



Identification of Suitable Trees and Shrubs for Sustainable Camel Production

Mengistu Russom Araya

Hamelmal Agricultural College, P.O.Box 397 Keren, Eritrea

E-mail: menrusaraya@gmail.com, Cell phone 002917128506

ABSTRACT

The aim of this study was to identify potential browse species in Hamelmal area of Eritrea. A total of 22 household from four districts in Hamelmal were interviewed to identify locally important browse species. Herbarium samples were collected for identification and confirmation of the scientific names. Trees and shrubs are more relevant to camels which are heavily dependent upon forages for their health and production in a cost-effective and sustainable manner. A total of 31 different browse species were identified, which are regarded as being important for camel. The most widely utilized browse species, as indicated by the interviewed herders, were *Acacia albida*, *Acacia etbaica*, *Cadaba farinose* and *Salvadara persica* (95.5%); *Acacia tortilis* (90.9%); *Acacia Senegal*, *Acacia laeta*, *Balnites aegyptica*, *Albizia amara*, *Capparis deciduas*, *Dalbergia melanoxylon*, *Ziziphus spina-christi* (86.4%); *Adansonia digitata* (81.8%); and *Dichrostachys cinerea*, *Tamarindus indica*, *Dobera glaba* and *Olea europaea* (77.3%). These results indicate that there is a number of promising browse species in the indigenous flora. Although the role of these forages could vary depending upon the regional preferences for the animal and forage species, climate and resources, their importance in the success of camel production is acknowledged. To maintain sustainability, it is crucial that such farming systems remain profitable and environmentally friendly while producing nutritious foods of high economical value. However, they need to be characterized further in terms of chemical composition, palatability, digestibility, feed intake, animal response trials and anti-nutritional factors, in order to be able to enhance their utilization in the future.

Keywords: trees and shrubs; Camel; Sustainability

INTRODUCTION

In Eritrea, despite of having good number of camels, per unit productivity is quite low. Poor nutrition is a major constraints limiting camel performance. Consequently, this leads to high mortality, longer calving intervals, and substantial weight loss, particularly during dry season usually extending from December to May in

most of Eritrea. Eritrea has mixed crop-livestock production systems with livestock production being dominated by the semi-arid to arid climatic conditions.

In most parts of Eritrea camels depend on natural fodder and crop residues. They have to survive on range that also has a low nutritional value for most of the year. The crude protein (CP)

content of range vegetation is between 8 to 12% of dry matter (DM) at the beginning of rainy season, but drops to 2-4% during dry season (Amaning-Kwarteng, 1991), leading to prolonged periods of animal malnutrition.

Browse species have considerable potential in mixed crop livestock production systems, to supplement low quality feeds, fix atmospheric nitrogen, provide fuel and shelter and to help in soil and water conservation. Moreover, the ability of most browse species to remain green for a longer period is attributed to deep root systems, which enable them to extract water and nutrients from deep in the soil profile and this contributes to the increased CP content of the foliage (Le Hou  rou, 1980).

Browse species can make a large contribution to livestock nutrition as they depend on such species during dry season. Despite the wider use of observed indigenous browse species, little has been documented with regard to the extent of their utilization and their potential nutritive value. This suggests that there is a need for research to characterize these feed resources in order to sufficiently understand their constraints for efficient utilization and to identify their relative potential. The objectives of this study were therefore, to identify potential browse resources for sustainable camel production in Hamelmalo area.

MATERIALS AND METHODS

Description of study area: The study was conducted in sub zone Hamelmalo, Eritrea. Hamelmalo is surrounded by highland plateaus. The altitude ranges from 1200 to 1400 meters above sea level and has a semi-arid climate. The area has an erratic, unreliable and low rainfall, averaging between 400 and 500 mm per annum.

The rainfall season is from June to September.

METHODOLOGY

Four administrative villages namely Basher, Libena, Gizgiza and Wazintet were selected to represent the existing farming systems. Representative herders were purposely selected in compliance with their proximity to roads and accessibility of infrastructure.

Random sampling of households was employed and a total of 22 households were interviewed. Structured and semi-structured questionnaires were used to collect information from key informants on types of browse species available, their vernacular names, season favored, palatability, parts of plants eaten and relative attractiveness to animals or animal preferences. Group discussions were held to clarify the understanding of all issues.

Data analysis: The data were organized, summarized and analyzed using the SAS statistical package (SAS, 2001). For data involving frequencies, descriptive statistics was employed.

