

# COMPARISON BETWEEN MUBENDE AND BOER x MUBENDE GOAT CROSSES BASED ON BIOMETRIC MEASUREMENTS AND WEIGHT-FOR-AGE IN UGANDA

<sup>1</sup>B. M. Babigumira, <sup>1</sup>E. Galukande, <sup>1</sup>H. Nakimbugwe, <sup>1</sup>W. Kifudde, <sup>1</sup>D.N.K. Semambo

<sup>1</sup>National Animal Genetic Resources and Databank (NAGRC & DB),  
P. O. Box 183 Nsamizi Road,  
Entebbe, Uganda  
Email: cattbrd@gmail.com

## ABSTRACT

Goat farming is considered pivotal in strategies directed toward improved rural livelihoods in Uganda. However, goat farming in Uganda faces two challenges, (1) the low productivity of indigenous genotypes and (2) missing performance and pedigree data of indigenous and crossbred goats. The aim of this study was to compare the performance of the Mubende and Boer x Mubende crosses for biometric measurements (heart girth (HG) and Body length (BL), scrotal circumference (SC)) and weight-for-age. A total of 819 goats that comprised Mubende ( $n = 296$ ), the first filial cross (F1;  $n = 296$ ) and Backcrosses (75% Boer;  $n = 145$ ; and 87.5% Boer;  $n = 79$ ) were randomly selected from over 2000 randomly breeding goats at Ruhengyere and Sanga Field Stations, Kiriuhura district, Uganda. The goats were aged using their dentition and assigned to five age groups (0-1, 1-2, 2-3, 3-4 and >4 year(s) old). The mean live body weight (LWT) of the flock ( $n = 819$ ) was  $35.28 \pm 15.79$  kg; HG  $78.03 \pm 9.33$  cm; BL  $58.58 \pm 6.98$  cm; and SC  $24.49 \pm 3.80$  cm. Based on population means, the 87.5% weighed heavier than 75% Boer by 7.91 kg, F1 by 11.3 kg and the Mubende by 15.5 kg. Based on age group means only 87.5% aged 1-2, 2-3 and 3-4 year(s) weighed heavier than the 75% BC by 8.6, 8.3 and 0.6 kg while 0-1 and >4 year(s) old weighed lighter by -2.6, -3.2 kg. The 87.5% weighed heavier than the F1 in all age groups. The 75% BC aged 0-1, 3-4 and >4 year(s) weighed heavier than the F1 by 4.5, 4.7 and 3.5 kg with 1-2 and 2-3 weighed lighter by 3.9 and 5.1 kg. All the crosses weighed heavier than the Mubende older than 2 years; the greatest differences in LWT occurred between the Mubende and either the 87.5% or 75% BC. The 75% BC had the lowest average BL (41.2 cm) and SC (15.5 cm). In addition we derived two regression equations to estimate body weight based on HG alone and both HG and BL. The correlations between LWT and HG, BL and SC were 0.86, 0.73 and 0.79. These results provide more information on the growth related traits of the Mubende and its Boer crosses and give justification for genetic improvement of the Mubende for meat production using the Boer goat in Uganda.

Key words: Goats Uganda

## Introduction

Goats are by far the most important small ruminants in the Uganda livestock production systems. It is estimated that there are about 12.5 million goats in the country kept by about 2.5 million households. A typical goat-keeping household will have on average 5 goats (MAAIF/UBOS, 2009). Traditionally the animals have been and continue to be an important source of meat and skins. In recent years exotic goats of Toggenburg, Saanen, Boer, Savannah and Anglo Nubian breeds have been imported in the

country with aim of increasing both milk and meat yields. In spite of the fairly large numbers of goats in country as compared to a human population now estimated at 33 Million and the existence of high performance goat breeds in the country, productivity is still very low. Due one or all the following (i) Production has largely been confined to subsistence level (ii) There has been no Consistent livestock improvement programs targeting goats (iii) Prejudice among the farming community. Goats are considered as livestock for the poor and (iv) High kid mortality.

