UNIVERSITY OF SINDH JOURNAL OF ANIMAL SCIENCES
Vol. 6, Issue 2, Pp: (8-18), June, 2022
Email: editor .usjas@usindh.edu.pk
Website: http://usindh.edu.pk/index.php/USJAS
ISSN (P): 2521-8328
ISSN (E): 2523-6067
Published by University of Sindh, Jamshoro
(USJAS)

PERFORMANCE ANALYSIS OF DAJAL CATTLE UNDER SEMI INTENSIVE SYSTEM AT RAJANPUR

HAFIZ MUHAMMAD ADEEL FAROOQ[1], HUMA RIZWANA[1], ATIQUE AHMED BEHAN[1], GHULAM SHABIR BARHAM[2], MUHAMMAD BILAWAL ARAIN[3], MUHAMMAD SOHAIB[4]

[1]Department of Livestock Management, Sindh Agriculture University, Tandojam, Pakistan.
[2]Department of Animal Product Technology, Sindh Agriculture University Tandojam, Pakistan.
[3]Department of Veterinary Pharmacology, Sindh Agriculture University, Tandojam, Pakistan.
[4]Department of Veterinary Microbiology, Sindh Agriculture University, Tandojam, Pakistan.

ARTICLE INFORMATION

Article History:
Received: 26th April 2022
Accepted: 31th August 2022
Published online: 27th June 2022

Author's contribution
All authors contribute equally.

Key words:
Dajal cattle, performance, semi intensive system, Rajanpur

ABSTRACT

The present study was conducted on Dajal cattle at Government livestock station, Fazal pur, Rajanpur. For this purpose, the available data of last four years (2017-2020) on the reproductive and productive performance of Dajal cattle was utilized. Information of 30 animals was used and remaining data was excluded from the record. Productive performance in an average value are for traits like birth weight, lactation length, milk yield, were 26±1.65, 203±1.38, 826±1.38 respectively. Similarly, reproductive performance in an average value are for traits like age at first calving, age at first conception, dry period, service period and calving interval were 1219±3.21, 937±1.15, 239±17.7, 164±1.69, and 448±1.84 respectively. On the basis of high weaning weight, birth weight and growth rate, In Dajal cattle there is late age at first calving, so this breed not suitable for dairy purpose. It is concluded that the Dajal breed is low milk producer, attained late age at first calving, late age at puberty, and having calving interval long and postpartum estrus period. It has been noted that the Dajal breed could be reared for meat purpose. The reproductive performance and milk yield was found very low, which needs to be improved by improving management practices and outcrossing or cross breeding program on scientific line.

1. INTRODUCTION

Livestock throughout the ages has arisen such as the biggest sub-area in cultivation. This one is a basis of far-off trade profit and donates near 3.1 part in absolute fares.

Deciding greater than 35% to 40% of their compensation from that space. The administration has currently prioritized this area for the country's financial development, food safety and scarcity reduction. The overarching livestock progress plan is centered on encouraging "private section conducted progress with the governmental section providing a

*Corresponding Author: dr_bilalarain@yahoo.com

supporting background by means of plans. (Siyal *et al.*, 2021)

By successfully covering health issues, managing practices, artificial insemination facilities, animal breeding techniques, using well-balanced rations to feed animals and the control of diseases of livestock for business and financial status. The goal is to capitalize on the potential of the livestock sector for commercial development, food safety, and countryside socioeconomic progress. Before, cattle were saved for draft reason. Afterward, through the industrial development, the steers involved the spot of meat and dairy creation. The most significant job of animals remains the creation of great type protein used for human utilization over the stock of meat and milk. Milk assembly remains the best proficient interaction in changing over herbal solid to an ideal nutrient. Milk establishes an indispensable piece of our day by day nutrition vital used for sustenance and wellbeing improvement of the individual (Irshad *et al.*, 2011).

The reproduction and production are straight forwardly affected by hereditary capability of the animals, nourishment, climate, the executives of ranch and staff included (Kunbhar, *et al*., 2015). Despite the fact that Pakistan is supplied with rich cattle hereditary variety and assets. Notwithstanding, proficient use and the executives of these assets are missing because of the absence of mindfulness and institutional shortcomings. Also, improvement in substantial variety and its use is restricted. Just a predetermined number of hereditary improvement projects could get foothold in government strategy because these projects customarily take long to finish, and because of political reasons, nearby governments in Pakistan are by and large intrigued by programs which yield fast and unmistakable outcomes (Afzal, *et al.*, 2004).

