



Qualitative Assessment of Fodder Species in the Western Highlands of Cameroon

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ABSTRACT

The identification of fodder species present in any locality is crucial for ensuring better management of pastures. Studies on forage plant inventories and livestock preferences are very limited in Western Highlands of Cameroon (WHC). Hence, the aim of this study was to identify local forage plants and assess livestock preferences in WHC. A survey was carried out involving 50 breeders with at least two years of experience in the livestock sector to acquire information on the type of forage resources consumed by livestock and their preferences. The results showed that 32 forage species were present in WHC, with 21 herbaceous and 11 browse forages. The most widely consumed parts of these plants are the leaves. The species most appreciated by livestock are in low proportion compared to the average ones, leading to a gradual deterioration in the quality of pastures. Measures must be taken to ensure the conservation of forage appreciated by livestock by delimiting and extending the areas of grazing land in the WHC.

Keywords: Fodder species; Forage; Livestock; Preferences

INTRODUCTION

Identifying the local fodder species through studies is a key step to improve pasture management. [1]. Especially as these have already developed qualities and adaptations over time that are perfectly suited to the environmental conditions of the area [2]. Studies have been carried out by and in Cameroon, Ghana, Benin, Algeria and Ethiopia, to identify local forage plants in these different localities [3-7]. The identification and characterization of forage are imperative because the zoo technical performance of livestock is strongly linked to the quality of pastures [8]. Pahimi, et al., listed approximately 41 species in North Cameroon, of which *Prosopis africana*, *Daniella oliveri*, *Acacia sieberiana*, *Stereospermum kunthianum*, and *Balanites aegyptica* were the most appreciated by livestock [4]. They also observed that many of these species are in decline, such as *Prosopis africana*, *Daniella oliveri*, and *Polygonum acuminatum*, owing to the shrinking of grazing areas in favor of croplands. Lucha, et al., listed 151 forage species in the savannahs of the Ngoketunja division in Northwest Cameroon [3]. The most abundant species were *Desmodium ascendens*, *Urena lobeta*, *Bracharia lata*, and *Vitex doniana*. However, few of these are appreciated by livestock because some grazers complain that fire is a major threat to forage plants. This destroys some plant species and leads to species extinction. Neba Ndenecho Emmanuel Recommended the utilization of

plants of the Moraceae family in this zone, particularly *Ficus* spp., which are readily browsed by ruminants and fire resistant [9]. However, no studies have been conducted from this perspective in the Western Highlands of Cameroon (WHC). Hence, the aim of this study is therefore to contribute to a better appreciation of the floristic diversity of forages by identify local forage plants and assess livestock preferences in WHC.

MATERIALS AND METHODS

Description of the study area

The Western Highlands of Cameroon is characterized by a rainfall of 1500 mm-2000 mm with a 9-month rainy season and 3-month dry season. The average annual temperature ranges from 22°C to 25°C. The soils are ferralitic, sandy-clay, generally not deep, and rejuvenated by erosion. Rich in humus, they are suitable for food and perennial crops.

Sampling

Five divisions in which ruminant breeders had a large herd with at least two years' experience were chosen, namely, Menoua, Bamboutos, Ndé, Mifi, and Noun (Figure 1). On the same basis,

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three districts were chosen per division. In these three districts, the snowball sampling or chain sampling method consisting of identifying new breeders from other breeders to form part of the sample was used. A total of fifty breeders were asked to provide information on the forage species consumed by their livestock and their preferences. Subsequently, with their permission, direct observation on the field was carried out to identify the forage species.

Forage species identification

Forage species were identified using the botanical guides “Graminée du Cameroun” and “Guide des ligneux” [10,11]. The identification of fodder plants was based on their morphological characteristics, according to these guides.

RESULTS AND DISCUSSIONS

Local forages identified

In the Western Highlands of Cameroon, 32 forage species are consumed by livestock (Table 1). Of these, 21 species are *herbaceous* plants and belonging to 6 families: *Poaceae* (11 species), *Fabaceae* (5 species), *Convolvulaceae* (2 species), one species each of *Malvaceae*, *Musaceae* and *Solanaceae*. On the other hand, 11 species are browse plants belonging to 7 families: *Fabaceae* (4 species), *Asteraceae* (2 species), one species of *Asparagaceae*, *Lauraceae*, *Myrtaceae*, *Euphorbiaceae* and *Meliaceae*.

