FODDER BANK ESTABLISHMENT AND MANAGEMENT FOR DRY SEASON MAINTENANCE OF SMALL SCALE LIVESTOCK INDUSTRY: A REVIEW

Kubkomawa, H.I[1]. Kenneth–Chukwu, A. M[2]., Krumah, J. L[3]., Yerima, I. N[3]., Audu, Z[4]. and Nafarnda, W. D[4].

1. Department of Fisheries Technology, Federal Polytechnic, Mubi Adamawa State, Nigeria
2. Department of Biochemistry and Animal Health and Production, College of Veterinary Medicine, Michael Okpara University of Agriculture, Umudike
3. Department of Animal Health and Production Technology, Adamawa State College of Agriculture Ganye
4. Faculty of Veterinary Medicine, University Abuja, Nigeria

Corresponding Author: Nafarnda, W. D. Wesley.nafarnda@uniabuja.edu.ng, nafarnda@gmail.com. Phone: +2348139778581

ABSTRACT

The objective of this study therefore, was to review fodder bank establishment and management for dry season supplementary feeding of livestock. Fodder banking involves fencing, planting, concentrating, storing and reserving of forage legumes in hays and silos to which concentrates, mineral and vitamin premixes are added. In addition, legume trees and shrubs such as *Acacia spp, Leucaena leucocephala, Mangifera indica, Musa spp, Cajanus cajan, Tamarindus indica, Stylosanthes guianensis, Centrosema pubescens, Desmodium spp* etc. are also good fodder crops which are commonly used. Fodder bank converts the above mentioned crops into supplementary or fall back forage kept in small to large plots for dry season use by aging, ailing, nursing, and lactating and high producing animals. The relatively deep roots of these woody perennials allow them to reach soil nutrients and moisture not available to grasses and herbaceous plants. This characteristic enables these plants to retain fresh foliage into the dry season. The ability of some legumes to fix atmospheric nitrogen makes them protein rich feeds. As with all tree planting activities, fodder bank establishment must be planned to coincide with the rainy season. This ensures high seed emergence, plant survival and establishment. Good site selection is paramount, accompanied with thorough land preparation for excellent establishment of fodder banks.

Keywords: Fodder bank, Management, Dry Season Feed, Livestock, Nigeria

INTRODUCTION

Livestock play an important role in most small scale farming systems throughout the world. They provide traction to plough fields, manure which maintains crop productivity, and nutritious food products for human consumption (Kubkomawa *et al*., 2007; Kubkomawa *et al*., 2011). In most small scale farming systems, livestock graze in pastures or wood-lands feeding on grass and other herbaceous plants. During the wet season these lands provide adequate forage to maintain productive animal herds. In the dry season, however, the quantity and quality of forage greatly decreases and is generally low in nutritional value. Livestock sustained on such diets often lose weight and productivity (Akinlade *et al*., 2002; Adjolohoun *et al*., 2008). To avoid this problem, farmers provide their animals with quality feeds to augment dry season forages. One option is to supply expensive concentrates or supplemental feeding. For most small scale farmers, this is not possible due to high costs and limited availability of supplements. A more practical alternative is for

farmers to establish fodder banks. The objective of this study therefore, was to review fodder bank establishment and management for dry season supplementary feeding of livestock.

Factors Involved in Fodder Bank Production in the Sub-Humid Zone (SHZ) of Nigeria

The factors involved in fodder bank production in the sub-humid zone of Nigeria include land, labour, capital, soil, climate, seed, fire and ants (Olawoye & Kubkomawa, 2018). Understanding how these factors operate under the varying conditions of different parts of the sub-humid zone helps to identify the problems and prospects of fodder bank development.

The Guidelines for the Establishment and Management of Fodder Banks

The guidelines for the establishment and management of fodder banks are fencing of a land of about 4 hectares, preparing the seed-bed by confining the herd overnight in the area, prior to the onset of the rains, to fertilize the soil with their droppings, broadcasting scarified seeds, controlling fast-growing grasses by early grazing, defer grazing until the dry season to allow the forage to grow, selected animals are to graze the fodder bank 2½ hours per day during the dry season, ensuring sufficient seed drop and stubble for regeneration in the following season (Olawoye & Kubkomawa, 2018).

