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Relationship of the native forages most preferred by cattle with nutritional content and its availability within the forest, Azero Norte Community - National Park and Serranía del Iñao Integrated Management Natural Area

Relación de las forrajeras nativas mas preferidas por el ganado vacuno con el contenido nutricional y su disponibilidad dentro del bosque, comunidad de Azero Norte - parque nacional y área natural de manejo integrado Serranía del Iñao

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Abstract

The cattle Azero Community North has its own characteristics, mainly the traditional way of farming (extensive), which is based on browsing in the native forest and crop stubble. As this paper aims to analyze the native forage most preferred by cattle considering the nutritional value and availability within the native forest, to recommend its conservation through use. 105 native forage species, distributed in 50 families were identified. The family contains more species are Fabaceae (22), continuous Asteraceae (14) and Euphorbiaceae, Malvaceae, Sapondaceae, Solanaceae with (5). With a species has 23 families. The species containing greater numbers of bites Similar to arivivi (Justicia sp.) In 1912, continuing with Kari kari (*Acacia etilis*) in 1821 , later being Motovovo (*Lycianthes asarifolia*) with 1664 numbers bites.

Notive forage, Cattle, Nutritional value, Forest

Resumen

La ganadería en la Comunidad de Azero Norte tiene características propias, principalmente por la forma tradicional de crianza (extensiva), que se basa en el ramoneo en el bosque nativo y en los rastrojos de cosecha. Por lo tanto, el presente trabajo tiene como objetivo analizar los forrajes nativos más preferidos por el ganado considerando el valor nutricional y su disponibilidad dentro del bosque nativo, para recomendar su conservación a través de su uso. Se identificaron 105 especies forrajeras nativas, distribuidas en 50 familias. La familia que contiene el mayor número de especies es Fabaceae (22), continuando Asteraceae (14) y Euphorbiaceae, Malvaceae, Sapondaceae, Solanaceae con (5). Con una especie se tienen 23 familias. Las especies que contienen un mayor número de picaduras son similares a arivivi (Justicia sp.) con 1912, continúa con Kari kari (Acacia etilis) con 1821, después Motovovo (Lycianthes asarifolia) con 1664 números de picaduras. Las especies que contienen la mayor energía en primer lugar Porotillo (Coursetia sp.) con 30%, seguido de Santa María (Bidens sp.), Satajchi fruta amarilla (Celtis brasiliensis) con 28% y las especies que contienen la mayor Proteína Kari kari (Acacia etilis) con 30%, flor blanca de hoja larga (Hilleria latifolia) con 23%.

Forajeras, Nativos, Ganado, Valor nutricional, Bosque nativo

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Introduction

The situation of forests and jungles in the world is precarious and difficult, since thousands of hectares are lost every year due to factors such as the growth of the agricultural frontier, excessive logging, population growth, uncontrolled cattle ranching, forest fires and floods. According to the FAO (1999), it is calculated that the rate of loss of forests and jungles amounts to more than 16.1 million ha per year of natural vegetation, of which 15.2 million are found in tropical zones (Villavicencio 2003).

Vera (2001) indicates that native pastures in Latin America and the Caribbean are, in general, subject to rapid and drastic changes. For example, the so-called agriculturization process has affected the subtropical zone of Bolivia, expanding the agricultural frontier with cultivated pastures and without carrying out the necessary cultural tasks for the maintenance of these prairies over time.

In Bolivia, only in the Department of Chuquisaca, which has a little over five million hectares, 90% of them have direct use or silvo-pastoral effects. This area includes more than 1.5 million hectares of natural forests at different ecological levels and with different degrees of artificialization. These ecosystems and other silvopastoral areas support about 556,553 cattle, 534,804 sheep and goats that produce 11,938 MT and 1,123 MT of meat, respectively (Agrarian Statistics 1994). Added to them is an important population of sheep and horses, which together have a strong dependence and impact on the nutrition of the population, in the generation of services and self-employment.

In the Chuquisaca Chaco, traditional livestock farming is similar to that stated by Joaquín et al (2004), and the one that does not have sufficient economic resources, so that local ranchers cannot execute considerable changes in their exploitation system.

However, it is important to mention a series of activities with which current production levels can be improved (silvopastoral systems, rotational grazing systems) and the execution of each one of them would depend on raising awareness among ranchers so that they can invest time and money, prioritizing activities to improve the livestock position.

Cattle ranching in the North Azero Community has its own characteristics, mainly due to the traditional (extensive) way of farming, which is based on browsing in the native forest and harvest stubble. Therefore, the present work aims to analyze the most preferred native forages by cattle considering the nutritional value and its availability within the native forest, to recommend its conservation through its use.

Background

The use of the foliage of trees and shrubs in the feeding of ruminants is a practice known by producers for centuries and whose empirical knowledge, on the forage properties of different species, is of great value to science. In numerous works characterizing production systems, producers report a high number of species that are used, both directly in grazing and in cutting systems (Ammour and Benavides 1987, Arias 1987).

Studies since 1980 have been carried out on this subject at CATIE, they are oriented towards the valorization of trees and shrubs as a source of fodder and their integration into production systems with ruminants (Benavides, 1989). The efforts of numerous professionals in the region have made it possible to identify and value numerous species of trees and shrubs with excellent characteristics in terms of quality nutritional value of its foliage, its capacity for biomass production. (Araya et al. 1993, Mendizábal et al. 1993, Godier et al).

At the level of the National Park and Integrated Management Natural Area (PN – ANMI) of the Serranía del Iñao, there are several studies. Among them, the one carried out by Huallata (2011), who makes a characterization of livestock production systems, who highlights that the predominant grazing system is extensive and the basis of bovine feeding is native forage. Likewise, Nina (2009), Orías (2010), Felípez (2010) and Terán (2010), carry out a study for the identification of useful native plants, where the category of forage plants constitutes an important wealth constituted on average by about 30 species. .

Finally, the study by Zarate (2010) analyzes the effect of cattle on the regeneration of native forage woody plants.

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He recorded a total of 38 important woody plants for the Azero Norte community, of which 55% correspond to forage woody plants within the forest (21), of which more than half were trees and the rest shrubs. In the area with a high stocking rate, the forage woody species with the highest relative density are palo squash (Pisonia squash) with 32%, caricari (Acacia praecox) 27%, wilca (Anadenanthera colubrina) 8% and chari (Piptadenia viridiflora) 8%. In the area with low stocking rates, the highest relative density was recorded for caricari (Acacia praecox) 42%, wilca (Anadenanthera colubrina) 30% and chari (Piptadenia viridiflora) 9%. For the area with average stocking rate,

Problem Statement

The grazing regime can considerably modify the functional and floristic composition of the vegetation, due to the effects of defoliation (Rusch and Oesterheld 1997). Over time, changes in the floristic composition can result in vegetation communities that are considerably different from the original ones, in which species that tolerate and/or recover well from grazing, or that are little consumed, may prevail (Augustine and Mcnaughton 1998). Frequently, the process of pasture degradation is associated with these changes, when the plants with the highest forage value are unable to restore the foliar material or the necessary reserves for regrowth between consecutive defoliations, a process that is aggravated by competition with other species. According to Zarate (2010), the main problems caused by livestock in protected areas are:

1. The death of young trees due to browsing
2. Regeneration problems,
3. Changes in biodiversity in cases of overgrazing with extinction of plant species
4. Destruction of vegetation due to the concentration of livestock in small areas due to water sources
5. Excessive use of natural pastures without any improvement or animal load control.

In animal nutrition, four basic spaces have generally been recognized that must always be taken into account: the requirements of the animal, the nutritional content of the food, its digestibility and the amount consumed by the animal. Specifically, the nutrition of grazing ruminants is a complex process with particular characteristics and problems (mejía 2002).

Research questions

How does the preference of native forages vary considering the nutritional value and its availability in a cattle grazing system in native forest?

