Study on the reproductive performance of Jersey cows at Wolaita Sodo dairy farm, Southern Ethiopia

Habtamu Lemma[1], Kelay Belihu[2], and Desie Sheferaw[3]

[1]Wolaita Sodo University, P. O. Box 128, Wolaita Sodo, Ethiopia.(nurhabta@yahoo.com)
[2]Addis Ababa University, Faculty of Veterinary Medicine, P.O.Box 34, Debre-Zeit, Ethiopia
[3]Wolaita Sodo University, Department of Animal and Range Science, P. O. Box 128, Wolaita Sodo, Ethiopia

Abstract

Retrospective study was conducted in Wolaita Sodo State Dairy Farm, Southern Ethiopia, to assess the reproductive performance and herd life of Jersey cattle, and the associated factors. The study breed was mainly kept in the farm on pastureland and with some supplementary feeds. The results revealed an overall mean of age at first service, age at first calving, calving interval, interval between calving and effective service and number of services per conception of 722.24 days (SE=36.4), 1035.21 days (SE=12.59), 450.09 days (SE=6.60), 174.68 days (SE=8.61) and 1.79 (SE=0.06) respectively. All the traits were significantly influenced by year of birth ($p<0.001$). Age at first service was significantly lower in imported cattle while calving interval was lower in on-farm raised cattle ($p<0.001$). Calving interval and the interval between calving and effective service were decreasing significantly with parity number ($p<0.001$). Number of services per conception was significantly lower in short rainy season ($p<0.05$). The mean length of the herd life, productive herd life and effective productive herd life were 2983.74 days (SE=67.98), 2310.11 days (SE=296.91) and 1663.15 days (SE=55.09), respectively. Year of birth had significant effect on herd life ($p<0.001$) and effective productive herd life ($p<0.01$). Imported cattle had significantly longer herd life ($p<0.01$) and productive herd life ($p<0.05$) than the on-farm reared animals. The mean birth and weaning weights were 22.87 kg (SE=0.17) and 108.88 kg (SE=0.67) respectively. Both traits were influenced significantly by year and season of birth, sex of calves and parity of the dam ($p<0.01$). Calves born in the long rainy season had better birth and weaning weight than the others. There was a trend of increased birth weight of calves as the parity number of the dam increased.

Keywords: Jersey, Birth weight, Herd life, Reproductive performance, Weaning weight

Introduction

Genetic improvement strategies of cattle in Ethiopia has been brought through modifying the breed composition of local populations, either by introducing genes from an external source or through direct importation of exotic cattle from other countries. The immediate increase in production from such types of development programs has a definite attraction (De Leeuw *et al*., 1991). Cunningham and Syrstad (1987) stated that from the experience obtained throughout the tropics, the Jersey, characterized by small mature size, low maintenance requirement, high milk fat content and good reproductive performance and has often been selected for tropical research and development program, which could have a definite attraction in the Ethiopian highland environments.

The Farm has been operating with Jersey cattle for the last 20 years and information on different traits of the breed has been recorded. However, detailed scientific study about the breed was not made on performance parameters. Hence, the objective of this study was to evaluate the reproductive performance and herd life of Jersey cattle maintained in the Farm.

Materials and methods

Study area

The study carried out in Wolaita Sodo State Dairy Farm, which is located in Wolayta Zone, Southern Ethiopia. The Zone is one of the densely populated, about 342 persons per Km^2, areas in the country and with a total human population of 1.65 million (WZFEDD, 2004). The Farm is situated at 6 º49' N latitude and 39º 47' E longitude. The area has mean annual temperature of 19ºC and a bimodal rainfall pattern, short rainy period from March to May and long rainy period from July to October. The average annual rainfall is 1014mm (NMSA, 2002). The total land area of the farm is 115 hectares where there are different farmstead structures and cultivated forge plants. The farm lies at an altitude of 1990 meters above sea level.

Study population

Wolayta Agricultural Development Unit (WADU) established the Farm in 1971, and in 1987 with the financial aid of Dairy Rehabilitation and Development project (DRDP) 90 Jersey breed heifers and 2 Jersey bulls were imported from Zimbabwe and Kenya respectively as initial foundation stock for the farm.