RESULTS AND DISCUSSION

Trees and shrubs utilized as feed: The list of forage browse species identified as locally important are presented in Table 1, where the scientific names, percentage of respondent and parts taken by camels are indicated. About 31 indigenous browse species were identified being used as feed sources by camels. All livestock in the survey area consumed browse species at one time or another during the year, depending upon availability and the preference by animal species.

According to the key informants and from the group discussions, camels selected the most palatable trees and shrubs. As the herbaceous component become more abundant and nutritious during the wet season, camels also

depend on them. However, during the dry season, the herbaceous components are less abundant. In this season they depend first on leaves, pods, fruits and succulent twigs of browse species. As the dry season progresses, however, less palatable species are also browsed by livestock during the critical dry season. The key informants also indicated that the less palatable species and/or some dried or wilted plants,

which are assumed to be poisonous, are eaten by camels during the critical feed shortage time in dry season or during drought period. The utilization of browse species by livestock as a feed has also been described by many authors in Ethiopia (Abule, 2003; Beyene, 2009; Teferi, 2006) and also in sub-Saharan Africa (Le Houréou, 1980).

Table 1: Trees and shrubs and Favored plant parts suitable for camels.

Scientific name	Common name in Tigre	Percent of respondents	Parts eaten
<i>Acacia tortilis</i>	<i>Akba</i>	90.9	leaf, twigs and pod
<i>Acacia Senegal</i>	<i>Chaea</i>	86.4	leaf, twigs and pod
<i>Acacia mellifera</i>	<i>Kedad</i>	59.1	Leaf, pod
<i>Acacia seyal</i>	<i>Chea</i>	72.7	leaf, twigs and pod
<i>Acacia laeta</i>	<i>Tashab</i>	86.4	Leaf, pod
<i>Acacia etbaica</i>	<i>Kerets</i>	95.5	leaf, twigs and pod
<i>Acacia albida</i>	<i>Melmelet</i>	95.5	leaf, twigs and pod
<i>Albizia amara</i>	<i>Abertetet</i>	86.4	leaf, twigs and pod
<i>Dichrostachys cinerea</i>	<i>Heghem</i>	77.3	Leaf and pods
<i>Adansonia digitata</i>	<i>Himeret</i>	81.8	leaf
<i>Balnites aegyptica</i>	<i>Kog</i>	86.4	Leaf and twigs
<i>Boswellia papyrifera</i>	<i>Wal wal</i>	63.6	leaf
<i>Boscia senegalensis</i>	<i>Hamta</i>	59.1	leaf
<i>Commiphora africana</i>	<i>Anqua</i>	59.1	leaf
<i>Boscia angustifolia</i>	<i>Tsai</i>	63.6	Leaf and twigs
<i>Cadaba farinosa</i>	<i>Asten</i>	95.5	Leaf, flower, fruits
<i>Capparis decidua</i>	<i>Sorob</i>	86.4	Leaf and twigs
<i>Carissa edulis</i>	<i>agam</i>	63.6	Leaf
<i>Cordia africana</i>	<i>Awhi</i>	72.7	Leaf
<i>Dalbergia melanoxylon</i>	<i>Alazeyen</i>	86.4	Leaf and fruits
<i>Ficus vasta</i>	<i>Daero</i>	68.2	Leaf and fruits
<i>Ficus sycomorus</i>	<i>Shaghla</i>	68.2	Leaf and fruits
<i>Opuntica ficus indica</i>	<i>Beles</i>	72.7	leaf
<i>Pterolobium stellatum</i>	<i>Kontetefe</i>	72.7	leaf
<i>Tamarindus indica</i>	<i>Ketse, Humeri</i>	77.3	leaf and twigs
<i>Salvadara persica</i>	<i>adai</i>	95.5	leaf and twigs
<i>Dobera glaba</i>	<i>Gheset</i>	77.3	leaf
<i>Olea europaea</i>	<i>wagre</i>	77.3	leaf and twigs
<i>Tamarix aphylla</i>	<i>Ubel</i>	95.5	leaf and twigs
<i>Terminalia brownii</i>	<i>Tsehat</i>	72.7	Leaf
<i>Ziziphus spinachristi</i>	<i>Kuslet</i>	86.4	leaf and twigs

In the study area key informants indicated that *Acacia albida*, *Acacia etbaica*, *Cadaba farinose*, *Salvadara persica*, *Acacia tortilis*, *Acacia Senegal*, *Acacia laeta*, *Balnites aegyptica*, *Albizia amara*, *Capparis deciduas*, *Dalbergia melanoxylon*, *Ziziphus spina-christi*, *Adansonia digitata*, *Dichrostachys cinerea*, *Tamarindus indica*, *Dobera glaba*, *Olea europaea* were most favored by camels. Pratt and Gwynne (1977) described that goats and camels are browsers to a large extent and can ensure normal growth on a pure browse diet. This explains why only camels can survive on the degraded rangelands so often found in arid and semi-arid zones, where browse constitutes most of the feed resources (Le Houréou, 1980).

