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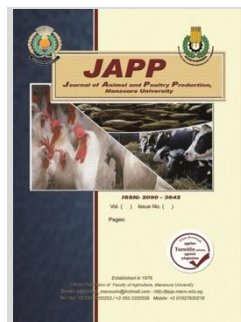
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Non-Genetic Factors Affecting Longevity and Lifetime Production Traits of Friesian Dairy Cattle in Egypt

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ABSTRACT

The present study was focused on evaluation of the most important non-genetic factors affecting longevity and lifetime production traits using multitrait linear animal model. A total of 2914 Friesian heifer records and their subsequent lactations until culled or died, cover the period from 1979 to 2013 were obtained from the history sheets of Friesian cows maintained at Sakha and El-Karada experimental stations. The effect of AFC on most of longevity and lifetime production traits was highly significant ($P < 0.001$). The optimum AFC was 23-25 month for the maximum longevity and lifetime production traits. Summer season of first calving (July, August and September months) showed the lowest means of longevity and lifetime production traits, however spring season of first calving (April, May and Jun months) showed the highest means of the same traits. Longevity and lifetime production traits showed a decreasing trend with increasing SP1c. Longevity and lifetime production traits increased linearly ($P < 0.01$) with increasing LP1c. Longevity and lifetime production traits increased linearly ($P < 0.001$) with increasing lactation number completed.

Keywords: Longevity, lifetime traits, non-genetic, Friesian.

INTRODUCTION

To maximize lactation performance and to reduce rearing cost, average AFC in Holsteins was recommended to be ≤ 24 months with a body weight < 560 kg after first calving at 24 months (Tozer and Heinrichs, 2001 and Cooke, et al., 2013). Late calvings for the first time are presumably caused by reasons related to fertility, herd management, or other health problems, so such factors increased culling risk (Sewalem et al., 2005). The fertility and health problems can be lifelong characteristics of particular animals and could therefore affect culling risk after the first calving of cow (Vukasinovic et al., 2001; Nilforooshan and Edriss, 2004 and Pachova et al., 2005, Zavadilova and Stipkiva, 2013).

Decreasing AFC has a positive effect on genetic progress due to decreasing generation interval and progeny tests are carried out earlier (Pirlo et al., 2000) and can also decrease replacement costs (Gardner et al., 1988 and Nilforooshan and Edriss, 2004). Heifer rearing costs represent the second largest expense after feed, on a dairy farm accounting for approximately 15-20% (Boulton, et al., 2015). Calving too early may be associated with an increased risk of dystocia (Hofman, 1997), and has also been associated with longevity and as result has a direct effect on productivity and economic return (Ettema and Santos, 2004, Eastham, et al., 2018).

The present study aimed to assess non-genetic factors affecting longevity and lifetime production traits in a population of Friesian dairy cattle in Egypt.

MATERIALS AND METHODS

A total of 2914 Friesian heifer records and their subsequent lactations until culled or died, cover the period from 1979 to 2013 were obtained from the history sheets of Friesian cows maintained at Sakha and El-Karada experimental stations, Kafr-Elsheikh governorate, belong to the Animal Production Research Institute (APRI), Ministry of Agriculture, Dokki, Giza, Egypt.

Longevity traits were number of lactation completed (LLNo); lifetime lactation period (LLP), i.e., accumulation of individual lactation period of individual cow; herd life (HL), i.e., time elapsed from birth date to culling/death date and productive life (PL), i.e., time elapsed between first calving date to culling/death date. Lifetime production traits were lifetime 305-day milk yield (LM305), i.e., accumulation of individual lactation 305-day milk yield of individual cow, lifetime total milk yield (LTM), i.e., accumulation of individual lactation total milk yield of individual cow, average lifetime milk yield per day of herd life (LTM/HL), i.e., LTM/HL, average lifetime milk yield per day of lactation period (LTM/PL), and longevity index (LLP/HL), i.e., (LLP/HL) *100.

Different non-genetic factors affecting longevity and lifetime production traits were accounted (Table 1) using GLM procedure of SAS (2011).

