

Research Article

Study on persistency of lactation in Holstein Friesian cattle

Kamal-Uddin Mandokhial, Hubdar Ali Kaleri, Rameez Raja Kaleri*, Asma Kaleri, Abdul Sattar Safi, Azhar Hussain Kaleri and Muhammad Akram Safi

Department of Animal Breeding and Genetics, Sindh Agriculture University, Tandojam-Pakistan

*Corresponding author's email: rameezkaleri@gmail.com

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Abstract

This study was performed to analyse the persistency of lactation in Holstein Friesian cattle, by analyzing 168 lactation records from the period of 2006-2013 (8 years) at Government Dairy Farm Quetta, Baluchistan. The (PL) persistency of lactation was found lower in first lactation, while highest in 3rd lactation in season winter and summer calves. The overall average (PL) was found $85.99 \pm 7.30\%$ in winter calves and $83.79 \pm 7.27\%$ in summer calves, whereas calving season effect was observed non-significant ($p > 0.05$). The highest (PL) was found in Sire-D followed by Sire- B Sire_ A and Sire_ C. The overall average (PL) in Holstein Friesian cattle was found $84.74 \pm 7.94\%$. The Sire-wise effect of (PL) was found non-significant. The heritability estimates of (PL) was estimated low (0.094), while the correlation estimates were found higher among lactation length vs milk yield length (0.814), milk yield vs (PL) (0.883) and (PL) vs lactation length (0.747). It was concluded that results of current study for (PL) and Heritability of production traits were low to moderate for heritable traits, which can be improved through the proper environmental and management conditions.

Keywords: Holstein Friesian; Persistency; Heritability; Correlation

Introduction

Livestock is an important and renewable natural resource that plays a major role in the agricultural economy of Pakistan. Agriculture sector of Pakistan shares 21% of the total (GDP), whereas the share of the livestock sector is 11.8% of the total values of (GDP). It seems that the livestock department is contributing about 55.91% to the total agricultural values of Pakistan [1]. The secretion of milk is a vital process of utilizing plant material and converting it into complete food. The milk serves as a major source for our routine diet,

which are important for nourishment and growth of the human body. Baluchistan province has a huge number of cattle, about 8 million heads (GOP, 2013), but milk shortage still remains a serious problem due to low production of animals. In this way to fulfill the demand of milk in Baluchistan province, high milk-producing imported Holstein Friesian strain from Denmark for receiving high level production of milk at Baluchistan. Lactation persistency is an important trait of dairy animals that is the capability of the cow to produce and

maintain higher production of milk at higher level followed by its peak milk yield [2]. Heritability is key genetic parameter, which play major role in the selection of superior animals for future breeding plans. Heritability show the degree of proportion by which the individual genetic difference contributed to individual's own genetic individual differences, which can be observed in its (phenotype or physical individual differences) [2].

Material and methods

The 168 lactations milk record of Holstein Friesian cattle of Government Dairy Farm Quetta, Baluchistan, 6 lactations of each animal were recorded for analysed. Hand milking was used twice a day at the Farm. Animals having normal complete were added and incomplete recorded were discarded form the study. A cow having incomplete lactation record of any week that was estimated by averaging the previous available record, while animal having incomplete lactation record more than 8 week were discarded form the study described of [3]. For observing effect of season in (PL) and season divided in 2, season, winter the cows, which has calved in month of October till March) and summer (for the cows calved from April to September) .To observe the effect geneitcal effect on (PL) in Holstein Friesian cattle, cows were divided in to four groups as Group-A sired by Bull No. 542-F, B sired by Bull No. 675-F, C sired by Bull No. 710-F and D sired by Bull No. Laurier-E.T.

Method for analysing of (PL) of Holstein Friesian

The (PL) was analyzed by using the formula as suggested formula given by Ludwick and Peterson (1943).

Method for estimation of (PL) of Holstein Friesian

Heritability estimates of (PL) was performed by the formula as suggested by Becker, (1985).

Results and discussion

Parity-wise all average values of (PL) are presented in Table 1. Average (PL) of Holstein Friesian cattle for winter and summer season calves were $298.91 \pm 4.78^*$ and $297.11 \pm 4.427^*$ respectively. The highest average (PL) was found at 3 lactation, whereas it was found lowest in 6th lactation of winter as well as summer calves. The number of researchers have been reported for (PL) in different breeds. The results of [3-6], are higher and lower than the current study, who reported the (PL) 82.6% in Jersey, 85.22% in Anatolian buffalo, 87.34% in Karan Fries, 87% in Nili-Ravi and 81.62% in Buffalypso breed. Mostly, exotic buffaloes and cows are higher yield animal and are higher persistent than *Bos indicus* cows. The findings of [7-9] are in agreement with the current study, they reported higher lactation length in 3rd lactation, while lower in 1st lactation length and milk yield was found little bit decreased in 3rd lactation with next calving. The results of [10] are in support with current study, who reported (PL) 68.73% Indian Red Sindhi Cattle and 63.65% in Indian Hariana cattle. Season of calving was found non-significantly ($p>0.05$) affecting on the (PL) of Holstein Friesian cattle.

