Evaluation of reproductive performance of indigenous buffaloes at Sreemangal Upazila

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ABSTRACT

The present study was conducted with a view to knowing the reproductive performance of indigenous buffaloes at Sreemangal Upazila under the Moulovibazar district. Data were collected on a regular basis in 2021 from thirty (30) families by written interview paper. Out of 30 families; 26 own 33 milch buffaloes, 17 dry buffaloes, 12 heifer calves, 7 bull calves, and 10 bullocks were counted for calculation. This study demonstrated that the distribution of buffalo populations was scattered and the average buffalo populations were 3.038 per house-holds. The evaluated reproductive performance of indigenous buffaloes found the age at puberty was 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 the average post-partum heat period was 147.6±18.68 days. The study revealed that the reproductive performance of the buffaloes was varying among breeds, farms, locations, areas, seasons, and management in the study area. In a concrete manner, this study gives a complete scenario of the reproductive performance of indigenous buffaloes at Sreemangal Upazila under the Moulovibazar district of Bangladesh which is strictly controlled by genetic and non-genetic factors.

Keywords: Buffalo, Reproductive performance, Puberty, Gestation period

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. In recent decades, buffalo farming has expanded widely in the Mediterranean and Latin America as well as, in Central or Northern Europe where several herds were introduced (Shamsuddin et al., 2001).

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 was then increased from 700 to 2,000 kg/year (Ghaffaret al., 1991).

The buffalo can utilize poorer quality roughages, adapt to harsher environments, and are more resistant to several bovine tropical diseases (Warriach et al., 2015). Despite these merits, buffalo

have relatively poor reproductive efficiency irrespective of their location throughout the world. Buffalo exhibits 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 (Qureshi et al., 2010). It can be seen that there is limited quality research in the area of basic physiology, health, management, nutrition, and applied reproduction; because buffalo are located mostly in developing countries with meager resources (Qureshi et al., 2010).

We discuss the impact of the various techniques as well as bottlenecks and possible future development which will lead to improved reproductive performance in this species. Like other developing countries, animal production systems and their use vary widely in Bangladesh with the climatic condition, topography, and socio-economic condition. The production systems are characterized by the small number of animals with no or minimal inputs, low outputs, and periodic demolition of animals by disease and are mostly maintained under scavenging systems (Saadullah, 2012). Buffaloes are a better converter of poor-quality fibrous feeds into milk and meat (Habib et al., 2017). 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, 1999).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 fewer management inputs. It has also been reported that buffalo holds a strategic place in the 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 for milk and milk products like butter cheese, ghee, yogurt, and ice cream has increased. During 2006-07, milk production in Bangladesh was 22.80 Lakh Metric tons whereas the current production is 72.75 Lakh Metric tons. The present demand for milk production in BD is 146.91 Lakh Metric tons and availability is 72.75 Lakh Metric tons hence the deficit is about 50.47%. Though milk production increased by 68.66% compared to the last 10 years but there are also 74.16 Lakh Metric tons, still we need to increase (50%) milk production in order to meet up the demand (DLS, 2016). In India, a white revolution occurred long ago through dairy buffalo rearing, and 67.99% of milk comes from buffalo whereas dairy buffalo production is very limited in Bangladesh as only 0.039% of milk is from buffalo. Major percentages (>90%) of milk is coming from dairy cows 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 is huge potential for 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 the South Asia region are 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 Buffalos production

system varies widely in accordance with climate, soil, and socio-economic opportunities in Bangladesh. Buffalos graze in a natural pasture in coastal areas. A total of 11, 5, and 84% of farmers reared buffalo for milk purposes, meat purposes, milk and meat purposes, respectively in coastal areas (Nahar, 2015). According to Saadullah (2012), buffaloes are kept mainly for specific purposes, i.e. either for milk or for meat production in Bangladesh under a semi-intensive system. It is an important livestock resource in several countries of South Asia and the Mediterranean regions. Buffaloes play a vital role in food security and poverty alleviation in South Asia, because of the largest population comprising diverse and the best buffalo germplasm in the world. Of the 194.29 million world buffalo population, 97% is concentrated in Asia and 57% in India alone (FAO, 2014).Due to high fat content of buffalo milk, it is the most preferred species and is called the Black gold of Pakistan (Bilal et al., 2006). The climatic condition of Bangladesh is nearly similar to India and has many rivers and marshy lands that favor raising buffaloes. Recently the Government of Bangladesh, the private sector, and research organizations have given emphasis on Buffalo production. The availability of milk in Bangladesh is only about 208.61 ml/day/head (DLS, 2021-22) whereas; the availability of milk in India and Pakistan is about 290 ml, and 525 ml/day/head respectively (Hamid et al., 2016). This figure indicates that Bangladesh needs to give more emphasis on milk production to fulfill the national demand. The indigenous dairy cows are low producers and the crossbred cow has limitations regarding disease resistance, repeat breeding etc.The 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 industries 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; Faruque and Amin, 1995; Shamsuddin et al., 2001). Faruque and Amin (1995) and Uddin et al., (2016) reported the reproduction and production performances of buffaloes in the Noakhali district of Bangladesh. However, there is no report on the reproductive performances of buffaloes in the Moulovibazar district of Bangladesh where a good number of buffaloes exist. Moreover, different management systems e.g. extensive and semi-intensive systems were followed in this area. Semi-intensive system was introduced very recently to emphasize lactating buffaloes. Therefore, the present study was designed to investigate the few reproductive characteristics of indigenous buffaloes in Bangladesh and hence find out the factors which control the reproductive performance of indigenous buffaloes at Sreemangal upazila.

