Backyard farming of Black Bengal goats at Upazilla Sadar in Rangpur, Bangladesh

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List of Abbreviations

SL No.	Abbreviation	Full Form
01	DLS	Department of Livestock Services
02	Tk	Taka
03	BBG	Black Bengal goat
04	Kg	Kilogram
05	NGO	Non-Government Organization
06	BBS	Bangladesh Bureau of Statistics
07	FAO	Food and Agriculture Organization
08	GDP	Gross Domestic Product
09	EXCEL	Experiential Curriculum for the Enhancement of Learning

Abstract

The Black Bengal goat is a yard-useful small ruminant that is a meat-type, early maturing, year-round breed of livestock in Bangladesh. The study was carried out to examine the productivity of Black Bengal goats and the livelihood produced by backyard goat. This study was done at five distinct villages, including Doctor para, Master para, Oviram, Gowalu, and Fokir para under Upazilla sadar in Rangpur district, Bangladesh, from May to June 2023. Data were gathered using a pre-structured questionnaire that asked questions on the type of breeding, breed, age, sex, and age at which the animals reached sexual maturity. The female goat pregnant twice a year. In proper care and management, they can produce more than two kids each time. The average body weight of male and female were 19.45 kg and 16.27 kg respectively. According to this study, the average age of puberty is 199.6 days. The range of lactation period was between 1.5 to 3.5 months. The average milk yield of Black Bengal goats was 40.5 kg per lactation per doe in which the average milk yield per day per doe was 0.6 kg. A few numbers of farmers (30%) used vaccination and practiced de-worming (80%) their goats. The semi-intensive technique was used to raise all of the goats, and 70% of them spend the night at the cow's residence. The farmers supply good bedding materials during the winter season. For 20 kg of body weight of a goat, farmers feeds 1-2 kg of green grass and 200–250 g of concentrate feed per day. It was found that the annual cost of raising a goat in our area averages Tk. 720. The main income source is the offspring, with an average annual return of Tk. 6220 (range: Tk. 5000-7000). After costs, the net annual income per goat is Tk. 5500, underscoring their financial significance. They also used deep tube wells to supply water. 70% of the farmers exclusively gave goats wheat bran as concentrate feed. Most farms maintained the housing, feeding, and breeding, but the healthcare was subpar. Disease outbreaks are both frequent and dangerous in goat rearing. As a result, it is crucial to make the right preparations to prevent certain goat diseases. Therefore, Black Bengal goat farming should play a significant role in lowering unemployment and poverty.

Keywords: Black Bengal goat, Backyard goat farm, Body weight, Rearing system, Reproductive performance, Goat breeds.

CHAPTER 1: Introduction

1.1. Background of the Study

In emerging nations in Asia, goats constitute a valuable source of animal genetic material. Goats are prized in Bangladesh for the meat and skin they produce. Farmers mostly cultivate goats as a species. There are 34.5 million goats in Bangladesh, and they produce 130,000 tons of goat meat, 1.31 million tons of goat milk, and 42,000 tons of fresh skin per year. With 169 million inhabitants crammed into a territory that is only 144750 square kilometers, Bangladesh is one of the poorest and most crowded countries in the world. The nation's per capita annual income is USD 2973, and its female population is roughly 49.47 percent (Economic Review, 2022). In Bangladesh, goats provide a respectable second-most amount of meat, milk, and skin, accounting for roughly 38.0%, 23.1%, and 28.0% of all livestock, respectively (FAO, 2010). The goat is frequently referred to as the "poor man's cow" because it is widely acknowledged as a sustainable resource for the underprivileged and because it was one of the first agricultural animals to have been closely associated to humans for a very long period. Due to the goat's long history of close ties to people, this is the case. Through the years, humans have come to value its production, size, and food quality (Aziz, 2010). Goats are a secondary source of revenue for poor farmers in Bangladesh. A significant portion of the family's income comes from goat farming in addition to business ventures (Sarker and Islam, 2011). Due to their significance to the economy, place in associated industries, and potential for exploitation, goats are categorized as a separate species in the livestock industry (Devendra, 1980). There were around 257,666,000 goats in the country in 2015, according to information provided by the Department of Livestock Services. According to the Department of animal Services (2015–2017), there are 257.66 lakh goats in Bangladesh, and they produce 61.52 lakh metric tons of the country's total animal meat. Herding goats is one of the primary sources of income for 36% of all agricultural households in Bangladesh, which contributes to the country's high poverty rate (45% of the population is estimated to be living below the poverty line). One of the most prevalent vocations in Bangladesh is goat husbandry (BBS, 2014). The situation looks to be radically changing right now as a result of the emergence of new agricultural techniques such as goat and poultry farming, family farming, crop and animal agriculture. It took a while for it to become obvious, and

