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PRODUCTION AND REPRODUCTION PERFORMANCE OF JERSEY CATTLE AT CATTLE BREEDING AND DAIRY FARM HARICHAND CHARSADDA NWFP

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ABSTRACT

Production and reproduction performance of Jersey cattle at Cattle Breeding and Dairy Farm, Harichand, Charsadda, NWFP during 1993 to 2003 was investigated. Effect of season and year of calving on milk yield and reproduction were studied. Average age at puberty was 748.71 ± 22.5 days and a coefficient of variation of 21.87%. Average lactation yield was 1663.15 ± 70.25 liters and a coefficient of variation of 29.23%. The average lactation daily milk yield was 5.3 ± 0.117 liters, with a coefficient of variation of 15.28%. Number of services per conception was 1.5 ± 0.152 and a coefficient of variation of 73.02%. Recording system at the farm needs to be improved and if possible, the data should be electronically managed.

Keywords: cattle, jersey, production, reproduction, performance, milk, yield.

INTRODUCTION

Livestock is the backbone of Pakistan's national economy. In NWFP about 50% of the land is not available for cultivation, hence most suited for keeping livestock (Agriculture Statistics of Pakistan, 1999-2000). Livestock is an important sub-sector of agriculture in Pakistan as it accounts about 38% of agriculture value added and about 9% of the GDP. Its net foreign exchange earning were to the tune of Rs. 53 billion in 2000-2001, which is almost 12.3 percent of the overall export earning of the country. The role of livestock in rural economy may be realized from the fact that 30-35 million rural population is engaged in livestock raising. The average household size is 2-3 cattle/buffalo and 5-6 sheep/goat per family deriving 30-40% of their income from it. The main livestock species include cattle, buffaloes, sheep, goat, camels and horses etc.

There are 22 million cattle in the country with a positive growth rate. Although, more than half of the cattle population is non-descript, Sahiwal and Red Sindhi, along with Cholistani are the distinguished dairy cattle breeds. The draught breed includes Bhangri, Dajal, Dhanni, Lohani, Rojhan and Ankaraj. Sahiwal is more extensively studied breed (Ahmad, 1972; Hasnain and shah, 1985; Dahlin, 1998; Ahmad, 1999) as compared to Red Sindhi (Wahid, 1975a). About one forth of the milk produced in the country comes from cattle. Yet cattle have traditionally been raised to produce bullocks for ploughing. About 55% cattle are raised in herds with size of 1-6 animals. Raising is generally under small farmer extensive production system.

Although, species wise breeding policy has been lacking in the past, however breeding strategy for cattle and buffalo have evolved progressively. Performance of Sahiwal and Swedish and White F1 provided a stimulus to start crossbreeding in the early 70's. Crossbreeding was allowed at the Government livestock experiment station with Sahiwal, Red Sindhi, and Thari cattle breeds. As follow-up (in the mid 70's), more experimental studies were performed at Government research stations using Friesian and Jersey semen. This was followed by artificial insemination of cows with private farmers at a large scale. Fearing the increased use, cross breeding of Sahiwal and Red Sindhi was forbade and cross breeding was recommended it for non-descript cattle comprising more than 2/3rd of the cattle population. The major objectives of the breeding policy included improvement in milk production of indigenous dairy cattle, and improving reproductive efficiency (Country Report on Animal Genetic Resources of Pakistan, 2002).

The Jersey breed of dairy cattle originated on the Island of Jersey, a small British Island located in the English Channel off the coast of France. The ability of Jerseys to make more profit per acre is one of the most important reasons for the breed's popularity. The breed's greater efficiency in converting feed into milk and the ability of the dairymen to keep more animals on an acre of ground are principal reasons why Jerseys make more profit per acre. They cost less to raise than other dairy cattle because they reach a productive age from 2 to 10 months earlier than other dairy breeds. Their initial cost is lower and they require less food for body maintenance during their productive life. They are especially tolerant to hot temperature, yet perform well in the northern climates. Jersey milk contains more food solids than milk from any other dairy breed. Its extra butterfat imparts a flavor to Jersey milk that is well liked by the milk drinkers and its extra proteins, vitamins, minerals and sugar make it a more nutritious food product (Frandsen 1958).

MATERIALS AND METHODS

Data regarding productive and reproductive performance of Jersey cattle maintained at Cattle Breeding and Dairy Farm, Harichand, Charsadda, NWFP during 1993 through 2003 was utilized for the present investigation.

