EVALUATION OF REPRODUCTIVE PERFORMANCE OF INDIGENOUS BUFFALO AT SREEMANGAL UPAZILA

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December, 2021

EVALUATION OF REPRODUCTIVE PERFORMANCE OF INDIGENOUS BUFFALO AT SREEMANGAL UPAZILA

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REGISTRATION NO.: 19-10086

A Thesis

Submitted to the Faculty of Animal Science & Veterinary Medicine, Sher-e-Bangla Agricultural University, Dhaka-1207,
in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE

(MS) IN

ANIMAL BREEDING AND GENETICS

SEMESTER: June-December, 2021

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CERTIFICATE

*This is to certify that the thesis entitled, "**Evaluation Of Reproductive Performance Of Indigenous Buffalo At Sreemangal Upazila**" Submitted to the Department of Animal Nutrition, Genetics and Breeding, Faculty of Animal science and veterinary medicine, Sher-E-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE (MS) in Animal Breeding and Genetics** embodies the result of a piece of bonafide research work carried out by **AlaUddin Himel, Registration No. 19-10086** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.*

I further certify that such help or source of information,as has been availed of during the course of this investigation has been duly acknowledged by her.

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DEDICATED
TO
My beloved Parents
And
Professor Dr. Lam
Yea Asad

Acknowledgement

For the very first of all, the author expresses his gratitude to the almighty Allah, the most gracious and supreme authority of the Universe for kind blessings to fortunate the author to accomplish this research work and complete this thesis successfully. Words actually will never be enough to express how grateful the author is nevertheless will try his level best to express his gratitude towards some respected persons for their advice, suggestions, direction and cooperation in completing the research work and thesis.

The author would like to express heartfelt gratitude to his honorable ***Supervisor Professor, Dr. Lam Yea Asad,*** *Department of Animal Nutrition, Genetics and Breeding, Sher-e-Bangla Agricultural University, Dhaka, for her cordial supervision, innovative suggestions, scholastic guidance, helpful comment, inspiration and timely instructions throughout the entire period of the research.*

The author expresses his deep indebtedness to his ***Co-Supervisor Associate Professor, Dr. Al-Nur Md. Iftekhar Rahman*** *Department of Animal Nutrition, Genetics and Breeding for his scholastic guidance, constructive criticism, untiring assistance and advice throughout the research work and in writing the thesis.*

The author would like to express his deepest respect and boundless gratitude to all the respected teachers of the Department of Animal Nutrition, Genetics and Breeding for their valuable teaching, sympathetic co-operation,and inspirations throughout the course of this study and research work.

The author wishes to extend his special thanks to Nasrin Akhter, Md. Habibur Rahman, Md. Lokman hossen, Md Shamsuddin Tabreeze for their keen help as well as heartiest co-operation and encouragement. Special thanks to all other friends for their support and encouragement to complete this study.

The author is deeply indebted and grateful to his parents, brother and other relatives for their moral support, encouragement and love with cordial understanding.

Finally, the author appreciates the assistance rendered by the staff of the Department of Animal Nutrition, Genetics and Breeding, Sher-e-Bangla Agricultural University, Dhaka, who have helped him during the period of study.

The author

EVALUATION OF REPRODUCTIVE PERFORMANCE OF INDIGENOUS BUFFALOES AT SREEMANGAL UPAZILA.

Abstract

The reproductive performance of indigenous buffaloes at Sreemangal Upazila under Moulovibazar district was studied. Thirty (30) families were interviewed by written interviewed paper from Sreemangal Upazilla under Moulovibazar district in 2021. Out of 30 families 26 own 33 milch buffaloes, 17 dry buffaloes, 12 heifer calves, 7 bull calves and 10 bullocks which were counted for calculation. This study demonstrated that the distribution of buffalo populations were scattered and the average buffalo populations were 3.038 per house-holds, age at puberty 44.06 ± 2.13 months, lactation length 204.70±20.68 days, milk yield 1.88±0.702 liters/day, gestation period 307.00±2.11 days, body weight 27.26±1.55 kg/calf, age at first calving 53.84±1.48 months, calving interval 1.72±.548 years and average post partum heat period was 147.6±18.68 days. These data will be helpful for future research and also give a guideline for buffalo development in Bangladesh.

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LIST OF ABBREVIATIONS AND SYMBOLS

%	=	Percentage
>	=	Greater than
<	=	Less than
±	=	Plus minus
AI	=	Artificial Insemination
ANOVA	=	Analysis of Variance
BAU	=	Bangladesh Agricultural University
B.C.	=	Before Christ
BLRI	=	Bangladesh Livestock Research Institute
BW	=	Birth Weight
DF	=	Degree of Freedom
DM	=	Dry Matter
DLS	=	Department of Livestock Services
et al.	=	Associate
FAO	=	Food and Agricultural Organization
GDP	=	Gross Domestic Product
Gm	=	Gram
GLM	=	General Linear Model
MS	=	Mean Square
NBF	=	Nucleus Breeding Flock
Lbs	=	Pound
ONBS	=	Open Nucleus Breeding System
Kg	=	Kilogram
LSD	=	Least Squares Means
Ml	=	Milliliter
no.	=	Number
SAARC	=	South Asian Association for Regional Co-operation
SAS	=	Statistical Analysis System
SAU	=	Sher-e-Bangla Agricultural University

SAURES	=	Sher-e-Bangla Agricultural University Research System
SE	=	Standard Error
SS	=	Sum of Squares
Viz.	=	Namely

CHAPTER 1

INTRODUCTION

Buffalo has a significant role in the agricultural economy of many developing countries by providing milk, meat and draught power. The world population of buffalo is estimated to be 199 million (FAOSTAT, 2012) with more than 96% of the population located in Asia including 16.4% of Pakistan's contribution. In recent decades, buffalo farming has expanded widely in the Mediterranean and Latin America as well as, in Central/Northern Europe where several herds were introduced.

Dairy buffaloes have been used for milk production in India, Pakistan, Bangladesh and some other South Asian countries, the Middle East and Italy; while dairy characteristics are being induced in the local population of Indo-Chinese Region and South America through crossbreeding with Pakistani Nili Ravi and Indian Murrah buffaloes. The milk yield increased from 700 to 2,000 kg/year.

