



Reproductive and Productive Performance Evaluation of Local Indigenous Non-descript Cattle of Manipur (Meetei San), India

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ABSTRACT

Background: The indigenous cattle of Manipur known as Meetei San are medium size, stout, hardy and a dual-purpose and non-descript animal. Even though the role of these local indigenous cattle in the household and national economies, they are currently under-utilised, their productivity remains low and populations are faced with extinction. In addition to that, inadequate measures are taken to secure their present and future value. In the present study, an attempt was made to study the reproductive and productive performances of local female cattle of Manipur.

Methods: A total number of 40 (forty) Manipuri local cattle were included in this experimental process. The experiment was carried out at the Livestock Farm Complex, College of Agriculture, Iroisemba, CAU, Imphal, Manipur and adjoining private indigenous cattle farms of Imphal west and Imphal east districts of Manipur. The mean values of age at sexual maturity, length of oestrous cycle, duration of oestrus, age at first calving, gestation length, inter-calving period, open days, dry period, number of service per conception, daily milk production, total milk production, lactation length of local female cattle of Manipur were recorded.

Result: The mean values of age at sexual maturity, length of oestrous cycle, duration of oestrus, age at first calving, gestation length, inter-calving period, open days, dry period, number of service per conception, daily milk production, total milk production, lactation length of local female cattle of Manipur were 26.00±0.36 months, 21.50±0.13 days, 18.43±0.11 hours, 37.35±0.33 months, 280.10±0.17 days, 555.23±3.97 days, 275.13±3.95 days, 148.00±3.00 days, 2.28±0.12, 2.86±0.03 Kg, 363.34±5.86 Kg and 407.23±1.83 days, respectively. The behavioural signs of oestrus i.e. restlessness, frequent urination, bellowing were prominent in local female cattle of Manipur. The swollen vulva, hyperemia of vulvar mucous membrane and genital discharge during oestrus was noticed. In conclusion, the different reproductive and productive parameters in local female cattle of Manipur (Meetei San) were found to be comparable with other cattle breeds/crossbreds with variation in terms of age at sexual maturity, behavioural and physical oestrus signs, inter-calving period, service period, dry period, milk production and lactation length.

Key words: Cattle, Performance, Production, Reproduction.

INTRODUCTION

Manipur is one of the North-Eastern state of India. It comprises mostly hilly areas in the boundary and plain areas i.e. so called Valley areas in the center, Imphal the capital of Manipur. Other plain areas include several districts e.g. Imphal East, Imphal West districts, Thoubal district, Bishnupur district etc. Manipur lies at latitude of 23.83°N and longitude of 93.03°E-94.78°E, covers an area of 22,347 square kilometers. Manipur shares its border with some north-eastern states, Nagaland in the north, Assam in the west and Mizoram in the south. Manipur also shares its International border with country Myanmar in the east.

The indigenous cow of Manipur is also known as Meetei San as their local native name. The meaning of Meetei San is, Meetei means an indigenous Manipuri people and San means cow. So they are popularly known as Meetei San throughout the state and widely reared by different communities in the state. Meetei San or local cattle of Manipur, its original nature is of semi wild type and it is a rare bovine species. Meetei San is only found in Manipur and are distributed in different districts of Manipur which have plain areas and grazing fields. They are also reared in closed cowsheds with semi-intensive type management system. The animal is mainly reared for draught purpose

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and milk purpose to some extent; they are also used for meat purposes. According to 20th Livestock Census (2019), Manipur had 2.63 lakh cattle head including 2.19 lakh indigenous and 0.44 lakh crossbred cattle. The average daily milk yield was 2.0 to 4.5 Kg, hence it has open up an opportunity to boost up the milk yield in the state of Manipur via systematic genetic improvement programs. Local cattle

population of Manipur is decreasing very rapidly due to various abiotic and biotic pressures.

Till date, there is still very limited number of systematic or scientific investigations conducted on the reproductive and productive traits of local female cattle of Manipur. Additionally, it is now necessary to use reproductive technologies to multiply the local germplasm in order to conserve and propagate it in its native habitat. It is crucial to have a precise understanding of the fundamental reproductive characteristics of the species in order to use reproductive biotechnology effectively. Thus, the primary goal of the current research is to determine the reproductive and productive parameters of indigenous female cattle of Manipur.

