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FERTILITY AND PROLIFICACY TRAITS OF CHIOS AND FARAFRA EWES UNDER SUBTROPICAL EGYPTIAN CONDITIONS

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ABSTRACT

The aim of this study was to evaluate reproductive performance traits of Chios and Farafra sheep. Eight hundred and twenty five Farafra and two hundreds and five Chios ewes were used for comparison during the experimental period. Ewes lambed per ewe joined (EL/EJ), estimates of lambs born per ewe joined (LB/EJ), lambs weaned per ewe joined (LW/EJ), kilogram born per ewe joined (KB/EJ) and kilogram weaned per ewe joined (KW/EJ) were recorded and calculated.

Results showed that EL/EJ in Farafra ewes was significantly (P< 0.01) higher than Chios ewes (0.67 vs. 0.49). In Farafra ewes, LB/EJ, LW/EJ, KB/EJ and KW/EJ were 0.86, 0.72, 2.94 and 8.86, respectively. The corresponding values in Chios ewes were 0.63, 0.43, 2.36 and 5.71, respectively. The best reproductive performance was observed in September (0.71, 0.96, 0.78, 3.43 kg and 9.58 kg) followed by May (0.65, 0.80, 0.66, 2.72 kg and 8.12 kg), then in January (0.50, 0.62, 0.51, 2.10 kg and 6.46 kg) for EL/EJ, LB/EJ, LW/EJ, KB/EJ, and KW/EJ, respectively. It was observed that fertility traits increased significantly (P< 0.01) up to 6 - <8 years old then decreased with advancing age. Chios ewes had slightly higher LB/EL (1.30) and KB/EL (4.83 kg) than Farafra ewes (1.28 and 4.39kg), respectively. Meantime, Farafra ewes had higher LW/EL (1.08) and KW/EL (13.25 kg) than Chios ewes (0.89 and 11.71 kg), respectively. Litter size at birth and at weaning was better in February compared to October and June lambing seasons. February lambing season showed the best values of KW/EL (4.83 kg), and KW/EL (13.49 kg), while, October and June lambing seasons had 4.21 kg & 4.17 kg for KB/EL and 12.60 kg &12.81 kg for KW/EL, respectively. In addition, it was found that prolificacy traits increased significantly (P< 0.01) with advancing age of mating up to 4 -<6 years old then decreased thereafter. It can be concluded that, must improve fertility and prolificacy traits of Chios flock, Moreover, the selection program for Farafra flock should be continued.

Keywords: Fertility, Prolificacy, ewes

INTRODUCTION

The Egyptian sheep breeds are mainly raised on rangelands of low quality and quantity under extensive production systems. The low efficiency common in this production system derives from several factors, e.g. low reproductive efficiency. Lamb production efficiency is influenced by reproductive of ewes as well as growth and survival potential of the lambs. Improvement in ewe productivity, as a key target, could partly be attained by increasing the number and weight of lambs produced per ewe within a specific year (Rashidi *et al.*, 2011).

Reproductive performance constitute is a major factor determining the economic efficiency of sheep production. Also, it is one of the most important criteria to be considered in planning for sheep improvement. Various measures of reproductive performance were cited in the literature. They fall into two main criteria, fertility and prolificacy measures. Fertility is one of the important characteristics in the reproductive measures. Fertility and Prolificacy traits were calculated in different ways in different reports (Aboul-Naga *et al.*, 1989 and Matika *et al.*, 2003).

Chios is a highly productive animal, originating from island of Chios, Greece. Chios flock was imported by Ministry of Agriculture at the end of 1986. Chios sheep are dual-purpose animals characterized by high prolificacy and high fertility (Hatziminaoglou *et al.*, 1996).

Farafra flock was introduced to Mallawi Research Station in 1992, Farafra is a local sheep dominate in El-Farafra Oasis of the Egyptian western desert, New Valley. Farafra sheep is morphological characterization by (Hamdon,1996

MATERIALS AND METHODS

The present study was carried out at Mallawi Animal Production Research Station, belonging to Animal Production Research Institute, Agriculture Research Center, Ministry of Agriculture, latitude 22° 42 N, longitude 30° 45E.

