THE SIGNIFICANCE OF EARLY BODY MEASUREMENTS IN FAYOUMI CHICKENS COMPARED WITH A STANDARD BREED R. I. R. AND SOME DEVELOPED LOCAL STRAINS

Rizkalla, H. E.; A. Z. Wagdy and E. F. Abdel-Hamied

ABSTRACT

A total number of 880 pedigreed baby chicks of four strains of chickens; the Fayoumi (FF) as local strain, Rhode Island Red (RIR) as foreign strain, and Silver Montazah (SM) and Mandara (MM) as developed local strains, were taken randomly from closed-flocks, and were subjected to some early body measurements.

The results indicated significant differences between the four strains concerning the body weight measurements and the males and females of Mandara strains were heavier significantly than the other's, at 8 and 16 weeks of age.

Mandara had higher relative growth rate (RGR) than other strains at (0-4) weeks and (4-8) weeks of age but R.I.R. had higher than the other strains at (8-12) weeks of age. However, Silver Montazah had RG higher than the others at 12-16 weeks only. Overall, estimates, growth rate averages were higher in males than in females at all periods. In contrary, Fayoumi females were higher than the males at (12 -16) weeks and R.I.R. showed the same result too.

The shank and keel length and breast circumference of Mandara were the longest compared with the other mentioned strains at (8-16) weeks of age. The Fayoumi had the similar results with this respect.

The R.I.R. showed highest growth rate compared with the other strains at 8 and 16 weeks of age, and the FF showed the lowest. Silver Montazah females had shorter shank length than the males and the keel length of R.I.R. females were longer than the males. The FF showed the shortest measure for shank length, keel length and breast circumference in both sexes compared with other strains.

Highly significant and positive correlations were found between shank length and breast circumference at 8 and 16 weeks of age. Similarly positive correlations were obtained for body weight with shank, keel length and breast circumference at the same periods. The Fayoumi showed the same results with this respect.

This results suggested that body weight could be improved by using selection index; i.e. of early body weight measurements studied, shank length, keel length and breast circumference.

INTRODUCTION

Body weight and body measurements are used as indicators for body and skeletal growth (Hafez, 1963). In addition, these characters are utilized in poultry to improve meat production. Shank length, also, was found to be important for growth rate by many investigators (Rizk and El-Ibiary, 1960 and Nordskog, 1976).

Most investigations indicated that phenotypic correlation's between body weight and each of body measurements traits were highly significantly correlated within each other. Abdel Gawad and El-Ibiary (1972), Zaidan (1977) and Verma et al. (1979) reported that body weights were positively highly correlated with shank length at different age. In addition, Ezzeldin et al.
(1991) studied also some phenotypic correlation's between body weights and, other body measurements and found that the estimates were positive and high.

Differences between local strains in body measurements were reported by some investigators. Hanan (1999) in body weight, shank and keel length, and Rizkalla (1996) in body weight, breast width, shank length and keel length.

The purpose of this work was to study early body measurements which affect meat production, in the Fayoumi chickens (FF) and compared the measurements with the others chickens; a standard breed, Rholde Island Red (RIR) and also with developed strains, the Silver Montazah (SM) and Mandara (MM) which showed importance in the work of other investigators, since their genetic make-up composed the Fayoumi blood in a part.

This work may also help other to study the early body measurements for the purpose of improving meat production and put the foundation of developing a suitable selection index using hetrosis procedure with local strains which had no potential for adaptation and more desease resistence.

MATERIAL AND METHODS

(1) Strains studies:

a- The Fayoumi (FF): as local strain and established by El-Hossari (1966).

b- R.I.R. (RR): as foreign strain adapted in Egypt from several years.

c- Silver Montazah (SM): as developed strain, a cross between the Dokki 4 and the R.I.R., Mahmoud et al (1974b).


All strains used had been brought from "El-Takamoly poultry project" (T.P.P.) of Fayoum Governorate.