Interviews conducted by Pahimi, et al., with ruminant farmers in north Cameroon identified 14 *herbaceous* species, which were fewer than those listed in the WHC. Nevertheless, they observed a decline in the floristic diversity of fodder resources due to climate change, shrinking grazing areas, and bush fires. In contrast, 11 browse species were also recorded. Pahimi, et al., recorded 31 browse species, which is similar to the results obtained by Ziblim, et al., in Ghana, who recorded 32 browse species. However, these values are lower than those obtained by Nachibingu, et al., in Congo and Denbela, et al., in Ethiopia, which recorded 43 and 50 browse species, respectively [1,4,5,7]. These differences between localities could be due to the fact that the floristic composition of an area's vegetation is strongly linked to its climate, edaphic factors (soil type, depth, texture, humidity) and degree of anthropisation [12]. Most *herbaceous* species consumed by livestock belong to the *Poaceae* family, whereas browse species belong to the *Fabaceae* family. This is in line with Pahimi, et al., Lucha, et al., and Ziblim, et al., who listed 57%, 31% and 48.8% respectively of the *herbaceous* species consumed by cattle as belonging to the *Poaceae* family. Klein, et al., stated that in tropical Africa the majority of species consumed by cattle belong mainly to two families, namely *Poaceae* and *Fabaceae*.

Livestock preferences in Western Highlands of Cameroon

The most appreciated species and their parts eaten by livestock for *herbaceous* and browse species, as declared by breeders, are presented in Table 2.

