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Study on performance analysis of Holstein Fresien cattle under intensive management at government dairy farm, Pishin, Balochistan

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Abstract. The study was carried out to analyze the productive and reproductive performance of Holstein Friesian cattle under intensive management at Government Dairy Farm, Pishin (Balochistan) exploring the ten years performance records from 1997-2007. Parameters were productive traits (birth weight, lactation length, lactation milk yield), reproductive traits (age at first conception, age at first calving, service period, dry period, calving interval) and effect of calving season on (milk yield, calving interval, birth weight, dry period on the Holstein Fresein cattle. Analysis of data revealed significant difference in all the productive traits ($P<0.05$). Maximum birth weight (33.05±0.61 kg) in 6th and minimum (31.31±0.63 kg) in 1st lactation was recorded. The lactation length was highest (332.91±13.40 days) in cows at 3rd and lowest (298.13±16.33 d) in 1st lactation. Maximum lactation milk yield (4102.45±119.34 liters) was in 3rd and minimum (3125.20±96.96 L) in 5th lactation. The service period was relatively higher (141.29±1.223 d) in 3rd lactation and lowest (122.21±2.034 d) in 2nd lactation. Dry period was comparatively higher (91.44±2.31 d) in 3rd and lowest (81.95±2.181 d) in cows at the end of 1st lactation. Calving interval was significantly higher (421.29±5.413 d) in 3rd and lowest (399.36±6.013 d) in 1st lactation cows. The age at first conception on average was 673.26±23.695 days, while the age at first calving was 977.779±33.891 days. The seasonal effect on birth weight, calving interval and dry period was insignificant ($P<0.05$).Comparatively higher birth weight and calving interval was (32.00±0.541 kg and 415.20 ±6.451 d) respectively recorded in winter. Dry period was slightly higher (90.12±3.311 d) in cows calved in summer and lowest (86.12±2.335 d) in winter. However, the calving season had effect on milk yield showed significant difference ($P<0.05$), winter season calving produced higher milk yield (4131.65±225.49 L) and autumn calving produced lowest milk yield (3795.91±116.40 L). It is concluded that season and period of lactation is not significantly difference ($P>0.05$) in higher birth weight of calves, dry period, calving interval and milk yield of cows, respectively.
Key words: birth weight, milk yield, productive performance, Holstein Fresien.

Introduction. Over the years livestock sector has emerged as a leading sub-sector of the agriculture sector in Pakistan. It contributed 51.8% of agriculture [11.29% of Gross Domestic Product (GDP)] during 2009-2010 which is more than the aggregated contribution of major crop sector (6.4%) in 2009-2010. Livestock production is one of the major activities as about 30-35 million people of rural areas are engaged in raising livestock and deriving 40 percent of their incomes. Besides its importance and share in the national economy, the history of livestock rising is embedded in the rural life since inception of our civilization. It is still a sign of prestige for the people associated with agriculture sector. It is an integral part of socio-economic activities of the rural areas and plays a very supportive role in mitigating the effects of poverty by providing essential items of daily use (Pakistan Economic Survey 2009-2010). Balochistan, which comprise more than one third of the country, but the cultivated area, is only 4% of the total area of 34.8 million hectare. The remaining is range land which provides more than 90 percent of the feed requirements of livestock primarily sheep and goat. The livestock breeding

system is not organized. Sires are maintained by the private farmers and in some parts artificial insemination on a limited scale by the Livestock Department.

In Balochistan and other parts of Pakistan the milk yield per animal is far less than the international standards. The factors responsible for low milk production probably are late age at maturity, delayed conception, long calving interval and inadequate feeding and housing management and non-descript animals all over the country (Khan et al 2008). To overcome the low milk production in the province, the provincial government imported 175 pregnant Holstein-Friesian heifers and 2 breeding bulls from Denmark in 1977-1978 and established several small farms in all corners of the province. Bilal et al (2005) studied the productive and reproductive profile of Holstein-Friesian kept in Balochistan province of Pakistan and concluded that Holstein-Friesian has been rated among top milk producing animal. However, even it is over three decades, and desired results in relation to increased population and self sufficiency in milk production in the province are yet to be achieved (Afzal & Naqvi 2004). Feeling the gravity of the situation, the present study was carried out to investigate the productive and reproductive performance of Holstein Friesian cattle under intensive management at Government Dairy Farm, Pishin (Balochistan).