Starting from this point, those animals kept in this Farm, for the last twenty years, were included in the study population.

Study design

A retrospective type of study was carried out to evaluate the reproductive performances of Jersey cattle in the farm. Recorded data for the last 20 years (1987-2007) on the reproductive performance of the breed in the Farm were used for this study. Only the data of cows with complete information were included in the study.

The recorded data used were birth weight (BW), weaning weight (WW), age at first service (AFS), age at first calving (AFC), number of services per conception (NSC), calving interval (CI), calving to conception interval (ICES), herd life or longivity, productive herd life (PHL) and effective productive herd life (EPHL). In addition, age and parity of cows, and season and year of calving were also used from the Farm records.

Productive herd life was defined as the difference between the date of first calving and date of disposal. Effective production herd life was estimated by multiplying the number of calves born per cow by 365 days. Total herd life (longevity) was calculated as the average age at disposal.

Data analysis

Collected data were entered into Microsoft Excel spreadsheet and summarized by descriptive statistics, and General Linear Models of SPSS (version 11.5) were used to analyze the effects of different factors on the performance parameters.

Models employed for the analysis were as follows:

Reproductive performances

I. AFS and AFC (year and season of birth, source of cattle)

$$Y_{jkq} = \mu + C_q + Mj + R_k + e_{jkq}$$

CI and ICES (season and year of last calving/service, parity, source of cattle)

$$Y_{jklq} = \mu + Cq + M_j + R_k + P_l + e_{jklq}$$

NSC (season and year of last service, parity, source of cattle)

$Y_{jklq} = \mu + Cq + M_j + R_k + P_l + e_{jklq}$

Calf production

Birth and weaning weights (year and season of birth, sex, parity, dam source)

$Y_{jkl\,q} = \mu + Cq + M_j + R_k + P_l + ejk_l$

Longevity and EPHL (year and season, source of cattle)

$$Y_{jkq} = \mu + Cq + M_j + R_k + e_{jkq}$$

Where, Y = the observations on each trait

μ = Value common to all animals (overall mean)

Bi = effect of i^{th} birth weight

Cq = Effect of q^{th} source of cattle

R_k = Effect of the k^{th} year

M_j = Effect of the j^{th} season

P_l = Effect of the l^{th} parity of dam

S_m = Effect of the m^{th} sex of calf

E_{ijklmq}= Random error associated with $Yi_{jklmq}{}^{th}$ observations which is assumed to be normally and independently distributed with mean zero and variance $\sigma^2 e$.

Results

Ages at first service and calving

The average age at first service and age at first calving were 722.24 days (SE=36.4) and 1035.21 days (SE=12.59), respectively as shown on Table 1. There was significant effect of year of birth ($p<0.001$) and cattle source ($p<0.001$) on age at first service; but age at first calving was significantly ($p<0.001$) affected by the year of birth.

Table 1: Least squares means (LSM) and standard errors (±SE) for age at first service (AFS) and age at first calving (AFC) of Jersey breed heifers

