

ANALYSIS OF NIGERIAN MEAT PRODUCTION TRENDS: 1961 - 2004

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ABSTRACT

This paper analyses Nigeria's production trends for chicken meat, beef, goat meat, mutton and lamb, pig meat, and total meat during the 1961-2004 period. The 1961-2004 period is divided into the 1961-1965 and 1986-2004 sub-periods to take into account the country's Structural Adjustment Programme (SAP) that was implemented as from 1986. The FAO time series data, covering the 1961-2004 period, were collected from the internet. The E-Views Student Version software was used to compute relevant descriptive statistics and trend equations. With the exception of pig meat, annual growth rates derived from exponential trend equations drastically declined during the 1986-2004 period. The computed annual growth rate of total meat production declined from 4.50 per cent during the 1961-1985 period to 2.26 per cent during the 1986-2004 period. Policy implications are derived from the study.

INTRODUCTION

Livestock meat provides quality protein that is expected to increase in quantity for human consumption as economic development progresses. In Nigeria's Third National Development Plan 1975-80 (p.67), the Federal Government stated that "the government will seek an increase in caloric intake per caput per day to 2,200 Kcal and a crude protein consumption of between 60 and 65 grammes, as well as adequate proportionate increase of animal protein relative to protein from other sources". The government noted that the livestock products that were facing rising demand were meat, milk and eggs which were quality food.

The Federal Ministry of Agriculture, Water Resources and Rural Development (1988) expected the nation to be self-sufficient in the medium-term (within five years) in the

production of poultry meat, eggs, mutton and goat meat if investment in their production was increased substantially. Self-sufficiency in beef production was expected to be achieved in the long-term. In 2003 and 2004 the Federal Government was still concerned with the issue of food self-sufficiency and in 2004 banned the importation of livestock meat. Udom (2003), from his livestock production analysis, found that total livestock meat production in Nigeria during the 1986-1999 period was significantly less than that of the 1971-1985 period. He was of the view that government policies, from the inception of the country's Structural Adjustment Programme (SAP) in 1986 till the time he wrote his paper, had adverse effect on livestock production.

Time series data are currently available up to 2004. In view of this, livestock meat

production trend analysis is carried out to estimate the annual percentage growth rates for chicken meat, beef, goat meat, mutton and lamb, pig meat, and total meat during the 1961 - 1985, 1986 - 2004 and the 1961-2004 periods.

METHODOLOGY

Since agricultural economic development is a process whereby agricultural productivity increases over a sustained period of time to take account importantly of human population growth, an important parameter of interest is growth rate. The exponential trend functional form is therefore appropriate for the analysis of Nigeria's livestock meat production.

Modelling trend for growth rate analysis

Olayide, *et al.* (1972) employed the linear, semi log, double log, and exponential, trend equations to estimate "compound annual rates of growth of supply" in relation to Nigerian crop production trends. The lead equation from the four functional forms based on the magnitude of the r^2 (coefficient of determination) was used to compute the trend elasticity that was regarded as the compound annual rate of growth. Udom (2003) employed this method in his analysis of Nigerian livestock meat production trends. He later realized that this method was wrong.

In modelling trend for this study, the exponential trend or log linear trend in employed (Diebold, 2004). This functional form is often phrased as "left-side semilog" by many econometricians according to Studenmund (2001). Thus the exponential trend equation for Nigeria's livestock meat production was modelled as follows (equation 1):

$$\ln M_t = b_0 + b_1 t + e \text{ ----- (1)}$$

Where \ln is the natural log of M (Livestock

meat measured in tonnes)

b_0 is the constant term

t is trend measured in years

b_0 is intercept

b_1 is the trend coefficient, and

e is the error term

The trend coefficient (b_1) multiplied by 100 per cent indicates the annual growth rate of M when t increases by one year as can be inferred from the method described by Studenmund (2001, p. 209).

Time series data with respect to M were obtained from the FAOSTAT Database Results in respect of the following Nigerian products: Total meat (M_1), chicken meat (M_2), beef (M_3), goat meat (M_4), mutton and lamb (M_5), pig meat (M_6) and others (M_7 computed as $M_1 - (M_2 + M_3 + M_4 + M_5 + M_6)$).

Descriptive Statistics Employed

Descriptive statistics (the means and their standard deviations) were computed for each of the meat products as well as the percentage share of each meat product with respect to total livestock meat.

Soft Ware Employed for Analysis

The Eview's Student Version software was employed to compute the exponential trend equations by the ordinary least squares (OLS) method. It was also used to compute the descriptive statistics for the 1961-1985, 1986-2004, and 1961-2004 periods.

