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Study of certain reproductive and productive performance parameters of malnad gidda cattle in its native tract

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Abstract
The study was conducted to establish baseline information pertaining to productive and reproductive performance of Malnad Gidda and its crossbred in Shivamogga District of Karnataka. The data from 286 animals reared by 98 farmers from Thirtahalli, Hosanagara and Sagara taluks of Shivamogga district were collected through a structured questionnaire. The parameters such as age at puberty (25.15±0.29 months); age at first calving (39.32±2.99 months); dry period (6.22±1.26 months); calving interval (13.68±2.55 months); gestation period (282.14±9.03 days); service period (136.73±10.03 days); lactation length (258.22 ± 10.95 days); milk yield per day (3.69±0.32 kg); total milk yield (227.19±8.31 kg); days to reach peak milk yield (46.19±0.51 day); birth weight of the new born calf (8.71±0.45 kg); time taken for placental expulsion of placenta (4.63±0.39 hours); onset of postpartum estrous (77.64±1.98 days); Duration of estrous period (15.25±1.67 hours); time of ovulation (15.15 ± 1.7 hours) and length of estrus cycle (22.63±2.96. days) were recorded. There was no significant difference (p>0.05) in the productive and reproductive parameters of cattle among three taluks Sagar, Hosanagar and Thirthahalli. These parameters are in similar line to that of other dwarf breeds of cattle like Punganur, Kasaragod and Vechur.

Keywords: Malnad gidda cattle, reproduction, production parameters

Introduction
Malnand Gidda is a small, multipurpose (manure, milk and draft) breed of cattle reared by the farmers in Western Ghat region of Karnataka. They play a pivotal role in the socio-economic status of the farmers in this region. A survey was carried out in Shivamogga district during 2005 to 2020 for studying the breed for its productive and reproductive status. It was observed that Malnad Gidda cattle are generally maintained under semi range housing system, being allowed to graze during day and being stallfed with paddy grass and little concentrates in the shed during night. Bedding material containing paddy straw, dry leaves and twigs mixed up with dung and urine were used as compost fertilizer for various plantations. The milk produced by this breed is 0.5 - 3.5 liters per day (Ramesha *et al*., 2013) [15]. The disease resistance capability of this indigenous breed is considered to be important in the present context of characterization, utilization and improvement of the breed. However, the data regarding the reproductive and productive state of this breed of cattle are seldom known. The present study was designed to study certain reproductive and productive performance parameters of malnad gidda cattle in its native tract.

Materials and methods
Malnad Gidda cattle from Sagar, Hosanagar and Thirthahalli taluks of Shivamogga district and cattle from Malnad Gidda Research and Information Center, Veterinary College Campus, Shivamogga were used for the study. The required genetic data information for the study was obtained from Southern Regional Station, ICAR-National Dairy Research Institute, Bengaluru, Karnataka.

131 Malnad Gidda cattle which had calved once, either multiparous or pluriparous, with the age group ranging from 3.5 years to 10 years were selected for recording the the data on the reproductive and productive performance using a detailed questionnaire. The parameters like age of puberty, age of first calving, dry period, calving interval, gestation period, service period, lactation length, peak milk yield per day, total milk yield, days to reach peak milk

yield, birth weight of the new born calf, time taken for placental expulsion, onset of postpartum estrous, duration of estrous period, time of ovulation and length of estrus cycle were recorded.

Statistical analysis

The data obtained from the present study were subjected to statistical analysis using computerized statistical software, GraphPad Prism Version 8.00 (2019) [8] by applying one way or two-way ANOVA at 0.05 % level of significance with the application of Tukey's post test. Mean values and standard error of mean were calculated and all the values were expressed as Mean ± SE (Graph Pad Prism, 2019) [8].

Fig 1: Malnad Gidda breed cattle

Results

The parameters like age at puberty (25.15±0.29 months); age at first calving (39.32±2.99 months); dry period (6.22±1.26 months);calving interval (13.68±2.55 months); gestation period (282.14±9.03 days); service period (136.73±10.03 days); lactation length (258.22 ± 10.95 days); milk yield per day (3.69±0.32 kg); total milk yield (227.19±8.31 kg); days to reach peak milk yield (46.19±0.51 day); birth weight of the new born calf (8.71±0.45 kg); time taken for placental expulsion of placenta (4.63±0.39 hours); onset of postpartum estrous (77.64±1.98 days); duration of estrous period (15.25±1.67 hours); time of ovulation (15.15 ± 1.7 hours); and length of estrus cycle (22.63±2.96 days) were recorded (Table 1). There was no significant difference (p>0.05) in the productive and reproductive parameters among three taluks Sagar, Hosanagar and Thirthahalli. There was no significant difference in between the productive and reproductive parameters among three taluks Sagar, Hosanagar and Thirthahalli.