MATERIALS AND METHODS

A total number of 40 (forty) Manipuri local cattle were included in this experimental process. For the present study, data pertaining to reproduction and production performances of the local female cattle of Manipur maintained in the register of Livestock Farm Complex, College of Agriculture, Iroisemba, CAU, Imphal, Manipur and adjoining private indigenous cattle farms of Imphal west and Imphal east districts of Manipur were collected, compiled and analysed for a period of 10 years (2014 to 2024). The animals were provided with standard housing with balanced ration comprising of both green and dry fodder. Sufficient quantities of concentrates, based on their maintenance and production requirements were given to the milch animals. Usual deworming and vaccination schedules were followed for the herds. The data of age at sexual maturity, length of oestrous cycle, duration of oestrus, age at first calving, gestation length, inter-calving period, open days, dry period, number of service per conception, daily milk production, total milk production, lactation length of local female cattle of Manipur were recorded as per procedure described by Hafez and Hafez (2000).

The collected data were compiled, tabulated and subjected to various appropriate statistical tests to draw meaningful results and logical conclusion. The data were subjected to statistical analysis as per Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

Results of different reproductive and productive parameters are depicted in Table 1.

Age at sexual maturity

In present study the age at sexual maturity was recorded as 26.00±0.36 months which were higher than the findings of Balamurgan *et al.* (2020). Das (2020) also reported higher age at sexual maturity in case of local cattle of Mizoram (Zobawng). The present finding of age at sexual maturity might be higher than the other breeds of cattle due to very harsh life of Meetei San for feeds and fodder along with lack of grazing pasture and poor managerial practices.

Length of oestrous cycle

Length of oestrous cycle of female local cattle of Manipur was recorded as 21.50±0.13 days. Almost similar finding

was reported by Das (2020). The length of oestrous cycle varies from breed to breed (Hafez and Hafez, 2000).

Duration of oestrus

The duration of oestrus of female local cattle of Manipur was 18.43±0.11 hours. Das (2020) found lower oestral periods in Mizoram local cattle. Almost similar findings with the research work were reported by Quinlan *et al.* (1941). Duration of oestrus varies among the different breeds.

Oestrous behaviour or signs

Restlessness

In the present study, 100% of the experimental animals showed restlessness on oestrus period, which was higher than the finding of Das (2020) and similar with the result of Bhattacharya *et al.* (2017). Restlessness occurs at the oestrus period due to the high level of estrogens in the circulatory system (Hafez and Hafez, 2000).

Frequent urination

Present study showed 70% of the experimental animals had frequent urination on oestrus days. Bhattacharya *et al.* (2017) found lower values and Das (2020) found higher value than the present study.

Tail raising

Tail raising behavior was observed in 20% animals on oestrus days. The present finding is supported by the findings of Bhattacharya *et al.* (2017) and Das (2020).

Bellowing

Bellowing sign in the experimental animals was observed in 90%. Negussie *et al.*, (2002) found higher value and Das (2020) found lower value than the present finding.

Genital discharge

All the experimental animals showed genital discharge during oestrus. Result of present study was supported by the findings of the Bhattacharya *et al.* (2017); Das (2020)

Table 1: Different reproductive and productive parameters of local female cattle of Manipur (Meetei San) (Mean± S.E), n=40.

Parameters	Value
Age at sexual maturity (months)	26.00±0.36
Duration of estrus (hours)	18.43±0.11
Duration of estrous cycle(days)	21.50±0.13
Age at first service (months)	27.00±0.36
Gestation period (days)	280.10±0.17
Age at first calving (months)	37.35±0.33
Inter-calving period (days)	555.23±3.97
Open days (days)	275.13±3.95
Dry periods (days)	148.00±3.00
Number of service per conception	2.28±0.12
Daily milk production (Kg)	2.86±0.03
Total milk production (Kg)	363.34±5.86
Lactation length (days)	407.23±1.83

and Negussie *et al.* (2002). Genital discharge occurs on oestrus due to the higher level of estrogen in the circulation and varies from breed to breed (Bhattacharya *et al.*, 2017).

Homosexual behavior

In present study 20% found that only homosexual behavior among the all experimental animals. Findings of the Bhattacharya *et al.* (2017) showed higher value than present study. Similar finding was reported by Das (2020). Homosexual behavior occurs mainly due to the high estrogenic level on oestrus.

