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Traditional knowledge of *sertanejos* about Zootherapeutic practices used in ethnoveterinary medicine of NE Brazil

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The present paper analyzes animal-based remedies used in ethnoveterinary medicine in a semi-arid area of Paraíba State (Caatinga biome) in NE Brazil. Information was obtained through semi-structured questionnaires applied to 32 local residents (24 men and 8 women) concerning animal species used as remedies, the body parts used, and the illnesses for which these remedies were prescribed. It is recorded the use of 13 animal species (of which 7 were non-domestic) recommended for treating 18 illnesses. Ram (*Ovis aries* Linnaeus, 1758), rattlesnakes (*Crotalus durissus* Linnaeus, 1758), and "teju" lizards (Tupinambis merianae (Duméril & Bibron, 1839)) were important medicinal resources for the community studied. The examination of folk knowledge and animal health practices gives us a better understanding of human interactions with their local environment and aids in formulating appropriate strategies for natural resource conservation.

Keywords: Ethnoveterinary medicine; Traditional medicine; Ethnozoology; Caatinga biome; Conservation

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Animal husbandry is an economic activity closely linked to the needs of local consumption and trade, which significantly influences the political, social and economic contexts in Latin America[1]. The occupation of Brazil by Europeans (especially in the northeastern region) starting in the first half of the 16th century was marked by the transmigration of numerous elements of the European fauna and flora[2], including cattle, goats and horses[3]. Through the centuries, the local descendants of Amerindians, Africans, and Europeans learned to use the native natural resources of the Caatinga (dryland) biome but also imported resources from the Old World to use in treating illnesses or infirmities in themselves and their livestock. This symbiosis of traditional knowledge has generated a rich and invaluable source of knowledge in relation to both human ethnomedicine and ethnoveterinary[4].

Ethnoveterinary medicine (EVM, or folk veterinary medicine) encompasses knowledge, skills, methods, practices, and beliefs about animal care[5,6]. Ethnoveterinary medicinal research is a holistic and interdisciplinary examination of local knowledge and of the socio-cultural structures and environment factors associated with animal health-care and husbandry[7]. In developing countries folk veterinary medicine is particularly important because conventional remedies for animal health care are inaccessible or unaffordable to poor rural farmers[8]. These high costs and inaccessibility, together with other problems associated with western-style healthcare systems, have helped maintain traditional treatment practices in these countries and fostered research on this subject[9].

In recent years, increasing attention has been paid to ethnoveterinary knowledge and local veterinary practices[10], and studies of EVM have increased dramatically[9,11-18] together with research examining the importance of plants in ethnoveterinary medicine[18-23]. However, in spite of the worldwide prevalence of traditional medical practices, research on medicinal animals has often been neglected in comparison to medicinal plants[24,25]. Moreover, although a number of ethnobiological inventories concerning the use of medicinal animals in human

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health care have been compiled in Brazil[4,26-32] and other countries[33,34], zootherapeutic practices in ethnoveterinary medicine (EVM) are poorly described and neglected in favor of human ethnomedicine[35-37].

In this sense, the present study was conducted among residents of an area inside the semi-arid of NE Brazil, where local residents known as '*sertanejos*' still maintains a historical culture of breeding from the seventeenth century, despite the growing rural exodus and growing influence of other aspects related to urbanization. In this region, folk knowledge is rapidly disappearing -with traditional medicine being set aside in favor of modern medical practices, and veterinary drugstores are now frequently found in formerly isolated areas[35], thus documentation on zootherapeutic practices can assist in protecting traditional knowledge, and in ensuring that future users recognize the contributions made by local communities, the current custodians of traditional knowledge. Besides, the study of traditional medicinal practices is the basis for conducting research that aim to verify the validity or possible adverse effects of traditional drugs locally used.

Methodology

Study site

The municipality of Sousa is located in the *Sertão* mesoregion of western Paraíba State, NE Brazil (06º 45' 33" S x 38º 13' 41" W) (Fig. 1) and covers an area of 842 km^2 [38]. The climate is semi-arid with an annual rainfall of 431.8 mm limited to a rainy season between November and April. The local vegetation is composed of spiny deciduous and semi-deciduous species characteristic of this semi-arid *Caatinga* region[39].

