



## Management practices of goats (*Capra hircus*) in Catarman, Camiguin, Philippines

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### Abstract

Goat farming is one of the sources of livelihood in Catarman, Camiguin. However, the management practices of goat farming need to be evaluated. Hence, this study aimed to assess the feeding, housing, and health management practices of goats in the municipality of Catarman. A total of 121 farmers were interviewed utilizing a structured questionnaire in the fourteen (14) barangays of Catarman, Camiguin. Descriptive statistics (frequency count, percentage distribution, ranking were used to analyze the data. Results showed that more than 50% were aged 36-55 years, majority were male (80 or 66.12%), mostly had reached secondary level (72 or 59.51%) and 104 or 85.95% were dependent in farming with an average of 1-5 heads of goats. Out of the 564 goat population, mostly were female kids (117 or 20.74%), and almost half (44.32%) were native breeds. The housing facilities were mainly made of bamboo slats, 49 (40.50%). Tethering, 88 (72.73%) through rotational grazing was the common practice with native species of grasses and considered a problem by 114 (94.21%) farmers. Health management of goats showed 44 (36.36%) farmers practiced deworming, 19 (15.70%) applied vaccines, 20 (16.53%) managed to supplement vitamins, 16 (13.22%) provided antibiotics and 22 (18.88%) with no supplementation and disease control. Based on the findings of the study, goat raisers in Catarman, Camiguin, need appropriate training with greater emphasis on the feeding, housing and health management in an effort to enhance their knowledge and skills on these farm management practices.

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## Introduction

Goat farming is a popular enterprise (Barcelo *et al.*, 2016) and profitable business in the Philippines. The total goat inventory as of September 30, 2023 was estimated at 3.86 million heads with Central Visayas having the highest goat population of 627.68 thousand heads and Northern Mindanao recorded with having 239.26 thousand heads of goats. Records showed that goats rank the highest in population that cattle with 2.59 million heads in the same year and sheep farming with 381,000 recorded in 2021.

Goat or *Capra hircus* is very popular with every Filipino because they are a potential source of proteins like meat and milk (Watkins *et al.*, 2021; Ripoll *et al.*, 2020). In Camiguin, goat farming is considered suitable and a feasible enterprise. The farmers in the province recognized goat raising as a low-maintenance and profitable farming venture. In coconut grooves, the goats will be especially valuable because they keep the brush down without destroying the main crop, and their manure makes the soil rich. Batubara *et al.* (2021) have shown that solid and liquid goat manures have great potential as a source of organic fertilizer. Farmers in the province can quickly raise goats; it only requires a small capital to start the project. However, it was observed that the management practices of goat raisers need to be evaluated to determine whether these farmers observe the appropriate feeding and health management practices for efficient production.

The secret of successful feeding is the formulation of cheap and efficient ration. However, there are factors to be considered like the bulk, palatability, availability, price, digestibility, and nutritive quality of the feeds. In the case of goats, they are believed to be very sensitive with peculiar feeding habits (Sabapara *et al.*, 2010). They have eating habits as selective to their food intake (Caillat *et al.*, 2016). For this reason, it is advisable to feed them in hay racks or hang the feed in bundles or on a branch of a tree (Singh *et al.*, 2021). Though, goats are very choosy and sensitive, they can quickly adapt to almost any climate and any management practices (Zucali *et al.*,

2020), can tolerate spare forage, and manage to survive on vegetation unpalatable to other ruminants. Goats eat a diet that includes leaves of trees and shrubs; guaranteeing a constant food supply any time of the year (Hedge, 2020; Pahl, 2019; Silanikove, 2000). The study of Simoes *et al.* (2021) has revealed that nutrition represents a high cost for flocks and significantly affects their health, the quality of their products, and their environmental impact.

Nutrition is the most limiting factor for goats in India to fulfil their genetic potential (Valentine *et al.*, 2020). In contrast, health management aims to control or eradicate economic and zoonotic diseases, ensuring animal health and welfare, food safety, and low ecosystem and environmental impacts concerning chemical residues and pathogen circulation (Simoes *et al.*, 2021). However, it has been noted that problems in nutrition and diseases are still prevalent in many small ruminants, which significantly affect their production. Argüello (2011) showed that in developing countries, modern nutrition is the basis for improving goat production. Mohammed *et al.* (2017) have shown that feed shortage, predators, and disease were the main goat production constraints. Angassa and Berhan (2015) demonstrated that diseases of small ruminants were the first-ranked production constraints of small ruminants, followed by feed shortage and water scarcity in Southern Ethiopia. Hernandez *et al.* (2019) also confirmed the risks posed by disease introduction and spread. It is believed to be more significant for backyard producers than commercial producers. The possible reason for this concept is backyard raisers do not implement proper animal health management practices and are not part of traditional livestock communication networks (Hernandez *et al.*, 2019).