Table 1. Model^a summary for multivariate analysis of longevity and lifetime production traits.

Trait ^b	F	M1c	Y1c	FM1c	AFCc	SP1c	LP1c	LLNo	Model	No.
LLNo	X	X	X	X	X		X		1	
LM305	X	X	X	X	X		X	X	2	
LTM, LLP, HL, PL, LMYHL, LMYLP, LLPHL	X	X	X	X	X	X	X	X	3	

a: F: farm, M1c: month of first calving, Y1c: year of first calving, FM1c: farm-month-year of first calving, AFCc: age at first calving classes, SP1c: first lactation service period classes, LP1c: lactation period classes of first lactation, LLNo: lifetime lactation number,

b: LLNo: lifetime lactation number, LM305: lifetime 305-day milk yield, LTM: lifetime total milk yield, LLP: lifetime lactation period, HL: herd life, PL: productive life, LMYHL: lifetime daily milk yield per day of herd life, LMYLP: lifetime daily milk yield per day of lactation period, and LLPHL: longevity index.

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Seven AFC classes were <23, 23-25, 26-28, 29-31, 32-34, 35-37, and 38-42 month. Nine first lactation service period classes were zero service period, <21, 22-43, 44-65, 66-87, 88-109, 110-131, 132-153, >153 day. Nine lactation period classes of first lactation were 150-180, 181-211, 212-242, 243-273, 274-304, 305-335, 336-366, 367-397, >397 day and ten lifetime lactation number completed were one to ten and more.

RESULTS AND DISCUSSION

Age at first calving (AFCc) effect

Age at first calving (AFCc) had a highly significant effect ($P<0.001$) for LLNo, HL, LMYHL, LMYLP and LLPHL, however it had a nonsignificant effect ($P>0.05$) for LLP, PL LM305 and LTMV, (Table 2). The highest longevity (LLNo, LLP, PL) and lifetime production traits (LM305, LTMV, LMYHL, LMYLLP and LLPHL) were obtained when AFC was 23-25 month, however the maximum HL was obtained when AFC was 26-28 month.

There was a positive relationship between AFC and HL, (0.53), however AFC was negatively correlated with PL (-0.45) and LLNo (-0.031 calvings) in Holsteins (Rizzi et al.,

2002). The late AFC (29.0 months) in Holsteins, caused a longer HL and a shorter PL (Rizzi et al., 2002). AFC in Holstein, was negatively correlated with both HL and PL (Silva et al., 1986). The highest lifetime milk production was obtained, when the AFC was 23 month (Nilforooshan and Edriss, 2004 and Teke and Murat, 2013). Jenko et al., (2015) reported that there was a stable trend observed for the effect of AFC on LTMV and PL, while the effect of AFC on PL was highly significant ($P<0.01$). The AFC between 23 and 27 month seemed to be an optimum for increased length of productive life (Essel, 1998, Durr et al., 1999 and Rogers et al., 2004). Syrstad (1979) concluded that an intermediate AFC was associated with the highest PL. Eastham et al., (2018) found that lifetime daily milk yield (LDMY) increased as AFC decreased, the 22 month AFC are predicted to have the highest mean LDMY (15.25kg), which decreased to 11.87kg for cows with an AFC of 42 months. PL decreased as AFC increased (Rogers et al., 1991, Nilforooshan and Edriss, 2004, and Zavadilova and Stipkiva 2013).

Table 2. Age at first calving (AFCc) effect on longevity and lifetime traits

AFC_C (mo.)	No.	LLNo. (no.)	LLP (d)	HL (d)	PL (d)	LM305 (Kg)
<23	47	2.1 ^c	587.9 ^f	1429.3 ^e	757.7 ^e	4382.5 ^d
23-25	173	3.3 ^a	1004.9 ^a	2006.8 ^d	1234.1 ^a	8310.3 ^a
26-28	578	3.3 ^a	947.0 ^b	2291.0 ^a	1206.2 ^a	8305.5 ^a
29-31	846	3.0 ^{ab}	877.3 ^c	2066.6 ^c	1109.9 ^b	7551.0 ^b
32-34	652	2.9 ^{ab}	849.8 ^{cd}	2123.5 ^b	1091.7 ^b	7241.9 ^{bc}
35-37	337	2.8 ^b	820.2 ^{de}	2163.0 ^b	1041.2 ^c	7022.7 ^c
>37	281	2.7 ^b	785.2 ^e	2055.2 ^c	993.7 ^d	6967.9 ^c
Significance		***	n.s.	***	n.s.	n.s.

