



Econometric Analysis of Characteristics Influencing Cattle Prices in Selected Livestock Markets in Yobe State, Nigeria

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Abstract: A survey was conducted to analyze buyers' preference between Sokoto Gudali, White Fulani and Red Bororo in some selected livestock market in Yobe State. Three major cattle markets were purposively selected, based on high concentration of cattle, cattle marketers and major distributing point of the cattle in the state. Potiskum cattle market, Ngalda cattle market in Fika local Government and Ngalzarma cattle market in Fune Local Government were purposively selected for the study. Some 390 Buyers were selected from three markets on weekly basis for period of 26 weeks. Descriptive statistics, Ginni Co-efficient and multiple regressions were employed to analyze the collected data. The result of the study revealed that, 39.7% of cattle, buyers were within age group of 31-40years, 100% of the respondents were male and 96.7% were found to be married. The respondents (52.3%) were small buyers category, 24.9% medium and 22.8% were large-scale buyers. Greater percentage of the respondents (63.3%) preferred Red Bororo. The Ginni co-efficient model shows that the markets structure was competitive with low Ginni co-efficient of 0.4863. Hedonic regression generally showed that In all the three cattle market, Red bororo breed of cattle were compared with White Fulani and Sokoto gudali, the results shows that white fulani were found to be statistically significant at probability level of ($P < 0.05$), in model I, II and IV with negative coefficient, and sokoto gudali were also found to be significant though negative in model I to IV, which implies that price of Red bororo were higher than that of two other breed, female cattle were found to be statistically significant ($P < 0.001$) with negative coefficient, this implies that the price of male cattle were higher in all the cattle markets compared with female cattle. Big size cattle were found to be statistically significant ($P < 0.001$) with positive coefficient, short horn cattle were found to be significant ($P < 0.01$) with positive coefficient in all the models. The height of cattle is another important physical characteristic that determine the size of cattle and height was found to be highly statistically significant ($P < 0.001$) in all the models and positive coefficient, implies that cattle with height attracted more price which means for any unit increases in these variables buyers would be willing to pay premium. It was recommended that, research efforts should target the characteristics of these cattle that buyers are sensitive to, which will enhance profitability, production and marketing.

Keywords: Characteristics, Cattle, Livestock-market, Price and Yobe-State.

INTRODUCTION

The 'ancestry of domestic cattle remains one of the most disputed topics in the broader debate over domestication. The most comprehensive overview of the origin of the traditional cattle of Africa in Epstein (1971) and Epstein and Mason (1984). Wild cattle seem to have been present in the Ancient Near East and Northeast Africa as late as 5,000 B.C. and the earliest African cattle presumably derive from these. Also included is the historical speculation about the chronology of their introduction into Nigeria. Muzzoleti (1983) has reviewed the evidence for cattle in Ancient Egypt and Gautier (1987) has synthesized the archaeological evidence for Northern and Middle Africa. There are three major types of cattle in Northeastern Nigeria, they are the zebu, the muturu and the kuri. Zebu are by far the most numerous and were probably established in Borno prior to the coming of the Fulbe. Kuri are found only in Borno and in adjacent parts of the Niger, Chad and Cameroon Republics. There are muturu cattle in the Mandara Mountains and in adjacent parts of Cameroon. Figurines of cattle have been recovered from excavations at Daima, south of Lake Chad, in the earliest layer of occupation, which dates from before 500 B.C. (Connah, 1981). The cattle represented do not appear to have humps and may well have been the ancestors of Modern-day kuri cattle.

The goal of beef cattle production is to provide highly desirable beef for consumption in the most efficient manner. Knowledge of breeding, feeding, management, disease control and the beef market is fundamental to the economical production of desirable beef. According to Missohou and Adakal (2004) West Africa is recognized as a reservoir of great genetic diversity with multifunctional livestock rearing systems. These animals contribute significantly to an estimated 25% of household incomes (Willson, 1994). Majority of poor rural households depend essentially on livestock for their income. Animal products play a direct and indirect role in reducing food insecurity in Nigeria and other West Africa countries. Cattle's in Nigeria are supplied through domestic

production from pastoral and agro pastoral systems, other sources of supply are Niger, Cameroon Republics (MAEP, 2005).

Therefore, the main objective of the study is to evaluate the influence of cattle characteristic determining Buyers decision. However, the specific objectives of this research work are to:-

- 1) Describe the socio-economic characteristics of cattle buyers in the study area.
- 2) Describe the structure of cattle market in the study area.
- 3) Determine the effect of cattle characteristics on buyers prices in the study area.

