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## Research Article

# Effect of period of first calving on productive herd life, longevity and lifetime calf production in Kankrej Cow at organised farm

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### Abstract

The objective of the present study was to determine the effect of period of first calving on productive herd life, longevity, and lifetime calf production in Kankrej cattle on organized farms. The data on history sheets of Kankrej cattle spread over a period of 15 years (2001-2015) were collected from Livestock Research Station, Sardarkrushinagar, Dantiwada Agricultural University, Sardarkrushinagar, Gujarat situated in semi-arid region of Banaskantha District of North Gujarat region having latitude of 24.35° North and longitude of 72.59° East. The least-square mean for productive herd life (days), longevity (days), number of calves born to each cow, number of female calves born to each cow and number of female calves reaching milking herd from each cow were 1351.99±114.55, 2592.56±115.02, 3.21±0.25, 1.56±0.17 and 1.09±0.14, respectively. The productive herd life, longevity, number of calves born per cow, number of female calves born per cow, and number of female calves reaching milking herd per cow were significantly affected by period of first calving.

**Keywords:** Herd life, longevity, Kankrej, calf production

### Introduction

Dairy cattle are constantly improving at a slower pace through selective breeding due to the importance of lifetime traits. It is the ultimate goal of an animal breeder to achieve maximum return per unit of input incurred during the lifetime of a cow. The overall productivity of dairy animals is considered on the basis of lifetime performance. The longevity influences the calf crop, lifetime milk production, and herd replacement. A long productive life reduces the number and cost of herd replacement and increases the proportion of highly mature animals in the herd (Asker *et al.*, 1954) [2]. Longevity in dairy cattle is double important characteristics both from an economic standpoint as well as from breed improvement (Plowman and Gaalaas, 1960) [25]. The information is lacking on the aspect of effect of period of first calving on lifetime production traits of cattle particularly in Kankrej cattle of semi-arid zone of North Gujarat, so it is very important to study the effect of period of first calving (non-genetic factor) affecting productive herd life, longevity and lifetime calf production traits in Kankrej cattle.

### Materials and Methods

The relevant data for the present investigation generated over a period of 15 years (2001-2015) were collected from the history sheets and pedigree sheets maintained at Livestock Research Station, Sardarkrushinagar, Dantiwada Agricultural University, Sardarkrushinagar, Gujarat which was initially set up to evaluate production potential of Kankrej Cattle a native breed of Gujarat state. The breeding data collected were used to calculate certain parameters viz. the productive herd life, longevity, and lifetime calf production of each Kankrej cattle. The traits under study were defined as follows:

#### (a) Productive herd life

It is defined as the number of days in milk from the date of first calving to the date of disposal.

#### (b) Longevity

It is defined as number of days from the date of birth to date of disposal of cows from herd either due to culling or death.

### (c) Lifetime calf production traits

The number of calves born to each cow, number of female calves born to each cow during its lifetime and number of female calves reached to the milking herd that is survival to their age at first calving from each cow in its lifetime were included.

To assess the impact of period of first calving, the data recorded over a 15-year period (2001-2015) were grouped into periods of three years each, assuming that the differences between consecutive years were insignificant and the variations throughout the year follow a cyclical pattern. This data has been divided into five periods as follows:

P1 2001-2003

P2 2004-2006

P3 2007-2009

P4 2010-2012

P5 2013-2015

To investigate the effect of above mentioned factor that is period of first calving, on the productive herd life, longevity and lifetime calf production in Kankrej cattle, the data were analysed by least squares analysis of variance techniques with the Harvey statistical model (1990) [10].

### Results and Discussion

The least squares means and their standard error were estimated for different period of first calving groups for each trait. The results of present study have been presented in Table 1 and discussed objective wise.

#### (a) Effect of period of first calving on productive herd life

In the present study productive herd life was found significantly influenced by period of first calving in Kankrej cattle. Present study which is in agreement with the findings of Basu *et al.* (1983) [5] in Tharparkar, Hegade and Bhatnagar (1985) [11] in Brown Swiss x Zebu, Butte and Deshpande (1987) [6] Holstein Friesian x Sahiwal, Ponce de Leon and Guzman (1988) [26] in Holstein Friesian, Tanida *et al.* (1988) [38] in Angus and Hereford, Singh and Tomar (1989) [35] in Karan Fries, Mahdy (1994b) [22] in Holstein Friesian, Singh *et al.* (1997) [34] in Red Dane x Rathi, Gahlot *et al.* (2001) [8] in Tharparkar, Atrey *et al.* (2005) [3] Frieswal, Dubey and Singh (2005) [7] in Sahiwal and crossbred, Goshu (2005) [9] in Friesian Boran crossbred, Ram and Goswami (2005) [27] in Tharparkar, Kumar (2007) [16] in Hariana, Kumar *et al.* (2009) [18] in Hariana, Jakhar *et al.* (2010) [12] in Hariana, Singh *et al.* (2011) [37] in Sahiwal, Kumar *et al.* (2014) [17] in Frieswal, Upadhyay *et al.* (2015) [44] in Sahiwal.

