

Limiting factors of beef goat and sheep farming in the city of Chapadinha, MA in the perception of farmers

Fatores limitantes da caprinovinocultura de corte na cidade de Chapadinha, MA na percepção dos produtores

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Abstract:

Goat and sheep farming is a common activity on most rural properties in Brazil, where it is developed empirically and extensively, with low technological levels and zootechnical indexes. This work try was to understand the reality of goat and sheep farming in the city of Chapadinha, MA, and to identify its limiting factors from the farmers' point of view. The study was carried out by applying a semi-structured questionnaire to 25 producers, according to the Snowball methodological technique. According to producers, the main factors limiting the activity are the lack of capital to invest, deficient food and the shortage of public incentives. Of the producers interviewed, 48% receive technical assistance, however, it is not carried out efficiently. Despite the little importance given by producers, this item can be the real catalyst for the development of the activity. Food was cited as the main component to be prioritized if producers had access to credits, followed by the acquisition of animals and facilities. The income of these producers came mainly from a set of agricultural activities combined with some public benefit. The administration of the properties was mainly carried out by the producers, however, around 40% of them did not live on the property, where they only made visits. The absence of food preservation techniques, combined with the lack of technical assistance, inadequate management and the little time dedicated by producers to the activity, limit the economic growth of goat and sheep farming in the Chapadinha, Maranhão, Brazil.

Keywords: small ruminants, human resources, meat production, obstacle

Resumo:

A caprinovinocultura é uma atividade comum na maioria das propriedades rurais do Brasil, onde é desenvolvida de forma empírica e extensiva, com baixos níveis tecnológicos e índices zootécnicos. Objetivou-se com este trabalho conhecer a realidade da Caprinovinocultura no município Chapadinha, MA, e identificar seus fatores limitantes sob o ponto de vista dos produtores. O estudo foi realizado por meio da aplicação de um questionário semiestruturado para 25 produtores, de acordo com a técnica metodológica *Snowball* (bola de neve). Segundo os produtores, os principais fatores

limitantes da atividade são a falta de capital para investir, alimentação inadequada e ausência de incentivo público. Dos produtores entrevistados, 48% recebem assistência técnica, no entanto, não é realizada de forma eficiente. Apesar da pouca importância dada pelos produtores, este item pode ser o real empasse para o desenvolvimento da atividade. A alimentação foi citada como principal componente a ser priorizado caso os produtores dispusessem de acesso a créditos, seguida da aquisição de animais e instalações. A renda destes produtores era oriunda principalmente do conjunto de atividades agropecuárias aliadas a algum benefício público. A administração das propriedades era feita principalmente pelos produtores, porém, cerca de 40% dos deles não residiam na propriedade, na qual realizavam apenas visitas. A ausência de técnicas de conservação de alimentos, aliada a falta de assistência técnica, administração inadequada e o pouco tempo dedicado pelos produtores à atividade, limitam o crescimento econômico da caprinovinocultura de corte no município de Chapadinha, Maranhão, Brasil.

Palavras-Chave: pequenos ruminantes, recursos humanos, produção de carne, entraves

1. Introduction

Goat and sheep farming is a common activity on most farms in Brazil, where it is developed empirically and extensively, with low technological levels and zootechnical indexes (Castro *et al.*, 2022). In the Brazilian Northeast, this activity has an important social, economic and cultural role, constituting a source of income and food for families at high risk of social exclusion, thus contributing to regional development (Castro *et al.*, 2022).

To the IBGE (2022), Chapadinha, MA, has an effective herd of 10,300 goats and 1,100 sheep. Currently, the city has the fourth largest herd of goats in the state of Maranhão, while the sheep herd is not very representative. Even with characteristics developed for the development of goat and sheep farming activities, the municipality has low productivity in terms of land, workmanship and animal factors.