Table 2. Continue

AFC_C (mo.)	No.	LTMV (Kg)	LMYHL (Kg)	LMYLP (Kg)	LLPHL (%)
<23	47	4865.1 ^c	2.872 ^e	7.745 ^c	35.4 ^d
23-25	173	9158.7 ^a	3.832 ^a	9.441 ^a	43.5 ^a
26-28	578	9003.6 ^a	3.630 ^b	8.808 ^b	39.5 ^b
29-31	846	8261.4 ^b	3.375 ^c	8.824 ^b	37.0 ^c
32-34	652	7941.3 ^b	3.213 ^{cd}	8.832 ^b	35.3 ^d
35-37	337	7800.8 ^b	3.074 ^{de}	8.864 ^b	33.0 ^e
>37	281	7687.2 ^b	2.918 ^e	8.480 ^b	30.1 ^f
Significance ^a		n.s.	***	***	***

Mean with the same letter in the same column are not significantly different.

a: n.s.= non significant, * = significant at $P<0.05$, ** = significant at $P<0.01$,

***= significant at $P<0.001$.

Month of first calving (M1c)

Month of first calving had a nonsignificant effect ($P>0.05$) for most of longevity and lifetime production traits, however it had a highly significant effect ($P<0.001$) for HL and PL (Table 3). Cows calved at July, August and September months showed the lowest means of longevity

and lifetime traits, however April, May and Jun months showed the largest means of the same traits (Table 3). Replacing month with season of first calving, we found that summer season had the lowest means of all longevity and lifetime production traits, however the highest means were showed for spring season (Table 4).

Table 3. Month of first Calving (Mo 1st C.) effect on longevity and lifetime traits

Mo 1 st C.	No.	LLNo. (no.)	LLP (d)	HL (d)	PL (d)	LM305 (Kg)
January	278	3.0 ^a	839.6 ^{ef}	2090.5 ^c	1102.3 ^{cd}	7278.3 ^{cde}
February	275	3.1 ^a	864.9 ^{cde}	2110.0 ^{bc}	1133.1 ^{bc}	7589.5 ^{bcd}
8March	398	3.0 ^a	877.5 ^{bcd}	2139.0 ^{ab}	1142.6 ^b	7682.0 ^{bc}
April	274	3.2 ^a	909.3 ^b	2162.6 ^a	1200.2 ^a	8246.1 ^a
May	241	3.1 ^a	913.3 ^b	2174.3 ^a	1183.3 ^a	8237.1 ^a
Jun	245	3.1 ^a	949.4 ^a	2176.9 ^a	1180.3 ^a	7930.1 ^{ab}
July	171	2.9 ^a	820.0 ^f	2007.9 ^{ef}	1024.0 ^{fg}	6948.5 ^e
August	187	2.9 ^a	821.4 ^f	2007.7 ^{ef}	1012.4 ^g	7123.6 ^{de}
September	168	2.9 ^a	834.3 ^{ef}	1999.7 ^f	1004.8 ^g	7128.3 ^{de}
October	159	3.0 ^a	870.5 ^{cde}	2041.9 ^{de}	1098.7 ^{cd}	7661.7 ^{bc}
November	258	3.0 ^a	860.4 ^{de}	2071.7 ^{cd}	1080.4 ^{de}	7537.1 ^{bcd}
December	260	2.9 ^a	898.0 ^{bc}	2074.1 ^{cd}	1057.1 ^{ef}	7207.6 ^{cde}
Significance		n.s.	n.s.	***	***	n.s.