The sheep flock was managed under an accelerated lambing system that permits the ewe to lamb three times each two years. Thus, three breeding and three lambing seasons were existed as follows:

Mating season	Lambing season	Weaning
January	June	August
September	February	April
May	October	December

During the mating season ewes were randomly divided into groups of 30 – 35 ewes, ewes were 1st mated at about 1.5 years old of age. Each group was joined with fertile ram for a period of 45 days, which change in case of disorder during one week.

Animals were fed according to recommendation of APRI (2000). The ewe reproductive performance traits studied in two years to measure two main categories (Maharem, 1996). The first category was related to ewe fertility, ewe lambed per ewe joined (EL/EJ), Lambs born per ewe joined (LB/EJ), Lambs weaned per ewe joined (LW/EJ), Kilogram born per ewe joined (KB/EJ), Kilogram weaned per ewe joined (KW/EJ), While the second category, related to ewe prolificacy and included, Lambs born per ewe lambed (LB/EL), Lambs weaned per ewe lambed (LW/EL), Kilogram born per ewe lambed (KB/EL), Kilogram weaned per ewe lambed (KW/EL), Number of records involved were 1030 for the two breed group.

RESULTS AND DISCUSSION

Fertility traits:

The results presented in Table (1) show that the Farafra ewes were more fertile than Chios ewes (0.67 vs. 0.49), the differences due to genotype were highly significant (P< 0.01). The estimates of (LB/EJ), (LW/EJ), (KB/EJ) and (KW/EJ) were 0.86, 0.72, 2.94 and 8.86 for Farafra ewes, and 0.63, 0.43, 2.36 and 5.71 for Chios ewes, respectively. Results showed that Chios ewes had lower performance than Farafra ewes in all studied parameters and the differences due to genotype, were highly significant (P< 0.01). These results may be attributed to inbreeding within small Chios flock, habitat and ecological conditions. These estimates are lower than those reported by Hadjipanayiotou (1988) who found that Chios ewes in Cyprus, ewe lambed per ewe joined (EL/EJ) was 79% and Marzouk (1997) in Egypt, who found that ewe lambed per ewe joined (El/EJ) was 68%. However, Morsy (2002) in Egypt, reported that (EL/EJ) was 65%. Farafra ewes estimates were nearly consistent with those reported by Ahmed *et al.*, (1992) who found that in Barki ewes the least– squares means of EL/EJ, LB/EJ, LW/ EJ, KB/EJ and KW/ EJ were 64.4%, 65.4%, 54.0%, 1.9 kg and 7.3 kg respectively. As well as, Maharem (1996) in Barki ewes (68.0%, 66.6%, 67.9%, 65.3%, 2.55 kg and 10.10 kg), respectively. However, lower estimates were reported by El-Shennawy (1995) who found that El/EJ, LB/EJ and LW/EJ were 77%, 1.01 and 0.80 for Rahmani ewes, respectively.

These results are in agreement with Marzouk (1997) working on Ossimi, Chios and their crosses, found that genotype of ewe had a higher significant effect (P< 0.01) on conception rate (EL/EJ). Also, Malik *et al.*, (2000) working on Naeemi, Chios, Texel, Boirder Leicester Merino (BLM) and Naeemi × BLM, reported significant genotype differences on fertility. On the other hand, Maharem (1996) on Barki, Awassi and their crosses, found that the differences among breed were not significant on EL/EJ, LB/EJ, LW/EJ, KB/EJ and KW/EJ. Also, Morsy (2002) on Ossimi, Ossimi, Chios and their crosses, reported that genetic groups had no significant effect on fertility.

Ewes mated in September had higher EL/EJ, LB/EJ, LW/EJ, KB/EJ, and KW/EJ, than May and January mating seasons (Table,1). The differences due to mating season were highly significant (P< 0.01). September mating season had the best performance (0.71, 0.96, 0.78, 3.43 kg and 9.58 kg) followed by May season (0.65, 0.80, 0.66, 2.72 kg and 8.12 kg) and the poorest performance was shown in January mating season (0.50, 0.62, 0.51, 2.10kg and 6.46kg), respectively. The present results are partly consistent with those reported by Aboul-Naga *et al.* (1985) who found that the oestrous activity of some subtropical fat-tailed sheep to be the highest in autumn breeding and the lowest in early winter and late spring. Also, Aboul-Naga *et al.* (1987) concluded that the local breeds showed oestrus activity around all the year without a clear anoestrus period, but with a drop during the period from February to July. Changes in day length modify the inherent rhythm, where the increase in day length decreased plasma luteinizing hormone (LH) level followed by a cessation of oestrus activity, while the decrease in day-length increased the plasma LH level followed by the stimulating the onset of oestrus activity, generally day-length is important factor causing the seasonal variation in oestrus activity (Hulet and Shelton, 1980). Aboul-Naga *et al.*, (1989) reported that seasonal variations in all reproductive traits studied was statistically highly significant (P< 0.001), and autumn mating (September) had significantly (P<0.001) better reproductive performance than winter (January) and spring (May) mating, except for conception rate, where January mating was somewhat better. Maharem (1996) on Barki, Awassi and their crosses, found that EL/EJ during September mating season (0.75) was significantly (P<0.01) better than May (0.48) and January (0.50) mating season.