Physical signs of oestrus

Swelling of the vulva

Marked Swelling of the vulva was found in 60%, moderate swelling in 20% of the local female cattle of Manipur and mild swelled in 20% of the animals in present study. The present finding is supported by the reports of Bhattacharya *et al.* (2017) and Das (2020). Findings of Negussie *et al.* (2002) showed higher value than the present study. Bulging of the vulva occurs due to hormonal influence of estrogens.

Hyperemia of the vulval mucous membrane

Present study revealed hyperemia of the vulval mucus membrane in 80% of the animals. Findings of Bhattacharya *et al.* (2017) and Das (2020) showed similar results with the present study. Present finding is also supported by Talukdar (2010). Hyperemia of the vulval mucous membrane occurs due to hormonal effect during oestrus.

Characteristics of genital discharge

In present study it was found that the color of the genital discharge was clear among 90% of the animals and opaque among the 10% of the all female cattle of Manipur. The quantity was found to be plenty in 60% of the cases. Findings of Das (2020) showed similar results with the present study. Amount of genital discharge varied from breed to breed and as well as the genital organs wellness (Bhattacharya *et al.*, 2017).

Age at first service

The average age at first fertile service in the present study for local female cattle of Manipur was 27.00 ± 0.36 months. The result of the present study regarding age at the first fertile service was found to be similar with the findings of Majumder *et al.* (2003). Lower age at first fertile service than the present finding was reported by Dhara (1999). The higher values for age at the first fertile service than the present finding was reported by Singha *et al.* (1990) The variation of results reported by different workers with the present findings might be due to the differences in breed, plane of nutrition, housing, climate etc. Normal age at first fertile service of crossbred cattle under tropical region should be in the range of 15 to 20 months (Rahman and Alemam, 2008). Poor quality fodder, stall fed housing system and environmental stress during summer might have resulted in higher age at first fertile service in local female cattle of Manipur recorded in the present study.

Age at first calving

In the present study, the average age at first calving (AFC) in local female cattle of Manipur was 37.35 ± 0.33 months. The comparable finding of age at first calving for present study was reported by Kaye (2017). The shorter age at first calving than the results of present study was reported Das (2010) in crossbred cattle of Assam. The higher age at first calving than the current study was reported by Thakur and Singh (2005). The variation of results reported by different workers with the present findings might be due to the differences in breed, plane of nutrition, housing, climate etc.

Gestation period

Length of gestation period was recorded 280.10 ± 0.17 days in the present study. Findings of Balamurgan *et al.* (2020) and Das (2020) showed almost similar results with the present study. The gestation period is not greatly altered in response to variations in feeding, housing, etc. rather all these factors affect the sizes of developing foetuses. The overall gestation period of the present investigation in local female cattle of Manipur was aligned within normal range.

Daily milk production

The average daily milk production for local female cattle of Manipur was found to be 2.86 ± 0.03 kg. Higher average daily milk yields than to present study was reported by Singh *et al.* (2015) for crossbred cow. The average daily milk yield in crossbred cattle within moderate climatic conditions holds paramount significance for dairy farming sustainability. The genetic potential of crossbred cattle, particularly when crossbred with other breeds, amplifies their adaptability and resilience, resulting in improved milk production. Moderate climates contribute to cattle well-being, minimizing heat stress and optimizing feed intake, thereby enhancing overall milk yield.

Total milk production

The total milk production for local female cattle of Manipur was found to be 363.34 ± 5.86 kg. The results obtained in the present study are comparable to reports of Prasanna *et al.* (2023). The higher lactation yields compared to the present findings were reported by Japheth *et al.* (2015) for crossbred cows. Lactation yield is a crucial economic trait in dairy animals, representing the performance of a dairy animal based on the amount of milk it produces during a specific lactation period. The milk yield not only directly impacts the economic productivity of the animal but also plays a significant role in determining the overall economic viability of dairy enterprises. Under Indian condition, lactation yield of crossbred cattle varies from 2453 to 5256 liters (Shastri and Thomas, 2021). By providing good quality fodder and by following stress free loose housing system, productivity of the local female cattle of Manipur could be increased.

Lactation length

The lactation length of local female cattle of Manipur reared under farm condition was found to be 407.23 ± 1.83 days.