		LSM (±SE)		LSM (±SE)
		AFS (days)		AFC (days)
Overall mean	254	722.24 (36.4)	191	1035.21 (12.59)
Year of birth		***		***
1985	28	606.71 (164.38)^{d}	28	934.64(41.40)^{c}
1986	31	749.26 (194.62)^{ab}	29	1076.24(34.99)^{ab}
1987/88	9	881.59 (320.13)^{a}	4	944.00(109.67)^{c}
1988/89	-	-	6	1067.34(71.45)^{ab}
1989	6	897.00 (278.18)^{ab}	-	-
1990	7	962.57 (236.83)^{a}	7	1197.14(54.63)^{a}
1991	8	722.13 (236.56)^{abc}	6	1035.00(29.35)^{ab}
1992	7	685.13 (168.14)^{d}	6	1042.00(64.34)^{ab}
1993	9	623.56 (128.09)^{d}	8	933.88(54.50)^{c}
1994/95	13	725.54 (330.49)^{ab}	9	1046.93(100.12)^{ab}
1995	9	1002.78 (234.57)^{a}	-	-
1996	13	1101.15 (165.85)^{a}	5	1212.60(60.93)^{a}
1997	12	951.92 (183.69)^{a}	9	1138.22(64.10)^{a}
1998	11	652.00 (112.66)^{d}	12	974.33(18.55)^{c}
1999	9	684.78 (63.21)^{d}	7	971.71(25.33)^{c}
2000	27	683.52 (168.24)^{d}	20	1026.45(25.17)^{ab}
2001	16	795.38 (108.63)^{ab}	12	1127.17(32.82)^{a}
2002	15	784.80 (83.18)^{ab}	11	1112.45(32.94)^{a}
2003	10	709.60 (83.38)^{abc}	8	935.80(95.00)^{c}
2004	7	789.43 (65.86)^{ab}	-	1100.33(25.62)^{a}
2005	5	722.80 (25.53)^{abc}	4	1000.25(14.13)^{ab}
Season of birth		NS		NS
Long rainy season	80	738.79(26.61)	56	1030.72(28.46)
Short rainy season	67	767.05(27.13)	52	1043.39(29.75)
Long dry season	105	720.75(21.73)	82	1034.09(23.45)
Cattle sources		***		NS
Imported	59	685.88(28.21)^{b}	57	1022.62(29.32)
Farm-bred	195	798.52(15.53)^{a}	134	1049.51(17.39)

LSM with different superscript letters within a factor differ significantly*** ($p<0.001$), NS=non-significant, AFS= Age at First Service, AFC= Age at First Calving

Table 2: Least squares means (LSM) and standard errors (+SE) for calving interval (CI) and calving-to-conception interval (ILCEI) of Jersey breed cattle

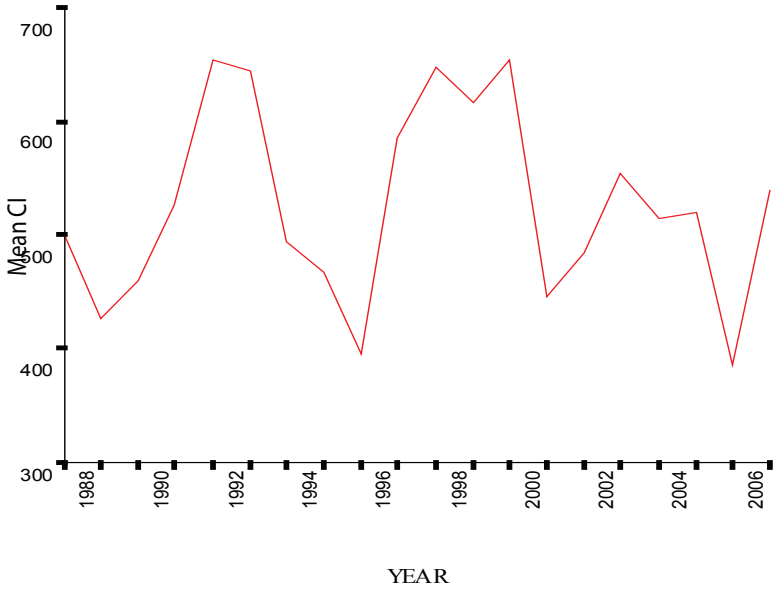
		LSM (±SE)	N	LSM (±SE)
		CI (days)		ILCEI (days)
Overall	564	450.09 (6.60)	214	174.68(8.61)
Year of last calving/service		***		**
1987	-	-	10	100.59(32.72)^{d}
1988	9	499.89 (52.82)^{ab}	19	114.25(25.26)^{d}
1989	22	427.14 (26.55)^{c}	14	158.01(28.52)^{bc}
1990/91	31	449.58 (17.81)^{c}	6	205.9(47.43)^{a}
1991	26	495.92 (26.53)^{ab}	-	-
1992	25	615.12 (33.75)^{a}	6	206.78(45.89)^{a}
1993	24	614.79 (40.62)^{a}	22	170.69(17.82)^{b}
1994	40	522.48(34.09)^{ab}	13	138.84(24.72)^{d}
1995	46	465.83(21.58)^{c}	21	173.49(21.78)^{b}
1996	45	408.22(14.21)^{cd}	15	221.81(27.28)^{a}
1997	42	465.43(20.05)^{c}	15	255.41(25.61)^{a}
1998	37	451.41(20.29)^{c}	8	249.44(35.30)^{a}
1999	24	481.04(22.78)^{ab}	12	217.05(27.14)^{a}
2000	24	521.54(35.19)^{ab}	15	169.98(30.07)^{b}
2001	31	502.23(40.92)^{ab}	23	179.40(22.67)^{b}
2002	31	466.06(32.35)^{c}	14	157.91(24.62)^{bc}
2003	29	456.41(27.27)^{c}	10	157.33(28.22)^{bc}
2004	27	449.93(23.62)^{c}	13	118.08(42.82)^{d}
2005	21	447.62(22.96)^{c}	-	-
2006	24	372.79(8.58)^{d}	-	-
2007	6	467.00942.96)^{c}	-	-
Season of last calving/service		NS		NS
Long rain	199	490.54(14.04)	80	174.81(12.17)
Short rain	142	456.25(10.42)	53	174.05(13.42)
Long dry	222	475.65(8.81)	81	175.19(10.32)
Cattle source		***		NS
Imported	48	491.35(19.74)^{a}	68	193.05(20.33)
Farm-bred	516	474.48(6.98)^{b}	146	156.32(11.47)
Parity		***	NS	***
1	160	500.87910.37)^{a}	55	243.36(15.18)^{a}
2	144	482.67(14.97)^{b}	64	179.14(14.12)^{ab}
3	118	475.37(16.62)^{bc}	39	171.99(17.77)^{ab}
4	76	468.75(17.73)^{bc}	43	155.73(14.46)^{c}
5	42	415.19(13.48)^{d}	36	123.19(15.31)^{d}

