FUDMA JOURNAL OF ANIMAL PRODUCTION AND ENVIRONMENTAL SCIENCE

(*FUDMAJAPES*)

Volume 1 issue 1 2025

ASSESSMENT OF EXTRINSIC FACTORS INFLUENCING CATTLE PRICING AND PROFITABILITY OF CATTLE MARKETS IN SOUTH-WESTERN, NIGERIA

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Keywords:
Cattle Markets, Hedonic Price Model, Southwest Nigeria

ABSTRACT
This study was carried out in South-western, Nigeria with the aim to assess the extrinsic factors influencing pricing and profitability of cattle in cattle markets. Producers are better informed characteristics of product demand, determinants of short-run cattle prices and price differentials among cattle breeds are communicated, their lack of which can result in inability to alter production and marketing decisions to maximize profitability and meet consumer demands. Cross-sectional data was collected from randomly selected 121 and 379 wholesalers and retailers respectively from three states' where cattle markets are predominant. The sample size was selected through a multistage sampling technique. The result of the estimated co-efficient from the Hedonic model for a wholesalers, show an R^2 value of 87 per cent of goodness of fit. The Age of animal with coefficient of 3.25, body size of 9.42 and body grade of 5.42 were positive and significant at ($P< 0.05$), ($P<0.1$) and ($P<0.05$) respectively which indicates that the higher the age, bigger size and body grade the higher the price of the cattle. Meanwhile, the horn length had a negative significant level with the pricing of the cattle at ($p<0.001$). The estimates for Retailers' Hedonic Regression Model had an R^2 of 58.76. The age of the animal, sex of the animal, body colour, body size, body grade and horn length had a positive relationship with price of a cattle at significant level of ($P< 0.1$, $P<0.05$, $P<0.05$, $P<0.05$, $P<0.05$ and $P <0.001$). The horn length was positive but not significant.

Citation: Okeowo, T.A., Akanni, K. A., Awotide, D. O., Oloniyo, R. B., Akerele., E. O., & Ogunbameru, A. (2025). ASSESSMENT OF EXTRINSIC FACTORS INFLUENCING CATTLE PRICING AND PROFITABILITY OF CATTLE MARKETS IN SOUTH-WESTERN, NIGERIA. FUDMA Journal of Animal Production & Environmental Science, 1(1), 155-162. https://doi.org/10.33003/japes.2025.v1i1.155-162

INTRODUCTION

Cattle marketing provide a range of employment and income-earning opportunities for populations on both sides of the border countries (Lutta, 2023). Contributions of cattle trade to the cash incomes and purchasing power of various population groups within pastoral areas are significant. According to Ekiru *et al. (*2022) livestock is a critical sector for the growth of the economies of many countries, regions and communities throughout the world. The sector is essential because it constantly provides food, income, nutrition, employment and trade. It facilitates the socio-economic transformation of smallholder farmers' livelihoods and is a source of capital for small and medium businesses. Cattle contribute significantly to Nigeria GDP, primarily through livestock sector. Specifically, the livestock sector is estimated to contribute about 5% of Nigeria's total GDP, and it accounts for roughly 17% of the agricultural GDP (Sennuga *et al.,* 2022).

Similarly, 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-sectorial linkages. Some of the population groups benefiting from the livestock sector include cattle owners,

hired cattle herders, breeders, wholesalers, retailers, transport owners, drivers, commission agents, loaders, butchers, brokers, sellers of fodder and water, veterinary professionals and other animal health assistants, truck owners, money vendors among others. Communication of product demand patterns, influencing short-term cattle prices, and price differentials among cattle breeds is crucial to enable producers to make decisions to attain improved profitability and meet consumer expectations (Schroeder *et al.,* 2022).

Hedonism and its impact on consumer behavior are the focus of extensive research in marketing over the last 50 years. It is interesting to observe that the magnitude of theoretical and empirical research on the hedonism phenomena of consumer behavior theory indicates that hedonism as a value statement remains inadequately researched (Tiwari *et al.,* 2022). Livestock production supports the livelihood of many households in the world, especially in Africa through the provision of diverse outputs, including food, and also acts as an important investment 'sink' that generates cash for socio-economic needs.

In Nigeria, the livestock subsector has overtime been a key player in the national economy and has particularly been one the main economic mainstay of the country (Siankwilimba, 2024). Despite the huge contribution of cattle and other livestock to economic growth the main issues with cattle market pricing between 2016- 2025 has been the inconsistent and volatile nature of price, influenced by factors like market dynamics, infrastructure challenges, and security concerns (AFDB, 2019). Price and volume of sales volatility over time has been an ever-present problem because of marketing inefficiencies. Marketing cattle becomes difficult, and this makes the cost of doing business increase, resulting in an increase of the final retail price of cattle and their products. Low-income families, who eat lower protein diets, may not be able to get cattle as a result of the operations of these stakeholders and intermediaries (Saleh *et al.,* 2018).