Importance and Justification

Native forage species play a preponderant role in animal feed, due to their multipurpose nature and wide margin of adaptation to climates and soils. In the Azero Norte community, raising cattle is one of the important economic activities that families engage in, with free grazing being the predominant form. This type of breeding without any type of control can constitute a threat to the dynamics of the forest, especially for natural regeneration. In addition, the presence of the most palatal forage plants in certain places, causes cattle to frequent only these areas, increasing the risk of extinction for these plants.

Therefore, the present work will identify and categorize the native forages according to their nutritional value and preference of the cattle, characterizing these plants to recommend controlled grazing systems for a sustained use of this resource. On the other hand, it will explore the factors associated with its distribution, in such a way that it allows locating the spaces where these forages grow, to recommend rest periods in critical times for the species and allow them to regenerate appropriately. Likewise, this work will be as a starting point for silvopastoral enterprises with native foragers, providing information on their nutritional value and preference, as well as being the basis for the collection of germplasm of the most valuable foragers.

From a theoretical point of view, the work will contribute to explain some variables that determine the most preferred native forages by cattle and some factors associated with the distribution of the species.

Research Objectives General Objective

Analyze the native forages most preferred by cattle considering the nutritional value and their availability within the forest, to recommend their conservation through their use in the community of Azero-North in the Serranía del Serranía National Park and Integrated Management Natural Area. Inao.

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Specific objectives

– Identify native forage in relation to the preference of cattle.

– Relate the most preferred native forages for cattle with the nutritional content and its availability within the forest.

Hypothesis

Ha:

a. The most preferred native forage for cattle is influenced by the nutritional value and its availability within the forest.

Materials and methods

Materials Field Materials

The materials that were used are the following:

Tent house, field board, notebook, newspapers, GPS, camera, botanical presses, graduated belts for presses, pruning shears, flasin tape, packing tape, machete, polyethylene plastic bags, sleeping bag, tent house, thermal insulation.

Stationery

The materials used were Excel Software, Word software, Botanical Identification Keys, XP Pentium V computer, bibliographic review regarding the research topic, etc.

Methods

Phase 1

Cabinet work (pre-field)

This phase corresponds to cabinet operations and reconnaissance of the study area. Before collecting data for the study, field reconnaissance was carried out to become familiar with the types of landscapes (for example, sloping terrain, undulating plains, flat areas, riverbanks), the vegetation present, and grazing/browsing management. in the study area.

Likewise, it corresponds to the preparation of the registration forms of the species desired by the cattle, a field notebook for collecting the specimens, and a field form for collecting general information about the place.

Phase 2

Field Phase

All work carried out outside the cabinet is considered as field work, from that point of view the activities were planned as follows.

Registry of bovine preference in native forage

Areas where there is a higher concentration of cattle were chosen with preference.

The methodology to determine the preference is that of monitoring cattle and direct observations of cattle for a 5-min time interval at a distance of approximately 5 m, following a total of one to one and a half hours at the time of observing and recording and marking with flasin tape the species consumed according to the number of bites and parts consumed along the way at the end of the observation, plots were installed according to (Braun Blanquet). The observations were made for 10 days a month, for four consecutive months, in the months of December, January, February, March and April. Livestock monitoring was carried out in the morning and in the afternoon the evaluation will be carried out in the plots and the collection of the consumed specimens.

For the categorization of native forage species based on their nutritional value, those that register the highest number of bites will be identified and then samples will be collected for their bromatological analysis (Jiménez 2012).

Collection of samples for bromatological analysis

The samples will be obtained from the parts consumed by the cattle, following their trajectory. The consumed parts of 1 kg per species were taken, being a total of 21, either these trees or shrubs or herbs, then they were exposed to the sun on parody and cardboard for their respective drying and these, when they were already dry.

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Were introduced into an envelope of newspaper and proceeded to the past of the same and later the total was subtracted by the weight of the envelope, the weight of the matter out came to weigh 250 gr depending on the amount of water that the plant contains. Homogeneous 500gr. Green matter for its bromatological analysis following the protocols indicated by the laboratory. In addition, the phenological state of the plant will be noted.

Collection of botanical specimens

Once the species consumed by livestock have been identified, specimens will be collected for taxonomic identification in the Herbarium of Southern Bolivia (HSB).

In order to estimate some variations in the number of bites caused by the presence of the species, sampling plots will be made as follows.

In this phase, the systematization of the data was carried out (filling out forms of species desired by the cattle and plots according to Braun Blanquet and the botanical specimens).

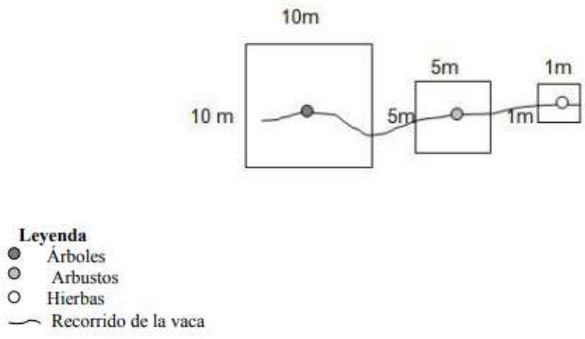

Figure 1 Sampling plots

These plots were installed in the transept traveled by the cow during the five minutes. The dimensions of the plot will be 10 x 10 m for trees, 5 x 5 for shrubs and 1 x 1 m for herbs, in these plots the presence of bitten forage was estimated, according to the following parameters. The parameters that will be observed in the plots are:

Coverage is estimated using the Braun-Blanquet scale, in which abundance and dominance are combined; the two lower indices (+, r) record abundance, while the remaining ones (1, 2, 3, and 4.5) take into account coverage or dominance (Alcaraz 2012).

Index	Meaning
R	Single individual, depreciable coverage
+	More individuals, very low coverage
1	Coverage less than 5%
2	Coverage from 5 to 25%
3	Coverage from 25 to 50%
4	50 to 75% coverage
5	Coverage equal to or greater than 75%

Table 1 Braun-Blanquet abundance-dominance scale

Phase 3

Cabinet phase (post field)

This phase corresponds to cabinet operations and data processing obtained in the field. For the identification of the plants consumed by the cattle, fertile specimens will be collected, for processing (drying and labeling), in the Chuquisaca Herbarium (HSB). The same will be done with the dominant plants of the place to have a general characterization of the vegetation.

Study design

The sampling of the study will be preferential, that is to say that the evaluation units will correspond to the space covered by the animal during the 5 minutes of monitoring, the cattle being free to take the route they want.

Hypothesis 1

Evaluation Unit

Distance traveled during the 5 minutes

Independent variable

Coverage Dependent variable: Number of bits Hidden factors: Ecological factors Data analysis For preference of the cattle (given by the frequency of bites) an analysis of linear regression between number of bits and coverage

Contextual framework Study area

According to the Communal Folder (1995), the Azero Norte community is located in the Los Sauces canton, north of the Provincial Capital of Monteagudo, approximately 34 km away. It corresponds to the first section of the Municipality of the Hernando Siles Province, in the Department of Chuquisaca.

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The study will be carried out in the community of Azero Norte, which is located on the municipal border between Monteagudo and Padilla (LS 19º34‟020‖ and LW 63º59‟363‖), at 947 masl.

Historical background of the area

The Azero Norte community is one of the youngest communities, according to the residents, it began with a single owner, Mr. Francisco Pizarro, who employs people for the agricultural production to which he was dedicated. Those who worked for him were, Messrs. Becerra and Ligerón (still alive), when Don Francisco Pizarro died, he left in the hands of the workers all the territorial extensions which divide the territory equally, measuring for each one 70 m. of frontage and of long as far as the property reaches.

