

## A STUDY ON PERFORMANCE INDICES OF CATTLE IN DROUGHT PRONE DISTRICTS OF RAJASTHAN

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### SUMMARY

The present study was conducted to access the productive and reproductive performance of indigenous cattle in severe drought prone districts of Rajasthan. A total of 300 livestock owners were selected from 20 villages of 10 tehsils of 5 districts of Rajasthan. Data on seven productive and reproductive performance traits of 434 indigenous cattle from 300 livestock owners were collected through structured interview schedule and results were as; average daily milk yield (lt.)  $7.17 \pm 2.58$ , peak yield (lt.)  $9.84 \pm 2.17$ , lactation length (months)  $9.39 \pm 1.59$ , dry period (months)  $3.11 \pm 0.82$ , age at first calving (years)  $3.56 \pm 0.65$ , inter-calving interval (months)  $14.94 \pm 1.89$  and conception rate (times)  $1.84 \pm 0.65$ . The results showed that average daily milk yield and peak yield were higher compared to national average of indigenous cattle whereas a short lactation length along with longer dry period, higher age at first calving and longer inter-calving interval were observed. Frequent drought episode resulted in shortage of fodder adversely affect the production and reproduction of cattle in term of low milk yield and poor conception. It can be suggested that fodder preservation and scientific animal husbandry practices to be promoted for high productive and reproductive performance of cattle.

**Keywords:** Cattle, Performance Indices, Field level, Drought

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India is blessed with huge livestock population accounting 536.76 million; produced 198.4 million tones milk, 8.6 million tones meat, 36.76 million kg. wool along with hair, hides and pelts during 2019-20. Cattle play vital role in livestock production system contribute 36.04% of total livestock, 48.71% of milk, 3.59% of meat, and other by-products during 2019-20 (Basic Animal Husbandry Statistics, 2020). Contribution of livestock sector to total gross value added (GVA) and of agricultural and allied sector GVA was 6.17% and 30.87%, respectively at current prices during 2020-21 (Basic Animal Husbandry Statistics, 2020). Livestock provides livelihood to two-third of the rural population and employment to about 8.8% Indian population (Singh *et al.*, 2020a). Therefore, livestock are considered as “moving banks” because of their potentiality to dispose off during emergencies and in cases of landless agricultural laborers many times it is the only capital resource they possess (Dash S., 2017 and Suthar *et al.*, 2019). Basically, milk production depends on four dimensions of animal husbandry practices i.e., breeding, feeding, health-care and management practices. Overall economic return from individual animal depends upon various performance traits and management of production and reproduction is of utmost importance for successful dairying. (Meena *et al.*, 2015; Meena *et al.*, 2017). Any impairment in normal reproductive function results into infertility or sterility of animal, leading to economic losses due to widening of dry period and inter calving interval, reducing calving and lactation during

lifetime of animal in addition to culling of about 18-40% of cattle and buffalo (Meena *et al.*, 2016). Frequent drought episode in the Western part of Rajasthan i.e., once in 3-4 years (Dutta *et al.*, 2015) adversely affects animal husbandry. The Western arid region of Rajasthan is dominated by “Tharparkar” cattle, one of the most important indigenous milch breed of cattle. Productive and reproductive performance of Tharparkar cattle were estimated at different farms in India. Kishore *et al.* (2016) estimated lactation length, lactation milk yield, 300 days milk yield and milk yield per day of lactation length in Tharparkar cattle were  $279.19 \pm 3.271$  days,  $2021.08 \pm 42.806$  kg,  $1970.32 \pm 33.044$  kg and  $7.45 \pm 0.088$  kg, respectively. Mishra *et al.* (2017) estimated days to reach peak yield, peak yield, lactation milk yield, lactation length and milk yield per day of lactation length were as  $43.38 \pm 0.66$  days,  $12.71 \pm 0.13$  kg,  $2261.28 \pm 37.26$  kg,  $294.93 \pm 2.58$  days and  $7.62 \pm 0.10$  kg, respectively. Age at first calving, service period, gestation period, dry period and inter-calving period were  $1769.07 \pm 29.80$ ,  $117.53 \pm 2.39$ ,  $281.62 \pm 0.37$ ,  $105.03 \pm 2.09$  and  $399.97 \pm 2.44$  days, respectively were assessed by Mishra *et al.* (2018). Drought has both primary and secondary effects on livestock concern with shortage of water, lack of availability of good quality and quantity feed, especially green fodder. The unavailability or insufficient amount of drinking water for livestock has negative impact on all performance indices and it may result in food insecurity, especially for smallholder farmers in developing countries (Akinmoladun *et al.*, 2019). Keeping above facts in view, a