On the other hand non-significant effect of period of first calving on productive herd life was observed by Singh *et al.* (1997) [34] in Rathi, Kumar (1997) [34] in cross bred cattle, Abbas and Sachdeva (2008) [1] in Sahiwal.

The significant effect of period is the reflection of improvement in herd due to selection and also may be due to improvement in management practices over the period.

#### (b) Effect of period of first calving on longevity

The statistical analysis of data indicated that the longevity of Kankrej cow was significantly affected ( $p \leq 0.01$ ) by period of first calving with a similar trend observed in productive herd life. The reason attributed to this effect may be the same as mentioned earlier for productive herd life. Thus decrease in average longevity from P1 to P5 showed that the improvement in herd due to selection/culling and also may be

due to improvement in management practices over the period. Significant effect of period of first calving on longevity was also reported by Hegade and Bhatnagar (1985) [11] in Brown Swiss x Zebu, Ponce de Leon and Guzman (1988) [26] Holstein Friesian, Singh and Tomar (1989) [35] in Karan Fries, Kaushik *et al.* (1994) [14] in Hariana farm one, Mahdy (1994a) [21] in Egyptian buffaloes, Singh *et al.* (1997) [34] in Red Dane x Rathi, Gahlot *et al.* (2001) [8] in Tharparkar, Atrey *et al.* (2005) [3] in Frieswal, Dubey and Singh (2005) [7] in Sahiwal and crossbred, Ram and Goswami (2005) [27] in Tharparkar, Kumar (2007) [16] in Hariana, Kumar *et al.* (2009) [18] in Hariana, Jakhar *et al.* (2010) [12] in Hariana, Saha *et al.* (2010) [30] in Karan Fries, Singh *et al.* (2011) [37] in Sahiwal, Kumar *et al.* (2014) [17] in Frieswal, Upadhyay *et al.* (2015) [44] in Sahiwal.

Non-significant effect of period of first calving on longevity was also reported by Kumar (1997) [15] in crossbred cattle, Singh *et al.* (1997) in Rathi, Abbas and Sachdeva (2008) [1] in Sahiwal.

### (c) Life time calf production traits

#### (i) Effect of period of first calving on number of calves born per cow

In the present study a significant effect of period of first calving on number of calves born per cow of Kankrej cow was observed. Similar results were reported by Hegade and Bhatnagar (1985) [11] in Brown Swiss and Brown Swiss x Zebu, Mukherjee and Tomar (1996) [23] in Brown Swiss cross, Atrey *et al.* (2005) [3] in Frieswal, Ram and Goswami (2005) [27] in Tharparkar, Goshu (2005) [9] in Friesian Boran crossbred, Banik and Naskar (2006) [4] in Sahiwal, Shahi and Kumar (2006) [31] in Jersey x Sahiwal, Abbas and Sachdeva (2008) [1] in Sahiwal, Kumar *et al.* (2009) [18] in Hariana, Jakhar *et al.* (2010) [12] in Hariana, Singh *et al.* (2011) [37] in Sahiwal, Kumar *et al.* (2014) [17] in Frieswal.

On the other hand, non-significant effect of period of first calving on number of calves born per cow was reported by Kumar (1997) [15] in crossbred.

The numbers of calves born by each cow for first period were more than those produced by cow in later periods and there was a declined trend in later periods due to successive culling. Decrease in number of calves born per cow from P1 to P5 may indirectly be related to decrease in productive herd life of cow in the herd.

#### (ii) Effect of period of first calving on number of female calves born per cow

In the present investigation a significant effect of period of first calving on number of female calves born per cow of Kankrej cow was observed. Similar results were observed by Lathwal (1989) [19] in Red Sindhi cow, Mukherjee and Tomar (1996) [23] in Brown Swiss cross, Atrey *et al.* (2005) [3] in Frieswal, Ram and Goswami (2005) [27] in Tharparkar, Banik and Naskar (2006) [4] in Sahiwal, Shahi and Kumar (2006) [31] in Jersey x Sahiwal, Kumar *et al.* (2009) [18] in Hariana, Jakhar *et al.* (2010) [12] in Hariana.

