

Ethnozoological Assessment of Native Rodents in Rural Areas of the Sucre Department, Colombia

Gerson A. Salcedo-Rivera, Jose A. Fuentes-Mario and Jaime De La Ossa-V*

Grupo de Investigacion en Biodiversidad Tropical, Laboratorio de Fauna Silvestre, Universidad de Sucre, Colombia; jaimesdelaossa@yahoo.com, gsalcedo07@hotmail.com, jfuentesmario@gmail.com

Abstract

Objective: A study about ethnozoological valuation for native wild rodents (*Coendou prehensilis*, *Cuniculus paca*, *Dasyprocta punctata*, *Hydrochoerus isthmius* and *Notosciurus granatensis*) in rural areas of department of Sucre, Colombian Caribbean is presented. **Methods/Statistical Analysis:** Research was realized between July 2017 and June 2018 with use of semi structured questionnaires applied to autochthonous users (638) of faunistic resources following snowball methodology; information obtained was analyzed for socio-economic aspects of informers and used species, for which was obtained: Mention Frequency (MF), Use Value Index (UVI), Relative Popularity Level (RPL), Accuracy Level Index (ALI) and Diversity Value of each Animal Index (DVAI). **Findings:** *N. granatensis* and *D. punctata* was the species with higher numbers of ethnozoological categories associated (7/10), but *C. paca* and *H. isthmius* presented higher values of MF (627 and 349), UVI (1 and 0.56) and RPL (0.98 and 0.55). On the other hand, data about species included in categories of aphrodisiac, amulet, craftwork, commerce, consumption, pet, ornamental, problematic and breeding are contributed; also, ethnomedical notes that emphasize the use of several parts are presented for *C. paca* (DVAI = 0.57) for popular treatment of various ailments. **Application:** Ethnozoology is very important contribution to support biological study; it conjugates valuable anthropologic information regarding to wildlife; equally, it is a valuable tool for community programs for conservation and sustainable use.

Keywords: Caribbean, Colombia, Ethnobiology, Use, Wild Rodents

1. Introduction

There is a strict relationship between humans and their environment, which is more evident in some communities¹; for many of them, there is a union between the natural, the supernatural and the social², from this interconnection they develop knowledge for the management, use and valuation of their environment, being the wild fauna a component of important social inclusion^{3,4}.

The constant use of fauna generates an appreciation by and importance to humans^{4,5}; it is not fortuitous that a large number of species are closely linked to the cultural, spiritual and symbolic knowledge schemes of the

identities of peoples⁶. In addition, the diversified benefit that humans have obtained from their relationships with animals also derives from characteristics such as location and sociocultural natures¹. Wildlife presents tangible value, such as: food, economy, leisure, medicine, and clothing, among others; and intangible value represented at least by ecological importance and link to cultural, spiritual, religious, and symbolic aspects³.

Wild rodents, especially larger ones, are a valuable resource for rural and forested communities, who use them for consumption and trade⁷⁻¹². Rodentia is a group of mammals of high specific richness¹³; in Colombia, they occupy the second place, preceded only by¹⁴ and, they comprise a total of 132 native species¹⁵.

*Author for correspondence

The present study was conducted in rural area of the department of Sucre, northern Colombia, evaluated ethnobiological aspects of five species of wild rodents: *Coendou prehensilis*, *Cuniculus paca*, *Dasyprocta punctata*, *Hydrochoerus isthmius* and *Notosciurus granatensis*.

2. Material and Methods

Study Area: Sucre is part of the arid Colombian peri-Caribbean belt¹⁶, has natural and anthropic savannahs, dry forests, very dry forests, humid forests and extensive wetlands¹³. The municipalities in which we work were selected based on a related bibliography¹⁷⁻²³.

Species Selection: Native, wild rodent species were selected according to references²⁴⁻³⁹ that highlight their use and/or consideration (or species of the same genus) in various places inside and outside of Colombia, such as: *Coendou prehensilis*, *Cuniculus paca*, *Dasyprocta punctata*, *Hydrochoerus isthmius* and *Notosciurus granatensis*. The taxonomic classification was based on recent listings of mammals in Colombia^{14,15}.