The buffalos can utilize poorer quality roughages, adapt to harsher environments and are more resistant to several bovine tropical diseases. Despite these merits, buffalo have relatively poor reproductive efficiency irrespective of their location throughout the world. Buffalo exhibit many of the known reproductive disorders including delayed onset of puberty, poor oestrus expression, longer postpartum ovarian quiescence, and most importantly lowered conception rates particularly when bred artificially (Gordon, 1996). However, higher fertility could be achieved through better feeding and management (Perera et al., 1987; Usmani et al., 1990; Qureshi et al., 2007). It appears that because buffalo are located mostly in developing countries with meager resources, there is limited quality research in the area of basic physiology, health, management, nutrition and applied reproduction.

The objective of this study is to examine the major recent developments in buffalo reproduction. We discuss the impact of the various techniques as well as bottlenecks and possible future development which will lead to improve reproductive performance in this species. Like other developing countries, animal production systems and its use vary widely in Bangladesh with climatic condition, topography and socio-economic condition. The production systems are characterized by small number of animals with no or minimal inputs, low outputs and periodic demolition

of animals by disease and mostly maintained under scavenging systems (Saadullah, 2012). Buffaloes are better converter of poor-quality fibrous feeds into milk and meat. They are reported to have the capacity of digesting 5% more crude fiber than high-yielding cows; and 4-5% more efficient in utilizing metabolizable energy for milk production (Mudgal, 1989).Terramoccia et al. (2000) reported a better degradation rate of both crude protein (CP) and protein free dry matter (DM) in buffaloes than in cattle. Growing buffaloes may utilize coarse feed more efficiently than cattle, have more disease resistance ability and produce more solids in milk (Dubey et al. 1997) and require less management inputs. It has also been reported that buffalo holds strategic place in overall livestock economy of Bangladesh and serves three important purposes such as milk, meat and draught power supply (Ghaffar et al., 1991). With increasing population and economic stability, the demand of milk and milk products like butter cheese, ghee, yogurt, ice cream is increased. During 2006-07, milk production in Bangladesh was 22.80 Lakh Metric Ton whereas the current production is 72.75 Lakh Metric Ton. Present demand of milk production in BD is 146.91 Lakh Metric Ton and availability is 72.75 Lakh Metric Ton hence the deficit is about 50.47%. Though milk production increased in 68.66% compared to last 10 years but there are also 74.16 Lakh Metric Ton, still we need to increase (50%) milk production in order to meet up the demand (DLS, 2016). In India, white revolution occurred long ago through dairy buffalo rearing and 67.99% milk coming from buffalo whereas dairy buffalo production is very limited in Bangladesh as only 0.039% milk from buffalo. Major percentages (>90%) of milk is coming from dairy cow in Bangladesh. It is expected that buffalo will ultimately emerge as the future animal of dairy-cum-meat industry in the region (Dhanda, 2013). Therefore, we assume there are huge potential of dairy buffalo production in Bangladesh. That's why it is needed to gear up dairy buffalo production to enhance food security from livestock origin.

The dynamics of buffalo production systems in South Asia Region is transforming day by day due to increasing the population more rapidly specially in Asia for its emerging role in economic development (Dhanda, 2013). Saadullah, (2012) observed that Buffalo production system varies widely in accordance with climate, soil and socio economic opportunities in Bangladesh. Buffalos graze in natural pasture in coastal areas. A total of 11, 5 and 84% farmers reared buffalo for milk purpose, meat

purpose and milk and meat purpose, respectively in coastal areas (Nahar et al., 2014). According to Saadullah (2012) buffaloes are kept mainly for specific purposes, i.e. either for milk or for meat production in Bangladesh under semi intensive system. It is an important livestock resource in several countries of South Asia and the Mediterranean regions. Buffalo is playing a leading role in the national economy by producing milk, meat and draught power in India and Pakistan. Buffalo contributes about 57% and 68% of total milk production of India and Pakistan, respectively (FAO, 2010). Due to high fat content of buffalo milk, it is the most preferred species and called Black gold of Pakistan (Bilal et al., 2006). Climatic condition of Bangladesh is nearly similar to India and has many rivers and marshy lands that favour for raising buffaloes. Recently Government of Bangladesh, private sector and research organization has given emphasis on Buffalo production. The availability of milk in Bangladesh is only about 158.19 ml/day/head of about 63.27% (DLS, 2018) whereas, the availability of milk in India and Pakistan is about 290 ml, 525 ml/day/head respectively (Hamid et al.,2016). This figure indicates that Bangladesh need to give more emphasis on the milk production to fulfil the national demand. The indigenous dairy cows are low producers and the crossbred cow has the limitation regarding disease resistance, repeat breeding etc. Use of other mammalian livestock species for milk production could help to improve the scenario (Siddiki, 2017) and the success of India and Pakistan dairy industry based on buffalo might be a good example for Bangladesh. However, buffaloes are low producers in Bangladesh, because of poor genetic potentialities, poor nutrition, longer puberty age, seasonality of breeding, longer calving interval, high calf mortality and poor management practices (Nahar, 2015;Amin et al.,2015; Sarker et al., 2013; Faruque and Amin, 1995; Shamsuddin et al., 2001). Faruque and Amin (1995), Uddin et al., (2016) and Amin et al., (2017) reported the reproduction and production performances of buffaloes of Noakhali district of Bangladesh. However, there is no report on the reproductive performances of buffaloes in Moulovibazar district of Bangladesh where a good number of buffaloes exist. Moreover different management system e.g. extensive and semi-intensive systems were followed in this area. Semi-intensive system introduces very recently for emphasized lactating buffaloes. Therefore, the present study was designed to investigate the few reproduction characteristics of indigenous buffalo in Moulovibazar district of

Bangladesh. Considering the above point in view the study was undertaken to know the reproductive features of indigenous buffaloes at Sreemangal upazila.

CHAPTER 2

REVIEW OF LITERATURE

Many researchers and scientist in different countries of the world have been carried out substantial research works related to the reproductive performance of buffalo. In different areas of our country this type of work also has been done but limited. Besides Sreemangal upazila undar Moulovibazar district there is no research work done about reproductive performance of buffalo. For this reason, I have selected this area for my study. This chapter includes high lightening of research work which is done by previous researcher and scientist related to the study.