According to Le Houréou (1980) selection of browse species by animals depends on many factors, including the feeding preference of a given animal species. This was in agreement with the ideas of key informants that during times of feed shortage such as the dry seasons other animals even shift to browse trees and shrubs.

The most widely utilized browse species, as indicated by the interviewed herders, were *Acacia albida*, *Acacia etbaica*, *Cadaba farinose* and *Salvadara persica* with (95.5%); *Acacia tortilis* with (90.9%); *Acacia Senegal*, *Acacia laeta*, *Balnites aegyptica*, *Albizia amara*, *Capparis deciduas*, *Dalbergia melanoxylon*, *Ziziphus spina-christi* with (86.4%); *Adansonia digitata* with (81.8%); and *Dichrostachys cinerea*, *Tamarindus indica*, *Dobera glaba* and *Olea europaea* with (77.3%).

Some of these are similar to those documented in the mid rift valley of Ethiopia by Shenkute (2012) who indicated that *Acacia tortilis* (95.8%), *Balanites aegyptica* (79.2%), *Ficus*

gnaphalocarpa (77.5%), *Olea europaea* (77.3%), *Grewia bicolor* (75.0%) and *Dichrostachys cinerea* (70.0%), by Beyene (2009) in south western Ethiopia who indicated *Rhus natalensis*, *Bauhinia farea*, *Grewia ferruginea*, *Acacia seyal* and *Deinbollia kilimandscharica* as the common browse in the Gembella region. Teferi (2006) also documented *Ziziphus spina-christi*, *Acacia asak*, *Acacia lahai*, *Balanites aegyptica* and *Terminalia brownie* as some of the most commonly utilized and distributed browses species in the Deberke district of northern Ethiopia.

For small ruminants (especially goats) the herders lead the animals to *Acacia* trees and shake the pods from the trees to feed the animals using adapted sticks. Even sometimes the herders collect pods of *Acacia albida* and *Acacia tortilis* to use it as supplement feed during the dry season. Similarly, the utilization of *Acacia* species is variably described by many authors in sub Saharan Africa (Le Houréou, 1980).

Conclusions: This study indicated that a large reserve of plant species in the local flora is available that could be potentially used for camel feeding. These feeds, if fully exploited, could assist in increasing the level of production and productivity of camel in the region. However, these feeds need to be characterized further in terms of chemical composition, palatability, digestibility, feed intake, animal response trials and anti-nutritional factor studies in order to enhance their utilization in the future.

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REFERNCES

- Abule, E. (2003). *Rangeland Evaluation in Relation to Pastoralists' Perceptions in the Middle Awash Valley of Ethiopia*. PhD thesis submitted to the University of the Free State, Bloemfontein, South Africa. 297p.
- Amaning-Kwarteng, K. (1991). Sustainable dry season feeding of ruminants in Ghana. The use of crop residues and leguminous shrubs as feed stuffs. In: The complementarity of feed resources for animal production in Africa. *Proceedings of the Joint Feed Resources Networks workshop held in Gaborone, Botswana 4-8 March 1991*.
- Beyene, T. (2009). *Assessment of livestock feed resources, feeding systems and rangeland condition in Assosa Zone, Benishangul-Gumuz Region*. M.Sc. thesis, Hawassa University, Hawassa, Ethiopia.
- Le Houérou, H. N. (1980). Chemical composition and nutritive value of browse in tropical West Africa. In: Le Houérou, HN. (ed.). *Browse in Africa: the current state of knowledge. International Livestock Center for Africa (ILCA), Addis Ababa, Ethiopia: 261-297*.
- Pratt, D. J. and M. D. Gwynne (1977). *Range land management and ecology in East Africa*. London, Hodder and Stoughton.
- SAS (2001). *STAT User's Guide Version 8.2*; Statistical Analysis Systems Institute. Inc., Cary, NC, USA.
- Teferi, A. (2006). *Identification and nutritional characterization of major browse species in Abergelle woreda of Tigray, Ethiopia*. M.Sc. thesis, Alemaya University, Alemaya, Ethiopia.