MANAGEMENT AND NUTRITION

General Characteristics of Household Systems for Goat Production, in the Municipality of Camagüey, Cuba

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ABSTRACT

Background: Worldwide, goats have always been linked to man, mainly due to the quality of their production of meat, milk, and wool. The aim of this paper is to present the general characteristics of household systems for goat production in the municipality of Camagüey, Cuba.

Methods: A survey was applied to 46 household farmers in urban and suburban areas of the city of Camagüey, Cuba. Descriptive statistics was used in the study, along with hierarchical clusters for system classification.

Results: All the farmers are more than 20 years of age, predominantly males with secondary education, on average. Overall, 54.3% does not own or is leasing land, and 47.8% works independently from any organizations; the rest belongs to a few cooperatives. The farmers can access little input and investment funds, and their labor is framed within their households, without salaries; their main way of sustenance is not goat breeding. The herds comprised between 1 and 54 goats, of which 27.5% are milking females. The systems were classified into three types, considering the total goats, grazing hours, milking goats, years of experience, educational level, and family members engaged in the activity. The first group showed higher educational level, longer grazing time, and a larger number of animals; the second averaged 5 hours of grazing and eighth grade of education. The indicators in these two groups were higher than in the third group.

Conclusions: Household goat production systems were characterized in the municipality of Camagüey, which will contribute to more strategic work projects that promote local sustainable development.

Key words: *goats, production systems, typification, suburban agriculture*

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INTRODUCTION

The utilization of goats is linked to the history of man, who has always made use of their milk, meant, and hair. In Ethiopia, for instance, the main sources of income for farmers were the production of meat, milk, and manure, according to Weldeyesus and Rohotash (2018). In Cuba, goats are also involved in rural lifestyles since the beginning of colonial times (La O *et al.*, 2018).

Although the production of sheep and goats account for a minor part of world's milk production, according to Pulina *et al*. (2018), most of these systems of production are environmentally friendly, and play a key role in the development of rural communities.

Due to the growth of population, concerns about the utilization of resources, and the impacts on the environment, every animal sector is expected to produce more using less in the future. Goats will not be the exception (Lu and Miller, 2019).

However, caprine breeding is not a relevant production activity in Cuba, being associated to traditional raising systems, which have become part of the lifestyle of rural families (La O, 2013, and Oficina Nacional de Estadísticas e Información, 2014). Accordingly, Dubeuf, Ruiz Morales, and Guerrero (2018)

noted that characterizing the production systems of goats would be the first step to take before starting new changes.

In that sense, the aim of this research is to conduct a characterization study of household goat production systems in the municipality of Camagüey, Cuba

MATERIALS AND METHODS

Forty-six urban and suburban farmers in Camagüey city (21° 23' 2" N 77° 54' 27" W), Cuba, were contacted between September 2017 and March 2018. The visits were arranged according to Hernández *et al.* (2011) and Delgado (2016), and comprised social, economic, and zootechnical aspects (age, sex, educational level, experience as farmer, composition of the household, number of family members engaged in goat raising, owned or leased lands, years of experience, and farming equipment).

The information was analyzed using descriptive statistics, and the quantitative variables were chosen (total goats, grazing hours, milking goats, years of experience, educational level, and family members engaged in the activity), in order to classify household goat farms (HGF), by means of hierarchical cluster analysis. IBM® SPSS® ¡, version 23.0. was used for all the statistical analyses.

RESULTS AND DISCUSSION

According to Dubeuf, Ruiz Morales, and Guerrero (2018), participatory methods are necessary to set up comprehensive discussions among all the actors, and to offer systemic directions. The coexistence of various models of production based on the available humans and natural resources might be the way to tackle these transitions.

All the 46 goat breeders are adult, 52.2% is between 20 and 49 years of age, and the rest is above 50 years of age. Most are males, with a predominant secondary educational level. Approximately half is not associated to any productive organization, the others are members of cooperatives; more than half do not own or lease land (Table 1).

