Inter-relationship Between Body Measurements and Prices of Sheep in An Open Market in Kano State

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Abstract. This study attempted to determine the inter-relationship between market price and body measurements among different breeds of sheep in open markets of six Local Government Areas of Kano State (Municipal, Taruauni, Gmale, Nassarawa, Fagge and Dala) of Kano city. Body measurements and prices of sheep used for this study were obtained from Unguwa Uku, Dorayi, Kara, Bachirawa, yankaba, Mariri and Kabara livestock markets in Kano. The Sudanese price was the highest (₦ 30,000±0.0), followed by Uda, Balami and Yankasa with the least cost being ₦ 10, 614±3,137. Similarly the Sudanese breed recorded highest body weight, back length, lion girth and height at wither compared to all other breeds, while Balami had a higher chest girth (78.77±6.0 cm), followed by Uda and Yankasa, which recorded the least. The extra large animals weighed 58.75± 1.25 kg, which was more than the body weight of the large, medium and small sheep which weighed 42.48±0.34kg, 34.93±0.21 and 27.92±0.26, respectively. The price of these animals also follow the same pattern as the extra large cost more than all the other weight classes. The prices were ₦ 25,750±8,500, ₦ 15,524±2,263, ₦ 11,284±2792 and ₦ 8,324±1,584 for extra large, large, medium and the small sheep, respectively. Price of sheep was positive and highly correlated to weight of the sheep (0.826). Price was also positive and moderately correlated to back length (0.579), chest girth (0.538), height at wither (0.535) and leg length (0.464) at 1% level of significance. Leg length was highly and positively correlated with height at wither (0.717). Height at whither together with back length are important additional variables to chest girth to obtain up to 38% prediction of price of rams. The price of any sheep breed is subjected to the weight and the price of sheep in an open market can best be predicted from a combination of leg length and loin girth.

Key Words: price of sheep, sheep breeds and open markets

Introduction

Small ruminants have a unique niche in smallholder agriculture because apart from the fact that they require small investments, they also have shorter production cycles, faster growth rates and greater environmental adaptability as compared to large ruminants (Tibbo et al., 2006). Sheep contribute significantly to the world needs for food, particularly meat. Grasslands account for over 30% of the global land surface and sheep provide high-quality foods from such lands that are largely unsuitable for crop production. They are important protein sources in the diets of the poor and help to provide extra income and support survival for many farmers in the tropics and sub-tropics. With human populations expected to increase by one-third in the next 20 years, the contribution of sheep to food supply will need to grow. Adu and Ngere (1979) concluded that the indigenous sheep of Nigeria have good potential for meat production that can be exploited through better management.

There is a need for a quick estimate of price of sheep in an open market. This will encourage sheep farmers to raise their stock purposely for market at a reduced time for profit. There is lack of adequate information on the relationship between price and body measurement in an open market. This study was therefore focused on establishing the relationships between price and body measurements.

Materials and Methods

A total of 321 sheep of both sexes consisting of Yankasa, Balami, Uda and Sudanese breeds were used in this study. The sheep were obtained from Unguwa Uku, Dorayi, Kara, Bachirawa, Yankaba, Mariri and Kabara livestock markets in Municipal, Taruauni, Gmale, Nassarawa, Fagge and Dala Local Government Areas respectively of Kano state. The weights were obtained using a bathroom scale and other body linear measurements were taken using a tailor tape rule. Neck length, back length, leg length, height at wither, loin girth and chest girth measurements were taken using a measuring tape. The body weight was measured by measuring the weight of a research assistant while carrying the animal in his hands using bathroom scale. The difference in the human weight from the total weight for each weighing was recorded as the individual animal's weight. The weights obtained were used to group the animals into four different weight classes thus: small (20-30 kg), medium (31-40 kg), large (41-54 kg) and extra large sheep (55 kg and above).

The data obtained was subjected to statistical analysis using General Linear Model Procedure of SAS (SAS, 2004). Phenotypic correlations between traits were computed by variance and covariance (Cov) component analysis, using Pearson correlation procedure of SAS (SAS, 2004). Also stepwise regression procedure of SAS (SAS, 2004) was used to establish the level of association of body linear measurements to predict price of sheep in an open market.

Results and Discussion

Table 1 shows the least square means of price, body weight and linear body measurement of sheep based on breeds. The Sudanese price was the highest (₦ 30,000±0.0), followed by Uda, Balami and Yankasa with the least cost of ₦ 10,614±3,137. Similarly the Sudanese breed recorded the highest body weight, back length, lion girth and height at wither compared to all other breeds, while Balami had a higher chest girth (78.77±6.0 cm), followed by Uda and Yankasa recording the least. The leg lengths and neck length of the entire breed were not significantly different. The height at wither followed a similar pattern with the exception of Sudanese measuring 77.00±0.0cm. From these results, the Sudanese breed performed better than the other three breeds. Significant weight differences of breeds of sheep in this study are similar to the report of Semakula et al. (2010).