Table 3. Continue

Mo 1 st C.	No.	LTMV (Kg)	LMY HL (Kg)	LMY LP (Kg)	LLPHL (%)
January	278	8275.6 ^{bcd}	3.231 ^{de}	8.775 ^{bc}	36.3 ^{bcd}
February	275	8448.3 ^{bc}	3.273 ^{de}	8.817 ^{bc}	36.3 ^{bcd}
March	398	7935.0 ^{cde}	3.287 ^{de}	9.004 ^b	36.6 ^{bcd}
April	274	9021.8 ^a	3.744 ^a	9.412 ^a	37.9 ^a
May	241	9076.1 ^a	3.572 ^{ab}	9.399 ^a	37.8 ^a
Jun	245	8631.1 ^{ab}	3.510 ^{bc}	9.063 ^b	37.1 ^{ab}
July	171	7577.2 ^e	3.191 ^e	8.533 ^c	35.8 ^{cd}
August	187	7818.1 ^{de}	3.204 ^e	8.678 ^{bc}	35.5 ^{cd}
September	168	7741.9 ^{de}	3.204 ^e	8.710 ^{bc}	35.4 ^d
October	159	8008.8 ^{cde}	3.427 ^{bcd}	8.733 ^{bc}	36.6 ^{bc}
November	258	8273.6 ^{bcd}	3.358 ^{cde}	8.778 ^{bc}	36.4 ^{bcd}
December	260	8362.3 ^{bcd}	3.291 ^{de}	8.812 ^{bc}	35.7 ^{cd}
Significance		n.s.	n.s.	n.s.	n.s.

Mean with the same letter in the same column are not significantly different.

a: n.s.= non significant, * = significant at P<0.05, ** = significant at P<0.01,

***= significant at P<0.001.

Table 4. Season of first calving (Se1st C.) effect on longevity and lifetime traits

Se 1 st C.	No.	LLNo. (no.)	LLP (d)	HL (d)	PL (d)	LM305 (Kg)
Winter	926	3.0 ^a	889.3 ^a	2094.8 ^b	1108.8 ^b	7526.0 ^b
Spring	805	3.1 ^a	890.2 ^a	2142.9 ^a	1156.1 ^a	7978.7 ^a
Summer	546	2.9 ^a	828.0 ^a	2000.4 ^c	1010.0 ^c	7212.3 ^c
Autumn	637	3.0 ^a	875.9 ^a	2115.2 ^b	1127.8 ^b	7398.7 ^{bc}
Significance		n.s.	n.s.	***	***	*

Table 4. Continue

Se 1 st C.	No.	LTMV (Kg)	LMYHL (Kg)	LMYLP (Kg)	LLPHL (%)
Winter	926	8282.3 ^b	3.282 ^b	8.819 ^b	36.2 ^b
Spring	805	8686.2 ^a	3.560 ^a	9.156 ^a	37.4 ^a
Summer	546	7893.3 ^c	3.258 ^b	8.677 ^b	35.7 ^b
Autumn	637	8107.5 ^{bc}	3.290 ^b	8.848 ^b	36.3 ^b
Significance		*	*	*	n.s.

Mean with the same letter in the same column are not significantly different.

a: n.s.= non significant, * = significant at P<0.05, ** = significant at P<0.01,

***= significant at P<0.001.

This might be the consequence of heat stress, which decreases the feed intake during the months of high temperatures, July, August and September (Jenko et al., 2015). Rizzi et al., (2002) reported that cows born in the rainy periods showed the lowest productive performances (HL, PL, LLNO, LTMV, LLP and LDMY), may be due to their growth is affected by poorer nutritional availability in the following dry seasons. Reduction in cow's PL in summer season can be explained by harsh conditions in the summer (heat stress) and food shortages in some cases may hamper the performances of the cows in subsequent lactations (Ajili, et al., 2007).

First lactation service period classes (SP1c)

First lactation service period classes (SP1c) had a significant effect (P<0.05, P<0.001) for LLNo, HL PL and LM305, however it had a nonsignificant effect (P>0.05) for LLP, LTMV, LMYHL and LMYLP (Table 5). Longevity and lifetime production traits showed a decreasing trend with increasing SP1c. Cows with zero service period (i.e. cows have only one service) showed the highest values of longevity and lifetime production traits, however those in last SP1c (cows have five services and more) had the lowest values of the same traits (Table 5).

