

Effects of severe undernutrition on body weight and fat tissue changes in dry Lacaune ewes

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The aim of this experiment was to examine the effects of both severity and duration of undernutrition on body weight changes and fat tissue variations in dry Lacaune ewes. Twenty-three mature (6–7 years old) ewes were divided in 4 groups of similar initial bodyweight (BW = 66–68 kg); group A: control, slaughtered initially; groups B and C: ewes fed at 60% of maintenance energy requirements (60% M) for 85 and 81 d, respectively, B ewes were slaughtered and C ewes were fed at 36% M for 36 more days (total of 117 d for group C); group D: ewes fed directly 34% M for 64 d. The diet consisted of straw, hay and minerals. Energy intake was adjusted weekly to the theoretical maintenance energy requirements ($M = 374 \text{ kJ ME/kg BW}^{0.75}$; ME: metabolizable energy). At slaughter, gut content was removed, omental adipose tissue was weighed, and backfat thickness was measured.

Ewes in the B and C groups were submitted to 60% M supply and lost about 9 kg BW in 85 or 81 d. Ewes in the C group subsequently lost 12.0 kg more when fed at 36% M during the remaining 36 d. D ewes directly submitted to severe undernutrition (34% M) lost 21.1 kg BW in 64 d (table I). The total BW losses were similar in groups C and

D, although the theoretical energy balances (T-EB) were different: -407 and -328 MJ ME (table I). Up to -328 MJ, the C ewes had lost 13.6 kg. The duration and intensity of undernutrition did not significantly affect final empty BW, omental fat weight and backfat thickness in C and D ewes (table I).

The ratio of BW loss (kg) to a 100 MJ-ME theoretical energy deficit for each period (table I) and sub-period was computed. It was the lowest (3.6) for ewes with moderate underfeeding (group B). With accentuated underfeeding (group C), this ratio was 5.1, while with severe underfeeding (group D) it was higher (6.4). At the beginning of each severe (around 35% M) undernutrition sub-period the ratio was always very high: 7.8 for the D group (in 12 d) and 7.6 for the C group (in 36 d). This shows that with moderate undernutrition ewes can adapt in order to avoid high BW losses. But with severe undernutrition (around 35% M) they first lose BW rapidly (7.7 kg/100 MJ energy deficit), and then reduce this ratio to 5.0 kg/100 MJ during the last 20 d, probably as a physiological limit. However, further studies on gut content and body composition are needed to better understand these adaptations.

Table I. *In vivo* and *post mortem* measurements in underfed ewes (mean, (SD)).

Groups (duration)	n	Initial BW (kg)	BW changes (kg)	E balance (MJ ME*)	Final EBW (kg**)	Omental fat (kg)	Backfat (mm)
A: control	6	67.8 (8.4)	-	-	53.7 (10.5)	2.35 (0.9)	10.1 (4.6)
B: 60% M (85 d)	6	67.5 (5.8)	-9.4 (2.8)	-257 (33)	46.5 (4.9)	1.14 (0.5)	4.2 (2.8)
C: 56% M (117 d)	5	66.7 (5.8)	-20.7 (2.3)	-407 (46)	38.7 (3.3)	0.70 (0.4)	0.5 (1.1)
D: 34% M (64 d)	6	66.5 (8.0)	-21.1 (3.3)	-328 (47)	38.8 (6.9)	0.82 (0.7)	0.0 (0.0)

* Theoretical energy balance; ** empty body weight.