On the other hand, non-significant effect of period of first calving on number of female calves born per cow was reported by Singh and Singh (1968) [33] in Hariana cow Tomar and Arora (1970) [39] in Hariana, Singh and Parekh (1982) [32] in Gir crossbred, Kale *et al.* (1982) [13] in Red Sindhi cow, Singh *et al.* (1983) [36] in Gir cow, Tomar and Verma (1988a) [43] in crossbred, Rawal (1991) [28] in Tharparkar, Singh *et al.* (1991) in crossbred, Tomar and Ram (1993) [41] in Murrah

buffalo, Kumar (1997)<sup>[15]</sup> in crossbred cattle. Decrease in mean of number of female calves born per cow

from P1 to P5 showed that the improvement in herd due to selection/culling over the period.

**Table 1:** The least Squares Means and standard error for PHL, L, NC, NFC & NFRMH across different groups of Period at first calving (non-genetic factor)

Period of first calving	n	Mean±S.E.				
		PH	L	NC	NFC	NFRMH
P1 (2001-2003)	59	1988.57 <sup>c</sup> ±168.45	3222.72 <sup>c</sup> ±169.15	4.56 <sup>c</sup> ±0.37	2.11 <sup>a</sup> ±0.25	1.60 <sup>c</sup> ±0.21
P2 (2004-2006)	67	1491.15 <sup>a</sup> ±152.81	2729.86 <sup>a</sup> ±153.44	3.60 <sup>a</sup> ±0.34	1.66 <sup>ab</sup> ±0.22	1.13 <sup>b</sup> ±0.19
P3 (2007-2009)	49	1536.54 <sup>a</sup> ±164.62	2773.07 <sup>a</sup> ±165.31	3.65 <sup>a</sup> ±0.37	1.73 <sup>abc</sup> ±0.25	1.01 <sup>b</sup> ±0.20
P4 (2010-2012)	48	903.40 <sup>b</sup> ±163.97	2151.25 <sup>b</sup> ±164.65	2.29 <sup>b</sup> ±0.36	1.36 <sup>c</sup> ±0.24	0.86 <sup>a</sup> ±0.20
P5 (2013-2015)	28	840.27 <sup>b</sup> ±199.68	2085.88 <sup>b</sup> ±175.85	1.93 <sup>b</sup> ±0.44	0.95 <sup>bc</sup> ±0.29	0.85 <sup>a</sup> ±0.25

Means with different superscripts differed significantly ( $p < 0.01$ ) in a row; PHL = Productive herd life, L = Longevity, n = Number of observations, NC = Number of calves born per cow, NFC = Number of female calves born per cow, NFRMH = Number of female calves reaching milking herd per cow.

### (iii) Effect of period of first calving on number of female calves reaching milking herd per cow

In the present investigation a significant effect of period of first calving on number of female calves reaching milking herd per cow of Kankrej cow was observed. Similar results were reported by Tomar and Basu (1981)<sup>[40]</sup> in Murrah buffaloes, Rawal (1991)<sup>[28]</sup> in Tharparkar and Sahiwal, Tomar and Ram (1993)<sup>[41]</sup> in Murrah buffalo, Lathwal *et al.* (1993)<sup>[20]</sup> in Red Sindhi, Rawal and Tomar (1994)<sup>[29]</sup> in Sahiwal, Tomar and Rawal (1994)<sup>[29]</sup> in Sahiwal, Mukherjee and Tomar (1996)<sup>[23]</sup> in Brown Swiss cross, Mukherjee and Tomar (1997)<sup>[24]</sup> in crossbred, Atrey *et al.* (2005)<sup>[3]</sup> in Frieswal, Ram and Goswami (2005)<sup>[27]</sup> in Tharparkar, Banik and Naskar (2006)<sup>[4]</sup> in Sahiwal, Shahi *et al.* (2006)<sup>[31]</sup> in Jersey x Sahiwal, Kumar *et al.* (2009)<sup>[18]</sup> in Haryana, Jakhar *et al.* (2010)<sup>[12]</sup> in Haryana.

On the other hand, non-significant effect of period of first calving on number of female calves reaching milking herd per cow was reported by Tomar and Verma (1988a)<sup>[43]</sup> in Tharparkar cow.

Significant effect of period of first calving was indicated for different management practices over the years due to implicit quality feed and fodder changes as well as the set of sires used and practice of different culling over the years.

### Conclusion

It may be concluded from the present investigation that period of first calving plays a very important role for the productive herd life, longevity and lifetime calf production traits.

Knowledge of various genetic and non-genetic factors associated with disposal of animals may also be helpful in developing breeding and management strategies to reduce the incidence of disposal.

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