Table 2 shows the least square means of price, body weight and linear body measurements of sheep based on the weight class. The extra large animals weighed 58.75±1.25 kg, which was more than the body weight of the large, medium and small sheep which weighed 42.48±0.34kg, 34.93±0.21 and 27.92±0.26 respectively. The price of these animals also followed the same pattern as the extra large costing more than all the other weight classes. The prices were ₦ 25,750± 8,500 and ₦ 15,524±2,263, ₦ 11,284±2792 and ₦ 8,324±1,584 for extra large, large medium and the small sheep respectively. The neck length of sheep in the open markets studied were similar (P>0.05) for all the weight classes. This phenomenon can be attributed to the behavioral patterns of sheep when their neck is to be measured and may have resulted in very high error variance. Back length was longer for extra large animals when compared to the back length of large, medium and small sheep. The large animals also had longer back length than the medium and the small however, the back length of the medium weight class and the small were similar (P>0.05).

Loin girth and chest girth of extra large sheep were longer than for all other weight classes. Height at wither and leg length of extra

Table 1. Least square means (±SE) of price, body weight and linear body measurement of sheep based on breeds

	Combined	Yankasa	Uda	Balami	Sudanese
Number of sheep (head)	321	264	28	26	3
Price (₦)	11.235±3728	10.614±3.137^{c}	14.375±2.771^{b}	12.000±2.843^{c}	30.000±0.0^{a}
Live body weight (kg)	34.36±0.33	33.80±0.31^{c}	37.25±1.31^{b}	33.92±1.31^{c}	60.00±0.0^{a}
Neck length (cm)	32.28±16.7	32.13±18.4^{a}	33.32±2.1^{a}	32.08±5.0^{a}	38.00±0.0^{a}
Back length (cm)	43.51±4.0	42.98±3.6^{c}	46.43±3.8^{b}	44.31±4.2^{bc}	56.00±0.0^{a}
Loin girth (cm)	82.08±5.8	81.81±5.24^{bc}	85.39±7.6^{b}	80.35±7.3^{c}	90.00±0.0^{a}
Chest girth (cm)	76.46±5.6	75.91±5.4^{b}	78.34±5.6^{b}	78.77±6.0^{b}	77.00±0.0^{a}
Height at wither (cm)	72.29±3.8	71.92±3.5^{b}	73.71±5.0^{b}	73.96±4.3^{b}	77.00±0.0^{a}
Leg length (cm)	42.94±3.0	42.62±2.9^{a}	44.18±3.4^{a}	44.77±2.9^{a}	44.00±0.0^{a}

Values bearing different superscript at the same column differ significantly (P<0.05).

Table 2. Least square means (±SE) of price, body weight and linear body measurement of sheep based on weight class

	Small	Medium	Large	Extra large
Number of sheep (head)	85	190	42	4
Price (₦)	8.324±1.584^{d}	11284±2.792^{c}	15.524±2.263^{b}	25.750±8.500^{a}
Live body weight (kg)	27.92±0.26^{d}	34.93±0.21^{c}	42.48±0.34^{b}	58.75±1.25^{a}
Neck length (cm)	28.21±3.4^{a}	33.18±21.3^{a}	36.02±2.8^{a}	36.75±2.5^{a}
Back length (cm)	41.34±2.8^{c}	43.32±3.5^{c}	47.71±3.3^{b}	54.50±3.0^{a}
Loin girth (cm)	78.52±5.7^{c}	82.52±4.7^{b}	86.31±5.7^{b}	92.75±5.5^{a}
Chest girth (cm)	73.12±5.0^{c}	76.37±4.6^{c}	82.55±4.9^{b}	87.75±1.5^{a}
Height at wither (cm)	69.95±3.2^{b}	72.19±3.1^{b}	76.95±3.0^{a}	77.75±1.5^{a}
Leg length (cm)	41.32±3.4^{b}	42.93±2.2^{b}	46.07±2.6^{a}	45.50±3.0^{a}

Values bearing different superscript at the same column differ significantly (P<0.05).