Category Description: Ten categories of use and/or consideration were defined according to the approaches presented in the literature^{5,8,11,17-21,25,27}, as follows: aphrodisiac (sexual stimulant), amulet (good luck), artisanal (traditional manufacture), commerce (purchase-sale), consumption (food), pet (pet), medicinal (popular treatment of diseases), ornamental (decorative), problematic (conflict) and breeding (reproduction and home management).

Fieldwork: Between July 2017 and June 2018, rural areas of the studied municipalities: San Onofre, Toluviéjo (Gulf of Morrosquillo), Coloso, Morroa (Montes de Maria), Galeras, Los Palmitos (Savannahs), Caimito, San Marcos (San Jorge), Guaranda and Majagual (La Mojana), were visited. According to the methodology of²⁰, preliminary data were obtained on frequent users (with special reference for hunters, natural resource traders and

healers) and for information related. Semi-structured questionnaires were applied^{2,41,42}; subsequently the snowball method was applied⁴³. To purge the research, it was decided to only resort to people from each place; no representative sample was calculated for finite populations⁴⁴ in order to use the greatest possible number of evidence^{19-21,45}; in all cases, photographs of the studied species were taken to facilitate taxonomic identification and avoid perception errors.

Data Analysis: The data were organized in tables and it were determined the following:

Frequency of Mention (MF), determined as the total number of informants that indicated the use⁴⁶.

Index of Species Use Value (UVI_{is}), which is calculated with $UVI_{is} = MF_{is}/V_{max}$, where "is" is the species used and V_{max} is equivalent to the frequency of the species with the highest number of reports. It used to better qualify the cultural value and its representativeness in the processes of use⁴⁷.

Relative Popularity Level of Species (RPL_{is}) was calculated using the formula: $RPL_{is} = MF_{is}/N'_{tot}$, where N'_{tot} is the total number of informants. Determined the sociocultural importance of the species⁴⁸.

Species Fidelity Level Index (ALI_{is}), was calculated by the equation $ALI_{is} = (Ip/MF_{is}) (100)$, where I_p is the number of references for a determined use. It used to calculate the value of each species within each use category⁴⁸.

Diversity Value Index (each animal) (DVAI), according to the equation: $DVAI = EA/nE$, where EA is equal to the total number of diseases cured for the species, and nE is the total number of conditions treated. Determined the importance of the species with medicinal use⁴².

3. Results

638 informants were contacted, of which 557 were men and 81 were women, with ages between 26 and

Table 1. Socio-economic and demographic aspects of the informants

Characteristics	Results (individuals)
Social stratum	Does not indicate or does not know = 94; lower social stratum 1 = 544.
Educational training	None = 212; primary basic = 307; secondary school and / or non-professional studies = 119.
Ethnicity	Mestizos = 409; indigenous (Zenú) = 182; afro-descendants = 47.
Occupational profile	Work in the fields or in the home, trade (not always natural resources) and various jobs; only 74 and 11 people indicated to dedicate themselves exclusively to the hunt and to be healers (medicine man), respectively.

72 years. The basic demographic, social and economic characteristics are indicated in Table 1.

100% of the informants referred to the exploitation and/or simultaneous consideration of more than one species of native, wild rodents; nevertheless, *C. paca* and *H. isthmius* obtained the highest values in terms of frequencies (627 and 349), Use Value Indexes (1 and 0.56) and Relative Popularity Level (0.98 and 0.55) (Table 2).

N. granatensis and *D. punctata* had the highest number of ethnozoological categories, associated with seven out of ten, sharing uses as amulets, trade, consumption, and pets, along with being considered “problem species” that affect the agricultural production of *Zea mays* (by *N. granatensis*) and *Manihot esculenta* (by *D. punctata*).

According to the informants, in many cases, hunting is done out of retaliation and as a control method, with later use as trade or meat consumption although some usually extract the skin of *N. granatensis* and preserve it as ornaments in houses and on farms.

Commerce, consumption and domestication were the categories that linked all species, with the exception of *C. prehensilis* (without commercialization). According to the Loyalty Level Index, *H. isthmius* presented a higher valuation in terms of trade (90.83); nevertheless, the consumption of *C. paca* and *C. prehensilis* meat was conspicuous (100), while *N. granatensis* enjoyed remarkable appreciation as a pet (75.65).