Marius *et al.* (2021) have mentioned that diseases and parasites are one of the challenges in goat production. Furthermore, small ruminants are highly affected by feed shortage, disease and parasites, water shortage, management, high predatory, and market instability. According to the study of Intong *et al.* (2018) on the goat farm performance in

Northern Mindanao, Philippines that diarrhea and coughing were very common diseases of goats in wet season. Diarrhea in goats maybe associated with parasitism (Rupa *et al.*, 2016; Alhaji Bukar *et al.*, 2023), bacterial disease and sometimes due to food poisoning (Sandariya *et al.*, 2023). These symptoms of diseases were also common problems encountered by farmers in Camiguin. As to the breeding practices, inbreeding and crossbreeding were employed by farmers. However, farmers have insufficient skills in detecting estrus in goats that results to low productivity. Jesuyon *et al.* (2023) reported that farmers with inadequate skills and not equipped to carry out technical breeding and management techniques failed to achieve high productivity and improvement in goats.

In Camiguin, goat farming is one of the sources of livelihood for farmers. However, the management practices of goats by the farmers in this municipality were not yet evaluated. The proper feeding and nutrition, housing, and disease prevention and control are essentials for the health and productivity of the animal. Hence, this research study was conducted to evaluate the management practices of goats in the municipality of Catarman, Camiguin, and specifically, determined the demographic profile of goat farmers, and the feeding, housing, and health management practices they provided for their goats.

## Materials and methods

### Study area

Fig. 1 shows the fourteen (14) barangays of Catarman, Camiguin where the study in the assessment of the management practices of goats was conducted. Camiguin is one of the provinces of the Philippines. Goat farmers from the different barangays of Catarman, Camiguin were the study's respondents.

The Municipality of Catarman is a 5th class municipality in the province of Camiguin, Philippines. The town got its name from the Cebuano word "katadman" which means point or cape. Catarman is politically subdivided into 14 barangays, namely; Alga, Bonbon, Bura, Catibac, Compol,

Lawigan, Liloan, Looc, Mainit, Manduao, Panghiawan, Poblacion, Santo Niño and Tangaro. Each barangay consists of puroks while some have sitios.



**Fig. 1.** The fourteen (14) barangays of Catarman, Camiguin

### Validation of questionnaire and data collection

The questionnaire was prepared by the authors themselves and validated by the three (3) experts before it was utilized in the study. The validation process of the questionnaire by the experts was based on the clarity, suitability and appropriateness of the items and whether it answered the purpose of the study or had captured the topic upon investigation. As to the overall validation, there are items that were deleted, revised and added. Pilot testing of fifteen (15) farmers in Mainit, Catarman, Camiguin was accomplished first before the conduct of full survey in the different barangays. Results of pilot testing showed the response patterns of the farmers; hence, enhancement of the questionnaire was done for convenience in the collection of the data.

Data collection was facilitated and accomplished after obtaining the list of goat farmers from the Municipal Agriculture Office of Catarman, Camiguin. The data gathered were focused on the demographic profile, and the specific feeding and health management practices employed by goat farmers. Most of the farmer respondents interviewed were backyard goat raisers. These farmers commonly feed their goats with a variety of grasses found and grown in the locality and are maintained with very minimal

operating expenses. There were 121 goat farmers personally interviewed using the structured questionnaire as the primary research instrument of the study. The information obtained from the farmers was those deemed necessary and relevant to the study including the sex of the farmer, age, address, civil status, educational attainment, source of income, number of goats, breed and category of goats, housing facilities, feeding management and nutrition and health management and disease control in goats. The responses of the respondents were treated confidential and secured properly in compliance with RA 10173 (Data Privacy Act of 2012).