A total number of 880 pedigreed baby chicks; contains 91 (FF), 98 (RR), 105 (SM) and 92 (MM) males and 113, 138, 113, 130 females with a total of 204, 236, 218 and 222 un sexed chicks, respectively.

The four strains were taken from closed flocks by random and were subjected to the early body measurements studied.

(2) Early body measurements studied:

a. Body weight (B.wt)

All chicks were weighed to the nearest gram at hatch and then at 4 weeks intervals up to the 16th weeks of age.

b. Gain (G)

It was calculated as formula \((w_2-w_1)\),

\[ W_1 = \text{body weight at certain age} \]

\[ W_2 = \text{body weight after certain period} \]

The periods studied (0-4),(4-8),(8-12), and (12-16).
c. Relative Growth Rate (RGR)

It was calculated according to Lerner and Asmundson (1932)

\[ RG = \frac{W_2 - W_1}{\frac{1}{2} (W_2 + W_1)} \times 100 \]

Where:
- \( W_1 \) = body weight at certain age
- \( W_2 \) = body weight after certain period

The periods studied (0-4), (4-8), (8-12) and (12-16).

(3). Body measurements:

- Shank length (SL), keel length (KL) and breast circumference (BC), were measured to the nearest millimeter at 8 and 16 weeks of age.
- Shank length (SL): The length of tarsometatarsus bone
- Keel length (KL): The length of sternum bone.
- Breast circumference (BC): The circumference from beginning sternum bone to beginning ilium bone.

(4) Management:

All chicks were fed starting ration (19% crude protein and 2800 k cal / kg ME.) for the first 8 weeks and then switched to grower ration (15.37% crude protein and 2770 k cal / kg ME.) till the 16th week of age.

All chicks were kept under normal brooding condition in floor brooder houses. Wheat straw was used as a litter in both brooding and rearing houses. The litter was about 5 cm in depth and wetting litter was continuously changed by fresh one. After the end of the brooding period chicks were moved to rearing houses. Chicks in this stage were allowed for free yard daily at 8 a.m. and housed at 4 p.m.

(5) Methods of Analysis:

Data were analyzed by a computer program a general linear models (GLM), Stat View 512* software package (1986, Abacus Concepts, Inc.). Correlations estimates were involved.

RESULTS AND DISCUSSION

1- Body weight (B. wt)

Table (1) showed significant difference between the four strains studied at 4, 8 and 16 weeks of age. Averages body weight of Mandara strain were higher than the other strain's Silver Montazah, R.I.R. and Fayoumi strain at 4, 8 and 16 weeks of age, respectively.

Generally, male chicks within a given strain had heavier body weight than female in all strain at 4, 8 and 16 weeks of age.

Both sexes of Mandara strain were higher than other strains; R.I.R., Silver Montazah and Fayoumi strain.

871
### Table (1): Mean ± S.D of body weight (gms) at 4, 8 and 16 wks of age for different strains.

<table>
<thead>
<tr>
<th>Strains</th>
<th>No.</th>
<th>Average body weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
</tr>
<tr>
<td>FF</td>
<td>91</td>
<td>255.18 ±28.65</td>
</tr>
<tr>
<td>R.I.R</td>
<td>98</td>
<td>296.60 ±31.43</td>
</tr>
<tr>
<td>SM</td>
<td>105</td>
<td>276.93 ±30.13</td>
</tr>
<tr>
<td>MM</td>
<td>92</td>
<td>316.10 ±32.71</td>
</tr>
</tbody>
</table>

FF = Fayoumi  
R.I.R = Rhode Island Red  
SM = Silver Montazah  
MM = Mandara
2- Gain (G).

Significant different between the four strains at all periods and average gain of Mandara strain was higher than the other strains at (0-4), (4-8) and (8-12) weeks only but Silver Montazah strain was higher than the other strain at 12w – 16w only as shown in Table (2).