Then more families immigrated who stayed to work the land and produce. Until the community was formed and organized, everyone had a place to live and work when they arrived at the place, currently the rest of the extension that has no owner, is for communal use, with grazing areas and in several cases also as cultivation areas . In February 1995, the neighborhood road built by the Municipal HA of Monteagudo, the PMA and with the participation of the community members was inaugurated (Communal Folder of Azero Norte 1995) cited in the thesis of Zarate and Terán 2010).

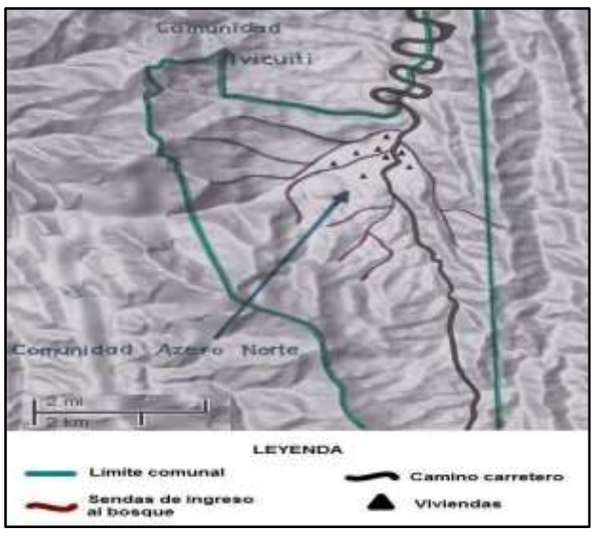

Figure 2 Azero North Community

Limits

The community of Azero Norte limits to the north with the community of Ivicuiti (Padilla Municipality-Tomina Province), to the south with the community of Divisadero, to the east with the Serranía de Cañón Húmedo and to the west with the Serranía de Monte Verde (Communal Folder of North Azero 1995).

Surface

It has a total area of 250 km2, approximately 10 km wide by 25 km long. (Communal Folder of North Azero 1995). Within this natural region, which encompasses sectors of three countries: Argentina, Bolivia and Paraguay with an estimated area of 1,100,000 to 1,200,000 km2, the Bolivian Chaco has an approximate area of 160,000 km2, considering the Chaco Forest. Dry and Serrano Chaqueño Forest (Beck et al 1993).

The physiognomy of the Dry Chaqueño Forest corresponds to an open forest where the tree species of Soto (Schinopsis lorentzzi) and Cacha predominate. Quebracho Blanco (Aspidosperma quebracho blanco) with a relatively open low forest and a continuous herbaceous layer of broadleaves and grasses, interspersed with species of bromeliads commonly called "carahuatas".

The Chaqueño Serrano Forest, unlike the Chaqueño Seco Forest, presents species from more humid environments, which with favorable exposures of the foothills favor rainfed agriculture (Saravia et al 1995).

Importance of woody species

In the Azero Norte community, the informants have prioritized 57 important plants, through direct assessment the most important species are: Quina (Myroxylum peruiferum) with 14.9 points obtained, chosen for the uses it has in the construction of houses, in the form of beams , pillars, post frames and also in technology for furniture. Oak (Amburana cearensis) with 5.9 points, selected as important for furniture and home construction in beams and columns. Cedar (Cedrela spp) with 5.3 points in the technology category for the manufacture of furniture and canoes.

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Timboy (Enterolobium contortisiliqum) with 5.3 points selected in the categories of Construction in beams and pillars and in technology for the manufacture of rafts.

Guaranguay (Tecoma stans) with 5.1 points in the medicinal category mainly as an analgesic for headache, stomach, liver, anti-fever and in construction as chajlla for wall fabric (Terán 2010).

Biogeographic characteristics

According to the Navarro and Maldonado (2002) classification, Azero Norte belongs to the Bolivian-Tucuman Biogeographic Province with a lower sub-Andean forest. Navarro and Ferreira (2007), based on biogeographical characteristics, temperature, climatic aspects, types of soil, location, among others, classify the Azero Norte community.

As Bolivian Tucuman forest, in two ecological systems, which correspond to the first system to the transitional xerophytic Bolivian Tucuman sub-Andean forests that are a group of deciduous forests, constitute the vegetation, distributed in areas of dry xeric bioclimate, in the complex transition floristic and ecological strip between the Bolivian-Tucumán Andes, the Chiquitanía and the Gran Chaco. And in the second, the inter-Andean and sub-Andean Bolivian-Tucuman mesophytic phreatophytic forests, this group of forests constitutes the potential edaphohygrophilous (azonal) vegetation of the deep soils with water tables that, at least seasonally, are shallow or accessible to plants distributed in the inter-Andean and sub-Andean valleys, in flat or slightly sloping areas, on fluvial terraces, recent alluvial plains,

In xeric bioclimate areas, phreatophytic forests are generally dominated by carob trees (*Prosopis alba*); While in areas with pluviseasonal bioclimate, Walnut (Juglans australis) and various laurels are common in these situations.

Azero Norte is located in the vegetation series mapped within this group as: Bolivian-Tucuman inter-Andean-lower phreatophytic algarrobal:

It is a series of Vallesia glabra-Prosopis alba.

For Ibisch (2003), the community of Azero Norte, in addition to the Bolivian Tucumano Forest, is characterized by the Chaqueo Serrano Forest, (Dry Zone of the Bolivian Tucumano and the Chiquitano Forest).

In the Monteagudo Municipal section, two kinds of climates are distinguished: one sub-humid, in the eastern part of the section of the (Sauces), and another humid, in the western part of the Municipality (Fernández, Pedernal and San Juan) Communal Folder Azero Norte 1995) mentioned by Terán 2010.

Geomorphology

According to the Departmental Physiographic Map, the region is classified as "Sub Andean", characterized by a mountain chain parallel to the Andes mountain range, although of less extension and height. This mountain chain occupies practically 90% of the Hernando Siles province to the East.

Only a thin strip to the west (10%), bordering the Provinces of Cinti and Azurduy, would be within the geomorphological system of the Eastern Cordillera (PDM-Monteagudo 2007-2011). The mountain ranges present elongated shapes for hundreds of kilometers and in the sloped valleys and parallel to each other, they are made up of more recent and softer rocks (ZONISIG 2000).

Floors

The Azero Norte community has soils ranging from yellowish brown clay loam to sandy clay with the presence of rock, near the Azero River (Communal Folder of Azero Norte 1995) mentioned by Terán 2010. It has an association of Cambiosols, Leptosols including Phaeozems, Regosole, Lixisols (ZONISIG 2000).

Due to the rugged topography that presents almost the entire geography of the Municipality, the soil is considered very fragile and susceptible to water erosion. This is aggravated by the anthropic activities of farmers such as: expansion of agricultural frontiers through slash-and-burn systems, grazing with a significant intensive trend, and extensive deforestation.

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Regarding the agricultural production systems, in general, in the four cantons of the Municipality, there are no adequate agrarian-ecological practices for soil conservation. Due to recent efforts, measures to mitigate soil degradation have recently been introduced (PDM Monteagudo 2007-2011).

Topography

In this mountain range formation, there are narrow, parallel mountain ranges, with gentle to steep slopes. According to this difference in altitude, there are high, medium,

Lowlands and hills, distributed indistinctly, forming narrow and elongated valleys (PDM Monteagudo 2007-2011). Among the rugged topography of the mountains, there are small embedded valleys, with alluvial terraces and foothills (ZONISIG 2000).

Water resources

The Azero River is the main water resource in the Community with flows of 6.8m3/sec, of notorious influence in the Tomina province, it is also important within the Monteagudo Municipality, being in some areas (for example: Chapimayu or Pedernal), a source of irrigation projects. This river will then continue to the north, as the limit between the provinces of Tomina and Hernando Siles and later between the provinces of Tomina and Luis Calvo, until it empties into the Rio Grande (PDM Monteagudo 2007-2011).