Data collection

Following data was collected from the records maintained at the farm:

- Identification number of each cow
- Date of birth
- Date of services
- Date of calving
- Date of going dry
- Daily milk yield

Data extraction

Following parameters were extracted from available records:

- Average puberty age (days)
- First lactation daily milk yield (liters)
- First lactation yield (liters)
- Number of services for first conception

To investigate the effect of season and year of calving on various traits, year was split in the following four seasons is as follows:

Winter = December through February
Spring = March and April
Summer = May through August
Fall = September through November

Statistical analysis

The data was analysed using General Linear Model (GLM) employing the following model and using SAS (INST. INC. 1988) program for analyses of the data:

$Y_{ij1} = \mu + \alpha_i + \beta_j + \varepsilon_{ij1}$

Y_{ij1} = observation in the i_{th} season of calving, in j_{th} year of calving.

μ = population mean constant common to all records.

α_I = the effect of i_{th} season of calving, I = 1….4

β_j = the effect of j_{th} year of calving, k = 1993……2003

ε_{ij1} = the residuals associated with each Y_{ij1}, distributed normally and independently with mean zero and variance$\sigma 2$

Correlation analysis:

Correlations between different traits were estimated using the following equation:

$$r = \frac{\sigma xy}{\sigma x \, \sigma y}$$

RESULTS AND DISCUSSION

Age at puberty

The average age at puberty was a 748.71 ± 22.5 days, ranging from 477 to 1350 days, with a coefficient of variation of 21.87% (Table-1).

Year and season of calving had significant effect on age at puberty (Table-1).

Average age at puberty of Jersey cows calved in fall was 852.67 days. The average age at puberty of Jersey cows calved in spring, summer, and winter was 741.46, 719.46 and 690.89 days, respectively (Table-2). Jersey cows calved in the 1995 had longer age at puberty of 950.90 days followed by Jersey cows calved in 1993, 1994, 1996, 1997, 1998, 1999, 2000, 2001, 2002 and 2003 with average age at puberty of 805, 667.6, 563.3, 740, 743, 866.7, 695, 639.6, 769.8 and 704 days, respectively (Table-3).

Varade *et al*., (1997) reported that average age at puberty of Jersey crossbred cows was different in various seasons of the year. According to them age at puberty in winter season was 988.5±14.58 days, while 968.77±7.43 days in summer, indicating short puberty age in winter than summer as against the results of the present study. Longer puberty age in summer as observed present study may be associated with high ambient temperature during the months of July-August. Contrary to the present finding Singh and Mishra (1980) and Zaman *et al*., (1983) reported that the age at maturity of Jersey cows was 619.4±35.69 and 416.1±10.88 days, respectively. The differences may be attributed to the variation in feeding and management practices. Inbreeding practiced at the farm may also be contributing factors towards larger age at puberty in the present study.

Age at puberty was significant ($p<0.01$) and positively correlated with number of services per conception (Table-4).

Lactation yield

Average lactation yield of Jersey cows are given in Table-1. Production ranged from 907.90 to 3841.90 liters, with a mean of 1663.15 ± 70.25 liters and a coefficient of variation of 29.23% (Table-1). The year and season of calving had a significant effect on milk yield (Table-1).

Although the effect of season on average lactation yield was non-significant yet cows calved in fall season had larger yield per lactation (1896.20 liters), followed by cows calved in spring, summer and winter having mean yield of 1695.9, 1670.6 and 1316.2 liters, respectively (Table-2). Cows calved during 1993 had the best production performance and had maximum mean milk yield of 2971.3 liters, followed by animals calved during the year 1994 with an average lactation yield of 1800.90 liters. Cows calved in 1995 had average lactation yield of 1453.50 liters. The average lactation yield during the years 1996, 1997, 1998, 1999, 2000, 2001, 2002 and 2003 was 1411.5, 1653.7, 1427.6, 1729.7, 1734,1567.2, 1552.9 and 1339.5 liters, respectively (Table-3).

Hayman (1974) and Baruah *et al.*, (1997) reported that average lactation milk yield of Jersey cows was 1944 ± 81.7 kg and 2028.91 ± 21.76 liters, respectively as against 1663.15 liters reported in the present study. If the farms are better managed and animal are efficiently fed, the average production of cows could be significantly improved.

Lactation yield was significant ($p<0.01$) and positively correlated with daily milk yield (Table-4).

Daily milk yield

Average daily milk yield of Jersey cows was 5.30 ± 0.117 liters, ranging from 4-8 liters, with a coefficient of variation of 15.28% (Table-1). Season and year of calving had significant effect on daily milk yield (Table-1).

Average daily milk yield of Jersey cows calved in winter was 5.71 liters those calved in fall, summer and spring produced 5.37, 5.26 and 5.08 liters, respectively (Table-2). Jersey cows calved in the year 1993 produced 6.66 liters milk per day, followed by Jersey cows calved in the year 1999, 1997, 1994, 1996, 2001, 2002, 2000, 2003, 1998, and 1995 with an average daily milk yield of 6, 6, 5.69, 5.33, 5.2, 5, 5, 4.75, 4.71 and 4.71liters, respectively (Table-3).