There are several physiological and environmental factors which can significantly influence the productive potential of these animals in tropical and sub-tropical environment The present study was, therefore, planned to evaluate and to compare the productive and reproductive performance of Holstein 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 Method. In order to investigate the productive and reproductive performance of Holstein Friesian cattle under intensive management system, the performance records at Government Dairy Farm, Pishin, Balochistan were scrutinized for the last ten years (1998-2007) and the data of productive traits (birth weight, lactation length, lactation milk yield), reproductive traits (age at first conception, age at first calving, service period, dry period, calving interval) and effect of calving season on milk yield, calving interval, birth weight, dry period were obtained. Intensive system of feeding is practiced on the farm. Most commonly available green fodders were maize, sorghum, lucerne and berseem. During the shortage of fodder, animals were fed dry roughages (wheat straw, maize) purchased from the farmers of the area. The natural system of breeding was practiced on the farm. The data thus, collected were analyzed statistically following method suggested by Gomez & Gomez (1984).

Results and Discussion. The results of the productive and reproductive traits of Fresein cattle are presented in Tables 1 and 2.

Table 1

Effect of laction on productive and reproductive traits of Holstein Friesian cattle farm Pishin (Means±SE)

Lacta-tion	*Birth weight*	*Lactation length*	*Milk yield*	*Service period*	*Dry period*	*Calving interval*
1	31.31^{c}±0.63	298.13^{c}±16.33	3853.45^{a}±160.51	127.31^{b}±2.034	81.95^{c}±2.181	399.36^{c}±6.013
2	31.95^{b}±0.45	306.66^{b}±8.20	4055.60^{a}±109.56	122.21^{c}±1.813	88.41^{a}±1.80	410.21^{b}±2.413
3	32.45^{b}±0.68	332.91^{a}±13.40	4102.45^{a}±119.34	141.29^{a}±1.223	91.44^{a}±2.31	421.29^{a}±5.413
4	32.39^{b}±0.73	311.19^{b}±7.31	3618.20^{b}±121.22	127.28^{b}±2.613	86.33^{b}±1.21	401.28^{c}±5.881
5	32.86^{a}±0.31	306.65^{b}±8.49	3125.20^{c}±96.96	127.10^{b}±1.456	87.31^{b}±1.53	400.10^{c}±4.203
6	33.05^{a}±0.61	311.11±6.098	3750.98±102.31	128.23±1.702	87.09^{b}±1.114	406.45±3.765

* Different superscript indicate significant difference (P<0.05)

Birth weight. The average birth weight of Holstein Friesian cattle was (33.05±0.61 kg) noted in the animals at 6th lactation, closely followed by 5th, 4th and 3rd lactation. The birth weight of Holstein Friesian cattle at 1st lactation was minimum (31.31±0.63 kg) which slightly increased to 41.95±0.45 kg in 2nd lactation cattle. The average birth weight over six lactations for ten year records was 32.34±0.41 kg. The

differences in birth weight between lactations were significant (P<0.05). However, differences in birth weight between 1st and 2nd lactation and between 3rd, 4th, 5th and 6th lactations were non-significant (P>0.05). Heins et al (2010) reported birth weight of Fresien cattle 43.3 kg and the obvious difference in birth weight is due to the nutritional status and proper breeding management.

Age at first conception. The age at first conception of Holstein Friesian during last ten years on average was found 673.26±23.695 days. Lower age at first conception (502.93 ± 11.71 d) in Holstein-Friesian heifers in Pakistan was reported by Haq et al (1993), while Sheikh (1997) and Rafique et al (2000) recorded 618 to 632 d in crossbred heifers in Pakistan. Sattar et al (2005) reported significantly higher age in Holstein Friesian (828.5 ± 233.1 and 714±9.72 d) in Pakistan. These differences might be due to environment, location and variable management practices at different farms. Feeding status would have along with breeding decisions have affected this trait.

