

Feed and Fodder

There are two main, distinct livestock production systems in Afghanistan; sedentary, mixed farming, and nomadic, transhumant pastoralism such as the Kuchis and the Karakul sheep production systems. In mixed farming, livestock keepers rely to some extent on the common grazing lands that normally surround the village, whereas transhumant herders practise vertical, seasonal migration between the dry plains and the mountain summer pastures. Grazing lands and pastures thus form a crucial resource for livestock feeding in Afghanistan, as the country mostly comprises extensive grazing land. However, there is limited access to adequate biomass all year around. This is crucial, as animals need a year-round feed balance for optimal growth and productivity.

Balanced animal feed

Balanced feeding implies providing fodder of sufficient quality and in sufficient quantities. For optimal growth animals need a balance of carbohydrates, proteins, fats, vitamins and minerals. Table 1 presents nutritional sources to create a balance diet for ruminants and poultry. Ruminants feed on various sources of biomass to satisfy their dietary requirements. However, mineral licks are an essential additional part of ruminant feed that is often overlooked. In rural Afghanistan poultry normally scavenge around the homestead and feed on available grains and crop residues. A supply of sufficient protein is crucial to maintaining good product quality in dairy and egg production.

Table 1: Nutritional sources for ruminants and poultry (adapted from FiBL, 2011)

Species	Carbohydrates	Proteins	Fats	Vitamins	Minerals
Ruminants	Forages, pasture, crop residues	Leguminous fodder, young grass	Not necessary to feed fat	Green pasture, fresh or dried leaves	Mineral licks, dried leaves, bark, herbage, shrubs
Poultry	Cereal grains, tubers and their industrial by-products	Insects and worms, legume seeds and legume plants	Cottonseed, sunflower, sesame or peanut cakes	Leafy greens, fruit and vegetable wastes	grit/stones, bone meal

The following section presents sustainable practices for improving animal nutrition. There is a special focus on protein supply and winter feed, as these are the two main challenges in Afghanistan.

Fodder from grazing lands

There is limited availability of adequate biomass all year around, especially in winter, as only about 40% of the land is suitable for winter grazing. The productivity of pastures in Afghanistan varies greatly between areas and from year to year.

Pastures in Afghanistan are often so-called **natural pastures**, as opposed to improved or sown pastures, as these are of less relevance here. **Artemisia steppe** is the predominant grassland type because of low precipitation in winter; there are also high-quality pastures in the high mountain regions, albeit only for a very short season. In the eastern monsoon regions, where there is adequate rainfall, *Cymbopogon*, *Chrysopogon*, *Heteropogon* and *Aristida* form the main grasslands, often in association with *Acacia modesta* and *Olea cuspidata*. In the northern plains, the leguminous sub-shrub *Alhagi maurorum* provides useful browsing for small stock and camels. *Alhagi m.* is, for instance, made into hay in Balkh Province (Thieme et al. 2006).

The major challenges for Kuchi herders - who depend predominately on grazing lands to feed their animals - are winter feed and reoccurring drought. Pastoralists such as the Kuchi change their migration patterns according to the availability of feed and water. The protection of grazing lands from degradation, and practices to improve rangeland productivity are discussed in more detail in the *AGR4B Rangeland Management* concept note.

Fodder production

Crop residues, cultivated fodder, (palatable) weed species and fodder trees play an important role in mixed farming systems alongside grazing, and are usually grown or collected near the homestead. Straw from wheat, and to a lesser extent from barley, are the main roughages for winter feeding in Afghanistan. The haulms of pulses including grams, lentils, peas and groundnuts are other crop residues used to feed livestock. Lucerne is the most widely sown fodder, even though it requires irrigation. Persian clover (*shaftal*), vetch, grass pea and clover are other plants cultivated for fodder in Afghanistan. Weeds around the homestead are also suitable for feeding, and farmers cut or uproot them to feed their livestock. Common fodder trees include mulberry (*Morus serrata* and *M. alba*), willow (*Salix spp.*), poplar (*Populus spp.*) and Russian olive (*Elaeagnus spp.*). On the hillsides, where soil moisture levels are higher, oaks (*Quercus spp.*) and olive trees (*Olea cuspidata*) are grown and browsed by stock (Thieme et al. 2006).

There are many strategies to improve fodder production in sedentary mixed farming systems. A major improvement can be achieved by cultivating legumes. Legumes fix nitrogen and improve soil fertility as well as providing protein-rich animal feed.

Box 1: Integrating forage legumes into a farming system

Crop mixtures/crop rotation:

All kinds of crop rotation and intercropping, for example, undersowing a cereal with a compatible legume. This practice has the advantage of increasing nutritive value and overall yield, while also enriching the soil.

Orchards: Orchard intercropping with fodder crops is common practice in Afghanistan in newly established orchards. Lucerne is preferred to clover. The beneficial effects of a fodder intercrop include protecting the soil and weed control during the early years when the trees are small; enriching the soil through nitrogen fixation; and biological pest control (lucerne is an alternative host to some predators of orchard pests).

Source: Thieme et al. 2006.

Agroforestry with tree legumes

One sustainable feeding strategy is to develop agroforestry systems with leguminous fodder trees or dual-purpose trees. There are different ways to introduce and promote tree legumes into a farming system; these include alley farming, on riverbanks, in hedgerows or along fence lines around the homestead or the borders of a cultivated field, or as a fodder bank. Both black locust (*Robinia pseudoacacia*) and Russian olive (*Elaeagnus spp.*) are promising fodder trees for all regions of Afghanistan, as well as fixing nitrogen. (USDA & UC Davis 2013). One can search the [Agroforestry Database](#) of the World Agroforestry Centre for trees in Afghanistan - for instance to improve soil fertility and trees as a source of fodder.