Climatic aspects

Among the most frequent climatic aspects in order of importance in the Municipality are floods, frosts, hailstorms and storms. Given the variability of their appearance, there are no records of areas in which these phenomena occur critically, such as specimens can mention that between the last months of the year 2000 and the first of 200, there were important floods in the Sauces and San Juan del Pirai cantons, they caused significant damage to the road infrastructure, as well as the destruction of crops and the death of persons. However, there are no records of these events (PDM Monteagudo 2007-2011).

Temperature:	19.7ºC annual average.
Precipitation:	926 mm/year Annual average.
Rainy season:	October-April.
Season of less Precipitation:	May-October.
Hail:	Eleven a year.
Frost:	2 to 3 times a year.

Table 2

Farming

Agriculture and livestock vary in intensity and technological level according to the geographical position and the road connection they have, mainly towards consumer markets.

The Sauces canton has the largest number of properties smaller than 20 ha, compared to the Fernández canton, which has only 315 agricultural units of up to 20 ha. In general, there are 3,285 Agricultural Units in the range of up to 20 hectares and only 43 units with surfaces greater than 500 hectares; These figures are closely related to the number of inhabitants in each Canton (PDM Monteagudo 2007-2011)3.

The economic activity of the section is basically characterized by the use of the land for agricultural production such as corn, peanuts, chili, whose crops are the most important in the region. Potato cultivation is also increasing; generating interesting yields as alternatives in crops, there are also less important crops such as rice, cassava, cumanda, sweet potato, citrus and beans whose surpluses are minimal, the same ones that are marketed on a reduced scale. In the same way, other products are produced that are only for family consumption.

Maize, in addition to covering almost the entire cultivated area (90.03%), is cultivated year after year, that is, monoculture is practiced due to the essentials that it currently results in for the needs of families and as food for farmer's cattle.

The exploitation in the chacos corresponds to a migrant agriculture. Once the weeds have been cleared and burned, they are planted for three to four years, until the yields fall and then they are abandoned and the same practice is carried out in another place. The downside of this work is that slope land is used that is easily destroyed by erosion (PDM Monteagudo 2007 -2011).

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Agricultural calendar

The agricultural calendar is determined by the climatic regime, with two vital limitations that condition the production and productivity of crops: the frosts that occur in the months of May, June, July, August and the lack of rain in the months of September to December.

These concepts arise from the interpretation of the water balance and the agro-climatic diagram of the Section. However, these data are averages of the records and observations, in practice, there are wet years and dry years, in addition, there are microclimates in several communities with higher humidity that allow early planting.

Activities	Months											
	Sep	Oct	Nov	Dec	Jan	Feb	Sea.	Apr	May	Jun	Jul.	Aug
Chaqueo burns												
Preparation of the ground(carpida)												
Sowing												
pest control and												
diseases. (Fumigation)												
weeding and jobs												

Table 3 Agricultural calendar

The anticipated sowings are normally done with the maize crop to offer corn every year end; The other annual crops, including corn for grain, begin their cultivation in the large sowing of the months of October and November.

Based on the agroclimatic diagram of the Monteagudo Agrometeorological Station, the respective agricultural calendars of the three main crops in the area have been prepared. In this way, it is confirmed that most of the crops begin their land preparation coinciding with the first rains and their vegetative development is carried out throughout the wet period, the harvest, drying, storage and basketing are carried out in the post-season period. . damp; As expected, excess moisture in the post-harvest season also causes damage, in this case it affects the storage of products (PDM. Monteagudo 2007-2011).

Livestock production system

The composition of the herd at the family level is generally composed of cattle, pigs and horses; It includes in the totality, the raising of hens and to a lesser degree the raising of ducks and, to an even lesser extent, that of turkeys; without ruling out the raising of birds with specific characteristics closely related to high yields and productivity.

From this structure, cattle and pigs represent the basis of its economy due to the monetary resources generated by their sale; the other species are of secondary importance and are generally destined for self-consumption, and with regard to equine cattle, this mainly responds to the need for transportation in a large part of the communities where there are no highways or due to the interruption of links in rainy seasons (PDM Monteagudo 2007-2011).

Cattle in general are raised extensively, being almost entirely of the Creole breed. The basis of feeding are forage species based on browsing, stubble and native grazing forests.

In the case of Creole pigs, the finish lasts up to two years, a higher consumption of fodder and they reach a maximum weight of 75 kg. due to the low level of conversion of corn into meat.

In the breeding of improved pigs (mestizo) during their breeding and after weaning, that is, after the first two months they are released into the bush; With a couple of months to go until they are one year old, they are locked up for fattening, until they reach 85 kg. prior deworming and vaccinated against epizootics of the species (PDM Monteagudo 2007-2011).

Grassland and forage management

The extensive system of livestock production, in some cases, determines the rotation of livestock in a browsing activity in areas known as foothills and mountain ranges (in which important species of legumes are found), between the months of September to February; in grassy meadows or pampas between March and June, and in stubble in July and August. This rotation is conditioned to the seasonality of the climate that affects the availability of food.

The semi-extensive system contemplates the rotation of cattle in pastures or natural meadows, implanted pastures and stubble. The availability of meadows, which in an important way is made up of grasses, is reduced; established pastures (mostly with brachearias) tend to grow periodically with a tendency to reduce the surface of the meadows and crops; An important potential in this type, represents the soils exhausted by agricultural activities, the same ones that with adequate technical assistance could become important spaces for livestock. Stubble is the main source of livestock feed during the dry season.

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The small ranchers who do not have the necessary areas for browsing, keep their cattle in natural pastures or mangroves and stubble, this situation is leading to overgrazing and therefore in the limitations of growth and fattening of the cattle due to the scarce availability of natural forage .

Silage and haymaking of fodder is not practiced, as a means of providing food for animals in the dry season; This is basically due to the limitations of knowledge and technical capacity, as well as the volume of needs of the vast majority of livestock producers (PDM Monteagudo 2007-2011). 30% of the population of this community is dispersed, with a 70% nuclear population around the school. 95% speak Spanish; Likewise, 4% speak Guaraní because of the Guaraní settlement as laborers and 1% are those who speak Quechua.

There are 33 families registered in the OTB (Base Territorial Organization), according to projection data from the INE (National Institute of Statistics) referenced in the PDM Monteagudo (Monteagudo Municipal Development Plan), each family in the community has an average of 5.1 members per family with a population of around 168 inhabitants in the community.

The concept of livestock refers to the breeding of animals whose purpose is to obtain an advantage of them. It is important to differentiate it from the breeding of companion animals or endangered species, which do not correspond to the traditional concept of livestock. Livestock is spoken of, normally, when the animals are developed in a state of domestication, being their use, mainly meat, milk, leather, eggs, among other products (In letter 2009).

Livestock farming or livestock production responds to a socio-economic strategy of reproductive security, capital accumulation (investment, social prestige) and savings (divisible capital, which reproduces itself). Economically it does not have regular use, it only occurs in emergencies or parties (Saravia 1995). In 2003, national cattle stocks were estimated at 6.5 million head. Of this total, the eastern plains have 73%, corresponding to Beni 48%, 25% to Santa Cruz and less than 1% to Pando.

To the valleys of Cochabamba, Chuquisaca and Tarija corresponding 18%. To the region of the altiplano with La Paz, Oruro and Potosí 9% head for transport.

Natural fodder

Forage is defined as all vegetation (grasses, herbs, shrubs and trees) with forage value, not sown, which can be consumed by domestic or wild animals. It is also defined as the herbaceous food consumed by cattle (Azúcar 2002). Preference refers to the response of animals to the acceptance of a plant for their diet; Palatability is the set of characteristics of the plant that stimulate the animal to select and consume it; Selectivity, the degree that the animal has to harvest the plants or parts of them, differentiating them from other species, in a result of preference and palatability (Joaquín et al 2001).