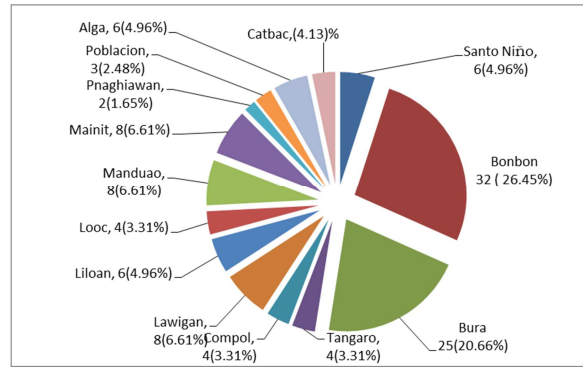
**Data analysis**

The data gathered were focused on the demographic profile, and the specific feeding and health management practices employed by goat farmers. The information gathered was analyzed through the Statistical Package for Social Sciences (SPSS) software. Descriptive statistics such as frequency count, percentage distribution, and ranking were used to measure the responses of respondents to the study.

**Results and discussion**

**Demographic distribution**

There were 121 total respondents of the study in the different barangays of Catarman, Camiguin, as shown in Fig. 2, with Bonbon comprising the highest number of 32 or 26.45% and Panghiawan with the lowest number of 2 or 1.65% of the respondents. Most of the goat farmers were backyard raisers and there were only three (3) farms noted as being registered in the Municipality of Catarman. But mostly were recognized by the Department of Agriculture in Catarman, Camiguin. Goats in the different barangays were allowed to graze wherever there is abundance of grasses in the area. It was noticed that goats were allowed to graze by most farmers ranging from 20-40 square feet and sometimes increased when there is enough area for grazing. According to Priddy (2017) that each goat requires 30-50 square feet for grazing but depending on the factors such as the number of goats, type of vegetation, climatic condition and management system.



**Fig. 2.** Demographic distribution of goat raisers in the different barangays of Catarman, Camiguin

**Demographic information of goat raisers**

The study showed that more than 50% of the goat farmers were aged 36-55 years old and only 2.5% were below 20 years of age as presented in Table 1. The majority of the farmers (66.12%) was male and married. Karjuki *et al.* (2022) have recently shown that men were perceived to exercise a greater variety of ownership rights compared to women. The study also of Cosadio *et al.* (2011) revealed that 93% of goat farmers in Claveria, Misamis Occidental were male and only 7% were female. Abd-Allah *et al.* (2019) also reported that most of the farmers were male in all villages of the Nile Delta in Egypt. Adekunmi *et al.* (2015) also revealed that 58.3% of the goat farmers in Southwest Nigeria were male.

**Table 1.** Category of goats in the fourteen (14) barangays of Catarman, Camiguin

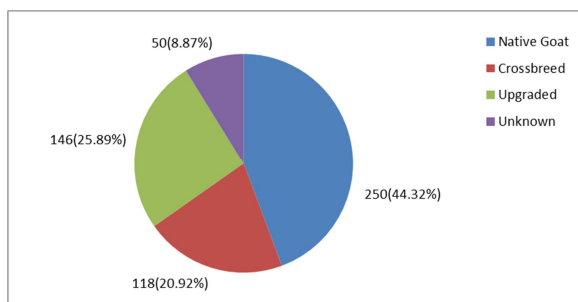
Category of goats	Total number	Percentage (%)
Male kids	113	20.04
Female kids	117	20.74
Doeling	102	18.09
Pregnant doe	43	7.62
Lactating doe	92	16.31
Dry doe	20	3.55
Buck	77	13.65
Total	564	100

As to the education of farmers, most of them (59.51%) had reached the secondary level of education, with 8.5% of them being college graduates. The study of Maputle (2012) showed that most respondents (30%) did not go to school, and some (27%) had received schooling till tertiary education. However, the study of Islam *et al.* (2018) revealed that most of the goat

farmers were having primary level of education. Economically, 90.5% of the goat farmers owned their houses, and 85.95% were dependent on farming. Other farmers have other sources of income from work and as entrepreneurs. Tongol *et al.* (2023) had emphasized that goat farmers are mostly dependent on farming and raised goats to augment their income along with agricultural crops. In the average number of goats, majority of the farmers raised 1-5 heads irrespective to goat categories with 113 (93.39%) out from the 121 respondents. The study of Tongol *et al.* (2023) showed that goat farmers raised 1-2 heads of goats that is contrary to the findings of Alcedo *et al.* 2013 that 7 mean heads of goats was raised by farmers.

*Category and breed of goats*

The goats raised by farmers were divided according to different categories as presented in Table 1. Out of the total number of 564 heads of goats, most were female kids, with 117 or 20.74%, and male kids, with 113 or 20.04%. In the population of goats recorded, many were not yet pregnant (doeling) with 102 or 18.09%, and others were still lactating with 92 or 16.31%. The buck goats were 77 or 13.65%, the pregnant does were 43 or 7.62%, and there are still 20 or 3.55% dry does that were fattened and intended for marketing.