The low quantity of meat sold and the inadequate management of productive resources can make economic returns unfeasible, thus preventing producers from making a living exclusively from the activity. Nascimento *et al.* (2022) analyzed the evolution of the goat and sheep meat market in the Northeast of Brazil, and draw attention to the precarious technological conditions, low productivity rates and lack of reliable information about the activity market in the region.

Many factors limit goat and sheep farming in the Northeast, restricting productivity and making it impossible for small producers to continue farming during periods of more severe drought (Alves *et al.*, 2022). According to Riet-Correa *et al.* (2013), the main factors limiting this activity are related to feeding, sanitary and milking management, facilities and zootechnical records.

Understanding the point of view of those who are directly involved with the activity can be an alternative to identifying the factors responsible for its inefficiency. According to Silva (2013), the personal and professional profile of the human resources involved in the activity can establish their performance. In that regard, the main goal of this work was to understand the reality of goat and sheep farming in Chapadinha, city of the Maranhão, and to identify the limiting factors of this activity from the producers' point of view.

2. Materials and Methods

The study was carried out in the municipality of Chapadinha, MA, Latitude: -3.7405, Longitude: -43.35933° 44' 26" South, 43° 21' 33" West, through the application of a semi-structured questionnaire with 25 producers who raise goats and/or sheep for commercial meat production.

The questionnaire was applied according to the Snowball methodological technique, which consists of a non-probabilistic sample using chains of reference, where the first participants, or seeds, in the study indicate new members and these continue the chain until the saturation point is reached

(Baldin & Munhoz, 2011). From this sampling it is not possible to determine the probability of selecting participants in the research, however it is an alternative to make it possible to study groups that are difficult to access, such as goat and sheep producers in the municipality of Chapadinha, due to insufficient records.

The network was started with the help of the Agência de Defesa Agropecuária do Estado do Maranhão – AGED/MA (i.e State Agency for Agricultural Defense of Maranhão - AGED-MA) and the Associação dos Criadores de Caprinos e Ovinos do Município de Chapadinha (i.e Association of Goat and Sheep Breeders of the Municipality of Chapadinha - ACCOMCHAP), which provided names and options of goat and sheep producers who were registered with the agency and who were associated with the organization. From these, more products were offered through restrictions.

The questionnaire applied was adapted from Silva (2013) and the variables studied were related to goat and sheep farming - size and distribution of herds, sources of income, workmanship, administrative characteristics, access to rural credit and technical assistance - and with the personal and professional profile of the producers – age, education, marital status, experience with the activity, residence and frequency of visits to the property.

The results found were tabulated and analyzed using the Excel program (Microsoft Office Excel) 2016, the data were stored in electronic spreadsheets and analyzed using descriptive statistics to obtain frequencies.

3. Results and discussion

The production system adopted on all properties studied is semi-extensive, without adopting technologies such as: adequate facilities, balanced diets and forage conservation techniques. On all properties visited, the animals are released into the pasture in the morning and remain there until the end of the afternoon when they are collected, and this is basically the only daily management used by producers in the region.

According to the information obtained through the questionnaire applied, 52% of the properties had a herd of goats and sheep between 20 and 50 heads, and only 24% had a herd greater than 100 heads (Table 1), which allows us to characterize goat farming in Chapadinha, MA, as small farms, with few exceptions. Among the properties, a predominance of goat/sheep farming was observed, where 64% raised only goats, 8% only sheep and 24% exploited both species, thus justifying the difference in the percentage of the goat herd (74%) in relation to the herd sheep (26%) in the municipality (Table 1).

Similar characteristics were observed by Farias *et al.* (2014), when studying goat and sheep producers in the semi-arid region of Ceará, Where the properties had a herd of goats and sheep with an average size of 40.5 heads and goat production was present in 94.1% of the properties. Characteristics that well reflect the reality of this activity in the Northeast of Brazil.