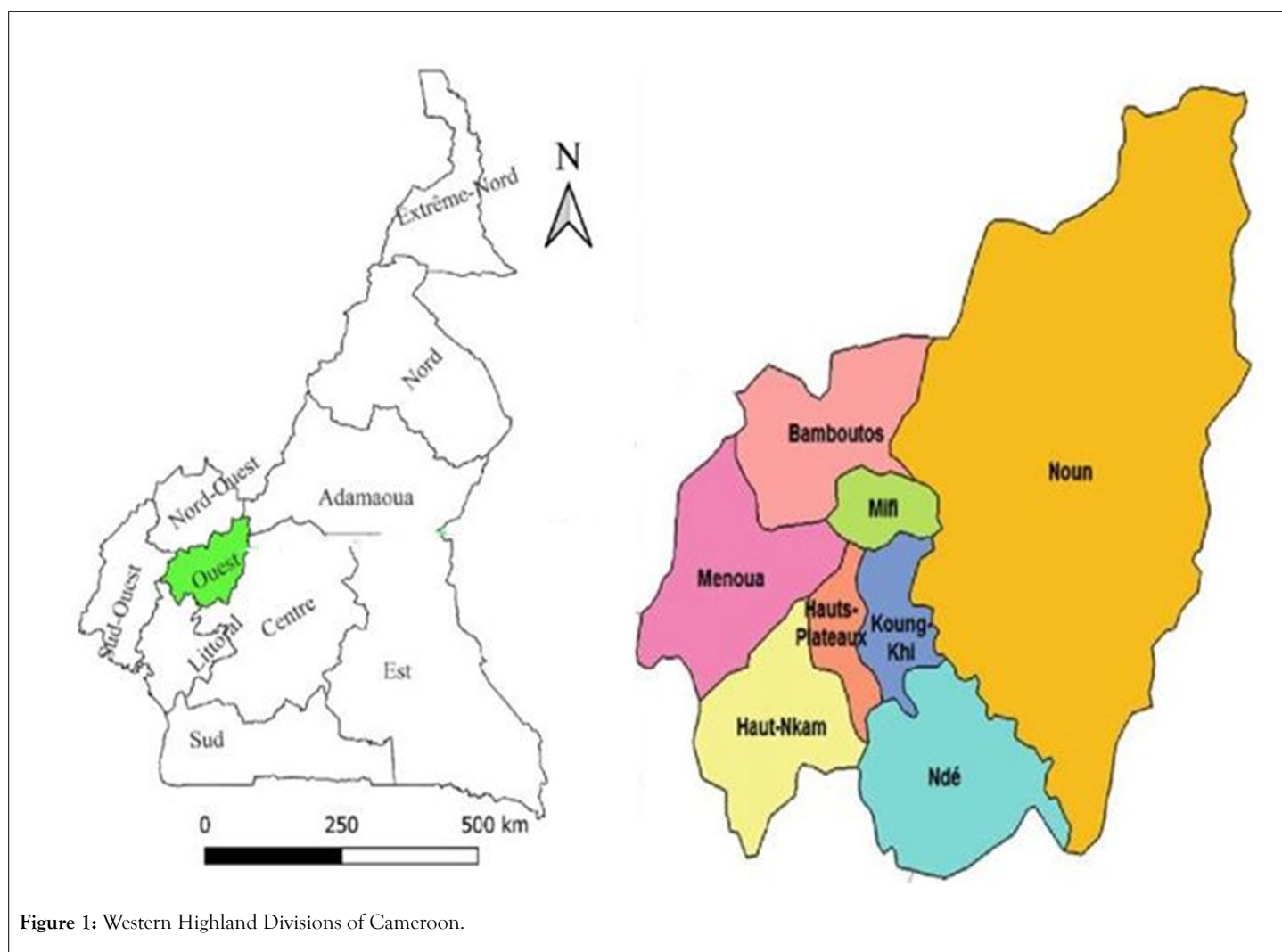


Table 1: Herbaceous and browse forages consumed by livestock.

Herbaceous		Herbaceous	
Families	Species	Families	Species
Poaceae	<i>Bracharia ruziziensis</i>	Convolvulaceae	<i>Ipomea batatas</i>
Poaceae	<i>Cynodon dactylon</i>	Convolvulaceae	<i>Dichondra micrantha</i>
Poaceae	<i>Panicum maximum</i>	Malvaceae	<i>Sida acuta</i>
Poaceae	<i>Digitaria ciliaris</i>	Musaceae	<i>Musa paradisiaca</i>
Poaceae	<i>Pennisetum purpureum</i>	Solanaceae	<i>Browallia americana</i>
Poaceae	<i>Pennisetum clandestinum</i>	Fabaceae	<i>Calliandra calothyrsus</i>
Poaceae	<i>Trypsacum laxum</i>	Fabaceae	<i>Leucena leucocephala</i>
Poaceae	<i>Imperata cylindrica</i>	Fabaceae	<i>Gliricidia sepium</i>
Poaceae	<i>Melinis repens</i>	Fabaceae	<i>Piliostigma thonningii</i>
Poaceae	<i>Setaria barbata</i>	Lauraceae	<i>Persea americana</i>
Poaceae	<i>Urochloa panicoides</i>	Myrtaceae	<i>Psidium guajava</i>
Fabaceae	<i>Desmodium uncinatum</i>	Euphorbiaceae	<i>Manihot esculenta</i>
Fabaceae	<i>Desmodium intortum</i>	Asparagaceae	<i>Draceana fragrans</i>
Fabaceae	<i>Arachis glabrata</i>	Asteraceae	<i>Thitonia diversifolia</i>
Fabaceae	<i>Centrosema pubescens</i>	Asteraceae	<i>Vernonia amygdalina</i>
Fabaceae	<i>Trifolium hybridum</i>	Meliaceae	<i>Entandrophragma cylindricum</i>

Table 2: Parts of plant eaten by livestock and their preferences.

