3.2. FEED INTAKE REQUIREMENTS

S.K. Ranjhan, J.B.Schiere and M.N.M. Ibrahim

INTRODUCTION

Animals have to be given feed, and generally, as the animal eats more, the production in terms of milk, draught and meat will be higher. There are exceptions however, and a few things are to be kept in mind before suggesting that dry matter intake is a guarantee for higher production. In fact, the nutrient concentration of the feed, and the capacity of an animal to eat what it is offered is more important than the focus on dry matter intake. Last but not the least it is the farmer who may decide to feed lower levels of feed than what the animal could eat, purely for practical or economic reasons. Some of these issues are discussed with special reference to straw based rations.

FEED QUALITY AND INTAKE

Not all the feed is the same, and accordingly the intake of their feeds will vary. No hard and fast rules can be suggested, but a few points should be taken into account when discussing "intake" for the formulation of rations

Handbook for Straw Feeding Systems
Kiran Singh and J.B. Schiere (eds.), 1995
ICAR, New Delhi, India

and feeding strategies: dry matter content, nutrient concentration and physiological state of the animal.

Dry matter content

While computing rations, the intake of a wet succulent feed like water hyacinth, alfalfa or young grass must be corrected for its dry matter content. Since ten kilos of such feeds contain only 1 - 2 kilo of dry matter, one has to be cautious in comparing the nutritive value of ten kilos of straw with ten kilos of green feed. As a general rule, it is always best to express everything on a dry matter basis. Only when this is to be translated to farmers conditions, does it make sense to express the total feed on a fresh matter basis.

The other problem with the dry matter content is that when feeds are very succulent, the intake may be reduced because of the large amount of water that is ingested. This effect is difficult to quantify. Wilting of the grass may help, but the argument that highly succulent feed need to be given straw in order to increase their dry matter intake is questionable. In fact, the intake of dry matter i.e. of nutrients, from for example alfalfa or berseem is higher than from straw as shown in Table 1. Straw may be added to these feeds for other reasons, for example, because it can help to improve dung consistency, to avoid bloat, or to actually reduce the nutrient intake:

> *farmers in the berseem growing area are known to mix chopped straw with the chopped berseem, but high producers are given a higher ratio of green to straw than low producers. This implies that the farmer dilutes the concentration of nutrients more for low than for high producers. If the milk production of the animals is still*

higher, less straw will be added, unless again, the secondary effects of straw become important, such as on dung consistency or rumen function.

Nutrient concentration

Some international literature about nutrient requirements uses the term "dry matter requirements" (NRC, 1987). However, they do so while stating at the same time the nutrient contents of the feeds that are considered in these estimates. The principle is that of a feed like straw, with 0.40 kg TDN/kg feed dry matter the animal would have to eat twice as much dry matter as when the feed contained 0.80 kg TDN per kg dry matter, as is the case in a good concentrate supplement. The problem is however, that whereas an animal should eat more straw to cover its nutrient requirements, in reality it can eat less. Whether this lower intake is regulated by the animal metabolism, or by rumen fill will be a matter of scientific dispute for some time to come, but the fact is that the poorer the feed, the lower is its intake (Table 1). What it really means is that the intake of straws is low, and since that is combined with a lower nutrient concentration, the total intake of nutrients is generally too low to even let the animal maintain its weight. What really counts therefore is not the dry matter intake, but the absolute intake of nutrients, better expressed as digestible organic matter, or as TDN, ME or whatever measures one uses. The use of tables with dry matter intake requirements is particularly misleading in case of poor quality feeds, and mainly based on conditions where feed is homogenous and of good quality.

Table 1. Some approximate intake values of feeds, estimated for animals at maintenance.

straw	1.5 kg/100 kg BW
treated straw	1.9 kg/100 kg BW
medium quality grass	2.2 kg/100 kg BW
good quality grass	2.6 kg/100 kg BW

Physiological state of the animal

Depending on its physiological state, the animal has the capacity to eat more, or less. High producers can eat up to twice as much of the same feed as low producers, starved animals may eat more than what one might expect on the basis of their bodyweight. Disease, parasite infections or mineral deficiencies will all cause the animal to eat less than what would be expected on the basis of its bodyweight (#4.1.).

THE FARMER AND THE DRY MATTER INTAKE

It may be clear from the above that dry matter intake depends on feed quality and physiological status of the animal. However, ultimately the farmer takes decisions on the basis of economics. Clearly, if a feed is very expensive (= scarce), the farmer may even temporarily decide to forego some production rather than to let the animal produce milk at prohibitive cost. The farmers' idea is then not how to feed as much as possible, but how to feed as little as possible. But the issue is more complicated, let us go back again to the case of straw mixing in berseem rations.

If a good feed like berseem is relatively scarce, and if straw is relatively cheap, the farmer prefers to feed as little berseem as possible, particularly

when the animal is producing only small quantities of milk. In that case, the farmer stretches the farm feed resources by mixing poor quality feeds. If necessary, the straw is chopped and soaked to increase the intake of on-farm feed, not so much to increase the daily nutrient intake of a cow, but to maintain the animals in a situation of limited supply of good feed.

The other case occurs where a farmer with high producing animals, and good access to the market, will reduce the roughage component in the feed as much as possible. To ensure a higher production of milk, the feed should be of the best quality, and it pays to replace the roughage with concentrate, e.g. the strategy of substitutional supplementation is applied (#4.3.). In these cases the roughage is only useful to maintain a certain level of fibre in the ration for optimum rumen function. Again, it should be clear that what counts is not just the dry matter requirement, but the intake of digestible nutrients. Though the increased dry matter intake is associated with the increased nutrient intake, the two are not synonymous.

CONCLUSION

The feed consumed by the animal determines to a large extent what the animal will produce, but it is incorrect to assume that a high dry matter intake guarantees a high output. Depending on the type of feed, the availability of feed and the type of produce), the farmer may decide to reduce rather than to increase the dry matter intake, or to decrease the nutrient intake by replacing berseem dry matter with straw dry matter.

SUGGESTED READING

Agricultural Research Council, 1980. the Nutrient Requirements of Ruminant Livestock. Commonwealth Agricultural Bureaux (CAB), Farnham Royal, UK, 351 pp.

De Wit, J., Dhaka J.P. and Subba Rao, A., 1993. Relevance of breeding and management for more or better straw in different farming systems, pp. 404-414. In: Kiran Singh and J.B. Schiere (Eds). Feeding of Ruminants on Fibrous Crop Residues. Proceedings of an International Workshop held on 4-8 February 1991, NDRI, Karnal. BIOCON/ICAR.

Forbes, J.M., 1986. The voluntary food intake of farm animals. Butterworth Publishing Co., UK.

Ketelaars, J.J.M.H. and Tolkamp, B.J., 1992. Toward a new theory of feed intake regulation in ruminants. 1. Causes of differences in voluntary feed intake: critique of current views. Livestock Production Science, 30: p. 269-296.0

NRC, 1987. Prediction Feed Intake of Food-Producing Animals, National Research Council, Washington DC.

Prasad, C.S., Sampath, K.T., Shivaramarajah, M.T. and Walli, T.K., 1993. Dry matter intake, digestibility and supplementation of slender and coarse straws, pp. 188-204. In: Kiran Singh and J.B. Schiere (Eds). Feeding of Ruminants on Fibrous Crop Residues. Proceedings of an International Workshop held on 4-8 February 1991, NDRI, Karnal. BIOCON/ICAR.