The Fayoumi strain had lower gain than the others but slow improvement than R.I.R and heavy than Mandara strain.

Generally, male chicks within a given strain had heavier gain than female in all strain at all period.

3- Relative growth rate (RGR)

Table (3) showed significant different between the four strains at all periods

a- 0w – 4w

The Mandara strain had RGR higher than; Silver Montazah, R.I. R or Fayoumi strain.

Generally, RG averages were higher in males than females.

b- 4w-8w

The Mandara strain had RGR higher than Silver Montazah, R.I.R or Fayoumi strain.

c- 8w-12w

The R.I.R strain had RGR higher than Silver Montazah, Mandara or Fayoumi strain.

Generally, RGR averages were higher in males than females but RGR average was higher in female Silver Montazah (48.51%) than males (47.48%)

d- 12w – 16w

The Silver Montazah strain had RGR higher than other strains; Fayoumi, R.I.R or Mandara strain.

Generally, RGR average was higher in males than females but RGR average was higher in females Fayoumi and R.I.R (21.46% vs 16.95%) than males (20.19% vs 15.80%), respectively.

(4) Body measurements:

a- Shank Length (SL)

Table (4) showed significant different between the four strains at 8 and 16 weeks of age and Mandara shank length had the longest than others; Silver Montazah, R.I.R. and Fayoumi strain at 8 and 16 weeks of age.

Generally, males had longer shank length than female at 8 and 16 weeks of age. These results agreed with Hanan (1999) who found that average shank length for males of the growth line of Fayoumi was 75.46 mm, and for females was 69.77 mm at 8 weeks of age. However this was not true concerning the magnitude.
<table>
<thead>
<tr>
<th>Strains</th>
<th>FF</th>
<th>R.I.R.</th>
<th>MM</th>
<th>SM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males 0w - 4w</td>
<td>Overall mean</td>
<td>157.01</td>
<td>156.82</td>
<td>158.83</td>
</tr>
<tr>
<td>Females</td>
<td>Overall mean</td>
<td>157.12</td>
<td>157.87</td>
<td>158.35</td>
</tr>
<tr>
<td>Males 4w - 8w</td>
<td>Overall mean</td>
<td>62.02</td>
<td>61.52</td>
<td>63.25</td>
</tr>
<tr>
<td>Females</td>
<td>Overall mean</td>
<td>62.33</td>
<td>63.75</td>
<td>63.68</td>
</tr>
<tr>
<td>Males 8w - 12w</td>
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<td>53.66</td>
<td>48.91</td>
<td>46.08</td>
</tr>
<tr>
<td>Females</td>
<td>Overall mean</td>
<td>49.67</td>
<td>45.76</td>
<td>48.01</td>
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<tr>
<td>Males 12w - 16w</td>
<td>Overall mean</td>
<td>19.80</td>
<td>20.19</td>
<td>22.58</td>
</tr>
<tr>
<td>Females</td>
<td>Overall mean</td>
<td>21.46</td>
<td>19.80</td>
<td>20.61</td>
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</table>

Table (2): Gain in different periods studied (0-4), (4-8), (8-12), and (12-16) weeks of age for Fayoumi, R.I.R., Silver Montazah and Mandara chickens.

Table (3): Relative growth rate (RG) in different periods (0 - 4), (4 - 8), (8 - 12) and (12 - 16) weeks of age for Fayoumi, R.I.R., Silver Montazah and Mandara chickens.

Rizkalla, H. E. et al.
Table (4): Mean ± SD of shank length (cm) at 8 and 16 wks of age for different strains.