One of the strategies proposed for improvement of goats is through breeding either by selection or through well-organized crossbreeding programs (Nsubuga, 1994). However due to absence of well-organized recording systems in Uganda, performance and pedigree data of indigenous and crossbred goats which are essential for a breeding program are lacking. The study was therefore conducted to compare the performance of the Mubende and Boer x Mubende crosses for important growth and reproduction traits to generate information that would be incorporated in future breeding programs.

## **MATERIALS AND METHODS**

### **Animals**

A total of 1262 randomly were selected goats from two NAGRC & DB farms. They comprised of the following genotypes Mubende and Boer x Mubende crosses (F1 or 50%, 75% backcross (BC) and 87.5% BC).

### **Biometric data**

The goats were assigned to only one of these age categories 0-1, 1-2, 2-3, 3-4, >4 years old after their ages were determined by examining their teeth. The heart girth (HG) was measured as the chest diameter in centimeters immediately caudal to the shoulder and neck base. The body length was measured as the distance between the bases of the neck and tail. Scrotal circumference (SC) was measured as widest horizontal diameter of the scrotum. Live body weight (LBW; kg) was determined using a weigh bridge.

### **Data analysis**

The data was analyzed in MS Excel and R. Body weight estimates (BW) were determined by linear regression using HG and BL and LBW.

$$y = a + \beta x;$$

Where y is the estimated body weight; *a* is the y-intercept,  $\beta$  is the slope and x is either HG or BL. Weight-for-age comparison was based on the live weight averages for all age groups.

## **RESULTS**

Only the records of 819 goats were included in the final analysis after data cleaning. Age categories of goats is given in Table 1, while observed minima (min), mean and maxima (max) heart girth ,body length, scrotal circumference and Live Body weight are given in table2.

## Biometric data

The Age categories of goats in the study are given in table 1 below.

	Sex		Age (years)					Total
	F	M	0-1	1-2	2-3	3-4	>4	
<b>Flock</b>	695	124	244	85	73	139	278	819
<b>F1</b>	254	45	108	25	20	34	112	299
<b>75%</b>	136	9	45	15	10	35	40	145
<b>87.5%</b>	60	19	3	9	20	24	23	79
<b>M</b>	245	51	88	36	23	46	103	296

Table 1 Number of goats in each age (years) group

Live body weight, Heart girth, body length and scrotal circumference are given in table 2.

	LWT (kg)			HG (cm)			BL (cm)			SC (cm)		
	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
<b>Flock</b>	4.0	35.3±15.8	74.0	49.0	78.0±9.33	94.0	40.0	58.6±6.9	76.0	13.0	24.5±3.8	30.0
<b>F1</b>	4.0	35.0±16.89	74.0	63.0	80.0±6.1	93.5	52.0	60.6±4.8	71.0	24.5	24.5	24.5
<b>75%</b>	9	38.4±16.3	74	50	63.8±17.1	91.0	40.0	49.1±12.3	70.0	13.0	18.4±6.9	30.0
<b>87.5%</b>	16	46.3±10.3	73	67	81.5±5.9	94	42.0	59.9±6.6	76.0	22.0	25.8±1.7	28.5
<b>M</b>	4	31.1±10.3	61	49	72.3±9.5	87	40	55.5±6.7	68.0	22.0	25.1±1.8	28.0

Table 2 Heart girth, Body length and scrotal circumference measurements for the flock, Mubende and Boer Crosses

## Data analysis

Live weight estimates were determined by simple regression using the formula below:

**LWT = -51.58 + 1.23\* HG.** The R Square and Adjusted R square were 0.775 and 0.774. The second formula (**LWT = -53.08 + 1.67\* HG + 0.109 \*BL**) was not used because BL was not significant (P=0.001). The R Square and Adjusted R square were 0.777 and 0.775 respectively for equation (2). Correlations between all four variables showed that highest correlation (0.863) was between LWT and HG and the lowest (0.526) was between BL and SC.