2.1 Buffalo population

The world buffalo population is estimated to be approximately 194.29 million over 42 countries (Hamid et al., 2016). About 92.5% of the total buffaloes are found in Asia. Within the Asian, about 71.32% of buffaloes are in South Asia, 12.8% in East Asia and only 8.4% are found in South-East Asia. Compare to the other Asian countries, Bangladesh has only The 1.471 million buffaloes mostly populated in the coastal regions about 40% (Faruque et al., 1990). The adult female buffalo reported to be 453 thousand including 121 thousand lactating buffalo cows (Huque, 2013). Within the adult buffalo, adult male and female were 58% and 33%, respectively, and, within the female, milking and dry buffalo were 27% and 37%, respectively (BBS, 2008). It could be Bangladeshi people use buffalo mostly for draught purpose.

2.2 Types or breeds of Buffaloes available in different regions of Bangladesh

Buffaloes in Bangladesh mainly classified into two categories:

(i) Indigenous buffaloes found in the coastal areas and marshy land of the country

(ii) Migrated buffaloes from India and Myanmar found in the sugarcane belt and Cox's bazar district, respectively (Saadullah, 2012). The migrated buffaloes from India are generally of river types, and from Myanmar, coastal areas or marshy land are of swamp types, though a number of crossbred between swamp and river types are found in the coastal area (Faruque et al., 1990; Faruque, 1992). There are several types of Buffaloes found in Bangladesh (Table 1). There is no recognized breed of

water buffaloes in Bangladesh and are mainly indigenous non-descriptive types (Faruque et al., 1990). However, two predominant type of buffaloes commonly available in Bangladesh such as riverine and swamp types (Sarwar et al., 2002a,b). River buffaloes basically reared for the milk production (Dhanda, 2013). In addition, there are few buffalo pockets in Bangladesh including coastal area, Sylhet haor area, sugar cane belt of Jamalpur and Kanihari buffalo pocket in Trishal upazila of Mymensingh district of Bangladesh solely used for milk production over hundreds of years (Sohel and Amin, 2015). It has been reported that they are found to be concentrated in Meghna-Ganga flood plain as well as Brahammaputra-Jamuna flood plain (Faruque and Hossain, 2007). There are also some cross breed with Murrah, Nili-Ravi, Surti and Jaffrabadi surrounding of Indian border (Faruque et al., 1990; Huque and Borghese, 2012). The event of crossbred dairy buffaloes indicates that the genetic improvement programs in place (Faruque, 2000).

2.3 Herd size and distribution of buffalo

In the household farming, the average herd size was less than three and it was about 82% of total respondents. Consequently, 62% of the total respondents had 51 bathan farming. In household farm mainly reared female animals and only 1% buffalo bull. On the other hand, 70% buffaloes were female and the remaining 30% was male dominantly growing bull and bullock in that farming system. Among the total female animals, the ratios between milch and dry buffalo were about 2:1 and heifer and adult cow 1:1 in both household and bathan farming (Uddin et al., 2016). Faruque et al. (1990) who reported that buffalo number per house-hold were 5.78 and 5.57 in the costal and hilly areas respectively in Bangladesh. He further mentioned that the buffalo number per house-hold were 2.2 in the plain land. Hussen (1990) mentioned the total number of buffaloes in Tangail district was 24537. He also mentioned the number of buffalo per household of Modhupur Upazilla, Tangail district was 3.75 ± 0.54. The average number of buffalo of 30 families at Kawkhali Upazilla under Pirojpur district was 5.37 per house-holds.(Kawkhali, Pirojpur 2016)

2.4 Age at puberty

Jainudeen (1984) who reported that the age at puberty of buffaloes were delayed (42-48 months).The average age at puberty of indigenous buffaloes at kawkhali, pirojpur area was 45.03 ± 6.97 months.(kawkhali, pirojpur 2016)

2.5 Lactation length

Faruque et al. (1990) who studied that the lactation length of indigenous buffalo was 275 days. Faruque and Amin (1994) mentioned that the lactation length of indigenous buffaloes in the coastal area was 270 days. EI-Kirabi (1995) stated the lactation length of Egypt buffalo was 210 to 280 days.

2.6 Milk yield

Hussen (1990) who mentioned that the daily average milk yield of those buffaloes was 2.3±0.63 litres. Das and Patro (1988) observed that the milk yield of Kalahandi buffalo breed of India ranged from 1 kg to 2 kg/day on single milking. However, some animals yielded as high as 4 kg/day. With daily average milk production is only 2.8 L/day with an average lactation length of 227 days (Huque, 2013). Though total milk production of Bangladesh is about 72.75 Lakh Metric Ton in 2015-16 where buffalo milk production was only 3-4% of the total milk production (DLS, 2015-16). Indigenous buffalo cow produces two times more milk than cows, having more milk fat and total milk solids (Faruque et al., 1990). Recently, buffalo milk production in Asia represents 97.02% of the total volume of the world‟s buffalo milk (FAO, 2010).

2.7 Gestation period

Hadi (1965) in his experiment showed that the average gestation period of Marathwada buffalo was 309.60±2.11 days. EISheik and Mohamed (1967) found that the gestation period of Egyptian buffalo was 316.70±0.19 days.

2.8 Birth weight

Hussen (1990) who reported that the average birth weight of indigenous buffaloes was 26.74±2.4 kg in Tangail district. Faruque and Amin (1994) mentioned that the average birth weight of indigenous buffaloes of the coastal areas of Bangladesh was 22.00±3.50 kg.

2.9 Age at first calving

Fadzil (1969) who found that the minimum age at first calving was 3 years, 3 months and 26 days. Shah et al. (1987) found that the average age at first calving of rural Nili-Ravi buffaloes in Punjab was 45.84±0.19 months.

2.10 Calving interval

Fadzil (1969) who found that calving interval was 639 days. Khan et al. (1990) reported that calving interval of Nili-Ravi buffaloes in Pakistan averaged 552.44±18.4 days.

2.11 Post partum heat period

Ei-Sheikh and Mohammad (1967) found that the post partum service interval of 1st , 2nd and 3rd calving for Egyptian buffalo were 192.95, 152.9 and 317.0 days respectively. Rao et al. (1973) described that the mean post partum estrus was 146.2 days. Parvez et al. (1994) found the post partum estrus interval averaged 171.79±4.01 days.