LSM with different superscript letters within a factor differ significantly, *** ($p<0.001$), ** ($p<0.01$), NS= not significant, CI= Calving Interval, ILCEI=interval between last calving and effective insemination

Calving interval and calving to effective service interval

The mean calving interval of the study animals was 450.09 days (SE=6.60) as indicated on Table 2. Year of last calving, cattle source and parity of dam had significant ($p<0.001$) effects on calving interval while seasonal effect was non-significant ($P>0.05$). The trend of calving interval from 1988 to 2007 is shown by throughout the years Figure 1. The shortest calving interval recorded was 372.79 days while the longest was 615.12 days. Farm bred cows had shorter calving interval, 474.48 days, than the imported ones, 491.35 days.

Figure 1. Mean calving interval of Jersey breed cattle at Soddo State Dairy Farm



Number of services per conception

The overall mean of the number of services per conception was 1.79 (SE=0.06) (Table 3). Of the total 804 detected heats, 77.77% conceived in the first insemination and the rest required two or more services per conception.

Herd life and productive herd life

The mean length of herd life or longevity of Jersey cows was 2983.74 days (SE=67.98) (Table 4). Year of birth ($p<0.001$) and cattle source ($p<0.01$) had

significant effect on herd life. The means length of productive herd life and effective productive herd life were 2310.11 days (SE=296.91) and 1663.15 days (SE=55.09), respectively.

Table 3. Least squares means (LSM) and standard errors (±SE) for number of services per conception (NSC) of Jersey breed cattle

Variables	N	LSM (±SE) of NSC
Overall	804	1.79(0.06)
Year of service		***
1987	14	1.00(0.32)^{f}
1988	30	2.08(0.24)^{a}
1989	20	1.33(0.26)^{e}
1990	24	1.61(0.24)^{cd}
1991	12	1.67(0.31)^{cd}
1992	24	1.89(0.23)^{ab}
1993	39	2.70(0.18)^{a}
1994	45	1.71(0.19)^{c}
1995	57	1.75(0.18)^{c}
1996	45	1.41(0.20)^{e}
1997	44	1.53(0.21)^{cd}
1998	37	1.84(0.22)^{ab}
1999	53	1.88(0.19)^{ab}
2000	39	1.65(0.19)^{c}
2001	53	1.76(0.19)^{c}
2002	57	1.79(0.18)^{c}
2003	57	1.98(0.17)^{ab}
2004	60	2.05(0.17)^{a}
2005	59	1.91(0.18)^{ab}
2006	19	2.01(0.26)^{a}
2007	16	2.15(0.29)^{a}
Season of service		*
Long rain	262	1.89(0.09)^{a}
Short rain	202	1.63(0.09)^{b}
Long dry	337	1.85(0.08)^{a}
Cattle source		NS
Imported	33	1.98(0.15)
Farm-bred	771	1.59(0.08)
Parity		NS
1	202	1.78(0.10)
2	202	1.79(0.09)
3	150	1.67(0.10)
4	95	2.02(0.12)
5	75	1.69(0.12)
>5	78	1.57(0.13)

