

was partially replaced by dry peas or urea, the latter not exceeding 1.5 % of the concentrate in any case;

— The problem of protein supplementation of farm cereal mixtures is not completely solved. Even if there is free access to cereals and protein feed, over-consumption of the latter is almost always the rule.

## Amino acid requirements of preruminant lambs

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The amino acid requirements of preruminant lambs were tentatively determined by different methods:

— ewe milk amino acids are assumed to satisfy the amino acid requirement of lambs and are compared to those of cows milk (Table I);

— the amounts of essential amino acids ingested by lambs in which the protein requirement is satisfied may be used as rough estimations of the amino acid requirements of preruminant lambs (Table 2). This method of evaluation tends to underestimate the requirements for the limiting amino acids of the experimental protein, and to overestimate the requirements for amino acids in excess of that protein.

The requirements for some essential amino acids were directly determined by measuring the nitrogen balance and/or the blood level of free amino acids of lambs fed increasing amounts of those amino acids. Thus, the methionine requirement of preruminant lambs was about 2.0 g/d (Fig. I), i.e. 2.6 g/d of sulphur amino acids.

The amino acid requirements of fast-growing lambs (250 to 300 g/d), evaluated by the different methods, are summarized in Table 5. It may be inferred that amino acid requirements vary according to age and feeding level. The amino acid requirements of 8-day old preruminant lambs fed *ad libitum* seemed to be satisfied by 67 g/d of cow milk protein supplemented by 0.3 g/d of DL methionine and 0.9 g/d of L lysine. When the lambs were 21 day old, they needed 72 g/d of cow milk protein supplemented by 0.1 g/d of DL methionine and 0.5 g/d of L lysine, if fed *ad libitum*: 76 g/d of cow milk protein supplemented by 0.3 g/d of DL methionine if the feeding level was only 80 % of *ad libitum* feed consumption.

## Effect of dehydrated pelleted hay on calcium and phosphate metabolism in lambs

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In 3-month-old ram lambs fed dehydrated pelleted lucerne hay, the urinary and faecal excretion of calcium was significantly higher than in control lambs fed normal lucerne hay (Table II). The causes for these differences are still unknown. This may be due to an increase in the speed

of dehydrated pelleted hay transit through the digestive tract. Nevertheless, this increase in calcium urinary and faecal excretion may be responsible for the bone deformation observed in lambs fed dehydrated pelleted hay during a long time.

In lambs fed dehydrated pelleted rye-grass hay, the daily urinary excretion of inorganic phosphorus was very high (Table III) and reached values similar to those observed in renal-stone prone lambs. Such an increase in daily urinary excretion of inorganic phosphorus was not observed in lambs fed dehydrated pelleted lucerne hay. Thus, the calcium content of the hay seems to play a major role in the control of the urinary excretion of inorganic phosphorus in lambs.

### **Effect on breeding of cabbage feeding**

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Cabbage is used more and more at certain periods of the year as the « sole meal » in ewes kept on zero grazing. However, depending on the variety or growth stage at crop time, this food contains goitrogenic substances which disturb the working of the thyroid and perhaps ovarian glands by stopping iodine assimilation.

When fed to ewes at the end of pregnancy, cabbage causes a high mortality rate of the lambs at birth and disturbs their growth. The month before and after artificial insemination, this green fodder leads to lower fertility and prolificacy rates.

It seems that these difficulties are fewer when cabbage feeding is restricted. In spite of this, cabbage remains an attractive food in pasture or zero grazing, but should be reserved for lactating or dried-up ewes, and not be given to mating ewes, as long as an efficient correcting factor has not been found.

### **Home range behaviour and use of pastures by unherded sheep on an alpine range**

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The home range behaviour of sheep kept on an alpine range in high altitudes in the Alps is studied.

Individual flocks remain as a stable social unit without mixing. Each uses an exclusive home range with stable camping sites and grazing areas, although the flocks often group together, especially during the rumination period in the middle of the day. When meeting during grazing, the flocks separate as soon as possible. As a consequence, the pasture is fairly uniformly used, and grass production is correctly utilized by the sheep.

In this very difficult environment, weekly checking by a shepherd is sufficient to limit the losses to 1 p. 100 during each of the 4 years of observation.

Such a system could be profitable for using mountain ranges.