Sowing forage legumes

The introduction of fodder legumes is not only sustainable but also a part of traditional Afghan farming systems. Fodder legumes can be fed fresh or made into hay to support winter feeding. Lucerne (*Medicago sativa*) is the most widespread fodder, but it needs a great deal of irrigation and has a reputation as an inefficient crop in terms of water use (*crop per drop of water*). Persian clover (*Trifolium resupinatum*) is grown in winter and gives two hay cuts in spring. Vetch (*Vicia spp.*) and grass pea (*Lathyrus sativus*) are cultivated at high altitudes under rain-fed conditions. Egyptian clover (*T. alexandrinum*) is cultivated in eastern regions, but is not made into hay (Thieme et al. 2006). Moreover, crop residues from legumes cultivated for human consumption - beans, chickpeas, field peas, lentils, mung beans, etc. - can also be used to feed livestock as fresh leaves, hay or straw. (USDA & UC Davis 2013)

Sainfoin (*Onobrychis viciifolia*)

is a perennial legume that is far more drought resistant than lucerne and needs less irrigation. In Kyrgyzstan sainfoin is cultivated on high mountain pastures where it has shown to conserve soil fertility. Moreover, sainfoin can be made into hay and thus presents an ideal protein-rich feed for semi-arid climates such as Afghanistan. Nevertheless, one major challenge is the availability of seeds to start sainfoin cultivation (WOCAT, 2014).

Anyhow, not all livestock keepers in Afghanistan have access to sufficient resources to cultivate fodder legumes. Moreover, the general lack of biomass pushes people to use any available crop residues, weeds and trees in animal feeding.



Figure 1: Sainfoin, a drought-resistant legume (<http://www.rgbstock.com>)

Agro-industrial by-products

The waste from processing pulses, cereals, oil seeds, cotton seeds, citrus, etc. are categorised as agro-industrial by-products. These agro-industrial by-products, which are rich in digestible nutrients, are good animal feeds. For example, cotton seed cake makes excellent feed for sheep, addressing protein deficiencies in winter.

Thinning and leaf stripping

Thinning and leaf stripping from cereals such as maize are often practised to increase fodder resources in mixed farming systems. Maize crops are sown very densely, then later thinned and used for feeding livestock. This practice is also widespread in the Himalayas and the Hindu Kush region, which encompasses parts of Pakistan, India and Nepal (Thieme et al. 2006).

Dual-purpose crops

Dual-purpose crops are crops that are grazed at an early stage of development with minimal effects on later grain yield. Wheat and barley are both dual-purpose crops. However, dual-purpose cropping is risky in dry regions with poor water retention and water shortages towards the end of crop development (GRDC, 2009).

Mulberry-fruit-based feed blocks

Mulberry-fruit-based feed blocks are a feed supplement for livestock in mountainous regions. A feed block contains fresh mulberry, urea, lime powder minerals, salt and wheat barn. These feed blocks are an eco-friendly technology and can be developed as a micro-business, especially in areas containing large numbers of mulberry trees (Habib, 2004). This actually provides business opportunities for women, as it can be prepared at household level.

Winter feeding

Major challenge in Afghanistan is adequate animal quality feed and fodder all year round. Winter feeding is one of the country's greatest problems, and strategies for conserving fodder need to be promoted for the cold season. However, for transhumant pastoralists the following strategies may not be applicable, as they concern sedentary situations.

Hay storage

Haymaking is the cutting of green forage that is then dried and stored to feed animals in fodder-deficit times. By contrast, straw is matured and dried in the field before harvest.

In Afghanistan, hay is crucial as supplementary winter feed and is often from irrigated forage legumes such as lucerne and Persian clover. In northern Afghanistan hay is usually made from *Alhagi m.* sub-shrub. The biggest problem is leaf loss through shattering. The crop is mown and left to wilt, but is removed from the field and dried elsewhere, either in swaths or in trusses. Moreover, drying must be done properly by exposing the cut forage to the sun on the ground and by turning it over regularly to aerate it. It usually requires two to three days in the sun to dry. It is important when storing hay to keep it dry, thus hay should always be covered in areas with rain and or snowfall. A simple shed (see Figure 2) keeps the hay dry during winter months (FAO, 2000).



Figure 2: A farmer in Bamyan in front of his winter hay store
(Source: Helvetas Swiss Intercooperation)

Silage making

Silage is fermented fodder stored when its moisture content is high. This ensures that losses in dry matter and nutritional value are kept to a minimum. Silage is perfect for feeding animals during fodder-deficit seasons. Silage production involves a fermentation process in airtight conditions, which can be achieved by storing it in silos or pits in the ground (FAO, 2000).

Willow silage is increasingly used as winter fodder in Bhutan. Willow twigs and leaves are laid evenly in a pit lined with polythene sheeting (see Figure 3), which is then covered to protect it from the sun and the rain. After one month it is ready for use as alternative winter fodder. For more information refer to SA PPLPP, 2009.



Figure 3: Willow silage in a pit lined with polythene (SA PPLPP, 2009)

In both cases, the stage at which the grass is cut (ideally, just before full flowering) determines the quality of the end product, whether hay or silage.

Fodder banks

Fodder banks address the problem of feed scarcity in winter. Fodder banks are based in principle on plantings of high-quality fodder species that meet forage needs in the dry season. The Ministry of Agriculture, Irrigation and Livestock established a fodder bank in Bamyan to support winter feeding. The fodder bank is organised as a cooperative and purchases animal feed in summer when feed prices are low, and then stores the feed for the winter months. Fodder banks increase the availability of animal feed during the winter at affordable prices and also offer new business ideas in the field of animal feeding (see: <http://asia.ifad.org/web/afghanistan>).

Further reading and references

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