The Dajal breed found in Dajal spaces of Punjab region; area Dera Ghazi Khan, Bahkar, Bahawalpur, Multan and so forth Dajal dairy cattle are white tone or light dark in shading. The male cows are blackish dim on bump. Typical load of male cows is 480 and female weight contains 380 kg. Dajal cows are like Bhagnari breed yet are less in size and the shading is lighter than Bhagnari cows. Dajal cattle are utilized for meat, anyway lower milk maker, guys are useful for draft purposes (Shah, 1994).

Dajal variety of steers existed as thicker in stopping milk mass (91.25kg) trailed through Dhanni calves (78.54 kg). Dhanni and Dajal cow varieties remain viewed as average draft types of Pakistan, Punjab. Notwithstanding, these animals position is rare as far as efficacy and protection (Khan *et al*., 2008). So, for, very little study has been reported od Dajal cows in Pakistan, the aims of the study were to investigate the productivity of Dajal cows in a semi intensive management system and to study the reproductive performance of Dajal cattle in a semi intensive management system.

The present investigation was carried out on Dajal cattle at Government livestock station, Fazal pur, Rajanpur. For this purpose, the available data of last four years (2017-2020) on reproductive and productive routine of Dajal cattle remained utilized. Data of 30 animals (lactation wise 1st to 5th) was used and remaining data was excluded from the record.

Productive parameters

Birth Weight: The natal heaviness of a new parturiated calves is named as birth weight. Lactation wise birth weight of 30 animals remained recorded from the available record (2017-2020).

Lactation length: The number of days in which animal produce milk. Lactation wise lactation length of 30 animals was recorded from the available record (2017-2020).

Milk yield: The quantity of total milk in one lactation period. Lactation wise lactation milk yield of 30 animals was recorded from the available record (2017-2020).

Reproductive parameters

Age at first conception: This one is computed as the time period amongst date of delivery and first conception. Age at first conception of 30 animals remained recorded from the available record (2017-2020).

Age at first calving: This one is computed as the time interval amongst time of birth and first parturition of animal. Stage at first calving of 30 animals remained recorded from the available record (2017-2020).

Service period: The interval from parturition to fruitful mating. Lactation wise service period of 30 animals was recorded from the available record (2017-2020).

Dry period: The interval amongst the completion of one lactation and beginning of the other lactation. Lactation wise dry period of 30 animals was recorded from the available record (2017-2020).

Calving interval: The time interval in the middle of two successive calving's called calving interval. Lactation wise calving Interval of 30 animals was recorded from the available record (2017-2020).

Statistical analysis

The acquired record was analyzed in descriptive statistics and one-way variance analysis to determine the significance and difference between distinct variables by means of statistic version 8.1 software.

2. MATERIALS AND METHODS

The present investigation was carried out on Dajal cattle at Government livestock station, Fazal pur, Rajanpur. For this purpose, the available data of last four years (2017-2020) on reproductive and productive routine of Dajal cattle remained utilized. Data of 30 animals (lactation wise 1^{st} to 5^{th}) was used and remaining data was excluded from the record.

Productive parameters

Birth Weight: The natal heaviness of a new parturiated calves is named as birth weight. Lactation wise birth weight of 30 animals remained recorded from the available record (2017-2020).

Lactation length: The number of days in which animal produce milk. Lactation wise lactation length of 30 animals was recorded from the available record (2017-2020).

Milk yield: The quantity of total milk in one lactation period. Lactation wise lactation milk yield of 30 animals was recorded from the available record (2017-2020).

Reproductive parameters

Age at first conception: This one is computed as the time period amongst date of delivery and first conception. Age at first conception of 30 animals remained recorded from the available record (2017-2020).

Age at first calving: This one is computed as the time interval amongst time of birth and first parturition of animal. Stage at first calving of 30 animals remained recorded from the available record (2017-2020).

Service period: The interval from parturition to fruitful mating. Lactation wise service period of 30 animals was recorded from the available record (2017-2020).

Dry period: The interval amongst the completion of one lactation and beginning of the other lactation. Lactation wise dry period of 30 animals was recorded from the available record (2017-2020).

Calving interval: The time interval in the middle of two successive calving's called calving interval. Lactation wise calving Interval of 30 animals was recorded from the available record (2017-2020).

Statistical analysis

The acquired record was analyzed in descriptive statistics and one-way variance analysis to determine the significance and difference between distinct variables by means of statistic version 8.1 software.

3. RESULTS AND DISCUSSION

Birth weight of Dajal cattle calves

The influence of semi-intensive management system towards the newborn mass of Dajal cattle calves was recorded and results are depicted in Table 1. The statistical analysis revealed ($P<0.05$) interaction variation in the birth mass of calves of Dajal cattle managed under semi-intensive management system. Comparatively ($P<0.05$) greater body weight of Dajal cattle was noted in; DC-11 (31.00kg) and were recorded newborn mass of Dajal cattle calves coded with DC-3, DC-8, DC-9, DC-14 and DC-29 (23.00, 23.00, 23.00 and 23.00kg, respectively) achieved significantly ($P<0.05$) minimum body weight under semi-intensive management system compared to rest of above mentioned Dajal cattle calves coded with

different number codes under similar type of management system.

