

Abstract



## Higher Vitamin D2 and 25(OH)D2, but Not Vitamin D3 Metabolites, in Bovine Plasma and Muscle from Grass-Based Finishing System, Compared to Concentrate <sup>†</sup>

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Abstract: Meat and meat products are one of the largest contributors to vitamin D dietary intakes. Little is known, however, about how different animal husbandry practices and/or finishing diets might affect the vitamin D content of the animal. Therefore, this study aimed to investigate the effect of bovine finishing diet (grass vs. concentrate) on the 25(OH)D plasma concentrations of cattle and subsequent vitamin D content in beef. Cattle were fed grass (n = 7) or concentrate (n = 9) finishing diets for 15 weeks prior to slaughter. Bovine blood samples were collected at slaughter and plasma aliquots were stored (-80 °C) until analysis. Beef top rump from each animal was chilled for an ageing period of 21 days, then homogenised and frozen (-80 °C) until analysis. Bovine plasma samples were analysed for circulating 25(OH)D3, and 25(OH)D2 (nmol/L), and raw beef muscle (top rump) samples were analysed for vitamin D metabolites; vitamin D3, vitamin D2, 25(OH)D3 and 25(OH)D2 (µg/kg), all by LC-MS/MS. Total vitamin D activity was defined: [vitamin D3 +  $(25(OH)D3 \times 5)$  + vitamin D2 +  $(25(OH)D2 \times 5)$ ]. Statistical analysis was conducted by SPSS with independent t tests used to compare groups; significance level p < 0.05. Data were presented as mean  $\pm$  SD. A significantly higher plasma 25(OH)D2 concentration was observed in the grass finished cattle compared to the concentrate group ( $43.18 \pm 11.75$  vs.  $16.56 \pm 1.58$  nmol/L, p < 0.002). No difference in plasma 25(OH)D3 concentrations was observed between groups. In beef top rump, the grass finishing diet resulted in a significantly higher mean  $\pm$  SD vitamin D2 [0.07  $\pm$  0.05 vs. 0.01  $\pm$  $0.01 \ \mu g/kg$ ] and  $25(OH)D2 \ [0.70 \pm 0.16 \text{ vs.}$   $0.25 \pm 0.07 \ \mu g/kg$ ] compared to concentrate finishing diet (both p < 0.001). Moreover, beef from grass finished cattle demonstrated a significantly higher total vitamin D activity compared to those in the concentrate group [9.52  $\pm$  2.43 vs. 6.78  $\pm$  2.00  $\mu$ g/kg, p < 0.05]. No difference was observed for muscle vitamin D3 or 25(OH)D3 between groups. In conclusion, a more favourable bovine vitamin D profile, driven by vitamin D2 metabolites specifically (not vitamin D3), is reported from a grass-based finished system, compared to concentrate finishing. Further research is required to understand the impact of these findings for both agriculture practices and human nutrition.

Keywords: vitamin D2; 25(OH)D2; beef; Grass-based finishing system

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