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EFFECTS OF DIETARY IRON ON STORAGE AND RUMEN CONCENTRATION OF FOLATE AND VITAMIN B_{12} IN SHEEP

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The concentration of folate in plasma decreased when sheep were fed a diet containing 2000 mg Fe/Kg (Wang and Masters 1990). The aim of this study was to determine if excess dietary Fe affected storage of folate and vitamin B_{12} in liver and red cells and concentrations of these vitamins in rumen fluid.

Twelve six-month-old Merino wethers with live weights of 31.8±1.85 Kg were allocated to three groups and housed in individual pens. The diets, composed of oaten hay, lupins and corn starch (4:1:1) contained 177 mg Fe/Kg plus 0, 500 or 2000 mg Fe/Kg added as $FeCl_3$, and were fed ad libitum for 12 weeks. Vitamins were measured microbiologically, using *Lactobacillus casei* for folate and *Euglena gracilis* Z strain - ATCC 12716 for vitamin B_{12} as test organisms.

Fe added (mg/Kg DM):			0	500	2000
Weight gain	weeks	0-6	35 ± 7^{a}	27 ± 13^{ab}	-3 ± 9^{b}
(g/day)		0-12	81 ± 9^{a}	64 ± 14^{ab}	38 ± 13^{b}
Serum					
Vit B_{12} (pg/mL)	week	0	561 ± 184^{a}	311 ± 80^{a}	476 ± 63^{a}
		12	4006± 741^{a}	3181± 843^{a}	2596± 519^{a}
Folate (ng/mL)		0	1.7 ± 0.24^{a}	1.6 ± 0.14^{a}	2.2 ± 0.65^{a}
		6	1.9 ± 0.10^{a}	1.5 ± 0.14^{a}	1.6 ± 0.18^{a}
		12	2.3 ± 0.18^{a}	1.8 ± 0.13^{a}	2.3 ± 0.45^{a}
Red cells					
Folate (ng/mL)	week	0	74 ± 8.7^{a}	72 ± 9.8^{a}	75 ± 4.2^{a}
		6	118 ± 16^{a}	104 ± 20^{a}	117 ± 4^{a}
		12	127 ± 10^{a}	102 ± 17^{a}	115 ± 10^{a}
Liver					
Vit B_{12} (ng/mg N)	week	12	36 ± 3.1^{a}	28 ± 5.0^{a}	27 ± 4.0^{a}
Folate (ng/mg N)		12	213 ± 34^{a}	199 ± 23^{a}	219 ± 24^{a}
Rumen fluid					
NN (mg/100 mL)	week	12	11 ± 2.5^{a}	9.6 ± 1.4^{a}	14 ± 0.6^{a}
Vit B_{12} (ng/mg NN)		12	1442± 224^{ab}	2348± 418^{a}	1255± 296^{b}
Folate (ng/mg NN)		12	796 ± 204^{a}	908 ± 209^{a}	374 ± 113^{a}

Mean±SE. Within rows, means with different superscripts are different, $P<0.1$. N - nitrogen; NN - nucleic acid nitrogen.

The depression of liveweight gain by excess dietary Fe is consistent with previous observations (Wang and Masters 1990). The significant decline in plasma folate, reported previously, was not obtained in the current experiment although a similar trend was observed in week 6. This may be due to free Fe causing short term damage to red blood cells and/or tissues, which resulted in a rise in folate requirement. Excess dietary Fe did not affect the storage of folate and vitamin B_{12} in liver or red cells or concentrations of these vitamins in rumen fluid. Therefore, the depression of liveweight gain is unlikely to be caused by a lack of these vitamins.

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