RESULTS AND DISCUSSION

Table 1: Estimated Mean Annual Quantities (Tonnes) for Different Meat Products in Nigeria During the 1961 – 1985, 1986 – 2004 and 1986 – 2004 Periods

MEAT PRODUCT	1961 – 1985	1986 – 2004	1961 – 2004
Chicken meat	76854.40 (36693.23)	171342.10 (16158.98)	117655.90 (55697.37)
Beef	240924.90 (93010.52)	261243.30 (31702.05)	249698.70 (73162.78)
Goat meat	33328.80 (26683.86)	127975.90 (12984.20)	74199.14 (52124.57)
Mutton and Lamb	17765.60 (9833.79)	66535.53 (24944.69)	38825.34 (30192.49)
Pig meat	32276.76 (9066.09)	136431.50 (37953.28)	77252.66 (58072.15)
Others	91800.00 (492950.4)	105263.20 (9048.28)	97613.64 (11127.62)
Total meat	492950.4 (177497.6)	868844.1 (114301.6)	655268.1 (241923.1)

Note: Figures in parentheses are standard deviations

Table 1 shows the mean annual quantities of the various livestock meat produced in Nigeria during the 1961 1985, 19862004 and 1961 2004 periods. Chicken meat, beef, goat meat, mutton and lamb, pig meat, other types of meat, and total meat produced in the country averaged 76,854.40, 240924.90, 33328.80, 17765.60, 32276.76, 91800.00 and 492950.40 tonnes respectively during the 19611985 period; 171342.10, 261243.30, 127975.90, 66535.53, 136431.50,

194511.40, 105263.20 and 868844.10 tonnes respectively during the 19862004 period; and 117655.90, 249698.70, 74199.14, 38825.34, 77252.66, 113024.50, 97613.64, and 655268.1 tonnes respectively during the 19612004 period. It is apparent from this Table that the structure of livestock meat production in Nigeria changed during the 19612004 period and that the output of the various meat products increased over time.

Table 2: Percentage Contribution of Different Meat Products to Total Meat Production in Nigeria During the 1961–1985, 1986–2004 and 1961–2004 Periods.

MEAT PRODUCT	1961 – 1985	1986 – 2004	1961 – 2004
Chicken meat	14.96 (2.802)	19.86 (1.636)	17.08 (3.398)
Beef	48.73 (3.321)	30.23 (3.120)	40.74 (9.805)
Goat meat	5.82 (2.901)	14.80 (0.995)	9.70 (5.039)
Mutton and Lamb	3.38 (2.270)	7.44 (1.904)	5.13 (2.448)
Pig meat	6.76 (0.781)	15.44 (2.346)	10.51 (4.646)
Others	20.37 (5.368)	12.21 (1.018)	16.85 (5.762)

Note: Figures in parentheses are standard deviations

Table 2 shows the change in the structure of livestock production between the 1961 - 1985 and 1986 - 2004 periods. Chicken meat increased from 14.96% of total meat production during the 1961 -1985 period to 19.86% during the 1986-2004 period. Beef dropped from 48.73% of total meat production during the 1961- 1985 period to 30.23% during the 1986-2004 period. Goat meat increased from 5.82% of total meat production during the 1961-1985 period to 14.80% during the 1986-2004 period. Mutton and lamb increased from 3.38% of total meat production during the 1961-1985 period to 7.44% during the 1986 -

2004 period. Pig meat increased from 6.76% of total meat production during the 1961-1985 period to 15.44% during the 1986-2004 period. Other meat products dropped from 20.37% of total meat production during the 1961-1985 period to 12.21% during the 1986-2004 period. Nigerians invariably would have substituted the different meat products in meat consumption. This would have been particularly the case for beef and "other meat products". The price of beef and "other meat products" is likely to have increased during the 1961-2004 period much more than that of the major livestock

Table 3: Estimated Annual Percentage Growth Rates for Different Meat Products in Nigeria During the 1961 - 1985, 1986 - 2004 and 1961 - 2004 Periods

MEAT PRODUCT	1961 - 1985	1986 - 2004	1961 - 2004
Chicken meat	6.78	1.33	4.41
Beef	4.38	1.31	1.36
Goat meat	11.93	1.77	7.97
Mutton and Lamb	7.50	6.53	6.59
Pig meat	3.31	4.79	5.81
Others	0.91	1.12	0.72
Total meat	4.50	2.26	3.07

Table 3 results are derived from Tables 4-6.

Table 4: Estimated Exponential Trend Equation Results for the 1961 - 1985 Period

Dependent variable	Constant	Trend	r ²	Adj r ²	F	DW
ln M ₁	12.46584 (393.7415)*	0.04499 (21.1257)*	0.9510	0.9489	446.2969*	0.6782
ln M ₂	10.25198 (429.3167)*	0.06777 (42.19186)*	0.9872	0.9867	1780.153*	0.8351
ln M ₃	11.75948 (205.6887)*	0.043848 (11.40167)*	0.8497	0.8431	129.998*	1.0571
ln M ₄	8.518847 (276.0003)*	0.119266 (57.44363)*	0.9931	0.9928	3299.771*	0.4398
ln M ₅	8.661516 (280.2458)*	0.075027 (36.08751)*	0.9826	0.9819	1302.308*	0.4248
ln M ₆	9.918163 (313.3134)*	0.033147 (15.66595)*	0.9143	0.9106	245.4217*	0.7078
ln M ₇	11.30440 (366.9056)*	0.009102 (4.391549)*	0.4561	0.4324	19.2857*	0.7173