Service period of Dajal cattle

The influence of semi-intensive management system on service period of Dajal cattle was recorded and results are depicted in Table II. The statistical analysis revealed (P<0.05) interaction variation in the service date of Dajal cattle managed under semi-intensive management system. Comparatively (P<0.05) greater service period of Dajal cattle was noted in; DC-23 (200 days) and minimum value of service period in DC-16 which is about 121 days, and on an average value of service period in Dajal cattle is recorded 164 days.

Calving interval of Dajal cattle

The influence of semi-intensive management system on Calving interval of Dajal cattle was recorded and results are depicted in Table III. The statistical analysis revealed substantial (P<0.05) interaction variation among the calving interval of Dajal cattle managed under semi-intensive management system. Comparatively (P<0.05) greater calving interval of Dajal cattle was noted in DC-23 (485days) minimum recorded in DC-16 (406days) and average is (448days).

Age at first calving of Dajal cattle

The influence of semi-intensive management system on time at first calving of Dajal cows was recorded and results are depicted in Table IV. The statistical analysis substantial (P<0.05) interactive variation among the time at first calving of Dajal cattle managed under semi-intensive management system. Comparatively (P<0.05) higher time at first calving of Dajal cattle was recorded in; DC-23 which is (1250 days) and minimum is recorded in DC-18(1185 days) and average value of time at first calving was noted as (1219) days.

Lactation length of Dajal cattle

The influence of semi-intensive management system on lactation length of Dajal cattle was recorded and results are depicted in Table V. The statistical analysis revealed significant (P<0.05) interactive variation among the lactation length of Dajal cattle managed under semi-intensive management system. Comparatively (P<0.05) higher lactation length of Dajal cattle was noted in; DC-28 (222 days) and minimum is recorded in DC-30 (118 days) and average value is 203 days.

Milk yield of Dajal cattle

The influence of semi-intensive management system on milk yield of Dajal cattle was recorded and results are depicted in Table V. The statistical analysis revealed substantial (P<0.05) interaction variation among the milk production of Dajal cattle managed under semi-intensive management system. Comparatively (P<0.05) higher milk yield of Dajal cattle was noted in; DC-28 (888 liters) and minimum value of milk yield was recorded in DC-16 (748 liters) and average value is recorded as 826 liters in 30 Dajal cattle per lactation.

Dry period of Dajal cattle

The influence of semi-intensive management system on dry period of Dajal cattle was recorded and results are depicted in figure VII. The statistical analysis (AVOVA) revealed significant (P<0.05) interactive variation among the dry period of Dajal cattle managed under semi-intensive management system. Comparatively (P<0.05) greater dry period of Dajal cattle was noted in; DC-23 (269 days) and minimum dry period is recorded of DC-18 (150 days) and on an average value of dry period in Dajal cattle is recorded as (239 days).

Age at first conception of Dajal cattle

The influence of semi-intensive management system on age at first conception of Dajal cattle was recorded and results are depicted in figure VIII. The statistical analysis revealed (P<0.05) interaction variation among the time at first conception of Dajal cattle managed under semi-intensive management system. Comparatively (P<0.05) higher age at first conception of Dajal cattle was recorded in; DC-23 (967 days) and minimum value is recorded in DC-18 (907 days) and on an average value of age at first conception was recorded 937 days.

4. DISCUSSION

Birth mass is a quality of extraordinary financial significance in the steers business. Now in dairy cows, it attribute has been extensively concentrated by various analysts in a few spots amongst various

varieties. Contrasts between birth loads of calves are additionally utilized as a sign of contrasts among them in energy, likely development frequency and develop mass. This isn't just a simple and dependable estimation of pre-birth period, yet additionally a significant factor that influences the post pregnancy development and improvement (Akubulut *et al*., 2001). In our study, birth weight of Dajal cattle was ranged between 23-31 kg. Consequences of this investigation are matched with definitions of (Khatri *et al.*, 2004) revealed that natal heaviness of male and female calves of Red Sindhi steers was 19.0 to 0.189 kg and 16.5+0.126 kg individually. (Vijaya *et al.*, 2019) discovered the birth weight of new conceived calves of crossbred cows is 23.99±0.43 kg. That one discovery is in near concurrence with birth weight of HF×Jersey×Sahiwal crossbred calves.