Table 1. Social, economic, and zootechnical characteristics

Criterion	Frequency (amount)	%
Owner age (y):		
More than 50 years	22	47.8
20-49 years	24	52.2
Sex:		
Female	10	21.3
Male	38	78.3
Educational level:		
Primary education	6	13.0
Secondary education	28	60.9
High school and college education	12	26.1
Breeding experience:		
1-10 years	33	71.7
More than 10 years	13	28.3
Household composition		
1-4 members	36	78.3
1-4 members	10	21.7

Family members engaged in breeding		
Up to 2 members	41	89.1
More than 2 members	5	10.9
Owned or leased lands		
No land ownership	25	54.3
1-10 ha	19	41.3
More than 10 ha	2	4.3
Farming equipment		
No possession	40	87.0
Hammerhead mill	6	13.0
Use of supplements and other foods		
No supplementation	39	84.8
Sugar cane and bagasse molasses/urea	7	15.2
Breeding type		
Backyards and lots	25	54.4
Farms	21	45.6
Membership productive organizations		
No member	22	47.8
Members of cooperatives	24	52.2

In caprine systems holding more than 20 animals, in the province of Ciego de Ávila, Delgado (2016) concluded that secondary educational level is adequate to start a skill acquisition process on this animal species. Most individuals in the study (78.3%) live in small households (1-4 members), whereas the rest lives in more numerous families. Generally, two or more members of the family are engaged in animal handling and care, more consistent with family business practices. Overall, the farmers can access to little inputs and investment funds, and their labor is framed within their households, without salaries. Their main way of sustenance is not goat breeding.

The results achieved are similar to reports by Delgado (2016), as to age (90% below 60), male predominance, greater expertise in suburban farming, and similar educational level of breeders.

Families are made of small household units, who participate actively in all the productive process, as reported in other regions. Barsa *et al.* (2011) described the similarity in relation to farmers´ lifestyles, traditional raising, and the absence of salaried labor.

The results of a surveyed conducted by Hernández (2011) in Mixteca Poblana, Mexico, showed that breeding households have no association with goat farmers, 31% does not own land, and 95% have irrigation systems and equipment. The study also showed the inexistence of leasing or cooperative association in their regions.

The outcome, in terms of breeding systems, coincides with La O (2013), who reported 54% of backyard breeding and neighborhood surroundings, 46% utilizes farm systems with herds, which is a fractional capital where the breeder can sell one or several animals depending on their needs.

Cluster analysis (Table 2) enabled distribution of breeders into three groups.

Group I. Made of six breeders, with high educational level (9-12 grades). Grazing is made for eight hours, and the number of goats is the highest.

Group II. Made of 13 members, with 17 and 29 goats. Their values are dispersed; grazing takes 2-8 hours, and the average educational level is eighth grade; their working experience is up to 20 years.

Group III. Made of 27 members with very few goats (1-8), 10.33% have an average educational level of tenth grade, and their working experience is 12 years.

The first and second groups are associated to cooperatives, different from the third group, whose prime interest is self-consumption; meat production is their main activity, but no interest is placed on mil production.

Regarding milk and meat sales, the first and second groups are more inclined to selling milk, whereas the third group is the one with the least number of milking animals. Milk is primarily used for self-consumption, and despite having fewer animals, breeders sell more animals than the other groups.

Table 2. Characteristics of the three groups of HGF

Criterion	GROUPS								
	I (n= 6)			II (n= 13)			III (n= 27)		
	N	Mean	Median	n	Mean	Median	n	Mean	Median
Total animals	260	43.3	44	323	24.8	27	279	10.3	12
Grazing hours	48	8	8	75	5.8	8	118	4.4	4
Milking goats in the year	40	6.7	6	85	8.5	5	21	0.8	0
Years of experience	46	7.7	7	134	10.3	9	184	6.8	5
People engaged in breeding	11	1.8	2	26	2.0	2	38	1.4	1

The groups are generally very different from more specialized breeders in the province of Ciego de Ávila (Delgado, 2016).

La O (2013) identified two typologies of household caprine systems in a region of Valle del Cauto, Cuba: breeders in backyards and lots, and breeders on farms. Both variants were also observed in this study, but higher predominance was in backyard raising, using compensation land, like roads and road sides, which cannot be leased or purchased.

In all cases, the reproduction system practiced is natural mating throughout the year, in contrast to the seasonal system demanded by the species. Ensuring proper nutrition and preparation of studs and females before mating allows for natural induction of sexual activity in goats. Enabling the "male effect" favors the concentration of parturitions in order to achieve more uniform offspring, more efficient consumption of grass, and greater milk production (Bidot, 2013). Another handling option during the delivery season is the utilization of fixed AI. In a recent study by Alvarado-Espino *et al*. (2019), they recommended the inclusion of a protocol based on an injection of 20 mg of progesterone, followed by 100 IU of hCG 24 h later, which was successful to synchronize estrus and ovulation in multiparous and nulliparous goats during anovulation.