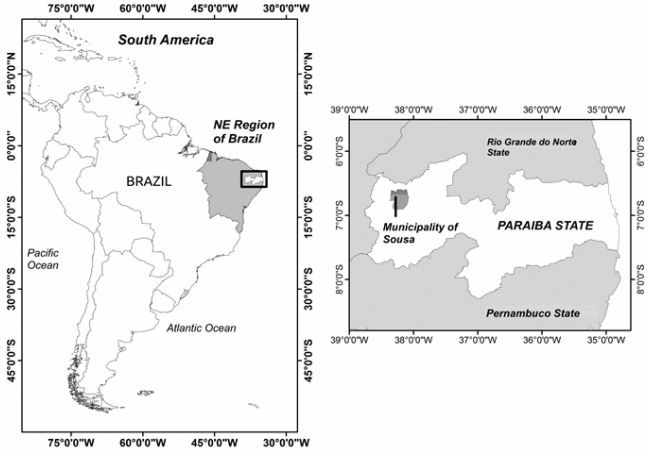

Fig. 1 —Map of study area

The total population of the municipality is approximately 63 800, of which 73.8% live in urban areas[40]. This population has a Human Development Index (HDI) of 0.658[40]. The principal economic activities of the municipality are subsistence agriculture (mainly bananas, sweet potato, beans and cassava) and livestock comprising cattle (22,000 heads), goats (4,500 heads), sheep (6,600 heads)[41].

Procedures

Field research was conducted between January and February 2008. Open as well as semi-structured interviews were conducted with 32 people (24 men and 8 women) between the ages of 24 to 90 years (mean: 52.9). Most interviewees (86%) had a monthly income of no more than US$230. In the studied area, livestock breeding is a predominantly male activity.

Informants were selected from a wide pool of individuals casually encountered in the community, as well as from a smaller group of "local specialists". A specialist is defined as a person recognized within the community as having exceptional knowledge about zootherapeutics[42]. We informed the interviewees about our research goals before initiating the interviews and questionnaires. The questionnaires were based on Barboza et al.[35] and Alves and Rosa[29] and encompassed the following subjects: which animals (zootherapeutics) were used for producing medicines; what were the purposes of those medicines; and how were they used.

The names of the zootherapeutic animals, and the symptoms and/or treated diseases were recording using the terminology employed by the interviewees themselves. Zoological material was identified with the aid of specialists through: (1) examination of specimens in the study area; (2) photographs (taken during interviews) of the animals or their parts; (3) vernacular names, with the aid of taxonomists familiar with the fauna in the study area.

Data analysis

To determine the relative importance of each locally known species, their use-values were calculated (adapted from the proposal of Phillips et al.[43]) using the following formula: $UV=\sum U/n$, where: **UV** is the use-value of a species; **U** the number of citations of that species; and **n** the number of informants. The use-value of each species is based only on the importance attributed by each informant and does not depend on the opinion of the researcher.

Results and discussion

In present work, we recorded the use of 13 animal species (5 mammals, 5 reptiles, and 3 birds) for 18 veterinary purposes (Table 1). The most important medicinal species (UV>0.5) were ram (*Ovis aries* Linnaeus, 1758) (UV=0.94), rattlesnakes (*Crotalus durissus* Linnaeus, 1758) (0.63), and "teju" lizards (*Tupinambis merianae* [Duméril & Bibron, 1839]) (0.5). Most of the species mentioned (84.6%) were also recorded in other localities in Paraiba State[35,44] and in many cases there was overlap in terms of their ethnoveterinary medicinal use. Barboza *et al*.[35], for instance, recorded the same use of *Iguana iguana* fat (Linnaeus, 1758) for treating wounds, and feathers of *Nothura maculosa cearensis* Naumburg, 1932 for treating snake bites in livestock as in the present study. However, the ethnoveterinary use of products derived from two other animal species as reported here had not been previously registered: the horns of the gray brocket deer, *Mazama gouazoubira* (G. Fischer, 1814) that are used to treat snake bites in cats, calves, cattle, dogs, goats, horses, mules, pigs and sheep; and the viscera of the lizard *Tropidurus hispidus* (Spix, 1825) that were used to remove embedded splinters from those same animals. All of the species cited by informants in the present study had previously been recorded for use in folk-treatments of human diseases (Alves *et al*.[4,45]; Alves and Pereira-Filho[46]; Alves and Rosa[29,47]; Costa-Neto[26]; Costa-Neto and Oliveira[27]; Lev[48]).