Result of this study showed that service period of Dajal cattle was ranged between 121-200 days. Fewer days service duration indicates timely gestation period and extra existence from main milk production. Service duration varied because of contrasts in taking care of and rearing administration (Irshad *et al.*, 2011). (Ahmad *et al*., 1989) announced a service duration of 145.5 days for Sahiwal cattle from Pakistan. (Mustafa *et al.*, 2003) detailed extended (235.87±14.05) days service duration in Red Sindhi yearlings in Pakistan. (Ahmad, 1999) detailed the service duration designed as first group, second and third group's equality Sahiwal cattle normal remained 153 days and 136 and 118 days, individually.

Findings of current investigation indicate that calving interval of Dajal cattle was ranged between 406-485 days. The overall mean calving interval of Achai cattle recorded was 461.89±20.23 days reported by (Hayaz *et al.*, 2014). (Saleem *et al.*, 2012), who reported 476.37± 5.17 days calving interval of Achai cattle. Calving span in Zebu cattle is about 418 days, in Red Sindhi cows it is about 429 days and in Sahiwal cows it is about 418 days has been accounted for through different writers (Qureshi, 2003). More limited calving span (380±36.6 days) remained accounted for by (Abeyagunawardena and Abeyawansa, 2013) for zebu cows.

Results of current study shows that age at first calving of Dajal cattle was ranged between 1185-1250 days. (Rege *et al.*, 1992) additionally revealed time of delivery as significant wellspring of variety meant for time at first calving. (Haq *et al.*, 1993) described that reduced time at first calving in Friesian yearlings (787 and 822 days, individually). (Sattar *et al.*, 2005) detailed no critical impact of period of delivery taking place time at first calving for Jersey and Friesian yearlings in Pakistan, separately. Time at first calving remained greater in Zebu cows as compared in Hybridized dairy cows. The time at first calving reported 1080 days for Zebu cows and for Red Sindhi steers 1119 days (Sheikh *et al.*, 200), that drop in the reach 726.0 to 1132 days of the present examination for Red Sindhi cattle.

In this study, lactation length of Dajal cattle was ranged between 118-222 days. Normal lactation length of 212.70 in addition to short 2.23 long stretches of Bhagnari cows revealed by (Jalbani, 1999). Lactation length in sahiwal cows is 235±2, announced by (Rehman *et al.*, 2008). This similar scope of lactation stretch (239-268 days) in Sahiwal cattle has recently stayed accounted for (Ilatsia *et al.*, 2011). Now Cholistani cows the lactating stretch noticed remained (165) days (Farooq *et al.*, 2010). Though lactation length (LL) of Red Sindhi cows is recorded 277.3±5.6 days by (Mustafa *et al.*, 2002). (Rehman and Khan 2012) revealed that in Sahiwal steers lactation stretch is about 235 ± 1.4 days for 5 fundamental groups of Sahiwal in Punjab.

Findings of this study showed that milk yield of Dajal cattle was ranged between 748-888 litters. (Javed *et al.*, 2000) revealed that normal lactating return of (1862.4±42) liters for a lactating stretch of (318±3.24) days for Sahiwal cattle on single of the primary groups, Livestock Experiment Station (LES) Jahangir Abad, Punjab. In different varieties like Cholistani cows the all-out milk producing noticed remained 1235 liters (Farooq *et al*., 2010) and for Frisian-Holstein cows the normal complete milk return noticed remained 2055 liters (Haile *et al.*, 2009). (Dahlin *et al.*, 1998) additionally revealed that Sahiwal cattle parturition in wintertime term created extra milk compared to those parturitions done in different terms. Milk production remained adapted to lactation stretch by utilizing the previous assessment time production and normal everyday production of the recognized piece of the lactation (Khan *et al.*, 1992). (Rehman and

Khan, 2012) revealed that for Sahiwal dairy cows the normal lactating milk production remained (1552±12.15) litters in a lactating stretch of (235±1.4) days at 5 principal Sahiwal crowds in Punjab.

Result of current study shows that dry period of Dajal cattle was ranged between 150-269 days. (Rehman and Khan, 2012) announced that crowd, time of parturation, period of calving, equality and milk production fundamentally influence the dry time frame in Sahiwal steers. Greater average worth of dry duration about 221.7±5.2 days remained recorded by (Javed *et al.*, 2000) designed for first lactating Sahiwal dairy cows. (Suhail *et al.*, 2010) announced no-significance impact of ancestor, term and date of parturation for dry time duration. Though dry time of 89 to1200 days designed for Red Sindhi and 86 to 140 days in Hybrid cows remained observe in research by (Kunbhar *et al.*, 2016).