MATERIALS AND METHODS

The present study was completed 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).

Study area

This study was conducted at different places of Sreemangal Upazila. Three villages namely Poshchimbharaura, Nawagaon and Uttoruttorsor were purposely selected for the study. The

ecology of this area is suitable for buffalo rearing. The average temperature is 24.5℃ and the annual rainfall average is 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 the household before collection of data.
ii) Recording reproductive performance directly from the farmers in their household.

Study period & data collection

The 26 families of buffalo owners were taken from Sreemangal Upazilla under the District of Moulovibazar for this study. Data for the experiment were conducted through door to door visits at farmer's houses during June/2021 to Dec/2021. Data was collected through a previously prepared interview schedule. Questionnaire includes both open and closed questions to collect data with view to objectives of this study. Direct interview method was used for collection of information.

Parameters of the study

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

Age at puberty

Age at puberty is the time between birth and first estrus. When a female shows the sign of first estrous that age counts as the age of puberty. By observing the wagging tail, swelling, watery discharge from vulva, jumping tendency to others and bleating detect the age of puberty of Buffalo.

Lactation length

Lactation length means the period when a Milch buffalo gives milk. Lactation period of Buffalo is longer than other animals. The total period when Milch buffalo gives milk was recorded in a data sheet and analyzed.

Milk yield

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

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.

Birth weight

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

Age at first calving

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

Calving interval

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

Post-partum heat period

Post-partum heat period means the first heat after calving. Data was recorded in a data sheet for analysis.

Statistical Analysis

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

RESULTS AND DISCUSSION

The finding is described in accordance with the objectives of our study. The results of this study for different traits are presented in different Tables. The number of buffaloes under the selected Sreemangal Upazila has been shown in Table 1.

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			

Table 2 Reproductive performance of indigenous buffalo at Sreemangal Upazilla under the district of Moulovibazar

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

Age at puberty

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, Bangladesh 2016).The collected data of age at puberty of buffaloes are presented in Table 2. Perera, (2011) reported that the age at puberty is influenced by genotype, nutrition, management, climate, and under favorable conditions occurs at 15-18 months in river buffalo and 21-24 months in swamp buffalo. The ovaries of buffaloes are smaller than in cattle and contain fewer primordial follicles. Buffalo are capable of breeding throughout the year, but in many countries a seasonal pattern of ovarian activity occurs. This is attributed in tropical regions to changes in rainfall resulting in feed availability or to temperature stress resulting in elevated prolactin secretion, and in temperate regions to changes in photoperiod and melatonin secretion. The delayed age of puberty in this study also supports the previous statement.

Lactation length

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) studied that the lactation length of indigenous buffalo was 275 days. Faruque and Amin (1995) 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. The recent study at Kawkhali upazila under Pirojpur district reported that the lactation period was 242.60±41.46 days. The average data of lactation period of indigenous buffaloes are presented in Table 2. The lactation length of the buffalo depends on several genetic and non-genetic factors. Maraiet al., (2009) found similar lactation lengths of the buffaloes found in this study and reported that lactation length is affected by the season of the birth and increased with the advancement of parity. In this study non-genetic factors, seasons, and parity might have the possibility to affect the lactation length of the buffaloes as well.

Milk yield

In the study area, the average milk yield of indigenous buffaloes was found 1.88±0.702 liters/day. Studies revealed that the daily milk production of Bangladeshi indigenous buffalo usually varied from 2.70-2.89 liters (Amin et al., 2015). However, comparatively higher milk production of 3.33-3.43 liters per day has also been reported in indigenous buffaloes by Karim et al., (2013). Afzal et al., (2007) reported that Milk production was lower in the first lactation than that in 2nd, 3rd and 4th lactations. Milk yield per lactation increased with increasing lactation length. The season of calving had a significant effect on milk yield. In this study, several factors might have affected milk production in the study area which corroborate the previous results found by different research findings.