	Species	Parts of Plant Eaten	Preferences
Herbaceous	<i>Bracharia ruziziensis</i>	Leaves + stems	***
	<i>Cynodon dactylon</i>	Leaves + stems	**
	<i>Panicum maximum</i>	Leaves + stems	**
	<i>Digitaria ciliaris</i>	Leaves + stems	***
	<i>Pennisetum purpureum</i>	Leaves + stems	***
	<i>Pennisetum clandestinum</i>	Leaves + stems	***
	<i>Trypsacum laxum</i>	Leaves	**
	<i>Imperata cylindrica</i>	Leaves	*
	<i>Melinis repens</i>	Leaves	**
	<i>Setaria barbata</i>	Feuilles + tiges	**
	<i>Urochloa panicoides</i>	Leaves + stems	**
	<i>Desmodium uncinatum</i>	Leaves + stems	**
	<i>Desmodium intortum</i>	Leaves + stems	**
	<i>Arachis glabrata</i>	Leaves	**
	<i>Centrosema pubescens</i>	Leaves + stems	**
	<i>Trifolium hybridum</i>	Leaves + stems	***
	browse	<i>Ipomea batatas</i>	Leaves + stems + tubers
<i>Dichondra micrantha</i>		Leaves + stems	**
<i>Sida acuta</i>		Leaves + stems	**
<i>Musa paradisiaca</i>		Feuilles + fruits	***
<i>Browallia americana</i>		Leaves	**
<i>Calliandra calothyrsus</i>		leaves	***
<i>Leucena leucocephala</i>		leaves	**
<i>Gliricidia sepium</i>		leaves	**
<i>Piliostigma thonningii</i>		leaves + pods	***
<i>Persea americana</i>		leaves + fruits	**
<i>Psidium guajava</i>		leaves + fruits	**
<i>Manihot esculenta</i>		leaves + tubers	***
<i>Draceana fragrans</i>		leaves	*
<i>Thitonia diversifolia</i>		leaves	*
<i>Vernonia amygdalina</i>		leaves	*
<i>Entandrophragma cylindricum</i>		leaves	*

Note: *: Low appreciated, **: Moderately appreciated, ***: Highly appreciated.

The most commonly consumed *herbaceous* species in WHC are *Bracharia ruziziensis*, *Digiatria ciliaris*, *Pennisetum purpureum* and *Pennisetum clandestinum*. This result is similar to those obtained by Babatoude, et al., who state that *Pennisetum purpureum*, *Panicum maximum* and *Bracharia ruziziensis* are most appreciated by sheep in Benin [13]. On the other hand, Nachibingu, et al., note that *Pennisetum purpureum* (2.8%) and *Sida acuta* (2.5%) are among the species least consumed and the most consumed is *Setaria pallide Fusca* by livestock in the Kumbungu district of Ghana [5]. *Calliandra calothyrsus*, *Piliostigma thonningii* and *Manihot esculenta* are the most commonly consumed browse species in WHC. In North Cameroon, Ziblim, et al., found that *Prosopis africana*, *Daniella oliveri*, *Acacia sieberiana*, *Stereospermum kunthianum* and *Balanites aegyptica* were the browse species most appreciated by livestock. This shows that livestock preferences vary from one area to another. This could be explained by the fact that preferences depend on livestock feeding habits and the availability of these forage species in these different localities [4]. Klein, et., also state that the palatability of grasses for livestock is explained by the relatively soft texture of their tissues, their discreet taste and odor not marked by unpleasant or repellent substances, the absence or low content of toxic substances or tannins, the high content of digestible carbohydrates (celluloses, soluble sugars, etc.) and fats [14]. For *herbaceous* species,

leaves+stems (57.14%) were the most frequently consumed parts, followed by leaves only (33.33%), leaves+stems+tubers (4.76%), and leaves+fruits (4.76%) (Figure 2). For browse species, the majority consumed leaves only (63.63%), followed by leaves+fruits (18.18%), leaves+tubers (9.09%), and leaves+stems (9.09%) (Figure 3).

It results that for *Herbaceous* and browse species, the plant parts most consumed by livestock are the leaves. This result is similar to those obtained by Lucha, et al., Ziblim, et al., and Suheel, et al., who stated that leaves are the most parts consumed by livestock [3,5,15]. Also, Denbela, et al., declared that cattle have a preference for leaves over other parts of the plant because they are easily accessible, highly palatable and very rich in nutrients [7]. Moussa, et al., mentioned that the choice of forage species organs by livestock depends on the animal species, the season, the phenological stage of the plant, and the availability and quality of the forage species [16]. As reported by Denbela, et al., livestock consume more leaves during the rainy season, seeds and pods at the start of the dry season, and stems and bark towards the end of the dry season [7]. Highly, moderately and low appreciated *herbaceous* species represent 33.33%, 61.90% and 4.76% respectively. Therefore, highly, moderately and low appreciated browse species represent 27.27%, 36.36% and 36.39% respectively (Figures 4 and 5).

