

Feeding Ruminants in Bhutan

Bhutan is a landlocked, mountainous country with an area of about 46,000 sq. km., situated in the eastern part of the HKH Region. It is basically an agricultural country where more than 95 per cent of the national labour force derive their livelihood from agriculture. Livestock are a major component of agriculture in Bhutan and consist of about 3,50,000 cattle, 26,000 *yak*, 40,000 sheep, and 42,000 goats. (AHD, RGOB, 1981-1987). The country is sparsely populated with an estimated figure of about 1.4 million and has good forest coverage. *Yak*, *mithun* (indigenous cattle), and sheep are the common domesticated animals found in the high altitude areas of Northern Bhutan whereas local *Siri* cows, sheep, and goats are popular farm animals in Southern Bhutan where buffaloes are rarely kept as farm animals.

Livestock raising in Bhutan provides many essential items, such as meat, milk, cheese, and wool, which generate cash income to purchase other household commodities. *Yak* and *Mithun* are used extensively for the transportation of goods across the steep mountains. Apart from this, livestock are the only source for replenishing soil fertility through the application of manure and for draft power for crop cultivation. Many of the nomadic farmers living in the high mountains (above 3,000masl) have no suitable land for crop cultivation. Most of them earn their living from livestock farming. These farmers keep on moving with their flocks throughout the year in search of animal feed and markets in which to sell animal products. During summer they take their herds as high as 5,000m and, in winter, they drive their flocks lower down to around 2,000m. Most of the *yak* herds do not come down to the lower mountains even in winter because of many environmental and topographical reasons. The farmers know the exact limits beyond which they can never take their herds. They rely on their homeland pastures only for about three months, over the period from July to October, during which enough forage is available to feed the livestock population. As soon as the summer pasture dries up, the body conditions and the productivity of the animals begin to deteriorate because of the highly fibrous and poor quality of pastures which are inadequate to meet the normal voluntary intakes of animals. In winter, these animals depend on dry and matured native grass, bamboo shoots, tree bark, residues of millet, and oats. It has been repeatedly claimed that due to lack of animal feed thousands of *yak* die in the high mountain areas, where almost all the land is covered with snow for three to four months during the year.

Lack of animal feed during the winter months is an acute problem for almost all Bhutanese farmers, and this is because of open and uncontrolled animal grazing on pasture rangeland and traditional animal feeding practices. On the southern hills where maize, rice, and wheat are grown on terrace lands and along rivers banks, crop residues make up the bulk of the feed given to ruminants; fodder leaves, sun-dried hay, and silage are rare commodities for small farmers in the rural areas. The productivity of communal pastures decreases every year despite the implementation of various fodder and pasture development projects. This has made crop residues, which are locally available, reliable animal feed during the periods of feed scarcity. Feeding on surplus amounts of cereal grain by-products and oilseed cakes with salt is a good practice commonly used to supplement feed. But this kind of practice is generally adopted in the case of animals having higher production levels. Feeding cattle on commercial concentrates is still a milestone practice at the village level.

During 1987/88 a 'Feed Mixing Plant' of about 10 MT capacity was installed under the FAO/UNDP/BHU/84/020 Project located in the southern border area of Bhutan. The production of cattle concentrates represents only about 15 to 20 per cent of the total production. Almost all of these cattle concentrates were consumed at government farms. Farmers having genetically improved cattle producing more than three litres of milk daily are likely to use cattle concentrates provided they have access to roads. These farmers are residing largely in southern Bhutan, at altitudes of 500 to 1,500m. The recently established Milk Processing Plant in the border town collects milk from farmers and provides various livestock services, including field level training on the feeding and management of farm animals. This has encouraged local farmers to feed compounded feed to their farm animals. However, it is unlikely that the compounded feed can form the bulk of the daily ration under field conditions, even during periods of feed scarcity in winter, because most of the livestock are local species with low production potentials but multipurpose functions.

It should also be considered that the country has a poor source of feed ingredients and almost totally depends on neighbouring countries for the raw materials required in manufacturing animal feed. Only about 10 per cent of the total maize and mustard oilseed cakes is available in the local market. The country suffers a great drain on foreign currency for importation of animal feed ingredients.

In this context, an efficient use of locally available feed resources would be an appropriate approach to meet the feed deficit problem during winter. Several forage conservation and resource utilisation techniques have been developed and experimentally tried on farm animals. Some of the resource improvement techniques developed in Bhutan are listed below.

- Treatment of straw with urea.
- Incorporation of farm wastes into grass silage.
- Inclusion of sun-dried poultry litter into cattle concentrates.
- Development of UMB

The treatment of straw with urea has become a regular farm practice on all government farms but has not been adopted by many farmers at the village level. In fact, many of them are being discouraged due to the complications that arise during the preparation of urea-treated straw. The normal practice is to ensile the straw that is treated with four per cent urea solution, with straw and water in a ratio of 1:1 (Premasiri 1985).

The maize (forage) silage mixed with poultry litter was successfully prepared and fed experimentally to eight lactating cattle for two months. This type of poultry waste mixed with maize silage was found to be equally palatable to dairy cows as silage prepared with maize forage alone. All cows consumed more than 15 kg of poultry litter-mixed silage daily without any deleterious effects on animal health (Bajracharya 1988).

The inclusion of 30 per cent of poultry litter (on DM basis) with maize forage, at the time of ensiling, improved the nutritional value of the final product in terms of crude protein and mineral content. It was also observed that a kilogramme of concentrate was saved daily when cows received supplements of the farm waste-mixed silage and they still maintained the same level of milk production. The experimental results suggested that the poultry waste-mixed silage was much more cost effective than that prepared from maize forage alone. It is now possible to prepare silage out of poultry wastes even under field conditions when poultry litter is easily available and farmers are familiar with silage preparation.

In another experiment, all four experimental sheep consumed two kilogrammes of each type of cattle concentrate prepared with and without sun-dried broiler litter (Bajracharya 1990). The inclusion of 30 per cent of sun-dried litter (on DM basis) helped to replace about 72 per cent of the oilseed cake ingredients in the concentrate without changing the nutritive value of the final mixture. The farm waste-mixed cattle concentrate, thus prepared was about 80 per cent cheaper than the commercial cattle concentrate, and it was also found to be cheaper than paddy straw in terms of digestible nutrient content. Nevertheless, further research on the use of local resources for preparing animal feed is required.

None of the above-mentioned methodologies, for the conservation and utilisation of local resources in preparing animal feed, was found appropriate to the existing conditions at high altitude where cropland does not contribute a considerable amount of feed for livestock. Silage-making has rarely been adopted to prepare winter feed in appreciable quantities. Only a limited quantity of plant residues from oats and millet are available during winter. Thus, the major source of animal feed at high altitude is the communal native pastures which are highly fibrous and contain negligible amounts of nutrients when mature. Even this low quality feed is not adequate to satisfy the maintenance requirements of animals. This type of feed deficit forces animals to lose their body weight and production for a considerable period of the year. Further limitations are caused by the frequent movement of herds from one place to another. Under such practical field conditions, many of the proven resource utilisation technologies contribute little to solving the problems of farmers, especially *yak* farmers.

It has been a great challenge for the Department of Animal Husbandry to overcome the severe feed deficit problem during winter in the high alpine areas of Bhutan. Livestock workers and advisors should also look for a suitable technology for the conservation and utilisation of local resources in preparing animal feed. Several formal as well as informal meetings were called by the head of the Department of Animal Husbandry to solicit alternative means of feeding in the *yak*-raising areas of the country. The development of UMB received highest priority among the technologies developed so far in Bhutan for the preparation of animal feed using local resources.