Ethnobotanical Study of the Rural Population of the West of the Pampa Plain (Argentina)

Walter Alejandro Muiño

Research

Abstract

This paper is an ethnobotanical study of cattle farming in the western Pampa region of Argentina, an arid region with very scarce rainfall and a population consisting mainly of **Criollo** farmers. A total of 68 rural settlers were interviewed, providing information on 69 specific and infraspecific taxa. Plants were classified into the following categories according to use: forage, toxic species or species with adverse effects on animals, use in rural constructions, tools, and those with veterinary applications. Data include native, naturalized and cultivated species. They revealed a diverse group of forage plants, according to the type of livestock, and very few toxic plants. Veterinary applications were related to first aid cases. In rural construction, plants were mostly used for fencing paddocks and corrals. The results of this study show the acute level of perception and detailed knowledge of the plant environment held by this farming community in relation to their main economic activity.

Introduction

Livestock farming in arid and semiarid areas is of scientific and technical interest due to the fragility of these ecosystems (Borrelli & Oliva 2001, Montes & Oliva 1995, Ojeda *et al*. 1998). In Argentina, the studies made into this topic aim to describe the environment and the living organisms that compose it (Anderson *et al*. 1970, Boelcke 1957, Cano 1988), as well as the management guidelines that should be followed for sustainable development of the land (Golluscio *et al*. 1998, Grünwaldt *et al*. 1992, Guevara *et al*. 1996).

Although various ethnobotanical studies on animal farming communities in Patagonia have been made (Ladio & Lozada 2004, 2008), none of them looks specifically at stock breeding in the Pampa region. Among the studies that address this topic from an anthropological point of view, in Argentina we can mention the work of Jiménez de Pupareli (1984), and other interesting studies on specific issues such as veterinary practices (Bartolomé 1968, Torres & Santoni 2003). From an ethnobotanical perspective, the works of Scarpa (2000, 2007) on veterinary aspects and the management of foraging species in farming communities of the semiarid Chaco are also important.

Current farming development programs are based on incomplete information about the relationship that exists between the rural inhabitant and his natural environment. Ignorance of the cultural framework in each production area is partly responsible for the problems that arise between rural producers and agronomists (Feito 2004). In addition, the Pampa region has areas with different types of vegetation, and its population is of different origins and the result of several colonization processes, each with its own specific sociocultural traits and each one deserving to be explored in studies which relate biology with an-

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thropology. Likewise, it has been proposed that as more information is gathered on the perception and significance of the environment for native communities, the communication between them and the parties responsible for local development policies will improve (Bollig & Schulte 1999).

As a result of the above, and due to the constant loss of cultural and natural diversity in a rapidly changing globalized world, the study of animal farming from an ethnobotanical point of view, i.e., taking into account the sociocultural interactions between man and environment, is becoming increasingly important.

As hypotheses it is put forward that farmers from marginal areas of the Pampa plain maintain their traditional knowledge and continue to use natural resources despite the availability of commercial supplies and materials. The aim of this paper is to make an ethnobotanical characterization of animal farming in a community of the northwest of the province of La Pampa. Special emphasis is placed on foraging species, species with toxic or other negative effects for the animals, species for veterinary uses and species used in the creation of facilities and tools for herd management. It is part of a more extensive investigation that includes other ethnobotanical values in the region (Muiño unpublished data).

Study area

The study area is located in the western half of the Chicalcó department, in the northwest of the province of La Pampa, Argentina, and borders on the province of Mendoza. (Figure 1)

The altitude of the region ranges between 800 and 1,000 m.a.s.l. The soil is loose and sandy, with a sand fraction of 85% (INTA, Gob. de La Pampa UNLPam 1980). It has occasional calcareous tuff horizons, and in the southwest there are various basaltic horizons emerging from the ancient mantle (Cuello 1968). The northwest section is the highest area and is characterized by a hilly landscape. There are numerous salt pans in the lower-lying areas. Here the landscape is a plain that slopes 0.5% from west to east, although this value increases in the hilly northwestern area. The historical mean annual rainfall of the area is 200 mm, falling mainly between the months of October to March. However, the last decades have seen a