Table 1. Herd size and percentage of distribution on properties and between species, in Chapadinha, MA

Tabela 1. Tamanho do rebanho e percentual de distribuição nas propriedades e entre as espécies, em Chapadinha, MA

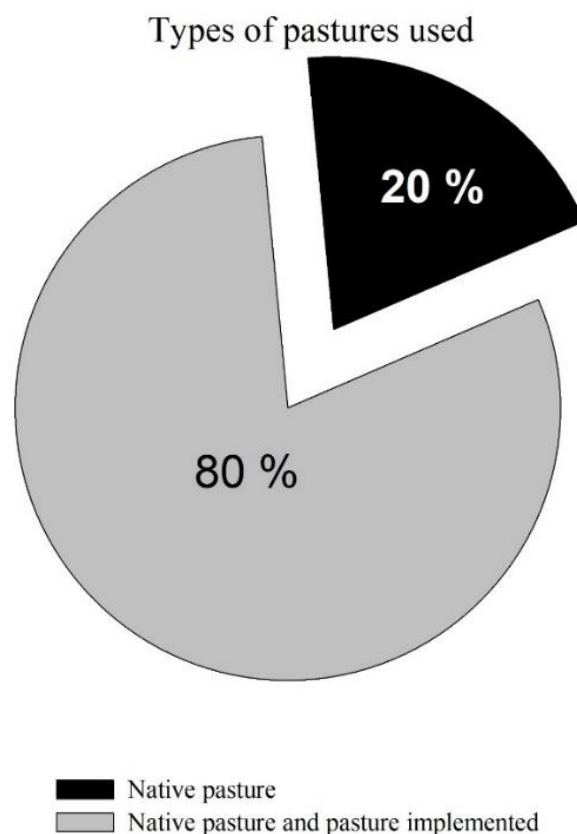
Herd Size (heads)	%
20 a 50	52
51 a 100	24
>100	24
Distribution on properties	%
Goats	64
Sheep	8
The two species	28
Relationship Between Goats and Sheep	%
Goats	74
Sheep	26

The feeding of these animals is basically native and established pasture, with a predominance of the use of mineral salt on all properties, even if empirically. The use of concentrated feeds, conventional or alternative, to supplement the diet of goats and sheep during the dry season is not a common practice in the region, which makes it difficult to maintain the herd during this period. Feed management consists only of releasing animals to look for food, due to the lack of structure for pasture formation and the lack of capital to invest in food supplementation, making feed management inefficient. Lack of knowledge about the nutritional requirements of animals and food preservation techniques can also explain failures in management.

In the total, 20% of producers use only native pasture to feed their animals (Figure 1), a common characteristic among producers who have a small herd, which limits the productivity of the activity on these properties. The other producers use native and established pasture, even with pasture cultivation, there is a food deficit during the dry season.

Figure 1. Percentage of producers who use native pasture and native and implemented pasture to feed goats and/or sheep in Chapadinha, MA

Figura 1. Percentual de produtores que utilizam pasto nativo e pasto nativo e implantado na alimentação de caprinos e/ou ovinos de Chapadinha, MA



The use of forage species adapted to the edaphoclimatic conditions of the region, such as forage palm (*Opuntia ficus-indica* Mill), Massai grass (*Panicum maximum* cv. *Massai*), Mombaça (*Panicum maximum* cv. *Mombaça*) and Tifton 85 (*Cynodon* spp.) can be an alternative to reduce the problems of food shortages, as well as the conservation of forage in the form of hay and silage, thus ensuring the continuity of the activity during the dry period (Souza *et al.*, 2023; Santos *et al.*, 2023).