**Fig. 3.** Breeds of goats raised by farmers in Catarman, Camiguin

Almost one-half of the total population of 564 goats raised by farmers in Catarman, Camiguin was native goats with 250 heads or 44.32% (Fig. 3). Other goats were upgraded with 148 heads or 25.89%, the crossbreeds were 118 heads or 20.92%, and 50 or

8.87% were of unknown breeds, as responded by farmers. The crossbreed goats were either breeding Anglonubian or Boer breeds of goats. The upgraded goats were products from native does and crossbreed buck. Alcedo *et al.* (2015) showed that the upgraded and native goats were the common breeds of goats raised by farmers in the Philippines. Bondoc *et al.* (2021) further emphasized that Philippine native goats predominated the goat population in the Philippines and were raised primarily for chevon production. Tongol *et al.* (2023) further reported that native goat was the common breeds raised by farmers in Negros Occidental, Philippines.

*Housing facilities*

The housing facilities for goats provided by the farmers can be divided four types as shown in Table 2. Out of the total respondents of 121 farmers, 62 or 51.23% did not provide shelter and preferred to tether their goats under coconut trees where various grasses are found.

**Table 2.** Housing facilities for goats in Catarman, Camiguin, Philippine

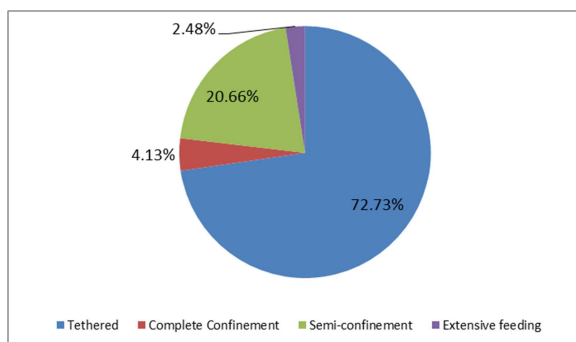
Housing facilities	NR (121)	%
<b>Housing type</b>		
Shed using bamboo slat	49	40.50
Shed using coco lumber	7	5.79
Concrete house, elevated, with partition	3	2.48
Tethered under the coconut tree	62	51.43
<b>Type of bedding</b>		
Rice straw	20	16.53
Wood shavings/Sawdust	2	1.65
Rice hulls	3	2.48
Empty sacks	5	4.13
None	91	75.21

NR= Number of Respondents, %= Percentage

Forty-nine (49 or 40.50%) respondents provided sheds using bamboo slats, other farmers used coco lumber, with 7 or 5.79% of respondents. However, there were still 3 or 2.48% of farmers who provided concrete houses that were elevated and with partitions. The farmers who provided standard housing for goats have the highest population of goats raised in the municipality. Results of the study conform to the findings of Tongol *et al.* (2023) that goats were commonly tethered on available pasture area.



As to the type of bedding used for goats, it was noticed that majority (91 or 75.21%) did not provide beddings to their goats. The goats were just tethered to a post near to their houses especially during night time and given shelter using bamboo slots but were not provided with comfortable bedding. That is why parasitism was predominant manifested with frequent diarrhea particularly in young goats. Almost 25% provided bedding to their goats but were replaced only whenever there are available materials, hence, bedding was irregularly provided by these farmers. The reason that scouring and symptoms of cold were the health problems encountered by these farmers. According to Alhaji Bukar *et al.* (2023), goat beddings play a vital role in the health and well-being of goats. If the bedding is not appropriately maintained, it can lead to the occurrence of various diseases and the cause of health problems (Fikru *et al.*, 2015). Tombarkiewics *et al.* (2009) further emphasized that proper housing and sanitation reduced incidence of diseases.



**Fig. 4.** Feeding management practices of goat raisers

#### *Feeding management and nutrition*

There were four types of feeding management practices for goats by the farmers in the Catarman, Camiguin, Philippines (Fig. 4) with most of respondents (88 or 72.73%) tethered their goats under coconut trees with abundant grasses. The practice of rotational grazing (Intong, 2018) was observed where farmers managed to transfer their goats from one area to another where abundant supplies of plant materials were available. Tudu *et al.* (2014) demonstrated that almost all the farmers used to graze their goats for feeding in West Bengal.

