Correlation of body weight and some body measurement parameters in Ouda sheep under extensive management system

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ABSTRACT: One hundred sheep of mixed sexes were used to assess the relationship between body measurements and body weight in sheep. The results revealed a significant difference among parameters measured as the age of the animal increases. Also sex had influence on distance between eyes and ear length with males having higher values. However, the stepwise regression equations derived show low percentage of fitness.

Key Words: Body weight; Body measurement; Ouda sheep; Sheep management.

Introduction

Apart from the conventional management practices common management practices are employed in sheep production. Some of these practices help to obtain information about sheep that are useful in the control and management of the herd during the entire rearing process (Seyoum, 1992). Some of such information have been obtained by measurement of other linear parameters in sheep and using the measurement obtained to estimated necessary information in sheep while other information are estimated by observing certain parameters in sheep for example the number and shape of teeth (incisors) have been used to estimate the age of small ruminants (Hall, 1991). Apart from the conventional use of scales in determining the weight of sheep, weight determination by estimating some linear parameters could be employed (Winrock International, 1992). There is a close relationship between the distance around an animal’s hearth girth and its body weight. This is a non – linear relationship expressed by the formula.

\[ W = aG^b \]

Where
- \( W \) = weight,
- \( G \) = heart girth
- \( a \) & \( b \) = constants
The value of the constants depends on the species or breed of animal and the units used in the measurement. This may provide accurate estimates over narrow weight ranges (McNitt J.I. 1983) as stated in World Bank (1995). The Schaeffer formula has also been in use for sheep and goats

\[ W = \frac{L \times G^2}{300} \]

\( W \) = Weight in pounds  
\( L \) = body length as measured from the point of the shoulders to the pin bones in inches  
\( G \) = heart girth in inches.

According to Salako (2006a), Body measurement in addition to weight measurements describes more completely an individual or population than do the conventional methods of weighing and grading. These body measurements have been used at various times for the estimation of weights when live weights are measured along side these parameters. Body dimensions have been used to indicate breed, origin and relationship through the medium of head measurements (Itty, et al, 1997) or to indicate size. EAAP and FAO have used wither height for example as a prime indicator type (Wilson, 1995). More recently, alternative body measurements and indices estimated from various combinations of conventional and non–conventional body parameters not only provide superior guide to weights but are also used as indicators of type and function in domestic animals Mason, 1996, Salako, 2006b).

The objectives of this study include the following: (i) To develop a database for estimating the body weight of sheep from body measurement; (ii) To evaluate the effect of sex on the body weight of ouda sheep, and (iii) To determine the relationship between body weights and some linear measurement parameters like ear length, Ear width, tail length and distance between eyes.

**Materials and Methods**

*Experimental Site*

The experiment was carried out in a reputable private sheep ranch located at Afuze – Emai, Owan East local Government area of Edo State, Nigeria. The vegetation map of the area shows that the area occupies a transitional zone between the savannah and the low land rainforest zones with optimum temperature of 32\( ^\circ \)c in peak dry season and 28 – 30\( ^\circ \)c in wet or rainy season with an annual rainfall ranging from 2,000 – 4,000 mm in mid rainy season.

*Experimental Animals*

One hundred ouda sheep comprising of fifty males and fifty females of varied ages were sourced directly from the local farmers in preference to buying from the open market because the low input nature of traditional production system of small ruminants ensures that only sick or problematic animals are taken to the market for sale.

*Management of experimental animals:*

All the animals were managed under a system that seems exactly like their original habitat under a semi–intensive management system. On arrival, the animals were given antistress to reduce fatigue and possible losses as a result of stress. Animals were led out to graze freely on the paddock provided during the day and return to the pens in the evenings at 5.00pm where their feeding was supplemented with whole grain and dry grass forage consisting of dried–chopped Panicum Maximum, Gliricidia Sepirum and groundnut leaves as supplement feed to make up for their nutrient requirement. Fresh water was given *ad libitum*. These lasted for twelve weeks after which the various measurements were taken.
Parameters Measured

The parameters measured during the course of this research include:

**AGE:** The age groups used for this study are 04 12months, 13 – 18months, 19 – 24months and 25 – 36 months.

**TAIL LENGTH:** The tail length measured was the distance between the base of tail close to the body of the sheep and the tip of the tail.

**DISTANCE BETWEEN EYES:** This is the length in centimeters (cm) between the two eyes of the sheep.

**EAR LENGTH AND WIDTH:** Ear length is the distance between the tip of the ear and the base white the width is the distance between the two sides of an ear at its middle.

**PROCEDURE FOR DATA COLLECTION:** A flexible tape rule was used to measure the tail – length, ear length and width while a pair of dividers was used to measure the distance between the two eyes and then determined by a wooden ruler. All these were done while restricting each animal by holding.

**STATISTICAL ANALYSIS AND EXPERIMENTAL DESIGN:** Data collected were subjected to various statistical tools in a one-way analysis of variance and then stepwise regression analysis and correlation using SAS/STAT, (1999) software to compare the relationship among parameters.

Results and Discussion

In this study, age is seen to have effects of body measurement parameters in sheep as shown in Table 1.

Table 1: Effect of age on body measurement parameters in sheep.