The use of forage legumes such as Leucaena (*Leucaena leucocephala*), moringa (*Moringa oleifera* Lam) and gliricidia (*Gliricidia sepium*) can be also a strategy to improve feeding and reduce the need to purchase protein concentrates, being a low-cost alternative, considering the nutritional value of the species and the high acceptance by animals (Oliveira *et al.*, 2023). Another alternative is

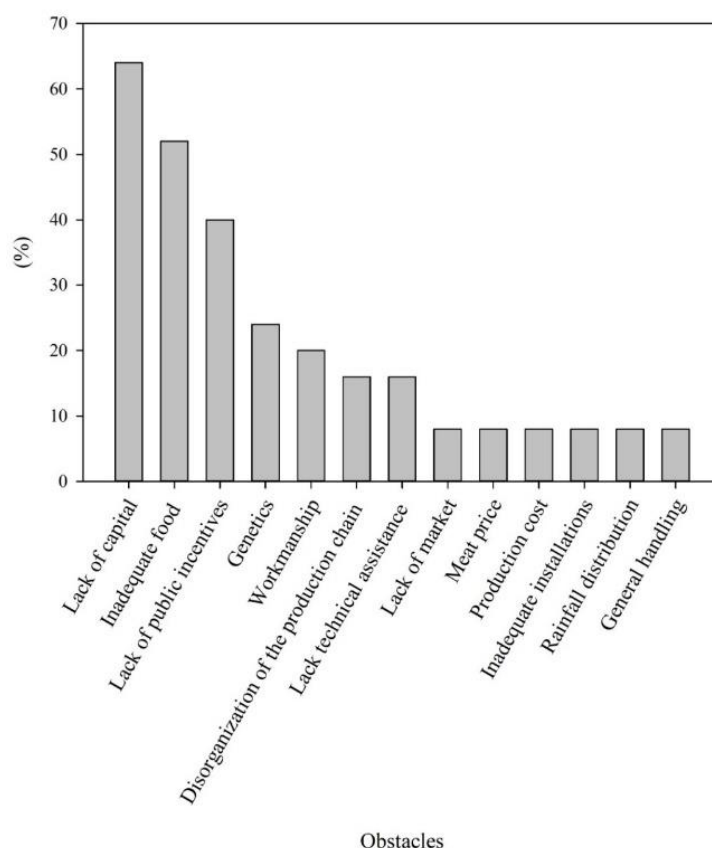
the use of by-products from the regional agroindustry, such as manioc (*Manihot esculenta*) bark, commonly used in feeding goats and sheep in São Luís island (Castro *et al.*, 2021). Babaçu (*Attalea speciosa*) by-products are also an excellent alternative for the region; however, producers must pay attention to the limits on the use of this food.

Even with pasture cultivation, during the drought period there is a food deficit, making it necessary to conserve forage to ensure the continuity of activity during the lean period. However, the most common practice adopted among producers to face the period of food scarcity is the reduction of the herd through sales. This practice can be used by producers strategically, scheduling sales for the beginning of the most critical period, before the animals begin to lose weight. Starting with the sale of males, followed by the sale of older dams, keeping the younger dams so that it is possible to re-establish the herd at the right moment.

In the perception of producers, the main factors limiting the development of goat and sheep farming in Chapadinha, MA, are the lack of capital to invest, inadequate food and lack of public incentives, respectively (Figure 2). Feeding, combined with the lack of technical assistance, were also reported by Silva *et al.* (2023), as the main limitations of raising goats and sheep in the municipality of Caracaraí – RR. Different from what was observed by Castro *et al.* (2021) on São Luís Island, state of Maranhão, where producers reported difficulties in marketing products, production costs, consumer market and lack of financing as the main obstacles.

Figure 2. Main obstacles to the development of goat and sheep farming activities, cited by goat and sheep producers in Chapadinha, MA

Figura 2. Principais entraves do desenvolvimento da atividade caprinovinocultura, citados pelos dos produtores de caprinos e ovinos de Chapadinha, MA



Each producer interviewed cited up to three obstacles that they considered responsible for the inefficiency of the activity. Problems such as genetics, workmanship and disorganization of the production chain were more frequent on properties with herds of more than 100 animals.