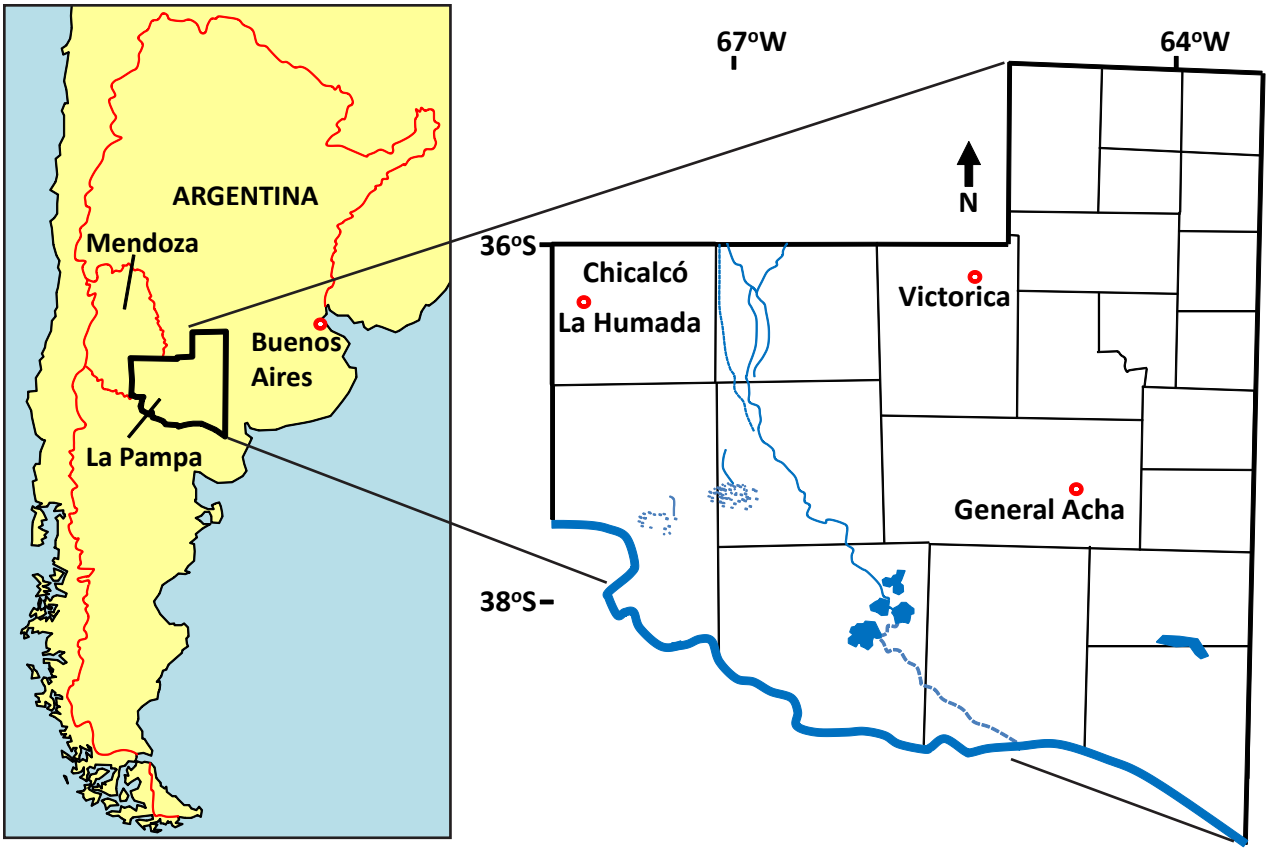

Figure 1. The study area in the western half of Chicalcó department, in the northwest of the province of La Pampa, Argentina, and borders on the province of Mendoza. Towns and provinces where livestock production is sold are also shown.

shift in isohyets and the region now has annual rainfall of over 300 mm. (Casagrande *et al*. 2006). Snow can occasionally fall in winter. The mean annual temperature is 14 °C with absolute maximum temperatures of 42 °C in January and minimum temperatures of -15 °C in June (INTA, Gob. de La Pampa, UNLPam 1980).

Most of the area belongs to the Monte phytogeographic province (Cabrera 1971), although the southern sector includes parts of the Payunia province (Martínez Carretero 2004). Vegetation is mainly represented by low open scrubland where *Larrea divaricata* Cav. is the dominant species together with *Junellia seriphioides* (Gillies & Hook.) Moldenke, *Acantholippia seriphioides* (A. Gray) Moldenke, *Poa lanuginosa* Poir., *Aristida mendocina* Phil. and *Panicum urvilleanum* Kunth. Some areas are also covered by open xerophytic shrublands and halophytic vegetation.

The department of Chicalcó has a surface area of approximately 9,117 km^2, and a population of 1,595 inhabitants, with a density of 0.2 inhabitants/km^2. The most important demographic center in the area is the locality of La Humada with a population of 419 inhabitants (INDEC 2001). Due to the presence of springs, there are another two settlements with microclimates that have favoured the concentration of several rural estates. These are the localities of Chos Malal and Agua de Torres, located to the north and south of La Humada respectively.

Stock breeding in the West Pampa region

The main economic activity of the rural inhabitants of the western Pampa is extensive stock breeding on natural grasslands. After colonization of the region at the end of the 19th century, sheep farming predominated in the area with some bovine farming on a much smaller scale. However, over the years this relationship changed and was actually reversed towards the end of the 20th century (Cuello & Montone 1999).

Together with this change there was a gradual increase in goat farming, which is now more important than cattle farming in the lower socioeconomic **puestos**. **Puesto** is the local word for a domestic unit comprising a rural home and its peridomestic area (Poduje 2000).

Water supply for animal farming is a crucial issue in this region of scarce rainfall. Today all farms have water pump systems based on windmills, internal combustion engines, or both. On some farms wells have been dug down to the water table and are called **jagüeles**. In these cases, water is extracted using leather balls or buckets and these systems are used exclusively for small herds or to supplement windmills in the event of breakdowns. The balls are made by tying several goatskins together with leather cords, with the hair facing inwards, to produce a round receptacle that varies in capacity. As a general norm each farm is supplied by only one water well and an additional one is generally added when the surface area is larger than 5,000 hectares.

Water is stored in metal tanks whose size varies from corral to corral. Most camps have only one water supply site, which limits their grazing area.

During prolonged droughts, farmers move their animals to other farms under rental contracts, or sell part of their herds to reduce their animal load. Nevertheless, local farmers noticeably tend to keep the animals on their farms for as long as possible and to be over-confident as to the capacity of the farm to recover by resorting to the seed bank when conditions of normal rainfall return. When this fails to happen, serious degradation of the environment results.

According to agronomic estimates, the natural grasslands of this region are able to support a livestock load of one bovine unit every 10 to 35 hectares. (INTA, Gob. de La Pampa, UNLPam 1980).

The **puesteros**, as the farmers call themselves, have not adopted the transhumance practices which are common in other Monte areas (Ladio & Lozada 2004, 2008). They manage their herds in a sedentary fashion, just as when the area was colonized; in other words, they leave their animals to graze freely in open grasslands, according to availability and their forage requirements. Furthermore, they do not carry out special grassland management practices such as growing natural or exotic grasses, using enclosures to protect foraging areas, or harvesting and storing forage, as in other stock breeding areas of Argentina (Scarpa 2007), but they do use practices like selective burning to promote resprouting of certain species in order to increase their foraging quality, a common custom in many grazing systems worldwide.

