RESEARCH ARTICLE

Reproductive and productive performances of Kosali cattle in its native environment

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Abstract: Present study was conducted to record reproductive and productive performances of Kosali cattle maintained under farmer's management conditions in Central Plain Region of Chhattisgarh state. 345 livestock owners were randomly selected and interviewed with structured questionnaire to obtain information on reproductive performance of Kosali cattle. Average age at first calving, calving interval, service period and number of services per conception were found 54.64 ± 2.18 months, 430.26 ± 6.33 days, 159.59 ± 2.67 days and 1.4 ± 0.08 , respectively. In male, age at first ejaculation and age at first mating were found to be 41.54 ± 1.14 and 51.3 ± 1.05 months, respectively. Production was recorded and average daily milk yield, peak yield, lactation milk yield, lactation length and dry period were estimated to be 0.92 ± 0.23 kg, 1.27 ± 0.15 kg, 210.3 ± 4.19 kg, 230.7 ± 9.11 days and 190.8 ± 8.19 days, respectively. Average fat and SNF percent were 4.4 ± 0.27 and $10.41 \pm 0.21\%$, respectively. Observed indices showed poor performances which are below the national average. Hence, suitable breeding strategies and training for livestock keepers and farmers on managerial aspects of Kosali cattle is needed to improve production and reproduction performances.

Keywords: Productive and reproductive performances, Kosali cattle, Central Plain region, Chhattisgarh

Introduction

Indian breeds of cattle have evolved as a result of very long period of natural selection and are well adapted to the existing agro-climatic conditions of the region. They are well known for their disease resistance, heat tolerance, adaptability and can live under the available feed stuffs and low management level. Productive and reproductive traits are crucial factors determining the profitability of dairy production. The reproductive efficiency can be assessed by several parameters which are termed as reproductive indices. Dairy production needs to be monitored regularly by assessing the productive and reproductive performance under the existing management system for improvement (Lobago *et al.*, 2007).

Kosali is the first breed of cattle from Chhattisgarh state registered as the 36th breed of cattle and it is mainly distributed in Central Plain Region of the state. In general, these animals are small sized, draft purpose breed, possessing red coat colour, stumpy horn, horizontal ear (Jain *et al.*, 2017, 2018a,b). These animals are contributing to the work power needed for various agricultural operations. Performance records of Kosali cows will be helpful in designing breeding as well as managerial strategies to develop the dairy sector of the state. However, information on the performance of Kosali cows at rural management systems is very scanty. Therefore, the aim of the present study was to record baseline information and knowledge on productive and reproductive performances of Kosali cattle under rural management conditions in its breeding tract.

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Materials and methods

Study area and method of data collection

From the breeding tract of Kosali, three districts, viz- Rajnandgoan, Baloda bazaar and Bilaspur were selected. In each district, four blocks and in each block, five to seven villages were selected at random by stratified two stage random sample technique. Data on reproduction parameters were collected in structured questionnaires by interviews and group discussion and production was recorded systematically.

345 livestock keepers/farmers were interviewed randomly with scheduled questionnaire. A total of 805 Kosali cows for age at first estrous (months), estrous cycle (days), estrous duration (h), age at first mating (months), and 695 cows for age at first calving (months), service period (days), number of services /conception, calving interval (days), gestation length (days) and number of calving were included. Data were recorded on daily milk yield (kg), peak milk yield (kg), days to reach peak yield, lactation length (days) and dry period (days) in 502 Kosali cows. Milk composition in 72 Kosali cows was recorded. 103 bulls were studied for their sexual behaviour.

Data management and analysis

Data collected from the field and secondary sources were entered in to database using Excel 2007 software. The data were subjected to statistical analyses as per Snedecor and Cochran (1989) and the results obtained were presented as mean and standard error.

Results and discussion

Reproductive traits in female

Age of sexual maturity, oestrous cycle and oestrus duration

Average age of first estrus, average age of sexual maturity, estrus cycle duration and estrus time were 34.15 ± 0.73 months, 41.15 ± 3.27 months, 21.69 ± 0.28 days and 14.45 ± 0.27 h, respectively. A considerable delay in the attainment of puberty and sexual maturity may mean a serious economic loss, due to an additional, non- lactating, unproductive period of the cow over several months (Mukasa-Mugerewa 1989). At field level, the general trend was observed that livestock owners are not keen to record estrus duration, as they prefer natural breeding.

Age at first fertile mating (AFFM) and calving (AFC)

Age at first calving is an important trait for economic milk production. Average AFFM and AFC are shown in table 1. These are comparable with Khariar cattle (Dhal *et al.*, 2007). Mean AFC of Manipur and Mizoram (Pundir *et al.*, 2015a, Pundir *et al.*, 2015b), Malnad Gidda (Singh *et al.*, 2008), Bachure (Chandran *et al.*, 2014) cattle were lesser than the mean AFC of Kosali cattle. Different factors advance or delay AFC. Environmental factors, especially balanced nutrition, determine pre-pubertal growth rates, reproductive organ development, and onset of puberty and subsequent fertility. In Chhattisgarh state, farmers provide poor feed stuffs and low management level to Kosali cows. This may be one of the cause of prolonged age of first calving. Therefore, there is need to improve this trait at the farmer's herd.

Gestation period

Normal gestation period was noticed in Kosali cows in the field conditions, which is in agreement with the gestation period of cattle species.