The only species considered an aphrodisiac was *C. paca*; men stated that its flesh restores sexual power;

Table 2. Ethnobiological assessment of the evaluated native, wild rodent species. Brackets ([]) indicate the status according to the International Union for Conservation of Nature (IUCN)

Taxon	Common Name	local name	MF	UVI _{is}	RPL _{is}	Aprovechamiento y/o consideración (ALI _{is})									
						AF	AM	AR	CM	CO	MA	ME	OR	PR	ZO
Sciuridae															
<i>Notosciurus granatensis</i> (Humboldt, 1818) [LC]	Ardilla cola roja (Red-tailed squirrel)	Ardita	115	0.18	0.18	---	64.35	33.91	50.43	36.52	75.65	---	55.65	65.22	---
Erethizontidae															
<i>Coendou prehensilis</i> (Linnaeus, 1758) [LC]	Puercoespín (porcupines)	Puercoespín	74	0.12	0.12	---	---	---	---	100	2.70	9.46	---	---	---
Caviidae															
<i>Hydrochoerus isthmius</i> Goldman, 1912 [DD]	Chigüiro (capybara)	Ponche	349	0.56	0.55	---	---	3.44	90.83	95.99	19.20	4.01	---	---	36.39
Cuniculidae															
<i>Cuniculus paca</i> (Linnaeus, 1766) [LC]	Paca (Lowland paca)	Guartinaja	627	1	0.98	6.06	---	---	89.79	100	14.19	10.85	---	---	14.83
Dasyproctidae															
<i>Dasyprocta punctata</i> Gray, 1842 [LC]	Agutí (Central American agouti)	Ñeque	281	0.45	0.44	---	7.47	---	67.97	73.31	12.81	1.42	---	38.43	10.32

The evaluated indices used the following abbreviations: frequency of mention (MF), Index of Species Use Value (UVI_{is}), Relative Popularity Level of Species (RPL_{is}), Index of Species Fidelity Level (ALI_{is}); likewise, the categories of use and/or perception were listed as: aphrodisiac (AF), amulet (AM), artisanal (AR), commerce (CM), consumption (CO), pet (MA), medicinal (ME), ornamental (OR), problematic (PR) and breeding (ZO)

Table 3. Diseases treated with parts of native, wild rodents

Species	Ailment (Suffering)	Used part	DVAI
<i>C. prehensilis</i>	Unhealed wounds	Gall (bile)	0.14
<i>H. isthmus</i>	Articulations pain	Fat	0.14
	Articulations pain	Fat	
<i>C. paca</i>	Postpartum weakness	Meat and fat	0.57
	Constant tiredness	Blood	
	Poisonous arthropod stings	Gall (bile)	
<i>D. punctata</i>	Muscle inflammations	Fat	0.29
	Weakness in children	Meat	

DVAI = Index of the Diversity Value of each Animal

others seek the same effect by dissecting the penis of males and ingesting it in the form of a drink: “guarapo” (juice based on brown sugar loaf, lemon and water).

There was a popular perception that the possession of dissected legs of *D. punctata* as amulets favors subsequent hunts of the species. However, this idea was broader for *N. granatensis* tails, which are maintained as elements for the bearer’s luck; some people take advantage of this to manufacture homemade key chains and market them. For trade purposes, *H. isthmus* skins were also used as canvases for paintings although this use was sporadic.

The captive breeding of rodents was carried out only for *C. paca*, *D. punctata* and *H. isthmus*; however, the latter had a higher estimate. Craft methods of captive breeding were used. Breeding processes were produced for the purpose of trade and consumption.

The use of *H. isthmus* stomachs to make cheese rennet was not included because it is considered an ancient practice that is currently in disuse.

Table 3 presents ethnomedicinal annotations related to the use of certain body parts of the evaluated species, being of more importance *C. paca*, that it is used to treat four conditions, which gave the maximum value in the Diversity Index of each Animal (0.57).

4. Discussion

When comparing the demographic, social and economic characteristics of the informants, there were clear similarities and concordance with respect to the results obtained in other studies^{11, 21, 42, 49}; several of these are explained in a recent publication on mammalian ethnozoology in the Gulf of Morrosquillo¹⁷.

It is noted that the ethnozoological assessment of the native, wild rodent species presented in this study comprises a broad spectrum, in which economic and anthropological components were linked, based on the knowledge and perception on the natural features of the species, such as behavior and ecology, among others.