Natural fodder is of great importance in arid and semi-arid zones. Forage comes mainly from the leaves of bushes, trees and bushes. This forage plays a fundamental role in livestock production ecosystems. In Niger for example, forage from trees contributes 25 percent of ruminant forage supplies during the dry season (FAO 2009).

Tropical forest

Tropical forages are those plants that grow in warm climates, where it rains abundantly at certain times of the year and that serve as food for livestock (Jiménez 2012).

Native forest

Native forests are those that have been established without the intervention of man, unlike crops and like soil and water, they are vital systems, with the capacity for self-conservation and self-regulation. They present a maximum complexity, involving tangible and intangible benefits essential for the continuity of life on the planet, such as microclimates, refuge for fauna and flora, protection of water and soil supplies, source of energy, supply of housing and other needs that come with the man (Montenegro 2006).

The evaluation of forest resources carried out by the FAO (2005), mentions that throughout the world, more than a third of the total forest area is primary forest (defined as forests of native species where there are no signs of human activities).

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The rapid decline in primary forest area in the 1990s continued in 2000-2005. This decline is due not only to deforestation, but also to forest modification through selective logging and other human interventions. .

The ten richest countries in forests account for two thirds of the total forest area. Seven countries or territories have no forest at all, and another 57 have forests on less than 10% of their total land area (FAO 2005).

Definition of preference

According to López (1984) in which he defines appetizing as the set of characteristics of the plant that stimulate the animal when consuming it; thus, preference is the animal's response to the plant's palatability. Livestock selectivity, on the other hand, is the measure of what the animal ingests relative to what it disposes of.

Preference, forage types and availability periods

Large and small livestock simultaneously take advantage of the different plant strata of the forest. The preference is conditioned to the time of the year where there are great variations in the supply of forage. Probably many of the species currently consumed are not the ones they prefer if a positive successional change occurs in the vegetation, therefore what will be seen are observations that discriminate livestock in relation to the consumption of a certain species and not a preferential assessment between species (Theran 1995).

Some species mainly provide energy material for subsistence in the form of dry matter (such as leaf litter in autumn-winter, dry twigs in early spring), other species are important for their protein content (spring ramones and summer foliage), others for the incorporation into the diet of nutritional micro-elements such as calcium or phosphorus in the fruits of carob trees and other species during the summer-autumn and part of winter (Terán 1995).

Cattle graze more frequently on Kari Kari (Acacia etilis), sirao (Acacia aroma) and tender carob shoots. In both cases they eat the carnations of the air and the pupa with great appetite. In which several existing species are listed in the Chaco mountain region of Chuquisaca as well as new species in the area.

All of them indicated according to the type of forage they offer, the cattle that preferentially consume them and phenological annotations to relate available periods.

Forage availability

NRC (1987); points out that the two main factors that influence the consumption of grazing livestock are: the quantity and quality of available forage; being the quantity the first limiting factor.

Likewise, López (1984) mentions that the production and presentation of the forage available for the grazing animal has considerable effects under prairie conditions; these variables may not be important in extensive grazing.

The food value

As in the recognition of the forage preference of the species, the food value is mostly reported descriptively, thus (ETAPA 1993) cites peasants from the Poroma area in Chuquisaca who indicate "the tipa (Tipuana tipu) and the quñuri (Erythrina falcata) are good foods. They keep the animal well, the tender and green sprouts make the blood work... they make the animal recover."

These same authors (ETAPA 1990) point out that for peasants the affirmation that a tree is good or bad is directly related to its nutritional value for the animal. In this sense (LOJAN 1992) indicates that in northwestern Argentina the churqui (Acacia caven) is considered a "strong" forage species, due to its pods that help the "rapid" fattening of cattle.

For that same area (DÍAZ 1963) he indicates that local ranchers know "albeit empirically" the value of vegetation in feeding animals, considering ramones and tree fruits as special fodder. However, for these species, the use of investigative procedures and methodologies for animal response has already begun, such as that reported by (PALACIOS 1987 cited by LOJAN 1992) pointing out that in Ecuador rations (diet) were tested with 80% of Acacia macracantha supplement, obtaining better results than using corn in fattening bulls.

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The mount resource

The trees and shrubs, plus the grasses, perennial and annual herbaceous plants, epiphytes and hemihepiphytes with forage capacity existing in the natural forest, constitute the main and primary component of the silvopastoral forest (adapted from Brassiolo M and Col 1990). When we speak of grazing we are referring to the use of the categories of vegetation mentioned and available as food for livestock, also including certain special forages such as leaf litter, flowers, fruits and regeneration of woody plants.

Definition of agroforestry systems

There are many concepts to define what is agroforestry or agroforestry systems; for Combe and Budowsky (1974), they turn out to be a set of land management techniques where forest trees are combined with agricultural crops, with livestock or a combination of the three, simultaneously or staggered in time and in management space. of land where forest trees are combined with agricultural crops, with livestock or a combination of the three, simultaneously or staggered in time and space, in order to increase production per unit area, following the yield principle sustained; while for others they are considered as forms of use and management of natural resources in which woody species (trees, shrubs, palms),

On the other hand, Nair (1984) defines agroforestry as the use of land where trees or other perennial crops are deliberately mixed with animal production in the same field, providing benefits resulting from ecological and economic interactions. Considering the limitations of the definitions expressed by some authors, Mac Dicken and Vergara (1990) conceptualize agroforestry as a different system of land use, which includes combinations of agriculture, forestry, horticulture, practices and animal subsystems.

Hart (1980), points out that it is an arrangement or set of components united or related in such a way that they form an entity or a whole. In this way, an agricultural or agroforestry system was defined as a physical design of crops and animals in space and through time; functionally it is a unit that processes income such as solar radiation, water, nutrients and produces outputs such as food, firewood and fibers.

Vera (1991) considers that the most correct definition of agroforestry systems is the one provided by Lungren (1982). Who mentions that it is...‖a collective term that encompasses systems and technologies for land use, in which 4 perennial woody species are combined with herbaceous crops and/or animals in the same management unit, in some way of spatial distribution or chronological sequence‖.

Peck (1977), mentioned by Pérez (1991), considers agroforestry as the process of food production in equal times and on the same surfaces as permanent forest crops; a particular case is the Taungya system. Agro-forestry is all plant cultivation and animal production that are part of a single biological cycle considering each exploitation unit as an integrated whole: the forestry component, agriculture, livestock and horticulture, in order to increase yield and optimize production. conservation of a certain piece of land.

Grazing systems

The most frequent grazing systems are: continuous, rotational and deferred (Lt Mannetje 2006), with simple alternate grazing, double alternate grazing, strip grazing, mixed grazing and others (Cazaravilla 2003).

Most frequent grazing systems continuous grazing

It is the prolonged occupation of pasture by animals. Grazing can be continuous with the same batch of animals (whereby said batch of animals and the pasture are in a permanent relationship) or it can be continuous with different batches of animals (whereby, although the pasture is subject to permanent occupation, hacienda plots, are rotating between different paddocks) (Spedding 1965).

Two categories can be set:

a) Fixed stocking, which does not observe seasonal fluctuations in pasture production, that is, grazing pressure (number of animals per available forage unit) constantly fluctuates. It is the most irrational form of grazing.

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b) Load variable. It is a more correct decision if the load adjustment is made following the fluctuations of. forage production. If the adjustment is made based on other factors (farm prices, tax relief, etc.) it can become, from the point of view of pasture, in a way as irrational as the previous one..

Rotational grazing

Rotational grazing is understood as any management in which the animals remain for a short period of time in part of the available area (one of the lots) and return to it at determined intervals, after having passed through the others (Spedding, 1965, Holmes 1962) mentioned by Giordani. 1973, Each lot has access to a water source.