Gestation period

The average gestation period of indigenous buffaloes of the studied area was 307.00±6.06 days. EI-Sheik 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 gestation period was 317.47±6.57 days.The average data of gestation period of indigenous buffaloes are presented in Table 2. It was reported that gestation length varies depending on breed. It was also found that in some cases the calving or parity number affects the length of gestation period of buffaloes (Anderson and Plum, 1965). It was also reported that the gestation length increases one to two days with each successive calf. Some investigators claim that the gestation length is influenced by the weight of the dam. Seasonal effects on gestation length have been found in a number of instances. In the present study the seasonal effects, dams weight, age, and parity number probably influenced the gestational period of the buffaloes at the study area.

Birth Weight

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 was 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 (1995) 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 the present study, the average birth weight of 18 to 30 kg. The recent study at Kawkhali upazila under Pirojpur district reported that the birth weight was 23.77±5.20 kg. The average birth weights of indigenous buffaloes are presented in Table 2.Naqvi and Shami (1999) reported that higher birth weight was observed in male and female calves born to early maturing buffaloes as compared to late maturing group. It was observed that the birth weight of male calves increased non-significantly, whereas, birth weight of female calves increased significantly with the increase in parity. The present study revealed the calves' weight influenced by several factors from sire and dams individuals which is relevant with this study.

Age at first calving

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. Fadzil (1969) also 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 reported that age at first calving was 55.33±7.2 months. The average age at first calving of indigenous buffaloes are presented in Table 2.Bashyalet al., (2021) revealed that age at first calving depends on genetic factor (breed and heredity), physiological factor (age at maturity, fertility issues and anticipation of puberty), environmental factors (time of birth, season of breeding, location and photoperiod), health and nutritional factors and managemental factors (feeding practice and managemental system). During this study all the factors was not possible to consider at a time. Hence, the age at first calving found in this study possible to cover all the factors.

Calving interval

The average age of calving interval of indigenous buffalo was 1.72±0.548 years which are more

or less similar to the findings of Fadzil (1969) who found that calving interval was 639 days. Khan et al. (1990) reported that the calving interval of Nili-Ravi buffaloes in Pakistan averaged 552.44±18.4 days. The recent study at Kawkhali upazila under Pirojpur district reported that the calving interval was 650.93±79.57 days. The average age of calving interval of indigenous buffaloes are presented in Table 2. Cady et al., (1983) found that herd, year, season, and parity number also had significant effects on days open and calving interval. Month of calving was important for time until return to estrus. Herd and year influenced day's open, calving interval and services per conception whereas parity affected only days open and calving interval. Similar influence also occurs in the reproductive performance of buffaloes at present study.

Post-partum heat period

The average post-partum heat period of buffalo 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. Pervez et al. (1994) found the post-partum estrus interval averaged 171.79±4.01 days. The recent study at Kawkhali upazila under Pirojpur district reported that the post-partum heat period was 235.90±52.28. The average data of post-partum of indigenous buffaloes are presented in Table 2.It was explained that postpartum heat period is affected by several factors such as nutrition plane, milk yield, Body Condition Score (BCS) at calving, suckling, parity, calving season and other factors (Barile,Braille 2005; El-Wishy, 2007). In this study the variation of post-partum heat period is possibly due to the similar factors found previously.

CONCLUSION

The existing research showed a relatively overall reproductive performance of indigenous buffaloes in the Shreemangal upazilla at Moulvibazar district. Results obtained from this study have shown variations in reproductive performances of indigenous buffaloes. This study found that the reproductive performance of indigenous buffaloes depends on various factors such as management, breed, parity, seasons, feeding and environmental condition. Along with some genetic and non-genetic factors,the physiological and hormonal condition of the individual animals also affects the reproductive performances. Although all the factors have not been studied in this research, it assumes that a lot of factors control the performance in combination. From this study, it can be concluded that the buffalo owner needs to rear the animals in a scientific manner rather than traditional practices.In general, the adoptions of proper selection and appropriate breeding methods are essential for its genetic improvement to increase its productivity. The main problem in buffaloes are silent heat, if it can be managed properly, we can get more production to fulfill our demand. This research finds out some reproductive performance which helps for further research. If we provide better management, nutrition and AI (Artificial insemination) service for reproduction, we hope better production from buffaloes. Finally, these data will be helpful for future research and also give a guideline for buffalo development in Bangladesh.

CONFLICT OF INTEREST STATEMENT

The author declares that there is no conflict of interest that could be perceived as prejudicing the impartiality of the research reported.

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