In our study, the age at first conception of Dajal cattle was ranged between 907-967 days. The mean time at first conception of Red Sindhi dairy cattle is 1024.86+27.54 days announced by (Mustafa *et al.*, 2003). Greater time at first conception 828.5±233.1 days remained accounted for through (Chaudhry and Shafique, 1994) in crossed yearlings in Pakistan.

Haq *et al.*, 1993) noted lesser time at first conception 502±11.8 days for Holstein-Friesian calves from Pakistan. (Rafique *et al.*, 2000) announced that the impact of period of natal on the oldness at first conception in quite a while remained ineffective. (Sattar *et al.*, 2005) detailed that the normal stage at first conception for 236 Holstein Friesian yearlings remained (715±9.7 days), going to range of 421-1819 days.

5. CONCLUSION

Comparatively higher service period of Dajal cattle was recorded in; DC-23 (200 days) and minimum value of service period in DC-16, which is about 121 days, and on an average value of service period in Dajal cattle is recorded 164 days. Comparatively higher time at first calving of Dajal cows was recorded in DC-23 which is (1250 days) and minimum is recorded in DC-18(1185 days) and average value of time at first calving was noted as (1219) days.

Higher lactation length of Dajal cattle was recorded in; DC-28 which is (222 days) and minimum is recorded in DC-30 (118 days) and an average value is 203 days. Higher milk yield of Dajal cattle was recorded in; DC-28 (888 liters) and minimum value of milk yield was recorded in DC-16 (748 liters) and average value is recorded as 826 liters in 30 Dajal cattle per lactation. higher dry period of Dajal cattle was recorded in; DC-23 (269 days) and minimum dry period is recorded of DC-18 (150 days) and on an average value of dry period in Dajal cattle is recorded as (239 days). Age at first conception of Dajal cattle was recorded in; DC-23 (967 days) and minimum value is recorded in DC-18 (907 days) and on an average value of age at first conception was recorded 937 days.

6. ACKNOWLEDGEMENT

Authors are thankful to Government livestock station, Fazal pur, Rajanpur for provided the farm record and placement for the research work.

7. CONFLICT OF INTEREST

All authors have declared that there is no conflict of interests regarding the publication of this article.

REFRENCES

Abeygunawardena, H. and Abayawansa, W. D. 2013. Studies on indigenous zebu cattle 1.: reproductive pattern under traditional management. *Journal of the National Science Foundation of Sri Lanka*, *23*(4).

Afzal, M., Naqvi, A. N., WFP, K. L. and Balochistan, P. I. 2004. Livestock resources of Pakistan: *Present status and future trends*. Quarterly Science Vision 9.

Ahmad, M., 1999. *Genetic evaluation of native and crossbred dairy cattle in Pakistan* (Doctoral dissertation, University of New England).

Ahmad, Z., Khan, M., Khan, M. S. and Ahmad, M. D. 1989. Effect of season on post-partum fertility parameters in Sahiwal cows. *Pakistan Journal of Agricultural Sciences (Pakistan)*.

Akbulut, O., Bayram, B. and Yanar, M. 2001. Estimate of phenotypic and genetic parameters on birth weight of Brown Swiss and Holstein Friesian calves raised in semi entansive conditions. *Journal of Lalahan Livestock Research Institute (Turkey)*.

Chaudhary M. Z. and Shafiq M. 1994. Factors affecting productive and reproductive trials in Cholistani Cows. 15th *Annual Report livestock Production Research Institute*, Bahadurnagar, Okara, Pakistan.

Dahlin, A., Khan, U. N., Zafar, A. H., Saleem, M., Chaudhry, M. A. and Philipsson, J. 1998. Genetic and environmental causes of variation in milk production traits of Sahiwal cattle in Pakistan. *Animal Science*, 66 (2): 307-318.

Farooq, U., Samad, H. A., Sher, F., Asim, M. and Khan, M. A. 2010. Continuing Education Article Cholistan and Cholistani Breed of Cattle. *Pakistan Veterinary Journal*, 30 (2): 2074-7764.

Haile, A., Joshi, B. K., Ayalew, W., Tegegne, A. and Singh, A. 2009. Genetic evaluation of Ethiopian Boran cattle and their crosses with Holstein Friesian in central Ethiopia: milk production traits. *Animal*, 3 (4): 486-493.

Haq, A. U., Chaudhry, R. A., Rahil, T., Ahmad, N. and Jabbar, R. A. 1993. Reproductive efficiency of Holstein Friesian and Jersey cows maintained at Livestock Experiment Station, Bhunikey (Pattoki), Punjab. *Annual Report, Research Institute of Physiology*. Animal Reproduction, Bhunikey (Pattoki), Distt. Kasur, Pakistan, pp: 24-34.