Table 3. Least square means (±SE) of price, body weight and linear body measurement of sheep based on sex

	Male	Female
Number of sheep (head)	223	98
Price (₦)	11.747±3.207^{a}	10.071±4.509^{b}
Live body weight (kg)	35.40±0.3^{a}	31.98±0.7^{b}
Neck length (cm)	33.44±19.8	29.67±4.04
Back length (cm)	43.96±3.86^{a}	42.47±4.0^{b}
Loin girth (cm)	82.75±5.1^{a}	80.5±7.0^{b}
Chest girth (cm)	76.75±5.2^{a}	75.79±6.5^{a}
Height at wither (cm)	72.98±3.5^{a}	70.71±3.9^{b}
Leg length (cm)	43.47±2.6^{a}	41.74±3.3^{b}

Values bearing different superscript at the same column differ significantly (P<0.05).

large and large sheep were similar. These were different from the values obtained for the same traits in medium and small sheep in the open markets where these records were obtained.

Least square means of price, body weight and linear body measurements of sheep based on sex are shown in Table 3. The price and the body parameters favored the male than the female. The male weighed 35.40±0.3 kg while the female weighed 31.98±0.7 kg. Males recorded significantly (P>0.05) higher body measurements than their female counterparts with the exception of chest girth which showed no significant differences between the sexes. This result concurs with the report of Semakula et al. (2010) who obtained significant sex differences in favour of males for Mubende and East African goat breeds in Uganda though, it

Table 4. Pearson correlation coefficient between body measurements and price of sheep

	Weight	Neck length	Back length	Loin girth	Chest girth	Height at wither	Leg length
Neck length	0.196**						
Back length	0.659**	0.094*					
Loin girth	0.558**	0.106*	0.409**				
Chest girth	0.613**	0.114*	0.624**	0.563**			
Height at wither	0.610**	0.195*	0.458**	0.647**	0.532**		
Leg length	0.585**	0.186**	0.525**	0.548**	0.457**	0.717**	
Price	0.826**	0.217**	0.579**	0.423**	0.538**	0.535**	0.464**

* significant; ** hightly significant

Table 5. Prediction equations of price of rams using body measurements

Predictor	Prediction equation	R^2	Level of significance of R^2
Chest girth (CGH)	Y = -12491 + 316CGH	0.2603	***
Leg length (LLT)	Y = -22676 + 227CGH + 3921LLT	0.3442	***
Neck length (NLT)	Y = -22274 + 226CGH + 369LLT+ 18.3NLT	0.3566	**
Back length (BLT)	Y = -22354 + 182CGH + 327LLT+ 19.5NLT + 119BLT	0.3688	**
Height at wither (HWT)	Y = -26056 + 151CGH + 207LLT + 18NLT + 130BLT + 150 HWT	0.3802	**

* significant; ** hightly significant

Table 6. Prediction equations of price of ewes using body measurements

Predictor	Prediction equation	R^2	Level of significance of R^2
Back length (BLT)	Y = -26067 + 851BLT	0.5816	***
Neck length (NLT)	Y = -25862 + 300NLT + 637BLT	0.6137	*
Height at wither (HWT)	Y = -36495 + 324NLT + 504BLT + 220HWT	0.6395	*
Leg length (LLT)	Y = -36056 + 345NLT + 609BLT + 400HWT + 438LLT	0.6893	***
Loin girth (LGT)	Y = -35824 + 352NLT + 656BLT + 96LGT + 460HWT + 412LLT	0.7010	***

* significant; ** hightly significant

contradicts those of Fajemilehin and Salako (2008) who recorded significant sex differences in body weight and measurements with females consistently showing superiority.

Pearson correlation coefficient between body measurements and price of sheep in an open market are shown in Table 4. Price of sheep was positive and highly correlated to weight of the sheep (0.826; P<0.01). Price was also positive and moderately correlated to back length (0.579), chest girth (0.538,) height at wither (0.535) and leg length (0.464) at 1% level of significance. Leg length was highly and positively correlated with height at wither (0.717; P<0.01). This indicates that the longer the legs of sheep the higher the height at wither. Also, the leg length was moderate and positively correlated to weight (0.585), back length (0.525) loin girth (0.548) and chest girth (0.457) while the correlation coefficient obtained between leg length and neck length was low but positive (0.186). It was observed that the correlation coefficients between the body measurements and price were all positive and significant though they ranged from low to high but were high in most cases. These positive and highly significant (P<0.05) correlation among the measured traits suggest

high predictability among the traits. The results obtained are in agreement with those of Afolayan et al. (2006), Salako (2006), as well as Salako and Ngere (2002) for West African dwarf and Yankasa sheep.

Table 5 shows the prediction equations of price of rams using body measurements. The essence was to determine how body measurements would influence the precision of price predictions compared to using chest girth alone. It was observed that height at wither together with back length are important additional variables to chest girth to obtain up to 38% prediction of price of rams (Table 6).

Conclusions

The price of any sheep breed is subjected to the weight. The price of sheep in an open market can best be predicted from a combination of leg length and loin girth.

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