LSM with different superscript letters within a factor differ significantly *** ($p<0.001$), *($p<0.05$), NS=non-significant, NSC=Number of Services per Conception

Birth weight and weaning weight

The mean birth weight of calves in the farm was 22.87kg (SE=0.17) as indicated in Table 5. Year of birth ($p<0.001$), season of birth ($p<0.05$), parity ($p<0.001$) and sex of claves ($p<0.001$) had significant effect on birth weight of calves. The mean birth weight for male calves was 23.61kg and that of female was 22.03kg. Birth weight of calves increased consistently until parity three and then follows irregular trend. The overall mean weaning weight was 108.88 kg (SE=0.67). Weaning weight was significantly influenced by year of birth ($p<0.001$), season of birth ($p<0.001$), sex ($p<0.001$) and parity ($p<0.01$). At weaning male calves were heavier (111.60 kg) than female calves (106.16 kg). The highest weaning weight (111.99 kg) recorded for those calves born in the long rainy season followed by those born in the short rainy season (108.29kg).

Table 4: Least squares mean (LSM) and standard errors (±SE) of total herd life (THL), productive herd life (PHL) and effective productive herd life (EPHL) of Jersey cattle

		LSM (±SE) THL (days)		**LSM (±SE) PHL (days)**		**LSM (±SE) EPHL (days)**
Overall	145	2983.74 (67.98)	119	2310.11(296.91)	139	1663.15 (55.09)
Year of birth		***		NS		**
1985	29	3159.72(156.37)^{a}	28	2163.939178.01)	25	1883.02(104.16)^{a}
1986	29	3421.17(171.28)^{a}	28	2357.32(190.56)	23	1789.15(110.10)^{ab}
1987	7	3642.95(351.95)^{a}	-	-	-	-
1989	8	3265.63(189.11)^{a}	-	-		
1990	9	3299.78(199.45)^{a}	9	2130.89(218.79)	8	1894.90(175.87)^{a}
1991	6	3290.33(283.63)^{a}	5	2226.20(365.69)	7	2096.69(190.01)^{a}
1992	8	2684.00(172.48)^{b}	6	1732.83(183.34)	8	1857.96(174.53)^{a}
1993	11	2608.63(257.82)^{b}	9	1967.78(293.15)	10	1765.18(155.64)^{ab}
1994	10	2285.30(96.67)^{cd}	5	1438.80(179.88)	7	1294.70(190.30)^{c}
1995	6	2715.83(208.51)^{b}	-	-		
1996	7	2434.86(211.35)^{cd}	7	1466.84(126.23)	6	1474.26(202.10)^{c}
1997	6	2347.67(160.16)^{cd}		-		
1998	4	2524.25(27.25)^{cd}	-	-		
1999	-	-	6	1065.13(75.17)	5	1228.52(223.90)^{c}
2000	4	2239.75(83.03)^{cd}	-	-		
Season of birth		NS		NS		NS
Long rain	43	2874.69(137.12)	29	2014.92(162.04)	38	1790.14(90.89)
Short rain	31	3010.00(173.99)	25	2279.04(173.77)	35	1787.36(90.64)
Long dry	71	2755.54(109.41)	65	1973.82(105.62)	66	1680.00(66.42)
Cattle source		**		*		NS
Imported	58	3294.25(106.39)^{a}	56	2272.01(119.55)^{a}	48	1825.02(79.62)
Farm-bred	87	2834.91(90.03)^{b}	63	1906.43(116.33)^{b}	91	1679.99(57.08)