<table>
<thead>
<tr>
<th>Variables</th>
<th>4 – 12 months</th>
<th>13 – 18 months</th>
<th>19 – 24 months</th>
<th>25 – 36 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance b/w eyes</td>
<td>7.42 ± 0.12(^b)</td>
<td>7.60 ± 0.22(^a)</td>
<td>9.00 ± 1.30(^a)</td>
<td>7.50 ± 0.23(^b)</td>
</tr>
<tr>
<td>Ear Length</td>
<td>70 ± 0.11(^b)</td>
<td>8.04 ± 0.22(^b)</td>
<td>10.20 ± 0.21(^a)</td>
<td>8.00 ± 0.11(^b)</td>
</tr>
<tr>
<td>Ear Width</td>
<td>4.03 ± 0.11(^b)</td>
<td>4.34 ± 0.21(^ab)</td>
<td>4.80 ± 0.14(^a)</td>
<td>4.20 ± 0.22(^b)</td>
</tr>
<tr>
<td>Tail Length</td>
<td>18.61 ± 0.13(^a)</td>
<td>18.00 ± 0.33(^a)</td>
<td>20.00 ± 0.10(^a)</td>
<td>17.50 ± 0.22(^b)</td>
</tr>
<tr>
<td>Body Weight</td>
<td>18.94 ± 0.11(^c)</td>
<td>27.40 ± 0.11(^b)</td>
<td>33.00 ± 0.12(^a)</td>
<td>22.50 ± 0.22(^c)</td>
</tr>
</tbody>
</table>

*Figures represent the means ± SE.

The body parameters measured, distance between eyes (DBE), ear length (EL), Ear Width (EW), tail length (TL) and body weight (BW) increased progressively as sheep increases in age. This growth rate however reduces with a slight decrease between 25 – 36 months of age when the increase in body size seems to be slow, and statistically different from growth rate in the preceding age groups gradually measuring up to full maturity Ear width, though increase with increasing age of sheep with a drop between 25 – 36 months shows no significant difference amongst measurement across the age groups but it showed highest rate of growth (weight gain) at 14 – 24 months and was significantly highest. A significant difference also resulted as the sheep grew from 04 – 12 months to 13 – 18 months and between 25 – 36 months of age, whereas, no significant difference occurred in weight gain between the ages of 04 – 12.
months, 13 – 18 months and 25 – 36 months of age. It could therefore be deduced that the rate of growth in sheep increases rapidly from 04 – 12 months and the drops at sharp rate at 25 – 36 months.

Table 2 shows the effect of sex on weight gain in sheep. Measurement of the distance between the eyes showed a considerable variation with that of the males significantly different with a value of 8.00 ± 0.19 from that of the females 7.28 ± 0.15 at. The results from the ear length measurement also gave a higher value of 8.31 ± 0.037 for the males and 7.75 ± 0.13 for the females which was also significantly different from that of the females. This shows that there is usually difference in the ear length and distance between the eyes of sheep. However no significant differences occurred in weight gain between the results obtained from both sexes with respect to ear width and tail length measured even with the higher values obtained from the males i.e, 4.16 ± 0.17, 4.21 ± 0.06 and 19.29 ± 0.68, 17.5 ± 0.94 for ear width and tail length for male and females respectively. Although the value obtained from the body weight the females was higher (23.15 ± 1.51) than that of the males (22.00 ± 2.22) no significant differences occurred between them. This might be as a result of additional weight gain of some of the females as a result of pregnancy as selection of the experimental animals did not include any form of pregnancy tests. As the weight of the males are generally higher than that of the females Jamsems and Vandepitte,(2004). The correlation coefficients of body measurement parameters in sheep is shown in Table III. Positive correlation is found between parameters measured and body weight i.e. as body measurement parameters increased body weight of sheep also increased. However, the age, distance between eyes and tail length of sheep shown a negative correlation with the values of – 0.095, - 0.279 and – 0.087 respectively.

Table 2: Effect of sex on body measurement parameters in sheep.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance b/w eyes</td>
<td>7.28 ± 0.15a</td>
<td>8.00 ± 0.19a</td>
</tr>
<tr>
<td>Ear Length</td>
<td>7.75 ± 0.13b</td>
<td>8.31 ± 0.37a</td>
</tr>
<tr>
<td>Ear Width</td>
<td>4.21 ± 0.06a</td>
<td>4.16 ± 0.17a</td>
</tr>
<tr>
<td>Tail Length</td>
<td>17.75 ± 0.09a</td>
<td>19.29 ± 0.68a</td>
</tr>
<tr>
<td>Body Weight</td>
<td>23.15 ± 1.51a</td>
<td>22.00 ± 2.22a</td>
</tr>
</tbody>
</table>

*Figures represent the means ± SE. N = 50

The stepwise regression equations generated from the stepwise regression analysis of values of the various parameters as they associate with one another considering body weight of the sheep as a dependent variable from the equations is shown in Table IV. Body weight of sheep gave a 37.89 percent estimation of age and ear width, a percentage of 41.44 percent was obtained considering Age, distance between eyes and EW of the weight of sheep, also a 42.73 percent estimation of body weight depends on the age, DBE, EW and EL of the animal (sheep) while a huger percentage 43.47 percent of body weight can be assessed from age of animal, using this equation (x) as shown in table IV.

**Conclusions and Recommendations**

Weight has been the pivot on which animal production thrives. The knowledge of livestock weight assessment remains the backbone on which all animal production management practices are hinged. Apart from avoiding the errors of visual determination of animal weights, the non skilled/ rural stockman which make up the higher percentage of animal farmers, need a reasonable and simple skill in estimating weight when a weighbridge cannot be assessed. In this study, it is shown that there is a positive correlation between increase in some body parameters measured and body weight. This means animals at different age groups will have differences in measurement of body parts like the Distance between eyes, Ear length, Ear width, and Tail length. Also, sex has no influence in weight gain of sheep since not significant difference was found on the over all body weight of the animals. The regression equations obtained through stepwise regression of varied body parameters on body weight for assessing the body weight of sheep implies a low percentage of fitness and hence cannot be used to estimate body weight in sheep. However, more research
should be done to ascertain if these parameters can be used for estimating the body weight of other livestock.

References