A study of Reproductive Performance of a Flock of Fleisch Merino Sheep under Subtropical Conditions

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A NUMBER of 1662 Fleisch Merino Ewes were used to study the effect of season of lambing and age of dam on the reproduction performance of this breed under subtropical conditions. It was found that both numbers of ewes lambing per ewe joined (E_{pj}) and number of lambs born per ewe lambing (L_{BP}) were higher for Spring lambing than for Autumn ones. The differences between the two seasons, were significant for (E_{pj}), but insignificant for (L_{Bp}).

The number of lambs weaned per lambs born (L_{WB}) and number of lambs weaned per ewe joined (L_{WB}) were higher for Spring lambing than for Autumn ones. The differences between the two seasons, in the two cases were highly significant.

The number of ewes lambing per ewe joined (E_{pj}), the number of lambs weaned per lambs born (L_{Wj}) and the number of lambs weaned per ewe joined (L_{Wj}) were found to be at its minimum 2 year old ewes and rose to the maximum for ewes aged 5 and 6 year old ewes. The differences between the different age groups, in the three cases were highly significant.

The number of lambs born per ewe lambing (L_{BP}) increased lineraly as ewes increased in age from 2 to 9 years the differences between the different age groups in this respect were highly significant.

Merino sheep were introduced to Egypt in great number twice; once during the rule of Mohamed Ali (Hamont, 1876) where they were also crossed with the indigenous sheep, and another in 1965. The source of the first introduction was French Merinoes (Precocee), while the other came mainly from D.D.R. The results of the first attempt were not encouraging since it ended in complete failure due to managerial difficulties and lack of control. The recent large scale importation of the Fleisch Merinos were the main subject of investigation in this work.

The effect of season of lambing and age of dam on the reproductive performance of the ewes were studied. The effect of change of habitat (in the very wide sense of the word) was the main concern of this study, as the results obtained would help in establishing the basis of successful husbandry system Merino sheep in Egypt.

Material and Methods

This study took place on "Koam O'Sheem" Farm which belongs to the General Organization for Meat and Milk Production. It lies west of the Nile valley near Fayoum. The cultivated area alloted for the sheep came to 500 Acres - where *Alfa alfa*, Egyptian clover (*Trifolium Alexandrium*), and Sweet Sorghum are grown to supply the sheep with green fodder all the year round. Concentrates are given to ewes before tupping, at late pregnancy, during lactation and for the lambs as creep food. The sheep are grazed and housed in open wooden sheds all the year round. Nearly six thousand heads of Fleisch Merino are raised in this farm, of which three thousand are mature ewes.

To study the effect of season of lambing and age of dam on the reproductive performance of this breed, two groups of ewes, different in age, lambing at both Autumn of 1971 and Spring of 1972 were chosen. The details are given in the following table.

TABLE 1. Number of ewes joined.

Breeding season	Autumn	Spring
Age of ewe at breeding (years)	Number of ewes joined	Number of ewes joined
1.5	400	80
2.5	90	100
3.5	100	50
4.5	102	100
5.5	130	52
6.5	104	50
7.5	50	100
8.5	50	104
Total	1026	634

Vasectomised rams were used for detecting oestrus in ewes. Mating was allowed for a period of eight weeks irrespective of the season of mating and no change of rams took place, thus having one groups of ewes along with their rams for Spring mating and another group for Autumn.

Measures of reproduction used in the study were :-
a) Number of ewes lambing per ewe joined (E_{pj}).
b) Number of lambs born per ewes lambing (L_{BP}).
c) Number of lambs weaned per lambs born (L_{WB}).
d) Number of male lambs weaned per male lambs born ($L_{W.B.E.}$).
e) Number of female lambs weaned per female lambs born ($L_{W.B.E}$).
f) Number of lambs from multiple births weaned per lambs born in multiple births (M_{WB}).
g) Number of single lambs weaned per single lambs born (S_{WB}).
h) Number of lambs weaned per ewe joined (E_{pf}).