The Factors that are Important for Long-Term Persistence Fodder Bank

The factors that are important for long-term persistence fodder bank are demographic characteristics in terms of germination, establishment, seedling survival and plant longevity and seed input, dormancy and dispersal; grazing pressure; soil fertility and fertilizer application; nitrogen output to the soil/plant system; other species in the pasture; time of first rains (Olawoye & Kubkomawa, 2018).

OTHER CULTURAL PRACTICES

Planting Materials

Direct seeding is normally recommended for fodder bank establishment. Seeds of many fodder bank species are soaked in water or scarified to assure good germination. Sowing depth depends on seed and site characteristics. Most seeds are sown at a depth equal to 1-2 times their width. In heavy soils, or when seed is small, sowing depth is shallow. When seedlings or cuttings are used, wide plant spacing of 50x50cm or 1x1m is usually recommended (Obua *et al*., 2012; Olawoye & Kubkomawa, 2018).

Post-Establishment Care

Although most fodder bank species are considered fast-growing, their initial growth is often slow. During this period seedlings are susceptible to weed competition for light, moisture and soil nutrients. Depending on weed growth, the fodder bank are thoroughly weeded every 2-4weeks (Obua *et al*., 2012; Olawoye & Kubkomawa, 2018).

Spacing and Design

To maximize dry season production, fodder banks are usually dense, nearly pure stands. Recommended spacing varies from 5x5cm to 1x1m. Total biomass yields per area increase at higher densities. Wider spacing is generally used when both fodder and small diameter wood, for fuel or poles, are desired. Closer spacing maximizes fodder production, but may make access for harvest or grazing difficult. Spacing of 1x1m is common for many species. Closer spacing encourages maximum fodder production. Fodder production and accessibility are improved by using double rows of fodder trees at wider spacing. Rows are established about 50cm apart with 1-1.5m between double rows. In-row spacing of trees varies from 5-50cm. Ideally, rows are oriented along the contours in an east-west direction as shown in Figure 1 (Obua *et al*., 2012; Olawoye & Kubkomawa, 2018).


Figure 1: Fodder Bank


Figure 2: Harvesting of Fodder Trees

FODDER BANK MANAGEMENT

For effective management and utilization of fodder crops especially in the tropics the following factors are considered:

Age at First Harvest

In most circumstances, the first harvest is delayed until the bank is 9-21months old. Biomass production/harvest and long-term production both increase when the first harvest is delayed. It is believed that, the first harvest, whether from cutting or grazing, terminates the downward growth of taproots. This is an important consideration in arid and semi-arid environments. To promote establishment of a healthy root system the first harvest is delayed until trees are 9-21months old (Olawoye & Kubkomawa, 2018).

Grazing

Fodder banks can be directly grazed by livestock. This system saves labour and effort but can cause plant damage and fodder waste from trampling. The key to direct grazing is sub-division of the fodder bank into paddocks. Livestock are restricted to one paddock until the available fodder resource is fully utilized. Animals are then moved to the next paddock. Grazing periods are generally 1-2weeks, followed by recuperation periods of 3-6weeks (or three times the grazing period). Periodic cutting of sections of each paddock may be necessary to improve animal access. The cut fodder is left on the ground where livestock can access it. The area cut should correspond to what will be eaten before the next cutting as shown in Figure 2 (Olawoye & Kubkomawa, 2018).

Cut-and-Carry

Most fodder banks are managed through a cut-and-carry system in which the fodder is harvested and carried to the livestock as shown in Figure 2. A cut-and-carry system decreases fodder waste from animal damage and the necessity to monitor animals. Important management factors to consider for a cut-and-carry system are cutting height, cutting frequency, and dry season management. These factors are all influenced by precipitation, temperature, soils, species, plant spacing, as well as by each other (Olawoye & Kubkomawa, 2018).

Cutting Height

To obtain maximum fodder production, research has recommended a great variety of cutting heights. For example, a standard cutting height of 50-150cm is essential. Besides fodder production, this height provides other advantages. Trees retain adequate foliage to ensure rapid re-growth and plant longevity. Fodder is harvested with a minimum of bending or reaching, allowing for efficient movement by the harvester. Cutting heights of 50-150cm often maximize fodder production (Olawoye & Kubkomawa, 2018).