discussions about development plans have only now brought it up. Rural women are increasingly being approached by a variety of governmental and non-governmental groups to provide credits and technical support services to boost their family's earnings and independence. On the other hand, it's critical to locate working areas so they may participate more actively in agricultural output. Increased goat productivity and marketing depend on appropriate intervention. To accomplish these aims, data on the current goat production and management system are needed (Assan, 2014; Kosgey *et al*., 2008). Goats are a very rich and promising animal resource both numerically and commercially in developing countries, especially those in Asia and Africa (Husain, 1993). Raising goats might increase gender equality and alleviate poverty. Poultry and small ruminants are economically significant for smallholder farmers. Due of the propensity of small ruminants' overall revenue share to be inversely related to the quantity of land holding, tiny ruminants are regarded to be particularly important for landless people. Raising this animal would act as a secondary occupation that provides year-round labor and income because agriculture only gives transitory occupations. A medium-sized goat donated to a farm family in need has shown to be easily self-sufficient through a mix of grazing and cut-and-carry feeding techniques. It is a crucial part of many farming practices in Bangladesh. One of Bangladesh's most significant livestock species is said to be the Black Bengal Goat. It is a sizable source of income for individuals who are underprivileged. Typically, struggling moms and underprivileged farmers raise goats with very little financial investment. A vital part of Bangladesh's diversified agricultural system, which generates around 2.90% of the nation's GDP (FAO, 2010), is livestock. One important and accessible source of income is the raising of cattle. Goats are one of the livestock species that has expanded in scope. In developing countries like Bangladesh, agriculture has emerged as an important sector for generating revenue, providing employment, decreasing poverty, producing food, enhancing nutrition, and promoting socioeconomic development for rural poor, weak women, and young people without work. Additionally, it contains three crucial environmental factors. Goats are an extremely important and promising animal resource in developing nations, notably in Asia and Africa (Husain, 1993). They are both a large and profitable animal resource. Goats are emphasized for their significant contributions of products like meat and milk, as well as raw materials for industries like skin and dung. They are also highlighted for their societal significance in terms of providing security through economic growth and human sustenance (Devendra, 1992;

Husain *et al*., 1998). It's probable that the goat is the only animal raised for meat, skins, milk, and excrement simultaneously in Bangladesh. It offers additional money to the farmers who are frequently found in Bangladesh and is one of the few sources of income for those farmers who are struggling with poverty. It is a significant source of protein, and businesses centered around goats may occasionally act as a steady fund to help farmers get through unanticipated difficulties that need for quick funding. It is evident that the goat industry has developed, becoming an essential sector for generating income, creating jobs, reducing poverty, producing food, ensuring nutrition, fostering socioeconomic development for Bangladesh's rural poor, vulnerable women, and unemployed youth, as well as having significant environmental benefits. Most of the goat population in rural areas is maintained with almost "zero input-no maintenance" expenditures and a tiny space with little overhead. Goat purchases cost less up front than cow purchases. Thus, goat farming is a straightforward process for small-scale and landless farmers. 5 Because goats contribute to both the rural economy and the nation's economy as a whole, the government of Bangladesh has put a lot of attention on raising goat production locally. In order to combat poverty through goat farming, the Department of Livestock Services (DLS) sponsored a program in the 1990s. From 1990 to 2005, 9283 distressed families got a total of 262.11 in loans. With the intention of meeting the Millennium Development Goals (MDGs), the government of Bangladesh has, since 2003, placed a particular emphasis on and has been actively implementing a national program on Black Bengal Goats for Poor Farmers (Kader, 2006).

