

A Study on Performance Analysis of Holstein-Friesian Cattle Herd under Semi-Intensive Management at Pishin Dairy Farm Balochistan

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ABSTRACT: The present study was conducted to evaluate the productive and reproductive performance i.e., age at maturity, age at first conception, age at first calving, services per conception, service period, gestation period, calving interval, dry period, lactation length and milk yield of Holstein-Friesian cattle. The data on six lactations of 100 Holstein-Friesian cattle (in each lactation) herd reared under semi-intensive management at Government Dairy Farm Pishin, Balochistan, Pakistan were collected during 1980-1994. Results of the study showed that overall averages, age at maturity heifers was 650.10±5.67 days, age at first conception was 633.82±10.44 days, age at first calving 912±13.11 days, services per conception 2.89±0.10, service period 133.79 days, gestation period 275.35±0.59 days, calving interval 409.17, dry period 113.19 days and lactation length 320.14±11.14 days. Averages of the milk yield for 1st, 2nd, 3rd, 4th, 5th and 6th lactations were found as: 3773.42±15.77, 3793.86±14.39, 3948.37±14.91, 4108.31±15.62, 4304.08±16.42 and 4022.40±11.35 liters, respectively with an overall average of 3992.41±16.20 liters. The results of all traits showed variation however, services per conception, service period, gestation period parameters were only significantly different (P<0.05). Season of calving affected on milk yield, lactation length, calving interval and dry period on the performance of the Holstein-Friesian cattle herd. Results reflected that productive and reproductive traits of Holstein-Friesian cattle in the present study were low to moderate compared to the findings of previous researchers. Therefore, it is necessary to improve managerial practices at the farm for better reproductive and productive traits.

Keywords: Holstein-Friesian cattle, Lactation length, Milk yield, Dry period

Balochistan, Pishin Süt Sığırcılık Çiftliğinde Yarı-Entansif Koşullarda Holştayn Irkı Sürülerinin Performans Analizi Üzerinde Bir Çalışma

ÖZET: Bu çalışma, Siyah-alaca sığırlarının ergin yaş, ilk gebe kalma yaşı, ilk buzağılama yaşı, gebelik başına tohumlama sayısı, servis periyodu, gebelik süresi, buzağılama aralığı, kuruda kalma period, laktasyon uzunluğu ve süt verimi gibi verim ve üreme performanslarını değerlendirmek için yürütülmüştür. Balochistan'da (Pakistan) bulunan Pishin devlet üretme çiftliğinde yarı entansif koşullarda yetiştirilen 100 Siyah Alaca sığırının 6 laktasyonuna ait veriler 1980-1994 yılları boyunca toplanmıştır. Çalışmanın sonuçları, düvelerin ergin yaşını 650.10±5.67 gün, ilk gebe kalma yaşının 633.82±10.44 gün, ilk buzağılama yaşının 912±13.11 gün, gebelik başına tohumlama sayısının 2.89±0.10, servis periyodunun 133.79 gün, gebelik süresinin 275.35±0.59, buzağılama aralığının 409.17 gün, kuruda kalma süresinin 113.19 gün ve laktasyon süresinin 320.14±11.14 gün olduğunu göstermiştir. Genel ortalaması 3992.41±16.20 lt olan süt veriminin 1., 2., 3., 4., 5., ve 6. laktasyon ortalamaları sırasıyla; 3773.42±15.77, 3793.86±14.39, 3948.37±14.91, 4108.31±15.62, 4304.08±16.42 ve 4022.40±11.35 lt olarak bulunmuştur. Tüm özelliklerin sonuçları önemli varyasyon göstermekle birlikte sadece gebelik başına tohumlama sayısı, servis periyodu ve gebelik süresi parametreleri bakımından önemli farklılıklar bulunmuştur (P<0.05). Buzağılama mevsimi, Siyah alaca süt sığırlarının süt verimi, laktasyon süresi, buzağılama aralığı ve kuruda kalma süresini etkilemiştir. Önceki çalışmaların bulguları ile karşılaştırıldığında, mevcut çalışmadaki Siyah Alaca sığırların verim ve üreme özelliklerinin düşük – orta düzeyde olduğu görülmüştür. Bu yüzden, daha iyi verim ve üreme özellikleri için çiftlikteki bakım ve idare uygulamalarının geliştirilmesinin gerekli olduğu sonucuna varılmıştır.

