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BODY WEIGHTS AND MORTALITY RATES AMONG TEXEL LAMBS AT THE TAHREER PROVINCE IN EGYPT

By

M. M. Morsy (2) and H. A. Karam (1)

SUMMARY

The Texel sheep was introduced into this country by the Tahreer Province in 1955. The number of animals imported was 385 pregnant ewes and 10 arms. This study was conducted during the years 1957, 1958 and 1959. The number of ewes mated was 209, 173 and 156 respectively. The aim of this investigation was to study the performance of the Texel sheep in Egypt with respect to some of the important economic characters.

While average birth, weaning and yearling weights for male lambs were 4.11, 21.75 and 31.27 Kg. respectively, they were 3.94, 19.41 and 30.87 for female lambs. Sex differences were significant at birth and at weaning but not at one year of age. Year of birth affecte all body weights significantly.

The heritability estimates for birth, weaning and yearling weights were 0.0960, 0.0743 and 0.4899 respectively.

Phenotypic correlations for birth and weaning, birth and yearning and weaning and yearling weights were 0.1918, 0.1640 and0.3308, respectively.

Mortality rates of lambs from birth to weaning were also studied. As birth weight of lambs increased, mortality rate decreased but the differences were statistically insignificant. Mortality rates differed significantly from one year to another. Ram lambs and single lambs had lower mortality rates than ewe and twin lambs.

The use of the Texel lambs for hothouse lamb production was suggested. More detailed studies of the environmental factors affecting growth of the lambs were called for. Also comparative studies with the local breeds were thought to be necessary for a better evaluation of the Texel sheep.

INTRODUCTION

Meat shortage is an important problem in Egypt at the present time. The local supplies do not fulfill all the increasing demands of the rising standard of living of a larger proportinon of the human population. Short term solutions to this problem depend mainly on importing frozen meat and live animals to be slaughtered shortly after arrival. Since lamb and mutton

(1) Former graduate student at the Dept. of Genetics, Univ. of Alexandria. Present adress : Animal production Dept., Tahreer Province.

(2) Associate professor, Animal production Dept., Univ. of Alexandria.

are preferred to other types of meat by many Egyptians, most importations are lamb mutton. Long term policies include adopting some of the standard and more specialized breeds to our local conditions. These breeds can also be crossed with the native ones for improving them genetically with respect to some of their economic traits.

The Texel sheep of Holland was one of the breeds imported for these purposes. It is an early maturing breed, hardy, highly fertile with good mutton and carcass qualities (Bates, 1953). The present investigation was conducted to study the performance of the Texel lambs when raised under the Tahreer province conditions. This and other studies should help in making future breeding plans involving this breed of sheep.

MATERIAL AND METHODS

During the period from August to December 1955, the Tahreer province imported 385 pregnant ewes and 10 rams of the Texel breed. By January 1956, they were severly attacked by pneumonia and as as result several of them died. Almost all lambs born during that seasoon died too. This was followed by an outbreak of smallpox which caused more deaths among the flock, leaving 226 ewes and 10 rams by July 1956. Since then the flock was divided into samall groups and put in temporary sheds in the alfalfa fields in the third village (Omar Makram). The animals grazed all day except when the fields were wet or the weather was extremely hot during the summer months. Berseem was available during the period from October to May, then alfalfa from June to September.

The mating season lasted from the middle of August to the end of October. The ewes were divided into groups of thrity and one ram was assigned to each group. About two months before the season started the ewes were flushed with a concentrated ration of equal parts of barley, linseed cake, and wheat bran. One per cent lime and 0.5 per cent salt were added to the mixture.

Lambing took place in individual pens in the sheep barn and the newly born lambs were kept with their mothers in those pens for one week. Then they were all put in larger groups and allowed to graze in nearby fields. Creep feeding began at 45 days of age and the lambs were weaned at about 4 months of age.

Pastular stomatitis infected the lambs during the three seasons of 1957, 1958 and 1959, causing heavy casualities among them. In 1958 lambs were affected during the suckling period which resulted in serious damages and high mortality rates. Some lambs were unable to suckle their mothers and were given cows' milk. The infection was milder during the other two seasons because in most cases it occured closer to or after weaning.