Hayaz U., Khan H.U., Khan M.I., Khan R. and Naveed A. 2014. Productive and reproductive performance of Achai cattle maintained at livestock research & development station Surezai Peshawar, *Journal of Animal Health and Production*. 22 (1):13–19.

Ilatsia, E. D. 2011. Breeding strategies for Sahiwal cattle genetic resources in Kenya. Cuvillier Verlag.

Irshad A., Tariq M.M., Bajwa M.A., AbbasF, Isani, G.B., Soomro G.H., Waheed A. and Khan K.U. 2011. A study on performance analysis of Holstein-Friesian cattle herd under semi intensive management at Pishin Dairy Farm Balochistan. Journal of Institute Science and Technology, *Pakistan Veterinary Journal,* 1: 53-57.

Jalbani, A. H. 1999. Repeatability estimates of calving interval lactation length and milk yield in a herd of Bhagnari cattle.

Javed, K., Mohiuddin, G. and Abdullah, M. 2000. Environmental factors affecting various productive traits in Sahiwal cattle. *Pakistan Veterinary Journal*, 20 (4): 187-192.

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

Khan, M., Ahmad, Z. and Khan, M. S. 1992. Analysis and interpretation of breeding records of a Sahiwal herd for reproductive performance. *Pakistan Journal of Agricultural Sciences* 29: 92–95.

Khatri, P., Mirbahar, K. B. and Samo, U. 2004. Productive performance of Red Sindhi cattle. *Journal of Animal and Veterinary Advances*.

Kunbhar, H. K., Lasi, A. B. and Memon, A. A. 2015. Reproductive performance of crossbred cattle maintained at Nagori cattle farm, Nagori society, Karachi, Sindh. *Pakistan. Journal of Advances in Animal and Veterinary Sciences*, 3 (5): 7-12.

Kunbhar, H. K., Sharif, S. M., Memon, A. A., Abro, S. H., Abro, R., Suthar, V. and Mughal, G. A. 2016. Reproductive performance of Bhagnari cattle breed managed under semi-intensive management condition. *Pure and Applied Biology*, 5 (3): 615.

Mustafa, M. I., Latif, M. and Bashirl, M. K. 2002. Productive performance of red sindhi cattle under hot and humid environment of Baluchistan province of p akistan. *Pakistan Veterinary Journal*.

Mustafa, M. I., Latif, M., Bashir, M. K. and Ahmad, B. 2003. Reproductive performance of RedSindhi cattle under hot and humid environment of Balochistan province of Pakistan. *Pakistan Veterinary Journal*, 23: 66-72.

Qureshi, M. (2003). Dairy industry in Pakistan. *International Journal of Agriculture and Biology*. 3, 420-428.

Rafique, M., Chaudhry, M. Z. and Amer, M. A. 2000. Reproductive performance of inter Se H. Friesian x Sahiwal crossbred. *Pakistan Veterinary Journal*, 20 (3): 109-112.

Rege, J. E. O., Lomole, M. A. and Wakhungu, J. W. 1992. An evaluation of a long-term breeding programme in a closed Sahiwal herd in Kenya: I. Effects of non-genetic factors on performance and genetic parameter estimates. *Journal of Animal Breeding and Genetics*, 109 (1-6): 364-373.

Rehman, S. U., Ahmad, M. and Shafiq, M. 2006. Comparative performance of Sahiwal cows at the Livestock Experiment Station, Bahadurnagar, Okara vs patadar's herd. *Pakistan Veterinary Journal*, 26 (4): 179.

Rehman, Z. U., Khan, S., Bhatti, S. A., Iqbal, J. and Iqbal, A. 2008. Factors affecting first

lactation performance of Sahiwal cattle in Pakistan. *Archives Animal Breeding*, 51(4): 305-317.

Rehman, Z., and Khan, M. S. 2012. Environmental factors affecting performance traits of Sahiwal cattle in Pakistan. *Pakistan Veterinary Journal*, 32 (2): 229-233.

Saleem, M., Rahim, I. U., Rueff, H., Khan, M., Maselli, D., Wiesmann, U. and Muhammad, S. 2012. Effect of management on reproductive performances of the Achai cattle in the Hindu Kush (Northern Pakistan). *Tropical animal health and production*, 44 (6): 1297-1302.

Sattar, A., Mirza, R. H., Niazi, A. A. K., and Latif, M. 2005. Productive and reproductive performance of Holstein-Friesian cows in Pakistan. *Pakistan Veterinary Journal*, 25 (2): 75.

Shah, S. I., 1994. Breeds and types of Livestock in Pakistan. *Journal of Animal Sciences*, 60-61.