METHODOLOGY

Study area

Yobe State is situated in the North-East Geopolitical Zone of Nigeria, the state is located within latitude 10°27` North to 13°23` North and longitudes 9°40` to 12°30` East of the equator (YBSG, 2007). It was carved out of present day Borno State. It shares boundaries with Borno State on the Eastern axis, Jigawa and Bauchi State on the West, Gombe on the South and Niger Republic on the North. It has an area of 45,502 square kilometres and a population of 1.4 million (NPC-2006). The field survey was carried out in (3) Local Government Area of Yobe State namely:- Potiskum, Fune and Fika. In turn (1) market out of each of the Local Government Area was purposively selected based on the high concentration of cattle and cattle marketers in each of the market.

Sampling procedure

The study area was purposively selected based on high concentration of cattle and cattle marketers; it also served as distributors for most markets within the Northern part of Nigeria. The study covered three Local Government Areas (LGA's) within the state. From each Local Government, one market was also purposively selected based on size, location and inhabitants. The market selected are, Tike cattle market in Potiskum,

Ngalzarma cattle market in Fune and, Ngalda cattle market in Fika Local Government Area.

From each of the cattle market selected, 5 cattle buyers were selected on a weekly basis using systematic sampling by truncation for a period of 26 weeks. Thus, the study selected one hundred and thirty (130) cattle buyers from each selected market making a total sample size of three hundred and ninety (390) respondents for the study area.

Analytical tools

The analytical tools employed for this study were: Descriptive statistics such as frequency distribution and percentages was used to determine socio-economic characteristics of the buyers, Ginni Co-efficient was also used to determine market structure and Hedonic price analysis model was used to determine physical attributes influence cattle prices.

Ginni Co-efficient

The Ginni co-efficient was used to measure market structure. In practice the actual value of the Ginni-Co-efficient lies between zero and one. The closer the value is to unity, the greater is the degree of inequality and vice versa, (Okereke and Anthonio,1988).

$$G.C = 1 - \sum XY \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad \text{equation 1}$$

Where G.C =Ginni Co-efficient

X = Percentage of markets per period of study

Y = Cumulative percentage of markets sales

Model specification and framework

The hedonic model, which is derived from the theory of consumer choice as postulated by Lancaster (1966) shall be used. The model states that the price of a good is explained in terms of a good's characteristics. Thus, it describes the price of a good as a linear summation of the implicit value of its attributes. (Wooldridge, 2000, Rosen 1974 & Edmeades, 2006) mathematically expressed as:

$$P_c = \frac{M}{\sum_{j=1}^{J-1} X_{cj} P_{cj}} \quad \text{equation 2}$$

Where:

P_c = price of cattle

X_{cj} = cattle characteristic j such as breed (red bororo, white fulani and sokoto gudali), sex (male and female cattles), body size (small, medium and large body sizes), face size (short and long face), horn (short and long horns) and height.

P_{cj} = Implicit of price characteristic j

Reference variables in the models are Red bororo, male cattle (bull), medium size cattle, long face and long horns.

Multiple regressions are the casual relationship between two or more independent variables and the dependent variables. Bhattacharya and Johnson (2002) defined regression analysis as a body of statistical methods dealing with formulation of mathematical models that depict relationship for the purpose of prediction and other statistical inferences.

In this study, preference will be the dependent variable, while the independent variables will be attributes to characteristics like skin type, colour and type of eye, tail type, hair type, breed, etc.

The model is generally specified as follows:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6 \dots X_n) + \mu \quad \text{equation 2}$$

Where

y = consumer preference/price of the animal

f =Functional notation

$(X_1 \dots X_n)$ = Independent or explanatory variables

μ = Error term

Derived from equation (1) above, the functional linear cob. Doglas form of the model was as follows:

$$y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + \mu \quad \text{where:}$$

y = Price of the animal

a = The Intercept

b_1 = The coefficient of X_1

X_1 = breed of the cattle (White Fulani, Sokoto gudali and Red bororo as reference)

X_2 = Sex of cattle (Female cattle and Male cattle as reference group)

X_3 = Size (Small, Big and Medium sizes as reference group)

X_4 = Face type (Short face and Long face as reference group)

X_5 = Horn Type (Short horn and Long horn as reference group)

X_6 = Height of the cattle (m)

X_7 = Length of the cattle

RESULTS AND DISCUSSION

Socio-economic characteristics of cattle markets in the study area

The socio-economic characteristics describe for the cattle marketers in some selected livestock markets in Yobe State, Nigeria are age, sex, marital status, educational qualification and scale of buyers. Age is the years of life of the respondents from birth to the time of the survey. The result in Table 1 revealed that, young adult of ages 31-40 years have the highest percentage (39.6%). Age and dynamism considerably contribute too many of the qualities associated with young people such as their active involvement in community development, higher social propensity, faster reaction time, and proneness to innovation (Adesope, 2007).