2.12 Challenges in dairy buffalo production in Bangladesh

2.12.1 Problems in general husbandry practices

The proper husbandry practices of the animals to some extent depend on the production systems. There are some problems in the general husbandry practices such as no housing system, no artificial insemination system, no routine vaccination programme, no animal identification and recording system. The management practices adopted by buffalo farmers usually depends on the type of production in which they are involved. At the rural level production is usually based on a small herd of mixed ages and sexes generally for draught and breeding purposes. Cattle

and buffaloes are kept at night, and spend the day time grazing for roughage, together with other animals. Grazing and browsing ranges over practically all village lands during the dry season but is restricted to upland non-cropped areas during the rainy season. Animals are more difficult to herd during the cropping season and buffaloes are considered to be more difficult to herd than cattle. Sometimes the whole village herd will lie down together in mud wallows remaining asleep or ruminating till evening. By about after noon they emerge out of their mud wallows covered with grey slime and graze on roads and other aquatic herbage till late in the evening. After this, they move to dry grounds where they remain till the day-dark. About 60% of the farmers dispose of dung and other refusal to pits for further use while the rest (40%) use them otherwise (as fuel and other purposes). Biogas plants are a very new concept to farmers during the early 2000s, and a very negligible (1%) of farmers had them (Huque, 2013).

The major feed for buffalo is rice straw, crop residues supplemented with marginal quantities of cereal and oil seed by-products and weeds from crop fields (Saadullah, 1990). Lack of quality feeds, fodder and pasture land for buffalo rearing; hence, nutritional deficiency cause poor production profile of buffaloes in Bangladesh. Buffaloes are raised mainly under a semi-intensive system on plain land and marshy land where there is limited pasture land. Recently, an intensive system for buffalo production is practiced by Lalteer Livestock Limited. The basal diet for buffaloes is rice straw, poor quality roughage having inadequate source of energy and protein. Buffaloes are allowed to graze on natural pasture, fallow land or road side during the day time. No concentrate or mineral supplements are usually fed. For milch buffaloes, the calves are usually separated from the dam in the evening or night and the milking only once in the morning. Sugarcane leaves, micro silage of sugarcane leaves, cassava leaves, roadside grass, elephant grass, and maize with corn cob and pineapple bran are also rarely used as feeding stuffs (Faruque, 2003). However, buffalo in the tropical area for feeding systems are based on unrestricted grazing, tethering or stall-feeding and free grazing, sometimes under the control of herders, is common in countries with native grasslands and fallows. Tethering and stall-feeding are practiced in areas where there is limited land and with cropping. In many situations, there appeared to be roughage limitations for animals in the stall-feeding and tethering systems (Wanapat and Chanthakhoun, 2009).

2.12.2 Feeds and Feeding problems

The major feed for buffalo is rice straw, crop residues supplemented with marginal quantities of cereal and oil seed by-products and weeds from crop fields (Saadullah, 1990). Lack of quality feeds, fodder and pasture land for buffalo rearing; hence, nutritional deficiency cause poor production profile of buffaloes in Bangladesh. Buffaloes are raised mainly under a semi intensive system on plain land and marshy land where there is limited pasture land. Recently, an intensive system for buffalo production is practiced by Lalteer Livestock Limited. The basal diet for buffaloes is rice straw, poor quality roughage having inadequate source of energy and protein. Buffaloes are allowed to graze on natural pasture, fallow land or road side during the day time. No concentrate or mineral supplements are usually fed. For milch buffaloes, the calves are usually separated from the dam in the evening or night and the milking only once in the morning. Sugarcane leaves, micro silage of sugarcane leaves, cassava leaves, roadside grass, elephant grass, and maize with corn cob and pineapple bran are also rearly used as feeding stuffs (Faruque, 2003). However, buffalo in the tropical area for feeding systems are based on unrestricted grazing, tethering or stall-feeding and free grazing, sometimes under the control of herders, is common in countries with native grasslands and fallows. Tethering and stall-feeding are practiced in areas where there is limited land and with cropping. In many situations, there appeared to be roughage limitations for animals in the stall-feeding and tethering systems (Wanapat and Chanthakhoun, 2009). In the household farming, after morning milking, buffaloes were allowed to graze in fallow or road side land up to evening that covers approximately 8-9 hours per day. From the evening to next morning, animals were tied up in homestead and they were offered mainly rice straw with little concentrate mixtures (wheat bran, rice bran, rice polish etc.). However, in bathan farming, buffaloes were raised in the open grazing area throughout the year. Except calves, all buffaloes (adult and growing heifers) were allowed to graze freely in the public land. In the evening, calves were enclaved in an area locally called “kella” to protect from wild animals. Any extra feed was not provided to buffalo in bathan farming (Uddin et al., 2016).

2.12.3 Poor reproduction

Delayed puberty, seasonal breeding, long calving interval, and poor estrus detection hampered the reproductive efficiency in the female buffalo. Most of the respondents reported that the average age at first heat was between 39 and 40 months in both household and bathan farming (Uddin et al., 2016). Nahar et al. (2012) also found similar findings of age of first heat in Mymensingh and Laximpur district. It was reported (Mudgal, 1999) that the age at first calving for Nili-Ravi buffaloes ranges from 30-54 months and for Khundi buffaloes ranges from 48-57 months. The natural mating system was practiced in both the system of farming and artificial Insemination (AI) was not yet practiced commercially in Bangladesh due to the weakness of oestrus symptoms and variability of oestrus length in buffalo.

2.12.4 Summer anoestrus in buffalo

Domestic buffaloes have a tendency to breed seasonally (Basu, 1962; Qureshi et al., 1999) showing a suspension of sexual activity during summer in almost all parts of the world (Hafez, 1955; Chaudhry, 1988; Shah, 1990). During this period, they remain sexually inactive without any signs of oestrus. This condition is popularly known as summer anoestrus. The incidence of summer anoestrus generally varies between 36.6% and 59.5% (Luktuke and Sharma, 1978; Singh et al., 1989). Furthermore, it was reported to be higher in nomadic buffaloes (83.0%) than the housed rural ones (63.0%) (Brar and Nanda, 2004). Summer anoestrus may be due to direct exposure to sunlight in the former case. The condition is characterized by inactive, smooth ovaries (Roy et al., 1972), abnormal hormonal profiles (Razdan, 1988). Several factors like environment, hormones, nutrition and management have been proposed to cause summer anoestrus in buffaloes. Thermal stress is one among the environmental factors that play a very significant role. The effect of thermal stress and season on dairy cattle reproduction has been reviewed in several recent published reports (Wolfenson et al., 2000; De Rensis and Scaramuzzi, 2003). Post-partum anoestrus in buffalo has also been summarized in a number of reviews (Gupta and Das, 1994; El-Wishy, 2007a,b). During hot summer months, buffaloes show hyper-prolactinemia (Sheth et al., 1978). Buffalo heifers show seasonal changes in the level of circulating FSH which coincide with the pattern of breeding (Sheth et al., 1978; Janakiraman et al., 1980). The lowest value was observed in the

non-breeding season (March to June) during hot months. In general, the FSH level in anoestrusbuffalo‟s remains low (Heranjal et al., 1979b; Madan, 1987) when compared with the basal level (Heranjal et al., 1979a) recorded in normal cycling buffaloes (Table 9). Luteinizing hormone plays an important role in contributing ovarian inactivity in buffaloes during summer months (Razdan et al., 1981). The secretion was lower during summer compared to winter (Heranjal et al., 1979b; Razdan et al., 1981).