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study was undertaken to explore the productive and reproductive performance of indigenous cattle managed by livestock owners in field conditions.

### METHODOLOGY

The present study was purposively conducted in five severe drought prone districts of Rajasthan i.e., Barmer, Jodhpur, Jaisalmer, Jalore and Sirohi where reoccurrence of drought was once in every three years. Two tehsils from each district and two villages from each tehsil were selected randomly. After the selection of the villages, a preliminary survey was conducted using the Participatory Rural Appraisal (PRA) tool in the selected villages to know the total number of livestock owners who engaged in livestock farming from generation to generation. Based on PRA survey, 15 livestock owners were selected randomly from each village who possess livestock for their livelihood. Livestock owners were asked seven performance indices *viz.*, average daily milk yield, peak yield, lactation length, dry period, age at first calving, inter-calving interval and conception rate for a cow at-least calved twice at their farm. Thus, data of 434 indigenous cattle from 300 livestock owners were collected, subjected to descriptive statistics using MS Excel 2019 and results were presented as average and distribution of cattle population on performance level based on mean and standard deviation.

### RESULTS AND DISCUSSION

The status of productive and reproductive performance of indigenous cattle was ascertained and results obtained are presented in the following sub-heads:

#### i. Average daily milk yield (liters/day/cattle)

Milk yield of the dairy animals is very important in showing the performances of the animals. The milk yield is the main output which has economic significance in animal husbandry. Data presented in Table 1 show that average daily milk yield for cattle was  $7.17 \pm 2.58$  lit./day/cattle ranging from 4 to 12 litres of milk per day. It was observed that 58.76% of cattle were medium milk yielder ranging 4.59 to 9.75 litres of milk per day followed

by low (23.04 %) and high (18.20 %) milk yielder, were producing less than 4.59 litres and more than 9.75 litres of milk per day, respectively. This finding is contrary to the findings of Meena *et al.* (2015) and Singh *et al.* (2021). It may be contributed to the fact that the larger study area was home tract of elite milch breed ‘Tharparker’ is known for its milk production.

#### ii. Peak yield (liters/cattle)

The data present in Table 1 indicate that the average peak yield of cattle was  $9.84 \pm 2.17$  lit./cattle and peak yield ranged from 7 to 15 litres of milk per cattle. Further, it was recorded that 71.43 per cent of cattle were medium peak yielder ranging 7.67 to 12.01 litres of milk followed by low (17.28 %) and high (11.29 %) peak yielder, were producing less than 7.67 litres and more than 12.01 litres of milk, respectively. Similar finding was observed by Meena *et al.* (2017).

#### iii. Lactation length

The optimum lactation length of the cattle is one of the best indicators in the performances of the dairy animals. The present investigation from Table 1 reveals that average lactation length of cattle was  $9.39 \pm 1.59$  months per cattle and lactation length ranged from 7 to 12 months. It was analyzed that 72.12% of cattle had medium lactation length i.e., 7.8 to 10.98 months whereas 20.28% had long lactation length (>10.98 months) and 7.60% had short lactation length (<7.8 months). These findings are supported by Singh *et al.* (2021).

