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AVERAGE SEASONAL PRICE INDICES, PRICE TRENDS AND FORECASTS FOR LIVESTOCK FEEDS IN OGUN STATE, NIGERIA

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Target audience: Poultry farmers, feed millers and policy makers.

ABSTRACT

The paper examined the seasonal price patterns of livestock feeds in Ogun State, using 1994-1998 average monthly price indices. Livestock feed prices were found to be strong (above annual average price) from July to December, while while they were weak (below annual average price) from January through June. Prices over the years showed an increasing trend. Monthly price forecasts were made for 1999 from May through December using 1999 average monthly price from January to April bench mark for current price level for forecasting 1999 annual average price which was required in forecasting monthly price for the rest of the year 1999.

Key words: Livestock feeds, seasonal price indices, price forecasts.

DESCRIPTION OF PROBLEM

Poultry production has long been recognized to make the greatest contributions towards rapid increase in protein supply in the short run. It is however generally believed that the rate of expansion of this intensive enterprise has been significantly reduced due, among other factors, to high feed cost arising largely from using prices of ingredient, poor quality feeds and inefficiencies in production and distribution. All these effectively militate against increased production in the feed manufacturing industry. Attempts so far made to increase commercial poultry production have been beset by many problems, some of which are inadequate supply of good day old chicks, poor management, poor infrastructure, poor marketing facilities, rising equipment and feed cost. Ikpi *et al* (1) Observed that complete integration in poultry business is essential in order to avoid bottlenecks created by unreliable suppliers of certain inputs like good day-old chicks, housing, feed and other materials. However, experience has further shown that the prices of the inputs themselves, particularly, the prices of feeds, are also important.

Knowledge of the seasonal price pattern of feeds is of great importance of the expansion of the poultry enterprises because through it, efficiency in the industry can be promoted. The Seasonal nature of some feed components, particularly energy sources of maize and guinea corn introduces seasonal pattern into the price of feed. (2) Feed prices tend to be high when these

components are out of season, while they are low when in season. Increasing feed cost erode the profit level of poultry enterpreneurs because the price of their products tends to be pegged. This study therefore investigated seasonal price pattern of livestock feeds in Ogun State with a view to provide information on seasonal price during strong and weak months as well as use the information to forecast future prices in some months.

Knowledge of seasonal price pattern of livestock feeds is important to livestock entrepreneur, feed millers and policy makers for planning and decision making. Feed cost, being the largest component of livestock total cost of production, can be managed to ensure efficient use of feeds through an understanding of the seasonal price pattern of feeds.

Futhermore, anticipation of the price of feeds through price forecast can assist livestock entrepreneur and feed millers to achieve reduced prices for their product using these feeds as inputs. This study therefore focused on seasonal price pattern and price forecasts for livestock feeds.

METHODOLOGY

Given the interest of this work on seasonal price pattern and price forecast, time series data are required. The data used in the study were monthly average retail prices data for livestocks feeds of chick mash, grower mash, layer mash, broiler starter mash and broiler finisher mash from 1994 to 1998, and the those of January to April, 1999. The data were obtained from Animal Care Konsult Services, a major livestock feeds industry that produces livestock feed used in Ogun State and the surrounding states.

Seasonal price index values, defined as average monthly price expressed as a percentage of average annual price, indicates how a given month's average price related to the annual average price and to price in other months (3). This study adopted this concept of seasonal index values to examine seasonal pattern in price of livestock feeds in Ogun State, Nigeria.

Another method of investigation of seasonal price pattern was through the use of sophisticated econometric techiques, which many people who are interested in price forecast do not easily understand because of its sophisitication. The use of index number values allows for easy understanding. The latter method was therefore, adopted in this study for the investigation of seasonal price pattern for livestock feeds and for their price forecast.

The average monthly retail price data of 25-kilogram bag of various livestock feeds were expressed as the percentage of their annual average prices. Five - year average monthly price indices (1994-1998) were used as a measure of the seasonal price pattern. The standard error and standard deviation of each index number are reported in order to give the readers some basis for understanding the consistency of the average seasonal price pattern as represented by the index value.

