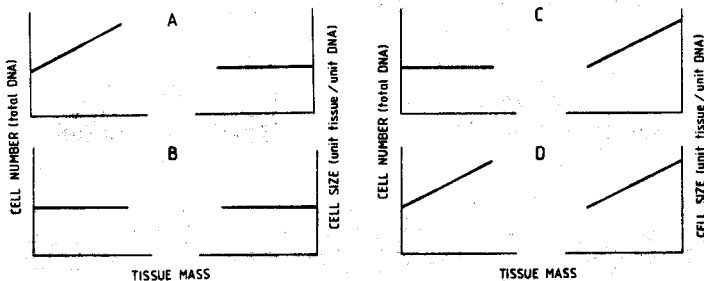


## SIZE AND CELLULARITY OF ORGANS IN MATURE SHEEP

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The growth and ultimate size of any organ is defined by the number and size of the cells within it. Winick and Noble (1966) postulated that organ growth occurred in three phases: (i) an increase in cell number (hyperplasia), (ii) an increase in cell number and cell size, and (iii) an increase in cell size alone (hypertrophy). However, Sands et al. (1979) showed that organ size was directly proportional to cell number in the heart, liver, kidney and gastrocnemius muscle of rats from birth to adulthood, and challenged the concept that growth occurs in these phases and that variations between genotypes in the mass of mature organs are due to hypertrophy.

The cellularity of 17 organs in adult rams was studied to establish whether differences in organ mass between sheep genotypes at maturity reflected differences in number and/or size of cells. Rams from six breeds were fed ad libitum until liveweight stabilised (62 to 94 kg). Organ DNA content was used as an index of cell number and organ mass per unit of DNA as an index of cell size.



'Stylized' examples of cellularity patterns found in organs of mature sheep.

Four types of tissue cellularity patterns were observed (see Figure). The most common was type A, where variations in organ size were a result of differences in cell number. A large proportion of body mass was represented by this pattern, including skeletal muscle, skin, heart, kidney, lung, liver and spleen. The B type pattern occurred in brain and blood, and indicated that small changes in cell number and/or size were associated with small changes in organ mass. Kidney fat depots typified the C pattern, where there were no differences in cell number between animals but large differences in cell size. Hood and Thornton (1979) showed that fat-cell number did not increase once sheep reached 11 months of age, whence changes in tissue mass were due to changes in cell size. Gastrointestinal tract organs were of the D type. These are metabolically active, and radical changes in mass can occur in a short time, as can rapid changes in cell number and cell size.

Thus variations in the mass of most mature tissues in adult sheep result from differences in cell number and not cell size.

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