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Hedonic Price Analysis of Characteristics Influencing Cattle Prices in Ngalda Livestock Markets in Yobe State

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Abstract: This research was carried out to analyze characteristics influencing cattle prices in Ngalda livestock markets in Yobe State. Fika Local Government was purposively selected based on high concentration of cattle and cattle marketers, Ngalda cattle market has being the major distributing point of the cattle in the state. A total of 130 Buyers were selected using systematic sampling by truncation on weekly basis for period of 26 weeks. Descriptive statistics, Ginni Co-efficient and multiple regressions was employed in analyzing the collected data. The result of the study revealed that 100% of the respondents were male, 47% of cattle buyers were within age group of 31-40years and 81.5% were found to be married. The respondents (66%) were small buyers category, 21.5% medium and 12.3% were large scale buyers. The Ginni co-efficient model shows that the markets structure was competitive with low Ginni co-efficient of 0.474. The regression results indicated colour of the ear, shape of the cattle face and type of horn were the factors that influenced the buyer's preference. Hedonic regression shows that female cattle, big carcass size, short horn cattle and height were found to be statistically significant ($P < 0.05$), ($P < 0.001$), ($P < 0.05$) and ($P < 0.001$) respectively with positive coefficient across all the models implies that for any unit increase in these variables, buyers would be willing to pay more premium. 1t was therefore recommended that research efforts should target the characteristics of these cattle that buyers are sensitive to so as to enhance profitability production and marketing.

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

BACKGROUND OF THE STUDY

Cattle command a prominent position in our meat supply and livestock industry. Beef is estimated to supply about 45 percent of total meat consumed in Nigeria (Usman and Nasiru 2007). Our National herd contain an estimated 16 million herd of cattle in 2010 (Lombin 2007). Over 90 percent of these are in the hands of traditional producers and in the Northern part of the country (Ken, 1982). The growth rate in the national herd is estimated at 1.5 percent annually. It is interesting to note that although developing countries contain about two-thirds of the world cattle populations, about two-third of total beef production is accounted for by developed countries. Whatever their level of production, livestock in developing countries provide millions of families with better nutrition, family income and employment opportunities, draft power and a more balanced agriculture.

Cattle marketing and associated service sectors provide a range of employment and income earning opportunities for populations on both sides of the border. Contributions of cattle trade to the cash incomes and purchasing power of various population groups within pastoral areas are significant. Despite the seasonality of cattle demand and prices, the cattle trade has a multiplier effect on local economies through the creation of employment opportunities, wealth, and extensive inter–sectoral linkages. Some of the population groups benefiting from the livestock sector include: cattle owners; hired cattle herders; cattle branders; cattle traders, buyers and brokers; sellers of fodder and water; veterinary professionals and other animal health assistants; truck owners, money vendors; militias who extort illegal taxes at check points; and local authorities who generate revenue through legal taxation on livestock sales. (USAID, 2000)

In a recent study, Kukowski (2004) points at the existence of long distance livestock trade flows in pre-colonial Sub-Saharan Africa. Many historians seem to have neglected this trade, perhaps because they were more interested in export goods like ivory and slaves. Most livestock were traded in networks of which the core business was oriented

towards luxury products such as gold or cloth rather than towards livestock. Nevertheless, livestock and livestock products such as skins and hides and leather featured in these trading caravans.

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 area.
3) Determine cattle characteristics that influence buyers choice of breeds.
4) Determine the effect of cattle characteristics on buyers prices in the study area.

METHODOLOGY

Study area and sampling techniques

The field survey was carried out in Fika Local Government Area of Yobe State, is located within latitude $11^0$17` North and longitudes $11^0$18` to 29^0 East of the equator (YBSG, 2007). It has an area of 2,208 square kilometres and a population of 136,895. (NPC-2006).

Ngalda cattle market was purposively selected based on the high concentration of cattle and cattle marketers in the area, it also served as a distributor for most markets within the Northern part of Nigeria. The data used in the study were obtained through a well-structured questionnaire administered to the buyers by the researcher with the help of well-trained enumerators; this was done between the month of February and August, 2012. A sample five (5) cattle buyers were selected on a weekly basis using systematic sampling by truncation for a period of 26 weeks, given a total sample size of one hundred and thirty (13) cattle marketers.

Analytical techniques

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, multiple regression was employed 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).