The result in Table 1 shows that 100% of cattle buyers were male, the result indicates that males who are more capable of coping with the drudgery associated with cattle

marketing dominated the study area. Furthermore, the table shows that 96.7% of the respondents were married.

The analysis of level of education in Table 1 shows that, Religious (Islamic) education has the highest percentage (76.9%) followed by primary education (12.6%) then secondary education (9%), while tertiary education has the least percentage of 1.5%. This is the indicator of the ability of the individual to read or write both in a formal and the informal way. An individual's level of education should usually enhance his social and economic decisions favourably, as he has the capacity to judge and make decision objectively. Result from Table 1 also shows that (53.3%) of respondents are small scale buyers, which suggest that, they dominate cattle marketing in the selected livestock markets in Yobe State, Nigeria.

Distribution of cattle Buyers to determine market structure for three market.

The result as presented in Table 2 below shows that the estimated Ginni Co-efficient for cattle buyers was 0.4863 (48.63%). This figure suggested that there is high level of inequality among the buyers. Therefore, empirical results indicated that cattle market was highly concentrated as revealed with a low Ginni coefficient of 0.4863, indicating that there was competitive behaviour in the market structure of the cattle market in the study area. This also revealed that there is high level of concentration which is also reflection of the inefficiency in the market structure for cattle. This agrees with the findings of Ekunwe (2009)

Results of Estimated Hedonic Regression for Physical Characteristics affecting price in three markets (Potiskum, Ngalda and Ngalzarma markets)

The analysis presented in Table 13 with price as dependent and cattle characteristics as independent variables. several models are considered but only four are presented in this research work. The breed of cattle was entered with three variables dummies (i.e. White Fulani, Sokoto Gudali and Red Bororo) but Red Bororo was the reference group; gender was also entered as male and female, but female was the reference group. Cattle

size (i.e. small, medium and big) and medium size was the reference groups. Face type of cattle was entered as long face and short face but short face was the reference group. Horn type was also entered as short horn and long horn; also, short horn was the reference group. The heights of cattle were entered as absolute values.

The results of the estimated coefficient with price as dependent variable shows an R^2 value ranging from 48% to 79%, which indicating that 48% to 79% of the variation in prices were explained by the explanatory variables included in the models. The remaining proportion can therefore be attributed to error or random distribution term. Durbin Watson p-value of 1.23 to 1.63 was also reported in the four models, which indicates there is a positive first order auto correlation as confirmed by Gerald and Brain, (1997).

In all the three cattle market, Red bororo breed of cattle were compared with White Fulani and Sokoto gudali, the results shows that white fulani were found to be statistically significant at probability level of ($P < 0.05$), in model I, II and IV with negative coefficient, and sokoto gudali were also found to be significant though negative in model I to IV, which implies that price of Red bororo were higher than that of two other breed, this may be as a result of high demand for the breed in the study area.

Result in model II, shows that female cattle were found to be statistically significant ($P < 0.001$) with negative coefficient, this implies that the price of male cattle were higher in all the cattle markets compared with female cattle. This may be because of high demand for male cattle in the selected livestock market. Another reason for the lower price offered for female cattle may be that they are usually sold by pastoralists only at the end of their productive live, which makes them older than the bulls and offered for sale and most buyers coming from the Southern part of the country preferred male cattle because of their bodyweight.

Medium size cattle were also compared with small size and big size cattle, the result indicated that big size cattle were found to be statistically significant ($P < 0.001$) with

positive coefficient in model I, III and IV and small size cattle were also found to be significant ($P < 0.001$) with negative coefficient. This implies that big size cattle attracted more prices and medium size cattle were cheapest in the markets, the reason was that there were more of medium size cattle in this market but their demand is low.

The long horn cattle were also compared with short horn, the result shows that short horn cattle were found to be significant ($P < 0.01$) with positive coefficient in all the models, implying that, cattle with short horn attracted more price than cattle with long horn. The reason was that short horn is one of the physical attribute of sokoto gudali cattle breed and those breed also attracted more price in cattle market.