In caprine systems of Mixteca Poblana, Mexico, the differences in production systems depend largely on social, economic, and cultural aspects (Hernández *et al.*, 2011), and the production of milk by small ruminants is concentrated in countries with a long tradition and sufficient resources (Pulina *et al*., 2018).

According to Mataveia *et al.* (2018) there is a need to find appropriate intervention strategies to increase goat production, through farmer education, focusing on good breeding practices, such as best breeding and nutrition practices, as well as strategies to control diseases.

CONCLUSIONS

Household goat production in the municipality of Camagüey was characterized as business, self-consumption, and not salaried, without land management or livestock control.

Most owners are male, less than 50 years of age, and 54% of them have no land. Grazing is in neutral areas, with minimal sales, in contrast to farmers who own land and enjoy other types of livestock, more areas, more goats, better facilities, and more grazing time.

Further studies on household goat breeding are recommended, along with the creation of a training program in agriculture for goat breeders.

The outcome of this study will contribute to new work strategies that promote local sustainable development of caprines.

REFERENCES

Alvarado-Espino, A. S., Menchaca, A., Meza-Herrera, C. A., Mellado, M., Arellano, F. y Véliz, F. (2019). Use of injectable progesterone and hCG for fixed-time artificial insemination during the non-breeding season in goats. *Theriogenology*, *127*(1), 21-25.

Lu, C. D. y Miller, B. A. (2019). Current status, challenges and prospects for dairy goat production in the Americas. *Asian-Australasian Journal of Animal Sciences*, *32*(8), 1244-1255.

Mataveia, G. A., Garrine, C. M., Pondja, A., Hassen, A. y Visser, C. (2018). Smallholder goat production in the Namaacha and Moamba districts of southern Mozambique. *Journal of Agriculture and Rural Development in the Tropics and Subtropics (JARTS)*, *119*(2), 31-41.

Pulina, G., Milán, M. J., Lavín, M. P., Theodoridis, A., Morin, E., Capote, J., *et al.* (2018). Invited review: Current production trends, farm structures, and economics of the dairy sheep and goat sectors. *Journal of Dairy Science*, *101*(8), 6715-6729.

Weldeyesus, G. y Rohotash, K. (2018). Management and Breeding Objectives of Maefur goat breed type in Erob district eastern Zone of Tigray, Northern Ethiopia. *International Journal of Livestock Production*, *9*(3), 50-66.

Bidot, A. (2013). Producción de leche de cabra y duración de la lactancia de los genotipos Nubia, Saanen y Toggenburg en condiciones de pastoreo restringido y suplemento con concentrado. *Abanico Veterinario*, *3*(1), 30-35.

Delgado-Fernández, R. (2016). Caracterización de los sistemas de producción caprina en la provincia Ciego de Ávila. *Pastos y Forrajes*, *39*(1), 64-71.

La O, M. A. (2013). *Estudio de conservación de las cabras criollas cubanas en la sub-cuenca Cautillo del Valle del Cauto*. Tesis de Doctorado en Ciencias Veterinarias, Instituto de Investigaciones Agropecuarias Jorge Dimitrov, La Habana, Cuba.

La O Áreas, M. A., Guevara Hérnandez, F., Rodriguez Larramendi, L. A., Pinto Ruis, R., Nahed Toral, J., Ley de Cross, A. et al. (2018). Resiliencia de los sistemas de crianza de cabras Criollas Cubanas en el contexto de la conservación del genotipo. VI Congreso Internacional de Producción Animal, 9(1), 18.

Hernández, J. E., Franco, F. J., Villarreal, O. A., Camacho, J. C. y Pedraza, R. M. (2011). Caracterización socioeconómica y productiva de unidades caprinas familiares en la mixteca poblana. *Archivos de zootecnia*, *60*(230), 175-182.

Oficina Nacional de Estadística e Información. Existencia de ganado ovino y caprino. Distribución de la tierra del país y su utilización por provincias en junio de 2013. La Habana: ONEI, 2014, http://www.one.cu/

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AUTHOR CONTRIBUTION

Author participation included the following: Conception and design of research: AIBF, RMPO, ACGM; data analysis and interpretation: RVMO, ACGM; redaction of the manuscript: ACGM, RMPO.

CONFLICTS OF INTEREST

None