LSM with different superscript letters within a factor differ significantly *** ($p<0.001$), ** ($p<0.01$), *($p<0.05$), NS= not significant, THL=Total Herd Life, PHL= Productive Herd Life, EPHL= Effective Productive Herd Life

Table 5. Least squares means (LSM) and standard errors (+SE) for birth weight (BW) and weaning weight (WW) of Jersey calves

		LSM (+SE)		LSM (+SE)
		BW(kg)		WW(kg)
Overall	938	22.87(0.17)	737	108.88(0.67)
Year of birth		***		***
1987	22	23.40(0.85)^{b}	17	89.09(3.98)^{e}
1988	29	26.31(0.67)^{a}	27	90.88(3.29)^{e}
1989	43	27.49(0.58)^{a}	35	82.67(2.87)^{e}
1990	42	24.74(0.55)^{b}	38	91.94(2.66)^{e}
1991	26	23.52(1.00)^{b}	11	104.56(4.82)^{c}
1992	41	22.37(0.62)^{bc}	29	99.47(2.67)^{cd}
1993	40	23.39(0.59)^{b}	33	99.65(2.52)^{cd}
1994	53	22.47(0.51)^{bc}	50	111.51(2.16)^{c}
1995	67	22.66(0.51)^{bc}	49	96.43(2.26)^{e}
1996	66	22.44(0.56)^{bc}	37	93.96(2.66)^{e}
1997	47	20.57(0.56)^{d}	36	107.72(2.72)^{c}
1998	49	20.19(0.59)^{d}	35	106.56(2.81)^{c}
1999	34	21.74(0.65)^{bc}	27	110.29(3.08)^{c}
2000	60	23.1(0.51)^{b}	48	139.82(2.42)^{a}
2001	53	20.6(0.52)^{d}	48	131.57(2.47)^{a}
2002	48	22.80(0.53)^{bc}	44	110.41(2.54)^{c}
2003	62	23.58(0.45)^{b}	58	124.19(2.20)^{b}
2004	36	23.26(0.61)^{b}	30	131.39(2.83)^{a}
2005	61	22.39(0.52)^{bc}	46	121.46(2.49)^{b}
2006	46	21.11(0.62)^{bc}	32	123.54(2.92)^{b}
2007	13	21.00(1.25)^{bc}	7	110.92(5.46)^{c}
Season of birth		*		***
Long rain	329	23.19(0.24)^{a}	265	111.99(0.92)^{a}
Short rain	218	22.80(0.28)^{b}	166	108.29(1.03)^{b}
Long dry	391	22.47(0.22)^{b}	306	106.35(1.20)^{c}
Sex		***		***
Male	491	23.61(0.20)^{a}	391	111.60(0.87)^{a}
Female	447	22.03(0.20)^{b}	346	106.16(0.87)^{b}
Parity		***		**
1	228	21.35(0.26)^{c}	208	108.37(1.11)^{ab}
2	221	22.32(0.26)^{b}	192	106.30(1.09)^{c}
3	155	23.51(0.29)^{a}	139	111.21(1.26)^{a}
4	111	23.42(0.36)^{a}	93	106.89(1.54)^{c}
5	70	23.49(0.45)^{a}	60	111.61(1.90)^{a}
Dam sources		NS		NS
Imported	213	22.93(0.38)	188	106.57(1.75)
Farm-bred	725	22.82(0.25)	549	110.38(1.15)

LSM with different superscript letters within a factor differ significantly, *** ($p<0.001$), **($p<0.01$),*($p<0.05$), NS= not significant, BW=birth weight, WW= weaning weight