As mentioned in a recent study¹⁷, it seems feasible that uses such as trade, consumption and domestication are not completely independent, establishing a certain relationship between these categories that results in higher valuation indicators; however, consumption tends to be more profitable since not only trade, but also subsistence is taken into account²².

Several of the categories are often indicated for large rodents (*C. paca*, *H. isthmus* and *D. punctata*), mainly trade and consumption^{19-22, 32, 36}; these species comprise a significant fraction of the “bush meat” that has been consumed by humans for centuries, especially in the tropical areas of Latin America³⁶. However, the consumption of *N. granatensis* in Sucre, although it may not be recent, has been documented on very few occasions¹⁷. This study reports for the first time the use of *C. prehensilis* as a source of animal protein in this department although there has been evidence of this³⁰. It is possible that these small-sized species, unlike others, are not included on regular menus, and their consumption is occasional; it should be taken into account that, with the population deterioration of the former, small species could become important elements of human diets, replacing large ones⁵⁰.

There is ample evidence in the Sucre region of breeding in captivity of native, wild rodents, and, with the exception of *C. prehensilis*, all of the species in this study have been documented for this purpose^{17, 19-21, 23}; however, in some areas of Colombia, the possession of porcupines

as pets is seen³⁰. Like many other mammals, with special reference to primates, these species are maintained and considered charismatic¹⁷.

Uses related to amulets, handicrafts, ornaments and conflicts have been registered for *N. granatensis* in the Sucre subregions Morrosquillo and La Mojana^{17,23}. In this study, the valuation and perception of the species were extended to more regions of the department, which could indicate cultural roots possibly derived from indigenous (Zenu) and rural perspectives; nevertheless, the taxidermy of *N. granatensis* was not documented although it exists in the Gulf of Morrosquillo¹⁷. There were novel observations related to amulets of *D. punctata*, which is also defined as an agricultural threat, as has been observed in other studies⁵¹; in addition, the value of *H. isthmus* skins for producing handicrafts was observed, a component that had not been documented.

Information on aphrodisiac species is increasing in the department; preliminary data are available for *Didelphis marsupialis* (Didelphimorphia: Didelphidae) and *C. prehensilis*¹⁷, together with *H. isthmus*, *D. punctata* and *C. paca*¹⁸, which, in this study, turned out to be the only one with this use, which further accentuates its assessment in the category. Although it may be debatable, this assessment is common, and the importance of the use of reproductive structures (penis or testes) of some species with considerable reproduction rates is emphasized. A part of this component arises from personal experience and culture; the mystery surrounding the use of wild animals as sexual enhancers persists although more in-depth studies could be carried out on the subject in order to elucidate some elements.

Also, although in many cases ethnomedicine can be controversial in the light of science, the idea of using parts of certain species of fauna for the treatment of diseases continues, and many people perform these practices,

In areas inhabited by indigenous peoples the idea of using parts of certain species of fauna for the treatment of diseases it's still usual, despite being controversial their results³¹. The importance of knowledge that is passed through the generations should be noted because it can justify traditional medicine⁵². In the results of research conducted in Morrosquillo¹⁷, the use of bile from *D. punctata* to avoid pregnancy is notable, which was not found in the present study, meaning this practice may be rare and only performed by some individuals.

For aphrodisiacs, the approach to ethnomedicine can be deepened with scientific studies and verification to

validate these uses, including studies on beneficial results in clinical research and, equally important, molecular determinations of the associated agents¹⁵.

The results for rodent domestication are of great relevance in this study. Attempts to establish *C. paca* in captivity have been carried out in Costa Rica, but with reduced success because of reproductive difficulties and low profitability³⁶; one solution may be to link traditional knowledge of people who have chosen to reproduce and raise some species with favorable results with the collaboration of researchers, creating management plans for production that could encourage sustainable perspectives that avoid extractivism.

5. Conclusions

Although there may be value in the benefits humans obtain from some wild populations of native rodents, these populations could be subjected to strong hunting pressures; however, aspects such as traditional, captive breeding can provide new management ideas to favor these groups and humans, meaning traditional knowledge and popular perceptions are key tools for conservation and sustainable development. The development of complementary biological and ethnobiological studies are recommended to obtain important information on abundance, ecology, conservation status, extraction rates and other elements of interest for rodents with an ethnozoological value.

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