Note: Figures in brackets are t-statistics

M₁ = Total meat, M₂ = Chicken meat, M₃ = Beef, M₄ = Goat meat,

M₅ = Mutton and lamb, M₆ = Pig meat, M₇ = others,

Asterisk (*) denotes significance at the 1 percent level

Table 5: Estimated Exponential Trend Equation Results for the 1986 – 2004 Period

Dependent variable	Constant	Trend	r ²	Adj r ²	F	DW
In M ₁	13.44123 (959.5430)*	0.022561 (18.36336)*	0.9520	0.9492	337.2129*	0.5424
In M ₂	11.91454 (450.3548)*	0.01328 (5.723524)*	0.6584	0.6383	32.7587*	0.7531
In M ₃	12.33424 (239.3630)*	0.013146 (2.908702)*	0.3323	0.2930	8.4606	0.3596
In M ₄	11.57711 (645.2550)*	0.017730 (11.26730)*	0.8819	0.8750	126.9520*	0.5007
In M ₅	10.38460 (204.4458)*	0.065251 (14.64700)*	0.9266	0.9223	214.5347*	0.6272
In M ₆	11.30809 (403.1958)*	0.047945 (19.49116)*	0.9572	0.9546	379.9052*	1.0566
In M ₇	11.44895 (437.5739)*	0.011195 (4.878524)*	0.5833	0.5588	23.8000*	0.6156

Note: Figures in brackets are t-statistics

M₁ = Total meat, M₂ = Chicken meat, M₃ = Beef, M₄ = Goat meat,

M₅ = Mutton and lamb, M₆ = Pig meat, M₇ = others,

Asterisk (*) denotes significance at the 1 percent level

Table 6: Estimated Exponential Trend Equation Results for the 1961 – 2004 Period

Dependent variable	Constant	Trend	r ²	Adj r ²	F	DW
In M ₁	12.62647 (380.5599)*	0.30680 (23.89053)*	0.9315	0.9298	570.7572*	0.2839
In M ₂	10.53582 (185.9568)*	0.044091 (20.10548)*	0.9059	0.9036	404.2304*	0.0832
In M ₃	12.08121 (175.4586)*	0.013649 (5.121490)*	0.3844	0.3698	26.2297*	0.3607
In M ₄	9.004052 (90.41587)*	0.079685 (20.67330)*	0.9105	0.9084	427.3852*	0.0355
In M ₅	8.759634 (273.9091)*	0.065861 (53.20793)*	0.9854	0.9850	2831.084*	0.3870
In M ₆	9.663506 (176.5179)*	0.058077 (27.40826)*	0.9471	0.9458	751.2126*	0.1409
In M ₇	11.32056 (537.9906)*	0.007193 (8.831244)*	0.6500	0.6416	77.9909*	0.6264

Note: Figures in brackets are t-statistics

M₁ = Total meat, M₂ = Chicken meat, M₃ = Beef, M₄ = Goat meat,

M₅ = Mutton and lamb, M₆ = Pig meat, M₇ = others,

Asterisk (*) denotes significance at the 1 percent level

Table 3 (derived from Tables 4, 5 and 6) shows the estimated annual growth rates of the various meat products during the 1961-1985, 1986-2004, and the 1961-2004 periods. With the exception of pig meat that increased from 3.31% per annum during the 1961-1985 period to 4.79% during the 1986-2004 period, and the "other meat" products that increased from 0.91% during the 1961-1985 period to 1.12% during the 1986-2004 period, the various livestock meat products' growth rates were much lower during the 1986-2004 period than those of the 1961-1985 period. The estimated annual growth rate during the 1961-1985 period was 6.78%, 11.93%, 7.50%, 4.50% for chicken meat, beef, goat meat, mutton and lamb, and total meat respectively. During the 1986-2004 period, the estimated annual growth rate was 1.33%, 1.31%, 1.77%, 6.53%, and 2.26% for chicken meat, beef, goat meat, mutton and lamb, and total meat respectively.

Nigeria's population growth rate of about 3.0% per annum was greater than the

total production growth rate of 2.26% per annum during the 1986-2004 period. Live animals are imported into the country and when slaughtered, contribute to the country's meat production.

POLICY IMPLICATIONS

The nation currently imports or smuggles livestock meat products because the annual growth of livestock meat production is less than the country's population growth rate. Imports or smuggling would be attractive if the domestic price of the products is lower than the domestic price plus the tariff or bribe settlement of customs officials. Banning of imports of livestock products is generally "paper work" because, as observed in Nigerian cities, banned poultry meat for instance, still thrives. The Nigerian government should impose optimum import tariff that should be used to support livestock research and the development of the livestock industry.

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