Discussions

In this study, the average age at first service was 722.24 days (SE=36.4), which is higher than the observation of Mangurkar *et al*. (1985), and Rath and Patro (1988). But Bashir *et al*. (2007) reported longer average age at first service. The effect of year of birth on age at first service was significant and this is in a general agreement with the findings of Mangurkar *et al*. (1985) and Smith *et al*. (1989). The late age at first service in this study could be due to irregularities in feed supply and changes in management conditions through the years. The average age at first calving observed in this study was 1035.21 days (SE=12.59). This observation is higher than the reports of Arora and Sharma (1983), Mangurkar *et al*. (1985), Jain and Khan (1990), Njubi *et al*. (1992) and Katyega (1988). Our finding for insignificant effect of season of birth on age at first calving agreed with reports of Jain and Khan (1990), Njubi *et al*. (1992), Enyew Nigussie *et al*. (2000), Melaku Negash (1994), and Mekonen Hailemariam and Goshu Mekonen (1996). Nevertheless, Million Tadesse *et al*. (2006) and Mekonen Hailemariam (1987) reported significant effect of season of birth on age at first calving. Similar to this study finding on Jersey breed cows and their crosses Yazdani *et al*. (1993), Njubi *et al*. (1992), Enyew Nigussie *et al*. (2000) and Kiwuwa *et al*. (1983) also reported significant effect of year of birth on age at first calving. However, Azage Tegegn (1981) reported that year of birth had no significant effect on the age at first calving in both lowland and highland heifers in Ethiopia.

The average calving interval observed during this study was in general agreement with the observation of Ramachandraiah *et al*., (1990) and Rath and Patro (1988). However, the finding of the present study is higher than reports of Arora and Sharma (1983) and Mangurkar *et al*. (1985) in India, and Njubi *et al*. (1992) in Kenya, and Katyega (1988), Enyew Nigussie *et al*. (1992) and Million Tadesse *et al*. (2006) for F_1 Jersey breed crosses in Ethiopia. But Dutt *et al*. (1988) reported calving interval in India. The present revealed that year of last calving, parity of dam and cattle source had significant effects on calving interval while seasonal effect was not significant. Enyew Nigussie *et al*. (1992) reported similar findings. The significant effect of year of calving was also reported by Matsoukas and Fairchild (1975), Njubi *et al*. (1992), Mekonnen Hailemariam and Goshu Mekonnen (1996), Yohannes Afework *et al*. (2001), Million Tadesse *et al*. (2006) and Kiwuwa *et al*.(1983). However, the finding of Njubi *et al*. (1992) and Mangurkar *et al*. (1985) reported as season of calving influenced the calving interval. Kefena Efta *et al*. (2006) reported that neither year of calving nor season of calving affected significantly the calving interval.

This study revealed that the calving interval consistently declined from the first parity through the fifth parity. Similarly Million Tadesse (1997) and Kiwuwu *et al*. (1983) reported shorter calving intervals at later parities. The reason for longer calving interval in younger cows might be due to higher nutrientional requirement for growth in addition to milk production and maintenance, which could delay the onset of postpartum heat. Mukasa-Mugerwa and Azage Tegegn (1991) indicated that ruminants gain weight and improved body condition during the period of feed availability; and cow in better body condition had shorter calving interval than the thinner of their contemporaries. The mean length of interval between last calving and the effective insemination observed during this study was better than that reported by Melaku Negash (1994) and Amene Fekadu (2006) in Ethiopia. Year of service and parity had significant effect on this trait. Ashebir Sewalem (1992) and Enyew Nigussie (1992) also reported variation among parity. Nevertheless, Mekonen Hailemariam and Goshu Mekonen (1987) found insignificant effect of parity on this trait. In a general agreement with Mekonen Hailemariam and Goshu Mekonen (1987) and Enyew Nigussie (1992) observation, this study also revealed the insignificant effect of season on this trait. On the contrary, Yimam Hussen *et al.* (1997) and Ashebir Sewalem (1992) reported significant seasonal effect. The higher interval between calving to effective service day could probably be due to delayed resumption of ovarian activity after calving and management factors such as heat detection, decisions of breeding after parturition, nutrition and disease control.