Anahtar kelimeler: Laktasyon süresi, Siyah Alaca süt verimi, Kuruda kalma süresi

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INTRODUCTION

Balochistan, which is the largest province of the Pakistan, has distinct geographical features, climatic variation, social and cultural milieu. Scattered human population, vast barren land, scarcity of water for irrigation and human consumption, and low rain fall are feature of the area which contributes towards low economical growth. Migratory nature of sheep flocking is mainstay of common man (Kakar and Ahmad, 2004). Nearly 44% of the sheep population of the country is found in this province. Lesser population of cattle and buffalo in comparison to sheep and goat coupled with lesser milk yield has resulted in acute shortage of milk and other milk product in the province (Pakistan Economic Survey, 2008-2009).

The low productivity of our animals is mainly because of non-descript animals, which are 11752 thousand head all over the country (Khan et. al., 2008). In recent years, to meet the increasing demand of milk, the government encouraged the import of exotic breeds of dairy cattle in the country with the objective of either rearing as purebred or upgrading the indigenous non-descript cattle. Holstein-Friesian was the main dairy breed imported for this purpose. There are several physiological and environmental factors which can significantly influence the productive potential of these animals in tropical and sub-tropical environment. These imported exotic dairy cattle are maintained in order to get increased milk production.

Milk production is one of the most efficient processes in converting plant material into nearly perfect food "milk" for humans. According to a report (Anonymous, 1996) an allowance of 250 ml of milk covers a major part of the daily basic nutritional needs for a child, where as per capita availability of milk has been reported as 169 kg per annum in Pakistan (Pakistan Economic Survey, 2008-2009), which is far less than that of several advanced countries.

To overcome the shortage of milk, Livestock and Dairy Development Department, Government of Balochistan decided in 1977-78, to import Holstein-Friesian cattle. For this purpose, 175 pregnant heifers and 2 bulls were imported from Denmark and stationed at Government dairy farm, Quetta. The project was aimed at multiplying the breed and raising it under different environmental/climatic conditions in different parts of the Balochistan province. The present study was, therefore, planned to evaluate and to compare the productive and reproductive performance of Holsteins-Friesian cattle kept at Government dairy farm Pishin, in Balochistan

province. The information obtained in the present study would further throw light on the adoptability, breeding policy of these cattle under local condition of Balochistan, Pakistan.

MATERIALS AND METHODS

Productive and Reproductive Traits of Holstein-Friesian cattle (n=100 cattle for each lactation) reared (number of lactation = 6) at the Government Dairy Farm Pishin, Balochistan, Pakistan which is 50 km away from Quetta have been recorded for the period of 15 years during 1980 to 1994. The traits included age at maturity; age at first conception, age at first calving, services per conception, service period, gestation period, calving interval, lactation length, dry period, lactation and milk yield. Fixed effect model was fitted. The data were analyzed using one way ANOVA (Snedecor and Cochran, 1989) and statistically significant differences were determined by Duncan's multiple range test (DMR) in MSTATC package program.

RESULTS AND DISCUSSION

Age at maturity: The average age at maturity heifers was 650.10 ± 5.67 days, ranging from 373 to 1065 days. Almost similar findings were observed by Chaudhry and Ahmad (1994) who recorded in crossbred heifers and Sattar et. al. (2005) also reported the average age at maturity in 236 Holstein-Friesian heifers 652.10 ± 6.98 days, ranging from 356 to 1077 days in Pakistan. Higher age at maturity (987.22 ± 14.77 days) for Bhagnari heifers in Pakistan was reported by Azam et al. (2001). On the other hand, lower values (18.3 months) were also reported by Ozbeyaz et al. (1996) in Swiss Brown heifers. These differences might be due to environmental and managerial practices that had impact on age of maturity.

Age at first conception: The average age at first conception of 456 Holstein-Friesian heifers was 633.82 ± 10.44 days, ranging from 339 to 1031 days. Cheema (1985), Sheikh (1997), Juma et al. (1990), Rafique et. al. (2000) reported almost similar values (ranged from 618 to 632 days) in crossbred heifers in Pakistan. Higher age at first conception compared to the present study was reported by Chaudhry and Ahmad (1994) in crossbred heifers and Sattar et. al. (2005) in Holstein-Friesian (828.5 ± 233.1 and 714 ± 9.72 days) respectively, in Pakistan. On the other hand, Haq et al. (1993) recorded lower age at first conception (502.93 ± 11.71 days) in Holstein-Friesian heifers in Pakistan. These differenc-

es might be due to location and variable management practices at different farms. Feeding and breeding decisions might also have affected this trait.

