

Phenotypic and Genetic Correlations among Body Weight and Measurements of Fleisch Merino Lambs Raised under Egyptian Conditions

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DATA on lambs born over the period from 1970 through 1972, to an imported Fleisch Merino flock raised at El-Salhia Sheep Breeding Station, in the eastern region of the Nile Delta, were analysed to obtain estimates of phenotypic and genetic correlations among body weight, body height, body length, heart girth, thigh length, thigh circumference and loin width, at birth, 2, 3 and 4 months (weaning time).

Body weight was generally positively phenotypically correlated with each of the body measurements at all ages studied. The strongest phenotypic association was only observed between body weight and heart girth while the rest of the body measurements were either low or moderately correlated with body weight.

Phenotypic correlations among all body measurements at the different ages studied were positive and generally highly significant but with different magnitudes. A strong phenotypic association was observed to exist between body height and each of body length and heart girth (0.57-0.78). The remaining associations were either moderate or low in magnitude.

The genetic correlation between body weight and each of the 6 body measurements at the different ages studied were in most cases either zero or negative in direction. On the other hand, most estimates of genetic correlations obtained among body measurements were positive and with values ranging from moderately low to very high.

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Phenotypic and genetic correlations among body weight and measurements of lambs during the suckling period are of interest to sheep breeders selecting lambs for mutton production. A knowledge of such correlations helps in determining the relative effectiveness of the use of one or more of these traits as a selection criterion. A limited amount of information has been reported on phenotypic and genetic correlations in foreign breeds of sheep raised under the Egyptian semi-arid conditions. The objective of this paper is to evaluate the phenotypic and genetic correlations among body weight of Fleisch Merino lambs and 6 of their body measurements taken at birth, 2, 3 and 4 months of age.

Material and Method

Data available for this study were collected on body weight and measurements of 2269 lambs born over a period of 3 consecutive years from 1970 through 1972, to a commercial flock of Fleisch Merino sheep imported since 1966 from the German Democratic Republic. This flock was located since its importation in the eastern region of the Nile Delta at El-Salhia Sheep Breeding Station belonging to the General Meat and Milk Organization. Complete information on the flock and its management were given by Alifi *et al.* (1979). Records included in this study were 866, 398, 246 and 189 at birth, 2, 3 and 4 months of age respectively.

Traits included in this study were body weight, body height, body length, heart girth, thigh length, thigh circumference and loin width measured at birth, 2, 3 and 4 months of age (weaning age). Constants obtained by Alifi *et al.* (1977) for the effects of year of birth, sex and type of birth on the same flock were used to adjust the data of each of the four ages studied.

The adjusted data for each age were then subjected as one set to the least squares variance-covariance half-sib analysis. The components of variance and covariance among sires and within sires were evaluated as described by Henderson (1953). The numbers of pairs of twins included in the analysis were very few and no sire group contained more than one pair if any. Accordingly, the analysis was performed disregarding the slight effect of the few pairs of twins present.

The phenotypic and genetic correlation coefficients among the different traits studied as well as their standard errors were evaluated as described by Falconer (1961). Tests of significance of the phenotypic correlation coefficients were done as suggested by Snedecor and Cochran (1971).

Results and Discussion

All the possible phenotypic and genetic correlations, evaluated among all the traits at each of the ages studied, are presented in Tables 1 and 2.

Phenotypic Correlations

Body weight and measurements

The phenotypic correlation between body weight and body height of lambs at the 4 studied ages ranged between low and moderate magnitude (Table 1). The coefficients of determination (r^2) indicated that body height was a relatively

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TABLE 1—Estimates of phenotypic correlations among body weight and measurements.