Table (1): Least-squares means ±SE of factors affecting fertility traits of Farafra and Chios ewes.

Items	No.	LSM ±SE				
		EL/EJ	LB/EJ	LW/EJ	KB/EJ	KW/EJ
Overall means	1030	0.63±0.45	0.81±0.68	0.66±0.65	2.82±2.29	8.23±8.03
Breed		**	**	**	**	**
Farafra	825	0.67±0.01	0.86±0.02	0.72±0.02	2.94±0.08	8.86±0.29
Chios	205	0.49±0.03	0.63±0.05	0.43±0.04	2.36±0.18	5.71±0.58
Mating season		**	**	**	**	**
September	381	0.71±0.02^{a}	0.96±0.03^{a}	0.78±0.03^{a}	3.43±0.12^{a}	9.58±0.45^{a}
May	383	0.65±0.02^{a}	0.80±0.03^{b}	0.66±0.03^{b}	2.72±0.11^{b}	8.12±0.41^{b}
January	266	0.50±0.03^{b}	0.62±0.04^{c}	0.51±0.04^{c}	2.10±0.14^{c}	6.46±0.50^{c}
Mating year				**		**
2001	459	0.66±0.02	0.86±0.03	0.75±0.03	2.89±0.11	9.40±0.41
2002	571	0.61±0.02	0.77±0.03	0.60±0.02	2.76±0.11	7.29±0.34
Age of ewe at mating		**	**	**	**	**
<2years	206	0.65±0.03^{ab}	0.77±0.04^{b}	0.62±0.04^{b}	2.64±0.15^{b}	7.37±0.52^{b}
2-<4 years	420	0.58±0.02^{b}	0.72±0.03^{b}	0.58±0.03^{b}	2.52±0.11^{b}	7.17±0.38^{b}
4-<6 years	87	0.71±0.04^{a}	1.01±0.08^{a}	0.91±0.08^{a}	3.47±0.28^{a}	11.33±1.02^{a}
6-<8 years	117	0.75±0.04^{a}	1.00±0.06^{a}	0.86±0.06^{a}	3.52±0.22^{a}	10.81±0.82^{a}
>8 years	200	0.61±0.03^{b}	0.84±0.05^{b}	0.69±0.05^{b}	2.95±0.19^{b}	8.49±0.67^{b}
Weight of ewe at mating		**	**	**	**	**
<35 kg	271	0.69±0.02^{a}	0.83±0.04^{a}	0.69±0.03^{ab}	2.74±0.12^{a}	8.45±0.47^{a}
35-<40 kg	381	0.66±0.02^{a}	0.85±0.03^{a}	0.71±0.03^{a}	2.92±0.12^{a}	8.71±0.44^{a}
40-<45 kg	231	0.62±0.03^{ab}	0.84±0.05^{a}	0.68±0.04^{ab}	3.10±0.17^{a}	8.54±0.58^{a}
45-<50 kg	119	0.50±0.04^{b}	0.66±0.06^{ab}	0.50±0.06^{bc}	2.40±0.24^{ab}	6.44±0.79^{ab}
> 50 kg	28	0.36±0.09^{c}	0.50±0.14^{b}	0.36±0.11^{c}	1.82±0.51^{b}	4.62±1.38^{b}
Breed × mating season		**	**	**	**	**
F × Sep.	300	0.71±0.02^{a}	0.96±0.04^{a}	0.79±0.04^{a}	3.40±0.14^{a}	9.62±0.50^{a}
F × May	304	0.72±0.02^{a}	0.90±0.03^{a}	0.77±0.03^{a}	3.01±0.12^{a}	9.44±0.46^{a}
F × Jan.	221	0.53±0.03^{b}	0.65±0.04^{b}	0.56±0.04^{b}	2.21±0.15^{b}	7.02±0.56^{b}
C × Sep.	81	0.68±0.05^{a}	0.95±0.08^{a}	0.72±0.08^{ab}	3.54±0.30^{a}	9.43±1.06^{a}
C × May	79	0.34±0.05^{c}	0.41±0.06^{c}	0.24±0.05^{c}	1.58±0.27^{b}	3.07±0.73^{c}
C × Jan.	45	0.40±0.07^{c}	0.47±0.09^{bc}	0.27±0.06^{c}	1.60±0.30^{b}	3.67±0.92^{c}