2.12.5 Buffalo diseases

The retrospective study findings revealed that high incidence of hemorrhagic septicemia (HS) and calf pneumonia, helminthes, enteritis and mastitis as the major disease problems for buffalo production in Bangladesh (Figure 3). To study the status of clinical and subclinical mastitis, a total of 114 milk samples were randomly collected from buffalo cows. The prevalence of clinical and subclinical mastitis in buffalo was found to be 23.68% and 31.57%, respectively. Hemorrhagic septicemia and calf pneumonia were reported to be the major disease problems by the farmers and local vets (Islam et al., 2016). The prevalence of GIT parasites was alarming in buffaloes in all over the areas of Bangladesh. Research findings of Islam et al. (2016) revealed that 64.2% of the studied buffaloes were infected with one or more species of gastro-intestinal parasites. Younger animals were found to be more susceptible to both parasitic and protozoan infections but sex was found not to affect the incidence. Most of the non-parasitic enteritis was caused by E. coli (62.5%) and Salmonella spp. (29.16%). Clinical and subclinical mastitis were recorded in 23.68% and 31.57% of samples analyzed, respectively. responsible for mastitis in buffalo was the Coagulase Negative Staphylococci (CNSs), Streptococcus spp., Bacillus spp. and Staphylococcus aureus (Islam et al., 2016).

CHAPTER 3

MATERIALS AND METHODS

The present study was done under the Department of Animal Nutrition, Genetics and Breeding, Sher-e Bangla Agricultural University (SAU), Dhaka-1207, with the financial support of the Sher-e Bangla Agricultural University Research System (SAURES).

3.1 Study area

This study was conducted at different places of Sreemangal Upazila. 3 villages namely Poshchim bharaura, Nawagaon and Uttoruttorsor were purposively selected for the study.The location of the study was illustrated in figure-1 and figure-2 respectively. The ecology of this area is suitable for buffalo rearing. The average temperature is 24.5℃ and the annual rainfall average 2081 mm. Grazing land is available for buffalo . In this study two approaches were adopted viz.

i) Initial in-depth monitoring of the activities of household before collection of data.
ii) Recording reproductive performance directly form the farmers in their household.

There is no data on the reproductive performances of the indigenous buffaloes. To know the reproductive features of indigenous buffaloes at Sreemangal upazila the places was selected.

