grass-fed" ground beef available to PA consumers offers higher levels of Omega-3 FAs and CLA, and a lower ratio of Omega-6:Omega-3 FAs than beef feed stored feed or sold in retail markets.

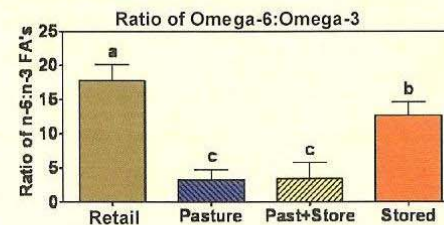
•More work is needed to determine differences in fat-soluble vitamins.



Results



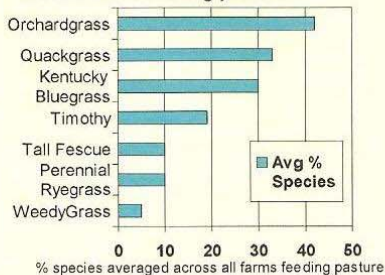
a, b, c indicate treatments that differed significantly at $p < 0.05$ for given fatty acid



a, b, c indicate treatments that differed significantly at $p < 0.05$ for given fatty acid

- No differences in fatty acids between Summer and Fall
- Pasture and Pasture+Stored feed groups similar in Omega-6, Omega-3, CLA, and Ratio of Omega-6:Omega-3.

Pasture Species Composition: across farms feeding pasture.



Feeding Strategy Description

Feed Strategy	Description
Retail	Retail beef available in PA from US beefpacking companies. Assume beef are finished on feedlot diet.
Pasture	100% DMI from pasture within 2 months before slaughter.
Pasture + Stored Feeds	Average 42% DMI from pasture within 2 months before slaughter. One sample included 8% DMI from pasture. Supplementation with grass or legume hay, or baylage. One sample included 25% DMI from mixed grain.
PA-Stored Feed	Beef raised on pasture & supplemented feeds, finished in PA for 2-4 months on mixture of grain (corn, oat, barley and/or rye) and com silage or haylage.

Objectives

Compare the fatty acid and fat-soluble vitamin content of:

•Ground beef from cattle raised on pasture as compared to ground beef marketed in PA from cattle fed grain and stored forages

•Ground beef in summer and fall

References:

Scollan, N, J-F. Hocquette, K. Nuernberg, D.Dannenberger, I Richardson, and A. Moloney. 2006. Innovations in beef production systems that enhance the nutritional and health value of beef lipids and their relationship with meat quality. *Meat Science* 74: 17-33.

Acknowledgments:

We thank the Pennsylvania Association of Sustainable Agriculture and the Northern Tier Meats Cooperative for their assistance, Kathy Soder and John Comerford for project advice and assistance, Marvin Risius for Statistical advice, Mohd. Nasir Mohd. Ismail for lab help, and all the producers for their time and beef donations.