The intensity or category of rotational grazing is defined by:

a. Frequency of defoliation, that is, the time that elapses between two successive cuts of the same part of the pasture. In practice, it is specified with the occupation and rest time of each lot or strip; this determines the number of subdivisions.

b. Defoliation intensity, that is, the cutting height to which the pasture will be subjected.

c. Size of the batches, data that will give us an idea of the "harvest uniformity" of the forage by the animal. In general, smaller plots can achieve better harvest uniformity.

d. Rigidity or flexibility of the method, regarding the order of rotation between the different lots, the time of occupation and the time of rest in different seasons of the year.

e. Type of farm: cattle, sheep, wintering, breeding, dairy cows, etc.

Silvopastoral systems

The SSP4 are land use systems where livestock and forestry coexist in the same productive unit, taking advantage of the positive interactions and minimizing the negative ones that are established between the animal, plant and soil components.

There are three elements on which man can act at the farm management level: primary production (trees and fodder); secondary production through livestock and soil management, without losing sight of the fact that it is a system, where the elements interact with each other (Carranza and Ledesma 2009).

The silvopastoral system (SSP); it is a type of agroforestry system, which implies the presence of animals between or under the trees and/or bushes; interacting directly (browsing) or indirectly (cutting and carrying forage). Perennial woody species (trees and/or shrubs) can be established naturally or planted by the producer within grazing areas; be it for timber purposes (coffee walnut), for industrial products (rubber), such as fruit trees (citrus, mango, guava), or multipurpose in specific support for animal production (leucaena, hatchery, mouse killer).

Silvopastoral systems; Although they are a new term, they are used to identify alternatives practiced by some livestock producers since ancient times. But nonetheless; reach great height and importance, due to the need to reduce the effects of degradation of natural resources (water, soil and vegetation) caused by unplanned reconversion of agricultural production systems and forested areas, towards the traditional livestock production system, where monoculture of grasses (pastures) has been privileged (Ojeda et al 2003).

In other words, a silvopastoral system is one that allows its components, forest trees, pastures and production animals, to be located under a comprehensive rational management scheme, which tends to improve in the medium-no or long term, productivity, sustainability and profitability. of the farm; all this taking into account the dissimilar conditions and production times of the various components.

The statement implies that the management of a silvopastoral system involves the knowledge and assembly of numerous variables that affect each of the aforementioned components, without forgetting soil and water resources (Martin and Agüero 2009). A silvopastoral system is a livestock production option that involves the presence of perennial woody species (trees and shrubs) and traditional components (herbaceous forage and animals), where all of them interact under an integrated management scheme (Somarriba 1992).

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Among some of the silvopastoral systems mentioned in the literature are: grazing in fruit or timber plantations, live barriers and windbreaks, live fences, scattered trees in pastures and fodder banks (Nair 1993, Pezo and Ibrahim 1998). Silvopastoral systems are agroforestry practices that are implemented as mechanisms that contribute to increasing the quality of life and production of farmers such as environmental sustainability (Beer and Guevara 2000, Souza et al 2000) mentioned by Decker 2009.

Its main function is to increase the productivity of the system and reduce the caloric interest of plants and animals, through partial shading of woody plants by regulating the microclimate and providing products (forage, fruits, wood, firewood), as well as grass and animals. (Ospin 2006). .

Silvopastoral practice is carried out at different levels, from large commercial tree plantations including cattle, to grazing in secondary forests as a complement to subsistence agriculture (MontagniniF and Col 1992).

The arrangement of the combination components in terms of their spatial and temporal sequence serves as a differential criterion to distinguish forms of silvopastoral exploitation such as: a) Grazing forest plantations) Grazing in secondary forests) live fences and windbreaks in grasslands, d) scattered trees in paddocks and e) Alleys of trees and shrubs in grasslands (Terán 1995).

The “traditional” practice of pasture implantation is very common, which consists of eliminating the tree layer, either with machinery or manually, in order to later sow the selected forage (Joaquín et al2004).

Protein and/or Energy Banks. Studies carried out over four years in the humid tropics of Central America show that a bank of Erythrina berteroana produces about 6.0 ton/ha/year of crude protein, which would be enough to provide the 30% of Protein requirement of 46 cows of 400 kg. of weight and with a production of 8.0 kg. Milk/cow/day (CATIE 1991).

Scattered trees, scatters are those tree species that the producer has deliberately planted or retained within an agricultural or ranching area and have been left when a land is cleared or repaired to provide a specific benefit or function of interest to the producer such as shade, food for animals and generate income, especially if they are species of commercial interest for consumption (Raintree and Warner 1986).

It is the combination of trees and/or shrubs with a cultivated grass and legume (Jiménez 2012).

Grazing

Grazing can be defined as the direct consumption of grass by livestock in the field, it is the simplest and cheapest system of converting that vegetable matter produced through photosynthesis by autotrophic organisms (primary producers), which in itself does not have value for man in products directly useful to him and with economic value (meat, milk, hides, wool, work, etc.), through the action of phytophagous5, or secondary producers (Ayanz 2003).

Importance of silvopastoral systems in the native forest

CATIE's experience highlights the importance of silvopastoral systems, focused on the main environmental services:

1) Restoration of degraded soils and water conservation, in acid soils (pH = 4.6), show that the integration of Acacia mangium in pastures with Brachiaria humidicola, constitutes the improvement of forage quality and the increase of phosphorus and nitrogen content, when compared to the monoculture of B. humidicola (Bolívar and Velasco 1998).

2) Reducing the pressure on the natural resources of the forests, in the different silvopastoral systems the production and extraction of wood for construction, firewood, charcoal, poles and others, can reduce the pressure on the natural resources of the forests and fuels fossil fuels , so there is a positive indirect impact on carbon conservation in other ecosystems. Silvopastoral systems with scattered trees do not allow the burning of pastures, another source of CO2 emissions, which is still used in the regeneration of pastures.

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3) The use of live fences, which is a traditional practice in Central America, not only because its establishment means a saving of 54% with respect to the cost of conventional fences (Holmannet al 1992), but also because it constitutes a form of reduce the pressure on the forest to obtain poles and firewood, in addition to representing a way to introduce trees in the pastures.

In Monte Verde, Costa Rica, 25% of all the estimated 400 species in the region found their suitable habitat in the windbreaks located in Cynodonlemfuensis pastures used for dairy production. Birds (89 different species used the curtains as habitat) were the most important vectors for the dissemination of the seeds of these species, especially when the curtain was connected to the forest.

Effect of livestock on forage woody species

Overgrazing causes the disappearance of valuable forage species from large areas, in some cases with the risk of extinction of ecotypes or other species, when not of the species itself (Saravia 1995).

In degraded and eroded areas due to the effect of cattle ranching with overgrazing, an increase in and invasion of woody, sub-woody and cacti is observed (Saravia 1995). For example, in the Sierra Riojana, Spain, the passage of transhumance with sheep can be observed over three centuries, where oaks and beeches are relegated to lower areas of this Sierra (Fuentes et al 2001).

Also in areas with overgrazing, the soil is altered by: a) denudation due to the destruction of the herbaceous cover) compaction due to trampling in the spaces between bushes where cattle walk) lower oxygen content in the soil due to the reduction of pore spaces) reduction of infiltration due to loss of organic matter and decreased porosity and e) soil loss due to wind and water erosion (Saravia 1995).

In Mexico, livestock still maintains an extensive bovine production system. This system consists of low management, without production intensification, and includes free foraging by livestock within subtropical montane forests.

Hernández et al (2000) indicates that until now there is no effect of cattle on diversity in the three types of vegetation. However, when analyzing the composition and density, they found differences

In: 1) an active selection of herbivores towards a specific plant species and, 2) the differential vulnerability of a plant species to cattle grazing, emerging that in mountain cloud forests, Cinnamomum pachypodum, Inga hintonii and Styraxramirezii, are species sensitive to livestock activity.

