

PLASMA COBALAMIN (VITAMIN B₁₂) ANALOGUES IN CATTLE

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Cobalamin (Vitamin B₁₂) is synthesised by rumen microbes from dietary cobalt. These microbes are also known to synthesise large quantities of cobalamin analogues which are inactive in the coenzyme functions of vitamin B₁₂ in tissues. Sheep absorb virtually no analogues but very little is known about the selectivity of the absorption mechanism in cattle. Unpublished data has provided estimates which vary from 'substantial' (Elliot 1979) to 'fairly limited' (MacPherson 1981). Plasma analogues have recently assumed importance in human medicine because they may be assayed as cobalamin by some methods and interfere with the clinical diagnosis of vitamin B₁₂ deficiency (Kolhouse et al. 1978).

Heparinised plasma samples were obtained from five Hereford beef cows and from 20 Friesian dairy cows, 10 of which had received a cobalt bullet plus grinder (Permaco^(R), ICI). Cobalamin plus analogues were assayed by radioisotope dilution using a crude pig intrinsic factor preparation. Cobalamin was assayed by an identical method, but incorporating a 100-fold excess of analogue to saturate the non-specific binding sites (Kolhouse et al. 1978).

Plasma cobalamin analogues in cattle (Mean \pm SEM)

Sample (n)	Cobalamin ($\mu\text{g/L}$)	Cobalamin + analogues ($\mu\text{g/L}$)	Analogues (%)
Hereford cows (5)	0.40 \pm 0.10	0.53 \pm 0.15	25
Friesian cows (10)	0.19 \pm 0.04	0.44 \pm 0.11	57
Friesian cows plus cobalt bullets (10)	0.14 \pm 0.02	0.35 \pm 0.03	60
Bovine pool †	0.15 \pm 0.01	0.26 \pm 0.01	42
Ovine pool †	1.82 \pm 0.03	1.78 \pm 0.02	2

† Pool replicated 10 times to indicate within-assay precision of methods.

Cattle plasma contained large and variable concentrations of cobalamin analogues. Dairy cows receiving grain supplements had higher concentrations of analogues than did Hereford beef cows grazing pasture only. High-concentrate diets are known to affect rumen synthesis in favour of more analogues and less cobalamin (Elliot 1979). Cobalt bullets did not affect either cobalamin or analogue concentrations in plasma. It would appear that sheep and cattle have very distinct mechanisms for cobalamin metabolism.

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