Table 5. First lactation service period classes (SP1_C) effect on longevity and lifetime traits

SP1_C	No.	LLNo	LLP (d)	HL (d)	PL (d)	LM305 (Kg)
0	983	3.5 ^a	1057.8 ^a	2268.7 ^a	1302.0 ^a	9222.0 ^a
<21	62	3.5 ^a	1009.7 ^b	2251.2 ^{ab}	1271.4 ^{ab}	9027.6 ^a
22-43	255	3.4 ^{abc}	1007.2 ^b	2245.1 ^{ab}	1264.3 ^{ab}	8763.0 ^{ab}
44-65	180	3.4 ^{ab}	980.0 ^b	2211.1 ^b	1239.2 ^b	8353.8 ^b
66-87	167	3.1 ^{abcd}	891.1 ^c	2080.4 ^c	1119.1 ^c	7691.9 ^c
88-109	143	3.0 ^{bcd}	872.8 ^c	2108.9 ^c	1122.1 ^c	7487.2 ^c
110-131	149	2.9 ^{dc}	862.9 ^c	2108.5 ^c	1099.1 ^c	7459.2 ^c
132-153	132	2.9 ^d	854.7 ^c	2097.9 ^c	1089.9 ^c	7311.1 ^{cd}
>153	843	2.8 ^d	785.8 ^d	2004.1 ^d	1012.0 ^d	6840.7 ^d
Significance		***	n.s.	***	***	*

Table 5. Continue

SP1_C	No.	LTMV (Kg)	LMYHL (Kg)	LMYLP (Kg)	LLPHL (%)
0	983	10084.7 ^a	3.839 ^a	9.138 ^a	41.1 ^a
<21	62	9657.2 ^{ab}	3.705 ^{ab}	9.097 ^{ab}	40.2 ^{ab}
22-43	255	9585.8 ^{ab}	3.597 ^{bc}	8.974 ^{ab}	39.4 ^{bc}
44-65	180	9072.7 ^{bc}	3.556 ^{bc}	8.986 ^{ab}	38.5 ^c
66-87	167	8582.6 ^{cd}	3.552 ^{bc}	8.944 ^{ab}	38.1 ^{cd}
88-109	143	8360.2 ^d	3.449 ^{cd}	8.859 ^{ab}	36.8 ^{de}
110-131	149	8073.7 ^d	3.288 ^d	8.745 ^{ab}	36.7 ^e
132-153	132	8025.0 ^d	3.263 ^d	8.652 ^b	35.6 ^e
>153	843	7231.8 ^e	2.952 ^e	8.680 ^b	33.0 ^f
Significance		n.s.	n.s.	n.s.	n.s.

Mean with the same letter in the same column are not significantly different.

a: n.s.= non significant, * = significant at P<0.05, ** = significant at P<0.01,

***= significant at P<0.001.

Lactation period classes (LP1c) of first lactation

Lactation period classes of first lactation had a highly significant effect ($P < 0.01$ and $P < 0.001$) on all longevity and lifetime production traits (Table 6). Longevity and lifetime traits increased linearly with increasing LP1c from 1.6 to 3.8 for LLNo, from 307.6 to 1104.2d for LLP, from 1461.4 to 2303.2d for HL, from 475.0 to 1322.0d for PL, from 2625.8 to 9954.2kg for LM305, from 2734.1 to 11348.1kg for LTMY, from 1.5 to 4.5kg for LMYHL, from 7.8 to 9.9kg

for LMYLP and from 17.5 to 45.2% for LLPHL (Table 6). Haworth et al., (2008) reported that cows producing less than 30L milk/day in the first lactation and with an AFC less than 2 years live 3.6 years on average, while cows with AFC of 2-3 years tend to survive for 4.7 years, and those more than 3 years of AFC have an average of longevity of 5.8 years. By contrast, first lactation Holstein cows producing more than 30L milk/day do not survive for more than two lactations.