If P_{my}, P_{y}, I_{my} and I_{m} are average monthly price for month m in the year y, average annual price in year y, monthly price index for month m in the year

y and I_m is average seasonal price index for month m respectively, then,

$$\frac{P_{my}}{P_y} \times 100 = I_{my} \quad \text{.....(1)}$$

$$\sum_{y=1}^{n} I_{my}/n = I_m \qquad m=1,2,3.....12\text{months} \quad \text{.....(2)}$$

Where n is the number of years involved in calculating the average monthly price index numbers. For our study, n = 1,2,3, ...5 years, because five-years average price indices were calculated. That is n=5.

$Sm = (Imy - Im)^2 / n$ .....(3)

while the standard error of the mean index for month m, $S\bar{m}$, is given by,

$$S\bar{m} = sm / \sqrt{n} \quad \text{.....(4)}$$

According to Durojaiye and Aihonsu (4), the strength of seasonal forces in the prices is measured by the degree of coincidence. This defined as the ratio of the number of years in which the actual highhest of lowest price fall in the same or adjacent month as the index high or index low to to the number of years in the series. The study therefore investigated and reported the degree of coincidence of the seasonal price pattern for the various feeds.

At the point of writing this paper January to April 1999 average feed prices (P_{my}) were the most current available prices in the year 1999. They were thus used as benchmark prices of current price level for forecasting current annual average price (P_y*) of each feed required in forecasting average monthly prices as follows:

$$P_y^* = \left\{ \left(\sum_{m=1}^{m} P_{my}/m \right) / \left(\sum_{m=1}^{m} I_m/m \right) \right\} * 100 \quad \text{.....(5)}$$

The expected annual average price was a means to an end. It was needed for the forecast of the monthly average prices of those months whose prices were not used in the forecast of the annual average price. The product of the expected annual average price and the quotient of seasonal price indices and 100 for the months whose prices were predicted provided the estimate of the expected average monthly prices. This follows from equation (1) and (2).

The average seasonal price indices (I_m) together with the forecasted average annual price (P_y*) for the year in which monthly price forecast are of interest, were utilized in making the monthly price forecasts (P_{my}. *) as follows:

The price forecast for month m, of the targeted year y, P_{my}* is given by

$$P_{my}^* = \frac{\bar{I}_m . P_{y^*}}{100} \quad \text{.....(6)}$$

In Table 2, the average annual price forecast for 1999 for the various feed types and the actual for last 5 years (1994-1998) and last year 1998 are given. The product of the expected 1999 average annual price and the seasonal index values reported in Table 1 for each feed type, gave the expected forecasted 1999 monthly seasonal price patterns of Table 3. No report is made for prices for the months of January to April, because the actual values were used in the computation of expected annual average prices, which were used in forecasting the average monthly prices for May to December 1999.

RESULTS AND DISCUSSION

Table 1 reports the seasonal price indices for the various livestock feeds as given by the five-year average price indices of 1994-1998. It also reports the standard errors and standard deviation values for each index number. According to Adam and Trapp (5) a statistical estimate of the amount that an idex value may change with updating, is given by the standard error value of the index in question. The standard deviation value is a statistical estimate of how much one can expect seasonal commodity price variation to deviate in the up-coming year from the average pattern reported by the index. Standard deviation measure indicated that one sixth of historical prices considered were above one positive standard deviation from the mean, and one - sixth were below one negative standard deviation from the mean. Both the standard error and standard deviation are therefore measures of stability, which are useful in alerting that abnormal conditions are occuring or have recently occurred in seasonal prices. The indices needed updating for current position on seasonal price pattern by bringing in the latest indices and deleting the oldest ones because of the possibility of changing seasonal price pattern. In respect of chick mash, the five-year seasonal price index values ranged between 92.53 and 105..56. The trough price was in March while the peak occurred in July. This indicated that March price was 7.74 percent below the annual average while July price was 5.56 percent above the annual average. The price for chick mash weakened from January to June, while it strenghtened from July to December as stratified by average annual price. The indices for the other months, and other feed types can also be similarly interpreted.

In respect of grower mash price, the 5-year average seasonal index values ranged between 96.02 and 105.16. The trough price was in February while the peak price occured in July. The weak price months were from January to June while the strong price month were from July to December as dictated by whether the monthly average price was lower or higher than the annual average price. The trough index of 96.02 in February indicated that February price was 5.98 percent below the annual average price while the 105.16 peak for July indicated that July price was 5.16 percent above the annual average price.