Age at first calving. The averaged age at first calving observed from the records of last ten years was 977.77±33.891 days. These findings were in line with Sattar et al (2005) who reported 987±8.81 d. Gual (1983), Sheikh (1997) and Khoso (2004) observed 852, 907.77 and 1963.2 d at first calving in Holstein-Friesian heifers, while Morsy et al (1986) reported higher age at first calving (1237). Contrary to these, Juneja et al (1991), Haq et al (1993) and Czerniawska et al (2003) reported 822, 787 and 715 d respectively, quite less age at first calving in Friesian Heifers. These differences might be due to the age of maturity, previous health, nutritional history and differences in management.

Lactation length (LL) days. Maximum lactation period (332.91±13.40 d) was found in cows at 3rd lactation, followed by 4th lactation with average lactation length of 311.19±7.31 d. Almost equal LL of 306.66 and 306.65 d was recorded at 2nd and 5th lactation respectively and the minimum LL of 298.13±16.33 d was recorded in 1st lactation cattle. The values of the LL of the present study are in agreement with the findings of the Dabduab & Misra (1988), Juma et al (1990) and Khoso (2004) who reported 320, 315 and 319.82±56.342 d. The higher LL compared to present study was documented by Oliveria (1975) who found it 392 days for Holstein-Friesian in Brazil, whereas lesser LL (265 days and 291.86±6.55) than the present study was reported by Taj (2001) and Sattar et al (2005).

Lactation milk yield (MY; liters). In the present study highest MY (4102.45±119.34 L) was recorded in third lactation, closely followed by 2nd and 1st lactation MY of 4055.60±109.56 and 3853.45±160.51 L, respectively. The MY after third lactation sharply decreased and was 3618.20±121.22 L in 4th lactation, while the lowest milk yield of 3125.20±96.96 L was recorded in 5th lactation (P<0.05). The average lactation MY for whole the ten year records was 3750.98±102.31 L. The MY for the present study was higher than those reported by many authors (Oliveria 1975; Parmar & Dev 1978; and Khoso 2004). 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; 3661.5±785.08 kg in Pakistan and 1917 kg in Malaysia respectively. Higher MY averages of Holstein Friesian ranging 6027-7017 kg were reported by Gual (1983), from Brazil, and Haluka (2004), from Croatia. Since the animals nutritional status in the present study was observed not up standard and MY can be improved if balance feed is guaranteed.

Service period (days). The results in relation to service period indicate that service period was higher (141.31±2.223 d) in 3rd lactation, closely followed by the cows in 4th and lactation with average service period of 128.238±2.613 d and while the minimum service period of 122.21±2.034 days was recorded in cows of 2nd lactation (P<0.05). Differences between 1st, 4th and 5th lactations were non-significant (P>0.05) and significant (P<0.05) when the service period of above lactations was compared with 2nd and 3rd lactations. The service period of 156, 145.5, 161 and 164 d were reported in Friesian cows by Juneja et al (1991), Juma et al (1990), Haq et al (1993) and Haluka (2004) respectively, while Mustafa et al (2003) reported longer service period (235.87 d) 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 d. The difference in service

period could be due to differences in feeding and breeding management. As some animal has the trendency to drop milk as soon as they gat pregnant especially in buffaloes.

Dry period (days). The data regarding the dry period based on five lactations of Holstein Friesian cattle raised under intensive management indicate that dry period was comparatively higher (91.44±2.31 d) in 3rd lactation cows, closely followed by the cows in 2nd lactation with average dry period of 88.41±1.80 d. Similarly, Holstein Friesians in 5th and 6th lactation had dry period of 87.31±1.53 and 86.33±1.21 d, respectively. However, the lowest dry period of 81.95±2.181 d was recorded in cows of 1st lactation ($P<0.05$). Longer average dry period compared to the present study was observed by Gogoi et al (1993) who reported 233.5 d in Jersey cows, while Sattar et al (2005) reported a dry period of 224.99 d. These differences might due to herd feeding and breeding management. However, individual animal behavior could be a factor in the dry period length.