Over the last two decades the number of farms with perimeter fencing has increased, but only very few are divided internally into plots. The size of the farms varies: medium sized farms predominate, while large estates are scarce. The surface area ranges from 2,500 to 5,000 hectares. Smallholdings are rare and are usually exploited by farmers acting as land occupants.

Cattle are enclosed only on special occasions, e.g., to perform vaccinations, pregnancy diagnoses, castrations and other controls. On rare occasions herds of different proprietors can get mixed up, but this does not lead to conflict in the community. Goats on the other hand are enclosed in corrals at night and are then released to graze in the morning. Neighboring **puesteros** establish mutual agreements for releasing their flocks in different directions to avoid confusion.

There are different forms of land ownership in the area. In some cases, the farmers own the land, while in others they

are permanent employees with or without the presence of the farm owners. There is also a marked presence of land occupants, whose future is uncertain due to the eviction threats made by the heirs of the original proprietors, or to the arrival of new investors lured by the increasing price of land. This situation is a result of the expansion of the agricultural frontier and the pressure generated on the land market (Gras & Barbetta 2004).

Types of livestock

Cattle and goats are the predominant types of livestock, followed in order of importance by sheep and horses. In addition, most households complement their family food requirements by breeding poultry. The main cattle breed in the western Pampa is Aberdeen Angus, which coexists with other strains produced by crossing European and **Criollo** breeds.

Goat breeding shares the same level of importance as cattle breeding and is greatly favored by the scrubland vegetation of the area. The animals are primarily intended to satisfy the food requirements of the family group, but are also sold for meat in urban centers (see Figure 1). The category with the greatest demand in the market is the **cabrito**, a one- or two-month-old animal that has yet to be weaned. The dominant caprine breed is commonly known as **criollo**. It originated from the flocks brought by Spanish colonizers and has fully adapted to the region. It has thus been suggested that the animal be identified as a "regional caprine" (Zuluaga 1973).

Horses are also important in the area, but the number of animals per rural establishment decreased over the second half of the 20th century (INTA, Gob. de La Pampa, UNLPam, 1980).

Methods

Between 2005 and 2007, seven field trips were made at different times of the year to La Humada, the most important population in the department, and to its surrounding rural area.

Traditional methodology used in social and ethnographical studies was applied in conducting these surveys (Barroso 2000, Guber 2001, Martin 2001). Data were recorded by participative observation, or by open and semi-structured interviews. These methods allow a great deal of base information to be obtained, especially when no previous documentation exists about a community, as in this case. At the same time they have the disadvantage of making difficult the attainment of standardized responses for further quantitative analysis. All records were written, with one exception in which it was deemed more convenient to make a recording on magnetic tape. Interviews were organized in thematic units, i.e., forages for different animals, plants with toxic and negative effects, plants for veterinary use, and species used in rural construction.

Field trips were organized to allow the interviewees to identify the plants with their common name, and they were asked to describe their uses and local significance. Samples of the specimens mentioned were collected after the interviews and any additional information was recorded. When the age or health of the informant did not allow this, fresh samples were collected and taken to their home for interviewees to identify and provide the required information. Samples were simultaneously collected to prepare herbarium specimens.

A total of 68 individuals (27 women and 41 men) between 24 and 86 years old were interviewed. The mean age of the population was 56. The information was recorded on a database to facilitate subsequent analyses; species were arranged according to their scientific and common name and categories of use together with the informant's data.

All collected samples were processed into herbarium voucher specimens. These were identified taxonomically by the author, except in cases requiring the collaboration of specialists from the Faculty of Agronomy of the Universidad Nacional de La Pampa. The specimens are stored at the herbarium of Universidad Nacional de La Pampa Argentina, La Pampa, Santa Rosa (SRFA).

Results

Forage resources

A total of 52 foraging plants were identified, with different animal preferences according to the type of livestock (Table 1). The winter grass cited most was **unquillo** (*P. lanuginosa*). Also of importance were the following grass-

Table 1. Foraging species for all types of livestock based on the perception of interviewees (number of quotes) in the western half of Chicalcó department, in the northwest of the province of La Pampa, Argentina. Foraging importance is expressed as IF = Is/N where I is the number of times the species s was cited and N is the total number of events or interviews.

Number of quotes	IF	Species	Common name	Collection number
41	0.60	*Panicum urvilleanum* Kunth. (Poaceae)	**Tupe**	Muiño & Arenas 35
39	0.57	*Poa lanuginosa* Poir. (Poaceae)	**Unquillo**	Muiño 160

