Comparison of Antioxidant Content in Complex Pasture vs. Conventional Feed for Beef Cattle by Time

Poster #512

Esha Garg[1], Vijayashree "Viji" Jambunathan[1], Srikar Kesamneni[1], Humza R Ali[1], Jenifer I Fenton[1]
[1]Department of Food Science and Human Nutrition, Michigan State University, East Lansing, MI

Abstract

Grass-finished beef is generally considered healthier than grain finished beef in part because the omega-6/omega-3 ratio is reported to be lower. However, complex pasture mixtures are also purported to contain higher concentrations of plant secondary metabolites; the consumption of which is thought to be important for human health. The objective of this study was to compare the carotenoids and chlorophyll in complex pasture vs conventional feed. Complex pasture containing a mixture of alfalfa, orchard grass, red and white clover, trefoil, chicory, fescue, timothy, and dandelion (n=22) compared to a mixture containing a mixture of 18% hay, dry and high moisture corn, and pellet (n=23). Total carotenoid concentration and chlorophyll A and B were measured using previously described spectrophotometric methodology. Total carotenoid concentration was significantly higher in pasture samples vs grain (60.3± 2.58 vs 10.4± 0.03; p<0.0001). Chlorophyll A concentration was significantly higher in pasture samples vs grain (117±12.0 vs 34.4± 3.12; p<0.0001). Chlorophyll B concentration was significantly higher in pasture samples vs grain (28.3 ± 3.53 vs 10.6±1.26; p=0.0004). There was no significant variation by time. In conclusion, chlorophyll and carotenoids are significantly higher in complex pastures compared to conventional feed. Complex pasture consumption by cattle may lead to accumulation of higher concentrations of plant secondary metabolites in beef.

Background

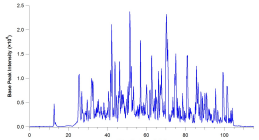
- Consumer interest in the connection between diet, health, and wellness is consistently increasing [1]
- Grass-fed beef (GFB), milk, and dairy products are growing in popularity[2,3]
- Feeding cattle high-energy grain is far more economically efficient[4,5]
- Pasture grass is commonly considered higher in antioxidants and vitamins compared to its conventional grain[3]
- The study compared the phenolic content and chlorophyll carotenoid levels in pasture vs conventional raised feed

Objective

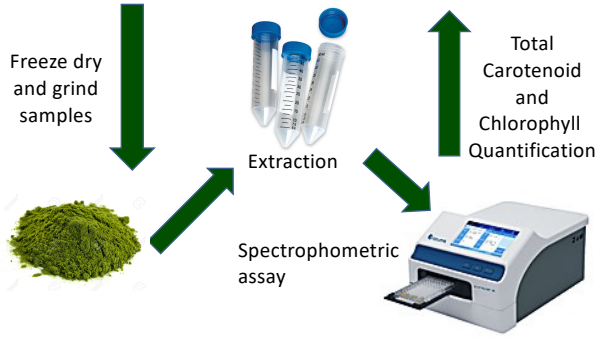
Quantify and compare the carotenoids and chlorophyll in complex pasture vs conventional feed for cattle beef.

Methods

Forage samples collected (n = 46)



Data Analysis



Results

Table 1: Sample Diet Characteristics

Pasture	Conventional
26% meadow fescue, 18% red clover, 15% timothy grass, 11% alfalfa, 10% white clover, 9% birdsfoot trefoil, 7% chicory, 2% orchard grass, and 2 % dandelion	20 % hay, 50 % dry corn, 24% high moisture corn, and 6% pellet

Table 2: Antioxidant Profile by Feed Type (Pasture vs. Grain)[a]

	Pasture	Grain	p-value[b]
Chlorophyll A (µg/g)	117 ± 12.0	34.4 ± 3.12	p < 0.0001
Chlorophyll B (µg/g)	28.3 ± 3.53	10.6 ± 1.26	p = 0.0004
Total Carotenoids (µg/g)	60.3 ± 2.58	10.4 ± 0.80	p < 0.0001
Total Phenolic Content (mg GAE[c]/g)	4.44 ± 1.01	2.91 ± 0.35	p = 0.009

[a]Data are reported as mean ± standard deviation
[b]p-values indicate results of one-way ANOVA
[c]GAE = gallic acid equivalents

Figure 1: Chlorophyll A for Pasture vs. Grain Samples (p<0.0001)

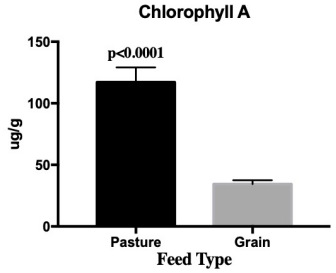


Figure 2: Chlorophyll B for Pasture vs. Grain Samples (p<0.001)

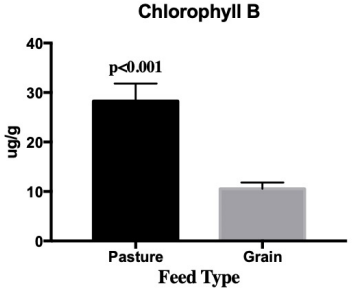


Figure 3: Total Carotenoids for Pasture vs. Grain Samples (p<0.0001)

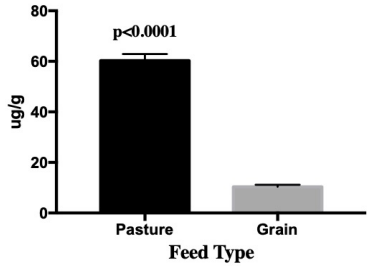
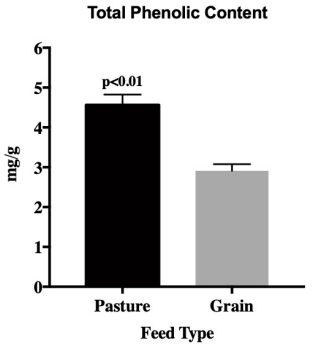


Figure 4: Total Phenolic Content Pasture vs. Grain Samples (p<0.01)



Significance and Future Directions

- Total carotenoid concentration was significantly higher in pasture samples vs grain (60.3± 2.58 vs 10.4± 0.03; p<0.0001)
- Chlorophyll A concentration was significantly higher in pasture samples vs grain (117±12.0 vs 34.4± 3.12; p<0.0001)
- Chlorophyll B concentration was significantly higher in pasture samples vs grain (28.3 ± 3.53 vs 10.6±1.26; p=0.0004)
- Complex pasture consumption by cattle may lead to accumulation of higher concentrations of plant secondary metabolites in beef[1]
- Customers wishing to purchase beef with higher plant secondary metabolites should purchase grass-fed beef
- Future studies should investigate whether protein and lipid levels are higher in conventional vs pasture fed beef

Current Status

Being authored for publication

References

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Acknowledgements

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