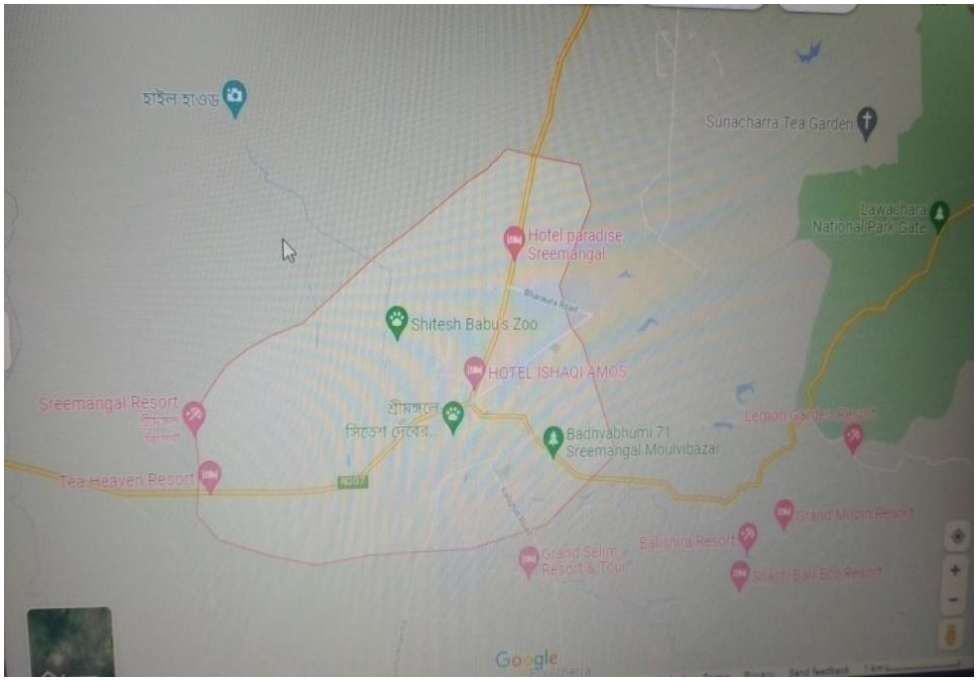

Figure: 1 **Map of Sreemangal Upazila**

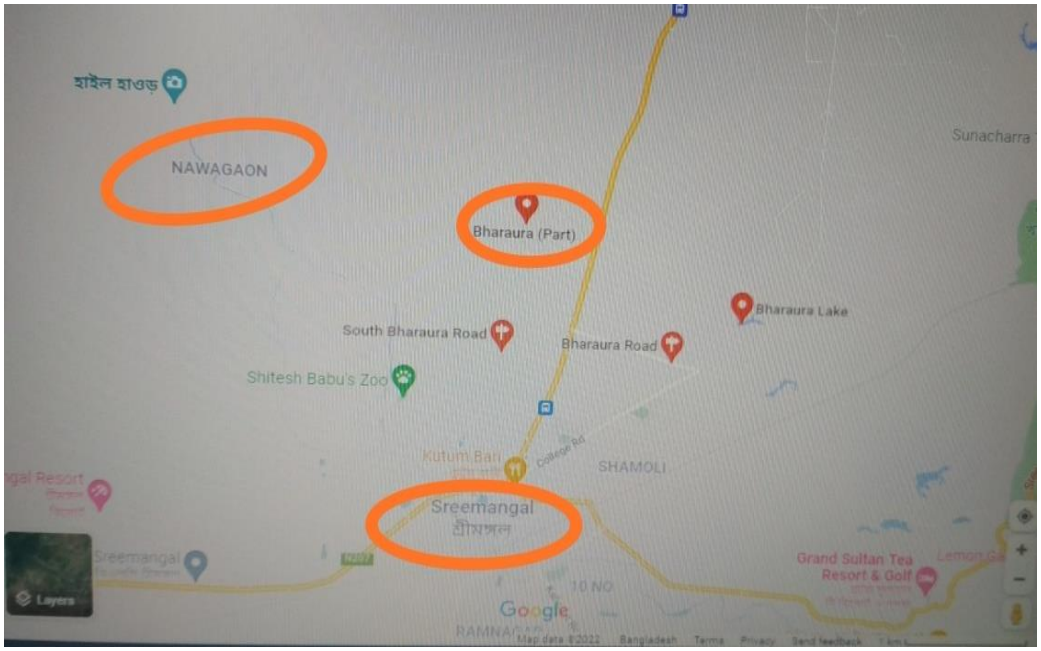

Figure: 2 Map showing the study area in Sreemangal Upazila

3.2 Population and sampling of the study

At first, survey was done randomly in different villages of Sreemangal Upazilla to find out distribution pattern i.e. the buffalo number per household, buffalo population dynamics and their utility. The 26 families of buffalo owners were taken from Sreemangal Upazilla under the District of Moulovibazar for this study. To obtain reliable data were collected by myself in 2021.

3.3 Study period & Data collection

Data for the experiment were conducted through door to door visit at farmer's house during Jun/2021 to Dec/2021. Data were collected by myself through previously prepared interview schedule. Questionnaire includes both open and closed question to collect data with view to objectives of this study. In order to make the data collection program successful, researcher myself visited every household of selected area during the study period. Direct interview method was used for collection of information.

3.4 Parameters of the study

To evaluate the reproductive performance of Buffalo the following parameters were considered.

3.4.1 Age at puberty

Age at puberty is the time between birth and first estrus. When a doe show the sign of first sign that age counted as age of puberty. By observing the wagging tail, swelling, watery discharge from vulva, jumping tendency to other and bleating detect the age of puberty of Buffalo.

3.4.2 Lactation length

Lactation length means the period when a Milch gives milk. Lactation period of Buffalo is longer than others animals. The total period when Milch gives milk were recorded in data sheet and analysed.

3.4.3 Milk yield

Milk yield means milk production expressed in kg per animal and day. The milk yield of indigenous buffaloes were recorded in data sheet and analysed.

3.4.4 Gestation period

Pregnancy period is known as gestation period. During gestation period a fetus develops, beginning with fertilization and ending at birth. This period is the time of conception to parturition.

3.4.5 Birth weight

Weight at first calving means the body weight of calf when gives birth first. The body weight of calf were recorded in data sheet for analysis.

3.4.6 Age at first calving

Age of first calving indicate that time when buffalo give first birth a calf. It is the time of interval between birth and first calving. That is recorded in data sheet for analysis.

3.4.7 Calving interval

The term calving interval refers to the period from one calving to next calving. Data were recorded in data sheet for analysis

3.4.8 Post partum heat period

Post partum heat period means first heat after calving. Data were recorded in dada sheet for analysis.

3.4.9 Statistical Analysis

The collected data of the experiment were compiled and included to the Excel spread sheet for statistical analysis. The values of reproductive performances were analyzed by using Statistical Analysis Software (SAS, 1998).

Plate 1: Data collection from a lady farmer

Plate 2: Data collection from a farmer

Plate 3: Data collection from a farmer

Plate 4: Modern buffalo farm under construction

Plate 5: Buffaloes are grazing at a hoar

Plate 6: Coming back home after day long grazing

CHAPTER 4

RESULTS AND DISCUSSION

In this chapter the finding are described in accordance with the objectives of our study.

The results of this study for different traits are presented in different Tables and Figures. The number of buffaloes under the selected Sreemangal Upazila has been shown in Table1.

Table 1. Average number of buffaloes per house-holds at Sreemangal Upazila under the district of Moulovibazar.

Types of buffaloes	No. of buffaloes	No. of house holds	Total No. of buffaloes	Average
Milch	33	26	79	3.038
Dry	17			
Heifer calf	12			
Bull calf	7			
Bullock	10			

4.1 Age at puberty

The average age at puberty for 33 milch was 43.9±1.98 months. The average age at puberty for 17 dry was 44.9±2.36 months. The average age at puberty for 12 heifers is 44.3±2.14 months. The average age at puberty for 7 bull calves is 44.4±2.4 months. The average age at puberty for 10 bulls is 43.8±2.48 months. The average age at puberty of indigenous buffaloes at the studied area was 44.06 ± 2.13 months and this finding is agreed by Jainudeen (1984) who reported that the age at puberty of buffaloes were delayed (42-48 months). The recent study at Kawkhali upazila under pirojpur district was reported that age at puberty was 45.03±6.27 months (Animal Health Research Division, Bangladesh Livestock Research Institute, Savar, Dhaka-1341, Bangladesh, 2016).The collected data of age at puberty of buffaloes are presented in Table 2. The average data of age at puberty of indigenous buffaloes are presented in Table 10.

Table 02: Age at puberty of indigenous buffaloes

Parameter	Types of Buffaloes	No. of Buffaloes	Mean ± SD
Age at Puberty (months)	Milch	33	43.9±1.98
	Dry	17	44.4±2.36
	Heifer	12	44.3±2.14
	Bull Calf	7	44.4±2.4
	Bull	10	43.8±2.48

4.2 Lactation lenght

The average lactation length of 33 milch buffalo is 206.06±21.56 days. The average lactation length of 17 dry buffalo is 202.05±19.20 days. The average lactation length of indigenous buffaloes at Sreemangal Upazilla of Moulovibazar district was 204.70±20.68 days where the findings of Faruque et al. (1990) who studied that the lactation length of indigenous buffalo was 275 days. Faruque and Amin (1994) mentioned that the lactation length of indigenous buffaloes in the coastal area was 270 days. EI-Kirabi (1995) stated the lactation length of Egypt buffalo was 210 to 280 days. Poor feeding and management are very much responsible. The recent study at Kawkhali upazila under Pirojpur district was reported that lactation period was 242.60±41.46 days (Aug, 2013). The collected data of lactation period of buffaloes are presented in Table 3. The average data of lactation period of indigenous buffaloes are presented in Table 10.