a, b, c: means in the same column within classification with different superscript for each factor differ (p<0.05) of all pair wise testes of breed × mating season differences for interaction (PDIFF).

EJ = ewe joined, EL = ewe lambed, LB = lambs born, LW = lambs weaned, KB = kilograms born and KW = kilograms weaned. F= Farafra ewes , C= Chios ewes.

Marzouk (1997) reported significant (P< 0.01) conception rate (EL/EJ) was 0.69, 0.60 and 0.83 for winter, summer and autumn. Also, Morsy (2002) observed that mating season had highly significant effect (P< 0.01) on fertility, where autumn season was the best season in fertility (0.85) as compared with winter (0.63) and summer seasons (0.53).

Table (1) showed that breed × season interaction was highly significant (P< 0.01) in all fertility traits. The fertility traits of both Farafra and Chios ewes were significantly better in September mating than May or January season. The performance of the Farafra ewes was much better than that of Chios in September, May and January mating seasons. These results are in agreement with Aboul-Naga *et al.*, (1989), while they are disagree with Maharem (1996) who found that the interactions between breed of ewe and mating seasons were not significant.

Results presented in Table (1) showed that differences in fertility traits throughout the years studied that attributed to the external factors as a result of environmental and management fluctuations from year to year e.g. feeding available and climatic conditions. The EL/EJ, LB/EJ, LW/EJ, KB/EJ and KW/EJ were 0.66, 0.86, 0.75, 2.89 and 9.40 in 2001, but were 0.61, 0.77, 0.60, 2.76 and 7.29 in 2002. The differences in LW/EJ and KW/EJ due to mating year were highly significant (P< 0.01), but in LB/EJ were significant (P< 0.05). These estimates were partly agreed with those reported by Ahmed *et al.*, (1992) where EL/EJ, LB/EJ, LW/EJ and KW/EJ were 57.9%, 58.8%, 44.9%, 1.79 kg and 5.29 kg in 1985, as well as, 70.9%, 72.0%, 63.1%, 2.01 kg and 9.42 kg in 1986, respectively. Also, Morsy (2002) working on Chios and their cross, reported that EL/EJ was 0.65, 0.67 and 0.69 in 1997, 1998 and 1999 respectively, but the differences were not significant.

Fertility traits tended to increase with age of the ewe up to 6 - <8 years old then decreased with advancing age (Table, 1). The effect of age of ewe at mating on fertility traits were highly significant (P< 0.01). The present results agree with, Ahmed *et al.*, (1992), Maharem (1996) Marzouk (1997) and Mourad *et al.*, (2001) who found that the effect of age of ewe at mating on fertility traits were significant.

The superiority of mature ewes over younger ones EL/EJ was attributed to the full development of their reproductive organs and bigger size (Vesely and Peters, 1974). Abouheif and Alsobayel (1982) working on Najdi ewes, found that reproductive traits as percentages of ewes lambed per ewes bred and percentage of lambs bom per ewes bred were increased with age up to six years of age. Also, Hadjipanayiotou (1988) reported that the highest percentage of ewes lambed were for adult ewes than for yearling ones in all studied breeds. Younis *et al.*, (1990) found that the number of ewes lambed per 100 ewe joined were 54, 62, 67 and 65% for 2, 3, 4, and more than 4 years old ewes, respectively. Likewise, Morsy (2000) reported that age of ewe at mating had no significant effect on fertility.