1.2. Justification of the Study

Cattle are essential to the agriculture industry and significantly increase our GDP. Over the past few decades, the country's GDP has expanded by about 5% despite persistent poverty, overpopulation, unemployment, and low literacy rates. Bangladesh continues to make money from raising domestic cattle in subtropical climates. Additionally, it is employed as a tactic to lessen poverty. Numerous livelihood improvement programs based on livestock farming have been undertaken by government organizations and NGOs. Selecting farmers based on their highest capability to run a small farm is crucial to ensuring the long-term profitability of small-scale animal farms. The manageable herd size for each species raised on a family farm must be established. Profitability is a need for producing animals. Understanding the best farm management techniques is a need for profitability. For small farms, there are resources for early funding, but there

are also restrictions. Take into account the accessibility of land, labor, and operating capital. We must optimize farm size based on the resources and constraints available in order to maximize profit and serve as a strategy for reducing poverty among Bangladesh's moderately and severely disadvantaged rural communities. Therefore, it is important to understand the manageability and profitability of small-scale semi-scavenging goat farming in distant areas in order to fully appreciate the importance of the current study. The current study was developed to address the aforementioned problematic circumstance because there haven't been many studies of this sort on goat husbandry in this country.

1.3. Objectives of the Study

The primary objective of the research is to determine the optimal herd size for goat rearing

farmers in a few selected regions. Specific objectives of the research are:

a. To evaluate the importance of goat farming in Bangladesh's agricultural landscape, considering its contribution to the country's GDP and its role in poverty alleviation and economic development.
b. To understand the socioeconomic impact of goat farming in rural Bangladesh, including its potential to empower women and provide year-round labor and income for landless people.
c. To investigate how goat farming, especially among struggling mothers and underprivileged farmers, contributes to livelihood improvement and serves as a significant source of income for these groups.

CHAPTER 2: Review of literature

The most potential industry for tackling the problems encountered by landless, small-scale, and marginal farmers and contributing in the eradication of poverty is livestock (BBS, 2007). Increased economic, environmental, and genetic variety on a farm can boost the farm's sustainability (Luginbuhl *et al*., 1996). Goats can be added to existing sheep and cow grazing systems. Research was done to correlate the severity of issues faced by farmers to the stated features of the farmers in order to comprehend the difficulties farmers encountered when rearing Black Bengal Goats in two upazilla in the Faridpur district. According to research, people who produce Black Bengal goats have the largest rate of high difficulties (60%) compared to those who raise medium problems (25%) and low problems (15%) (H. Kober, 2005). Because they lack the wherewithal to maintain the animals in separate quarters, poor marginal farmers continue to keep the majority of the goat population. Because of this, goats are frequently kept outside all day. At night, they are often kept in the owner's living room (64% of the time). According to studies, just 15% of farmers provided separate shelter for their goats. According to Devendra and Burns (1983) and Smith and Sherman (1994), goat housing was not properly ventilated, cleaned often, or designed with pregnant or nursing animals in mind. The main causes of infant mortality in the 0-3 months age group were malnutrition (8.33%), increasing predators (13.88%), mechanical (5.5%), and others (11.11%), while infectious causes like pneumonia, diarrhea, enterotoxaemia, and ecthyma were responsible for 25%, 16.6%, 13.88%, and 5.55% of all infant deaths, respectively (Ershaduzzaman *et al*., 2007). Enterotoxemia was most likely the main cause of mortality for adult goats (>1 year of age) during the dry season (October to March), when there was a paucity of green grass in the grazing grounds and female goats died much more frequently than male goats. When male goats died noticeably more frequently than female goats, the same thing happened. The bulk of deaths in growing goats between the ages of three and twelve months were caused by pneumonia and diarrhea, with a mortality rate of around 22%. Low birth weight had an effect on the observed child mortality, and death rates were highest (almost 40%) during the hot and rainy season (July to October) (Ershaduzzaman *et al*.,8 2007). Sayeed *et al*. (2005) found that treatment of diseased goats had no effect ($p>0.05$), despite the fact that the causes of goat deaths varied greatly depending on the kind of