Table 1-Zootherapeutics resources used in Ethnoveterinary medicine in municipality of Sousa, semi-arid region, NE Brazil

Famíly/species/local name	Number of mentions	UV	Parts used and way of administration[a]	Disease (or illness)	Animals[b]
REPTILES					
Chelidae					
Phrynops geoffroanus (Schweigger, 1812) - Geoffroy's side-necked turtle, "cágado"	7	0.22	Fat (1)	Rheumatism, swellings	ct, ho
Iguanidae					
Iguana iguana (Linnaeus, 1758) - Common Green Iguana, "Camaleão"	8	0.25	Leather (1)	"Estrepes" (suck a splinter out of skin), wounds	do, ca, ct, go, ho, mu, pi, sh
			Fat (1)	"Estrepes", wounds, rheumatism in cattle and horses, swellings	do, ca, ct, go, ho, mu, pi, sh
Teiidae					
Tupinambis merianae (Duméril & Bibron, 1839) - Lizard teju, "tegu", "tejuaçú"	16	0.50	Fat (1, 2)	"Throat inflammation", snake bite, wounds, "estrepes"	do, ca, ct, go, ho, mu, pi, sh
			Leather (1)	"Estrepes" (suck a splinter out of skin), wounds	do, ca, ct, go, ho, mu, pi, sh
Tropiduridae					
Tropidurus hispidus (Spix, 1825) - Lizard, "lagartixa", "catenga"	1	0.03	Viscera (1)	"Estrepes" (suck a splinter out of skin)	do, ca, ct, go, ho, mu, pi, sh
Viperidae					
Crotalus durissus Linnaeus, 1758 - South American rattlesnake, "Cascavel"	20	0.63	Fat (1)	Wounds, rheumatism in livestock cattle and in horses, swellings, harmed areas	do, ca, ct, go, ho, mu, pi, sh
MAMMALS					
Bovidae					
Bos taurus Linnaeus, 1758 - Domestic cattle, "Vaca"	8	0.25	Milk (3, 4, 5)	Weakness, "cow hooves disease", worms (intestinal parasites), fractures, fracture bones	do, ca, ct, go, ho, mu, pi, sh
			Milk cream (6)	Mastitis	ct
Ovis aries Linnaeus, 1758 -Ram, "Carneiro"	30	0.94	Castrated ram suet (1, 7)	"Oca" (Bovine Gangrenous Coryza), "Estrepes", scabies, wounds, rheumatism in livestock and in horses, swellings	do, ca, ct, go, ho, mu, pi, sh
Cervidae					
Mazama gouazoupira (G. Fischer, 1814) – Gray brocket, "veado-catingueiro"	1	0.03	Horns (8)	Snake bite	do, ca, ct, go, ho, mu, pi, sh

(Contd)

Table 1-Zootherapeutics resources used in Ethnoveterinary medicine in municipality of Sousa, semi-arid region, NE Brazil—*Contd*

Famíly/species/local name	Number of mentions	UV	Parts used and way of administration[a]	Disease (or illness)	Animals[b]
Hominidae *Homo sapiens* Linnaeus, 1758 - Human	2	0.06	Milk (1)	Oxen eyes inflammation	ct
Suidae *Sus scrofa domesticus* Linnaeus, 1758	5	0.16	Fat (1)	"Estrepes", scabies, "control hair loss", eyes inflammation	do, ca, ct, go, ho, mu, pi, sh
BIRDS Meleagrididae *Meleagris gallopavo* Linnaeus, 1758 - turkey, "peru"	2	0.06	Fat (1)	"Estrepe", torsions	do, ca, ct, go, ho, mu, pi, sh
Phasianidae *Gallus gallus domesticus* (Linnaeus, 1758) - Domestic chicken, "Galinha"	8	0.25	Fat (1) Eggs (3)	Wounds, "estrepes", expectorant, cattle earache Weakness in calves	do, ca, ct, go, ho, mu, pi, sh cl
Tinamidae *Nothura maculosa cearensis* Naumburg, 1932 - Spotted Nothura, "Codorniz"	1	0.03	Feather (8)	Snake bite	do, ca, ct, go, ho, mu, pi, sh

Legend [a]Way of administration: (1) Application on the affected area, (2) ingestion of the melted fat, (3) ingestion, (4) for "cow hooves disease" treatment in cattle hooves, the cow milk is mixed with the residual wood ash used in traditionals firewood ovens, locally call "pucumãn", and applied on the affected area, (5) For the treatment of worms and problems in the osteomuscular system (fractures, broken bones), mixed with *Chenopodium ambrosioides* L. and taken as a drink, (6) Applied on the cows' mammas, rubbing the affected area, (7) For the treatment of Bovine Gangrenous Coryza, the informers used to cut the oxen or cow horn and fill out the inner cavity with the castrated ram suet, (8) after dry, toasted and triturated, the powder is applied on the affected area. [b]Animals: ca, cats; cl, calves; ct, cattle; do, dogs; go, goats; ho, horses; mu, mules; pi, pigs; sh, sheeps.