## Weight-for-age comparison

Summaries for weight-for-age comparisons between Mubende and Boer crosses are presented in Tables 4 and 5. The group averages are the diagonals and the differences between group averages are the off-diagonals. For the age group 0-1 year, the Mubende (M) were on average heavier than the F1, 75% and 87.5% by 12.22, 7.83 and 10.43 kg. The 87.5% weighed heavier than F1 by 1.79 kg but lighter than 75% by -2.6 kg. The 75% weighed heavier than F1 by 4.39 kg. For the age group 1-2 years, the Mubende weighed heavier than the F1 and 75% by 1.78 and 5.66 kg but lighter than the 87.5% by -2.96 kg. The 87.5% weighed heavier than both F1 and 75% by 4.74 and 8.62 kg. The 75% weighed lighter than the F1 by -3.88 kg. For the age group 2-3 years, the Mubende weighed lighter than the F1, 75% and 87.5% by -

3.32, -1.16 and -6.5 kg. The 87.5% weighed heavier than the F1 and 75% by 3.18 and 5.34 kg. The 75% weighed lighter than the F1 by -2.16 kg (Table 3).

	0-1 year				1-2 years				2-3 years			
	F1	75%	87.5%	M	F1	75%	87.5%	M	F1	75%	87.5%	M
<b>F1</b>	<b>15.54</b>	4.39	1.79	12.22	<b>36.48</b>	-3.88	4.74	1.78	<b>42.47</b>	-2.16	3.18	-3.32
<b>75%</b>		<b>19.93</b>	-2.6	7.83		<b>32.6</b>	8.62	5.66		<b>40.31</b>	5.34	-1.16
<b>87.5%</b>			<b>17.33</b>	10.43			<b>41.22</b>	-2.96			<b>45.65</b>	-6.5
<b>M</b>				<b>27.76</b>				<b>38.26</b>				<b>39.15</b>

Table 3 weight-for age comparison between Mubende and Boer Crosses aged between 0-1, 1-2 and 2-3 years old.

For the age group 3-4 years, the Mubende weighed lighter than the F1, 75% and 87.5% by -9.85, -14.5 and -15.14 kg. For the age group aged over 4 years, the Mubende weighed lighter than the F1, 75% and 87.5% by -18.65, -21.28 and -18.91 kg (Table 4).

	3-4 years				Older than 4 years			
	F1	75%	87.5%	M	F1	75%	87.5%	M
<b>F1</b>	<b>44.38</b>	4.65	5.29	-9.85	<b>48.87</b>	2.63	0.26	-18.65
<b>0.75</b>		<b>49.03</b>	0.64	-14.5		<b>51.5</b>	-2.37	-21.28
<b>0.875</b>			<b>49.67</b>	-15.14			<b>49.13</b>	-18.91
<b>M</b>				<b>34.53</b>				<b>30.22</b>

Table 4 weight-for age comparison between Mubende and Boer Crosses aged 3-4 and older than 4 years.

## DISCUSSION

This study attempted to capture biometric information that would furnish a comparison between the Mubende its Boer crosses under conditions where performance and pedigree data are partially or wholly missing. One of the widely used livestock improvement interventions in Uganda has been crossbreeding and/ or upgrading using exotic genetics such as the Boer goat. Our findings showed that the Mubende and all three crosses had a birth weight of at least 4.00 kg and adult weight of up to 74.00 kg (Table 2). However, the Mubende aged 0-1 year weighed, on average, heavier than their F1, 75% and 87.5% Boer counterparts by 12.22, 7.83 and 10.43 kg (Table 5). This performance by the Mubende may be attributed to the native adaptive advantage it has over the Boer crosses. Further, our findings indicated that up to 2 years of age, the Mubende still weighed heavier than the F1 and 75% by 1.78 and 5.66 kg but lighter than the 87.5% by -2.96 kg (Table 3).

## References

1. Nsubuga H.S.K., 1994. Small Ruminant Research and Development in Africa. Proceedings of the Third Biennial Conference of the African small Ruminant Research Network, UICC , Kampala Uganda , 5 – 9 December 1994.
2. MAAIF/UBOS, 2009. Livestock Census Report 2008. Ministry Of Agriculture Animal Industry and Fisheries, Entebbe, Uganda and the Uganda Bureau of Statistics August 2009.