The height of cattle is another important physical characteristic that determine the size of cattle and height was found to be highly statistically significant ($P < 0.001$) in all the models and positive coefficient, implies that cattle with height attracted more price which means for any unit increases in these variables buyers would be willing to pay premium. These results agree with Edmeades (2006).

CONCLUSION AND RECOMMENDATION

Conclusion

The findings in this study have shown that cattle's marketing in the study area was a male oriented business and most of the men involved were young men indicating that there was less participation in the venture by the elders. The structure of the market based on the criteria laid was said to be competitive. The variable factors that mostly determine the buyer's preference and prices were found to be carcass quality (big size cattle), sex (male cattle), short horn cattle, height and length of cattle. Meaning as people found out the price and carcass size is okay and they are convinced there is nutritional benefit in the cattle then they can buy it

Recommendation

Research effects should target the characteristics of these cattle that buyers are sensitive to so as to enhance profitability production and marketing. There is a need for utilization of modern cattle marketing facilities like standard weight, crush for loading and grading in the market. This will help in transforming the marketing procedures that form the current traditional system to more modern ones.

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Table 1: Distribution of socio-economic characteristics of the respondents

Variable	Frequency	Percentage (%)
Age (years)		
	34	8.7
21-30		
31-40	155	39.7
41-50	130	33.3
51-60	63	16.2
61-70	8	2.1
Total	390	100
	12	3.1
	377	96.7
Marital status	1	0.3
Single	390	100
Married		
Divorced	300	76.9
Total	49	12.6
Educational Qualification	35	9.0
Qur'anic	390	100
Primary		
Secondary	204	52.3
Tertiary	97	24.9
Total	89	22.8
Category of Buyers	390	100
Small		
Medium		
Large		
Total		

Table 2: Summary Distribution of Buyers at Cattle Market

Purchase Range	Frequenc y	Proportio n of Buyers	Cumm. Frequency	Cumm. Proportion of Buyers	Total Purchase	Prop. of Purchas e	Cum m. Prop.	xy
20,000 – 86,000	216	0.55	216	0.55	12,280,000	0.33	0.33	0.1815
86,001 – 152,000	117	0.30	333	0.85	13,261,000	0.35	0.68	0.204
152,001 – 218,000	39	0.10	372	0.95	7,260,000	0.19	0.87	0.087
218,001 – 284,000	17	0.04	389	0.99	4,190,000	0.11	0.98	0.0392
284,001 – 350,000	1	0.002	390	1.00	350,000	0.01	1	0.002
Total	390	1			37,341,000	1		0.5137

Mean value of purchase =95746.1, Ginni Co-efficient = $1 - 0.5137 = 0.4863$

Table:3 Summary of Estimated Hedonic Regression for Physical Characteristics affecting price in three markets (Potiskum, Ngalda and Ngalzarma markets)

Variable	Model I	Model II	Model III	Model IV
	-583.10	-1021.6		-650.7
White Fulani	(-1.855)*	(-2.413)*		(-2.114)*
	-2242.8	-3541.6	-2242.8	-2566.5
Sokoto Gudali	(-2.308)*	(-2.413)*	(-2.308)*	(-2.784)**
	-30.804	-1743.9	-30.804	-28.822
Female Cattle	(-0.1065)	(-3.925)***	(-0.1065)	(0.9967)
	-1709.6		-1709.6	-1697.7
Small Size	(-3.864)***		(-3.864)***	(-3.838)***
	9120.8		9120.8	9054.8
Big Size	(23.94)***		(23.94)***	(24.09)***
	-629.36		-629.3	
Short Face	(-1.050)		(-1.050)	
	2695.1	8435.6	2695.1	2414.9
Short Horn	(3.185)**	(2.688)**	(3.185)**	(3.007)**
	245.60	500.81	245.6	247.2
Height	(9.599)***	(18.12)***	(9.599)***	(9.678)***
	-3935.7	-14635	--3935	-4017.9
Constant	(-2.935)**	(1036)**8	(-2.935)**	(-3.001)**
R ² (R ² Adj)	79.85%	48.37%	79.85%	79.79%
	(79.43%)	(47.70%)	(79.43%)	(79.42%)
DWP-Value	1.63	1.23	1.63	1.87

***Significant at 0.1% ($p < 0.001$), **Significant at 1% ($p < 0.01$), *Significant at 5% ($p < 0.05$) Figures in parentheses are t-values.