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Evaluation of Assamese buffaloes considering important economic traits under field conditions in their home tracts

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Abstract
The Assamese buffaloes are being reared by the farmers/breeders for milk, meat and for draught purposes. These buffaloes are known for higher fat contents in their milk (8.5 percent on an average) and are famous in the market with a great demand and are known as "Khuti milk". They are good source of livelihood for breeders and the graziers both in its breeding tract and have attracted researchers to consider the study of some important economic traits under field conditions. The present study was organized and considered the data on a total of 324 Assamese buffaloes distributed over three districts namely Kamrup, Nagaon and Darrang in Assam covering 35 khutis (open herds) during the year 2015-16 eighteen months. The lactation milk yield of Assamese buffalo was observed as 448.38±1.67 kg with a lactation length of 237.06±0.74 days and the peak yield and days to attain were measured as 3.41±0.02 kg and 54.16±0.19 days respectively. The reproduction traits like age at first calving, gestation period, service period and inter-calving period were considered for the study based on the breeders' interview using pre-structured formats. The age at first calving was recorded as 52.28±0.81 months, the gestation period was observed as 323.10±0.68 days with an inter-calving period of 465.70±1.67 day. The service period and the dry period for these buffalo was 171.34±0.82 and 252.84±1.47 days respectively. The production and reproduction performance of Assamese buffaloes need special attention to be addressed for further improvements to help a large size of population of Assam, who are entirely depending for their livelihood on these valuable AnGR (buffaloes) of Assam.

Keywords: Assamese buffaloes, Breeding tract, Economic traits, Production, Reproduction

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INTRODUCTION

Majority of Indian buffaloes (63 percent) are owned by marginal and small land holders, which implies that marginal and small farmers derive a considerable proportion of their income from buffaloes. The primary importance of buffalo is more for provision of high value protein rich animal products (milk and meat), indirectly support crop production through draught power and manure, finally they are the source of income and employment for small farmers (Parashuramulu*et al.,* 2015). The buffalo population has increased from 105.3 million (2007) to 108.7 million in 2012 (19th Livestock census, 2012). The buffaloes of Assam are mostly of swamp type, which is still possess a semi-wild type behavior in their nature. These buffaloes, which are considered to be the most valued animal genetic resources in the region (Das et al., 2007). The Assamese buffaloes have been found along the Brahmputra river valley region in Assam represent a unique population persisting and producing in a typical "Khuti" (open herds) system locally developed over the decades and being reared by the farmers/breeders for milk as well as for draught purpose. Assamese buffaloes are mainly distributed in upper, lower and central Brahmputra valley in the districts of Sibsagar, Dibrugarh, Jorhat, Kamrup, Sonitpur, Darrang and Nagaon. The population of these Assamese buffaloes are estimated to be around 6,78,000 (2003), 5,00,000 (2007) and 4,35265 (2012) as per live-

stock census 17th, 18thand 19threspectively. These buffaloes, originally described as Swamp type based on their morphological appearance were later confirmed as riverine type based on cytogenetic analysis (Mishra *et al.,*2015). These buffaloes are famous for higher fat contents in their milk (8.5 percent on an average), having good market and liking among the consumers; the milk is having great demand and is known as "Khuti milk". About 17-18 percent of this milk is converted into curd and ghee, these are the reasons that these buffalo genetic resources of Assam have been considered a good source of livelihood among the breeders/graziers in its breeding tract and have attracted the researchers for further comprehensive study on production and reproduction performance under khuti management in its breeding tract. Work has been done on these lines under farm conditions on Assamese buffaloes at Assam Agricultural University, Khanapara, Guwahati, Assam (Aparna *et al.,* 2005; Aparna *et al.,* 2015), whereas, information under extensive management conditions are not available, hence, importance of this research is having great value for further improvement of the breed to improve production and reproduction performance of Assamese buffaloes under field conditions.