<table>
<thead>
<tr>
<th>Strains</th>
<th>At 8 wks</th>
<th></th>
<th></th>
<th>Overall Mean</th>
<th></th>
<th></th>
<th></th>
<th>At 16 wks</th>
<th></th>
<th></th>
<th></th>
<th>Overall Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF</td>
<td>91</td>
<td>113</td>
<td>5.15</td>
<td>4.96</td>
<td>204</td>
<td>5.05</td>
<td>+0.36</td>
<td>+0.44c</td>
<td></td>
<td>66</td>
<td>7.06</td>
<td>112</td>
</tr>
<tr>
<td>R.I.R</td>
<td>98</td>
<td>138</td>
<td>5.42</td>
<td>4.97</td>
<td>236</td>
<td>5.16</td>
<td>+0.40</td>
<td>+0.45b</td>
<td></td>
<td>93</td>
<td>8.01</td>
<td>133</td>
</tr>
<tr>
<td>SM</td>
<td>105</td>
<td>113</td>
<td>5.74</td>
<td>4.84</td>
<td>218</td>
<td>5.27</td>
<td>+0.46</td>
<td>+0.62a</td>
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<td>105</td>
<td>8.07</td>
<td>113</td>
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<tr>
<td>MM</td>
<td>92</td>
<td>130</td>
<td>5.69</td>
<td>5.27</td>
<td>222</td>
<td>5.44</td>
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<td>+0.52a</td>
<td></td>
<td>78</td>
<td>8.26</td>
<td>130</td>
</tr>
</tbody>
</table>

b-Keel Length (KL)

From Table (5) it could be reported that significant difference between the four strain at 8 and 16 weeks of age and Mandara keel length strain had the longest compared with Silver Montazah, R.I.R. and Fayoumi strain at the same ages.

Generally, males had longer keel length than female at 8 and 16 weeks of age. These results almost agree with the findings of Hanan (1999) who found that average keel length for males of the growth line of Fayoumi was 69.39 mm, and for females was 64.25 mm at 8 weeks of age.

Table (5): Mean ± SD of keel length (cm) at 8 and 16 wks of age for different strains.

<table>
<thead>
<tr>
<th>Strains</th>
<th>At 8 wks</th>
<th></th>
<th></th>
<th>Overall mean</th>
<th></th>
<th></th>
<th></th>
<th>At 16 wks</th>
<th></th>
<th></th>
<th></th>
<th>Overall mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF</td>
<td>91</td>
<td>113</td>
<td>7.65</td>
<td>7.25</td>
<td>204</td>
<td>7.43</td>
<td>+0.49</td>
<td>+0.56c</td>
<td></td>
<td>66</td>
<td>9.92</td>
<td>112</td>
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<tr>
<td>R.I.R</td>
<td>98</td>
<td>138</td>
<td>8.68</td>
<td>7.84</td>
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<td>8.19</td>
<td>+0.66</td>
<td>+0.84d</td>
<td></td>
<td>93</td>
<td>11.45</td>
<td>133</td>
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<td>SM</td>
<td>105</td>
<td>113</td>
<td>8.69</td>
<td>7.74</td>
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<td>8.20</td>
<td>+0.77</td>
<td>+0.82b</td>
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<td>11.06</td>
<td>113</td>
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<td>MM</td>
<td>92</td>
<td>130</td>
<td>9.00</td>
<td>8.26</td>
<td>222</td>
<td>8.56</td>
<td>+0.83</td>
<td>+0.79a</td>
<td></td>
<td>78</td>
<td>11.79</td>
<td>130</td>
</tr>
</tbody>
</table>

c- Breast circumference (BC)

Significant different between the four strain at 8 and 16 weeks of age and Mandara breast circumference strain and the longest compared with other strains; Silver Montazah, R.I.R. and Fayoumi at the same ages as shown in Table (6).

Generally, males had longer breast circumference than female at the same ages in all strains studied.
Table (6) : Mean ± SD of breast circumference (cm) at 8 and 16 wks of age for different strains.