Table 1: Different reproductive and productive parameters of Malnad Gidda cattle

S. No	Details	Hosanagara	Sagar	Thirthahalli	Average
1.	Age at puberty (Month) n=63	25.14±0.33	25.45±0.32	24.86±0.26	25.15±0.29
2.	Age at first calving (Month)n=56	38.43±4.38	39.56±3.32	39.98±1.29	39.32±2.99
3.	Dry period (Months),n=96	5.23±1.38	6.68±1.12	6.75±1.29	6.22±1.26
4.	Calving interval (Months) n=65	13.36 ±2.36	13.69±2.56	14.01±2.63	13.68±2.55
5.	Gestation period (Days) n=61	283.34±9.38	299.98±8.45	263.12±9.28	282.14±9.03
6.	Service period (Days),n=59	144.34 ±5.38	128.48 ±12.45	137.39 ±12.28	136.73±10.03
7.	Lactation length (Days) n=65	258.01±10.13	248.12±11.13	268.55±11.61	258.22 ± 10.95
8.	Milk yield per day (kg), n=57	3.58±0.13	4.13±0.23	3.38±0.61	3.69±0.32
9.	Total milk yield (kg) n=54	228.33±9.13	226.88±8.12	223.38±7.61	227.19±8.31
10.	Days to reach peak milk yield (Days), n=56	48.93 ± 1.54	47.13 ± 1.41	45.20±1.10	46.19±0.51

11.	Birth weight of the new born calf (kg), n=36	8.61±0.34	8.78±0.49	8.66±0.56	8.71±0.45
12.	Time taken for placental expulsion of placenta (h) n=33	4.51±0.31	4.71±0.72	4.63±0.13	4.63±0.39
13.	Onset of postpartum estrous (Days), n=65	78.63±1.56	82.63±1.87	75.93±2.65	77.64±1.98
14.	Duration of estrous period (h) n=37	14.75±1.28	17.87±2.15	13.15±1.52	15.251.67
15.	Time of ovulation (h) n=17	14.57 ± 1.69	17.58 ± 1.68	11.57 ± 1.72	15.15 ± 1.7
16.	Length of estrus cycle (Day) n=67	19.69±3.56	24.12±2.15	23.11±3.18	22.63±2.96

Values are expressed as Mean SEM p*<0.05

Discussion

The present study was undertaken to document the reproductive parameters of Malnad Gidda in its native tract through data collection and also to assess the response of repeat breeding Malnad Gidda cattle to estrus induction. The results obtained in the present are tabulated (Table 1) and statistically analyzed. The results are discussed as hereunder;

Age at puberty: There was no significant difference between the age at puberty between Malnad Gidda animals of all three taluks. The average age at puberty was 25.15±0.29 months (Table 1). This finding is in accordance with the finding of Rambabu Naik (2011) [14] who also found the age at puberty of Punganur, a dwarf cattle breed was 24.18±0.2 months which is nearer to the value of Malnad Gidda cattle. In Vechur cattle also, the age at puberty was in similar line about 25.51±1.32 month (Sosamma, 2018) [21]. Further this is also supported by the finding of Ekambaram *et al*., (2015) [4] who also reported the similar age at puberty in Punganur cattle as 25.5±1.5 months. In Kasargod breed of cattle, similar observation was done (Sosamma *et al*., 2016) [22]. Hence, the dwarf breeds of cattle do have the similar age at puberty. The age of maturity is inversely proposal to the conception rate as the early age of maturity, the conception rate will also increase and it is beneficial to the farmers.

Age at first calving: The average age at first calving was 39.32±2.99 months (Table 1). Which is in accordance with the findings Ekambaram *et al.* (2014) [4], who reported the age at first calving in short breeds like Punganur cattle. The overall age at first calving were 40.32±1.32 months in Tharparkar cattle (Thombre *et al,* 2002) [24]; 44.35±2.31 months in Deoni cattle. (Bhadoria 2002) [1]; 57.13 ±1.11 months in Gir cattle was for Gir cattle which is more compared to the Malnad Gidda and other dwarf cattle. The higher age at first calving were reported by Kamal Kishore (2012) [9] as 60.86±1.02 month's days in Tharparkar cattle.

Dry period: The average dry period was 6.22±1.26 months. The higher dry period was observed by Joshi *et al.* (2005) as 140 days in Gir cattle; Dangi *et al.* (2013) [3] as 155.28±9.65 days in Rathi cattle. The results of the present study is in agreement with Nanavati and Singh (2009) [11] in Nimari cattle; Bhutkar The dry period being the trait mostly governed by the managemental practices and very less by the genetic and physiological factors. The non-significant effect dry period between taluks may lead to the conclusion that it can be better controlled with proper management only.