Table (1) showed that weight of ewe at mating (35- <40 kg) had higher LB/EJ, LW/EJ and KW/EJ, than other weights of ewe at mating. Weight of ewe at mating had a highly significant (P< 0.01) effect on all fertility traits. In the literature some studies obtained similar results, whereas other studies did not. Younis and Galal (1973) local purebred and crossbred found that body weight of ewe at mating had a significant effect on lambing percentage, and it increased by 2.1% for every kg increase increased premating body weight of the ewe. Mousa (1991) reported that heavier ewe at mating achieved better reproductive performance. Also, Maharem (1996) working on Awassi, Barki and their cross, observed that fertility traits (EL/EJ, LB/EJ, LW/EJ, KB/EJ and KW/EJ) insignificantly increased as live body weight of ewe at mating increased from 30kg to more than 50kg.

Prolificacy traits:

It is calculated as lambs born per ewe lambed (litter size, LB/EL), lambs weaned per ewe lambed (LW/EL), kilograms of lambs born per ewe lambed (KB/EL) and kilograms of lambs weaned per ewe lambed (KW/EL). Table (2) shows that the Chios ewes had slightly higher LB/EL (1.30) and KB/EL (4.83 kg) than Farafra ewes (1.28 and 4.39kg), respectively. However, the differences among breeds were not significant with LB/EL, but it were highly significant ($P< 0.01$) with KB/EL (Table, 2). Farafra ewes had higher LW/EL (1.08) and KW/EL (13.25 kg) than Chios ewes (0.89 and 11.71 kg), respectively. Moreover, the differences among breed were highly significant ($P< 0.01$) with LW/EL, and significant ($P< 0.05$) with KW/EL. The results obtained of LB/EL and LW/EL for Chios ewes were lower than those recorded by Marzouk (1997) and were (1.53 and 1.13) for LB/EL and LW/EL, respectively. As well as, Morsy (2002) 1.52 and 1.30 for Chios and there cross, respectively. But, higher than those reported by Hadjipanayiotou (1988) recorded 1.13 and 1.00 for Chios, respectively. While, the estimated LB/EL, LW/EL, KB/EL and KW/EL of Farafra ewes were higher than those reported by Ahmed *et al.*, (1992) 1.02, 0.83, 3.00 kg and 11.2 kg for Barki ewes, respectively and Maharem (1996) 1.01, 0.95, 3.82 for LB/EL, LW/EL and KB/EL in Barki ewes, respectively. But, the estimates of LB/EL, LW/EL and KB/EL of Farafra ewes were partly similar with those reported by Aboul-Naga *et al.*, (1989) 1.22, 1.08, and 4.4 kg for Ossimi ewes, respectively and Morsy (2002) found 1.20, 1.11 and 5.5 kg for LB/EL, LW/EL and KB/EL in Ossimi ewes, respectively. These results are agree with those reported by Hadijipanayiotou (1988), Aboul-Naga *et al.*, (1989), Marzouk (1997), Malik *et al.*, (2000) and Morsy (2002) where they found that genotype effects of ewe on all prolificacy studied traits were statistically significant. On the other hand, Maharem (1996) reported that prolificacy traits did not differ between different genotypes.

Table (2) show that ewes lambed in February had higher litter size at birth and litter size at weaning than ewes lambed in October and June. Moreover, season of lambing had a highly significant ($P< 0.01$) effect on litter size at birth, but was non significant effect on litter size at weaning. February lambing season was the best season by considering values of KB/EL (4.83 kg), and KW/EL (13.49 kg) as compared with either the October or June lambing seasons (4.21 kg & 4.17 kg) and (12.60 kg & 12.81 kg), respectively. Lambing season had a highly significant effect($P< 0.01$) on KB/EL, but was not significant for KW/EL. The increase in litter size at birth per ewe lambed at September mating seasons as compared with January and May mating seasons were 0.13 and 0.11 lamb, respectively.

Table (2): Least-squares means ±SE of factors affecting prolificacy traits of Farafra and Chios ewes.