<table>
<thead>
<tr>
<th>Strains</th>
<th>At 8 wks</th>
<th></th>
<th></th>
<th>Overall</th>
<th>At 16 wks</th>
<th></th>
<th></th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>No.</td>
<td>Females</td>
<td>No.</td>
<td>Mean</td>
<td>Males</td>
<td>No.</td>
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<tr>
<td></td>
<td>±1.26</td>
<td>±1.91</td>
<td>±1.72c</td>
<td>±1.32</td>
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<td>±1.57d</td>
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<td>R.I.R</td>
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<td>24.66</td>
<td>138</td>
<td>23.07</td>
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<td>93</td>
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<tr>
<td></td>
<td>±2.10</td>
<td>±2.11</td>
<td>±2.5b</td>
<td>±2.51</td>
<td>±2.35</td>
<td>±2.67bc</td>
<td></td>
<td></td>
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<tr>
<td>SM</td>
<td>105</td>
<td>25.19</td>
<td>113</td>
<td>22.74</td>
<td>218</td>
<td>23.92</td>
<td>105</td>
<td>30.19</td>
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<tr>
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<td>±1.71</td>
<td>±1.86</td>
<td>±1.66b</td>
<td>±1.56</td>
<td>±2.24</td>
<td>±2.76c</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MM</td>
<td>92</td>
<td>25.35</td>
<td>130</td>
<td>24.50</td>
<td>222</td>
<td>24.85</td>
<td>78</td>
<td>30.40</td>
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<td></td>
<td>±2.30</td>
<td>±2.07</td>
<td>±2.20a</td>
<td>±2.09</td>
<td>±1.84</td>
<td>±2.26ab</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FF = Fayoumi  R.I.R = Rhode Island Red  SM = Silver Montazah  MM = Mandara
W=week.
Means within each column bearing different letter are significant (P<0.05).

(5) Phenotypic Correlation Coefficients:

a- The phenotypic correlation between body weight (B.wt) and other measurements studied.

Results Table (7) showed highly significant and positive correlation between body weight and each of, shank length, keel length and breast circumference at 8 and 16 weeks of age.

b- The phenotypic correlation between shank length (SL) and other measurements studied.

Data in Table (7) indicated also highly significant and positive correlation between shank length and each of keel length and breast circumference at 8 and 16 weeks of age. Similarly significant and positive correlation between keel length and breast circumference at the same ages. These results agreed with El-Full (1989) and Hanan (1999) in Fayoumi strain at 8 weeks of age.

c- The phenotypic correlation within body measurements; shank length, keel length and breast circumference.
A highly significant and positive correlation within all measures at 8 and 16 weeks of age as noted in Table (7).

The Fayoumi strain showed lower values than other strains at 8 weeks of age but higher value than other strains for the correlations between body weight and breast circumference.

Also, The Fayoumi strain showed a trend of lower value than other strain at 12 and 16 weeks of age within body measurements but this was not true between body weight and shank length.

Conclusively, it can be concluded that the selection for body weight measurement, shank length, keel length and best circumference can be using for improving the body weight.
Table (7): Phenotypic correlation within body measurements for the different strains at 8 and 16 wks of age.

<table>
<thead>
<tr>
<th>Traits</th>
<th>At 8 wks</th>
<th>Phenotypic correlation</th>
<th>At 16 wks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>SL X KL</td>
<td>SM</td>
<td>MM</td>
<td>R.I.R</td>
</tr>
<tr>
<td></td>
<td>0.78**</td>
<td>0.77**</td>
<td>0.73**</td>
</tr>
<tr>
<td>SL X BC</td>
<td>R.I.R</td>
<td>SM</td>
<td>MM</td>
</tr>
<tr>
<td></td>
<td>0.76**</td>
<td>0.70**</td>
<td>0.54**</td>
</tr>
<tr>
<td>KL X BC</td>
<td>R.I.R</td>
<td>SM</td>
<td>MM</td>
</tr>
<tr>
<td></td>
<td>0.67**</td>
<td>0.66**</td>
<td>0.54**</td>
</tr>
<tr>
<td>B.Wt X SL</td>
<td>SM</td>
<td>R.I.R</td>
<td>MM</td>
</tr>
<tr>
<td></td>
<td>0.78**</td>
<td>0.77**</td>
<td>0.75**</td>
</tr>
<tr>
<td>B.Wt X KL</td>
<td>R.I.R</td>
<td>SM</td>
<td>MM</td>
</tr>
<tr>
<td></td>
<td>0.76**</td>
<td>0.65**</td>
<td>0.64**</td>
</tr>
<tr>
<td>B.Wt X BC</td>
<td>FF</td>
<td>SM</td>
<td>R.I.R</td>
</tr>
<tr>
<td></td>
<td>0.77**</td>
<td>0.76**</td>
<td>0.74**</td>
</tr>
</tbody>
</table>