farm. Hemorrhagic septicemia (HS), Peste des Petits Ruminants (PPR), goat pox, blot/tympany, parasitic diseases, and malnutrition were the main problems for the goat. Goats had a morbidity rate of 24% and a mortality rate of 11%, respectively. The majority of fatalities (86%) were caused by Pestedes Petits Ruminants (PPR). Each ill goat received medication for Tk. 46. Goat fatalities cost each afflicted farm and all farms a total of 881.00 and 338.00 in lost revenue, respectively. Goats in rural areas have had a number of cases of dermatophytosis, demodicosis, psoroptosis, sarcoptosis, chorioptosis, trobiculidosis, tick infestation, and pediculosis. Donkin and Boyazoglu (2004) found that the mean annual goat newborn mortality rate during a three-year period was 29%. Breed, gender, or numerous births did not seem to make a difference. The two most prevalent illnesses that led to goat kid deaths were coccidiosis and pneumonia. Enterotoxemia was the primary cause of death in adult goats, according to Chowdhury *et al*. On the other hand, infectious diseases like pneumonia and diarrhoea caused the demise of every baby goat. The study's findings showed that pneumonia ranked first among the causes of child fatalities (42.39%), followed by diarrhea (32.61%), ecthyma (20.65%), and bloat (4.34%). This increased death rate in semi-intensive raising systems was most likely caused by the animals being under more stress. Animals demonstrated a greater incidence of disease and death rate as a direct result of this elevated stress. In the current production system, Husain *et al*. (1995) discovered that low birth weight, insufficient milk supply of does just after kidding, incorrect treatment, and overall bad husbandry methods all contributed to higher baby mortality. When allowed free range and a wide variety of feed, goats were mainly immune to semi-poisonous plants, according to David Mackenzie's 1995 research. But eventually, food supplies run low or a gate is left unsecured. According to a research by Saadullah (1991), very few farmers give sheep and goats separate homes. The homestead's open yard, kitchen, cow barn, hallway, and verandah are where they are kept. Research indicates that the remaining sheep are kept indoors, while 47% of goats are housed in an open shed, 30% in the cow shed. When Sriram *et al*. (1982) looked into goat mortality in Andhra Pradesh, they discovered that pneumonia and enteritis were the main killers. In Bangladesh, the poor still favor goats as a farm animal. Despite several limitations, there are large differences in farm size. To yet, no study has been conducted in the field. Yasmin *et al*.'s study on the effects of microcredit for poverty reduction through goat husbandry in Narchar, Bangladesh, discovered that goat populations grew by 24.21% while chicken, duck, and cow populations declined by

69.68%, 31.09%, and 11.38%, respectively. She also noted that more people were using electricity, milk, eggs, meat, and fish at home. She suggested expanding goat farming finance alternatives to fight rural poverty. Due to goats' vigorous reproduction instincts, twins or triplets are frequently born during kidding. Goat milk cheese is renowned for being of the highest caliber worldwide. The skin of the Black Bengal Goat is very unique across the world (Banerjee, 1980). In 1996, Das conducted a socioeconomic study on the Black Bengal Goat on 50 randomly selected farms in the Bangladeshi district of Mymensingh. He discovered that each household's annual total cost of producing BBG was Tk 246.20, while its gross return and net return were Tk 880.00 and Tk 633.80, respectively. The results showed that net returns were highest for small farms (Tk. 753.53 per farm) and lowest for large farms (Tk. 166.43 per farm). The author also suggested financial loans, agricultural extension, farmer training, goat production, and marketing facilities as forms of support services. At birth, boys typically weighed 1.14 kg more than females (1.06 kg). In the first, second, and third parties, the total litter size produced was 1.22, 1.79, and 2.03 correspondingly. First, second, and third parity live weights at kidding were 15.41, 18.43, and 19.99 kg, respectively. With the parity, child mortality dropped from 22.2 to 8.16%. The third parity of Black Bengal Goats performed more productively and reproductively than the first and second parties.

CHAPTER 3: Materials and Methods

3.1. Study Area

The study was carried out in the Doctor Para, Master Para, Oviram, Gowalu, and Fokir Para upazillas of Rangpur district of Bangladesh. The district of Rangpur is located in latitude 25°7' and longitude 89°27'. The choice to choose the research location was made in large part because of the preponderance of goat farmers in the area. This criterion was chosen as the top choice because goat farming is a significant agricultural activity in the region and because it contributes significantly to the socioeconomic growth of the neighborhood. It was thus concluded that the area under investigation was suitable for the study of goat farming methods and the consequences such methods have on the economy and environment of the region. Using pre-designed questions and a direct random survey approach, the data was gathered. The months of May and June 2023 were used for this poll. Information on total goat populations, breeding practices, feed varieties, and feeding methods were all included in the questionnaire. Numerous production and reproductive data, including information on the mating system, grazing, age, sex, breed, number of goats, body weight, lactation time, milk supply, and production performance, were collected using questionnaires. Some additional information about family member participation in goat rearing, purposes of goat raising were also collected. The information collected was compiled in Microsoft Excel.