Table 3 : Lactation period of buffaloes

Parameter	Types of Buffaloes	No. of Buffaloes	Mean ± SD(days)
Lactation lenght (days)	Milch	33	206.06±21.56
	Dry	17	202.05±19.20

4.3 Milk yield

The average milk yield of 33 milch buffalo at the studied area was 1.8± 0.69 litres per day. The average milk yield of 17 dry buffalo at the studied area was 1.9± 0.74 litres per day. The average milk yield of indigenous buffaloes at the studied area was 1.88± 0.702 litres per day. In the present study the average daily milk yield was more or less similar to the findings of Hussen (1990) who mentioned that the daily average milk yield of those buffaloes was 2.3±0.63 litres. Das and Patro (1988) observed that the milk yield of Kalahandi buffalo breed of India ranged from 1 kg to 2 kg/day on single milking. The recent study at Kawkhali upazila under Pirojpur district was reported that milk yield was 2.35±0.703 kg (Aug 2016). However, some animals yielded as high as 3 kg/day. The collected data of milk yield of buffaloes are presented in Table 4. The average data of milk yield of indigenous buffaloes are presented in Table 10.

Table 4: Milk yield of indigenous buffaloes

Parameter	Types of Buffaloes	No. of Buffaloes	Mean ± SD
Milk yield (litre/days)	Milch	33	1.8±0.69
	Dry	17	1.9±0.74

4.4 Gestation period

The average gestation period of milch buffalo of the studied area was 306.81±6.35 days. The average gestation period of dry buffalo of the studied area was 307.35±5.63 days. The average gestation period of indigenous buffaloes of the studied area was 307.00±6.06 days. Hadi (1965) in his experiment showed that the average gestation period of Marathwada buffalo was 309.60±2.11 days. EISheik and Mohamed (1967) found that the gestation period of Egyptian buffalo was 316.70±0.19 days.The recent study at Kawkhali upazila under Pirojpur district was reported that gastation period was 317.47±6.57 days (Aug 2016).The collected data of gestation period of buffaloes are presented in Table 5.The average data of gestation period of indigenous buffaloes are presented in Table 10.

Table 5: Gestation period of indigenous buffaloes

Parameter	Types of Buffaloes	No. of Buffaloes	Mean ± SD
Gestation period (Days)	Milch	33	306.81±6.35
	Dry	17	307.35±5.63

4.5 Birth Weight

The average birth weight of 12 heifers of the studied areas was 27.16±1.53 kg. The average birth weight of 7 bull calves of the studied areas was 27.43±1.71 kg. The average birth weight of indigenous buffaloes of the studied areas was 27.26±1.55 kg. In the present study, the birth weight of indigenous buffalo calves were more or less similar to the findings of Hussen (1990) who reported that the average birth weight of indigenous buffaloes was 26.74±2.4 kg in Tangail district. Faruque and Amin (1994) mentioned that the average birth weight of indigenous buffaloes of the coastal areas of Bangladesh was 22.00±3.50 kg which was almost similar to the findings of present study, the average birth weight of 18 to 30 kg. The recent study at Kawkhali upazila under Pirojpur district was reported that birth weight was 23.77±5.20 kg (Aug 2016).The collected data of birth weight of buffaloes are presented in table 7.The average data of birth weight of indigenous buffaloes are presented in table 10.

Table 6: Birth weight of indigenous buffaloes

Parameter	Types of Buffaloes	No. of Buffaloes	Mean ± SD
Birth weight (kg)	Heifer	12	27.16±1.53
	Bull Calf	7	27.43±1.71

4.6 Age at first calving

The age at first calving of 33 milch buffalo of studied areas was 53.72±1.5 months. The age at first calving of 17 dry buffalo of studied areas was 54.05±1.47 months. The age at first calving of studied areas was 53.84±1.48 months which is more or less similar to findings of Fadzil (1969) who found that the minimum age at first calving was 3 years, 3 months and 26 days. Shah et al. (1987) found that the average age at first calving of rural Nili-Ravi buffaloes in Punjab was 45.84±0.19 months. The recent study at Kawkhali upazila under pirojpur district was reported that age at first calving was 55.33±7.2 months (Aug 2016).The collected data of age at first calving of buffaloes are presented in table 6.The average data of age at first calving of indigenous buffaloes are presented in table 10.

Table 7: Age at first calving of indigenous buffaloes

Parameter	Types of Buffaloes	No. of Buffaloes	Mean ± SD
Age at first calving (months)	Milch	33	53.72±1.5
	Dry	17	54.05±1.47

4.7 Calving interval

The average of calving interval of 33 milch buffalo was 1.73±0.52 years. The average of calving interval of 17 dry buffalo was 1.69±0.56 years. The average of calving interval of indigenous buffalo was 1.72±.548 years which is more or less similar to the findings of Fadzil (1969) who found that calving interval was 639 days. Khan et al. (1990) reported that calving interval of Nili-Ravi buffaloes in Pakistan averaged 552.44±18.4 days. The recent study at Kawkhali upazila under Pirojpur district was reported that calving interval was 650.93±79.57 days (Aug 2016).The collected data of calving interval of buffaloes are presented in Table 8.The average data of calving interval of indigenous buffaloes are presented in Table 10.

Table 8: Calving interval of indigenous buffaloes

Parameter	Types of Buffaloes	No. of Buffaloes	Mean ± SD
Calving interval (year)	Milch	33	1.73±0.52
	Dry	17	1.69±0.56

4.8 Post partum heat period

The average post partum heat period of 33 milch buffalo was 147.36±18.39 days . The average post partum heat period of 17 dry buffalo was 150.00±19.03 days The average post partum heat period of the studied areas was 147.6±18.68 days. Ei-Sheikh and Mohammad (1967) found that the post partum service interval of 1st , 2nd and 3rd calving for Egyptian buffalo were 192.95, 152.9 and 317.0 days respectively. Rao et al. (1973) described that the mean post partum estrus was 146.2 days. Parvez et al. (1994) found the post partum estrus interval averaged 171.79±4.01 days. The recent study at Kawkhali upazila under Pirojpur district was reported that post partum heat period was 235.90±52.28 (Aug 2016).The collected data of post partum heat period of buffaloes are presented in Table 9.The average data of post partum of indigenous buffaloes are presented in Table 10.

Table 9: Post partum heat period of indigenous buffaloes

Parameter	Types of Buffaloes	No. of Buffaloes	Mean ± SD
Post partum heat period (days)	Milch	33	147.36±18.39
	Dry	17	150.00±19.03

Table 10.Reproductive performance of indigenous buffalo at SreemangalUpazilla under the district of Moulovibazar.