Items	No.	LSM±SE			
		LB/EL	LW/EL	KB/EL	KW/EL
Overall means	650	1.28±0.46	1.05±0.58	4,46±1.39	13.01±7.02
Breed			**	**	*
Farafra	550	1.28±0.02	1.08±0.02	4.39±0.06	13.25±0.29
Chios	100	1.30±0.04	0.89±0.06	4.83±0.16	11.71±0.84
Lambing Season		**		**	
February	269	1.35±0.03^{a}	1.09±0.03^{a}	4.83±0.09^{a}	13.49±0.46^{a}
October	247	1.24±0.02^{b}	1.03±0.03^{a}	4.21±0.09^{b}	12.60±0.43^{a}
June	134	1.22±0.03^{b}	1.02±0.05^{a}	4.17±0.11^{b}	12.81±0.61^{a}
Lambing year			**		**
2001	302	1.31±0.02	1.14±0.03	4.39±0.08	14.25±0.40
2002	348	1.26±0.02	0.98±0.03	4.53±0.08	11.94±0.39
Age of ewe at mating		**	**	**	**
<2 years	134	1.19±0.03^{c}	0.95±0.04^{c}	4.06±0.10^{c}	11.32±0.56^{c}
2-<4 years	345	1.24±0.02^{bc}	0.99±0.03^{bc}	4.31±0.08^{bc}	12.26±0.41^{bc}
4-<6 years	62	1.42±0.07^{a}	1.27±0.08^{a}	4.87±0.20^{a}	15.89±0.93^{a}
6-<8 years	88	1.32±0.05^{ab}	1.13±0.06^{ab}	4.63±0.16^{ab}	14.24±0.79^{ab}
>8 years	121	1.39±0.04^{a}	1.13±0.06^{ab}	4.88±0.15^{a}	14.04±0.76^{ab}
Weight of ewe at mating				**	
<35 kg	186	1.21±0.03^{a}	1.00±0.03^{a}	3.98±0.09^{c}	12.26±0.47^{a}
35-<40 kg	251	1.29±0.03^{a}	1.08±0.04^{a}	4.41±0.09^{bc}	13.17±0.47^{a}
40-<45 kg	144	1.35±0.04^{a}	1.10±0.05^{a}	4.97±0.13^{ab}	13.71±0.61^{a}
45-<50 kg	59	1.32±0.06^{a}	1.00±0.08^{a}	4.84±0.21^{ab}	12.99±1.05^{a}
> 50 kg	10	1.40±0.16^{a}	1.00±0.14^{a}	5.11±0.60^{a}	12.94±2.02^{a}
Breed × lambing season			**		**
F × Feb.	214	1.34±0.03^{ab}	1.10±0.04^{a}	4.74±0.10^{ab}	13.39±0.51^{a}
F × Oct.	220	1.25±0.03^{ab}	1.07±0.03^{a}	4.16±0.09^{bc}	13.04±0.44^{a}
F × Jun.	116	1.23±0.04^{ab}	1.07±0.05^{a}	4.20±0.13^{bc}	13.38±0.65^{a}
C × Feb.	55	1.40±0.07^{a}	1.06±0.09^{a}	5.22±0.21^{a}	13.89±1.14^{a}
C × Oct.	27	1.19±0.07^{b}	0.70±0.12^{b}	4.61±0.34^{bc}	8.98±1.62^{b}
C × Jun.	18	1.17±0.09^{b}	0.67±0.11^{b}	3.99±0.16^{c}	9.17±1.59^{b}

a, b, c: means in the same column within classification with different superscript for each factor differ ($p<0.05$) of all pairwise testes of breed × lambing season differences for interaction (PDIFF).

EL = ewe lambed, LB = lambs born, LW = lambs weaned, KB = kilograms born and KW = kilograms weaned.

F= Farafra ewes , C= Chios ewes.

Prolificacy traits in the present study, showed higher performance of ewes in February (September mating) followed by October (May mating), while the poorest performance was in June (January mating) season. These results are in agreement with Aboul-Naga *et al.*, (1989) who found that September mating season had a significant ($P< 0.001$) better prolificacy traits than January and May mating seasons. Also, with Marzouk (1997) who reported that season of mating was of highly significant effect on litter size at birth, but not significant on litter size at weaning. On the other hand, Maharem (1996), Barghouth (2000) and Morsy (2002) found that lambing season was not significant effect on each of litter size at birth, litter size at weaning, litter weight at birth and litter weight at weaning. Marzouk (1997) observed that the largest litter sizes (1.39 lambs) was obtained with ewes mated in September – October, while 1.26 was recorded in winter lambing season (January – February) and was the best season considering the values of KB/EL (5.80 kg), and KW/EL (20.27 kg). The summer (May – June) and the autumn (September – October) lambing seasons had the same values of 18.48 kg for KW/EL. Moreover, Barghouth (2000) reported that autumn mating had slightly higher litter size at birth than both of summer and winter mating seasons, litter size at weaning was slightly higher in summer mating than in autumn or winter mating season. Morsy (2002) found that the winter season (January – February) had the best values (1.43 and 1.30) compared to (1.41 and 1.24) in the other autumn season (September – October) for litter size at birth and litter size at weaning, respectively. The autumn lambing season was the best season (6.2 kg) for litter weight at birth, but the best season for litter weight at weaning (17.3 kg) was the winter season.