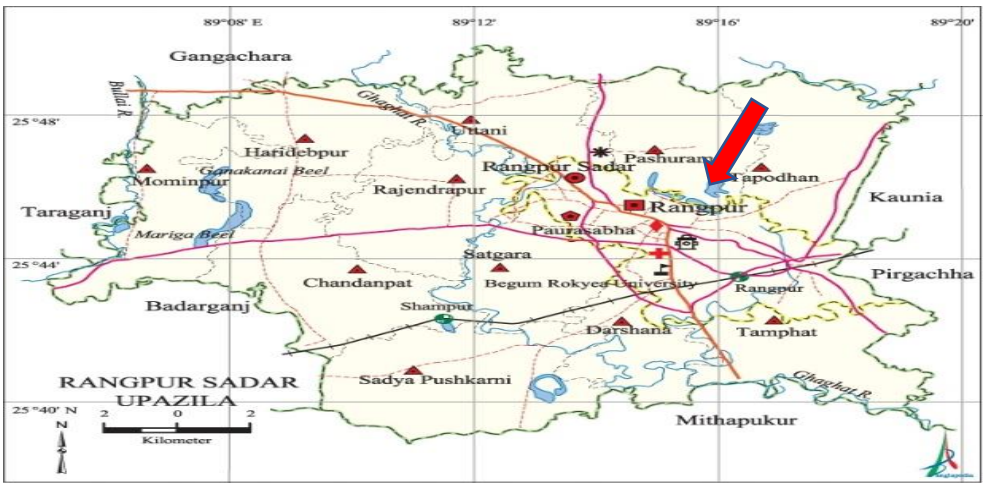

Figure 3.1. Rangpur Sadar Upazilla.

CHAPTER 4: Result and Discussion

4.1. Bodyweight:

The average body weights of male and female goats are presented in Table 4.1. Males and females had average body weights of 19.45 kg and 16.27 kg, respectively, between the ages of 15 days and 6 months (Figure 4.1.). Male and female average body weights between 7 and 12 months of age were 16.20 kg and 13.5 kg, respectively (Table 4.1.). The average male body weight was 19.45 kg, while the average female body weight was 16.27 kg. This outcome is almost comparable to that of (Jalil, 2014), who stated that the average live weight was 9.63kg. However, the outcome is less favorable than that reported by Chowdhury *et al*. (2002), who noted that the average mature body weight of male and female goats was 29.91.76 and 23.60.81 kg, respectively.

Table 4.1. Relation between Age and body weight of Black Bengal goat.

Age(months)	**Average body weight of male(kg)**	**Average body weight of Female(kg)**
0-6	13.50	10.2
7-12	16.20	13.5
13-24	19.7	16.9
Above 25	28.4	24.5
Average	19.45	16.27

This discrepancy may be due to poor rearing management. Because most of them are sold for meat at a particular age, and the females are retained for breeding for a long period, the males have lower body weights than the females. The goat's age (months) and body weight (kg) were substantially correlated (P 0.001). The correlation between them was favorable (R= 0.59).