In respect of layer mash price, the 5-year average seasonal index values ranged between 86.1 to 103.34. The trough price was in March while the peak was again in July. Going by the stratification as to whether average monthly price

Table 1: Average Seasonal Price Index numbers (1994-1998) for chick mash, grower mash, layer mash, broiler starter, and broiler finisher mash.

Chick Mash: Retail prices paid by consumers.

	J	F	M	A	M	J	J	A	S	O	N	D
Seasonal Price Index Numbers	92.62	93.08	92.53	97.02	99.04	99.75	105.56	103.99	104.26	104.20	103.56	104.55
Standard Deviation	10.02	10.13	9.79	1.79	2.91	3.57	5.70	5.66	5.56	6.62	5.82	6.00
Standard Error	4.48	4.53	4.38	0.08	1.30	1.60	2.55	2.53	2.53	2.96	2.60	2.68

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Grower Mash: Retail prices paid by consumers

	J	F	M	A	M	J	J	A	S	O	N	D
Seasonal Price Index Numbers	99.66	96.02	96.30	96.67	96.03	97.69	105.16	103.78	102.07	102.57	102.03	104.01
Standard Deviation	7.40	6.31	7.13	6.24	5.11	5.91	4.40	8.41	7.02	7.13	6.33	5.30
Standard Error	3.31	2.82	3.19	2.79	2.28	2.64	1.97	3.76	3.14	3.19	2.83	2.37

Layer Mash : Retail Prices by consumers

	J	F	M	A	M	J	J	A	S	O	N	D
Seasonal price Index Numbers	96.87	96.48	96.17	96.56	98.78	99.16	103.34	102.13	102.13	103.09	102.24	103.05
Standard Deviation	3.22	2.39	1.25	1.92	2.85	3.41	3.78	2.59	2.59	5.21	4.27	4.20
Standard Error	1.44	1.07	0.56	0.86	1.27	1.53	1.69	1.16	1.16	2.33	1.91	1.88

Broiler Starter : Retail Prices Paid by consumers

	J	F	M	A	M	J	J	A	S	O	N	D
Seasonal Price Index Number	97.48	95.14	93.09	93.87	97.62	100.93	106.24	104.35	103.51	103.52	102.13	102.13
Standard Deviation	4.79	4.22	4.17	4.30	4.09	3.19	2.11	4.92	4.88	5.03	3.89	3.89
Standard Error	2.14	1.88	1.87	1.92	1.83	1.43	0.94	2.20	2.18	2.25	1.74	1.74

Broiler Finisher: Retail Prices paid by consumers

	J	F	M	A	M	J	J	A	S	O	N	D
Seasonal Price Index Number	96.34	95.50	95.56	96.65	98.06	101.09	102.80	102.52	102.59	103.40	102.63	102.76
Standard Deviation	6.39	4.84	3.25	4.14	6.41	3.87	5.23	5.57	4.73	4.96	3.63	4.95
Standard Error	2.86	2.16	1.45	1.85	2.86	1.73	2.24	2.49	2.11	2.22	1.62	2.21

is lower or higher than the annual average price, the price of layer mash was weak during the months of January to June, while it is strengthened from July to Decemeber.

The seasonal price index values for the broiler starter mash ranged between 93.09 and 106.24. The trough and peak price months corresponded respectively to the months of April and July. The price of broiler starter mash, weakened between January and May while it was strengthened from June to December.

In respect of the price of broiler finisher, the price index values ranged between 95.50 and 103.40. The trough and peak price month were February and October respectively. Broiler finisher mash price weakened from January to May and was strenthened from June to December.

From the supply side, for all the feeds except broiler finisher, the peak price month was July, while the trough for all the feeds occured either in February, Marsh or April. The consecutive nature of the trough price is noteworthy. It could be the result of late commencement of cropping season in some years among many other factors for maize and guinea corn used in making the compound feeds. Although the July peak price month of most livestock feeds coincided with harvest period of maize and one would expect low feed prices then, it should be borne in mind that millers use dry maize and guinea corn grains stored from previous year's harvest. The attendant make up prices for maize and guinea corn arising from storage, among other factors, explained feed prices peak of July.

The amplitudes of the seasonal index number for the respective chick mash, grower mash, layer mash, broiler starter and broiler finisher were found to be 12.94, 9.14, 7.17 ,13.15 and 7.30. This is a pointer to inefficiency in feed pricing system arising from high storage cost.