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

Where G.C =Ginni Co-efficient

X = Percentage of markets per period of study

Y = Cumulative percentage of markets sales

Multiple Regression

Multiple regressions are the casual relationship between two or more independent variables and the dependent variables. 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:

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

Where

y = consumer preference/price of the animal

f =Functional notation

(X_1----X_n) = Independent or explanatory variables

μ = Error term

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

$y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + \mu$ *where:*

y = consumer preference/price of the animal

a = Intercept

b_1 = Coefficient of X_1

X_1 = Purchase price

X_2 =Sex of cattle

X_3 = Size

X_4 = Skin type of the cattle

X_5 = Colour of Ear

X_6 = Face type

X_7 = Horn Type

X_8 = Height of the cattle

X_9 = Length of the cattle

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. (Edmeades, 2006) mathematically expressed as:

$$Pc = \sum_{J-1}^{M} Xcj\ Pcj$$ ----------equation 3

Where:

Pc = price of cattle

Xcj = 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.

Pcj = Implicit of price characteristic j

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

RESULTS AND DISCUSSION

Socio-economic characteristics of cattle marketers in Ngalda cattle market

Socio- economic Variables are important human attributes that enhance the efficiency of farmers, consumers and marketers of agricultural produce in their business (Shu'aib, *et al.*,2009). Socio- economic Variables are important human attributes that enhance the efficiency of farmers, consumers and marketers of agricultural produce in their business (Adomi, 2010). Frequency distribution of the respondents' personal and social characteristics is contained in Table 1. Age distribution of respondent showed that the middle aged group of 31 to 40 years has the highest frequency of 61 respondents constituting 47% of the total number of respondents. In other words, majority of them were between 31 to 40 years. 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).

It was also found from the survey that, all the respondents (100%) were male, which means cattle marketing was a male dominated business. This could be attributed to the physical hardship involved in cattle marketing. This corroborates the finding of Adamu,

(2010) which states that socio-cultural features of the study area restrict women from outdoor activities.

Most of the respondents (81.5%) were married, only 17% were single and divorced 0.7%. UN (1973) found that, different ethno-religious groups continue to attach prestige to marriage as an indicator of social responsibility, trust and achievement. This is typical of a northern community set up within which people marry early and this act shows responsibility and respect for the religion. The study area reveres the institution of marriage so much that the married people are viewed as more responsible and more courteous.

A substantial proportion of the farmers (58.4%) had no formal education. Those with primary and secondary education constituted the highest percentage (36.5%) of the respondents. Only a small fraction of the respondents (5%) had post-secondary education. 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. Category of buyers explained the level of respondents in the business. Result shows that (66 %) of respondents are small scale buyer followed by medium scale buyer with (21.5%) while the large scale buyers were the least (12.3%).

Distribution of cattle Buyers to determine market structure in Ngalda Market.

The result as presented in table 3 below shows that the estimated Ginni Co-efficient for cattle buyers was 0.474 (47%). 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 0.474, 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)

The result of the regression analysis which estimated the characteristics that influences buyers choice of cattle breeds in Ngalda market.

The result in Table 3 showed significant buyers preference levels for colour of the ear and shape of the face were statistically significant at ($p < 0.001$), type of horn and sex of cattle were statistically significant at ($p < 0.01$) and ($p < 0.05$) respectfully. Carcass size, skin type, length and height of cattle were not statistically significant. This means buyers were not sensitive to them.

The results of the analysis are presented in Table 4 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 values.

The results of the estimated coefficient with price as dependent variable shows an R^2 value ranging from 42% to 68%, indicating that 42% to 68% of the variation in prices were explained by variables included in the models. The remaining proportion can therefore be attributed to error or random distribution term. Durbin Watson p-value of 1.70 to 1.94 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 Ngalda cattle market, Red bororo breed of cattle were compared with White Fulani and Sokoto gudali. The results show that white fulani were found to be statistically significant at probability level of($P < 0.05$), in all the models with negative coefficient, which implies that price of Red bororo were higher than that of other two breed in Ngalda cattle market, this may be as a result of high demand for the breed in the market.

Result in model I to IV, shows that female cattle were found to be statistically significant in all ramification with positive coefficient, this implies that the price of female cattle were higher in Ngalda cattle market compared with male cattle. This may be as a result of high demand for female cattle in the area for fattening activities or reproduction purposes.