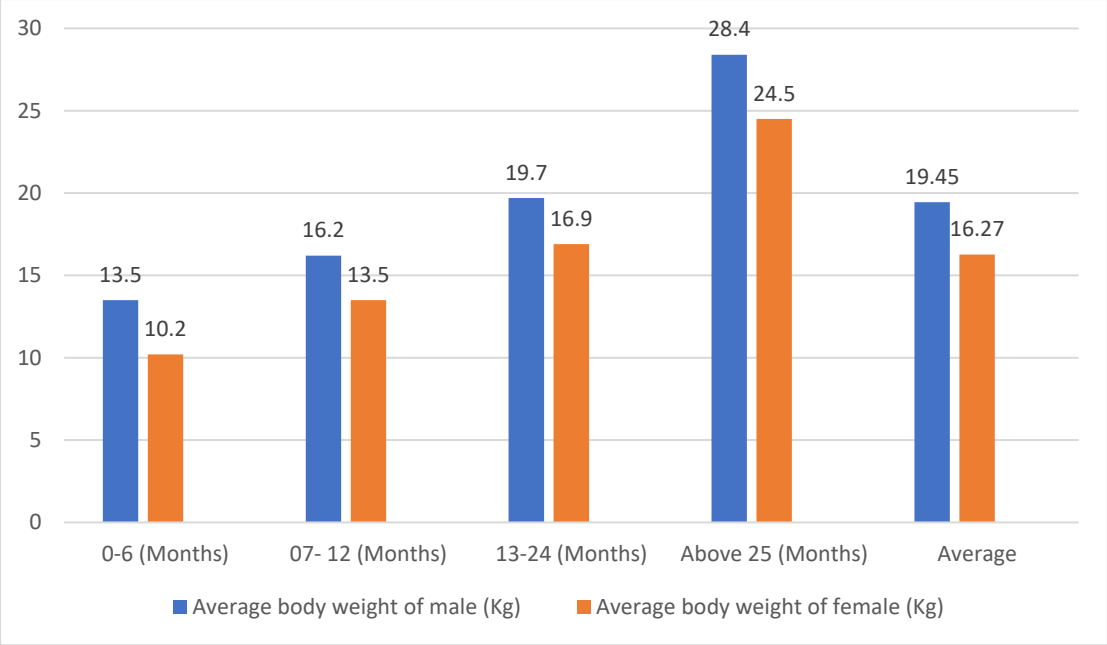

Figure 4.1. Relation between Age and body weight of Black Bengal goat.

4.2. Housing System of the goat:

Although (Hossain *et al*., 2015) indicated that few goat farmers kept their goats in a free-range and intense system, farmers at research locations raised their goats in the semi-intensive system (Table 2). The majority of farmers housed their goats at cows' homes. However, the majority of farmers (90%) gave their goats bedding throughout the winter. The majority of farmers bathed their goats in the summer, whereas the majority of farmers did not bathe their goats in the winter.

Table 4.2. Housing of Black Bengal goat

Parameter	Category	Number of goats	percentage
Rearing system	confinement	5	12.5
	Semi-intensive	35	87.5
Night shelter	Goat's house	5	12.5
	Cow's house	25	62.5
	Farmer's living room	10	25
Provide bedding material during the winter season	Yes	36	90
	No	4	10

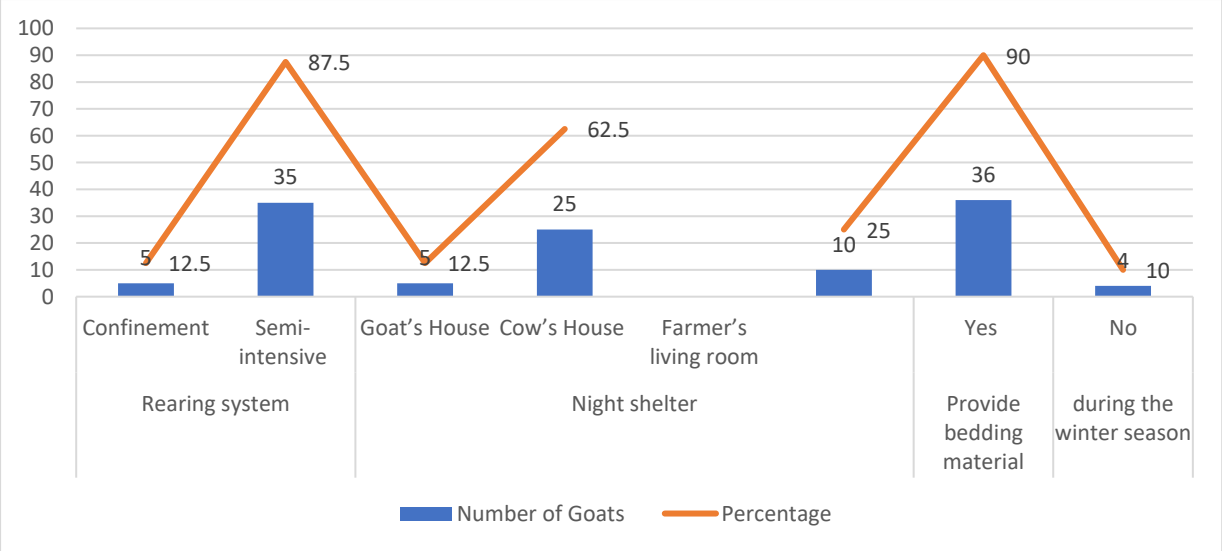

Figure 4.2. Rearing system, Night shelter, Provide bedding Materials of Black Bengal goats.