Number of quotes	IF	Species	Common name	Collection number
29	0.43	*Schinus johnstonii* F.A.Barkley (Anacardiaceae)	**Molle**	Muiño 88
27	0.40	*Lycium chilense* Miers ex Bertero (Solanaceae)	**Llaullín**	Muiño 47
21	0.38	*Prosopis flexuosa* DC. var. *depressa* F.A. Roig (Fabaceae)	**Alpataco**	Muiño 102
20	0.29	*Condalia microphylla* Cav. (Rhamnaceae)	**Piquillín**	Muiño 13
17	0.25	*Pappostipa vaginata* (Phil.) Romasch. (Poaceae)	**Coirón**	
14	0.21	*Acantholippia seriphioides* (A.Gray) Moldenke (Verbenaceae)	**Tomillo**	Muiño 119
14	0.21	*Aristida mendocina* Phil. (Poaceae)	**Flechilla**	Muiño 4
13	0.19	*Bromus catharticus* Vahl var. *rupestris* (Speg.) Planchuelo & P.M. Peterson (Poaceae)	**Cebadilla**	Muiño 121
13	0.19	*Nassella tenuis* (Phil.) Barkworth (Poaceae)	**Flechilla fina**	Muiño 151
10	0.15	*Ephedra ochreata* Miers (Ephedraceae)	**Solupe frutero**	Muiño 90
10	0.15	*Larrea divaricata* Cav.(Zygophyllaceae)	**Jarilla**	Muiño & Arenas 38
8	0.12	*Atriplex lampa* (Moq.) Gillies ex Small (Amaranthaceae)	**Zampa**	Muiño 106
8	0.12	*Monttea aphylla* (Miers) Benth. & Hook. f. (Plantaginaceae)	**Ala**	Muiño 52
7	0.10	*Schismus barbatus* (L.) Thell. (Poaceae)	**Pasto de invierno**	Muiño 117
7	0.10	*Thelesperma megapotamicum* (Spreng.) Kuntze (Asteraceae)	**Té pampa**	Muiño 22
6	0.09	*Hyalis argentea* D. Don ex Hook. & Arn. (Asteraceae)	**Blanquilla**	Muiño 79
5	0.07	*Grindelia chiloensis* (Cornel.) Cabrera (Asteraceae)	**Melosa**	Muiño 73
5	0.07	*Prosopidastrum striatum* (Benth.) R. A. Palacios & Hoc (Fabaceae)	**Retamilla**	Muiño & Arenas 26
4	0.06	*Baccharis gilliesii* A. Gray (Asteraceae)	**Yerba de oveja**	Muiño 171
4	0.06	*Bothriochloa springfieldii* (Gould) Parodi (Poaceae)	**Pasto de hoja**	Muiño 129
4	0.06	*Gomphrena mendocina* (Phil.) R.E. Fr. (Amaranthaceae)	**Yerba del pollo**	Muiño & Arenas 24
4	0.06	*Jarava ichu* Ruíz & Pav. (Poaceae)	**Coirón fino**	Muiño 66
3	0.04	*Chuquiraga erinacea* D. Don (Asteraceae)	**Chirriadora**	Muiño 39
3	0.04	*Junellia seriphioides* (Gillies & Hook. ex Hook.) Moldenke (Verbenaceae)	**Tomillo macho**	Muiño 33
3	0.04	*Parthenium hysterophorus* L. (Asteraceae)	**Altamisa**	Muiño 99
3	0.04	*Senna aphylla* (Cav.) H.S. Irwin & Barneby (Fabaceae)	**Cacho de cabra**	Muiño & Arenas 36
3	0.04	*Setaria mendocina* Phil. (Poaceae)	**Pasto de hoja**	Muiño 5
2	0.03	*Eragrostis mexicana* (Hornem.) Link ssp. *virescens* (J. Presl.) S.D. Koch & Sanchéz Vega (Poaceae)	**Gramilla**	Muiño 127
2	0.03	*Bougainvillea spinosa* (Cav.) Heimerl (Nyctaginaceae)	**Monte negro**	Muiño 98
2	0.03	*Eupatorium patens* D. Don ex Hook. & Arn. var. *patens* (Asteraceae)	**Bejuco**	Muiño 44
2	0.03	*Fabiana peckii* Niederl. (Solanaceae)	**Pichanilla**	Muiño & Arenas 31
2	0.03	*Glandularia flava* (Gillies ex Hook.) Schnack & Covas (Verbenaceae)	**Yerba de la vaca**	Muiño 14

Number of quotes	IF	Species	Common name	Collection number
2	0.03	*Gochnatia glutinosa* (D. Don) D. Don ex Hook. & Arn. (Asteraceae)	**Jarillilla**	Muiño 10
2	0.03	*Neosparton aphyllum* (Gillies & Hook.) Kuntze (Verbenaceae)	**Solupe**	Muiño 114
2	0.03	*Pappophorum philippianum* Parodi (Poaceae)	**Pasto de hoja**	Muiño 140
2	0.03	*Plantago patagonica* Jacq. (Plantaginaceae)	**Cola de piche**	Muiño 108
2	0.03	*Ximenia americana* L. (Olacaceae)	**Albaricoque**	Muiño 163
1	0.01	*Baccharis salicifolia* (Ruiz & Pav.) Pers. (Asteraceae)	**Chilca**	Muiño 30
1	0.01	*Caesalpinia gilliesii* (Wall ex Hook.) D. Dietr. (Fabaceae)	**Mal de ojo**	Muiño 164
1	0.01	*Erodium cicutarium* (L.) L'Hér. ex Aiton (Geraniaceae)	**Alfilerillo**	Muiño 71
1	0.01	*Jarava neaei* (Nees ex Steud.) Peñailillo (Poaceae)	**Flechilla**	Muiño 2
1	0.01	*Junellia aspera* (Gillies & Hook.) Moldenke (Verbenaceae)	**Monte negro**	Steibel 2512
1	0.01	*Larrea cuneifolia* Cav. (Zygophyllaceae)	**Jarilla crespa**	Muiño 149
1	0.01	*Lycium gilliesianum* Miers (Solanaceae)	**Llaullín crespo**	Muiño 85
1	0.01	*Margyricarpus pinnatus* (Lam.) Kuntze (Rosaceae)	**Yerba de la perdiz**	Steibel 2520
1	0.01	*Philibertia gilliesii* Hook. & Arn. (Apocynaceae)	**Enredadera del avestruz**	Muiño 84
1	0.01	*Prosopis flexuosa* DC. var. *flexuosa* (Fabaceae)	**Algarrobo**	Muiño 133
1	0.01	*Rhodophiala mendocina* Ravenna (Phil.) Ravenna (Amarillydaceae)	**Cebolla del zorro**	Muiño 74
1	0.01	*Solanum elaeagnifolium* Cav. (Solanaceae)	**Quillo**	Muiño 165
1	0.01	*Suaeda divaricata* Moq. (Amaranthaceae)	**Vidriera**	Muiño 89