Statistical analysis was carried out according to Snedecor (1956). Observed differences were considered significant or highly significant when the probability was less than 0.05 or 0.01 respectively. For testing the differences of reproduction rate and its components, percentages were transferred to their corresponding arcsine before applying analysis of variances.

Results and Discussions

1. *Factors affecting number of ewes lambing per ewe joined (E_{pj})*
   a. *Effect of season of lambing*

Table 2 shows that the average of E_{pj} in the different age groups was higher for Spring lambing than for Autumn lambing. The differences between the two seasons, in this respect, were highly significant (Table 3). This finding agrees with that reported by Le Roux (1970).

TABLE 2. Effect of age of dam on E_{pB} L_{Bp} L_{WB} L_{WJ}.

Season of lambing		Age of dam at lambing (year)								Mean
		2	3	4	5	6	7	8	9	
Spring	E_{Jp}	0.650	0.767	0.830	0.892	0.946	0.875	0.860	0.840	0.825
	L_{Bp}	1.123	1.145	1.181	1.186	1.195	1.230	1.230	1.286	1.196
	L_{WB}	0.818	0.899	0.908	0.945	0.959	0.955	0.923	0.818	0.912
	L_{WJ}	0.598	0.789	0.890	1.000	1.085	1.029	0.960	0.880	0.904
Autumn	E_{pJ}	0.587	0.710	0.780	0.890	0.903	0.860	0.820	0.778	0.791
	L_{Bp}	1.085	1.155	1.153	1.191	1.191	1.209	1.219	1.259	1.183
	L_{WB}	0.725	0.841	0.822	0.906	0.892	0.904	0.890	0.892	0.859
	L_{WJ}	0.463	0.690	0.740	0.960	0.962	0.940	0.890	0.875	0.815

The difference in E_{pj} between the two seasons were attributed to the high incidence of oestrus observed in Autumn than in Spring (Shelton and Morrow, 1965).

TABLE 3. Analysis of variance for the effect of age of dam and season of lambing on the number of ewes lambing per ewe joined.

Source of variance	d.F.	S.S.	M.S.	F. Value
Age	7	682.00	97.428	70. 908 **
Season	1	37.85	37.85	27.547**
Residual	7	9.62	1.374	
Total	15	729.47		

b. *Effect of age of dam*

It was found that in Spring lambing season E_{pj} rises from a minimum of 0.650 for 2 year-of ewes to a maximum of 0.946 for 6 year old ewes, then falls to 0.840 for ewes 9 year old (Table 2). In Autum lambing E_{pj} rises from a minimum of 0.587 for 2 year old ewes to a maximum of 0.903 for 6 year old ewes, then decreasing with the older ages to 0.820 and 0.778 for 8 and 9 year old ewes respectively. This pattern is just the same in the two saesons where the peak is reached at ages of 4 to 7 years. In both younger and older ewes, E_{pj} was rather less than that of the middle age ones. Generally, the differences between means in this respect for the different age groups (ranging from 2 - 9 years) for both Spring and Autumn were highly significant (Table 3). These findings were similar to those of Teodereanu and Simon (1956).

2. *Factors affecting number of lambs born per ewe lambing* (L_{Bp})

a. *Effect of season of lambing*

L_{Bp} was found to be higher for Spring lambing than for Autumn (Table 2). The overall mean of L_{Bp} was 1.196 and 1.183 for Spring and Autumn lambing respectively, but this difference lacked statistical significant (Table 4).

TABLE 4. Analysis of variance for the effect of age of dam and season of lambing on the number of lambs born per ewe lambing (L_{Bp}).

Source of variance	d.F.	S.S.	M.S.	F. Value
Age	7	202.11	28.873	23.725**
Season	1	3.37	3.37	2.769
Residual	7	8.51	1.217	
Total	15	213.98		

** Highly significant.

b. *Effect of age of dam*

Table 2 shows that L_{B_p} increases linearly as ewes increased in age from 2 - 9 years. These differences between the different age groups (ranging from 2-9 year) were highly significant (Table 4). These results were in the direction as those of Desvignes (1971).