The degree of coincidence of the peak price indices for chick mash, grower mash, layer mash, broiler starter, and broiler finisher mash, were 0.60,0.60,0.60,1.00 and 0.60 respectively while that of trough prices were 0.80, 0.60, 1.00, 0.80, and 0.80. The degrees of coincidence are strong enough to support the effect of seasonal forces. This is expected, given that maize and guinea corn which represent over 60 percent of feed component by weight (6) are affected by seasonal price pattern.

From the demand angle, the strong price that existed from July to December for the feeds can also be explained by the demand for the poultry products. The demand for poultry products (eggs and meat), are usually higher durng festivities, particularly Christmas and New-year, because people like to celebrate by giving themselves special menu from eggs and poultry meat on such occasions. The relatively higher feed price during July to December , may therefore, partly be explained by the higher demand for the feeds then, towards getting the poultry products ready for christmas and New year. Pullets day old chicks take between 4 to 5 months to come into lay and by 6

months, most of the birds would be in lay supplying eggs. When the brooding of the day-old pullets commence in July, the goal of getting eggs in December can thus be achieved. This thus partly explains the higher prices (relative to annual average price) for chick mash, grower mash and layer mash from July onwards. The peak price for broiler finisher mash occured in October. Broiler day-old chicks are usually raised for 2 to 3 months for marketable weight. Thus the peak price month of October for broiler finisher mash is partly explained by the targeting of December demand of consumers by the producers.

Table 2 shows that the last five-year average price, (1994-1998) was lower annual average price for 1998 while the forecasted 1999 annual average price was still higher than the previous year's annual average price for all the feeds. Table 3 also shows that the forecasted prices for May to December were all higher than that of the preceding year. This is borne out of the fact that January to April benchmark prices of current price level used in calculating the expected annual prices in 1999 were relatively higher than in the preceding year. All things being equal therefore, the prices that will prevail for the rest of the months in the year 1999 (i.e May to December) vis-a-vis those of 1998 are expected to be higher. The results obtained confirmed this expectation.

Table 2:1 Last 5-year period consumers' average annual price, 1998 consumers' average annual price and 1999 price forecast for feed types in Ogun State, N /25Kg

Feed	Last 5 year average Price (1994-1998)	Last year (1998) Avg. price	Forecasted (1999)Avg. Price
Chick Mash	476.17	550	719.54
Grower Mash	356.00	417.08	539.26
Layer Mash	453.08	512.50	643.65
Broiler Starter	512.67	558.33	753.42
Broiler Finisher	509.92	557.92	703.05

Table 3: Seasonal Price Forecast for May to December, 199 for fedd types in Ogun State, N/25Kg.

Feed	M	J	J	A	S	O	N	D
Chick Mash	713	718	759	748	750	750	745	752
Grower Mash	519	528	568	560	554	554	550	562
Layer Mash	636	639	665	658	658	664	658	664
Broiler Starter	735	760	802	785	779	755	769	769
Broiler Finisher	689	711	723	721	721	727	721	723

CONCLUSION AND APPLICATIONS

1. Going by the stratification of whether monthly price is above or below annual average price, the strong price months were found to be July to December, while the weak price months were found to be January to June generally for all the feeds.
2 Prices were also found to have been on the increase over the years. The major policy implication arising from this study is that the months where intervention can take place for mitigating the high feed prices have been identified.
3. The price of feed ingredients can be focused upon during July to December to ensure that they do not unnecessarily get out of control.
4. Information on seasonal price behaviour of feeds will assit production and marketing decisions by helping producers (millers) to make advantage of regularities in price movement.
5. Farmers (consumers) will also be assited in making purchasing decisions.
6. Provision of compound feeds of right quality to support livestock expansion programme will depend on adoption of certain measured and concerted effort and actions to achieve this.
7. Principal among these measures are the encouragement of production and supply of raw materials especially grains which would enable mills to work at higher efficiency, to ensure all the year round availability and stable price.
8. The prices of imported raw material'(component of feed) such as fishmeal, soybean, and feed additives could be reduced and stabilized by bulk purchasing. Price stabilization could be made more permanent by eventual replacement of these imports with local ingredients.
9. The empirical study therefore provides information on marketing issues about which detailed and objectives information is lacking but which have attracted comments by interested parties.
10. It has contributed to the understanding of seasonal price behaviour of livestock feeds and provided a simple means of anticipating seasonal feed prices.

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