es and plants: **tupe** (*P. urvilleanum*), **flechilla fina** (*Nassella tenuis* (Phil.) Barkworth), **cebadilla** (*Bromus catharticus* Vahl var. *rupestris* (Speg.) Planchuelo & P.M. Peterson), **pasto de invierno** (*Schismus barbatus* (L.) Thell.), **pasto de hoja** (*Bothriochloa springfieldii* (Gould) Parodi), **flechilla blanca** (*Jarava ichu* Ruíz & Pav.), **té pampa** (*Thelesperma megapotamicum* (Spreng.) Kuntze), **alfilerillo** (*Erodium cicutarium* (L.) L'Hér. ex Aiton) and **gramilla** (*Eragrostis mexicana* (Hornem.) Link ssp. *virescens* (J. Presl.) S.D. Koch & Sanchéz Vega), all of which were preferred by cattle and sheep. Horses prefer hard grasses like **coirón** (*Pappostipa vaginata* (Phil.) Romasch.), **flechilla gruesa** (*A. mendocina*) and other shrubs and bushes like **llaollín** (*Lycium chilense* Miers ex Bertero), **tomillo** (*A. seriphioides*), **retamilla** (*Prosopidastrum striatum* (Benth.) R. A. Palacios & Hoc), **yerba de oveja** (*Baccharis gilliesii* A. Gray) and **molle** (*Schinus johnstonii* F.A. Barkley).

According to the farmers of the area, the characteristics of the best foraging species are related with their capacity for "fattening" the animal and with their palatability, while the plant's volume is not really taken into account. This can be observed in plants like **unquillo** (*P. lanuginosa*) which, despite growing in very sparse clumps and having little volume, is locally considered to be one of the most valuable grasses in the area.

In addition to the aforementioned plants, sheep have a particular preference for certain herbaceous species like **yerba del pollo** (*Gomphrena mendocina* (Phil.) R.E. Fr.), **peludilla** (*Plantago patagonica* Jacq.), **yerba de la perdiz** (*Margyricarpus pinnatus* (Lam.) Kuntze), and **yerba de oveja** (*B. gilliesii*). Other plants occasionally consumed are **blanquilla** (*Hyalis argentea* D. Don ex Hook. & Arn.), **tomillo macho** (*J. seriphioides*) and the inflorescences of **melosa** (*Grindelia chiloensis* (Cornel.) Cabrera).

Plants identified as being important in the diet of goats were mainly bushes such as **jarilla** (*L. divaricata*), **molle** (*S. johnstonii*), **alpataco** (*Prosopis flexuosa* DC. var. *depressa* F.A. Roig), **piquillín** (*Condalia microphylla* Cav.), **llaollín** (*L. chilense*), **ala** (*Monttea aphylla* (Miers) Benth. & Hook. f.), **jarillilla** (*Gochnatia glutinosa* (D. Don) D. Don ex Hook. & Arn.), **solupe frutero** (*Ephedra ochreata* Miers), **zampa** (*Atriplex lampa* (Moq.) Gillies ex Small), and other species, but in a lower proportion.

Table 1 indicates the foraging species for all types of livestock. Based on the perception of the informants, foraging importance (IF) is expressed as follows:

IF = Is / N

where I is the number of times the species s was cited and N is the total number of events or interviews. Poaceae and Asteraceae were the most important families based on the number of foraging species, followed by Verbenaceae, Solanaceae, Fabaceae. Others are less well represented in the total number of plants.

Local knowledge on foraging resources not only includes species with good palatability and nutritional characteristics but also plants whose abundance hinders the presence of other good quality forage. A significant increase in these species is considered to be a sign that the pastures have been overloaded with cattle. Within this category the locals identified **melosa** (*G. chiloensis*) and **tomillo macho** (*J. seriphioides*), both species that are rejected by animals and whose reproductive success makes them invasive species.

Toxic plants or plants with adverse effects on livestock

Table 2 shows the list of poisonous species or those with adverse effects. The most frequently named toxic plant was **tabaco cimarrón** (*Nicotiana noctiflora* Hook.). This plant is only eaten by hungry animals during periods of scarce forage, or by animals from other areas.

Sandilleja (*Cucumis anguria* L.) was identified as causing intoxications in goats and when ingested in great quantities can be fatal. When eaten in low quantities insufficient to cause toxic effects, it lends the animals' meat and milk a bad taste.

Other plant species may cause losses in sheep, mainly lambs, but not as a result of toxicity. This is the case of some **flechilla** grasses with hard florets, such as *Jarava neaei* and *N. tenuis*. These grass florets first pierce the animal's wool and then its skin, causing injuries that can eventually become infected and lead to death.

Some toxic effects are related to the phenological stage of the plant and climatic variations. **Unco** (*Sporobolus rigens* (Trin.) E. Desv.) is a plant that can cause intoxications when eaten after an intense resprouting. In other cases, periods of great rainfall generate appropriate conditions for a large-scale establishment of toxic species which would otherwise go unnoticed by the animals. One of these plants is **pechuguilla** (*Euphorbia collina* Phil.) that causes severe diarrhoea. The outcome of this intoxication may be fatal, depending on the level of ingestion. The biological activity and toxicity of some of the species recorded in this study have also been previously documented (Bedotti *et al*. 2002, Sequeiros *et al*. 2003).

Other cases of intoxication can occur during very rainy springs that lead to intense resprouting and generate appropriate conditions for fungal attacks on plants. This season often brings a particular form of horse constipation, locally known as **torozón**, caused by the animals grazing intensely on the tender forage of plants such as **llaollín** (*L. chilense*).

Veterinary treatments

Problems requiring local treatment are mainly related to inflammatory processes of diverse etiology. These include skin infections, burns, local irritations, etc., all of which are locally known as **pasmos**.