Table 6. Lactation period classes (LP1_C) of first lactation effect on longevity and lifetime traits

LP1_C	No.	LLNo. (no.)	LLP (d)	HL (d)	PL (d)	LM305 (Kg)
150-180	429	1.6 ^d	307.6 ^a	1461.4 ^f	475.0 ^f	2625.8 ^a
181-211	129	2.5 ^c	569.5 ^b	1820.1 ^e	846.6 ^e	4700.9 ^b
212-242	227	2.8 ^c	686.6 ^c	1922.3 ^d	942.5 ^d	5599.5 ^c
243-273	322	3.1 ^b	879.5 ^d	2157.1 ^c	1174.8 ^c	7469.6 ^d
274-304	412	3.3 ^{ab}	1000.1 ^e	2256.6 ^b	1269.8 ^b	8409.1 ^e
305-335	368	3.4 ^{ab}	1009.8 ^{ef}	2269.7 ^{ab}	1279.7 ^b	8545.3 ^e
336-366	289	3.5 ^{ab}	1039.1 ^f	2280.7 ^{ab}	1284.9 ^b	9474.3 ^f
367-397	244	3.5 ^a	1103.1 ^g	2282.8 ^{ab}	1286.7 ^b	9508.9 ^f
>397	494	3.8 ^{ab}	1104.2 ^g	2303.2 ^a	1322.0 ^a	9954.2 ^g
Significance		**	***	***	***	***

Table 6. Continue

LP1_C	No.	LTMY (Kg)	LMYHL (Kg)	LMYLP (Kg)	LLPHL (%)
150-180	429	2734.1 ^a	1.5 ^a	7.8 ^e	17.5 ^a
181-211	129	4871.5 ^b	2.2 ^b	7.9 ^e	26.1 ^b
212-242	227	5816.6 ^b	2.5 ^c	8.3 ^d	31.1 ^c
243-273	322	7802.7 ^c	3.1 ^d	8.4 ^{cd}	36.2 ^d
274-304	412	8911.6 ^d	3.4 ^e	8.6 ^{cd}	39.6 ^e
305-335	368	9119.8 ^d	3.6 ^e	8.6 ^c	40.2 ^e
336-366	289	10356.4 ^e	4.1 ^f	9.5 ^b	41.7 ^f
367-397	244	11089.6 ^f	4.4 ^g	9.7 ^{ab}	44.5 ^g
>397	494	11348.1 ^f	4.5 ^g	9.9 ^a	45.2 ^g
Significance		***	***	***	***

Mean with the same letter in the same column are not significantly different.

a: n.s.= non significant, * = significant at $P < 0.05$, ** = significant at $P < 0.01$,

***= significant at $P < 0.001$.

Lifetime lactation number (LLNo)

Number of lactation completed had a highly significant effect ($P < 0.001$) on all longevity and lifetime production traits (Table 7). Longevity and lifetime production traits increased linearly with increasing lactation number completed from 258.7 to 3035.4d for LLP, from

1323.4 to 4647.6d for HL, from 330.8 to 3734.7d for PL, from 1888.9 to 29707.9kg for LM305, from 2080.6 to 32055.5kg for LTMY, from 1.521 to 6.957kg for LMYHL, from 8.015 to 10.565kg for LMYLP and from 19.5 to 65.2% for LLPHL (Table 7).

Table 7. Lifetime lactation number (LLNo) effect on longevity and lifetime traits

LLNo	No.	LLP (d)	HL (d)	PL (d)	LM305 (Kg)
1	934	258.7 ^a	1323.4 ^a	330.8 ^a	1888.9 ^a
2	611	549.0 ^b	1721.1 ^b	720.3 ^b	4310.6 ^b
3	397	870.3 ^c	2089.9 ^c	1098.4 ^c	7301.4 ^c
4	334	1192.5 ^d	2488.1 ^d	1504.4 ^d	10385.0 ^d
5	219	1525.8 ^e	2858.0 ^e	1901.0 ^e	13591.1 ^e
6	174	1814.2 ^f	3237.5 ^f	2265.1 ^f	16335.4 ^f
7	113	2056.1 ^g	3627.8 ^g	2633.4 ^g	19073.6 ^g
8	69	2417.6 ^h	4070.2 ^h	3098.8 ^h	21852.7 ^h
9	40	2562.3 ⁱ	4239.6 ⁱ	3294.4 ⁱ	23629.5 ⁱ
10	23	3035.4 ^j	4647.6 ^j	3734.7 ^j	29707.9 ^j
Significance		***	***	***	***