Calving interval: The average calving interval was 13.68±2.55 months which was in accordance with finding Gahlot (1999) [6] who reported that calving interval in Tharparkar cattle as 13.73 ± 0.44 months. Patel *et al.* (2000) reported that calving interval in Tharparkar cattle as 14.41±0.21 months and found significant effect of period of calving and parity whereas non-significant effect of season. Nivasarkar *et al.* (2000) [12] noticed the inter calving period of Gaolao cattle as 12.9 ± 0.09 months. Gahlot *et al.* (2002) [6] observed that calving interval in Tharparkar cattle as 398.25 ± 3.09 days. Thombre *et al*. (2002) [24] reported that the overall inter calving period was 533.64 ± 5.21 days in Deoni cattle maintained at CCBP and ACDF, Parbhani and found non-significant effect of season of calving whereas significant effect of period. Bhadoria *et al.* (2002) [1] reported calving interval as 439.02±5.98 days and found highly significant effect of period and significant effect of parity whereas non-significant effect of season. Salunkhe (2007) [18] observed that inter calving period in Deoni cattle as 487.99 ± 2.47 days and found non-significant effect of season whereas significant effect of period.

Gestation period: The average gestation period was 282.14±9.03 days, which was in close agreement with Sahoo *et al.* (2003) [17] as 282.13 ± 0.99 days in Malvi cattle where it is 278.9±2.9 days in Malnad Gidda cattle and is closely related.

Gestation period for the Tharparkar cattle was recorded as 281.62 ± 0.37 days. The lower gestation period was reported by Bhutkar *et al.* (2014) as 278.80±0.44 days in Deoni cattle and Ekambaram (2015) [4] as 276.9 ±0.79 days in Punganur cattle. The similar findings were reported by Bhutkar *et al.* (2014) in Deoni cattl The non-significant effect of period and season and only significant effect of parity on gestation period of Tharparkar cattle may lead to the conclusion that this trait is genetically and physiologically governed trait hence there is no possibility of any variation than the normal limits decided by nature.

Service period: The higher service period were reported by Kamal Kishore (2012) [9] as 122.04 ±4.264 days in Tharparkar cattle. Bhutkar (2014) informed that it is 203.73±12.47 days in Deoni cattle and Kumar *et al.* (2016) [10] noted as 261.26±26.15 days in Ongole cattle.

The findings of present study are in accordance with the earlier researchers like Bhadoria *et al.* (2002) [1] in Gir cattle; Kamal Kishore (2012) [9] in Tharparkar cattle; The service period being the traits mostly governed by the set of management practices, physiological adaption and periodical improvement leads to exhibit this trait in a refined form. Hence it may be concluded the service period observed in the present study might be the result of physiological adaptation and improvement in the set of management practices followed during the period of study.

Lactation length: The average lactation length was 258.22 ± 10.95 days, Gahlot (1999) [6] observed that milk yield per day of lactation length as 6.12 ± 0.05 kg in Tharparkar cattle and found significant effect of period of calving. Patel *et al.* (2000) reported that milk yield per day of lactation length in Tharparkar cattle as 4.65±0.13 liters and found non-significant effect of season and period whereas significant effect of parity.

Peak milk yield per day: There was no significant difference

between the peak milk yield per day between Malnad Gidda animals of all three taluks. The average peak milk yield per day was 3.69±0.32 kg (Table 1). This finding is in accordance with Ramesha *et al*. (2013) [15]. The milk yield is depending on genetic trait and also breed milk characters. Usually dwarf breeds of cattle do have low milk yield. The milk yield of the dwarf breed Punganur was almost similar (Reddy *et al.,* 2004) [16]. Similar milk yield also observed in another dwarf cattle breed Vechur which also yielded the milk yield per day of 4.12±1.10 kg (Sosamma, 2018) [21]. Hence, most of the dwarf breed of cattle are low yielders compared to cross breeds. However, the milk yield of Hallikar, Amrut Mahal, Khilar etc also less as they are dual purpose breeds (Singh *et al*., 2005)

Total milk yield: The average total milk yield per day was 227.19±8.31 kg. The lower lactation milk yield in the present study is not in accordance with the finding of Vataliya *et al.* (2013) who reported it as 1838 kg in Gir cattle; Kuralkar *et al.* (2014) as 910.95 ±43.11 kg in Deoni cattle and Kumar *et al.* (2016) [10] 678.84± 43.11 kg in Ongole cattle. The milk yield is mainly dependent on breed. Malnad Gidda is a low yielder and mainly genetic trait of it might had played a major role in low milk yield (Geetesh, 2016) [7].