Cutting Frequency

The most common cutting frequencies are 6-18weeks. Generally, longer cutting frequencies of 12-18weeks generates more total biomass but as well increases the proportion of small wood production. Shorter cutting frequencies of 6-12weeks favours fodder yields and fodder quality. Younger foliage tends to have a higher nutritive value and palatability. However, repeated cutting after short frequencies decrease longevity. Standard cutting frequencies were developed for tropical conditions and tend to correlate with re-growth heights of 1-2.5m (Olawoye & Kubkomawa, 2018).

Dry-Season Management

Dry-season fodder production is a main objective of fodder bank management. In areas with severe dry seasons, special management practices are followed. Six to eight weeks before the beginning of the dry season, trees are cut to the recommended height. The new foliage produced over the next few weeks will be retained well into the dry season when it is most needed (Olawoye & Kubkomawa, 2018).

Fertilization

Fodder banks are long-term crops that are properly maintained to continue high productivity. Even under direct grazing, fodder banks remove large amounts of soil nutrients from the site. These nutrients are replenished by application of manures or chemical fertilizers. The nitrogen requirement may be self-provided if the species used are nitrogen-fixing (Olawoye & Kubkomawa, 2018).

COMMON FODDER BANK SPECIES FOUND IN NIGERIA

Many species make excellent fodder bank components. In general, these species establish readily, grow fast, out-compete weeds, produce high quality fodder, remain productive under repeated harvest, remain productive during dry seasons and survive on poor sites (Heuzé *et al*., 2017; Olawoye & Kubkomawa, 2018). Some of these fodder bank tree species are shown in Figures 3, 4, 5 and 6.

Figure 3: Lead Tree (*Leucaena leucocephala)*

Figure 4: *Acacia Specie*

Figure 5: Lebbek (*Albizia lebbeck*)

Figure 6: Agati (*Sesbania grandiflora*)

CONCLUSION AND RECOMMENDATIONS

Fodder banks are valuable crops which support productive farming systems. They are managed intensively. Legume fodder banks provide high-quality feed during the dry season, and are gaining acceptance among settled pastoralists in the sub-humid zone. A well-managed fodder bank of Stylosanthes spp. of about 4 hectares provides protein supplements for 15 to 20 cattle during the dry season. For year round and continual use of fodder bank as supplementary feed, proper cutting age, height, frequency and other management practices must be strictly adhered to.

REFERENCES

Adjolohoun, S., Bindelle, J., Adandédjan, C., & Buldgen, A. (2008). Some Suitable Grasses and Legumes for Ley Pastures in Sudanian Africa: The Case of the Borgou Region in Benin. *Biotechnol. Agron. Soc. Environ.*, 12 (4), 405-419.

Akinlade, J., Smith, J. W., Larbi, A., Archibong, I. O., & Adekunle, I. O. (2002). Forage from Cropping Systems as Dry Season Supplements for Sheep. *Trop. Grassl.*, 36 (2), 102-106.

Kubkomawa, H. I., Helen, U. O., Timon, F., Kabir, A. M., & Neils, S. J. (2011). The Use of Camels, Donkeys and Oxen for Post Emergence Weeding of Farm Lands in North-Eastern Nigeria. *Journal of Agriculture and Social Sciences*, 7(4), 136 -138.

Kubkomawa, H. I., Nafarnda, W.D., Obudu, C. E., Helen, O.U., Alahira, C.C., Iliya, D.S. Mshellia, A.A., & Nesati, Y.I. (2007). Highlights on the Use of Donkey for Land Cultivation in Adamawa State, Nigeria. *International Journal of Tropical Agriculture and food systems*, 1(3), 247-249.

Obua, B. E., McAlbert, F. U., Okoro, B. O., & Efrenie, S. (2012). Survey of the Diversity of Forage Plants Used in Feeding Pigs in Small-holder Farms in South-Eastern Nigeria. *Int. J. Agric. Rural Dev*., 15 (3), 1310-1316.

Olawoye, U. H. and Kubkomawa, H. I. (2018)**.** *Principles of Pasture and Range Management for Agricultural Science and Related Disciplines*. First Edition Published by Tapass Institute of Scientific Research and Development Ezeogidi Estate, Umunwanio Irete, P. O. Box 2143 Owerri, Imo State, Nigeria.