However, several studies have looked into pricing and they lack recent data on specific cattle market sources, pricing, productivity, price drivers, market margins, and marketing information flows (Bui et al., 2023). Furthermore, there is a lack of empirical evidence on the presence or kind of price connections in cattle markets, the effects of marketing costs on gross marketing profitability, and the influence of cow characteristics on price, among other things (Jobirov et al., 2022). The aim of this study is to assess the extrinsic factors influencing cattle pricing and profitability in cattle markets of Southwestern, Nigeria.

According to the study of (Jose *et al.,* 2025) on hedonic analysis of cattle prices in Nicaragua, their study found that weight, lot size, and class are statistically significant factors impacting cattle auction prices. The results are relevant to Nicaraguan cattle buyers and sellers and help understand how the futures market can be used to predict price differences and reduce price risk and uncertainty.

Adam and Usman (2023) analysed the quantitative and qualitative factors influencing cattle price in trans-border trade between Nigeria and Niger Republic. The study revealed that price of cattle in Maigatari (terminal) was significantly ($p<0.01$) higher than that of the Dungass (supplying) market. Also, the result reveals that sex, weight and market supply had positive coefficients and significant ($p<0.001$) influence on cattle price. Seasons of sale and types of buyers had positive coefficients and significant influence on the market price at $p<0.001$ with a value of R^2 of 0.933.

Motta *et al.* (2018) researched the factors influencing cattle prices in order to develop effective policies for long-term productivity and enhanced food supply in Cameroon. In their study, which was conducted Over a 12-month period, they investigated the impact of a range of individual and market-level characteristics on the price of cattle sold in all transactions (n = 118,017) recorded in 31 livestock markets in the country's primary cow production region. The best explanatory model was chosen, and the model's predictive power and the robustness of the discovered drivers were assessed using an information-theoretic technique based on a generalized additive mixed-effect model. It was repeatedly revealed

that the age and gender of the cattle traded were major price drivers.

Lawal *et al.*, (2016) in their study hedonic price analysis of characteristics influencing cattle prices in Ngalda livestock markets in Yobe State, shows that 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. It 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.

The study of Javier *et al.,* (2012) on factors that influence the price of cattle in livestock auctions: the case of the stockyard of Melipilla (Chile) showed that the most influential variables with respect to the price of beef cattle, in decreasing order, are as follows: 'condition', ′breed', 'quarter of sale' and 'year', which are followed far behind by 'lot size' and 'average weight'. The market pays a premium for Red Friesians, Crossbreds and Herefords and punishes the price of Holstein Friesians. Additionally, higher prices are paid in the last two quarters of the year than in the first two, and the third quarter is preferable to the fourth. Finally, the average lot weight and lot size are variables that have a positive, but small, influence on the price of cattle.

Abdullahi (2014) investigated the 'variables affecting the costs of live cattle in Garissa, North Eastern Province's in Kenya main livestock market'. The empirical data revealed that the gender of the cattle (both male and female), the age of the cattle (both mature and young), the cow's physical condition, and the season in which the transaction occurs are the significant variables in explaining the average market price of the cattle. The data indicate that cattle with male and mature characteristics positively shock the average market price, but calves with female, young, and thin characteristics negatively shock the average market price. Weather had a negative impact on average expenses. Long dry seasons are prevalent in the research area, resulting in a decrease in market values. It was proposed to employ institutional and policy reforms to overcome the key constraints that impede the cattle sub-sector's performance on a variety of fronts.

MATERIALS AND METHODOLOGY

The research was carried out in Southwest Nigeria. Nigeria has a population of over 230 million people and a land area of 923,768 square kilometers (Asakitikpi & Aretha, 2024). Crop production is the population's primary traditional activity, with smallholder farming being the most common, encompassing the cultivation of both cash and food crops. In addition, small animals and birds are grown as food. Southwest Nigeria has a tropical climate, with high temperatures all year, heavy rains from April to October, and dry winds from November to March. Because of these positive annual weather swings, approximately 75% of the inhabitants are estimated to rely on farming as their primary or secondary source. of income (Ojo & Baiyegunhi, 2021). States in the Southwest geopolitical zone include Ekiti, Lagos, Ogun, Ondo, Osun, and Oyo. Because of the favorable climatic conditions, the area is agrarian and ideal for the cultivation of permanent crops such as cocoa and oil palm, as well as arable crops (maize, yam, and cassava). The states contain three separate ecological zones: rainforest belt, derived savannah, and Guinea savannah. A huge population creates a correspondingly high demand for cattle. The indigenous Fulani population, who moves their livestock indiscriminately and causes conflicts between farmers and herders, also raised cattle in the area. The area is full of livestock markets.