4.3. Litter size

In Black Bengal does, the typical litter size was 2.36. (Amin, 2000) revealed that the average litter size for randomly chosen BBG goats was 1.68 and for the selected BBG goats was 1.96; however, the average litter size for Generation 1 (G1) and Generation 2 (G2) was 2.15 and 2.18, respectively. This is virtually identical to the study's findings. (Jalil, 2014) said that the average Black Bengal goat litter size was 1.75 0.03; this is also less than what was seen in this study. In Black Bengal goats, a typical litter size ranges from one to four young. Black Bengal goat litter sizes varied from 1 to 4.

According to Chowdhury *et al*. (2001), the BBG goat's litter size varied from one to three, which is virtually identical to the study's findings.

4.4. Feeding management

One of the most crucial aspects of goat rearing is the control of feed. The cost of feed is the most expensive of all the production expenses. On the other hand, effective food control is necessary for appropriate physiology. Grass is the primary food source for goats. On average, most farmers gave 250–300 g of concentrated feed. Several feed additives (vitamins, minerals) were offered by some goat producers (32.6%). Water for drinking was obtained from a deep tube well. This outcome matched that of Islam *et al*. (2018).

4.5. Age at puberty

The average age at the first sign of heat of Black Bengal goats were 192.2±7.5 days (Hassan *et al*., 2007). According to this study, the average age of puberty is 199.6 days. This result was in agreement with the result of Hassan *et al*. (2007).

4.6. Lactation period

The average lactation period for Black Bengal goats was 78.7 ± 7.5 days. In this study, the average milk feeding time was 64.4 days. This result is similar to that of Shill *et al.* (2003).

4.7. Milk production

The average milk yield of Black Bengal goats was 40.5 kg during lactation per goat. The average daily milk yield and goat was 0.6 kg. Total milk yields in goats range from 0.240 to 1.73 kg and have been reported (Dhara *et al*., 2012).

4.8. Vaccination and de-worming

A few numbers of farmers (25%) used vaccination and practiced de-worming (65%) their goats in the study area and this result higher than the result found by (Islam *et al*., 2016) due to more awareness of farmers.

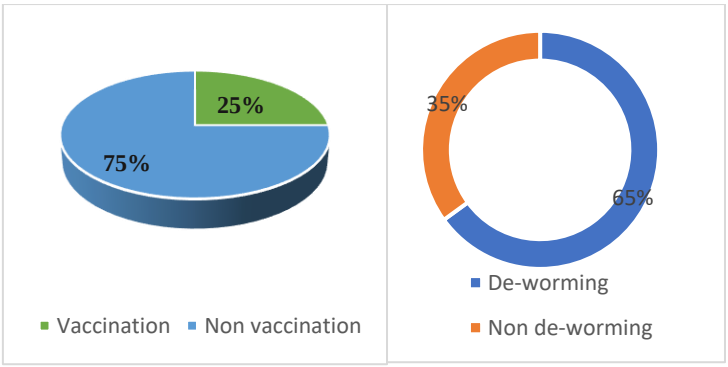

Figure 4.8. Vaccination and De-worming of Black Bengal goats.

4.9. Profit from goat rearing

In this study, it is closely examined that the economics of goat rearing in our experimental area. Raising one goat costs an average of Tk. 720 annually. The real highlight is the income generated by their kids, averaging Tk. 6220 per year, with a range from Tk. 5000 to Tk. 7000. After accounting for expenses, the net annual income from a single goat averages Tk. 5500. These findings emphasize the significant role these goats play in our experiment's financial landscape.

Conclusion

It is commendable how well Black Bengal goats perform in terms of providing improved livelihoods for rural residents through money production. Because they helped raise their own goats, women's employment expanded significantly. A positive indicator of the country's progress was the fact that rural women who had previously been unemployed started working as livestock raisers. It is abundantly obvious that farmers who raised goats saw dramatic changes in their mode of subsistence. The value of Black Bengal goats in rural and urban husbandry may be boosted significantly with the help of updated management manuals and veterinary services.

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