Calves and foals that will not be used in breeding are branded and castrated at the beginning of autumn. This task is performed under a waning moon as the local tradition considers that it conveys less risk and damage to the animals. In this regard, plants used to reduce inflammation and as disinfectants are **jarilla** (*L. divaricata*), **bejuco** (*Eupatorium patens* D. Don ex Hook. & Arn. var. *patens*) and **pichana** (*Baccharis spartioides* (Hook. & Arn.) Remy). They can be applied directly as poultices made by crushing the aerial parts of the plants or by washing the affected area with lukewarm decoctions. These decoctions are locally known as waters (**aguas**), hence the names **jarilla**

Table 2. Six toxic species or species with adverse effects identified by the perception of interviewees (number of quotes) in the western half of Chicalcó department, in the northwest of the province of La Pampa, Argentina.

No. of quotes	Species	Common name	Collection number
6	*Nicotiana noctiflora* Hook. (Solanaceae)	**Tabaco cimarrón**	Muiño 91
4	*Cucumis anguria* L. (Cucurbitaceae)	**Sandilleja**	Muiño & Arenas 32
2	*Sporobolus rigens* (Trin.) E. Desv. (Poaceae)	**Unco**	Muiño 69
1	*Euphorbia collina* Phil. (Euphorbiaceae)	**Pechuguilla**	Muiño 92
1	*Jarava neaei* (Nees ex Steud.) Peñailillo (Poaceae)	**Flechilla**	Muiño 2
1	*Nassella tenuis* (Phil.) Barkworth (Poaceae)	**Flechilla fina**	Muiño 151

or **bejuco** water. **Tomillo** (*A. seriphioides*) is also used to prevent skin irritations by placing two twigs in the shape of a cross between the saddle girth and the animal's skin, a therapeutic treatment with an evident religious metaphorical meaning. The magic and religious therapies include curing by word (**curas de palabra**) and curing by the animal's footprints (**curas por el rastro**).

Retention of the placenta is a common problem in animal births. In these cases a concentrated decoction of the stems and leaves of **jarilla** (*L. divaricata*) is commonly used as an oral oxytoxic; a decoction of **jarillilla** (*G. glutinosa*) is also used, but less frequently.

The parasitoses requiring most primary attention are myiases, including **bicheras** (mites), horse bots and goat horn flies. **Bicheras**, caused by the larvae of *Cochliomya* flies, are treated with **jarilla** (*L. divaricata*) and **bejuco** (*E. patens*). This treatment consists in applying crushed leaves or a decoction of them on the area, or mixing the latter with other liquids like mineral engine oil or other oily products. These preparations are applied directly onto the wound, covered with cow dung, and then bandaged. A therapeutic variation against myiasis is the use of necklaces made with **bejuco** (*E. patens*) branches that are hung around the neck of affected animals until the parasites disappear completely. In these cases, the treatment probably acts as an insect repellent.

Bejuco (*E. patens*) is also used for treating bot flies (*Gasterophilus* sp.) and horn flies (*Hematobia irritans* L.), but in this case it is administered orally. This preparation is also used to treat horses suffering from different gastrointestinal diseases. The treatment for bot flies also includes oral administration of milk with garlic (*Allium sativum* L.), or diluting bleach in the watering trough.

Mal seco is another disease affecting horses in the area. Clinically identified as equine streptococcal adenitis, it is a bacterial disease caused by the *Streptococcus equi* that is generally fatal, although in some cases it has a favorable outcome (Gatti Assandri 2007). The horse's chest is massaged with animal fat to speed the infection process and obtain profuse suppuration. This can also be caused by making an incision in the affected region. The wound is then disinfected with a decoction of **jarilla** (*L. divaricata*).

Wheat flour mixed with cold water is fed to calves to control diarrhoea, which is also treated with **ajenjo** (*Artemisia absinthium* L.) or wormwood water. A concentrated decoction of **tamarindo** (*Tamarix ramosissima* Ledeb.) branches is used for diarrhoea in kid goats. All these treatments are administered orally.

Snakebites are an important cause of accidents in herds. When they happen, a decoction of tobacco (*Nicotiana tabacum* L.) and garlic (*A. sativum*), or simply tobacco with oil, is applied on the wounds.

The importance of the species for veterinary use is expressed as the number of times they were cited (Table 3).

Rural constructions and tools for livestock

The use of plants in livestock facilities mainly involves building fences. The posts used for building corrals and fencing the perimeter of the farm are made from **caldén**

Table 3. Ten species for veterinary use identified by interviewees (number of quotes) in the western half of Chicalcó department, in the northwest of the province of La Pampa, Argentina.

No of quotes	Species	Collection number	Common name
24	*Larrea divaricata* Cav. (Zygophyllaceae)	Muiño & Arenas 38	**Jarilla**
12	*Eupatorium patens* D.Don ex Hook. & Arn. var. *patens* (Asteraceae)	Muiño 44	**Bejuco**
2	*Allium sativum* L. (Alliaceae)	note 1	**Ajo**
2	*Nicotiana tabacum* L. (Solanaceae)	note 1	**Tabaco**
1	*Acantholippia seriphioides* (A. Gray) Moldenke (Verbenaceae)	Muiño 119	**Tomillo**
1	*Artemisia absinthium* L. (Asteraceae)	Muiño & Rojas 271	**Ajenjo**
1	*Baccharis spartioides* (Hook. & Arn. ex DC.) J. Rémy. (Asteraceae)	Muiño 11	**Pichana**
1	*Gochnatia glutinosa* (D. Don) D. Don ex Hook. & Arn. (Asteraceae)	Muiño 10	**Jarillilla**
1	*Tamarix ramosissima* Ledeb. (Tamaricaceae)	Muiño 104	**Tamarindo**
1	*Triticum aestivum* L. (Poaceae)	note 1	**Trigo**

1. Purchased commercially.

(*Prosopis caldenia* Burkart) or **algarrobo** (*P. flexuosa* var *flexuosa*), although the latter is preferred because of its durability. The wattle, and sometimes the posts themselves, is usually made of **eucaliptos** (*Eucalyptus camaldulensis* Dehnh., *Eucalyptus tereticornis* Sm.), which is readily available on the market, or **acacia** (*Robinia pseudoacacia* L.). However, it is common to find fences with wattle of local shrubs like **jarilla** (*L. divaricata*).