Animal-derived products used as folk-medicines included eggs, fat, feathers, leather, milk, suet, and viscera. Zootherapeutics are usually applied in simple ways, mostly through ingestion or direct application to the affected area - and usually not in association with other animal-derived ingredients. In some cases, however, an association with medicinal plants is observed as, for example, a drink prepared from a mixture of cow's milk and *Chenopodium ambrosioides* L. used to treat intestinal parasites in NE Brazil[49] and to treat bone fractures in livestock in the municipality of Cubati, Paraíba, southern Brazil[35]. The use of suet from castrated ram (*O. aries*) as well as "teju" lizard (*T. merianae*) and rattlesnake fat (*C. durissus*) in the present study area corroborated other surveys that indicated these same species as significant zootherapeutic medicinal resources in the semi-arid region of NE Brazil (Alves et al.[45]; Alves and Rosa[47]; Barboza *et al*.[35]; Costa-Neto and Oliveira[27]).

In several instances the treatment of animal diseases was based on healing similar human illnesses, as confirmed by the interviewees and also as reported in the literature. For instance, the use of fat from the common green Iguana (*Iguana iguana* Linnaeus, 1758) to treat embedded splinters in humans or the use of horns from *M. gouazoupira* to treat snake bites was first documented in reports of folk-medicinal practices in Brazil[35]. These results are consistent with the viewpoint that parallels between human and animal ethnomedicine are myriad, spanning not only health care concepts, beliefs, and practitioners, but also nearly all known modes of administration of remedies[50]. The use of folk remedies to treat diseases or ailments in animals based on similar or identical illness that attack human was denominated 'human models for animal diseases' by Barboza *et al*.[35]. The relationships between ethnoveterinary and human ethnomedicine can be easily explained in this perspective, as the main stock animals (e.g. cattle, sheep, goats, pigs, among others) are mammals[37], which often have health problems that are similar to humans with identical symptoms; these similarities have been noted by many different communities[51]. Recently, Souto *et al*.[36] concluded that ethnoveterinary practices in NE Brazil have probably

evolved based on traditional human medicine practices. This results were together based on the high similarity (Spearman correlation, rs = 0.7859, $t(n-2) = 32.2$, $p < 0.001$) between the zootherapeutic species used in the treatment of same categories of diseases to humans and animals.

Considering the multiple aspects of Zootherapy and its general acceptance in popular folk-medicine, the use of animals to produce medicinal products almost certainly puts pressure on the natural populations of these species[52]. The utilization of wild species from the *Caatinga* region for ethnoveterinary purposes (e.g. *Crotalus durissus* Linnaeus, 1758; *Iguana iguana* (Linnaeus, 1758); *Mazama gouazoupira* (G. Fischer, 1814); *Nothura maculosa cearensis* Naumburg, 1932; *Phrynops geoffroanus* (Schweigger, 1812); *Tupinambis merianae* (Duméril & Bibron, 1839); *Tropidurus hispidus* (Spix, 1825)) must be taken into account in planning for the management and sustainable use of these animals. The *Caatinga* region has undergone, and is still experiencing, extensive alteration and environmental deterioration due to unsustainable utilization of its natural resources[39,53,54] and, in this perspective, documentation of the animal-based medicines and of the traditions that rural communities have established in regards to their local faunal resources can contribute to future management and conservation programs[55].

Holmstedt and Bruhn[56] observed that a great number of useful products have been identified from scientific studies of remedies traditionally employed by various cultures, and the conservation of folk knowledge may be able to contribute to the discovery of new drugs[48, 57]. However, this traditional knowledge is eroding under the influence of rapid urbanization, easy access to the modern health cares, the expansion of modern agriculture, and the acculturation of indigenous peoples[58-60], indicating an urgency to document ethnoveterinary practices of human cultures throughout the world. Finally, there is a need for follow-up studies to confirm the real efficiency of these zootherapeutics remedies and to record the full range of traditional knowledge, while at the same time promoting the conservation of natural resources and the culture integrity of these local populations.

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