Age at first calving: The average age at first calving for 445 Holstein-Friesian heifers was 912 ± 13.11 days, ranging between 637 - 1302 days. These findings were in agreement with those recorded by Gual (1982) who observed (852 ± 43.8) days at first calving in Holstein-Friesian heifers, Njubi et. al. (1992) reported in Jersey heifers in Kenya and Shiekh (1997) also documented it 907. 77 days. Higher age at first calving ($1237, 1017 \pm 43.8$ and 987 ± 8.81 days) was found by Morsy et. al. (1986), Mangeraker et. al.(1995) and Sattar et. al. (2005) in Friesian heifers, respectively. On the other hand, Juneja et al. (1991) and Haq et. al.(1993) reported lesser age at first calving in Friesian heifers (822 and 787 days, respectively). These differences might be due to differences in management and herds.

Number of services per conception: The average number of services per conception for 589 records for the present study were 2.89 ± 0.10 , ranging from 1 to 17. Almost similar findings 3.10 services per conception were recorded by Saha and Parekh (1988) in crossbred cows in India and Sattar et. al. (2005) reported (3.07 ± 0.10) in Friesian cows in Patoiki, Pakistan. However, Mangurkar et al. (1987) and Garcia and Velez (1988) reported to be lower (1.50 and 1.80) number of services per conception in Friesian cows. Variations in the management, environment and fertility status of the breeding cows might lead to differences in number of services per conception.

Service period: The average service period of Holstein-Friesian cows for the present study was 133.797 ± 5.84 days (Table 1), varying from 36.0 to 404 days. Similarly, Juneja et. al. (1991), Juma et. al. (1990) and Haq et. al. (1993) reported the service period as 156, 145.5 and 161 days, respectively in Friesian cows. However, Gogoi et. al. (1993) observed much longer service period (280 days) in Jersey cows in India. Mustafa et. al. (2003) reported longer (235.87 ± 14.05 days) service period in Red Sindhi heifers in Pakistan, and

Sattar et. al. (2005) reported that average service period for 508 records in Holstein-Friesian cows was 222.22 ± 6.87 days, ranging from 46 to 828 days. Service period differed due to differences in feeding and breeding management.

Gestation period: The average gestation period was 275.35 ± 0.59 days with ranging from 265 to 305 days. Haq et. al. (1993) reported similar findings for Holstein-Friesian cows. Sattar et. al. (2004) reported that the average gestation period was 278.61 ± 0.29 days, ranging from 260 to 300 in Friesian cow in Pakistan. However, Juneja et. al. (1991) reported shorter gestation period (266 ± 47.7 days) in Friesian cows in India. In the present study, higher gestation period (279.04 ± 0.41 days) was observed in cows carrying male calves than those carrying female calves (278.19 ± 0.42 days) and this difference was statistically non-significant. Similar findings were also observed by Haq et. al. (1993) and Sattar et. al. (2004) in Friesian and Jersey cows, respectively. These differences might be due to inefficient breeding management at these farms.

Calving interval: The average calving interval was 409.17 ± 7.32 days (Table 1), ranging from 285.8 to 628 days. The maximum calving interval was achieved in 2nd calving interval (425.8 ± 6.20 days), followed by 3rd (414.35 ± 9.62 days), 4th (404.14 ± 5.82 days) and 5th 410.30 ± 7.32 days), while the least calving interval was found (400.79 ± 6.37 days) in the 1st calving. In the present study, no significant differences in calving interval among parities ($P > 0.05$) were found. Juma et. al. (1990), Juneja et. al. (1991) recorded almost similar values (418, 414.17 and 417 days, respectively) in Friesian cows. However, Morsy et. al. (1986) and Sattar et. al. (2005) reported longer (522 ± 39.9 and 505.02 ± 8.28 days respectively) calving interval in Friesian cows. These differences might be due differences in herds, management and feeding regimes.

Dry period: The average dry period for 453 records on Holstein-Friesian cows was 102.18 ± 15.35 days (Table 1), with a range of 77-359 days in the present study. Longer average dry period compared to the

Table1. Productive and Reproductive Traits of Holstein-Friesian cattle (n=100 cattle each lactation) Farm Pishin (Means±SE)