Although two really impactful factors were reported - engaging food and lack of public incentive - the main obstacle to the activity was attributed to the lack of capital to invest, relating the success of production to the socioeconomic profile of the producers. Goat and sheep farming in Chapadinha, MA, is still maintained as a subsistence activity.

Despite the importance given by producers to the problem with the lack of capital to invest in the activity, 56% of them have or have already had access to rural credit (Table 2), but some report that they experience difficulties in obtaining a return on the capital invested, ending up unable to continue the activity and often found themselves in debt from the bank.

Those who have never had access to rural credit (44%) (Table 2) claim difficulty in obtaining the resource due to bureaucratic issues. Some do not have land registration, a basic requirement for obtaining credit. Others say they are afraid of falling into debt with the bank due to common reports.

Table 2. Percentage of goat and sheep producers in Chapadinha, MA, who receive technical assistance and who have already had access to rural credit

Tabela 2. Percentual de produtores de caprinos e ovinos de Chapadinha, MA, que recebem assistência técnica e que já tiveram acesso à crédito rural

Technical assistance	%
Yes	48
Public	75
Private	25
Not	52
Access to rural credit	%
Yes	56
Not	44

Technical assistance plays a very important role in the development of rural enterprises, especially for small properties, where there is a great lack of appropriate information and technologies. As seen in table 2, 48% of goat and sheep producers in Chapadinha, MA receive private (25%) or public (75%) technical assistance, however, according to producers' reports, it is not carried out efficiently.

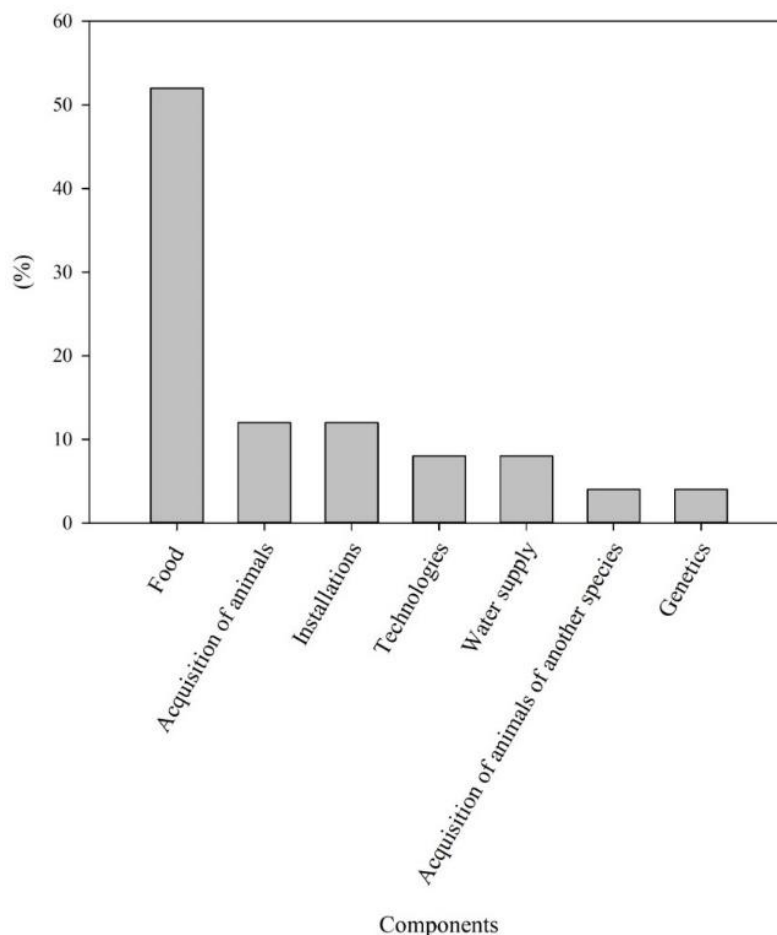
This reality is common in the Northeast region, similar results were observed by Silva *et al.* (2015) in the municipality of Rosário, MA, where 56% of the producers interviewed stated that they had already received technical assistance or some training. In the municipality of São Luís, MA, 92.5% of the producers stated that they had never received any type of technical assistance or training offered by public agencies (Brandão *et al.*, 2022).

