

AMINO ACIDS IN PREGNANT AND LACTATING EWES

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Pregnancy and lactation reduce wool growth (Oddy 1985). Limited availability of sulphur amino acids (S-amino acids) could account for this depression since S-amino acids, used by non-reproducing sheep for the production of wool, are also required for foetal growth and milk synthesis. Changes in plasma amino acid concentrations in response to energy induced protein synthesis have been used to identify possible limiting amino acids (Purser et al. 1966). The amino acid which decreases the most relative to other essential amino acids is considered limiting. Since protein synthesis increases with foetal growth and milk production, changes in the concentration of amino acids in the plasma may indicate whether S-amino acids are limiting during pregnancy and lactation.

Ten pregnant and 10 non-pregnant Merino ewes, in individual pens, were fed an oaten hay diet with 25% lupin seed for 10 weeks. Intakes were restricted allowing a small increase in live weight of the non-pregnant ewes (63.5 ± 3.6 g/d) and in conceptus-free live weight of the pregnant ewes (28.0 ± 16.0 g/d). Weight loss occurred during lactation (134.9 ± 25.0 g/d). Blood was collected at weeks 18 (T1) and 20 (T2) after mating, at birth (T3) and at weeks 1 (T4) and 3 (T5) of lactation. Corresponding samples were collected in the non-pregnant ewes. The samples were de-proteinized using 10% sulphosalicylic acid and the plasma assayed for amino acid concentration using a Biotronic LC5001 amino acid analyser. Amino acid concentrations of reproducing ewes are presented in the table.

Amino Acid	Concentration ^a					Change in Concentration ^a	
	T1	T2	T3	T4	T5	(T1 to T3)	(T3 to T5)
Arginine	33.1	23.8	14.1	16.1	16.6	-19.0 \pm 2.3**	+2.5 \pm 2.4
Cysteine	4.7	4.5	5.3	6.8	5.6	+0.6 \pm 0.5	+0.3 \pm 0.5
Histidine	9.8	7.6	11.3	9.3	9.3	+1.5 \pm 0.8	-2.0 \pm 1.1
Isoleucine	11.0	8.7	8.2	11.7	9.9	-2.8 \pm 0.8**	+1.7 \pm 1.2
Leucine	11.1	8.8	9.3	13.0	10.2	-1.8 \pm 0.5**	+0.9 \pm 1.3
Lysine	23.4	19.0	11.1	15.4	13.7	-12.3 \pm 1.2**	+2.6 \pm 1.2*
Methionine	4.5	4.0	4.8	6.7	4.8	+0.3 \pm 0.6	0.0 \pm 0.8
Phenylalanine	9.4	11.1	16.4	16.6	16.1	+7.0 \pm 0.7**	-0.3 \pm 0.9
Threonine	15.9	8.5	8.6	18.0	16.6	-7.3 \pm 1.5**	+8.0 \pm 1.9**
Valine	17.3	11.9	13.6	18.0	14.7	-4.0 \pm 1.4	+1.1 \pm 2.3

^a mean \pm sem; μ g/ml

**($P < 0.01$) *($P < 0.05$) Significant change in concentration using Students t-test

The concentration of methionine and cysteine did not change during pregnancy or lactation. Arginine, isoleucine, leucine, lysine and threonine all decreased ($P < 0.01$) during late pregnancy. These amino acids also decreased ($P \leq 0.05$) in the non-pregnant ewes over the same time period but for arginine and lysine the magnitude of change was significantly greater in the pregnant ewes ($P < 0.01$).

Our results indicate that the S-amino acids, cysteine and methionine, are not limiting during pregnancy or lactation because they remained at a constant concentration. Arginine and lysine, however, were significantly depressed as a result of pregnancy and may be limiting.

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