Other respondents 25 or 20.66% provided a semi-confinement method of feeding goats where they allowed grazing in open grasslands, typically with controlled grazing of fenced pasture.

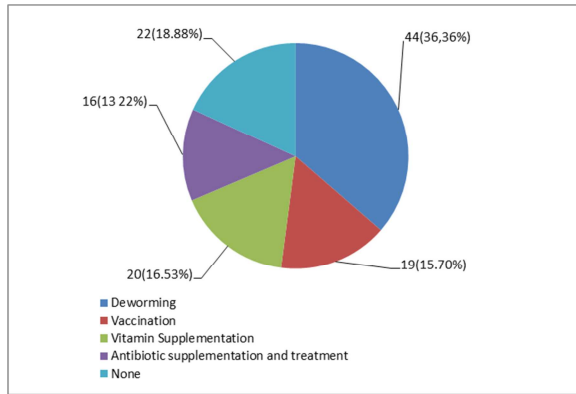
There were also 5 or 4.13 % of respondents who had provided a complete confinement method or zero grazing method of feeding goats. Farmers confined their goats in pens and fed them freshly harvested grasses (Intong, 2018). Only 3 or 2.48 % of the respondents allowed grazing goats in open grasslands with varieties of pastures.

Pasture quality fed to goats can be considered a problem by 114 or 94.21% out of 121 respondents. The pastures were readily available, but most of the species growing in the area were primarily native grasses. Only 7 or 5.79% of the farmers provided an improved pasture with mixed concentrate. These farmers practiced the cut and carry system of feeding their goats to ensure that feeds given to goats were of high quality or improved pasture.

Kebede (2020) indicated that most respondents kept their sheep and goat under free grazing and partly tethered management, respectively, during the dry and wet seasons. Systems of feeding depend mainly on the grazing habits of goats on native or natural pastures, and their output also depends on the grass/shrub present or produces (Valergakis, 2015).

#### *Health management and disease control*

The survey results in Fig. 5 showed that 44 or 36.36% of 121 respondents had provided dewormers as a preventive measure for parasites. Others had adopted the vaccination programs conducted by the Department of Agriculture, and Provincial Veterinary Office, with 19 or 15.70% of the respondents. Some farmers, with 20 or 16.53% of the respondents, managed to supplement vitamins to enhance the immunity of their goats from any possible disease outbreak. There were 16 or 13.22% of the respondents had supplemented and provided antibiotics when the disease was observed in goats they raised.



**Fig. 5.** Health management and disease control of goat raisers

There were 22 or 18.88% of the respondents had not given any forms of prevention and control of diseases in goats. They were not providing any means of increasing the resistance of goats against diseases, considering that most of the goats they raised were native breeds and believed that these animals were resistant to any disease occurrence. Health management practices can reduce incidence of goat diseases and reduce the need for medications. The study of Tamil *et al.* (2021) showed that more than half of goat farmers in the study area practiced deworming once in 3 months and Airs *et al.* (2023) findings revealed that goat farmers commonly administered anthelmintic to goats infested with internal parasites. However, in the study of Ouchene-khelifi *et al.* (2021) showed that only few goat farmers provided treatment and vaccination to their animals and Prank *et al.* (2023) reported that majority of the goat farmers did not provide vaccines to their goats.

### Conclusion

The availability of grasses in the locality can be an excellent opportunity for the goats to thrive, but most of the grasses were native species in quality. However, the abundance of grasses in the surroundings kept the goats well-fed resulting to reduced feed cost. But most of them did not strictly employ health management practices, and only a few were adopting programs for disease prevention and control. Goat farming is really a great opportunity for small farm raisers in Catarman,

Camiguin. Goats can survive due to the abundance of feed resources and easily adopt in any climatic conditions in Camiguin. But most goat raisers have overlooked the importance of health management and nutrition that are considered important factors in goat production. Appropriate intervention and strict implementation of the recent technologies in goat farming must be employed in order to succeed in the enterprise. Nutrition of goats can be enhanced through establishment of improved pasture that will be made available to goats. Good nutrition results to efficient production and subsequently increased income of farmers.

### Recommendations

The goat farmers need to be informed in the proper management practices of goats by providing them with sufficient training, so that they can have an effective and profitable production. The application of appropriate technologies on proper housing, pasture management to improve feed quality, feeding management and breed selection of goats with faster growth rate. The experts of the college and stakeholders such as the Department of Agriculture and Provincial Veterinary office may collaborate to conduct outreach programs to the goat farmers by educating them the best practices that can improve their production.

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