

Factors affecting productive herd life, longevity and lifetime calf production traits in Haryana cattle

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Formulation and implementation of breeding strategies for genetic improvement in dairy sectors essentially needs critical and reliable information on these traits. Very scanty information is available in literature on these traits on Haryana cattle. Therefore, the present, study was designed and conducted to study the effect of non-genetic factors, viz. years of birth and age at first calving (AFC), groups on productive herd life (PHL) longevity and lifetime calf production traits in Haryana cattle

This investigation was conducted on 1592 calving records of 285 Haryana cows and 89 sires collected at Government Livestock Farm, Hisar Haryana for 13 years i.e. from 1990 to 2002, under similar feeding and managerial conditions. The productive herd life was calculated as number of years and lactations during the interval from the date of first calving to the disposal of the cow from the herd. The longevity was taken as the time interval in years from the date of birth to the date of disposal of cows from the herd. The selective value of a cow indicated as its contribution to the next generation in terms of its living female progeny surviving upto AFC. Effect of year of birth of cow and AFC group (days) on PHL, longevity and lifetime calf production (LCP) traits were determined using least-squares analysis of variance.

Longevity and productive herd life: The averages of various traits are presented in Table 1. Analysis of variance showed that the year differences in longevity and PHL were highly significant with decreasing trend in later years. Similar findings were observed by Basu *et al.* (1983) in Tharparkar cows, Mukherjee *et al.* (1999) for crossbreed cows and Atrey

et al. (2005) for beef cows. The overall average of longevity in Haryana cows in this herd was 8.50 ± 0.20 years out of which 4.38 ± 0.20 years was the productive herd life during which she calved 3.87 ± 0.16 times. These findings fall within the range as reported by Basu *et al.* (1983) for Tharparkar, and Arun (2007) for Haryana cattle. However, lower estimates were reported by Ram and Goswami (2005) for Tharparkar and Atrey *et al.* (2005) for Frieswal (crossbred). The longevity and PHL had decreasing trend in the later years of the study which might be due to less number of observations. It was observed that with the increase in AFC, the longevity increased and PHL decreased. In AFC group of <1200 days, the longevity was shortest (6.50 ± 2.05 years). The PHL was shortest in AFC group with >1799 days followed the AFC group of <1200 days. AFC group had nonsignificant effect on PHL. Similar results were reported by Rogers *et al.* (1991) for exotic cattle, and Arun (2007) for Haryana cows mentioning lower PHL for lower AFC while Ram and Goswami (2005) reported no effect of AFC on PHL in Tharparkar. In 90% of the females the AFC ranged from 3 to 5 years in this study. The present finding suggested that the too low (<1200 days) or too high (>1799 days) AFC is highly undesirable for longevity and PHL and an optimum AFC was observed ranging from 1200 to 1599 days.

Total alive calves born: This trait was significantly affected by year of calving and AFC which was supported by the findings of Mukherjee and Tomar (1996) for crossbred cattle. Each cow produced on an average 3.70 ± 0.75 alive calves which was similar to the findings of Tomar *et al.* (1995) for Red Sindhi Cows, Mukherjee and Tomar (1996) and Rawal and Tomar (1994a) for zebu breeds. Matharu and Gill (1981) reported higher values for this trait. More number of alive calves were produced by the cows with AFC ranging from 1200 to 1599 days. Out of the total cows, 1.7% left the herd without producing any alive calf.

Number of female calves born (NFCB): Year of calving and AFC had significant effect on this trait. Mukherjee and Tomar (1996) and Kumar (1999) reported significant effect

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Table 1. Average values of longevity, productive herd life and lifetime calf production traits