Grazing intensity

It is defined as the grazing behavior of ruminants6 and the daily yield of hot-climate pastures or as the product of the instantaneous load by the time of occupation. It is a concept of great importance because the effect of grazing on the vegetation, for the same global load, varies considerably when the instantaneous loads vary (Muslera and Ratera 1991).

Fodder trees

In order for a tree or shrub to be classified as forage, it must have advantages in terms of nutrition, production and agronomic versatility, over other traditionally used forages. Fodder trees and shrubs: an agroforestry alternative for livestock in this sense the requirements for such qualification are: i) that their consumption by animals is adequate to expect changes in their response parameters; ii) that the nutrient content is attractive for animal production; iii) that it is tolerant to pruning and iv) that its regrowth is vigorous enough to obtain significant levels of edible biomass production per unit area (Sosa et al 2004).

Essential Nutrients in Livestock Feed

The food obtained from plants does not only consist of forage species, seeds, foliage or roots; but also in by-products derived from the processing of various plant elements (Maynard et al 1981)

Crude protein (bw)

Crude protein (cp) and digestibility are the most important quality components of the plant consumed by the animal.

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Percentages above ten are considered to be of medium quality in the case of PC (Crude Protein). In general, grasses have a lower PC% (between 6 and 15%) than the leaves of trees and shrub species between (15 and 25%). Pastures lose digestibility with advancing age, 6 It is said of the cloven-footed artiodactyl mammals, which feed on vegetables, lack incisor teeth in the upper jaw, and have a stomach made up of four cavities (they chew for the second time) just like your PC content. On the other hand, the leaves of shrubs and trees maintain quality to a certain degree (Joaquín et al. 2004).

Crude protein (pb)

Because protein is the main constituent of the organs and soft structures of an animal body, an abundant and continuous supply of it in food is required throughout life for growth and replenishment. The transformation of dietary protein into body protein is a very important part of the nutritional process (Maynard et al 1981).

Ethereal extract (ee)

In analyzes of crude nutritional substances, those that readily dissolve in organic solvents (eg ether, acetone, benzol) are included in the group of fats or lipids (Rojas 1978).

From the point of view of the amounts present in the animal body and its food, fats are the most important members of the group, but many other lipids play significant roles in nutrition and physiology (Maynard et al 1981).

Nitrogen free extract (eln)

The nitrogen-free extract is a mixture of all the starches and sugars in the sample, a little more hemicellulose and quite a bit of lignin considering that the ELN is made up of all soluble carbohydrates (Crampton and Harries 1974).

Crude fiber (fb)

Crude fiber is also considered to be the residue obtained after the successive boiling of the food with alkali or diluted acids, based on a sample previously subjected to extraction with ether, dried or incinerated, the difference in weight before and after burning is the reference fraction, as indicated (Crampton and Harries 1974).

McDonald et al (1975) states that crude fiber primarily represents the carbohydrates of plant structures such as cellulose, hemicellulose and part of lignin.

Minerals (calcium and phosphorus)

More than 70% of the body's ash is made up of calcium and phosphorus. Most of the time they enter the body combined with one another and an inadequate supply of either in the diet limits the nutritional value of both. (Maynard et al 1981).

Methods to determine the preference of forage consumption by cattle

In this technique, the number of bites made during grazing and their average size are considered.

For the calculations, it is assumed that forage consumption is the product of the number of bites made by the animal and the individual size of each one of them. This technique is of low precision since it is difficult to accurately record the bite mechanism. Visual observation of jaw movement is difficult in grazing animals and may not result in a true biting rate, as some of the jaw movements are associated with manipulation of plant cover and others with the act of swallowing.

Normally the bite rate is recorded for short periods (Hodgson 1982) as it varies during the day (Jamieson and Hodgson 1979).

It is important, therefore, to select the intervals and measurement time during the day well, the shorter the recording period, the greater the error to estimate the bite. Hodgson (1982) suggests a minimum time interval of 30 seconds for each recording.

Special care must be taken to account for the change in bite rate during periods of hunger, eg, after milking, (Jamieson and Hodgson 1979). The first efforts of Pinning (1983) with the development of sensors to estimate the movement of the mandible and the respective equipment, have allowed the continuous measurement of the bite.

A second measurement is the size of the bite or amount by weight of organic matter or dry matter consumed in each bite.

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Results and discussion

Results

Richness of native forage

105 native forage plants were identified, distributed in 50 families. The family that contains the largest number of species is Fabaceae (22), continuous Asteraceae (14) and Euphorbiaceae, Malvaceae, Sapondaceae, Solanaceae with (5). With one species there are 23 families (Figure 1).

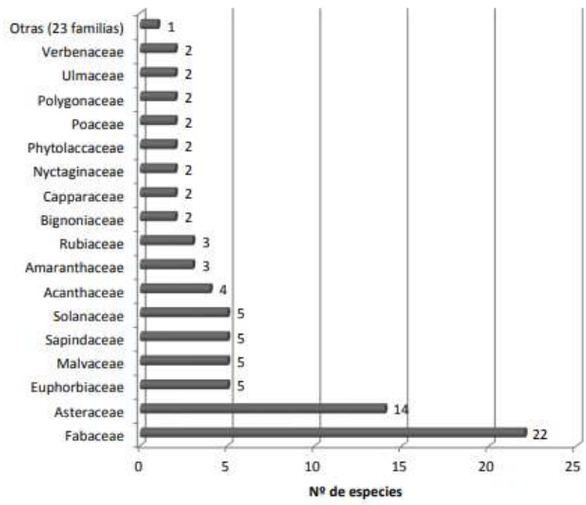

Figure 1

Forage preference

The species most preferred by cattle is the one called: near arivivi (Justicia sp.), which has recorded an average of 71 bites per hour during the monitoring period, continued kari kari (Acacia etilis) with 67, later in third place is motovovo (Lycianthes asarifolia) with 62 bites

Family	Scientific name	Common name	Average of bits/hour
Acanthaceae	*Justice sp.*	Close to arivivi	71
Fabaceae	*acacia etilis*	Kari Kari	67
solanaceae	*Lycianthes asarifolia*	Motovovo	62
Fabaceae	*Coursetia*	porotillo	42
cannabaceae	*Celtis spinosa*	Satajchi red fruit	40
Ulmaceae	*Celtis brasilensis*	Satajchi yellow fruit	3. 4
Asteraceae	*Biden's*	Santa Maria	32
Malvaceae	*rodrigoi aids*	Afata/guacachi	32
Phytolaccaceae	*Hilleria latifolia*	white flower long leaf	30
Fabaceae	*acacia scent*	sirao/tusca	29

Table 4 Most preferred forages during monitoring

Native forage preference according to evaluation season

Observations were made during the months of February, March and April. For the month of February, the most preferred species is the Sirao or tusca (33 bits per hour), continues Santa María. (32) and then with the same number of bites (30) there are three: morita 1, close to arivivi and satajchi yellow fruit.

Family	Scientific name	Common name	Average of bits/hour
Fabaceae	*Acacia Scent*	sirao or tusca	33
Asteraceae	*Biden's*	Santa Maria	32
Asteraceae	*Sp 4*	blueberry 1	30
Acanthaceae	*Justice Sp.*	close to arivivi	30
Ulmaceae	*Celtis Brasilensis*	Satajchi yellow fruit	30
Sapindaceae	*Serjania Foevata*	guider	26
Cannabaceae	*Celtis Spinosa*	Satajchi red fruit	25
Malvaceae	*Rodrigoi Aids*	Afata or guacachi	21
Fabaceae	*Acacia Albicorticata*	Tatari or churqui	19
Urticaceae	*Bacciferous Urethra*	itapalla network	16

Table 5 Most preferred forages during February

For the month of March, the species that was in first place (sirao/tusaca) is displaced, along with guidera, morita 1, tatari/churqui and red itapalla. Which are replaced by porotillo, white flower, kari kari, long leaf white flower and motovovo. Those that remain are similar to arivivi, which is occupying the first place, santa maria, satajchi red fruit and satajchi yellow fruit.