Breed × season interaction effect was highly significant (P< 0.01, Table, 2) on litter size at weaning per ewe lambed (LW/EL) and litter weight at weaning per ewe lambed (KW/EL), but, it was no significant on litter size at birth per ewe lambed (LB/EL) and litter weight at birth per ewe lambed (KB/EL). Similar results were obtained by Aboul-Naga *et al.*, (1989) who found that Breed × season interaction was negligible as regards prolificacy traits. Also, Maharem (1996) observed no significant genotype × season interaction effect on prolificacy traits.

Table (2) showed that differences in LW/EL and KW/EL were highly significant (P< 0.01). although, the effect of lambing year had no significant effect in LB/EL and KB/EL, it can also observed that, the 2001 lambing year was better than 2002 lambing year. These results may be attributed to management and environmental fluctuated conditions. Similar results was obtained Ahmed *at el.,* (1992) who reported that year of breeding had no significant effect on prolificacy traits. But, Morsy (2002) found that the year of lambing had a highly significant (P< 0.01) effect on litter size at birth and litter size at weaning and significant (P< 0.05) effect on both litter weight at birth and litter weight at weaning.

All prolificacy traits tended to increased as age advanced of the ewe at mating up to 4 – <6 years old then decreased with advancing age (Table, 2). The effect of age of ewe at mating on prolificacy traits were highly significant (P< 0.01& Table, 2). These results may be attributed to a significant increase in litter size as ewe aged due to the higher increase in ovulation rate, which was strongly correlated with litter size, with advanced age of ewe (Mukasa and Lahlou-Kassi, 1995). Likewise, Abouheif and Alsobayel (1982) observed that percentages of LB/EL and LW/EL increased with age up to six years of age. Hassan and Sallam (1988) found that ewes aged 4 years had the highest twining percentage (23.6%) followed by ewes aging 5 years or more (20.6%), while ewes aged 2 years or less had the lowest value (8.6%). Also, Maharem (1996) reported that LB/EL and LW/EL tended to increase with age of the ewe up to 5 years and then decreased with advancing age. However, KB/EL and KW/EL were high for ewes older than 5 years. But, the effect of age of ewe on prolificacy traits was not significant. Morsy (2002) found that age of ewe had a significant effect either on litter size at birth and at weaning or litter weight at birth and at weaning. The ewes aged (≥ 4 years) had the highest values for litter size at birth (1.47) and litter size at weaning (1.30), while ewes aged (≤ 2 years) had the lowest values of these traits. Lambs born from ewes aged (≥ 4 years) were heaviest in total weight at birth (6.3 kg) and at weaning (18.4kg) compared with ewes in the other ages.

Table (2) showed that weight of ewe at mating had no significant effect on all prolificacy traits except for KB/EL that was highly significant ($P< 0.01$). The present results showed that all prolificacy traits tended to increase with increasing weight of ewe at mating up to 40- <45 kg then decreased with increasing weight. In agreement with the present findings, Nawaz and Mayer (1991) indicated that 10% increase body weight of ewes at mating should produce 6% increase in litter size. While, Maharem (1996) reported that weight of ewe at mating had no significant effect on LB/EL, LW/EL, KB/EL, and KW/EL. However, ewes weighing more than 50kg weaned the highest lambs.

It concluded that in Egypt, the temperature is higher during April till August than Cyprus. So, Chios ewes must be mated during September season only under subtropical Egyptian conditions, but may be mated each eight months, (September, May and January) and early weaning system more suitable for Farafra than Chios ewes. Also, Chios flock must to improve reproductive traits by import a good rams from Greece or Cyprus, import Chios semen to using artificial insemination, or by embryo transfer, regarding feeding and husbandry. Moreover, the selection program for Farafra flock should be continued and transformation Farafra ewes and rams from El-Farafra Oasis, New Valley.