The finding of the lactation length documented in this investigation was agreement with Mishra *et al.* (1997). The lower lactation length compared to present study was reported by Prasanna *et al.* (2023). Inter-calving period of 365 days (12 months) with lactation length 305 days and 60 days dry period is considered as ideal for cross bred dairy cattle. However, inter-calving period up to 15 months can be considered good under Indian condition Shastry and Thomas (2021) and Rahman and Alemam (2008) acknowledged that the inter-calving period is at least not less than 14 months in crossbred cattle.

Dry period

The dry period of local female cattle of Manipur was found to be 148.00 ± 3.00 . Lower dry period with present study were reported by Gautam and Khadka (2022). Longer dry periods compared to present results were reported by Das (1995); Rahman and Kalita (2015). The dry period of a dairy cow is a critical aspect that reflects both productive and reproductive efficiency. Achieving an optimum dry period is desirable for several reasons. If the dry period is too short, it can negatively impact the foetal growth of a pregnant cow and may also affect production of milk in the subsequent lactation. Conversely, an excessively prolonged dry period serves as an indicator of poor productive and reproductive efficiency in a cow. Therefore, maintaining the right balance in the duration of the dry period is crucial for ensuring the overall health, well-being and performance of dairy cows. Rahman and Alemam (2008) regarded 60 days as standard dry period of cows, however, Pezeshki *et al.* (2010) advocated for an 8-week dry period as the long-standing gold standard in the management of dairy cows.

Inter calving period

The inter-calving period for local female cattle of Manipur was found to be 555.23 ± 3.97 days. This finding aligns with similar observations made by Wangdi *et al.* (2014). The lower calving interval to current findings was reported by Prasanna *et al.* (2023). The calving interval is the time interval between two successive calving and it serves as a crucial index for evaluating a cattle herd's reproductive efficiency. It is considered one of the best indicators of breeding and reproductive performance in a herd. An ideal calving interval is desirable as it contributes to increased lifetime productive performance of the animal. Long calving intervals may also be caused by environmental variables, ineffective reproductive management practices, such as incorrect heat detection, premature insemination, incompetent AI personnel and an inadequate and poor-quality feed supply (Fernando *et al.*, 2016). Overall, a shorter and well-managed calving interval is indicative of improved reproductive efficiency and positively impacts the overall productivity of the animal.

Open days

The result of the present research pertaining to open days of local female cattle of Manipur was 275.13 ± 3.95 days.

Shorter open days than the present findings were reported by Prasanna *et al.* (2023). Higher open days compared to present study were reported by Sreedhar *et al.* (2013). The Normal standard open days for cattle is established to be within the range of 60-90 days. However, in the present study service period has surpassed this normal range, which might be due to reproductive disorders, nutritional deficiencies, stall feeding housing system.

Number of service per conception

The number of services per conception for local female cattle of Manipur at farm condition of Manipur was 2.28 ± 0.12 . The similar finding of present study is reported by Vijayakumar *et al.* (2019). Lower number of service per conception than present study was reported by Tomar *et al.* (2023). Number of Services per conception (NSPC) is one of the measurements for reproductive efficiency. It expresses the fertility level of the dairy herds. It is simple and easy to calculate and understand and it is a good measure of reproductive status, however, it usually does not indicate reasons on heifers and cows that fail to conceive. The higher number of services per conception noted in the present study suggests moderate reproductive efficiency of the local cattle. Poor quality of fodder available in the area combined with stress of stall-feeding practice might have affected the reproductive health of the cattle, leading to higher number of services per conception in the present study.

CONCLUSION

Different reproductive and productive parameters in local female cattle of Manipur (Meetei San) were found to be comparable with other cattle breeds/crossbreds with variation in terms of age at sexual maturity, behavioural and physical oestrus signs, inter-calving period, service period, dry period, milk production and lactation length.

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Disclaimers

The views and conclusions expressed in this article are solely those of the authors and do not necessarily represent the views of their affiliated institutions. The authors are responsible for the accuracy and completeness of the information provided, but do not accept any liability for any direct or indirect losses resulting from the use of this content.

Informed consent

All animal procedures for experiments were approved by the Institution Animal Ethics Committee of College of Veterinary Sciences and Animal Husbandry, Central Agricultural University, Selesih, Aizawl, Mizoram, India.

Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this article. No funding or sponsorship influenced the design of the study, data collection, analysis, decision to publish, or preparation of the manuscript.

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