Similar to the present finding Rohilla and Verma (1998) reported that average daily milk yield in Jersey crossbreed cows ranging from 6.093 to 7.77 liters. Findings of Buvanendran (1975) were also in agreement of the present study who reported 5.23kg daily milk yield in Jersey cows.

The daily milk yield was significantly ($p<0.01$) positively correlated with lactation yield (Table-4).

Number of services per conception

Average number of services per first conception was 1.5 ± 0.152 ranging from 1 to 6 with a coefficient of variation of 73.02% (Table-1). Season and year of calving had significant effect on number of services per first conception (Table-1).

Numbers of services per first conception of cows in different seasons are given in (Table-2). Cows in fall season had maximum number of services for first conception of 2.55, followed by Jersey cows bred in summer, winter and spring seasons having 1.37, 1.22 and 1.15 services per conception, respectively. The number of services per first conception of Jersey cows in different years is given in (Table-3). The average number of services per first conception of Jersey cows in the year 1995 was 2.87, followed number of services for first conception in the year 1999, 2002, 2001, 1998, 1996, 1994, 1997, 1993, 2000 and 2003 that 2, 1.5, 1.4, 1.37, 1.33, 1.06, 1, 1, 1 and 1 services, respectively.

Findings of the present study are supported by the results of Murdia and Tripathi (1990) who reported 1.58 services per conception. Some other workers like Singh and Mishra (1980) have also reported almost similar results (2.0 ± 1.15). Sekerden (1996) reported comparatively large number of services (3.3 ± 0.17) per conception.

The services per first conception was significant ($p<0.01$) and positively correlated with the age at puberty (Table-4).

Successful service or insemination depends on many factors as quality of semen, skill of the inseminator, proper time of insemination and cows to be inseminated themselves. Management, Nutrition and climate conditions may also affect the success of service or insemination. The findings of the present study suggested comparatively better insemination and management services at Harichand Farm during the period of the study.

Table-1. Range, Mean ± SE, Season, year ($p<0.001$) and coefficient of variation in traits regarding production and reproduction up to the end of lactation in Jersey cows.

Trait	Mean ± SE	Range		Year ($p<0.001$)	Season ($p<0.001$)	CV (%)
		Minimum	Maximum			
Age at puberty (days)	748.71 ± 22.5	477	1350	0.03	0.03	21.87
First lactation milk yield (liters)	1663.15 ± 70.25	907.90	3841.90	0.016	0.0002	29.23
First lactation daily milk yield (liters)	5.30 ± 0.117	4.0	8.0	0.019	0.0002	15.28
Number of services per first conception	1.52 ± 0.152	1.0	6.0	0.004	0.03	73.02

Table-2. Comparison of means of various traits of lactation of Jersey cows in relation to season of calving.

Season	Puberty age	Lactation yield	Daily yield	Number of services per conception
Winter	690.89b	1316.2b	5.71a	1.22b
Spring	741.46b	1695.9a	5.08b	1.15b
Summer	719.46b	1670.6a	5.26ab	1.37b
Fall	852.67a	1896.2a	5.37ab	2.55a

Table-3. Comparison of means of various traits of lactation of Jersey cows in relation to year of calving.

Year	Puberty age	Lactation yield	Daily yield	Number of services per conception
1993	805.0abc	2971.3a	6.66a	1b
1994	667.6bc	1800.9b	5.69abc	1.06b
1995	950.9a	1453.5b	4.71c	2.87a
1996	563.3c	1411.5b	5.33bc	1.33ab
1997	740.0abc	1653.7b	6ab	1b
1998	743.0abc	1427.6b	4.71c	1.37ab
1999	866.7ab	1729.7b	6ab	2ab
2000	695.0bc	1734.1b	5bc	1b
2001	639.6bc	1567.2b	5.2bc	1.4ab
2002	769.8abc	1552.9b	5bc	1.5ab
2003	704.0bc	1339.5b	4.75c	1b

Table-4. Pearson's correlation in different economic traits up to the end of lactation in Jersey cows.

	Age at Puberty	Lactation yield	Daily yield	Number of services per conception
Age at Puberty	-	0.193 0.179	0.013 0.927	0.589 0.0001
Lactation yield	0.193 0.179	-	0.511 0.0001	-0.055 0.704
Lactation daily milk yield	0.013 0.927	0.511 0.0001	-	-0.072 0.618
Number of service per conception	0.589 0.0001	-0.055 0.704	-0.072 0.618	-

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