#### iv. Dry period

The dry period is the most important phase of a cattle’s lactation cycle. During this phase, cattle udder is prepared for the next lactation. It is visible from the Table 1 that average dry period of cattle was  $3.11 \pm 0.82$  months. The shortest dry period was observed as 1.5 months and up to 5 months as maximum. It was reported that large numbers of cattle fell under medium and long dry period i.e., 38.25 and 36.18%, respectively and about one fourth (25.58%) of cattle fell under short dry period. This finding

**Table 1. Productive and reproductive performance of cattle in drought prone area (N=434)**

Sl. No.	Performance Traits	Average	Range	Distribution of cattle on performance level		
				Low (%)	Medium (%)	High (%)
1.	Average Daily Milk Yield (Lit.)	$7.17 \pm 2.58$	4-12	23.04 (<4.59)	58.76 (4.59-9.75)	18.20 (>9.75)
2.	Peak Yield (Litres)	$9.84 \pm 2.17$	7-15	17.28 (<7.67)	71.43 (7.67-12.01)	11.29 (>12.01)
3.	Lactation Length (Months)	$9.39 \pm 1.59$	7-12	7.60 (<7.8)	72.12 (7.8-10.98)	20.28 (>10.98)
4.	Dry Period (Months)	$3.11 \pm 0.82$	1.5-5	25.58 (<2.29)	38.25 (2.29-3.93)	36.18 (>3.93)
5.	Age at First Calving (Year)	$3.56 \pm 0.65$	2.5-5	8.07 (<2.91)	78.80 (2.91-4.21)	13.13 (>4.21)
6.	Inter-calving Interval (Months)	$14.94 \pm 1.89$	12-18	30.64 (<13.05)	53.69 (13.05-16.83)	15.67 (>16.83)
7.	Conception Rate	$1.84 \pm 0.65$	1-3	30.18 (1)	55.76 (2)	14.06 (3)

is in corroboration with that of Meena *et al.* (2017).

#### v. Age at first calving

The age of the animal at first calving is very important for high production in life time. Lower the age at first calving, better the performances of dairy animals. In the present study from Table 1, it was observed that the average age at first calving of cattle was  $3.56 \pm 0.65$  years/cattle. Early and late ages at first calving were 2.5 years and 5 years, respectively. Further analysis showed that 78.80% of cattle had medium age at first calving i.e., 2.91 to 4.21 years followed by late ( $>4.21$  years) and early ( $<2.91$  years) age at first calving i.e., 13.13 and 8.07%, respectively. The above finding is in consonance with the earlier findings of Dhami *et al.* (2018).

#### vi. Inter-calving interval

This is the period between two successive calving. It is more profitable to have at least one calf for every 12 months in cattle. More calving interval will result in less number of calvings in life time and overall milk production of cattle will also be decrease in a life cycle. The data present in Table 1 show that the average inter-calving interval of cattle was  $14.94 \pm 1.89$  months/cattle. Inter-calving interval of cattle observed in study area was ranging from 12 to 18 months. About half (53.69 %) of cattle population had medium calving interval from 13.05 to 16.83 months followed nearly one third (30.64 %) cattle population had short calving interval ( $<13.05$  months) and 15.67 per cent of cattle production had long calving interval i.e., more than 15.67 months. These findings are in conformity with Kumar *et al.* (2015) and Singh *et al.* (2020b).

#### vii. Conception rate/ Service per conception

It was observed from Table 1 that the conception rate of cattle was  $1.84 \pm 0.65$  times/cattle. Further, it was evaluated that 30.18 per cent, 55.76 per cent and 14.06 per cent of cattle were conceived in one, two and three services, respectively. This finding is contrary to the findings of Singh *et al.* (2021) who reported conception rate  $2.57 \pm 0.73$  times/cattle.

### CONCLUSION

The study can be concluded that average daily milk yield and peak yield were higher than the national average for cattle in this region. It may be contributed to the fact that the larger study area was home tract of elite milch breed 'Tharparker', is known for its milk production. Although, short lactation length along with longer dry period, higher age at first calving and longer inter-calving interval in comparison to scientific standards were noticed. Frequent drought episode resulted in shortage of fodder adversely affecting the production and reproduction of cattle in term of low milk yield and poor conception. The ultimate goal is to increase lifetime production by decrease

in the number of services per conception and shorten calving interval of cow. It can be suggested that fodder preservation practices to be promoted in the region. There is need for shifting traditional practices, largely depend on pasturegrazing, to scientific animal husbandry for optimal harvesting of untapped potential.

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