Calving interval (days). The calving interval of Holstein was significantly different ($P<0.05$) by lactations which suggested that calving interval was significantly higher (421.29±5.413 d) in Holstein Friesians in 3rd lactation, followed by the cows in 2nd lactation with average calving interval of 410.21±2.413 d. The Holstein Friesian cows in 4th and 5th lactations had impartiality in calving interval i.e. 401.28±5.881 and 400.10±4.203 d, respectively. However, the lowest calving interval of 399.36±6.013 d was recorded in 1st lactation cows. Juma et al (1990), and Juneja et al (1991) recorded (418, 414.17 and 417 d calving interval, respectively) in Friesian cows. However, Sattar et al (2005) reported longer calving intervals (522±39.9 and 505.02±8.28 d respectively) and Uur (2003) reported calving intervals of 325-450 d and above during different years for Holstein Friesian cattle. The differences in calving interval might be due differences in breeding management.

Seasonal effect on birth weight. The results on the effect of calving season on birth weight indicated insignificance ($P>0.05$). The birth weight was comparatively higher (32.00±0.541 kg) in cows calved in winter season, followed by birth weight of 31.89±0.751 and 31.35±0.649 kg recorded in cows calved in spring and summer season, respectively.

Seasonal effect on milk yield. The statistical analysis of the data suggested significant effect ($P<0.05$) of season of calving on lactation milk yield. The results indicated that winter season calving Holstein Friesian cattle produced higher milk yield of 4131.65±225.49 L, while summer and spring season calves ranked second and third with average lactation milk yield of 3830.66±200.40 and 3814.35±140.19 L, respectively. However, autumn calving produced lowest milk yield of 3795.91±116.40 liters. However, in other study by Khoso (2004) no significant effect of season on milk is reported.

Seasonal effect on calving interval. The effect of calving season on calving interval illustrated that the calving interval was not different ($P>0.05$), slightly higher (415.20±6.451 d) in case of Holstein Friesian cattle calved in winter season, followed by calving interval of 414.35±10.103 and 412.12±9.203 d recorded in cows calved in summer and spring season, respectively. However, the calving interval was minimum (409.40±13.145 d) in cows calved in autumn season. The statistical analysis of the data suggested non-significant effect of season of calving on calving interval.

Table 2

Effect of season on productive and reproductive traits of Holstein Friesian cattle farm Pishin (Means±SE)

Season	Milk yield	Calving interval	Birth weight	Dry period
Summer	3830.66[a]±200.40	414.35±10.103	31.35±0.649	90.12±3.311
Autumn	3795.91[b]±116.40	409.40±13.145	31.00±0.710	89.91±4.121
Winter	4131.65[a]±225.49	415.20 ±6.451	32.00±0.541	86.12±2.335
Spring	3814.35[a]±140.19	412.12 ±9.203	31.89±0.751	89.80±3.456

***** Different superscript indicate significant difference ($P<0.05$)

Conclusion. The results of all traits showed variation. However, services per conception, service period and gestation period parameters were found much different. The variation in productive and reproductive traits during different years reflected the level of feeding and management on the cows. Season of calving possessed varying effects on milk yield, lactation length, calving interval and dry period on the performance of the animals of the Holstein Friesian cattle. 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 is suggested that improvement in managerial practices at the farm may be adopted.

References

Afzal M., Naqvi A. N., 2004 Livestock resources of Pakistan: present status and future trends. Quarterly Science Vision **9**(4):1-14.

Bilal M., Lodhi M. Y., Chawanakul S., Kakar M. A., 2005 Productive and reproductive profile of Holsteins kept in Balochistan province, Pakistan. Reproduction, Fertility and Development **17**(2):245–245.

Czerniawska P. E., Kamieniecki H., Pilarczyk R., Stafiej D., 2003 Production and reproductive performance of a dairy cow herd. Folia Universities Agriculture Stetinensis, Zootechnica **45**(3/4):151-156.

Dabduab S. K., Misra N. K., 1988 Milk production in pure bred Friesian, Sharbi and crossbreds in Northern Iraq. Mesopotaminia Journal of Agriculture **20**(3):175-192.

Gogoi D. N., Goswami R. N., Das D., 1993 First lactation performance of Jersey, Red Sindhi and their F1 crosses under the farm conditions of Assam. Indian J Anim Sci **63**(5):569-572.

