

DETECTION AND COMPARISON OF CAROTENOID AND RETINOL
CONCENTRATIONS IN THE SERUM AND BODY FAT OF SHEEP AND GOATS

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Sheep and goats are known to have white body fat even when they are grazed on green pastures which contain considerable quantities of carotenoids, the pigments that cause yellow fat in cattle. The reported carotenoid concentrations in the serum of sheep ranged from 0 to 0.18ug/ml (Peirce, 1946). No carotenoids have been detected in goats except in their colostrum (Chanda, 1952). The major dietary carotenoid, beta-carotene, is capable of being converted to the colourless retinol in the mucosal layer of the small intestine (Goodwin, 1952). Unconverted carotenoids and retinol are then absorbed, transported in plasma and deposited in various tissues. The aim of this study is to detect whether goats absorb any carotenoids at all and to compare the carotenoid and retinol concentrations in the serum and fat of sheep and goats.

Eight Merino cross ewes and eight feral does around 12 months old were put on pasture comprising mainly pangola grass and clover for four months before the animals were slaughtered. At slaughter, blood and subcutaneous fat samples were taken for the analysis of carotenoids and retinol. A high performance liquid chromatography method was modified to detect carotenoids at 436nm and retinol at 313nm and to determine their concentrations in the serum and fat samples. The results are shown in the Table.

	Serum (ug/ml)		Fat (ug/g)	
	Carotenoids	Retinol	Carotenoids	Retinol
Sheep	0.03	0.38	0.04	0.72
Goats	0.02	0.40	0.06	0.96 ¹
¹ P<0.10				

Carotenoids were detected in both the serum and fat of goats. The failure to detect any carotenoids in goats in the earlier reports may have been due to the low sensitivity and efficacy of the methods used. Lutein was the major carotenoid detected in the serum and adipose tissue of both sheep and goats. No beta-carotene was detected in these samples. There was no correlation between serum and fat carotenoid and retinol concentrations. No difference was found between sheep and goats in their serum and fat carotenoid concentrations and their serum retinol levels. Goats had 25% higher retinol in their fat than sheep (P<0.10).

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Chanda, R. (1952). Biochem. J. 52, ii.

Goodwin, T.W. (1952). In The Comparative Biochemistry of the Carotenoids, pp 269-288.

Peirce, A.W. (1946). Aust. J. Exptl. Biol. Med. Sci. 24, 231-240.

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