3. *Factors affecting number of lambs weaned per lambs born l_{WB} (survival rate)*

a. *Effect of season of lambing*

Table 2 showed that L_{WB} was higher for Spring lambing than for that of Autumn. The overall mean was 0.912 and 0.859 for Spring and Autumn lambing respectively. The difference between the two seasons was statistically highly significant (Table 5). This agreed with what was reported by Shelton (1964) and Barr *et al.* (1968).

TABLE 5. Analysis of variance for the effect of season of lambing, age of dam at lambing, sex and type of birth on survival rate (L_{WB}).

Source of variance	d.f.	S.S.	M.S.	F. Value
Between season (E)	1	493.60	493.60	17.26**
Between age (A)	7	1961.33	280.19	9.80**
Between sex (S)	1	24.77	24.77	0.87
Between type of birth	1	1575.69	1575.69	55.09**
AXS (T)	7	246.54	35.22	1.23
AXT	7	225.68	32.24	1.13
AXE	7	432.04	61.72	2.16
SXT	1	6.38	6.38	0.22
SXE	1	1.58	1.58	0.06
TXE	1	92.76	92.76	3.24
Residual	29	829.40	28.60	
Total	63	5889.77		

It seems that the ewes lambing in Autumn were subject to the effect of the high summer temperature during their last months of pregnancy, therefore the development of the foetus was checked in a way that birth weight was relatively

smaller than that of Spring lambs. This factor is of great importance in determining the livability of lambs especially during their first month of age. Ragab *et al.* (1954), Hoversland *et al.* (1957) and Shelton (1964) came to the same conclusion.

b. *Effect of age of dam*

The results presented in (Table 2) showed that L_{WB} in Spring born lambs rose from a minimum of 0.818 for 2 year old ewes to a maximum of 0.959 for 6 year old ewes, then it fell to 0.818 for 9 year old ewes. In Autumn born lambs L_{WB} rose from 0.725 for 2 year old ewes to a maximum of 0.906 for 5 year old ones. Again it decreased slightly with the advance in age to 0.892 for 9 year old ewes. Differences between average L_{WB} in age groups were highly significant (Table 5). These findings agreed with those reported by Prud'hon *et al.* (1968)and Mullaney and Brown (1969).

It could be inferred that young ewes are known to be of lower mothering ability and small size, besides that their udders are still under development. Therefore, their light weight newly born lambs are expected to be more sensitive to the environmental conditions, besides that they also receive limited quantities of milk from their young dams. On the other hand, the aged dams lose much of their vitality through aging, while their udder, are subject to many troubles which effect the lambs milking supply. Therefore in those two cases more lamb mortality is expected.

c. *Effect of sex*

The survival rate L_{WB} for female lambs up to weaning age, *i.e.* four months was very close to that of males (Table 6). The differences between the two sexes in this respect were not significant (Table 5).

This finding agrees with those reported by Ragab *et al.* (1954) and Labban *et al.* (1966) but disagreeing with that reported by Prud'hon *et al.* (1968)

d. *Effect of type of birth*

The survival rate L_{WB} up to weaning at four months of age was higher for single born lambs than for twin-born ones (Table 7). The differences between singles and twins in this respect were highly significant (Table 5). These results followed the same trend as that found by Vettar *et al.* (1960) and Shelton (1964). However, this may be due to the fact that the average weight of single lambs is higher than that of twins which are experted to be more sensitive that in the case of singles.

4. *Ecctors effecting number of lambs weaned per ewe joined*

a. *Effect of season of lambing*

L_{WJ} was found to be higher for Spring lambing than for Autumn ones (Table 2). The overall mean was 0.904 and 0.815 for Spring lambing and Autumn lambing respectively. This difference was statistically highly significant (Table 8). This finding agrees with those reported by Dun *et al.* (1960) and Reyneke (1969).