Technical assistance is directly related to the success of production, simple techniques implemented on these properties will enable improvements in animal productivity, reduce production costs and increase yield, providing improvements in the quality of life of these producers. Despite the little importance given by producers, lack technical assistance can be the real obstacle to the development of goat and sheep farming in Chapadinha, MA.

With the intention to once again record the producers' perception regarding the limiting factors for goat and sheep farming, they were asked which components of the production system would be prioritized if they had access to financial resources. Animal feeding was cited as the main component, followed by the acquisition of animals and installations (Figure 3).

Figure 3. Components that would be prioritized by goat and sheep producers in Chapadinha, MA, with the obtaining of financial resources

Figura 3. Componentes que seriam priorizados pelos produtores de caprinos e ovinos de Chapadinha, MA, com a obtenção de recursos financeiros



Food was mentioned as a priority factor, reinforcing the relevance of this item for the performance of the activity and its relationship with economic problems, since food is the most expensive item in the production cycle. The interest in acquiring more animals reveals that these producers have growth prospects, but they have a distorted perception regarding the factors determining the development of the activity, where the main problem is not the size of the herd but rather its productivity, which could be improved. with the adoption of technologies, an item that received little importance (Figure 3).

None of the producers interviewed have goat and sheep farming as their main source of income, configuring this activity only as a complementary source of income for families, as was also observed by Brandão *et al.* (2022) and Castro *et al.* (2022) on São Luís Island. The producers' income comes mainly from the set of agricultural activities combined with some public benefit (44%). Free-range poultry farming is predominant on 88% of properties, but is not practiced as an economic activity. Other activities such as pig farming, agriculture, cattle farming and fish farming, in increasing order of representation, are also developed, composing the income of these families, as can be seen in table 3.

Table 3. Sources of income for producers and other economic activities involved in goat and sheep properties in Chapadinha, MA**Tabela 3.** Fontes de renda dos produtores e outras atividades econômicas desenvolvidas nas propriedades de caprinos e ovinos de Chapadinha, MA

Sources of income	%
Agricultural activities combined and public benefit	44
Permanent job	20
Retirement or other public benefit	12
Agricultural activities combined	12
Agricultural activities combined and Permanent job	4
Other	8
Exclusive to goats and sheep	0
Other economic activities	%
Free-range poultry farming	88
Pig farming	68
Agriculture	56
Cattle farming	40
Fish farming	24

The administration of goat and sheep properties in Chapadinha-MA is carried out mainly by producers (80%), the other properties (20%) are managed by their children or employees, as can be seen in table 4. The administrators, for the most part, have a lower level of education than is required for their role. 40% of the producers interviewed claim to take notes for production control (Table 4), however, they find it difficult to answer basic questions related to the production cost of the activity, so it can be assumed that the administration of these properties is carried out in an inefficient way.

Similar characteristics were also observed by Silva *et al.* (2021), On sheep farms in the municipality of Quixeramobim, Ceará, most of the producers interviewed did not use notes as administrative control techniques. The lack of interest in recording data is related to the difficulty these producers have in understanding the importance of notes as a general management tool (Riet-Correa *et al.*, 2013). Rural administration can be used to identify the main bottlenecks within the production system and assist producers in making strategic decisions for their business (Naves & Costa, 2021).