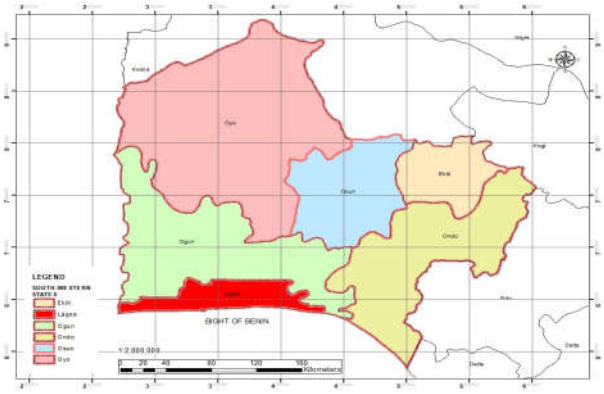

Figure 3: Map of Southwest Nigeria Shows the Study Area (Source: article.sapub.org/sors)

Data Collection Techniques and Resources

For this research, primary data was used. The primary data were collected using a structured questionnaire to capture relevant information on market/marketer characteristics, cattle market prices, elements considered important in price formulation and determination, and market constraints. Data was gathered by randomly sampling livestock markets and market customers in the study area.

Sampling Techniques and Sample Size

The study employed a multistage sampling strategy. Because of the high volume of cattle traders in the states during the early stages, three of the six states in Southwest Nigeria were purposely picked. These are Lagos, Ogun, and Oyo states. The second stage involved selecting five local government areas in each state that were recognized to have flourishing livestock markets. During the third step, one market was selected from each local government region. In the fourth step, leaders of market associations' member registers were utilized to choose 30% of the respondents in each market. Finally, 169 cattle traders were selected from Lagos State, 160 from Ogun State, and 171 from Oyo State, for a total of 500 respondents. In addition, 30 market officials were selected from each research state.

Table 1: Sample size and sampling of respondents in the study area

State	Market Name	Total Registered Marketers	30% of Registered Marketers	Wholesalers	Retailers
Lagos	Sabo	143	43	9	34
	Oko-oba	207	62	15	47
	Alaba Rago	78	23	6	18
	Imota	68	20	5	15
	Igan	68	20	5	15
	Sub-Total	**564**	**169**	**40**	**129**
Ogun	Imowo	138	41	10	31
	Mowe	130	39	10	29
	Ikeoluwa	54	16	4	12
	Corner	55	17	4	12
	Berger	157	47	11	36
	Sub-Total	**534**	**160**	**39**	**121**
Oyo	Kara	129	39	10	29
	Amode	138	41	10	31
	Akinyele	106	32	8	24
	Bodija	142	42	11	31
	Oke-ose	55	17	3	14
	Sub-Total	**570**	**171**	**42**	**129**
Total		**1,668**	**500**	**121**	**379`**

Source: Field survey, 2020

Classification of Cattle Marketers

Marketers were classified into two categories based on the types of jobs they did and the quantities they handled: wholesalers and retailers. Wholesalers are cattle buyers who purchase in bulk. Retailers, on the other hand, are marketers who acquire cattle in small amounts and then sell to end users. However, for the sake of this study, marketers who manage more than 40 herds are classified as wholesalers, while those who handle fewer than 40 are classified as retailers. Girei *et al.* (2013) classified cattle marketers in their study as "the wholesalers or bulk are those that (irrespective of the quantity of the animals) are considered to have uniform weight and thus attract the same average price, while retailers are those that deal with fragmenting the animals into various weights, sizes, breeds, male or female, with each animal attracting different prices to be determined by their above-mentioned attributes.

Analytical Methods

Determining price variations in cattle markets

Hedonic Pricing Model

Zanou *et al.* (2024) investigated the attributes and factors affecting small ruminant price in Benin, West Africa using hedonic analysis. There are several functional ways in which the market price of live cattle and the factors influencing its price might be linked. To evaluate the animal and market factors influencing price variations, this study used multiple regression analysis. The model argues that a product consists of multiple distinct attributes that consumer's value differently. These attributes encourage buyers to buy the goods.

The estimated model was described as follows:

$$P = b_0 + b_1X_1 + b_2X_2 + \ldots\ldots\ldots\ldots\ldots + b_8X_8 + e_1 \quad \ldots (6)$$

Where:

P = Price of the Cattle (₦)
X_1 = Age (years)
X2 = Sex (Male =1; Otherwise = 0)
X_3 = Colour of the Skin (White =1; Otherwise=0)
X_5 = Body Size (Extra Large= 3, Large=2, Medium=1, Otherwise=0)
X_6 = Season (Wet = 1; Otherwise=0)
X_7 = Body Grade ((Good=1; Otherwise =0)
X_8 = Breed Type (White Fulani =1; Otherwise = 0)
X_7 = Location (Far = 1, otherwise=0)
b_o = Intercept
e_1 = Error term

The regression model was implemented in three functional forms: double-log, semi-log, and linear. Based on the magnitude of R2, importance of t-values, F-value, and a priori predictions of the signs and sizes of the regression coefficients, lead equation was ultimately chosen following Gujarati (2003).