Table 7. Continue

LLNo	No.	LTMY (Kg)	LMYHL (Kg)	LMYLP (Kg)	LLPHL (%)
1	934	2080.6 ^a	1.521 ^h	8.015 ^e	19.5 ^h
2	611	4831.9 ^b	2.759 ^g	8.606 ^d	31.7 ^g
3	397	8093.3 ^c	3.819 ^f	9.144 ^c	41.5 ^f
4	334	11417.3 ^d	4.596 ^e	9.476 ^{bc}	47.9 ^e
5	219	15078.2 ^e	5.315 ^d	9.600 ^{bc}	53.5 ^d
6	174	17667.3 ^f	5.443 ^{cd}	9.695 ^{bc}	56.3 ^c
7	113	20505.3 ^g	5.620 ^{bc}	9.710 ^{bc}	56.7 ^c
8	69	23496.3 ^h	5.841 ^b	9.808 ^b	59.5 ^b
9	40	24819.1 ⁱ	5.875 ^b	9.867 ^b	60.6 ^b
10	23	32055.5 ^j	6.957 ^a	10.565 ^a	65.2 ^a
Significance		***	***	***	***

Mean with the same letter in the same column are not significantly different.

a: n.s.= non significant, * = significant at $P < 0.05$, ** = significant at $P < 0.01$,

***= significant at $P < 0.001$.

CONCLUSION

Age at first calving affected longevity and lifetime traits. Reducing AFC is an effective method for dairy farmer to decrease payments and allow an earlier return on investment. Results of the present study suggested that the optimum AFC was 23-25 month for the maximum longevity and lifetime production traits. It was shown that heifers with first calving in summer season had lower longevity and lifetime production traits compared with spring season.

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العوامل الغير وراثية المؤثرة على صفات طول الحياة وطول الحياة الإنتاجية لماشية الفريزيان في مصر

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الملخص

تسلط الدراسة الحالية الضوء على أهم العوامل الغير وراثية التي تؤثر على صفات طول الحياة وطول الحياة الإنتاجية باستخدام نموذج الحيوان متعدد الصفات. تم التحصل على بيانات ٢٩١٤ سجل لعجلات الفريزيان والمواسم التالية لها حتى إستبعادها أو وفاتها خلال الفترة من ١٩٧٩ وحتى ٢٠١٣ من سجلات أبقار الفريزيان في محطتي التجارب بسخا والقرضا. كان للعمر عند أول ولادة (AFC) تأثير عالي المعنوية ($P < 0.001$) على معظم صفات طول الحياة وطول الحياة الإنتاجية وكان العمر الأمثل لأول ولادة هو ٢٣-٢٥ شهرا حيث تم الحصول على أقصى قيم لصفات طول الحياة وطول الحياة الإنتاجية. أظهر موسم الولادة الصيفي (أشهر يوليو - أغسطس - سبتمبر) أقل المتوسطات بالنسبة لصفات طول الحياة وطول الحياة الإنتاجية، بينما كان موسم الربيع (أشهر إبريل - مايو - يونيو) أعلى المواسم بالنسبة لنفس الصفات المدروسة. أظهرت الدراسة إنخفاض متوسطات صفات طول الحياة وطول الحياة الإنتاجية وذلك مع زيادة طول فترة التلقيح في الموسم الأول (SP1c). ازدادت متوسطات الصفات المدروسة زيادة خطية عالية المعنوية ($P < 0.01$) مع زيادة طول موسم الحليب في الموسم الأول. زادت متوسطات صفات طول الحياة وطول الحياة الإنتاجية زيادة خطية عالية المعنوية ($P < 0.001$) مع زيادة عدد مواسم الحليب (LLNO).