

THE CELLULARITY OF OVINE ADIPOSE TISSUE

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Both hyperplasia and hypertrophy of adipocytes contribute to the growth of subcutaneous adipose tissue of Dorset Horn X Merino wethers until they reach about 12 months of age. Thereafter growth of this fat depot occurs only by hypertrophy of the existing adipocytes (Hood and Thornton 1979).

The contribution(s) of hyperplasia and hypertrophy of adipocytes to the growth of subcutaneous (S), perirenal (P) and omental (O) fat depots of 32 growing adult Border Leicester X Merino wethers were examined in a 120 day growth experiment. The animals were serially slaughtered over the liveweight range of 29-56 kg; the adipose tissues were dissected, weighed and samples from each were fixed in osmium tetroxide for sizing by an image analysis technique (Thornton, Hood, Rowe and Jones 1983).

TABLE 1 Linear regression equations ($y = a + bx$) describing the relationships between various parameters (y) and time (x, days)

y	a	b	R ² (%)
Liveweight (kg)	28.895	0.186	88.1
S Fat Wt. (kg)	1.791	0.041	77.7
O Fat Wt. (kg)	0.273	0.016	80.4
P Fat Wt. (kg)	0.225	0.010	70.4
S Adipocyte Volume (nl)	0.401	0.006	61.2
O Adipocyte Volume (nl)	0.712	0.016	66.9
P Adipocyte Volume (nl)	0.408	0.011	63.6
S Adipocyte No. ($\times 10^9$)	6.090	0.001	0.1
O Adipocyte No. ($\times 10^9$)	0.658	0.002	8.2
P Adipocyte No. ($\times 10^9$)	0.778	0.002	6.7

S adipose tissue had the largest population of adipocytes, but its cells were the smallest ($\bar{x} = 0.76$ nl), and showed the slowest rate of volume increase; O tissue had the lowest number of cells, but its cells were the largest (1.63 nl), and grew the fastest; while P tissue was intermediate in terms of cell numbers, size (1.0 nl) and growth rate.

The frequency distribution of cell volumes from each of the three fat depots was usually normal (24 out of 32 for S; 26/32 for O and 29/32 for P). Although small cells were always present there was no evidence of the development of large populations of small adipocytes (hyperplasia) or of bimodal distributions of cell volumes in the adipose tissues of any sheep. Differential hypertrophy of existing adipocytes could alone account for the growth of all three adipose tissue depots. These findings agree with, and clarify, our previous reports (Hood and Thornton 1979; Thornton et al. 1983) but contrast with recent studies on laboratory animals (Faust, Johnson, Stern and Hirsch 1978).

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