Since E_{PJ}, L_{BP} and L_{WB} were higher in Spring lambing than in Autumn, consequently L_{WJ} is expected to be also higher for Spring lambing ewes than for those lambing in Autumn.

TABLE 6. Effect of sex on the number of lambs weaned per lambs born.

Season of lambing	Sex of lamb	Age of dam at lambing (year)								Mean
		2	3	4	5	6	7	8	9	
Spring	L WB.R	0.794	0.881	0.881	0.968	0.962	0.957	0.917	0.826	0.894
	L WB.R	0.859	0.917	0.938	0.913	0.956	0.952	0.885	0.800	0.892
Autumn	L WB.R	0.640	0.863	0.846	0.935	0.923	0.900	0.864	0.892	0.868
	L WB.R	0.808	0.906	0.789	0.887	0.867	0.917	0.911	0.892	0.863

TABLE 7. Effect of type of birth on the number of lambs weaned per lambs born.

Season of lambing	Sex of lambs	Age of dam at lambing (year)								Mean
		2	3	4	5	6	7	8	9	
Spring	S WB	0.877	0.915	0.926	0.959	0.970	0.971	0.941	0.990	0.923
	M WB	0.609	0.850	0.866	0.912	0.937	0.929	0.989	0.792	0.821
Autumn	S WB	0.794	0.883	0.848	0.931	0.947	0.912	0.918	0.900	0.894
	M WB	0.625	0.727	0.750	0.853	0.778	0.889	0.806	0.881	0.81

.b. *Effect of age of dam*

The results presented in Table 2 showed that L_{WJ} in Spring increased from 0.598 for 2 year old ewes to 1.085 at the age of 6 years then decreasing to 0.880 for the 9 year old group. The pattern of change in L_{WJ} with change in age in Autumn was similar to that of Spring. It increased from 0.463 for 2 year old ewes to 0.962 to 6 years of age then decreasing to 0.875 at 9 years.

TABLE 8. Analysis of variance for the effect of age of dam and season of lambing on number of lambs weaned per ewe joined (L_{wJ}).

Source of variance	d.F.	S.S.	M.S.	F. Value
Age	1	2591.76	370.251	41.011**
Season	1	323.19	323. 19	35.799**
Residual	7	63.20	9.028	
Total	15	2978.15		

** Highly significant.

This pattern is generally one of rise with age reaching a certain maximum then followed by a successive decline. The peak in this respect was reached when the ewes were 6 years old. The differences between age groups were highly significant (Table 8). This is supported by the findings reported by Turner et al. (1962) and Mullany and Brown (1969). Such results are expected since change in L_{wJ} with changing age would be similar to the pattern of its components (E_{pJ} , L_{Bp}, L_{wB}).

General Discussion

The newly imported Merinoes into Egypt represented by Kaam O'Sheem flock, the subject of this study showed that an overall mean for number of ewes lambing per ewe joined (E_{pJ}) and number of lambs born per ewe lambing (L_{Bp}) were higher for Spring lambing than Autumn ones.

The survival rate of lambs (L_{wp}) was higher for Spring lambs than for Autumn ones. This could be attributed to that ewes lambing in Autumn were subject to the effect of the high summer temperature during their last months of pregnancy, therefore the development of the foetus was checked in a way that the birth weights be relatively smaller than that of Spring lambs. Consequently, a higher percentage of mortality is observed among the Autumn Lambs.   To avoid this bad effect, it was suggested that such ewes must graze during the mild hours of the day, i.e. in the early morning or late evening. Also grazing green lush grass would help in avoiding the after effects of this time of the year.

The number of lambs weaned per ewe joined (L_{wJ}) was found to be higher for Spring lambing than those of Autumn lambing (0.904) and 0.815 for Spring and Autumn lambing respectively.

Age of dam is known to be one of the important factors that affects the reproductive performance of the ewe. It was found that the number of ewe lambing per ewe joined (E_{pJ}) rose from the minimum for 2 year old ewes to the peak at the age from 4 to 7 years, then decreasing as age advanced, to another minimum when the ewe reached 9 years of age.

