Trees for fodder

Introduction

In low-income countries, livestock keeping is extremely important as a pathway towards poverty alleviation and nutritional security for millions of people. Trees can play a significant role in addressing some of the factors that limit the sustainability and productivity of livestock.

One of the key challenges is the availability of high quality fodder. Currently, most fodders used in developing regions are derived largely from grasses and crop residues such as sorghum, maize, pearl millet and rice. This feed is bulky, high in fibre and low in nitrogen and minerals, and animals are often unable to consume it in large quantities and to digest it properly. In addition, farmers cannot afford to regularly purchase often expensive feed supplements to satisfy the animals’ nutritional requirements.

There is a huge variety of protein-rich trees and shrubs that have leaves, fruits and seed-pods that are edible to livestock, which, therefore, can be used as high-quality fodder supplements. Such tree fodder is suitable for a range of livestock systems. Animals can either graze directly on the trees, or the appropriate parts can be cut and carried to them. In addition, tree fodder can be harvested in-season and stored for use when there is scarcity.

Trees also have a major role in addressing a range of adverse impacts on livestock keeping that are likely to be caused by climate change. The expected variations, in temperature, reduced rainfall and generally more variable weather conditions, will probably lead to decreases in feed quantity and quality. Because tree fodders have deep root systems that can draw water from further into the soil, they are more resilient to variability in weather patterns. Therefore, they can provide fodder for longer than shallower-rooted plants during dry periods.

Trees are also expected to provide other important climate adaptation functions for livestock. For instance, increases in temperatures and drought will possibly cause heightened physiological stress in animals leading to mortality, lower productivity and
the increased prevalence of some animal diseases. In this context, trees can provide shade for animals and, possibly, ethno-veterinary treatments to counter increased disease threats associated with climate change.

Besides helping to improve livestock diets and productivity, fodder trees provide a range of other benefits. For instance, through the nitrogen-fixing properties of many species they can increase soil fertility. They can also conserve water, suppress weed growth, control erosion, and provide wood for timber and fuel.

Examples of agroforestry for fodder interventions in East Africa
In the last three decades, new agroforestry approaches have emerged in East Africa, involving the planting of mostly-exotic tree fodders, with calliandra (*Calliandra calothyrsus*, a leguminous species) being the most popular.

Farmers in the highlands are using calliandra as a substitute for dairy meal or as a supplement to a basal diet that includes crop residues, Napier grass and natural grasses. One kilogramme of dried calliandra leaf is estimated to contain an amount of digestible protein that is similar to that of dairy meal. For each dairy cow, a farmer needs approximately 500 calliandra trees to provide sufficient feed throughout the year, although the majority of farmers plant fewer than this. Normally, calliandra is ready for first pruning for fodder nine to 12 months after initial field establishment, and the trees can be pruned four or five times a year.

More than 200,000 small-scale dairy farmers in the highland regions of East Africa are growing calliandra, normally planting it along field boundaries, where it does not compete with crops, and along contours, where it helps to limit soil erosion.

Challenges, recommendations and areas for further research
To design and implement more effective tree fodder agroforestry systems, challenges that need to be addressed through further research include:

- Potential for improved productivity not only comes from the use of the right fodder tree species, but in exploiting the genetic variation in fodder production characteristics that occur within species. Calliandra, for example,
demonstrates large differences in leaf production and leaf digestibility among provenances that could be very usefully exploited to improve value. Genetic variation in fodder production and quality for most trees and shrubs has not been widely studied and more work is required. Therefore, both species- and genetic-level selection for fodder quantity and quality, but also for ease of establishment, ability to prune, seasonality, browse- and coppice-tolerance and palatability, among other traits, is required.

- In order to understand which tree fodders are appropriate for promotion in particular locations under future climate scenarios, present-day and future growth suitability maps for a wider range of indigenous and exotic species are needed.

- Currently, there is limited data on how the phenology of fodder trees will respond to climate change. Therefore, research is required to understand, in particular, any changes in phenology that would make production systems more vulnerable to dry-season animal-feed shortages, and to identify suitable alternatives for fodder production.

- The lack of functioning seed supply systems to reach farmers with planting material needs to be addressed. Current constraints include the poor policies of government seed centres that favour only certain seed providers, the unnecessary restrictions of plant health regulatory agencies, and the often unsustainable approach of non-governmental organisations that distribute free seed.

- While fodder tree use requires relatively little land, labour or capital, tree fodder production is often a knowledge-intensive practice, as farmers need to acquire new skills, such as nursery establishment, tree pruning and seed collection. Because extension systems in many countries, especially in Africa, are weak, innovative approaches such as farmer-to-farmer extension, civil society campaigns, and facilitative policies are needed to promote widespread adoption.
Further reading