SL = Shank length  
KL = Keel length  
SM = Silver Montazah  
R.I.R=Rhode Island Red.  
BC = Breast circumference  
B.Wt = Body weight  
MM = Mandara  
** Significant at (P < 0.01)  
1,2,3,4, arrangement descending

FF=Fayoumi
REFERENCES


معنوية قياسات وزن الجسم المبكر في الكاتكايتي الفيومى بالمقارنة مع الرود أيلاند

وبعض السلالات المحلية المستنبطة

حكيم عرفة رزق الله ووجدي زكريا علي وعصام فؤاد عبد الحميد

معه بحوث الإنتاج الحيواني - مركز البحوث الزراعية - وزارة الزراعة - الدقى - القاهرة

أخذت 880 كنوز ذكر وانثى عشوائي لاربع انواع، الفيومى كسلالة محلية والرواديلاند الأحمر

كسلالة أجنبية والمتى القدى والمدرة كسلالتين مستنبطة من قطيع مغلق لدراسة قياسات الجسم في العمر المبكر حتى عمر 16 أسبوع.

النتائج تشير إلى وجود اختلافات معنوية بين الأربع سلالات المستخدمة في دراسة الصفات

وكتبت ذكور واناث سلالة المدرة أثقل وزنا عن السلالات الأخرى عند 8 و16 أسبوع من العمر. كما

لاحظ ان ذكور الكاتكايتي داخل السلالة كانت أثقل وزنا من الإناث في كل السلالات.

تتميز سلالة المدرة بارتفاع معدل النمو النسبي عن السلالات الأخرى المستخدمة في الدراسة

في عمر 8-16 أسبوع ولكن معدل النمو النسبي لسلالة الرواديلاند الأحمر مرتفعة عن السلالات الأخرى في

عمر 8-16 أسبوع، أيضا معدل النمو النسبي لسلالة المدرة الضخمة كانت مرتفع عن سلالات الأخرى في

عمر 12-16 أسبوع. كما لوحظ ان متوسط معدل النمو النسبي مرتفع في الذكور من الإناث في كل

الفترات (0-8، 8-16، 12-16 أسبوع) ولكن كان معدل النمو النسبي لاناث المدرة مرتفع عن

الذكور في فترة 8-16 أسبوع وأيضا معدل النمو النسبي لاناث الفيومي والرواديلاند الأحمر في

فترة 12-16 أسبوع.

قصبة الرجل وعظام الفخذ ومحيط الصدر لسلالة المدرة كانت أطول من السلالات الأخرى

السابق ذكرها عند 8-16 أسبوع من العمر. حيث متوسط كتلة الذكور أطول من الإناث في نفس الفترة

من العمر ونفس القياسات. كما حققت سلالة الرواديلاند الأحمر أعلى قياسات من السلالات الأخرى في عمر

8-16 أسبوع.

العلاقة بين مقاييس الجسم في الأعمار المبكرة حتى عمر 16 أسبوع كانت معنوية وموجبة ولذلك

يمكن العمل معها لاستخدام المقابلات بين المقاييس: وزن الجسم وطول الجسم - طول قصبة الساق - طول

عظم الظهر ومحيط الصدر لتحسين وزن الجسم للاستير النحم من الدواجن.

879