Lactation #	Milk yield (liters)	Lactation length (days)	Dry period (days)	Calving interval (days)	Service Period (days)
1	3773.42±15.77	356.93±12.50	97.24±16.35	400.79±6.37	123.16±4.34
2	3793.86±14.39	302.60±10.30	109.89±10.13	425.8 ±6.20	147.57±6.05
3	3948.37±14.91	310.89±11.70	103.06±11.37	414.35±9.62	138.25±4.37
4	4108.31±15.62	310.89±09.27	99.50±13.35	404.14±5.82	129.54±6.16
5	4304.08±16.42	340.03±12.08	97.30±16.08	410.30±7.32	130.45±5.07
6	4022.40±11.35	299.6±13.64	103.43±12.00	412.41±7.32	125.36±6.23
Overall average	3992.41±16.20	320.14±11.14	102.18±15.35	409.17±7.32	133.797±5.84

present study was observed by Gogoi et. al. (1993) who reported 233.5 days dry period in Jersey cows, Juneja et al. (1991) and Sattar et. al. (2005) reported a dry period of 224.99 ± 10.00 days in Jersey and Friesian cows in India and Pakistan, respectively. These differences might due to herd, feeding and breeding management. The average dry period in the present study was lower than other studies because animals were not well fed and bred earlier.

Milk yield: Means and standard errors of milk yield for six lactations are given in Table 1. It was observed that the milk yield averaged 3773.42 ± 15.77 , 3793.86 ± 14.39 , 3948.37 ± 14.91 , 4108.31 ± 15.62 , 4304.08 ± 16.42 and 4022.40 ± 11.35 liters in 1st, 2nd, 3rd, 4th, 5th and 6th lactations respectively with an overall averaged of 3992.41 ± 16.20 liters while the results were varying but not significant It was determined that the highest milk yield was attained in the 5th lactation with 4304.08 ± 16.42 liters while the lowest in the first lactation was 3773.42 ± 15.77 liters. The milk yield showed an increasing trend from 1st to 5th lactation. The results of the present study were consistent with the findings of some researchers (Sandana and Basu 1981; Cheema, 1985) who reported that the milk yield in Holstein-Friesian cattle ranged from 3911 to 5259 kg. These differences might be due to differences in parities, length of lactation, herd and management.

The milk yield for the present study was higher than those reported by many authors (Oliveria, 1975; Parmar and Dev, 1978; Osman and Kassim, 1983). These researchers reported that milk yields of Holstein-Friesian cows in different part of world averaged 2554 kg in Brazil; 3144.2 ± 45.7 kg in India; 3139.49 ± 56 kg in Pakistan and 1917 kg in Malaysia respectively. Higher milk yields of Holstein-Friesian cattle were also informed by Gual (1982), who obtained milk yield averages of 6202; 6576; 6439 and 4328 kg, respectively from Bejco, Northern Mexico, Hidalgo and Publa farms.

Lactation length: The average lactation length for 600 records in Holstein-Friesian cattle was found as 320.14 ± 11.14 days in the present study (Table 1), with the range of 299.6 ± 13.64 to 356.93 ± 12.50 days. The highest LL was found in 1st lactation, while the lowest was found in 6th lactation. Differences between averages of lactation numbers in lactation length were insignificant ($P > 0.05$). The values of the LL of the present study were in agreement with the findings of the several authors as Perez and Ronda (1983) reported the average LL as 315 ± 17.9 days in India. Dabduab and Misra

(1988) reported an average LL of 303.2 days for pure-bred Friesians in Iraq, and Juma et. al. (1990) found that 273 Holstein-Friesian during 1978-1987 recorded mean LL of 320 days. The higher LL compared to present study was documented by Oliveria, (1975) who found it 392 days for Holstein-Friesian in Brazil, and Basu (1974) also reported LL 347.42 ± 5.59 , whereas several authors have reported lesser LL than the averaged LL in the present study as Taj (2001) reported 265 days LL at Punjgoor, Pakistan, and Sattar et. al. (2005) observed 291.86 ± 6.55 days LL in Holstein-Friesian at Patoki, Pakistan.

CONCLUSION

The results of all traits showed variation however, services per conception, service period, gestation period parameters were only significantly different ($P < 0.05$). The variation in productive and reproductive traits detected during different years reflected the level of feeding and management in addition to some environmental effects like rainfall, humidity and temperature, etc. on the cows. Availability of feed and fodder could never have been the same over the 15 years period due to rainfall and several other factors like provision of funds, quality and quantity of seeds and fertilizer, etc, which could have affected the productive performance of the animals in the different years. Season of calving possessed varying affect on milk yield, lactation length, calving interval and dry period on the performance of the animals of the Holstein-Friesian cattle herd. Conclusively, results indicated productive and reproductive traits of Holstein-Friesian cattle were low to moderate when compared to the findings of previous researchers. Therefore, it was necessary to improve managerial practices at the farm for providing better reproductive and productive traits of the farm. This study would provide a guideline for further import, breeding policy and keeping standards of such exotic breeds in the country.

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