The average number of services per conception in this study was 1.70 (SE=0.06) very closer to the reports of Enyew Nigussie *et al.* (2000) for Jersey-Arsi crosses. However, the present result is lower than the one reported by Mangurkar *et al*. (1985), Niubi *et al*. (1992), Sekerden (1991), and Singh and Mishra (1980). As reported by Niubi *et al*. (1992) and Assegid Bogale and Birhanu Mekibib (2004) there is insignificant effect of parity number on number of services per conception rate in this study too. However, Enyew *et. al*. (2000) reported significant effect of parity on number of services per conception. According to McDowell *et al*. (1976), high environmental temperature and reduced efficiency of inseminators contribute to the higher rate of number of services per conception.

The result of the average length of herd life of this study higher than that reported by Sadana and Basu (1982), Njubi *et al*. (1992) and Narasimha and Mohan (1996). However, Gebreegiziabher Gebre-Yohannes and Mulugeta Kebede (2006) reported higher length of herd life for Boran and Horro breed crosses with Jersey breed. Study done in Brazil by Teodoro and Madalena (2005)

showed the average length of herd life of Jersey breed cattle was similar to this study finding. Our finding for the effect of year of birth on the herd life agreed with the observation of Melaku Negash (1994). The mean productive herd life observed by this study was much better than that reported by Narasimha and Mohan (1996) and by Njubi *et al.* (1992). The productive life for Jersey breed crosses with Boran and Horro breeds were 5.1 and 6.8 (Gebreegiziabher Gebre-Yohannes and Mulugeta Kebede, 2006) years respectively. From this study, we found that only cattle source had significant effect on productive herd life. The mean effective productive herd life found in this study was 1663.15 days (SE=55.09). According to Gebeyehu Goshu *et al.* (2007) and Giday Yifter, (2001) observation year of birth had significant effect on effective productive herd life on Holstein Friesian and its crosses with Fogera breed.

The overall mean birth weight of calves seen in this study was 22.87kg, 23.61 Kg and 22.03 Kg for male and female respectively (SE=0.17). This finding is in a general agreement with finding of Sinderos Demeke *et al.* (2003) for Jersey breed crosses Barka, Boran and Horro breeds, and the result reported by Bhuyan and Mishra (1985) and Pandya *et al.* (1985) for Jersey breed cattle in India. On the other hand, Zaman *et al.* (1989) reported mean birth weights of 16.89, 17.5, and 15.18kgs over three year intervals, and 17.31 and 15.74 kg for male and female calves, respectively. As reported by Amsalu Sisay (2003) birth year, calf sex, parity and season of birth during this study also showed significant effect, while dam sources had no significant effect on birth weight. The effect of birth year for variation in birth weight could be probably due to yearly differences in management and climatic factors. Birth weight of calves increased consistently until parity three and then follows irregular trend. Similarly, Addisu and Hegde (2003) reported a trend of birth weight increment with parity. This variation could attribute to the good maternal environment provided by the mature cows to developing foetus. Trail and Greory (1981) and Abdinasir Ibrahim (1992) reported insignificant effect of parity on calves' birth weight. The result of this study showed that season of birth significantly affects calves birth weight. However, Addisu Bitew and Hegde (2003), Abdinasir Ibrahim (1992), and Ashebir Sewalem (1999) reported that it has no effect on calves' birth weight. The average weaning weight found during this study was calves in this study was 108.88kg (SE=0.67) higher than that reported by Sinderos Demeke *et al.* (2003) for Jersey breed crosses with Barka, Boran and Horro breeds respectively. The year of birth, season of birth, sex and parity had significant effects on weaning weight. Ashebir Sewalem (1992) for Fogera breed, and Addisu Bitew and Hegde (2003) for Fogera breeds and their crosses;

and Ashebir Sewalem (1992); Rahnefield *et al*. (1980); and Rege *et al*. (1994, Ashebir Sewalem (1992) and Mekonnen Hailemariam (1987) reported that year of birth, season of birth, sex and parity influences the weaning weight respectively.

Conclusions

Cows with high parity number tend to have longer postpartum period and calving interval. Season was only important in this study in determining number of services per conception. The herd life, productive herd life and effective productive herd life of Jersey cattle that are found in Wolaita Sodo State Dairy Farm is generally good. There is a big gap between total herd life and, productive and effective productive herd life indicating the presence of times wasted unproductively. Variability in the management and climatic conditions through the years seem to affect the traits than any other factor considered.

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