The lambs were weighed at birth and at monthly intervals until weaning; then at 6, 9 and 12 months of age. Our of 352 lambs, only sixty were twin born and 15 of them died before weaning. Weights of twins were corrected to single basis to facilitate the analysis. The number of lambs used for each character was not the same because of death losses. Also the sires of some lambs were not identifiable, causing the total number within sire groups to be even smaller.

The data were classified into sire groups within sex and year of birth; the intra-class correlation was used for estimating heritabilities of the different body weights. Phenotypic correlations were also calculated within year and sex.

RESULTS AND DISCUSSION

Body weights at different ages.

Effect of sex:

The average birth weights of male and female lambs were 4.11 and 3.94 kilograms, respectively (Table 1). By four months of age males were still growing at faster rates than females. Their averages were 21.75 and 19.41 kilograms. Differences at both ages were statistically highly significant. These results are in agreement with those reported by Bonsma (1939), Phillips at al. (1940), Hazel and Terril (1945a, 1946), Badreldin (1951), Asker et al. (1952), Ragab et al. (1953a), Blackwell and Henderson (1955), Karam (1955), de Baca et al. (1956), Storke et al. (1958), Karam (1959a), and Kassab and Karam (1961). Ram lambs were heavier at birth and at weaning than ewe lambs.

TABLE 1.—**Mean body weights (Kgs.), standard deviations and coefficients of variability for lambs at different ages**

Age in months	Male lambs				Female lambs			
	No. of animals	Mean	S.D.	C.V. (%)	No. of animals	Mean	S.D.	C.V. (%)
Birth	199	4.1	0.9	22.8	200	3.9	0.9	22.2
1	178	9.6	3.3	34.4	172	9.3	3.1	33.1
2	176	13.0	5.8	44.8	162	13.3	3.8	28.9
3	125	17.0	4.9	29.1	131	15.9	4.4	27.9
4	148	21.8	6.1	27.8	151	19.4	5.4	27.8
6	139	25.5	6.5	25.6	148	23.6	6.1	25.6
9	130	28.1	5.7	20.3	142	27.1	5.3	19.5
12	113	31.3	5.8	18.6	129	30.9	4.4	14.4

By one year of age male and female lambs averaged 31.27 and 30.87 kilograms, respectively (Table 1). The difference was not significant. It is also smaller than that found at weaning which is contrary to other work reported by Phillips et al. (1940), Terrill et al. (1947, 1948a, 1948b), Badreldin (1951), Karam (1959a), and Kassab and Karam (1961). They all stated that sex differences were larger at yearling age than at weaning age.

Effect of year of birth:

The analysis of variance (Table 2) showed that there were highly significant differences among year for birth and weaning weights, but not significant for yearling weights. These differences are a reflection of the condition of the maternal effects which affects, birth, weaning, and, to a lesser extent, yearling weights of their lambs. They also reflect other environmental factors such as weather conditions, quality and quantity of food, systems of management practices and diseases affecting growth rates of lambs. Also any year to year changes in the average genetic make-up of the flock would contribute to the observed fluctuations between years. Several investigators found that year of birth was an important source of variation among lamb weights at different ages (Phillips et al. 1940, Blunn 1944, Hazel and Terrill 1945a, Terrill et al. 1947, 1948a and 1948b, Asker et al. 1954, Sidwelland Grandstaff 1949, Ragabet al. 1953a, Karam 1955, Blackwell and Henderson 1955, and Karam 1959a).

Heritability estimates:

The intra-class correlation (half-sib-correlation) was used in estimating the heritability of body weights at different ages. Table 2 presents the analysis of variance (mean squares), variance components and heritability estimates obtained. Sire variances were claculated within year and sex. The number of lambs per sire ranged from 3 to 30, with averages of 6.6, 5.0 and 4.1 for birth weaning and yearling weights.

In a random bred population the sire variance is expected to contain one-quarter of the additive genetic variance plus a small part of the epistatic variance. The error variance contains the environmental variance plus the rest of the genetic variance. The heritability estimate would then be four times the sire variance divided by the total variance, both genetic and environmental.