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صفات الخصوبة لنعاج الكيوس والفرافرة تحت الظروف الشبة استوائية فى مصر

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اجرى هذا البحث من خلال دراسة ست مواسم تلقيح متتالية خلال سنتين متتاليتين، من خلال مجموعتين من الصفات شملت المجموعة الاولى تلك الصفات المنسوبة الى عدد النعاج التى دخلت التلقيح والمجموعة الثانية: تلك الصفات المنسوبة الى عدد النعاج التى ولدت وقد اظهرت النتائج تفوق نعاج الفرافرة (٠.٦٧) عن نعاج الكيوس (٠.٤٩) فى نسبة الخصوبة ، و كانت الفروق بينهما عالية المعنوية (٠.٠٠١)، و أيضاً تفوق نعاج الفرافرة على نعاج الكيوس فى كل من عدد الحملان المولودة، عدد الحملان المفطومة، عدد الكيلوجرامات المولودة و عدد الكيلوجرامات المفطومة المنسوبة الى عدد النعاج التى دخلت التلقيح و كانت الفروق بينهما عاليـة المعنـوية (٠.٠٠١). تفوق النعاج التى لقحت فى موسم سبتمبر فى كل مقاييس الخصوبة يليه موسم تلقيح مايو ثم يليه موسم تلقيح يناير. أيضا كان لسنة التلقيح تأثير معنوى على مقاييس الخصوبة. زيادة مقاييس الخصوبة بتقدم النعاج فى العمر (٦ – أقل من ٨ سنوات) ثم تنخفض بعد ذلك ، أيضاً تزداد مقاييس الخصوبة بزيادة وزن النعاج عند التلقيح (من ٣٥ – أقل من ٤٥ كجم) ثم تبدأ فى الانخفاض بزيادة الوزن. و تشير النتائج الى أنة كان لكل من عمر النعجة و وزن النعجة عند التلقيح تأثير عالى المعنوية (٠.٠٠١) على مقاييس الخصوبة.

كما اظهرت النتائج تفوق نعاج الكيوس عن نعاج الفرافرة فى بعض الصفات المنسوبة للنعاج التى ولدت وكانت الفروق بينهما غير معنوية مع عدد الحملان المولودة وكانت الفروق عالية المعنوية (٠.٠٠١) مع عدد الكيلوجرامات المولودة، بينما تفوق نعاج الفرافرة عن الكيوس فى كل من عدد الحملان المفطومة وعدد الكيلوجرامات المفطومة أيضاً و كانت الفروق بينهما معنوية (٠.٠٠٥). تفوق النعاج التى تلد فى موسم سبتمبر فى كل من حجم الخلفة عند الولادة و عند الفطام ، يليه موسم ولادة أكتوبر ثم موسم يونيو ، و كانت الفروق بين مواسم الولادة عالية المعنوية (٠.٠٠١) مع حجم الخلفة عند الولادة و غير معنوية مع حجم الخلفة عند الفطام. أيضاً أظهر موسم ولادة سبتمبر تفوق عالى المعنوية (٠.٠٠١) مع عدد الحملان المولودة/النعاج الوالدة يليه موسم ولادة أكتوبر ثم يونيو ، بينما التفوق غير معنوى مع عدد الحملان المفطومة/النعاج الوالدة. لسنة الولادة تأثير عالى المعنوية مع عدد الحملان المفطومة/النعاج الوالدة، بينما تأثير غير معنوى مع عدد الحملان المولودة/النعاج الوالدة. عمر النعجة يؤثر معنوياً على كل المقاييس عدد الحملان المولودة، عدد الحملان المفطومة، عدد الكيلوجرامات المولودة، عدد الكيلوجرامات المفطومة/للنعاج الوالدة، بينما وزن النعجة يؤثر معنويا على عدد الكيلوجرامات المولودة/النعاج الوالدة فقط.

يستنتج من ذلك انة يفضل تحت الظروف المصرية تلقيح نعاج الكيوس مرة واحدة فى السنة وهو موسم تلقيح سبتمبر – ولكن اتباع نظام اسراع الولادات والفطام المبكر للحملان مع نعاج الفرافرة ربما يكون افضل.

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