Fence openings consist of gates or **tranquerones**, an adaptation of a section of the wire fencing that allows enclosures to be opened or closed. Gates and other facilities such as cattle squeeze chutes, loading chutes, headgates and others, are purchased on the market, and are made of hardwood from northern Argentina, usually **curupay** (*Anadenanthera colubrina* (Vell.) Brenan var. *cebil* (Griseb.) Reis) or **anchico colorado** (*Parapiptadenia rigida* (Benth.) Brenan). Likewise, the wattle and posts that are purchased are also made of wood alien to the area, such as **urundel** (*Astronium urundeuva* (Allemão) Engl.), **grapia** (Apuleia leiocarpa (Vogel) J.F. Macbr.), **itín** (*Prosopis kuntzei* Harms ex Kuntze), **quebracho colorado** (*Schinopsis lorentzii* (Griseb.) Engl.) and **eucaliptos** (*E. camaldulensis*, *E. tereticornis*).

Traditional water supply systems like leather balls and buckets call for the use of resistant wood in their support structure. The posts used in these cases are made from native trees like **algarrobo** (*P. flexuosa* var. *flexuosa*) or trees grown in the **puestos** such as **olmos** (*Ulmus* spp.) or **acacia** (*R. pseudoacacia*).

The corrals for enclosing goats can be made of different materials, but the fences are traditionally of **jarilla** (*L. divaricata*) and **solupe** (*Neosparton aphyllum* (Gillies & Hook.) Kuntze), which are held up and reinforced with posts made from **acacias** (*R. pseudoacacia*), **algarrobo** (*P. flexuosa* var. *flexuosa*), or **piquillín** (*C. microphylla*). Within these corrals there is generally another smaller enclosure made of different materials that is used to hold kid goats during the production season. Modern corrals are made of wooden planks obtained from the outer cuttings of **álamo** trunks (*Populus nigra* L.), a species grown extensively in the irrigated areas of neighboring provinces.

Local trees used for making tool handles are, in order of preference, **chañar** (*Geoffroea decorticans* (Gillies ex Hook. & Arn.) Burkart), **alpataco** (*P. flexuosa* var. *depressa*), **algarrobo** (*P. flexuosa* var. *flexuosa*), **acacia** (*R. pseudoacacia*), **olmos** (*Ulmus* spp.), and **jarilla** (*L. divaricata*). Before being used, the ends of the handles are superficially burnt to prevent the wood from cracking later.

Due to local abundance, **jarilla** has a great variety of uses. In addition to the above, it is also used to make bradawls, roasting spits, sheave axles, wattle for drying cheese, and brooms, although **pichana** (*B. spartioides*) branches are preferred for the latter whenever they are available in the area.

Leatherwork is intimately related to livestock activities and plants are also used for this type of handicraft. The bars of packsaddles are filled with **blanquilla** (*H. argentea*), **melosa** (*G. chiloensis*) or **unco** (*S. rigens*). Certain plants are also used for dying: **yerba mate** (*Ilex paraguariensis* A. St.-Hil.) is used to give the leather used for making ropes different shades of grey. The dye is made by collecting the leaves left over from the traditional infusion called **mate** in a tin container. The oxidation produced when this deposit is exposed to the air gives it a black color that after a few months can be used for staining leather. No plants are used in the curing of leather; mineral compounds like salt and alum are used instead. Table 4 shows the importance of the species in rural constructions based on the number of times they were cited.

Discussion

As in other communities of the Monte region, the economy of the inhabitants of the west Pampa is based on livestock. However, these people do not maintain the transhumance practices of other communities in the region (Ladio & Lozada 2008). One of the prime reasons influencing sedentary animal farming probably has a cultural origin. The farmers in this study descend from colonizers that established small settlements and military forts at the end of the 19th century. These settlements were located close to natural sources of water where sedentary grazing could be carried out in the open grasslands. The settlers of the areas near the Andes were those who adopted, and still maintain, transhumance practices, using the higher mountain pastures called **veranadas** in summer and migrating to lower pastures in winter. However, the flat landscape of the Pampa does not favour this practice. This, and the scarcity of water sources, might have been sufficient reason to adopt a sedentary animal farming activity instead of transhumance.

Of the total number of species cited in this study, the use of wild plants for livestock (60 species) comprises 20% of the total estimated flora of the study area (294 species), according to information obtained from the database of the SRFA herbarium and the vegetation surveys of the area (INTA, Gob. de La Pampa, UNLPam 1980, Troiani *et al*. 1994). This percentage of use is particularly important if the lower specific relative abundance in the area that is characteristic of arid ecosystems is taken into account.

Although most foraging species belong to the Poaceae family, 75% of the resources quoted within this category of use are dicotyledons. This is consistent with the two predominant types of livestock in the area since bovines feed primarily on the herbaceous strata composed mostly of grasses, while goats feed on the shrub strata, which mainly comprises woody dicotyledons.

Table 4. Sixteen taxa (15 species with two varieties of *P. flexuosa*) used for rural constructions identified by interviewees (number of quotes) in the western half of Chicalcó department, in the northwest of the province of La Pampa, Argentina.