Means effect	No. of cows	Longevity years	Productive herd life		Lifetime calf production traits		
			Years	Lactations	Number of alive calf born	Number of female calves born	Number of female calves survived up to AFC (selective value)
Overall year of birth	285	8.52±0.20	4.38±0.20	3.87±0.16	3.70±0.15	1.88±0.09	0.74±0.05
1990	23	10.42±1.00	6.57±0.98	5.87±0.80	5.69±0.80	3.13±0.51	1.43±0.33
1991	47	9.40±0.61	5.67±0.60	4.85±0.46	4.76±0.44	2.14±0.27	0.76±0.11
1992	44	9.11±1.21	5.11±1.38	4.51±1.08	4.27±0.41	2.05±0.23	1.11±0.18
1993	42	9.18±1.21	5.22±1.20	4.40±0.94	4.24±0.36	2.33±0.24	1.00±0.15
1994	8	10.46±0.74	5.77±0.83	4.88±0.55	4.50±0.50	3.00±0.57	1.50±0.19
1995	17	9.38±0.52	4.55±0.48	3.47±0.35	3.47±0.35	1.41±0.29	0.71±0.19
1996	11	8.36±0.82	3.84±0.76	3.27±0.52	3.00±0.54	1.72±0.24	0.55±0.16
1997	13	8.07±0.62	3.88±0.63	3.71±0.57	3.38±0.58	1.38±0.38	0.23±0.12
1998	34	7.43±0.23	3.13±0.25	2.74±0.22	2.56±0.23	1.44±0.15	0.35±0.09
1999	21	6.87±0.02	2.30±0.02	2.24±0.02	2.04±0.21	1.43±0.16	0.33±0.11
2000	15	8.51±8.49	4.33±4.30	3.80±3.78	1.53±0.19	0.73±0.15	0±0
2001	2	5.36±0.15	0.86±0.08	1±0	0.5±0.50	0±0	0±0
2002	8	4.19±0.12	0.67±0.07	1.12±0.12	1.00±0.0	0.25±0.16	0±0
AFC groups							
<1200	6	6.50±2.85	3.31±2.67	3±1.94	3.0±0.93	1.67±0.56	0.83±0.40
1200–1399	95	8.28±0.39	4.71±0.39	4.34±0.32	4.29±0.32	1.91±0.18	0.80±0.11
1400–1599	100	8.97±0.35	4.92±0.35	4.27±0.27	4.28±0.27	4.11±0.26	0.91±0.10
1600–1799	48	8.56±0.38	3.89±0.38	3.22±0.27	3.23±0.27	1.37±0.16	0.52±0.14
>1799	36	8.18±0.36	2.86±0.35	2.53±0.24	2.50±0.24	1.33±0.19	0.41±0.11

of year but Atrey (2005c) found nonsignificant effect of AFC on number of female calves born. On an average, each cow during its lifetime in the herd produced 1.88±0.09 female calves. The estimate is similar to that reported by Tomar *et al.* (1995) for Red Sindhi Rawal and Tomar (1994a) for Sahiwal while Thakur *et al.* (1992) reported higher number for exotic and crossbred female calves and Atrey *et al.* (2005c) reported lower number for Frieswal female calves.

The cows in AFC group with 1400–1599 days produced more number of female calves (4.11±0.26) as compared to the cows in other AFC groups. It was also observed that only 3% of the cows in the herd produced more than 5 female calves while 30.5% produced no female calf and left the herd. These estimates are almost in agreement with those reported by Mukherjee and Tomar (1996) in Brown Swiss-Zebu crossbred herd.

Number of female calves reaching milking herd (selective value): This trait was significantly affected by year of calving and AFC. Mukherjee and Tomar (1996), Atrey *et al.* (2005c) also observed significant effect of period/year but nonsignificant effect of AFC on selective value. The overall selective value of each cow was 0.74±0.05, indicating that each Harijana cow did not replace herself in the milch herd. Almost similar results were reported by Tomar *et al.* (1995) for Red Sindhi cows, Mukherjee and Tomar (1996) and Atrey

et al. (2005c) for crossbreeds. More than one replacement were reported by Rawal (1991) for Tharparkar and Rawal and Tomar (1994) for Sahiwal cows. Selective value was observed highest in AFC group with 1400–1599 days, indicating it as optimum.

It was further observed that 51.9% cows left the herd without giving any replacement, whereas 29.0% left only one, 13.3% left two, 2.4% left three and 1.7% of the cows left four replacement daughters. The percentage of the cows which did not leave any replacement daughter was 42.4 for Red Sindhi (Tomar *et al.* 1995), 33.9 for Sahiwal (Rawal and Tomar 1994 a) and 39.6% for Tharparkar cows (Rawal 1991).

SUMMARY

Data on 1592 calving records of 285 Harijana cows and 89 bulls maintained at Govt. Livestock Farm Hisar over 13 years (1990–2002) were analyzed to determine the effect of non-genetic factors (year of calving and age at first calving (AFC) group on longevity productive herd life (PHL) and life time calf production traits. Year of calving and AFC group had significant effect on all the traits except that AFC group had nonsignificant on longevity. The investigation revealed that average longevity, PHL in years and lactation, number of alive calf born, number of female calves born and selective

value were observed as 8.52 ± 0.2 years, 4.30 ± 0.2 years, 3.87 ± 0.16 lactation 3.70 ± 0.15 , 1.80 ± 0.09 and 0.74 ± 0.05 , respectively. The selective value of 0.74 indicated that each Haryana cow did not replace herself in the herd. The AFC ranging from 1200 to 1599 was observed as optimum to have better PHL and lifetime calf production traits. The female calves of superior genetic potential contribute more to genetic gain in next generation which is also a function of productive herd life, longevity, number of normal calves born, number of female calves born and number of female calves survived upto age at first calving i.e. selective value.

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