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## Comparative Economic Analysis of Black and Brown Commercial Layer Strains in Nigeria

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**Abstract:** The present study was carried out to compare the productivity and profitability of two exotic commercial layer strains commonly raised for egg production in Nigeria. They are brown (Isa Brown) and black (Bovan Nera) feathered layer strains. Inputs such as feeds, labor and drugs as well as income generated from eggs produced including money realized from culls (spent layers) were considered for comparative economic analyses. In terms of egg production, brown feathered layers produced  $326 \pm 51.3$  eggs/week and black recorded  $273.12 \pm 36.9$  eggs/week and the difference was statistically different ( $p < 0.01$ ). Brown layers produced more eggs/bird/week during the observed period than black layers. In terms of net returns, brown layers also recorded higher ( $p < 0.01$ ) profitability level than their black counterparts. The brown birds had \$4,345.1 per farm and black recorded \$2,229.5 per farm. The difference was \$2,115.5 in favor of brown layers. The result showed that brown layers are good converters of feeds to eggs, consumed less than black layers and yet produced more eggs than the latter. Brown feathered strain therefore, appeared commercially productive and profitable than black feathered ones.

**Key words:** Strain, exotic, egg, feather, productivity

### INTRODUCTION

In commercial egg laying farming enterprise, the success depends on the total number and size of eggs produced. Commercial layer strains produce eggs for food and egg processing industries. Egg consumption on regular basis can effectively correct nutritional imbalance among vulnerable groups particularly nursing mothers and children (Olawumi *et al.*, 2006). The commercial layer strains reared in this country are bred majorly in Europe and supplied to enfranchised local companies for multiplication. In terms of nutritional value, Ikeme (1990) reported that poultry products ranked second to cow milk and are the most economically viable source of animal protein. Bukah *et al.* (1997) reported that egg industry is the main livelihood stock industry in the Southwestern region of Nigeria. Poultry industry in this region though over four decades old, is still bedeviled with socio-economic problems such as poor marketing mechanism, lack of storage facilities resulting in colossal losses during certain period of the year. There are also the problem of adaptability to the local weather conditions with these imported strains, scarcity of feed ingredients and high cost of other poultry equipments. These factors contribute to high cost of poultry products and the resultant low level of animal protein consumption in Nigeria. There are small, medium and large-scale poultry industries and they provide employment opportunities for both unskilled and skilled labor. Besides, the industry provides quickest returns on investment because of short gestation time required

before a hen lays eggs. However, due to the fluctuating environmental temperature in this country, most of these exotic birds are not able to express their full genetic potential. The black and brown plumage (feather color) layer strains varied in their productive capability and livability in this hot climate. Olawumi (2007) reported that parents of black layer strain had lower mortality rate and more adaptable to hot weather than parents of brown layer strain. The production potential of a good layer strain is better assessed based on the number and size of eggs produced during its lifetime. The price per egg also depends on the size and shell quality of eggs delivered to the market by the farmers. The cost of day-old chicks, equipments, feeds, drugs and other inputs are unbearable and for a farmer to succeed in this enterprise, the most productive layer strain must be reared on the farm in order to achieve the desired maximum profit, repay the loans secured for the business and plan for expansion. Agbam (2005) reported that poultry business is a profitable venture provided improved strains are stocked. The contribution of poultry industry to the agricultural sector in particular and the national economy in general cannot be quantified in view of the aforementioned importance of the poultry industry to the economy. This study was undertaken to assess the profitability and productivity of black and brown layer strains raised for egg production in this country. The objectives are to:

- Evaluate the productive capability of two layer strains for a period of one year in lay.

- Assess the cost, returns and profitability of the two layer strains managed under same housing and environmental conditions.

## MATERIALS AND METHODS

Data on Bovan Nera (black) and Isa Brown (brown) commercial layer strains were collected for this study. The research was carried out at Teaching and Research Farm, University of Ado-Ekiti in Southwest, Nigeria. The city is situated in the region where we have the highest concentration of poultry industries in Nigeria due to its favorable weather conditions. The production of tree crops, root tuber, grains and other arable crops is well reported in this region also. The birds were of the same age (20 weeks) at the commencement of their egg production. They were reared on deep litter system and intensively housed in separate pens under the same roof made up of slate materials. The birds were fed layers mash *ad libitum*, fortified with vitamins and micronutrients. They were dewormed at three months' interval. Antibiotics and vaccines against Newcastle diseases were administered given on regular basis. Daily recordings of egg production were taken on strain basis and this continued until the birds were one year in lay. The study was carried out between September 2007 and August 2008. Data collected included cost of inputs such as feeds, drugs, veterinary services, labor and sales/income from eggs produced by the two strains during the period of egg production. The birds were later sold as spent layers and the revenue generated computed accordingly. These costs and revenue generated were computed separately for the two strains in order to compare the efficiency and net returns to arrive at fair, unbiased judgments.