Parameter	Types of Buffaloes	No. of Buffaloes	Mean ± SD
Age at puberty (Months)	Milch , Dry , Heifer, Bull calf,Bull	79	44.06 ± 2.13
Lactation Period (Days)	Milch , Dry	50	204.70±20.68
Milk Yield (Litre /Day)	Milch , Dry	50	1.88± 0.702
Gestation period(Days)	Milch , Dry	50	307.00±6.06
Age at first calving(Month)	Milch , Dry	50	53.84±1.48
Birth Weight (kg)	Heifer, Bull calf	19	27.26±1.55
Calving Interval(years)	Milch , Dry	50	1.72±.548
Post partum heat period (Days)	Milch , Dry	50	147.6±18.68

The average age at puberty of indigenous buffaloes at the studied area was 44.06 ± 2.13 months. The average lactation length of indigenous buffaloes at Sreemangal Upazilla of Moulovibazar district was 204.70±20.68 days. The average milk yield of indigenous buffaloes at the studied area was 1.88± 0.702 litres per day. The Gestation period of indigenous buffaloes at Sreemangal Upazilla of Moulovibazar district was 307.00±6.06 days. The average age at first calving of indigenous buffaloes at Sreemangal Upazilla of Moulovibazar district was 53.84±1.48 months. The average birth Weight of indigenous buffaloes at the studied area was 27.26±1.55 kg. The average of calving interval of indigenous buffaloes at Sreemangal Upazilla of Moulovibazar district was 1.72±.548 Years. The average post partum heat period of indigenous buffaloes at Sreemangal Upazilla of Moulovibazar district was 147.6±18.68 days

CHAPTER 5

SUMMARY AND CONCLUSION

The study was conducted at Sreemangal Upazilla under Moulovibazar District, in three (3) villages namely Poshchimbharaura, Nawagaon and Uttoruttorsor from Jun/2021 to Dec/2021. The present experiment was conducted under the Department of Animal Nutrition, Genetics and Breeding in Sher-e Bangla Agricultural University (SAU), Dhaka, with the financial support of the Sher-e Bangla Agricultural University Research System (SAURES) .This study involves only field work for accumulation of data. The total 79 data were taken from the area respectively. The main objectives of this study is the evaluation of reproductive performance of buffaloes in village condition based on different factors.

The age at puberty of indigenous milch buffaloes at the studied area was 43.9 ± 1.94 months. The age at puberty of indigenous dry buffaloes at the studied area was 44.4 ± 2.36 months.The age at puberty of indigenous haifer buffaloes at the studied area was 44.03 ± 2.14 months..The age at puberty of indigenous bull calf buffaloes at the studied area was 44.4 ± 2.13 months. The age at puberty of indigenous bull buffaloes at the studied area was 43.06 ± 2.48 months. The average age at puberty of indigenous buffaloes at the studied area was 44.06 ± 2.13 months. The age at puberty of indigenous buffaloes are highly correlated.

The lactation lenght of indigenous milch buffaloes was 206.06±21.56 days. The lactation Period of indigenous dry buffaloes was 202.05±19.20 days.The average lactation length of indigenous buffaloes at Sreemangal Upazilla of Moulovibazar district was 204.70±20.68 days.

The Milk yield (L /D) of indigenous buffaloes at the studied area was 1.8±0.69 litres per day. The Milk Yield (L /D) of indigenous buffaloes at the studied area was 1.9±0.74 litres per day .The average milk yield of indigenous buffaloes at the studied area was 1.88± 0.702 litres per day.

The Gestation period of indigenous milch buffaloes at Sreemangal Upazilla of Moulovibazar district was 306.81±6.35 days. The average gestation period of indigenous dry buffaloes at Sreemangal Upazilla of Moulovibazar district was

307.35±5.63 days. The Gestation period of indigenous buffaloes at Sreemangal Upazilla of Moulovibazar district was 307.00±6.06 days.

The Age at first calving of indigenous milch buffaloes at Sreemangal Upazilla of Moulovibazar district was 53.72±1.5 months. The Age at first calving indigenous dry buffaloes at Sreemangal Upazilla of Moulovibazar district was 54.05±1.47 months. . The average age at first calving of indigenous buffaloes at Sreemangal Upazilla of Moulovibazar district was 53.84±1.48 months.

The Birth weight of indigenous haifer buffaloes at the studied area was 27.16±1.53 kg. The Birth Weight of indigenous bull calf buffaloes at the studied area was 27.43±1.71 kg. The average birth Weight of indigenous buffaloes at the studied area was 27.26±1.55 kg.

The Calving interval of indigenous milch buffaloes at Sreemangal Upazilla of Moulovibazar district was 1.73±0.52 years. The Calving Interval of indigenous dry buffaloes at Sreemangal Upazilla of Moulovibazar district was 1.69±0.56 years. The average of calving interval of indigenous buffaloes at Sreemangal Upazilla of Moulovibazar district was 1.72±.548 years.

The Post partum heat period (Days) of of indigenous milch buffaloes at Sreemangal Upazilla of Moulovibazar district was 147.36±18.39 days .The Post partum heat period of indigenous dry buffaloes at Sreemangal Upazilla of Moulovibazar district was 150.00±19.03 days.The average post partum heat period of indigenous buffaloes at Sreemangal Upazilla of Moulovibazar district was 147.6±18.68 days

The results on different reproductive parameters of indigenous buffaloes in this study showing that most of the parameters has a strong positive co-relation between milch and dry cows. In socio-economic aspects of Bangladesh we have to improve the reproductive features of buffalo cows in order to improve national economic.The present study identified the following problems from the indigenous buffalo owners such as- scarcity of feeds and fodders, lack of veterinary care and services, non-availability of hybrid breeding bull, grazing problems, conception rate. Artificial Insemination should be perfomed for better reproductive performance.

Recommendation:

Based on the findings and conclusions of the study, the following recommendations were made:

1. The present study was conducted only 3 villages namely Sreemangal Upazila. Three villages namely Poshchimbharaura, Nawagaon and Uttoruttorsor. Findings of the study need further verification through similar research in other parts of the country.

2. This study investigated on eight reproductive parameters on the basis of farmers information. Therefore, it is recommended that further studies should be conducted involving other variables in these regards.

4. It is recommended that proper care and management also helps for better reproductive performance of indigenous buffalo.

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