

Variation in fatty acid composition of subcutaneous fat from beef carcasses commercially produced in Australia

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Many beef cuts include subcutaneous fat as part of the edible portion and while many cuts are trimmed, the fat removed is often added to manufactured products. As seasonal differences result in variation in pasture growth⁽¹⁾ and the effect of feeding systems on FA composition of beef is well established,⁽²⁾ it is hypothesised the fatty acid composition of subcutaneous fat will vary between years. Consequently, this research aimed to determine if FA composition of subcutaneous fat and therefore nutritional quality differed between years. The subcutaneous fat from beef carcasses from grain ($n = 280$) and grass-fed cattle ($n = 280$) were collected during 2018 and 2019. Once analysed, predicted means were calculated using linear modelling with year and production system as fixed effects. Comparing the two years shows saturated fatty acids (SFA) were significantly lower in grass-fed cattle in 2018 with a predicted mean of 8.3 g/100 g (SE: 0.20) compared to 25.1 g/100 g SFA (SE: 0.22) in 2019. Similarly, monounsaturated (MUFA) and polyunsaturated fatty acids (PUFA) contents were also lower in 2018 with 12.1 g/100 g MUFA (SE: 0.24) and 0.64 g/100 g PUFA (SE: 0.02), respectively; however, carcasses from sampled in 2019 had predicted means of 35.5 g/100 g MUFA (SE: 0.26) and 1.9 g/100 g PUFA (SE: 0.02). Although the ratio of omega-6 to omega-3 FAs in fat from grass-fed cattle sampled in 2018 was significantly lower at the $p = 0.05$ level (1.49 compared to 1.70), there was little practical difference. Likewise, data from grain-fed carcasses showed a significant difference between years with carcasses from grain fed cattle in 2018 containing significantly lower concentrations of SFA and MUFA with 11.2 g/100 g SFA (SE: 0.22) and 13.7 g/100 g MUFA (SE: 0.27), respectively. By contrast carcasses from grain-fed cattle measured in 2019 yielded 27.9 g/100 g SFA (SE: 0.24) and 29.2 g/100 g MUFA (SE: 0.29). PUFA was also significantly greater in 2019 at 1.54 g/100 g (SE: 0.02) compared with 0.71 g/100 g (SE: 0.02) in 2018. Interestingly, the ratio of omega 6 to omega 3 FAs was also markedly higher from cattle measured in 2019 (8.12, SE: 0.26) compared to cattle measured in 2018 (5.18, SE: 0.25). A significant interaction between year and production system was evident for MUFA, PUFA and n6:n3, while production system and year were significant for SFA there was no interaction. Overall, these results demonstrate the FA concentrations of subcutaneous fat from beef carcasses varies between years. It is hypothesised these differences are the result of increased fat deposition with more rapid maturation given increased fat deposition results in increased SFA and MUFA, while the concentration of PUFAs remain consistent.⁽³⁾ Given the large variations found, further research is required to determine whether intra and intermuscular fat which make up more of the edible portion also significantly vary.

References

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