**The profitability of layer production:** The profitability of layer production was estimated using a budget analysis. This involves the deduction of the total variable costs from the total value of crates of eggs layed to obtain the gross margin for each strain of bird. The total variable costs of production are the cost of point of lay of birds, labor, feed, veterinary services and drugs.

$$GM_i = \sum_{i=1}^n P_i Y_i - C_i \quad (1)$$

Where

- $GM_i$  = Gross margin of strain  $i$
- $P_i$  = Farm gate price of crate of egg of strain  $i$
- $Y_i$  = Total number of crates of eggs layed by strain  $i$
- $Q_i$  = Farm gate price of crate of egg of strain  $i$
- $Z_i$  = Total number of culled layer of strain  $i$
- $C_i$  = Total variable cost of incurred on strain  $i$
- $i \dots n$  = Total number of farms

**Productivity of layer production:** To determine the average productivity of the inputs used in production, three indicators were used to assess Feed, labor and veterinary services productivities. These productivities are estimated as:

$$\text{Feed productivity} = \frac{\text{Total quantity of eggs produced}}{\text{Quantity of feed in kg}} \quad (2)$$

$$\text{Veterinary services productivity} = \frac{\text{Total quantity of eggs produced}}{\text{Cost of veterinary services in US\$}} \quad (3)$$

## RESULTS AND DISCUSSION

The mean weekly egg production for the black strain is 273.12 eggs while it is 326.35 eggs for the brown strain. The difference is significant at 1% (T statistics = 6.182). Table 1 and Fig. 1 clearly demonstrates that the brown strain records higher egg production than the black strain for almost all weeks. Previous researchers had reported significant strain differences in laying pattern of commercial layers. The result of this study therefore confirmed the findings of Charles and Tucker (1993) and Yakubu *et al.* (2007) which reported that egg production differed among strains of layers. In contrast, however, Hossain (1992) reported no significant strain effect on egg production.

Table 1: Mean weekly egg production per farm for black and brown layer strains

Strain	Mean	S.D.	Min.	Max.
Black	273.12	36.9	107	321
Brown	326.35	51.3	110	391

S.D. = Standard Deviation. Min. = Minimum. Max. = Maximum

Table 2 presents the costs and returns of the strains of layers per farm and per bird. The difference in gross revenue is \$1,019 with the brown strain having higher gross margin than the black strain and is significant at 1%. However, the gross revenue per bird is higher by \$0.30 in favor of the black strain but not significantly different. Although the cost of point of lay for the two strains are same, the cost of feed differs significantly because the quantity of feed consumed per bird by the brown strain is lower than that of the black strain thus resulting in a lower total variable cost for the brown strain. The cost of feed per bird is also lower which increases the net revenue realized per bird and for the whole farm. The gross margin for the brown strain shows a difference of \$2,115.6 for the whole farm and is significant at 1%. The difference per bird is \$28. This analysis also shows the superiority of the brown layers over the black layers.

The partial productivities reveal higher productivities for the brown strain as compared with the black strain as shown in Table 3. The productivity of feed for the brown strain is more than twice that of the black strain

Table 2: Costs and returns for black and brown layers in US \$

Items	Bovan Nera (Black)		Isa Brown (Brown)	
	Per farm (50 Birds)	Per Bird	Per farm (60 Birds)	Per Bird
<b>Gross Revenue</b>				
Sale of Eggs	2,248.9	44.9	2,674.7	44.5
Sale of Culled Layers@74weeks	2,966.1	59.3	3,559.3	59.3
Total	5,215.0	104.2	6,234.0	103.9
<b>Variable cost</b>				
Cost of point of lay @ N800.00/pullet @ 20weeks	338.9	6.8	406.8	6.8
Cost of Feed	2,447.2	48.9	1,286.0	21.4
Cost of drugs and veterinary services	46.9	0.9	43.6	0.7
Labor cost per year	152.5	3.1	152.5	2.5
Total	2,985.5	59.7	1,888.9	31.4
Gross Margin	2,229.5	44.5	4,345.1	72.5

\$1 = N118

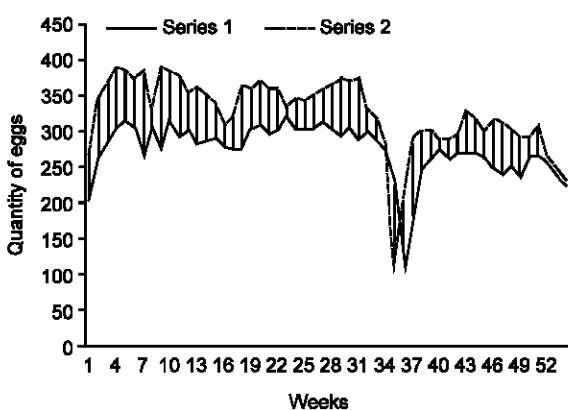


Fig. 1: Trend in egg production in black and brown layer strains, series 1 is for black strain while series 2 is for brown strain

Table 3: Estimated productivities for black and brown layers

	Bovan Nera (Black)	Isa Brown (Brown)
Feed (number of eggs/kg)	2.8	6.4
Vet services (number of eggs/\$)	1.5	1.7

implying a higher feed conversion of the brown strain. The productivity of veterinary services though higher for brown strain is not significantly different.

In all, the analysis reveals that the brown layers are more profitable and are good converters of feeds to eggs than the black layers. This result is in agreement with the findings of Zaman (2002) who reported differences in feed consumed and accruable net income between strains. In the same vein, Hossain (1992) reported a significant ( $p < 0.05$ ) effect of strain on gross profit among three strains kept under intensive management.

The overall results on egg production, profitability and partial productivity reveals that the brown strain records higher feed conversion and production under same breeding conditions than the black strain. Similarly, it gives higher profit and productivity. It is therefore recommended that the brown strain should be promoted among farmers to increase their incomes and productivities.

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