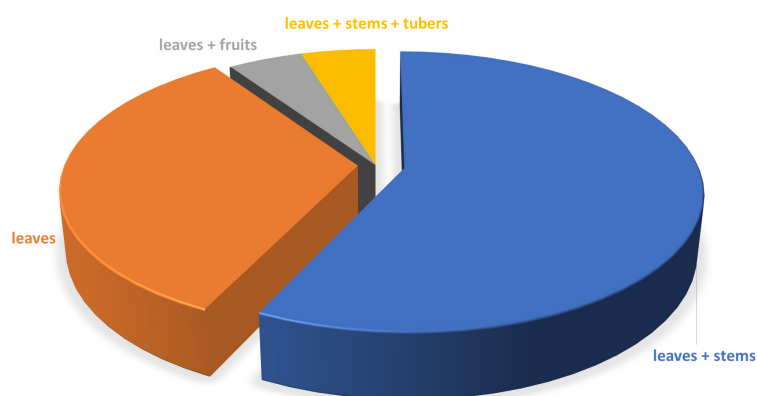


Figure 2: Proportion of different parts of *herbaceous* forages eaten by livestock. Note: (■) Leaves+Stems; (■) Leaves; (■) Leaves+Fruits; (■) Leaves+Stems+Tubers



Figure 3: Proportion of different parts of browse forage browsed by livestock. Note: (■) Leaves; (■) Leaves+Pods; (■) Leaves+Fruits; (■) Leaves+Stems.

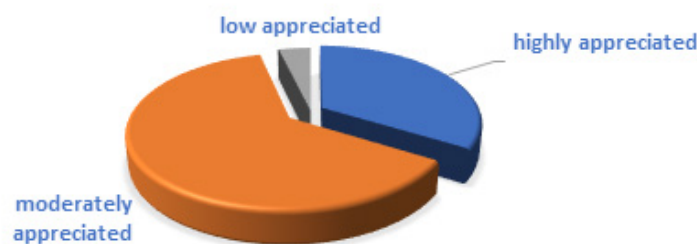


Figure 4: Proportion of different level of preferences for herbaceous species. Note: (■) Highly Appreciated; (■) Moderately Appreciated; (■) Low Appreciated.

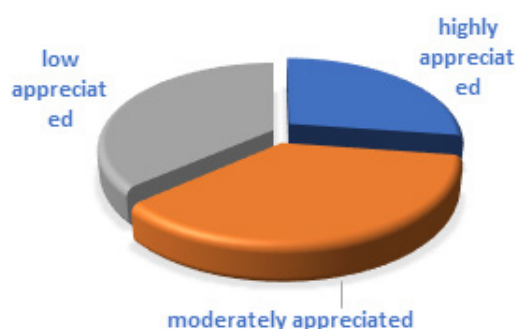


Figure 5: Proportion of different level of preferences for browse species. Note: (■) Moderately Appreciated; (■) Low Appreciated; (■) Highly Appreciated.

It can be seen that the proportion of highly appreciated species is relatively low compared to those moderately appreciated. The breeders explained that the land allocated for grazing in this area is very small and the number of breeders is constantly increasing as a result of the migration of refugees fleeing the country's war zones. This situation leads to overgrazing and the growth of other types of plants is encouraged. Indeed, when some animals focus on consuming a certain category of plants, this encourages the growth of other species that could be moderate, low or no palatable. Moreover, if their consumption is uncontrolled, they could disappear over the years [2].

CONCLUSION

A total of 32 forage species consumed by livestock have been recorded. Most forage species belong to two families namely *Poaceae* and *Fabaceae*. The leaves are the main part of the plant consumed. The forage highly appreciated by livestock is constantly declining, and if nothing is done, they are doomed to disappear. Expanding grazing land and forage cultivation could ensure the sustainability of plants with good pastoral value.

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