The heritability estimates obtained for birth, weaning and yearling weights were 0.096, 0.074 and 0.490, respectively (Table 2). Genetic factors affecting body weights at different ages are not exactly the same, nevertheless many of them should be common to all weights. Environmental variances are also expected to differ from one age to another. They usually increase gradually from birth to weaning and then decrease by one year of age with the disappearance of the ewes effect.

TABLE 2.—Analysis of variance (mean squares), variance components and heritability estimates

Source of variation	Birth wt.		Weaning wt.		Yearling wt.	
	d.f.	Mean squares	d.f.	Mean squares	d.f.	Mean squares
Total	332	0.850	245	35.66	197	32.59
Between years . .	2	16.404**	2	883.41**	2	9.49
Between sex within years	3	3.470**	3	124.12**	3	17.34
Between sires within sex and years . .	44	0.859	43	29.59	42	46.22*
Within sires, sex and years	283	0.711	197	27.03	150	29.39
	Components of variance and heritability					
k_0	6.61		5.00		4.10	
6^2s	0.0224		0.512		4.102	
6^2e	0.7106		27.032		29.389	
h^2	0.10 ± .15		0.10 ± .19		0.49 ± .28	

* Significant at P = 0.05.
** Singificant at P = 0.01.
6^2s = sire variance
6^2e = error variance.
k_0 = the average number of lambs per sire.

Chapman and Lush (1932), Nelson and Venkatachalam (1949), Ragab *et al.* (1953), Blackwell and Henderson (1955), Bonsma (1958), Karam (1959a) and Imam (1962) gave heritability estimates for birth weight ranging from 0.17 to 0.61 with most of them around 0.35.

For weaning weights, Hazel and Terril (1945b, 1945), Nelson and Ventkatachalam (1949), Karam *et al.* (1953), Kyle and Terrill (1953), Ragab *et al.* (1953b), Blackwell and Henderson (1955), Karam (1959)a, and Imam (1962) reported estimates ranging from 0.06 to 0.54.

As for yearling weights, the range was much narrower (.21 to .51) in several studies dealing with different types of sheep and using different methods of estimation; Terrill and Hazl (1943), Morley (1950), Karam *et al.* (1953), Kyle and Terrill (1953), Karam (1959a), Imam (1962). The estimate obtained in the present study is also closer to most of those reported by other workers.

The heritability of weaning weight was lower than those at birth and at one year of age. This is contrary to most of the reports in the literature where this value is intermediate between the other two. The high standard errors obtained indicate that more data is needed to arrive at better and more reliable estimates.

Correlation coefficients:

Many investigators tried to correlate body weights of lambs at different ages with the idea of finding an early criteria for selection. The highest relationship is usually found between weaning and yearling weights, followed by birth and weaning, and the lowest is between birth and yearling. In the present study these correlations were 0.331, 0.192 and .164 respectively. They were also statistically significant (Table 3). Panenkov (1935), Bonsma (1939), Glembockii and Bogoljubova (1940), Ragab *et al.* (1935a), Karam (1959a), and Kassab and Karam (1961) reported correlations between birth and weaning weights ranging from .21 to .63. For, birth and yearling weights the range was from .20 to .29; Glembockii and Bogoljubova (1940), Karam (1959a), Kassab and Karam (1961). Panenkov (1935) found no corelation between birth weight of lambs and their weight at one year of age. Gartner and Ungern-Sterberg (1938) determined the correlation between 100 days weight and yearling weight as .431. Morley (1950), Terrill *et al.* (1950) and Kyle and Terrill (1953) reported estimates ranging from .50 to .77 for the correlation between weaning and yearling weights of lambs. Karam (1959) and Kassab and Karam (1961) estimated this correlation as .315 and .227, respectively.

TABLE 3.—**Phenotypic correlations**

Body weights correlated	Number of observations	r.
Birth and weaning	253	0.192** ± 0.019
Birth and yearling	203	0.164* ± 0.222
Weaning and yearling	204	0.311** ± 0.020

* P value = .05
** P value = .01

Mortality rates.