Service period (SP)

Under field conditions, service period obtained is shown in table 1, which is comparable to Manipuri and Mizoram (Pundir *et al.*,

Table 1 Average reproduction traits of female and male in Kosali cattle

Traits	Number of observation	Range	Average
Reproduction traits in female			
Age at first estrous (months)	805	29-38	34.15 ± 0.73
Estrous cycle (days)	805	20-24	21.69 ± 0.28
Estrous duration (h)	805	12-18	14.65 ± 0.27
Age at first fertile mating (months)	805	35-45	44.43 ± 1.17
Age at first calving (months)	695	46-59	54.64 ± 2.18
Service period (days)	695	126-165	159.59 ± 2.67
No of services /Conception	695	1-2	1.40 ± 0.08
Calving interval (days)	695	395-460	430.26 ± 6.33
Gestation length (days)	695	272-285	278.64 ± 0.96
No of calving	695	3-5	3.48 ± 0.12
Reproduction traits in male			
Age at first ejaculation (months)	103	37-50	41.54 ± 1.14
Age at first mating (months)	103	42-58	51.31 ± 1.05

Table 2 Overall mean of production traits in Kosali cows

Traits	First Lactation		N	Overall		
	Average	Range		Average	Range	N
Daily milk yield (kg)	0.70±0.17	0.5-0.9	71	0.92±0.23	0.6-1.4	502
Peak milk yield (kg)	0.90±0.21	0.8-1.1	71	1.27±0.15	0.9-1.4	502
Days to reach peak yield	35.0±3.13	30-45	71	38.5±2.89	30-45	502
Lactation length (days)	190.3±10.33	170-240	71	230.7±9.11	180-245	502
Lactation milk yield (kg)	180.6±5.19	180-220	71	210.3±4.19	180-220	502
Fat %	3.91±0.29	3.3-4.8	23	4.4±0.27	3.3-4.8	72
SNF %	10.05±0.37	9.0-10.45	23	10.41±0.21	8.5-10.4	72
Protein	3.73±0.89	3.5-3.94	23	3.82±0.76	3.5-3.94	72
Lactose	5.81±0.34	5.5-5.9	23	5.2±0.31	5.5-5.9	72
Dry period (days)	175.6±9.12	150-185	91	190.8±8.19	160-200	502

2015a, Pundir *et al.*, 2015b) and Sanchori cattle (Singh *et al.*, 2015) and less than the Malnad Gidda (Singh *et al.*, 2008). The variation in SP reported by different workers may be due to variation in the management efficiency like availability of feed and fodder, estrus detection, silent heat and timely breeding followed in different herds (Savaliya *et al.*, 2016). Service period has its impact on inter calving period and subsequently, on the economics of the milk production. It is needed that the animal should conceive after calving at the earliest. This can be achieved by providing better management and feeding and creating awareness among the owners of the Kosali cattle.

Number of services/mating per conception and number of calving

Mean number of mating per conception and number of calving are shown in table 1 and these are comparable to Bachaur (Chandran *et al.*, 2014) cattle.

Calving Interval (CI)

The calving interval ranged and pooled average are shown in table 1 which is comparable to Bachaur (Chandran *et al.*, 2014) and Sanchori (Singh *et al.*, 2015) cattle and less than the Manipuri and Mizoram (Pundir *et al.*, 2015a, Pundir *et al.*, 2015b), Khariar (Dhal *et al.*, 2007) and Malnad Gidda (Singh *et al.*, 2008) cattle. It is more, profitable to have one calf yearly in cattle. If the CI is longer, the total number of calvings in life time and lifetime milk production decreases. Calving interval is affected by age and breed of cows, season of calving and availability of feed and fodder in any particular year (Yifat *et al.*, 2012).

Male reproductive traits

Age at first ejaculation and age at first mating were found as 41.54±1.14 and 51.3±1.05 months, respectively (table 1).

Production performance

Lactation milk yield

Average daily milk yield and peak yield of Kosali cows are shown in table 2. Days to reach at peak level ranged between 30-45 days. Mean lactation yield was 210.3±4.19 kg with a range of 180-220 kg. These production parameters of Kosali cows are comparable with Malnad Gidda (Hegde *et al.*, 1978, Singh *et al.*, 2008) and are lesser than Bachaur (Chandran *et al.*, 2014), Sanchori (Singh *et al.*, 2015), Manipuri and Mizoram (Pundir *et al.*, 2015a, Pundir *et al.*, 2015b) and Vechur (Iype 1996) cattle. Milk production of Kosali cows is lesser than the national average of Indigenous cows. Genetic group, herd size, season of calving and parity has significant effect on lactation milk yield (Kumar *et al.*, 2014).

Lactation Length and dry period

Average of lactation length and dry period were 230.7±9.11 and 190.8±8.19 days, respectively, under rural management conditions in the breeding tract (Table 2). This is comparable with Malnad Gidda (Singh *et al.*, 2008), Manipuri and Mizoram (Pundir *et al.*, 2015a, Pundir *et al.*, 2015b) cattle and it is lesser than Sanchori (Singh *et al.*, 2015) cattle.

Composition of milk

Major contents of milk like percentage of the fat, SNF, lactose, protein etc are shown in the Table 2. This is corresponding to other Indian breeds of cattle. Under the rural conditions, the milking is done twice a day, between 6:30 – 8:00 A.M. in the morning and between 6:30 – 8:00 P.M. in the evening. Weaning is not practiced in the entire breeding tract apparently to ensure milk let down by suckling. Suckling also takes place after milking. Generally milking is done by the thumb pressure or knuckling method rather than full hand milking because of small teats.

Conclusions

Dairy sector of the studied area is characterized by poor productive and reproductive potential of Kosali cows. None of the farmers surveyed kept records and they exhibit a limited knowledge of improved management. This calls for a planned technical and breeding programmes and intervention of state or

central Government for improving the Kosali cattle in its native tract. Moreover, in line with this, sustainable extension services, animal feed resources, management and health services are also needed. Breeding plan needs to be adopted wherein better cows may be identified and their male progeny is reared under intensive management to serve as future sires. State animal husbandry department needs to take proactive action for improvement of dairy sector.

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