Days to reach peak yield: The average days to reach peak yield was 46.19±1.51 days.In present study, the non-significant effect of sire, parity, period and season was observed which was in agreement with Bhutkar (2014). The non-significant effect of sire, parity, period and season on days to reach peak yield in Tharparkar cattle might be due the fact that 40 days are required for involution of uterus and to retain cyclicity of ovary. As Tharparkar cattle being more cyclic animal and exhibit peak yield immediately after pueperium and for which the period ranged between 41 to 46 days which is quite normal and comparable with other milch breed (Geetesh, 2016) [17].

Birth weight of the new born calf: The average birth weight of calf was 8.71±0.45 days. There was no significant difference between weight of the new born calves in Malnad Gidda animals of all three taluks. Birth weight depends on the weight of the dam, sire, nutritional status, season, parity and many other parameters. The above findings are supported by the finding of Ramesha *et al.* (2013) [15] who reported the birth weight of the Malnad Gidda cattle was 7.91±0.58 kg. Further, the same is also supported by the findings of Singh *et al.* (2008) [20].

Time taken for placental expulsion: The average time taken for placental expulsion was 4.63±0.39 hours after calf delivery. There was no significant difference between any groups in Malnad Gidda animals of all three taluks. Time taken for placental expulsion depends on the dam, sire, nutritional status, season, many other parameters. The above findings are supported by the finding of Singh *et al.* (2008) [20] who reported the time taken for expulsion of placenta was of the Malnad Gidda cattle was 4.88±0.58 h which is in accordance with the findings of the present study.

Onset of postpartum estrous: The onset of post partum estrus depend on suckling stage of calf, suckling reflex, milk yield, nutritional status of the animal and nurishment as reported by earlier workers Ramesha *et al.* (2013) [15] and Singh *et al.* (2008) [20]. The dwarf breeds of cattle belonging to Kasargod breed of cattle was also in the similar range as reported by Sosamma *et al*., (2016) [22].

Duration of estrous period: The average duration of estrus was 15.25±1.67 hours. There was no significant difference between any groups in Malnad Gidda animals of all three taluks. Duration of the estrus period is dependent on the hormonal profile of the animal. Standing estrus, also referred to as standing heat, is the most visual sign of each estrous cycle. It is the period of time when a female is sexually receptive. Estrus in cattle usually lasts about 15 hours but can range from less than 6 hours to close to 24 hours. Many cattle do similar duration of estrus period in similar line to the finding of the present study (Sosamma *et al*., 2016; Thangaraju *et al*., 2001) [22, 23].

Time of ovulation: There was no significant difference between any groups in Malnad Gidda animals of all three taluks. The average time of ovulation was 15.15 ± 1.7 hours., which is accordance with Sosamma *et al* (2016) [22] who reported 13.57 ± 0.68 hours. Present finding is in accordance with most of the local breeds of the cattle which do have similar time of ovulation (Geetesh, 2006; Ramesha *et al*., 2013; Thangaraj *et al*., 2001) [17, 15, 23].

Length of estrus cycle: The average length of estrus cycle was 22.63±2.96 days. Following each standing estrus, a new estrous cycle will be initiated. In the present study ength of the estrus cycle in different native breed animals (Geetesh, 2006; Ramesha *et al*., 2013; Thangaraj *et al*., 2001) [17, 15, 23].

Study of other reproductive parameters in Malnad Gidda cattle

Reproductive parameters and disorders also existing in the Malnad Gidda cattle. In the present study, by external observation and data collection, many such parameters such as symptoms of the estrus, lochia and parturient and peri parturient disorders recorded. were in ccordanc with other dwarf breeds of cattle like Punganur, Kasargod and Vechur (Sosamma, 2018; Sosamma *et al*., 2016; Singh *et al*., 2008) [21, 22, 20]. Ergene, (2013) [5] also noticed similar type of estrous symptoms in exotic cattle. The incidences of disorders of pregnancy such as habitual abortion and threatened abortions and retention of prolapse of uterus, dystokia, post parturient prolapse, retention of fetal membranes. Are very common in cross bred animals and also in other native breeds of cattle (Singh *et al*., 2006). Compared to the other breeds, the said disorders are less common in Malnad Gidda animals (Veerendra, 2012) [25]. Observed in seven cattles the incidence of such disorders are comparitively less compared to the other breeds and cross breed cattle (Singh *et al*., 2008) [20].

Summary

Malnad Gidda cattle are hardy animals. Known for the short stature, adaptability to native climates and disease resistance capability. There was no significant difference ($p>0.05$) in the productive and reproductive parameters of cattle among three taluks Sagar, Hosanagar and Thirthahalli. Most of the parameters of Malnad gidda are similar that of other dwarf breeds of cattle like Punganur, Kasaragod and Vechur and further review and researches are necessary for the improvement of Malnad Gidda cattle breed in the future.

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