



International Journal of Veterinary Sciences and Animal Husbandry



ISSN: 2456-2912

NAAS Rating (2025): 4.61

VET 2025; 10(10): 473-475

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www.veterinarypaper.com

Received: 22-09-2025

Accepted: 26-10-2025

Komal B Todkar

Department of Animal
Husbandry and Dairy Science,
College of Agriculture, VNMKV,
Parbhani, Maharashtra, India

DS Chauhan

Professor, Department of Animal
Husbandry and Dairy Science,
College of Agriculture, VNMKV,
Parbhani, Maharashtra, India

Jyoti M Deshmukh

Professor [CAS] Department of
Agril. Extension, College of
Agriculture, VNMKV, Parbhani,
Maharashtra, India

Divyani G Rohankar

Department of Animal
Husbandry and Dairy Science,
College of Agriculture, VNMKV,
Parbhani, Maharashtra, India

Corresponding Author:

Komal B Todkar

Department of Animal
Husbandry and Dairy Science,
College of Agriculture, VNMKV,
Parbhani, Maharashtra, India

Breeding efficiency of Deoni cattle maintained at organised farm

Komal B Todkar, DS Chauhan, Jyoti M Deshmukh and Divyani G Rohankar

DOI: <https://www.doi.org/10.22271/veterinary.2025.v10.i10g.2677>

Abstract

The research work entitled, “Studies on Breeding Efficiency of Deoni Cattle Maintained at Organised Farm”, was undertaken on the records of Deoni cattle maintained at Cattle Cross Breeding Project, Vasantao Naik Marathwada Krishi Vidyapeeth, Parbhani (MS) for the period from 1991-2024. The study covered 34 years data from (1991-2024) on lactation records of 494 Deoni cattle with 713 lactations. Breeding Efficiency was calculated by using Tomar (1965) ^[12] method and Least squares of Harvey (1990) ^[4] model was used to study the effects of various non-genetic factors (period, season) on breeding efficiency. Average breeding efficiency of Deoni cattle was 73.04±0.41 percent. The effect of period was significant ($p<0.01$) on the breeding efficiency in Deoni cattle, whereas, the effect of season was non-significant on breeding efficiency in Deoni cattle.

Keywords: Breeding efficiency, Deoni, Tomar method

Introduction

The success of dairy industry is much depends on level of production and reproduction traits of the animals. Breeding efficiency is one of most important trait. Reproductive efficiency is proposed as a measure of the net biological accomplishment of all reproductive activities and phenotypic expression of the interplay of genetic and environmental factors (McDowell, 1985) ^[7]. The breeding efficiency is a complex phenomenon controlled by both genetic and non-genetic factors, the non-genetic factors being climate, nutrition and level of management. The breeding efficiency varies not only between species and breeds but also among the animals within the same breed (Raina *et al.*, 2016) ^[9]. The reproduction or breeding efficiency is determined by the combined effect of hereditary and environment. Several measures of breeding efficiency like number of services per conception, calving interval, and days from first breeding to conception are useful. The profitability of a dairy enterprise depends on herd life which in turn is largely affected by the breeding efficiency of cows of that herd (Habib *et al.*, 2013) ^[5].

The breeding efficiency of cows is influenced by several factors, including the age at first calving and the length of the calving interval. The useful lifespan of a cow is associated with the age at first calving, as earlier calving can lead to increased lifetime productivity and profitability. The length of the calving interval is governed by the degree of fertility during succeeding lactations. Length of service period, length of dry period and calving interval are employed to indicate the degree of fertility. Key reproductive indicators such as age at first calving and calving interval are essential for estimating breeding efficiency over the lifetime of a herd.

Materials and Methods

Study area

The study covered 34 years data from (1991-2024) on lactation records of 494 Deoni cattle with 713 lactations maintained at Cattle Cross Breeding Project is situated at main campus of VNMKV, Parbhani. It is situated on 19° 60' North latitude and 76° 50' East longitudes at an

elevation of 489 meter from mean sea level. The Cattle Cross Breeding Project maintains pure Deoni cattle for breeding purpose and its crossbred progeny.

Breeding Efficiency

Breeding efficiency was calculated using Tomar's (1965) [12] formula for Indian indigenous cattle breeds was adopted owing to the fact that Deoni is one of the indigenous cattle breeds in India. Therefore, the formula used to calculate breeding efficiency (BE) was as follows:

$$\text{Breeding Efficiency (\%)} = \frac{[n(365) + 1020]}{\text{AFC} + \text{ICP}} \times 100$$

Where,

n = Number of inter-calving periods (ICP)

365 = The desired ICP in days

AFC = Actual AFC in days

1020 = The desired AFC in days

ICP = Sum of actual inter-calving period studied in days.

