

Comparing the plasma polyunsaturated fatty acid (PUFA) profile of beef cattle fed on different finishing diets

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Introduction

- Red meat is an important dietary source of protein and many other essential nutrients including omega(n)-3 polyunsaturated fatty acids (PUFA) which provide numerous benefits to human health⁽¹⁾
- Meat from grass-fed animals contains a more favourable fatty acid profile, compared to other feeding regimes⁽²⁾
- Alternative methods to enhance the fatty acid profile of red meats are needed to meet increasing consumer demands for 'healthier' products

Objective

To compare plasma PUFA concentrations across cattle finished on three different feeding regimes for a minimum of 15-weeks prior to slaughter

Methods

Study design & Cattle Details

- Three UK farms supplied livestock to the current study
- 112 animals were finished on one of three feeding regimes

Ad lib concentrate
(negative control)
n=23

n3-enriched ad lib concentrate
(treatment)
n=49

Grass-fed
(positive control)
n=40

Blood Collection

- Blood was collected at slaughter into EDTA tubes and kept refrigerated before processing (centrifugation at 2200 × g for 15 min at 4°C)
- Plasma aliquots were stored at -80°C until analysis

Sample & Data Analysis

- A validated gas chromatography–mass spectrometry (GC-MS) method⁽³⁾ was used to quantify individual PUFA concentrations (mg/ml)
- SPSS v25 was used for all statistical analysis

Results

- Grass-fed cattle had significantly ↑ n3, but ↓ n6 concentrations compared to the other finishing regimes at slaughter



Table 1. Effect of different finishing diets on PUFA concentrations (mg/ml)

	Cattle treatment group			P value*
	Neg. control (n=23)	Treatment (n=49)	Grass-fed (n=40)	
C18 : 2n-6 (LA)	0.940 ± 0.282 ^a	0.801 ± 0.252 ^b	0.289 ± 0.079 ^c	<0.001
C18 : 3n-3 (ALA)	0.026 ± 0.007 ^a	0.058 ± 0.022 ^a	0.334 ± 0.121 ^b	<0.001
C20 : 4n-6 (AA)	0.120 ± 0.034 ^a	0.118 ± 0.033 ^a	0.067 ± 0.015 ^b	<0.001
C20 : 5n-3 (EPA)	0.000 ± 0.000 ^a	0.002 ± 0.004 ^a	0.058 ± 0.017 ^b	<0.001
C22 : 5n-3 (DPA)	0.021 ± 0.013 ^a	0.035 ± 0.016 ^b	0.064 ± 0.020 ^c	<0.001
C22 : 6n-3 (DHA)	0.002 ± 0.011 ^a	0.000 ± 0.003 ^{ab}	0.005 ± 0.010 ^{ac}	0.026

*Difference between groups (ANOVA, P<0.05);

^{a,b,c}Different superscript letters in a row denotes differences within groups (LSD post-hoc tests, P<0.05)

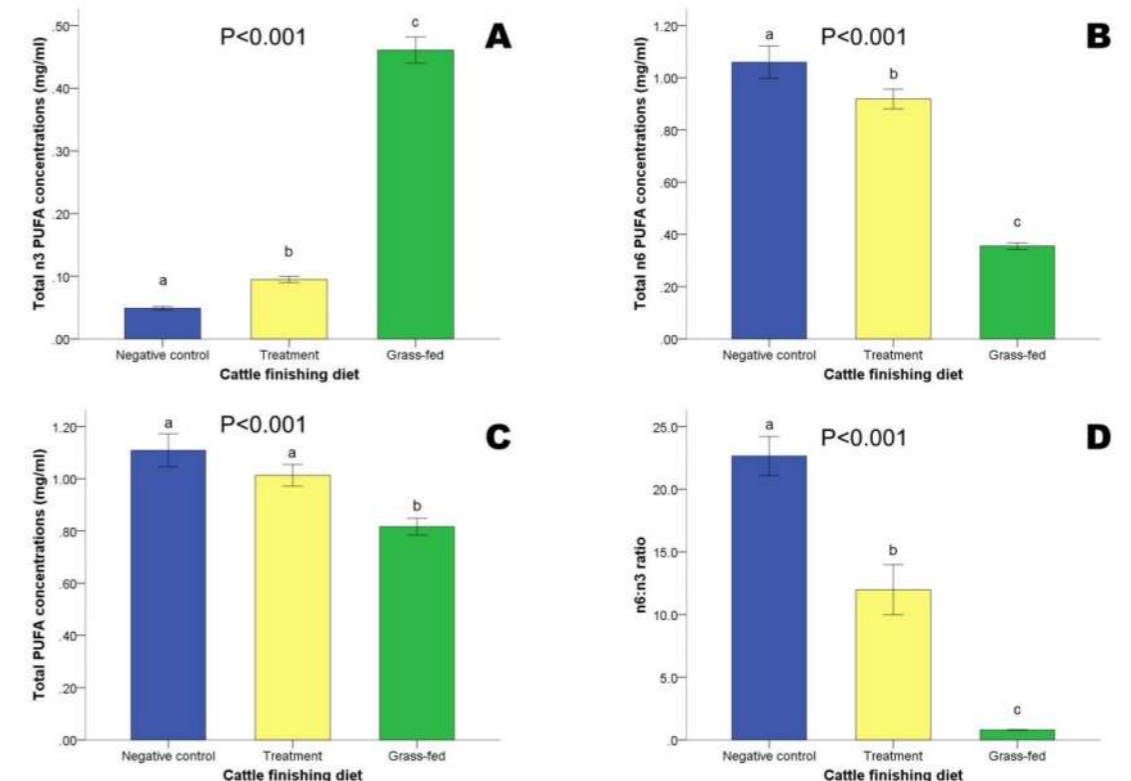


Figure 1. Effect of different finishing diets on plasma (A) n3, (B) n6, (C) total PUFA concentrations, and (D) the n6:n3 ratio in 112 beef cattle. (P value from one-way ANOVA showing different between groups. ^{a,b,c}Different superscript letters within a graph denotes differences within groups (LSD post-hoc tests, P<0.05)

Conclusions

- The finishing diet can impact plasma PUFA concentrations of beef cattle
- Further research required to confirm if such beneficial changes are also observed in bovine muscle, which would have direct benefits for consumers

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