RESULTS AND DISCUSSIONS

Price Variation Determinants for Cattle Market in Southwestern Nigeria

Hedonic Price Analysis Results for Wholesalers

The result on table 2 revealed that Age was positively significant at (P< 0.05) relevant in the logarithmic model used in cattle markets in the Southwest, indicating that wholesalers paid more for older cattle. The body size and body grade were significant at (P> 0.1 and P>0.05) respectively and they exhibit positive relationship with price which means the bigger the body size and higher body grade the higher the associated price of the cattle. This result was in line with study of (Wanyoike *et al.*, 2015) who found out that the size and body grade affects the pricing of cattle.

Table 2 also showed that horn length is significant at (P>0.01) with a negative relationship with the price this implies that the shorter the horn length of the cattle the higher the price buyer would offer at the market while the longer the horn the less the price premium. This was in line with the study of (Mohammed *et al.,* 2016). The logarithmic

model's judgment of wholesaler coefficients yield an R^2 value of 0.86, suggesting that the model's components indicated 86% of the total variation in basis is explained by the independent variables of the regression model.

Table 2: Wholesalers' Estimates of Hedonic Cattle Prices

Variable/Parameters	Logarithmic model Coefficient	T-value
Age	0.0391	3.25**
Sex	-0.0020	-0.53
Body Color	-0.0339	-0.82
Body Size	0.5908	9.42***
Body Grade	0.4962	5.43**
Tail Length	-0.0002	-0.01
Horn Length	-0.0076	-2.02*
Season	-0.0053	-1.20
Location	.01713	0.87
Constant	4.9872	111.35
R^2	0.8731	
Adj R^2	0.8641	
P value	0.0000	
No of obs	121	

Source: Computed form survey data, 2020 *= 1%; ** = 5%; *** = 10% significant levels

The Hedonic Model Results for Cattle Retailers

Table 3 shows the results of the cattle retailers' hedonic model where six variables out of nine variables were statistically significant. The result showed that sex of animal, body colour, body size and body grade were positive and significant at (P>0.05) respectively, while age of the cattle was positive and significant at (P>0.1) this means the older the cattle the higher the price at the cattle market. This was also reported in the study of (Baenyi *et al.,* 2020). Also, horn length was positive but insignificant at (P>0.01) that is buyer would pay more for cattle with longer horn.

The Adjusted R^2 for the semi-logarithmic model is 58.76%, indicating that the model reasonably fits the data and that the variables included in the models explained 58.76 percent of the variation in pricing.

Table 3: Estimates for Retailers' Hedonic Regression Model

	SEMI-LOGARITHMS EQUATION	
PRICE OF CATTLE	**COEFFICIENT**	**T-VALUE**
Age of animal	.4296	12.63***
Sex of animal	.0815	2.16**
Body colour	.0311	3.39**
Body size	.0361	2.22**
Body grade	-.0444	2.98**
Horn length	.0331	1.83*
Tail length	-.0012	-0.09
Season	-0.013	-0.04
Location	.01713	0.87
Constant	4.7663	80.14
R^2	0.5876	
F –statistic	26.71	
AIC	-107.1147	
Prob (F- stat)	0.0000	
BIC	-69.84542	

Source: Computed from Survey Data, 2020.
*= 1%; ** = 5%; *** = 10% significant levels

CONCLUSION AND RECOMMENDATIONS

The study revealed that cattle price for both the wholesalers and retailers had better market ground based on the identified variables that influenced cattle market in the southwestern Nigeria. The extrinsic factors of the animal body trait that positively influenced the market price were age, sex, body size, and colour all had a significant impact on cattle pricing, highlighting the necessity of paying great attention to body conformation at sales point.

Based on the study's findings and conclusions, a number of policy implications developed, and important recommendations for enhancing cattle markets in Southwest Nigeria are provided below:

i. The study found that size, age, and body color all affect the price per head of cattle. Adopting subjective pricing techniques will not help marketers get lucrative returns on their investments. Therefore, farmers should identify the extrinsic factor that was pronounced in their market as basis for their price tag.
ii. Since the identified trait at the southwest market are had positive relationship with price, cattle breeders should concentrate on those factors such as body colour, body side, age and sex that will positively increase their customer base and income.

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