The number of lambs that survive up to weaning age affects to a great extent the net profit from the flock, since lamb losses determine the number available for sale every year. Following are some of the factors studied and which influence mortality rate among lambs from birth up to four months of age.

Birth weight:

Table 4 shows the birth weights of lambs divided into five groups with equal intervals from 2 up to 6.9 kilograms. It is clear that as birth weight increased, mortality rate decreased. But the differences between groups were not statistically significant. There were only two lambs that died at birth and they belonged to the lighter group. The rest died between birth and forur months of age. Pbillips and Dawson (1940), Venkatachalem *et al.* (1949), Ragab *et al.* (1954), Karam (1959), and Purser and Y oung (1959) found significantly higher mortality rates among lambs with lighter birth weights. Proper consideration should be given to birth weight when selecting lambs for breeding purposes.

TABLE 4.—**Effect of birth weight on lamb mortality**

Birth wt. (Kg.)	2.0–2.9	3.0–3.9	4.0–4.9	5.0–5.9	6.0–6.9
Total number of lambs.	15	107	138	76	16
No. of dead lambs	8	42	30	8	0
Mortality % . . .	53.3	39.3	21.9	10.5	0.0

Sex and type of birth:

Total mortality rate was about 25.0% of all lambs born. Ram and single lambs had lower mortalities than ewe and twin lambs, but the differences were not statistically significant. Venkatachalam *et al.* (1949) found that mortality rates among twin and ram lambs were significantly higher than among single and ewe lambs at two months of age. Karam (1959b) found similar results among Rahmani lambs from birth to four months of age. Ragab *et al.* (1954) found that mortality rate, among Ossimi lambs, was higher for males than females up to four months of age. It was the other way round among Rahmani lambs.

Year of birth:

The percentages of lamb mortality for the years 1957, 1958 and 1959 were 7.5., 48.9 and 9.7 respectively. Using the chi-square test, the differences were found significant. Such differences are usually associated with feeding, health and weather conditions from year to year. This was very pronounced in 1958 because most of the lamb crop was affected with Pastular stomatitis. Venkatachalam *et al.* (1949) and Karam (1959b) found that years differed significantly in mortality rates of lambs of different breeds.

High mortality rates is a serious economic problem and a great handicap to the breeder. It lowers his chances in selecting for the desirable traits and consequently improving the genetic make-up of the flock. Therefore, ewes should be in good condition during gestation and suckling periods to be able to lamb and wean a large percentage of lambs. Considerable care should also be given to lambs, especially from birth to weaning, in order to minimize death losses among them.

TABLE 5.—**Productivity, mortality and body weights of lambs born in 1957, 1958 and 1959**

Year	1957	1958	1959
Number of mated ewes	209	173	156
Percentage of ewes lambing	50.7	82.7	66.0
Percentage of twin lambs born	15.1	22.4	11.6
Percentage of dead lambs till weaning age	7.5	48.9	9.7
Average birth weight of males	4.4	3.7	4.2
„ „ „ „ females	4.2	3.7	4.1
„ weaning „ „ males	25.0	18.2	20.3
„ „ „ „ females	22.0	16.7	19.3
„ yearling „ „ males	31.3	31.7	31.0
„ „ „ „ females	31.4	29.9	31.1

GENERAL CONSIDERATIONS

Improving mutton production could be achieved by improving the environmental conditions under which the sheep are maintained and by changing the genetic make-up of the animals. The most progress could be attained when both policies, if possible, are carried out at the same time. The Texel sheep were imported from Holland to investigate the possibilities of their use as a pure breed or for the genetic improvement of the local sheep.

To judge whether this newly imported breed has accomplished the purpose of its introduction to the new habitat, many points should be made clear. First of all, this breed must reproduce successfully, secondly, the incidence of mortality should not be very high leaving the breeder with a proper herd size suitable for effective selection. Thirdly, the surviving animals must grow with reasonable rates to attain good weaning, yearling and mature weights.