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 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 Ngalda cattle market, the reason was that there were more of medium size cattle in this market but their demand is low. In model I and II, long horn cattle were also compared with short horn, the result shows that short horn cattle were found to be significant ($P<0.05$) with positive coefficient, implying that, cattle with short horn are sold at higher prices than cattle with long horn in Ngalda 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 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

Cattle production and marketing occupies a very important position in Fika Local Government of Yobe State, in terms of number of farmers that engaged in its production, marketing and its economic value. The cattle 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 (female cattle), short horn cattle and height 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. It is therefore imperative for individual, cooperative bodies, government and non-governmental organization to assist the farmers in these areas of marketing, in order to boost cattle marketing in Nigeria.

Recommendation

Based on the results findings. Credit facilities and schemes need to be put in place to assist cattle marketers and strengthened thier marketing. So that cattle marketers can have access to soft loan, and such loans should be interest free with no stringent condition so that cattle marketers can expand their scale of marketing cattle to large scale in the market. 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)		
	33	25.3
21-30		
31-40	61	47
41-50	17	13.1
51-60	19	15
Marital status		
Single	23	17
Married	106	81.5
Divorced	1	0.7
EducationalQualification	76	58.4
Qur'anic	33	25.3
Primary	15	11.5
Secondary	6	5
Tertiary		
Category of Buyers	86	66
Small	28	21.5
Medium	16	12.3
Large	**130**	**100**
Total		

Table 2: Summary Distribution of Buyers at Ngalda Cattle Market

Purchase Range	Frequency	Proportion of Buyers	Cumm. Frequency	Cumm. Prop. of Buyers	Total Purchase	Prop. of Purchase	Cumm. Prop.	xy
25,000 – 70,000	51	0.4	51	0.4	2,363,000	0.22	0.22	0.088
70,001 – 115,000	52	0.4	103	0.8	4,632,000	0.43	0.65	0.26
115,001 – 160,000	22	0.16	125	0.96	2,727,000	0.25	0.9	0.144
160,001 – 205,000	3	0.02	128	0.98	512,000	0.05	0.95	0.019
205,001 – 250,000	2	0.015	130	1.00	480,000	0.045	1	0.015
Total	130	1			10,714,000	1		0.526

Mean value of purchase =N82,415

Ginni Co-efficient = 1- 0.526 = 0.474

Table 3, Summary of the regression analysis which estimated the characteristics that influences buyers choice of cattle breeds in Ngalda market.

Variable name	Estimated Value	T-value	P-Value
(Constant)	2.890	10.026	.000
Purchase price	.001	.901^{NS}	.370
Gender	.161	2.033*	.044
Carcass size	-.102	-1.024^{NS}	.308
Skin type	-.131	-1.289^{NS}	.200
Colour of Ear	.687	13.792***	.000
shape of face	-.672	-3.911***	.000
Type of horn	-.657	-3.487**	.001
Height	.006	.584^{NS}	.561
Length	.001	.122^{NS}	.903

R- square=0.741

R- square Adjusted= 0.722

***Significant at 0.1% ($p < 0.001$), **Significant at 1% ($p < 0.01$), *Significant at 5% ($p < 0.05$).

Table:4: Results of Estimated Hedonic Regression for Physical Characteristics affecting price in Ngalda Market

Variable	Model I	Model II	Model III	Model IV
	-839.92	-1272.9	-839.92	-1119.9
White Fulani	(-1.970)*	(-2.295)*	(-1.970)*	(-2.560)*
	1793.1	125.11	1793.1	-53.459
Sokoto Gudali	(1.007)	(0.5571)	(1.007)	(-0.3012)
	1308.1	2434.3	1308.1	1413.4
Female Cattle	(2.397)*	(3.674)***	(2.397)*	(2.483)*
	-3436.6		-3836.6	-3368.6
Small Size	(-4.867)***		(-4.867)***	(-4.569)***
	7016.4		7016.4	5983.3
Big Size	(8.157)***		(8.157)***	(7.095)***
	-4522.3		-4522.3	
Short Face	(-3.480)**		(-3.480)**	
	2862.8	-492.20	2862.8	51.521
Short Horn	(1.797)*	(-0.2702)	(1.797)*	(0.3591)
	80.491	228.19	80.491	88.134
Height	(2.467)*	(7.596)***	(2.467)*	(2.592)*
	4168.3	-4482.3	4168.3	3783.2
Constant	(2.129)*	(-2.847)**	(2.129)*	(1.853)*
	68.06%	42.08%	68.06%	64.86%
R^2(R^2Adj)	(65.94%)	(39.74%)	(65.94%)	(62.84%)
DWP Value	1.44	1.37	1.44	1.31

***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.