Sheikh, M., Mustafa and Zelam, N., 2000. Reproductive performance of Holstein Friesian cattle under tropic conditions Central Netherland. *Acaban Veterinary Mannual*. 4: 3-6.

Siyal, M., Leghari, R. A., Memon, M. I., Soomro, S. A., and Arain, M. B. 2021. Control strategies of mastitis/udder problems in the dairy farms of hyderabad. *University of Sindh, Journal of Animal Sciences*, (3): 5-15.

Suhail, S. M., Ahmad, I., Hafeez, A., Ahmed, S., Jan, D., Khan, S., and Rehman, A. 2010. Genetic study of some reproductive of jersey cattle under subtropical conditions. *Sarhad Journal of Agriculture*. 26 (1): 87-91.

Vijayakumar, P., Singaravadivelan, A., Silambarasan, P., Ramachandran, M., and Churchil, R. 2019. Production and reproduction performances of crossbred Jersey cows. *Veterinary Research International*, 7 (2): 56-59.

Table 1. Birth weight of thirty calves of Dajal cattle

DC-1	**DC-2**	**DC-3**	**DC-4**	**DC-5**	**DC-6**	**DC-7**	**DC-8**	**DC-9**	**DC-10**
25.00	27.00	23.00	27.00	26.00	28.00	28.00	23.00	23.00	25.00
DC-11	**DC-12**	**DC13**	**DC-14**	**DC-15**	**DC-16**	**DC-17**	**DC-18**	**DC-19**	**DC-20**
31.00	29.00	26.00	23.00	25.00	26.00	24.00	29.00	25.00	27.00
DC-21	**DC-22**	**DC-23**	**DC-24**	**DC-25**	**DC-26**	**DC-27**	**DC-28**	**DC-29**	**DC-30**
26.00	28.00	27.00	27.00	30.00	28.00	26.00	24.00	23.00	24.00

Table 2. Service period of thirty calves of Dajal cattle

DC-1	**DC-2**	**DC-3**	**DC-4**	**DC-5**	**DC-6**	**DC-7**	**DC-8**	**DC-9**	**DC-10**
160^{l}	144^{p}	182^{e}	$169i^{j}$	171^{hi}	159^{lm}	165^{k}	175^{g}	187^{d}	122^{s}
DC-11	**DC-12**	**DC-13**	**DC-14**	**DC-15**	**DC-16**	**DC-17**	**DC-18**	**DC-19**	**DC-20**
166^{jk}	156^{m}	193^{b}	148^{o}	188^{cd}	121^{s}	132^{r}	123^{s}	186^{d}	173^{gh}
DC-21	**DC-22**	**DC-23**	**DC-24**	**DC-25**	**DC-26**	**DC-27**	**DC-28**	**DC-29**	**DC-30**
161^{l}	179^{e}	200^{a}	179^{ef}	140^{q}	$176f^{g}$	152^{n}	197^{a}	191^{bc}	138^{q}

Values with different letters for each group indicate significant differences at $p \leq 0.05$

Table 3. Calving interval of thirty Dajal cattle

DC-1	**DC-2**	**DC-3**	**DC-4**	**DC-5**	**DC-6**	**DC-7**	**DC-8**	**DC-9**	**DC-10**
440^{j}	425^{m}	467^{e}	450^{h}	455^{g}	440^{j}	445^{i}	460^{f}	472^{d}	405^{p}
DC-11	**DC-12**	**DC-13**	**DC-14**	**DC-15**	**DC-16**	**DC-17**	**DC-18**	**DC-19**	**DC-20**
450^{h}	440^{j}	478^{b}	430^{l}	473^{cd}	406^{p}	415^{o}	405^{p}	471^{d}	455^{g}
DC-21	**DC-22**	**DC-23**	**DC-24**	**DC-25**	**DC-26**	**DC-27**	**DC-28**	**DC-29**	**DC-30**
445^{i}	450^{h}	485^{a}	460^{f}	425^{m}	461^{f}	435^{k}	482^{a}	476^{bc}	420^{n}

Values with different letters for each group indicate significant differences at $p \leq 0.05$

Table 4. Age at first calving of thirty Dajal cattle

DC-1	DC-2	DC-3	DC-4	DC-5	DC-6	DC-7	DC-8	DC-9	DC-10
1207l^{m}	1226^{gh}	1221^{h-j}	1239^{b-d}	1236^{cd}	1206^{mn}	1233^{d-f}	1222^{hi}	1227^{f-h}	1235^{c-e}
DC-11	**DC-12**	**DC-13**	**DC-14**	**DC-15**	**DC-16**	**DC-17**	**DC-18**	**DC-19**	**DC-20**
1247^{a}	1199^{o}	1200no	1219^{i-k}	1213^{kl}	1240^{bc}	1225^{g-i}	1185^{q}	1245^{ab}	1229^{e-g}
DC-21	**DC-22**	**DC-23**	**DC-24**	**DC-25**	**DC-26**	**DC-27**	**DC-28**	**DC-29**	**DC-30**
1221^{h-j}	1215^{jk}	1250^{a}	1225^{g-i}	1215^{jk}	1195^{op}	1190^{p-q}	1194^{op}	1215^{jk}	1192 ^{p}