Traits	Body height	Body length	Heart girth	Thigh length	Thigh circumf	Loin width
Body weight at : Birth	0.06±0.03**	0.44±0.03**	0.54±0.02**	0.78±0.01**	0.46±0.03**	0.05±0.03
2 months	0.58±0.03**	0.17±0.05**	0.17±0.05**	0.57±0.05**	0.14±0.05**	9.16±0.05**
3 months	0.47±0.05**	0.31±0.06**	0.37±0.06**	0.92±0.01**	0.33±0.06**	0.17±0.06**
4 months	0.39±0.06	0.24±0.07**	0.58±0.07**	0.12±0.07	0.21±0.07**	0.11±0.07
Body height at : Birth		0.59±0.02**	0.57±0.02**	0.03±0.03	0.17±0.03**	0.44±0.03**
2 months		0.71±0.02**	0.67±0.03**	0.27±0.05**	0.35±0.04**	0.43±0.04**
3 months		0.78±0.02**	0.67±0.04**	0.42±0.05**	0.36±0.06**	0.44±0.05**
4 months		0.77±0.03**	0.59±0.05**	0.41±0.06**	0.25±0.07**	0.31±0.07**
Body length at : Birth			0.45±0.03**	0.43±0.03**	0.35±0.03**	0.40±0.03**
2 months			0.58±0.03**	0.60±0.03**	0.31±0.04**	0.36±0.04**
3 months			0.55±0.05**	0.37±0.06**	0.21±0.06**	0.36±0.06**
4 months			0.43±0.06**	0.33±0.06**	0.16±0.07**	0.26±0.07**
Heart girth at : Birth				0.14±0.03**	0.42±0.03**	0.36±0.03**
2 months				0.46±0.04**	0.39±0.04**	0.41±0.04**
3 months				0.36±0.06**	0.44±0.05**	0.52±0.05**
4 months				0.31±0.07**	0.44±0.06**	0.40±0.06**
Thigh length at : Birth					0.42±0.03**	0.03±0.03
2 months					0.66±0.03**	0.36±0.04**
3 months					0.50±0.05**	0.26±0.06**
4 months					0.32±0.06**	0.10±0.07
Thigh circum- ference at : Birth						0.15±0.03**
2 months						0.28±0.05**
3 months						0.24±0.06**
4 months						0.17±0.07**

Number of records used was 2269 while that completed the analyses was 866 at birth, 398 at 2 months, 246 at 3 months and 189 at 4 months.

that selection when directed for either increasing or decreasing one or more of these measurements will result in simultaneous increase or decrease in other measurements. These observations would be confirmed when bearing in mind the positive and significant phenotypic correlations calculated in this work for these relationships as previously stated.

The few negative estimates of genetic correlations in some of these relationships at certain ages may be probably due to the probable non-suitable environmental conditions that did not give the chance for genes controlling these traits to exhibit their true effects at such early ages at which the genetic correlations were calculated. Effects of unadjusted environmental deviations may have also played a role in such cases. It is recommended, however, that the change in strength and/or direction of some of the studied relationships with the advance in age stresses the need for additional evaluation of such relationships.

In spite of the call for additional estimates that should be made for the genetic correlations, the present findings gave some indication that positive genetic association exist among most of the traits studied. Thus, the body dimensions studied could be used as aids to selection of lambs for body weight.

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الارتباط المظهري والوراثي بين وزن وابعاد الجسم في حملان مرينو اللحم تحت الظروف المحلية

حسن العكش ، عزت عطا عفيفي ، محمد توفيق رجب ، أحمد الشرييني وغريب
الصياد

كلية الزراعة ، جامعة الأزهر ، كلية العلوم الزراعية ، بمشتهر ، وزراعة
القاهرة

شملت هذه الدراسة سجلات ٢٢٦٩ حملا مولودة خلال الفترة من ١٩٧٠ -
١٩٧٢ لقطيع أغنام المرينو اللحم المستورد بمحطة الصالحية - محافظة
الشرقية التابعة للمؤسسة العامة للحوم والألبان * ومدف الى قياس معاملات
الارتباط المظهري والوراثي بين صفات وزن وابعاد الجسم (ارتفاع الجسم
طول الجسم - محيط الصدر - طول الفخذ - محيط الفخذ - وعرض القطن)
عند عمر الميلاد ، ٣ ، ٣ ، ٤ أشهر (النظام) *

كان هناك بصفة عامة ارتباطا مظهريا موجبا بين وزن الجسم وكل من أبعاده
المختلفة عند كل الأعمار المدروسة . وقد لوحظ أن أقوى ارتباط كان بين
وزن الجسم ومحيط الصدر بينما كان الارتباط بين وزن الجسم وبقية أبعاده
إما متوسطا أو ضعيف القيمة * أما فيما يتعلق بمعاملات الارتباط المظهري
بين أبعاد الجسم المختلفة فيما بينها فقد كانت جميعا موجبة ومعنوية ولكنها
ذات قيم مختلفة وأكبرها هو ما كان بين ارتفاع الجسم وكل من طول الجسم
ومحيط الصدر (من ٥٧* الى ٧٨*) *

كان الارتباط الوراثي بين وزن الجسم وكل من أبعاد الجسم المدروسة
عند الأعمار المختلفة في أغلب الحالات أما عندما أو سالب الاتجاه بينما كانت
معظم قيم هذا الارتباط بين أبعاد الجسم المختلفة فيما بينها موجبة وذات قيم
تتراوح ما بين المتوسطة والمرتفعة *