The Least-squares of Harvey (1990) [4] model was used to study the effects of various non-genetic factors on different traits:

The following model was used for least squares analysis,

$$Y_{ijk} = \mu + S_i + P_j + b(X_k - \bar{X}) + e_{ijkl}$$

Where,

Y_{ijk} = Observation on the k^{th} individual recorded in the j^{th} period and i^{th} season.

μ = Population mean

S_i = Effect of i^{th} season, $i = 1 \dots 4$ (season)

P_j = Effect of j^{th} period, $j = 1 \dots 7$ (period)

B = Regression of Y_{ijk} on age at first calving

X_k = Age at first calving of the k^{th} individual

$\bar{X}$ = Average age at first calving

e_{ijkl} = Random error, NID (0, $\sigma^2 e$).

Results and Discussion

The least squares means and analysis of variance showing effects of period of calving and season of calving on Breeding efficiency in Deoni cows was presented in Table 1 and 2. The overall least square means for Breeding Efficiency in Deoni cattle was 73.04±0.41 percent. The similar results were reported by Deshpande and Bonde (1975) [1], Kakde *et al.* (1976) [6], Thombre (1996) [11] in Deoni cattle, Shelke *et al.* (1992) in Red Kandhari cattle, Habib *et al.* (2013) [5] in Red Chittagong cattle.

The analysis of variance revealed highly significant ($p < 0.01$) effect of period of calving on Breeding Efficiency in Deoni cows. The DMRT indicated that the mean BE (per cent) in Deoni cows born in period of calving P_7 (78.25±1.31) had higher BE than cows born in period P_1 (69.71±1.39), P_2 (71.46±0.87), P_3 (72.08±0.79), P_4 (73.50±0.76) and P_6 (74.24±0.79). The similar finding were observed in Deshpande and Bonde (1975) [1], Thombre (1996) [11] in Deoni cattle, Raina *et al.* (2016) [9] in Crossbred cattle.

The effect of season of calving on Breeding Efficiency was non-significant in Deoni cows. The mean BE (per cent) was higher in Deoni cow calved during S_1 (73.58±0.61) followed by S_2 (72.95±0.70), S_3 (72.59±0.59), and S_4 (72.46±0.77). A notable contribution was reported by Habib *et al.* (2013) [5] in Red Chittagong cattle, Raina *et al.* (2016) [9] in Crossbred cattle.

Table 1: Least squares means and standard error for BE (per cent) over different periods and seasons in Deoni cows

Sources	Code	N	LSM±SE
Overall mean	μ	494	73.04±0.41
Period	P_1	26	69.71±1.39 ^c
	P_2	76	71.46±0.87 ^b
	P_3	82	72.08±0.79 ^{ab}
	P_4	102	73.50±0.76 ^a
	P_5	96	72.07±0.77 ^{ab}
	P_6	83	74.24±0.79 ^a
	P_7	29	78.25±1.31 ^a
Season	S_1	141	73.58±0.61
	S_2	111	72.95±0.70
	S_3	155	72.59±0.59

Means with similar superscripts are not differ significantly

Table 2: Analysis of variance for BE Tomar (1965) [12] method

Sources	DF	SS	MSS	F Value calculated
Period	6	1489.2	248.20	5.13**
Season	4	25.488	6.3720	0.13 ^{NS}
Error	480	23184	48.300	
Total	494	24698.688		

** Significant at $p < 0.01$, NS= Non significant

Conclusion

This study revealed that the non-genetic factors such as period had highly significant ($p < 0.01$) effect on breeding efficiency. Significant effect of period of calving indicating that some changes might have occurred in the climate and management of the herd over the years. Since, temporary environmental factors play a major role on these reproductive traits, better

breeding management like accurate detection of heat and managerial interventions could enhance the breeding efficiency. In addition, multi-trait evaluation with a combination of production and reproduction traits may be a carried out for simultaneous improvement of production and reproduction performances of Deoni cattle. It can, therefore, be concluded that good management practices would help in improving the breeding efficiency of farm.

Conflict of Interest

Not available

Financial Support

Not available

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How to Cite This Article

Todkar KB, Chauhan DS, Deshmukh JM, Rohankar DG. Breeding efficiency of Deoni cattle maintained at organised farm. International Journal of Veterinary Sciences and Animal Husbandry. 2025;10(10):473-475

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