Values with different letters for each group indicate significant differences at p≤0.05

Table 5. Age at first calving of thirty Dajal cattle

DC-1	DC-2	DC-3	DC-4	DC-5	DC-6	DC-7	DC-8	DC-9	DC-10
200^{n}	189.7 ^{pq}	211 $^{e-g}$	207.33 $^{i-k}$	203 ^{lm}	205.7 $^{j-l}$	192 ^{p}	190^{b}	213.7 ^{de}	210.33 $^{f-h}$
DC-11	**DC-12**	**DC-13**	**DC-14**	**DC-15**	**DC-16**	**DC-17**	**DC-18**	**DC-19**	**DC-20**
210 $^{g-i}$	196.99 ^{o}	212 $^{e-g}$	208^{h-j}	207 ^{jk}	187.7^{q}	197 ^{o}	184.7	204.67 $^{k-m}$	212 $^{e-g}$
DC-21	**DC-22**	**DC-23**	**DC-24**	**DC-25**	**DC-26**	**DC-27**	**DC-28**	**DC-29**	**DC-30**
202 ^{mn}	221^{a}	215.7 ^{cd}	213 $^{d-f}$	215 ^{cd}	219^{ab}	217^{bc}	221.7^{a}	221^{a}	118^{s}

Values with different letters for each group indicate significant differences at p≤0.05

Table 6. Milk yield of thirty Dajal cattle

DC-1	DC-2	DC-3	DC-4	DC-5	DC-6	DC-7	DC-8	DC-9	DC-10
800^{q-r}	760^{e}	840^{f}	820^{f}	812^{p}	824^{m-n}	792^{t}	798^{r-s}	848^{g-h}	828^{l-m}
DC-11	**DC-12**	**DC-13**	**DC-14**	**DC-15**	**DC-16**	**DC-17**	**DC-18**	**DC-19**	**DC-20**
832^{k-l}	794^{s-t}	844^{h-i}	836^{j-k}	852^{f-g}	748^{w}	784^{u}	752^{w}	816^{o-p}	844^{h-i}
DC-21	**DC-22**	**DC-23**	**DC-24**	**DC-25**	**DC-26**	**DC-27**	**DC-28**	**DC-29**	**DC-30**
804^{q}	880^{b}	864^{d}	856^{e-f}	860^{d-e}	872^{c}	864^{d}	888^{a}	876^{b-c}	796^{r-t}

Values with different letters for each group indicate significant differences at p≤0.05

Table 7. Dry period of thirty Dajal cattle

DC-1	DC-2	DC-3	DC-4	DC-5	DC-6	DC-7	DC-8	DC-9	DC-10
240 a-d	235 a-d	257ab	245 a-d	252 a-c	234 a-d	252 a-c	263ab	260 ab	198e
DC-11	**DC-12**	**DC-13**	**DC-14**	**DC-15**	**DC-16**	**DC-17**	**DC-18**	**DC-19**	**DC-20**
242 a-d	242a-d	267a	221 c-e	260 ab	229 c-e	219 c-e	150.33f	267a	244 a-d
DC-21	**DC-22**	**DC-23**	**DC-24**	**DC-25**	**DC-26**	**DC-27**	**DC-28**	**DC-29**	**DC-30**
244 a-d	230 b-e	269a	246 a-c	210e	243 a-d	219 c-e	260ab	257 ab	221c-e

Values with different letters for each group indicate significant differences at p≤0.05

Table 8. Age at first conception of thirty Dajal cattle

DC-1	DC-2	DC-3	DC-4	DC-5	DC-6	DC-7	DC-8	DC-9	DC-10
925l	945fg	952e	935i	955d	923l	963b	938h	947f	955d
DC-11	**DC-12**	**DC-13**	**DC-14**	**DC-15**	**DC-16**	**DC-17**	**DC-18**	**DC-19**	**DC-20**
965ab	915n	920m	938.33h	933ij	960c	943g	907p	964b	944g
DC-21	**DC-22**	**DC-23**	**DC-24**	**DC-25**	**DC-26**	**DC-27**	**DC-28**	**DC-29**	**DC-30**
935i	930k	967a	940h	931jk	914no	910p	912op	910p	932jk