Table 1. Average (PL) % in Holstein Friesian cattle

Parity	Summer Calvers	Number of Calvers	Winter Calvers	Number of Calvers
1st Lactation	2664.58 ^c ± 294.07 [*]	20	2698.44 ^c ± 482.75 [*]	08
2nd Lactation	3476.25 ^{bc} ± 266.92 [*]	16	3630.58 ^b ± 236.48 [*]	12
3rd Lactation	4914.64 ^a ± 523.79 [*]	14	4991.14 ^a ± 518.92 [*]	14
4th Lactation	4096.86 ^b ± 197.88 [*]	15	4236.00 ^{ab} ± 289.53 [*]	13
5th Lactation	3438.31 ^{bc} ± 236.10 ^{ns}	16	3503.33 ^b ± 215.77 ^{ns}	12
6th Lactation	3215.06 ^{bc} ± 171.01 [*]	17	3344.27 ^b ± 292.81 [*]	11
Overall	3564.97 ± 763.26[*]	98	3825.69 ± 804.01[*]	70

*=T-Statistics significant (p<0.05)

ns=T-Statistics non-significant (p>0.05)

The overall average of sire-wise (PL) is shown in table 2

The overall average of sire-wise (PL) in Holstein Friesian cattle was found 84.74 ± 7.94, the effect of sire in (PL) was observed non-significant (p>0.05). The results of current study are in conflict with [11, 12], who had reported significant effect of sire on the (PL), this difference may be because of sire and small number of animals in herd. The results of current research are in accordance to results of [13], who estimated the 0.09 heritability for (PL) in Holstein

cattle. The results of [14, 16] are relatively low than the results of current study, who estimated 0.01 to 0.07 in Egyptian Friesian and 0.05 to 0.08 heritability of (PL) in German Holstein. Results of [17, 19], are high than the present study, who reported the estimates of heritability of (PL) 0.02 to 0.51 in Canadian Holstein, 0.16 to 0.27 in Israel Holstein and 0.06 to 0.22 in Iranian Holstein Cattle. The difference among results of heritability is may be due to change in environmental conditions and management methods [20].

Table 2. The Sire-wise (PL) and Heritability estimates in Holstein Friesian cattle

Sire	Persistence (%)
A	84.62 ± 8.10 ^{ns}
B	84.62 ± 8.31 ^{ns}
C	84.63 ± 8.02 ^{ns}
D	85.09 ± 7.60 ^{ns}
Overall	84.74 ± 7.94
Heritability	0.094

ns= non-significant (p> 0.05)

The results for correlation co-efficient between lactation components of Holstein Friesian cattle are shown in Table 3

Results of current for correlation estimates was observed among milk yield and (PL) (0.883) and lactation length and (PL) were found high positive. The estimations of current research are in partial accordance to [16], who had reported correlation among

different (PL) traits from 0.13 to 0.46 in German Holstein Cattle. [10] has reported high positive correlation among that milk yield and (PL). There are various factors which effect on the production of cattle like age, breed, years of calving, sex, nutrition [21]. In a high temperature environment animal loss excessive heat production due to increasing stored heat in animals body,

resulting in increased body temperature. While, radiation and environment temperature decrease the production of

animal due to losses of heat of body by metabolism, feed intake and milk yields [22].

Table 3. The results for correlation estimates between milk yield and (PL) and lactation length and (PL)

Lactations component	Correlation
Lactation persistency vs Lactation yield	0.883
Lactation persistency vs Lactation length	0.747

Conclusion

It has been concluded that (PL) in Holstein Friesian cattle was found relatively lower, whereas season and sire effect was found non-significant. Heritability an estimate of (PL) was found low that is why it is important to improve nutrition and management practices for betterment of low heritable traits.

Authors' contributions

Conceived and designed the experiments: HA Kaleri, Performed the experiments: KU Mandokhail, RR Kaleri, AH Kaleri, AS Safi & MA Safi, Analyzed the data: HA Kaleri, RR Kaleri & A Kaleri, Contributed reagents/materials/ analysis tools: KU Mandokhail, RR Kaleri & A Kaleri, Wrote the paper: HA Kaleri & RR Kaleri.

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