Gomez K. A., Gomez A. A., 1984 Statistics for Agricultural Research (Second Edition). John Willey and Sons, New York.

Gual L. F., 1983 Effect of origin and lactation of herd on milk yield, days open and calving interval in Mexico, Madrid, Spain, Editrial garsi, 247-250. Anim Breed Abst **51**:(4784).

Haluka J., 2004 Breeding Program for Holstein-Friesian cattle in Croatia. Stoarstvo **58**(5):373-382.

Haq A. U., Chaudhry R. A., Rahil T., Ahmad N., Jabbar R. A., 1993 Reproductive efficiency of Holstein Friesian and Jersey cows maintained at Livestock Experiment Station, Bhunikey (Pattoki), Punjab. Annual report, Res Inst Physiol Anim Reprod Bhunikey (Pattoki), Distt Kasur, Pakistan: 24-34.

Heins B. J., Hansen L. B., Hazel A. R., Seykora A. J., Johnson D. G., Linn J. G., 2010 Birth traits of pure Holstein calves versus Montbeliarde-sired crossbred calves. J Dairy Sci **93**(5):2293-2299.

Juma K. H., Saad T. R., Tikriti A., 1990 Performance of Brown Swiss and Friesian cattle in central Iraq. Proceeding of 4th world congress on genetics applied to Livestock production Edinburg UK, 23-27.

Juneja I. J., Sastry N. S. R., Yadav B. L., 1991 Performance of purebred herd of Jersey and Holstein-Friesian cows in the semi-arid region. Indian J Anim Prod Management **7**:240-241.

Khan M. S., Rehman Z., Khan M. A., Ahmad S., 2008 Genetic resources and diversity in Pakistani Cattle. Pakistan Vet J **28**(2):95-102.

Khoso A. N., 2004 Effect of genetics and environmental factors on lactation components in Holstein Friesian cattle at government dairy farm Quetta. M.Sc. (Animal Breeding and Genetics) Sindh Agriculture University Tandojam.

Morsy M. A., Nigm A. A., Sadek R. R., El-Rawy A., 1986 Some production characteristics of Friesian and Jersey cattle in Libya. Egyptian J Anim Prod **26**:15-34.

Mustafa M. I., Latif M., Bashir M. K., Ahmad B., 2003 Reproductive performance of Red Sindhi cattle under hot and humid environment of Balochistan province of Pakistan. Pakistan Vet J **23**(2):66-72.

Oliveria F. M. D. E., 1975 Some factors effecting milk production of Holstein-Friesian herd. Thesis, Universidade Fedral de Minas garais Brazil.

Pakistan Economic Survey, 2009-2010 Government of Pakistan, Finance Div. Economic Advisor's Wing, Islamabad.
Parmar O. S., Dev D. S., 1978 Additive and non-additive genetic effects for some economic traits in Holstein-Friesian x Sahiwal crosses. Indian Journal of Dairy Science **31**:316-320.
Rafique M., Chohan K. R., Chaudhry Q. Z., 2000 Factors affecting age at maturity and age at first conception in Holstein-Friesian x Sahiwal crossbreds. Pakistan Vet J **20**(1):40-42.
Sattar A., Mirza R. H., Niazi A. A. K., Latif M., 2005 Productive and reproductive performance of Holstein-Friesian cows in Pakistan. Pakistan Vet J **25**(2):75-81.
Sheikh A. B., 1997 Performance evaluation of Holstein-Friesian herd under intensive management system (case study of Mastung) Balochistan, Pakistan. M.Sc. Thesis, Sindh Agriculture University, Tandojam, Pakistan.
Taj G. R., 2001 Study on performance analysis of Holstein Friesian cattle under intensive management at Punjgoor cattle farm, Balochistan Pakistan. M.Sc. Thesis. Sindh Agriculture University, Tandojam, Pakistan.
Uur F., 2003 Influence of previous calving intervals on milk yield traits of Holstein-Friesian cattle reared in the Kumkale State Farm located in Western Anatolia. Journal of Applied Sciences **3**(3):203-205.

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