Effects of restricted feeding and refeeding on Barbarine lambs growth, carcass quality and fatty acid composition

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INTRODUCTION

Sheep production system, in arid and semi-arid areas, depends mostly on natural vegetation. Seasonal fluctuations cause a periodical restriction in feed quality and quantity. Alternatively, the growth may be delayed until an adequate feed supply is available in the next wet season and take benefit from compensatory effects. The Restriction of nutrients and subsequent compensatory growth can affect body or carcass composition particularly muscle and fat deposition.

The objective of this research was to study the effect of feed quantity and quality restriction and rehabilitation on lamb growth, carcass quality and intramuscular fat fatty acid composition.

MATERIAL AND METHODS

50 lambs born in spring and bred in summer were used, 5 lambs were slaughtered at the start of the experiment, the remaining were divided in 3 groups and were fattened in 2 periods: restriction (Table1) and rehabilitation (Table 2). Lambs were periodically weighted. At the end each period 5 lambs per group were slaughtered, half-carcasses were dissected for carcass composition and intramuscular fatty acid analysis.

Under-feeding	Low	Medium	High
nb. lambs	15	15	15
Initial BW (kg)	18.3	19.1	18.8
Diet	Stubble	Stubble + 100 g soya	Hay + conc-

Rehabi-litation	Low		Medium		High	
Diet	Hay + conc-		Hay + concentrate		Hay + conc	
Crude Prot (%)	16	21	21	16	16	21

RESULTS

UNDERFEEDING PERIOD

REHABILITATION PERIOD

(No protein content effect)

Growth performance and carcass weight

Growth rate for sheep fed stubble (L) was low. Soya bean meal slightly improved lamb growth (M). Lambs kept indoors (H) grew faster than did M and L ones. Slaughter BW and carcass weight were significantly higher in the H group than in in the M and L groups (Table).

Under-feeding	Low	Medium	High
Slaughter BW (kg)	22.6	24.4	26.4
ADG (g)	61	76	108
Carcass (kg)	7.9	8.5	11.2

The growth rate was higher in MH and LH lambs than in HH ones. However, lambs for H group had heavier SBW and carcass weight than the other groups (Table), this is in relationship with their initial BW.

Rehabili-tation	Low	Medium	High
Slaughter BW (kg)	35.5	37.7	39.6
ADG (g)	125	128	114
Carcass (kg)	17.7	18.7	20.0

Carcass composition

H lambs had more muscle and fat, but all groups had similar bone weight. The H lambs gained daily more muscle than the M ones, which gained more than the L ones. They also deposed much more ($p<0.001$) fat than the two other groups. The M lambs had better composition of carcass gain with the highest proportion of muscle and the lowest fat concentration (Figure 2)

Body muscle weight was similar in all treatments. H lambs had significantly more fat (both in terms of mass and proportion) than compensating animals (Figure 3). There was no difference between L and M group lambs for carcass gain and composition. The fat concentration increased (306 g/kg) while muscle and bone proportions decreased for the H diet (Figure 4).

Figure 1. Tissues weight (kg) in Underfeeding period

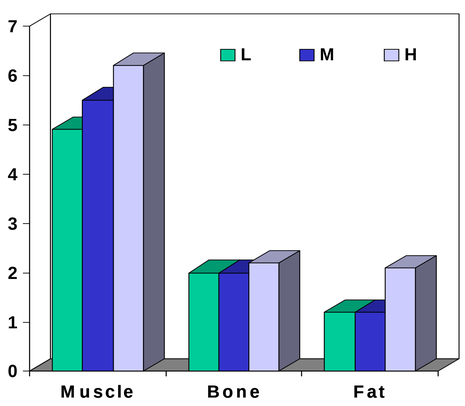


Figure 2. Carcass gain composition (%) in underfeeding period

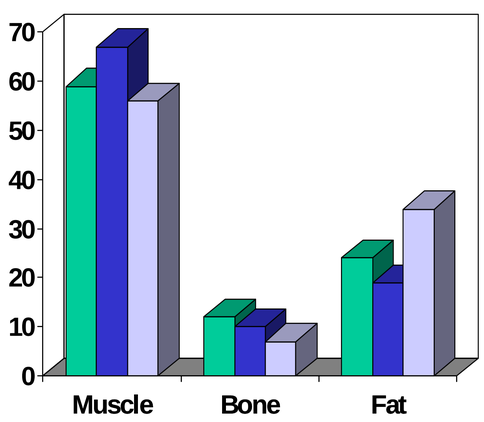


Figure 3. Tissues weight (kg) in rehabilitation period

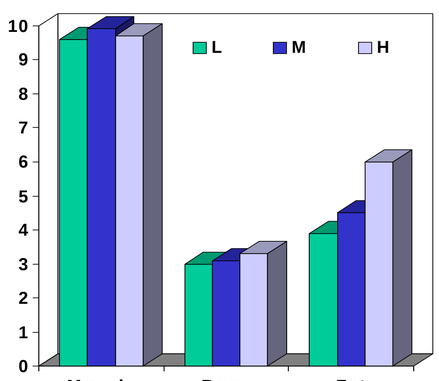
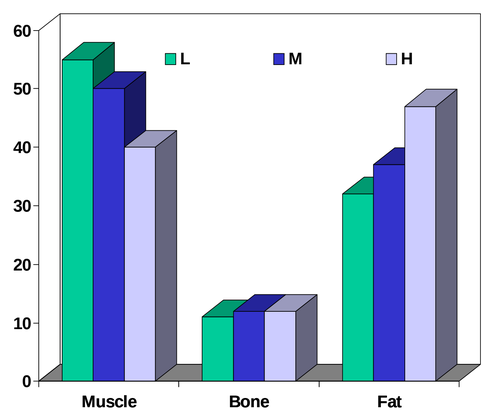


Figure 4. Carcass gain composition (%) in rehabilitation period



Intramuscular fatty acid composition

Sheep on Low regimen had more C18:0, C18:1 than the ones on M and H diets. The intra-muscular fat content in C18:2 and the unsaturated (UFA) to saturated fatty acid (SFA) ratio were similar for all treatments.

Under-feeding	Low	Medium	High
C18:0	20.810	17.437	17.574
C18:1	38.535	34.813	33.874
C18:2	4.228	4.487	4.426
UFA/SFA	0.917	0.89	0.880

The intra-muscular fat composition was similar for all the treatments except for C18:2, which was significantly higher in L than in H sheep. Compensating animals showed a slightly higher proportion of unsaturated FA and unsaturated FA to saturated FA ratio than unrestricted ones.

Rehabil-itation	Low	Medium	High
C18:0	21.078	19.958	18.960
C18:1	46.033	48.406	45.640
C18:2	4.026	2.818	2.148
UFA/SFA	1.147	1.197	1.030

CONCLUSION

* For lambs born in spring for slaughtering in autumn, stubble grazing with proteic supplement (M) lead to a satisfactory growth rate and better composition of carcass gain with the highest proportion of muscle and the lowest concentration of fat.

* For lambs born in spring for slaughtering in winter at high BW, stubble grazing followed by realimentation with appropriate energy supply allowed BW at slaughter similar to the High diet with an opportunity to reduce fat and increase the muscle content of carcasses in heavy lambs.