MATERIALS AND METHODS

Present study was conducted by using purposive sampling procedure survey technique in eighteen villages having highest percentage of population density of Assamese buffaloes in three districts of Assam, India, viz. Kamrup, Nagaon and Darang using stratified random sampling technique in a period of 18 months during the year 2015 & 2016. Three hundred forty two (342) buffalo cows were randomly selected for recording of data covering 35 khutis' (open herds) in the breeding tract. A pre -structured questionnaire and comprehensive discussions with breeders were used to collect the data related to milk production traits like lactation milk yield in kg, lactation length in days, peak milk yield in kg, days to attend peak milk yield, dry period in days and reproduction traits like age at first calving in days, gestation period in days, service period (days) and inter-calving period (days). In order to get logical interpretations the data collected were compiled, tabulated and subjected to appropriate statistical analysis methods described by Harvey (1975).

RESULTS AND DISCUSSION

Production performance

Lactation milk yield: The least square mean of lactation milk yield was recorded as 448.38±1.67 kg for Assames buffaloes under open herd management conditions (Table 1). The results of the present study was lower than the findings of (Das, 1988, Zaman *et al.*, 2003, Goswami, 2009 and Arpana*et al.,* 2015)in swamp buffaloes of Assam, who reported the lactation milk yield as 514.16±7.67 kg, 503.89±3.87 kg, 540.34 kgand 514.16±7.67 kg respectively under farm management conditions, whereas Thuchadaporn*et al.* (2013) reported lower total lactation milk yield (255±20.9 kg) in Thai swamp buffaloes under intensive farm conditions. Higher milk yield in compared to the present findings was also observed by Ismaiel (1998) and (Juma*et al.*, 1991) in Murrah buffaloes may be due to best buffalo breed of the world maintained under farm conditions. Manzoor *et al.* (2013) reported quite higher milk yield (1735.30±8.1kg in 305 days and 1910.20±10.4 kg of total lactation yield) in registered Nili-Ravi buffaloes under field conditions, may be due to existing breed and management practices. The lower level of production in swamp buffaloes of Assam might be due to poor application of scientific breeding and management practices followed by the breeders in the breeding tract.

Lactation length: The least square mean of lactation length of the Assamese buffaloes under present study was observed as 237.06±0.74 days and was lower than the report of Goswami, 2009 (223.80 days) whereas, lactation length reported by Das, 1988, Zaman et al., 1996, Roychoudhury, 2000 and Gogoi*et al.* (2002) in swamp buffaloes of Assam were higher under farm conditions. The results of Sadhana Kurrey et al., 2016 (238.6±1.7 days) in local buffaloes of Chhattisgarh plains was almost similar to the present study. In contrast Al-Amin *et al.* (1988) in Iraqi buffalo, Srivastava *et al.,* (1996) in Murrah buffaloes and Pathodiya*et al.* (1998) in Surti buffaloes reported the lactation length as 283.7±2.47 days, 290.26±0.42 days and 264.60±3.0 days respectively, were also higher than the present findings, may be due to breed type and farm management practices. Karim *et al.* (2013) reported lactation length as 286.12±11.27 and 290.44±10.92 days in two different districts of Bangladesh for indigenous breed of buffaloes under field conditions, which are also higher than the present study. Thuchadaporn*et al.* (2012) reported in Thai swamp buffaloes as 127.50±104.6 days of lactation length which is quite lower than the present study.

Peak yield: The least square mean of peak milk yield of the Assamese buffaloes under present study was recorded to be 3.41+0.02 kg. Finding of the peak milk yield of the present study was lower than the findings of Gogoi (1994), Zaman(1996) and Goswami (2009) for swamp buffaloes of Assam who reported peak milk yield as 4.18+0.05 kg, 4.08+0.06 and 4.24 kg, respectively and Azad et al., 2014 in graded Murrah, Diara and Non-descript buffaloes (7.87±0.26, 7.28±0.28 and 5.74±0.27 kg), whereas, PMY (3.20±0.05kg) reported by Aparna *et al.*, 2015 under farm conditions was lower than the present study in swamp

Table 1. Milk production performance of Assamese buffaloes in its breeding tract during the period 2015-16.