Number of quotes	Species	Collection number	Common name
21	*Larrea divaricata* Cav. (Zygophyllaceae)	Muiño & Arenas 38	**Jarilla**
17	*Prosopis flexuosa* DC. var. *flexuosa* (Fabaceae)	Muiño 133	**Algarrobo**
8	*Baccharis spartioides* (Hook. & Arn. ex DC.) J. Rémy. (Asteraceae)	Muiño 11	**Pichana**
8	*Prosopis caldenia* Burkart (Fabaceae)	Muiño 134	**Caldén**
7	*Geoffroea decorticans* (Gillies ex Hook. & Arn.) Burkart (Fabaceae)	Muiño 161	**Chañar**
6	*Populus nigra* L. (Salicaceae)	Muiño 272	**Álamo**
4	*Prosopis flexuosa* DC. var. *depressa* F.A. Roig (Fabaceae)	Muiño 102	**Alpataco**
3	*Robinia pseudoacacia* L. (Fabaceae)	Muiño 162	**Acacia**
2	*Eucalyptus* spp. (Myrtaceae)	Muiño 217	**Eucalipto**
2	*Ulmus* spp. (Ulmaceae)	Muiño 235	**Olmo**
1	*Condalia microphylla* Cav. (Rhamnaceae)	Muiño 13	**Piquillín**
1	*Grindelia chiloensis* (Cornel.) Cabrera (Asteraceae)	Muiño 73	**Melosa**
1	*Hyalis argentea* D. Don ex Hook. & Arn (Asteraceae)	Muiño 79	**Blanquilla**
1	*Ilex paraguariensis* A.St.-Hil. var. *paraguariensis* (Aquifoliaceae)	note 1	**Yerba**
1	*Neosparton aphyllum* (Gillies & Hook.) Kuntze (Verbenaceae)	Muiño 114	**Solupe**
1	*Sporobolus rigens* (Trin.) E. Desv. (Poaceae)	Muiño 69	**Unco**

1. Purchased commercially.

As observed in other grazing communities, these communities have detailed knowledge of the foraging species present in the area. This experience is dynamic and accumulative, as revealed by certain testimonies concerning the present increased abundance of non-foraging invasive species over those of better foraging quality. This information shows that **puesteros** are conscious of the changes occurring in the ecosystem as a result of environmental pressures.

The locals' capacity of observation includes all the natural elements in their environment. As a consequence they use empirical forms of management. Evidence for this is the choice of days on which to perform certain activities. For example, calves should be castrated during a waning moon, a period during which they believe there are fewer risks of complications in wounds. The relationship between the choice of the lunar phase and the effectiveness of certain veterinary treatments has previously been observed in other ethnobotanical and anthropological studies of rural communities in Argentina (Jiménez de Pupareli 1984, Scarpa 2000).

Regarding plants that are toxic for cattle, most interviewees recognize the existence of only five species and clearly identify the symptoms caused in the animals. However, cases of intoxication related to *N. noctiflora*, *C. anguria* and *E. collina* are highly infrequent.

We also recorded a plant that does not normally produce intoxications, but that can become toxic under certain climatic conditions. *Sporobolus rigens* is a grass with toxic effects on herbivores when eaten after an intense spring resprouting. The effect has been observed in other grasses and is probably related to metabolic changes that lead to an accumulation of cyanogenic compounds under certain environmental conditions (Gallo 1979).

Regarding medicinal plants for veterinary uses, an equal proportion of native and exotic species, either cultivated or commercially acquired, is used. Nevertheless, the two plants most commonly used for veterinary purposes are native species that are easily obtained due to their abundance. Traditional treatments are mainly applied in first aid cases and less serious acute problems, while commercial veterinary products are preferred for treating diseases of greater risk. These products may be easily obtained from nearby urban centers, but the subsequent impact on the loss of knowledge and use of natural resources is a trend already observed in the use of wild plants (Reyes García *et al*. 2005).

Among the plants used for veterinary treatments, oxytoxic, anti-parasitic and disinfectant species stand out. However, a very important ensemble of magical and religious practices that are also common in other rural areas of Argentina is associated with these treatments and calls for elements of animal and mineral origin in addition to plants (Bartolomé 1968, Jiménez de Pupareli 1984). The importance of these beliefs in veterinary therapies is exemplified in the preventative practice for skin irritations in horses in which the invocation of the cross holds evident religious connotations.

It is important to note that throughout the Pampa region the generalized concept of illness is that of an intrusive substance in the organism that must be removed. This concept persists in this study area and is seen in the use of practices that encourage infections to mature and "emerge", practices for expelling internal and external parasites, and poultices and washes for eliminating **pasmos**.

The design and type of materials that predominate in livestock facilities are those that are available commercially and which are generally made from foreign raw materials. However, they coexist with other typical traditional constructions in the animal farming regions of the country such as the fences used to enclose goats. The diversity of uses given to plants for making tools and rural installations is related to the abundance of species in the area. An example of this is the use of *L. divaricata*. In the case of trees, there is no difference in the diversity of uses between native species like *P. flexuosa* and other exotic species such as *R. pseudoacacia* and *P. nigra* cultivated in peridomestic areas. Within this category, the scarce use of *C. microphylla* is noticeable when considering the resistance of its wood. Older informants claim that the main reason for this is the dramatic fall in the number of large plants of this species.

Conclusion

This study presents the results of an investigation that basically consisted in saving traditional knowledge on a sapiential issue in a determined community. Beyond the value of the documentation on the cultural and natural patrimony, the aim of this investigation is to provide a useful tool for the implementation of policies targeting the farmers of the region. In fact, actions developed in arid ecosystems must not only consider the results of studies describing the environment but also the traditional knowledge of the human groups living in them. This will allow for better results in efforts to promote the conservation of biological and cultural diversity.

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