Familia	Scientific name	common name	Aver de bites/hour
Acanthaceae	*Justice Sp.*	Similar arivivi	115
Cannabaceae	*Celtis Spinosa*	Satajchi red fruit	79
Fabaceae	*Acacia Etilis*	Kari Kari	76
Acanthaceae	*Ruellia Longipedunculata*	white flower	75
Solanaceae	*Lycianthes Asarifolia*	Motovovo	70
Fabaceae	*Coursetia*	porotillo	57
Ulmaceae	*Celtis Brasilensis*	Satajchi yellow fruit	54
Phytolaccaceae	*Hilleria Latifolia*	white flower long leaf	53
Malvaceae	*Rodrigoi Aids*	Afata/guacachi	44
Asteraceae	*Biden's*	Santa Maria	29

Table 6 Most preferred forages during March

In the month of March, the species that are maintained are similar to the arivivi, kari karil, porotillo, movovo and santa maria. Disappear satajchi red fruit, satajchi yellow fruit and long-leaved bench flower, white flower and afata or guacachi.

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These are replaced by peach, malvilla, broadleaf grass, algarrobo and the sirao or tusca that reappears

Family	Scientific name	Common name	Average of bits/hour
Fabaceae	*Acacia Etilis*	Kari Kari	93
Solanaceae	*Lycianthes Asarifolia*	Motovovo	84
Acanthaceae	*Justice Sp.*	Similar arivivi	65
Fabaceae	*Coursetia*	porotillo	52
Fabaceae	*Acacia Scent*	sirao/tusca	41
Polygonaceae	*Ruprechtia Triflora*	peach	39
Poaceae	*Panicum*	broadleaf grass	39
Malvaceae	*Sp 3*	Malvilla	35
Asteraceae	*Biden's*	Santa Maria	35
Fabaceae	*Prosopis Alba*	carob tree	33

Table 7 Most preferred forages during April

Nutritional content of native forages

The species that contains the highest energy is in the first place Porotillo with 30%, followed by Santa María and Satajchi yellow fruit with 28%. The species that contains the highest protein is Kari kari with 30%, long-leaf white flower with 23%.

Scientific name	Common name	Parsed part	MS %	PB%	HR %	THEN %	EB (Kcal/g) %	P% Tosuch	Cto %	K %	mg %
Justice	Similar Arivivi	HT	94.37	twenty.42	23,fifteen	26.81	27	3.161	3,two	3.76	0.27
Acacia praecox	Kari Kari	F	95.43	30.91	twenty.09	32.81	26	one,588	0.75	one.55	0,twenty-one
lycianthes	Motovovo	H	95.36	twenty-one.82	twenty-one.52	29.84	18	0.227	one.6	5.91	0.54
asarifolia	porotillo	HT	94,3 . 4	16.89	27,3. 4	36.46	30	0,twenty-one	two.42	two,4	0.18
Coursetia	satajchi fruit	F	92.33	twenty-one.49	13.09	30.9	twenty	one.537	5.12	one.92	0.87
Celtis spinosa	Net	F	92.68	twenty-one.81	14,twenty-one	3, 4.03	28	one.278	4.16	one.17	0.7
Celtis brasiliensis	satajchi fruit	HT	94.74	twenty-one.78	25.08	31,3 . 4	28	two,681	0,Four . Five	3.25	0.87
Eupatorium hookerianum	yellow	F	93.55	16,two	26.51	36.06	26	0.12	two.205	two.44	0,4
rodrigoi aids	Santa Maria	HT	92.59	23,3. 4	17.07	31.72	19	one.372	two.08	two.41	0.63
Hilleria latifolia	Afata/guacachi	F	93.82	19.37	26.55	36.49	twenty-one	0.109	one.07	0,Four. Five	0.31

Table 8 Native forage with nutritional value

Forage availability

The forage plants with the greatest availability within the forest are yellow Asteracea (Viguiera), comadre (Zinnia peruviana) and murucuyá (Passiflora cincinnata), who have a degree of coverage of four (Coverage from 50 to 75%).

But these species are not always the most preferred by livestock. In the case of the first, it registers a value of 1 (Coverage less than 5%), the second 1 (Coverage less than 5%) and the third + (More individuals, very low coverage). On the other hand, those most preferred by cattle (similar to arivivi) register a value of 3, the second (kari kari) with 2 and the third (motovovo) 3 (Table 12).

Family	Scientific name	common name	Average of bit time	coverage
Acanthaceae	*Justice Sp.*	Similar arivivi	71	3
Fabaceae	*Acacia Etilis*	Kari Kari	67	2
Solanaceae	*Lycianthes Asarifolia*	Motovovo	62	3
Fabaceae	*Coursetia*	porotillo	42	2
Cannabaceae	*Celtis Spinosa*	Satajchi red fruit	40	2
Ulmaceae	*Celtis Brasilensis*	Satajchi yellow fruit	3. 4	3
Asteraceae	*Biden's*	Santa Maria	32	3
Malvaceae	*Rodrigoi Aids*	Afata/guacachi	32	3
Phytolaccaceae	*Hilleria Latifolia*	white flower long leaf	30	3
Fabaceae	*Acacia Scent*	sirao/tusca	29	3
Acanthaceae	*Ruellia Longipedunculata*	white flower	25	3

Table 9 Availability of native forage

Relationship of availability of native forage with preference

According to the linear regression analysis, there is no relationship between the availability of forage (expressed by dominance abundance coverage), with the preference of cattle. In the graph it can be seen that at a value of 1, which expresses minimum availability, the number of bites remains at approximately 20, a value that is similar when availability increases to 5 (maximum availability).

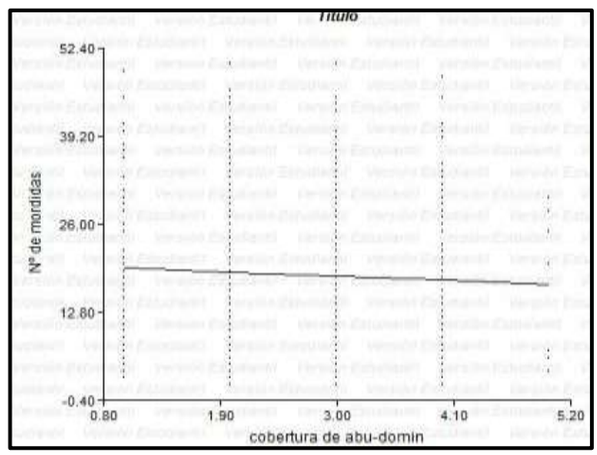

Figure 3

Discussion

The highest concentration of forage species is recorded in the Fabaceae family, Asteraceae, which is related to the importance of these families by Villalobos (2009), who reports the Fabaceae family with the highest importance index value. Most of the most preferred forage species depend on the season, which are being replaced as their phenological cycle (tender shoots) passes. According to the results of the bromatological analysis, it is not possible to see a trend that better nutritional quality improves.

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However, among the preferred species are species with excellent nutritional value such as similar arivivi, kari kari and porotillo. The preference of forage is not influenced by availability, this shows species such as muyucuya, Guaranguay, comadre, yellow Asteraceae that have a coverage value between 4, have a preference of 1 bite / hour.

Conclusions

The alternative hypothesis is not accepted. The preference of native foragers for cattle within the forest is independent of the nutritional value and availability of these.

Recommendations

Supplement animal feed in the dry season by reserving native grasslands, cultivating and conserving forage from annual and multiannual plants, annual native weeds.

Continue with research work in native grasslands in order to improve forage production and its conservation.

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