S.N.	Production parameters	No. of observations	Mean± SE
1.	Lactation milk yield (kg)	342	448.38±1.67
2.	Lactation length (days)	342	237.06±0.74
3.	Peak yield (kg)	342	3.41±0.02
4.	Days to attain peak yield (days)	342	54.16±0.19

Table 2. Reproductive performance of Assamese buffaloes in its breeding tract during the year 2015-16.

S.N.	Reproduction parameters	No. of observations	Mean± SE
1.	Age at first calving (months)	98	52.28 ± 0.81
2.	Gestation period (days))	265	323.10 ± 0.68
3.	Dry period (days)	305	252.84 ± 1.47
4.	Service period (days)	315	177.34 ± 0.82
5.	Intercalving period (days)	310	465.79 ± 1.67

buffaloes. Higher peak yield as compared to the present finding was reported by Chowdhary and Choudhry, 1981(in Mehsana and Surti buffalo), Prakash and Tripathy, (1987); Gajbhiye and Tripathi (1991), Gogoi, 1994 and Singh et al., 2016 (in Murrah buffalo) and Chaudhary et al., 2016 (in Nili -Ravi buffalo) which may be due to the effect of type of breed and management system.

Days to attain peak yield: The least square mean of days to attain peak yield of Assamese buffaloes was found to be 54.16±0.19 days. The present finding is in agreement with the report of Gajbhiye and Tripathi (1991) in Murah buffaloes who reported the peak period as 54.25 days. Zaman, 1996 and Das, 2001 in Swamp buffaloes reported the peak period as 57.8±0.87 days and 56.31±0.32 days, respectivelywhich were slight longer. Govindiah and Rai (1986) reported peak period in medium sized Surti buffaloes as 33.0±1.0 days and Azad et al., 2014 reported 37.67±0.74, 41.10±0.78 and 41.91±0.75 (DAPY) in graded Murrah, Diara and Non-descript buffaloes, which were shorter than the present finding. Galsar et al. 2016 have reported the maximum period (73.13±1.49 days) to attend the peak yield in mehsana buffalo.

Reproductive performance

Age at first calving: The least square mean of age at first calving of the Assamese buffaloes under present study was recorded as 52.28±0.81 months. Finding of the age at first calving of the present study was lower than the findings reported by Amonge (1993); Zaman (1996); Roychoudhuri (2000) and Aparna *et al.* (2005) in swamp buffaloes of Assam. On the other hand Kanaujia *et al.* (1974) and Dahama and Malik, (1991), Sethi and Kala (2005) (55.4±0.4 months), Sadhana et al., 2016 (55.60±0.34 months) and reported higher values for the age at first calving in Indian buffaloes. However, the age at first calving in swamp buffaloes reported by Neog (1990) and Gogoi (1994) were in close conformation with the present study. Thuchadaporn*et al.*, 2012 and Goswami, 2009 reported age at first calving in swamp buffalo under intensive farm conditions as 47.10±8.0 and 47.97 months respectively and Karim *et al.,* 2013 reported in indigenous breed of buffalo of Bangladesh as 50.88±1.71 months, all these findings were greater than the present finding in Assamese buffaloes.

Gestation period: Least squares mean of gestation period was reported to be 323.10±0.68 days. The gestation period of the present study was in close agreement with findings of Amonge, 1993 and Zaman,1996 in swamp buffaloes of Assam. On the other hand Al-Amin *et al.*, 1988 in Iraqi buffaloes, Tailor and Jain, 1993 in Mehsana buffaloes, Pyne*et al.*, 1992 in Murrah buffaloes observed shortest gestation period than the present findings.