It is known that most of the variability in lambing percentage and mortality rates, within breed, is mainly environmental. Also, a reasonable part of the variability in the body weight of lambs, at different ages, is environmental. Table 5 shows the differences in these characters for the years 1957, 1958 and 1959. The percentage of ewes lambing varied from 50.7 to 82.7 while the percentage of twin lambs born ranged from 11.6 to 22.4. Although these estimates are much lower than what is known of the Texel sheep in Holland, yet they point out to the effect of the new environment on such characters. Comparatively, better results were obtained when conditions were more and twin lambs favourable. The year 1958 was the highest in the percentage of ewes lambing born, although the heaviest death losses were among the lambs born at that year.

Body weights also differed from one year to another. The year 1957 was the best for the three weights under investigation ; birth, weaning and yearling, while the 1958 weights were the worst in that respect. These results call for further studies of all environmental factors affecting the characters studied. Management practices, disease control, feeding requirements, weather conditions and breeding habits should be among the first to start wtih. Also, the interactions between heredity and environment should not be overlooked.

The Texel lambe made reasonably fast gains from birth to weaning, especially in the favourable years, as compared with the local breeds. This finding supports the opinion that Texel ewes are good milkers and that their lambs have good growth potentials. More would be expected from them in that respect if properly managed. At present, hothouse lamb production can be a promising enterpirse with these lambs, especially when they are unable to make but little gains from weaning until twelve months of age under the prevailing conditions.

There was enough genetic variability among the progeny of the different sires for the characters studied to allow for some selection to be practised. Also, the survivors of the attacks of several local sheep diseases should be more immune and adaptable to the local conditions than the previously imported ones.

In the meantime, the Texel sheep should be compared with the local breeds, under similar environmental conditions, with respect to all economic traits. When such studies are completed, a better evaluation of the Texel sheep, for the purposes given earlier, can be presented.

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وزن الجسم ومعدل النفوق فى الحملان النكسل فى مديرية التحرير

الملخص

أدخلت أغنام التكسل لاول مرة فى هذه البلاد فى مديرية التحرير فى عـام ١٩٥٥ وقد بلغت الاعداد المستوردة ٣٨٥ نعجة حوامل وعشرة كباش وقد شملت الدراسة اعوام ١٩٥٧ ، ١٩٥٨ فى ١٩٥٩ وقد بلغت اعداد النعاج فى هذه السنوات ٢٠٩ ، ١٧٣ ، ١٥٦ على الترتيب وكانت اهداف الدراسة هى معرفة مدى نجاح تربية اغنام التكسل تحت الظروف المحلية متخذين فى ذلك الصفات الاقتصادية دليـلا •

وقد تبين من هذه الدراسة ان متوسط الوزن عند الميلاد فى ذكور الحملات ٤ر١١ كجم مقابل ٢١ر٧٥ كجم و ٣١ر٢٧ كجم لها عند الفطام وفى عمر عام اما فى الاناث فكانت متوسطات الاوزان للثلاثة اعمار السابقة هى ٥٣ر٩٤ ، ١٩ر٤١ ، ٣٠ر٨٧ وقد تبين ان هناك فروقا معنوية بين الجنسين فى الوزن عند الميلاد وعند الفطام فقط كما تبين ايضا ان سنة الميلاد ذات تأثير معنوى على كل الاوزان •

وقد تبين ايضا ان القيمة الوراثية للوزن عند الميلاد وعند الفطام وفى عمر سنه هى ٠٩٠٦ر ، ٠٧٤٣ر ، ٤٨٩٩ر٠ على التوالى •

اما التلازم المظهرى بين الوزن عند الميلاد والوزن عند الفطام والوزن عند الميلاد والوزن عند عمر سنة وكذلك بين الوزن عند الفطام والوزن عند عمر سنة كان ١٩١٨ر ، ١٦٤٠ر ، ٣٣٠٨ر ، على التوالى •

وقد تبين عند دراسة معدل النفوق من الولادة للفطام أنه كلما ازداد وزن الحملان عند الولادة كلما قل معدل النفوق وان كانت هذه النتيجة يعوزها الدليل المعنوى الاحصائى • هذا وقد اختلفت معدلات النفوق من سنه لاخرى كما كانت نسـبة النفوق أقل بين الذكور وبين الحملان الفردية عنها فى الاناث والحملان التوأمية •