Table 4. Administrative characteristics of goat and sheep properties in Chapadinha, MA**Tabela 4.** Características administrativas das propriedades de caprinos e ovinos de Chapadinha, MA

Property Administration	%
Owner	88
Children	8
Employees	4
Administrator Education	%
Incomplete elementary school	40
Complete elementary school	8
Complete high school	44
Technical level	4
Higher level	4
Control Notes	%
Yes	40
Not	60

The personal profile of producers indicated that 56% of them are between 31 and 60 years old and 36% are over 61 years old (Table 5). According to Andrade *et al.* (2020), since older producers

tend to be more resistant to change, which makes the adoption of new techniques difficult. In the present study, it was observed that younger producers are more concerned with administrative issues and are always looking for innovations, despite financial limitations.

Table 5. Personal and professional profile of goat and sheep producers in Chapadinha, MA

Tabela 5. Perfil pessoal e profissional dos produtores de caprinos e ovinos de Chapadinha, MA

Age	%
Up to 30 years	8
31 to 60 years	56
Over 61 years	36
Marital status	%
Married	68
Single	28
Widower	4
Level of education	%
Incomplete elementary school	36
Complete elementary school	8
Complete high school	40
Technical level	4
Higher level	12
Time of experience with the activity	%
Up to 5 years	12
6 to 10 years	16
10 to 20 years	24
Over 20 Years	48

The majority of producers were married (68%) and had levels of education ranging from incomplete elementary school to higher education (Table 5). All producers interviewed knew at least how to read, 40% of them had completed secondary education, 36% had incomplete primary education and 12% had higher education, however, none had training in agricultural sciences. These results allow us to confirm that goat farming in Chapadinha, MA has a relatively good perspective in relation to education, which can facilitate the adoption of new technologies.

Regarding the time of experience with the activity, 48% of producers are over 20 years old and 12% are less than 5 years old, data that is related to the age of producers (Table 5), indicating that goat and sheep farming is a traditional activity. For Farias *et al.* (2014) the time spent with an activity reflects its tradition and development. This aspect also influences the technological level of the activity, older/more experienced producers tend to be more resistant to adopting technologies and, consequently, changes in the production system (Andrade *et al.*, 2020).

According to the data in table 6, it can be seen that 44% of the producers did not live on the property and the distance to the property, in the majority, was between 6.8 and 12.4 Kilometers. Visits to properties were generally daily (27.27%), weekly (36.37%) or, to a lesser extent, twice a week and every 15 days (18.18%), lasting up to 6 hours (36.37%) or more than 12 hours (45.45%).

The producer's place of residence has a great influence on the performance of rural activities, as it has a direct connection with the time dedicated to the business. The shorter the distance between the producer's residence and the farm, the greater the time dedicated to it, which facilitates the identification and resolution of problems, contributing to better administration.

Table 6. Place of residence, distance from the city to the property, frequency and duration of visits to goat and sheep properties in Chapadinha, MA**Tabela 6.** Local de residência, distância da cidade até a propriedade, frequência e duração das visitas às propriedades de caprinos e ovinos de Chapadinha, MA

Place of residence	%
Lives on the property	56
Lives in the city	44
Distance from the city to the property	%
Up to 10 km	27,27
11 to 20 km	45,46
21 to 30 km	27,27
Visits to properties	%
Daily	27,27
Weekly	36,37
Twice a week	18,18
Every 15 days	18,18
Duration of visits	%
Up to 6 hours	36,37
6 to 12 hours	18,18
More than 12 hours	45,45

Even though they do not understand the real limiting factors for goat and sheep farming in the municipality, the majority of producers interviewed stated their interest in participating in technical-educational events, mainly focused on issues of health management, food conservation and care of offspring. According to them, its biggest failures are concentrated in these areas.

4. Final Considerations

The absence of food preservation techniques, combined with the lack of technical assistance, inadequate management and the little time dedicated by producers to the activity, limit the economic growth of goat and sheep farming in Chapadinha, Maranhão, Brazil.

The implementation of public policies for financial support and technical monitoring, associated with constant research into alternatives, especially food, that are economically viable and adapted to individual conditions, as well as the managerial training of producers, are alternatives to stimulate and provide improvements in this sector.

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