Intercalving period: Least squares mean of intercalving period was found as 465.79±1.67 days in Assamese buffaloes in its breeding tract. Similar results were also reported by Pathodia*et al.,* 1992in Surti buffaloes and Das, 1988 in swamp buffaloes. However, Dhanani *et al.,* 1980 observed a shorter inter-calving period in Kundi buffaloes and Goswami, 2009 reported 445.30 months in Swamp buffalo, which is also less than the present finding similarly Sinha et al., 2014 reported 436.34±5.32 days in graded murrah buffalo. On the contrary, Kandasamy *et al.*, 1993; Pyne*et al.*, 1992; Zaman, 1996 and Roychoudhuri, 2000), Sethi and Kala, 2005 (511±4.5 days), Sinha et al., 2014 (747.88±5.66 days in Diara and 477.21±5.43 days in Non-descript buffaloes) and Aparna *et al.* (2015) reported longer inter-calving period in different breeds of buffaloes, may be due to the breed type and management practices, whereas, gestation period reported by Thuchadaporn*et al.,* 2012 (321.4±11.3 days) in Thai swamp buffaloes under intensive farm conditions, and Karim *et al.,* 2013reportedobservations as 319.56±5.93 and 319.12±4.69 days in indigenous buffaloes of two different districts of Bangladeshwere lower than the present study.

Service period: Under present study in Assamese buffaloes, the least squares mean of service period was found to be 171.34±0.82 days in Assamese buffaloes under field conditions. The present value was corroborated well with the findings of Mourad *et al.*, 1991 in Egyptian buffaloes, Pyne*et al.*, 1992 in Murrah buffaloes and Zaman, 1996 in swamp buffaloes of Assam, Thuchdapor-

n*et al.,* 2012 in Thai buffaloes and Aparna *et al.,* 2015 in Assamese swamp buffaloes during most calving season (August to January). Longer service period than the present study was reported earlier by Narasimharao and Ramachandrarao, 1996 in Murrah buffaloes, Ahmad *et al.*, 1983 in Nili Ravi buffaloes and Tailor and Jain, 1993 in Surti and Mehsana buffaloes. However, Dhanani *et al.*, 1998 in Jaffrabadi buffaloes and Pathodiya*et al.,* 1998 Surti buffaloes observed shorter service period.

Dry period: In present study, the least square mean for dry period in Assamese buffaloes was recorded as 252.84+1.47 days. The present value for dry period in Assamese buffaloes was well corroborated with the reports of Das, 1998 in swamp buffaloes, where as Sethi and Kale, 2005 reported 193.4±4.7 days which is shorter period than the findings of present study and Goswami, 2009 reported even more lesser period (152.09 days) in Swamp buffalo. Sinha et al., 2014 reported dry period (DP) of graded Murrah, Diara and non-descript buffaloes as 135.84±6.02, 155.26±6.39 and 159.37±6.14 days respectively. Galsar et al., 2016 observed 158.49±5.15 days of dry period in Mehsana buffalo which is also less than the present study. Longer dry period was observed by Shrestha and Yazman, 1998 in Nepali swamp buffaloes. Tailor and Jain, 1993 in Surti buffaloes, Zaman, 1996 and Roychoudhuri, 2001 in swamp buffaloes observed shorter dry period than the present findings.

Conclusion

Assamese buffaloes are mostly reared by the Tribes, Nomads and Landless population in the breeding tract for sole source of livelihood in Assam. The productive and reproductive performance of this breed is needed to be addressed based on present study under field conditions for further improvement of the breed and its conservation to help the breeders/stakeholders. The population of Assamese buffaloes estimated to be around 6,78,000 (2003), 5,00,000 (2007) and 4,35265 (2012) as per livestock census 17th, 18th and 19 respectively, means continuous decline in the population due to various reasons has attracted the attention to conducted study on production performance of the breed. The mean lactation milk yield was 448.38$\pm$1.67 kg, the peak yield 3.41$\pm$0.02 kg, to attain peak yield it took 54.16$\pm$0.19 days and the lactation length was 237.06$\pm$0.74 days. The overall reproduction performance of the breed was 52.28 $\pm$ 0.81 months on age at first calving, gestation period 323.10$\pm$ 0.68 days, dry period 252.84 $\pm$ 1.47 days, Service period 177.34 $\pm$ 0.82 days and Inter-calving period 465.79 $\pm$ 1.67 days (Table 2). The production and reproduction performance of Assamese buffaloes are better under organized farm conditions than the present study under field conditions, keeping in view it is suggested that using technological interventions/research findings may be improved the performance of the breed in its breeding tract and ultimately income and livelihood can be enhanced of the breeders/farmers of all four district under study.

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