Also it was found that the number of lambs born per ewe lambing (L_{BP}) increased linearly as ewes increased in age from 2 to 9 years.

The number of lambs weaned per ewe joined (L_{WJ}) rose as age increased till it reached a maximum then followed by a successive decline. The peak was reached when the ewes 6 years old.

To compare reproduction performance obtained from this work with that of indigenous sheep breeds, following Turner and Dolling (1965), the number of lambs weaned per ewe joined (L_{WJ}) was used to represent reproduction performance. In this work L_{WJ} was 0.815 and 0.904 for Spring lambing and Autumn lambing respectively, while in Egypt also Gheith (1969) working on Ossime sheep found that L_{WJ} was 0.400 and 0.800 for 2 year old ewes and 0.779 and 0.695 for mature ewes in two successive years. It is clear that L_{WJ} in this work for Fleisch Merino Sheep is higher than that for Ossimi Sheep in Egypt.

Although the reproductive performance of this flock over a number of six years has shown satisfactory results, especially when compared with that of the Osssimi Breed *i.e.* the most common native one, yet other aspects such as mutton and wool production have to be considered.

If all in all these features of production would prove to be of the same level as those of the imported breed at home or at least still more than those of the indigenous breeds, the importations would be justified.

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المقدره الانتاجية لاغنام مرينو اللحم تحت ظروف شبه جافة

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لدراسة قدرة هـذه الأغنام على التكاثر استخدم قطيعين من النعـاج تتراوح اعمارها عند الولادة بين ٢ ، ٩ سنوات ولقح القطيع الأول وعدده ٦٣٦ نعجة وبدرية فى خريف ١٩٧١ ليلد فى ربيع ١٩٧٢ بينما لقح النطيع الثـانى وعدده ١٠٢٦ نعجة وبدرية فى ربيع ١٩٧٢ لتلد فى خريف نفس العام .

هذا واستمر موسم التسميد لمدة ثمانية اسابيع فى كلا الموسمين وينقس نظام التلقيح كذلك بنفس الأكباش والتى تراوح عمرها بين ٤ ، ٦ سنوات. وجد أن كلا من عدد النعاج التى ولدت بالنسبة لعدد النعاج المقدمة للكبش وعدد الحملان المولودة بالنسبة لعدد النعاج الوالدة وجد أنها أعلى من موسم الولادة الربيعى عنها فى موسم الولادة الخريفى وكانت الفروق بين الموسمين معنوية فى الحالة الأولى وغير معنوية بالنسبة لحالة الثانية كذلك وجد أن عدد الحملان المفطومة بالنسبة لعدد الحملان المولودة وأيضا عدد الحملان المفطومة بالنسبة لعدد النعاج المقدمة للكبش كانت أعلى من موسم الولادة الربيعى عنها من موسم الولادة الخريفى هـذا وكانت الفروق بين الموسمين عالية المعنوية فى كلتا الحالتين .

لوحظ أن عدد النعاج الوالدة بالنسبة لعدد النعاج المقدمة للكبش وعدد الحملان المفطومة بالنسبة لعدد الحملان المولودة وأيضـا عـدد الحملان المفطـومة بالنسبة لعدد النعاج المقدمة للكبش وجد أنها كانت عند حدها الأدنى منحالة النعاج التى عمرها سنتين وأرتفعت الى حدها الأقصى للنعاج التى أعمارها ٥ ، ٦ سنوات وبعد ذلك انخفضت تدريجيا بتقدم عمر النعاج لتصل الى حد أدنى آخر للنعاج التى عمرها ٩ سنوات ، هذا وكانت الأختلافات الناتجة عن اختلاف أعمار النعاج عالية المعنوية فى الحالات الثلاث .

ازدادت نسبة التوائم اضطراريا بنقدم عمر النعـاج حتى وصلت حـدها الأعلى للنعاج التى عمرها ٩ سنوات وكانت الفروق عالية المعنوية .