BREAK-EVEN ANALYSIS AND COMPARATIVE PROFITABILITY OF INTENSIVELY MANAGED FOUR STRAINS OF COCKERELS IN A HUMID TROPICAL ENVIRONMENT.

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ABSTRACT

Two hundred and forty (240) day-old cockerel chicks – 60 birds each of the Nera (Treatment I), Bovan (Treatment II), Harco (Treatment III) and local Nigerian (Treatment IV) strains were used in comparing their costs, returns and Break-Even Point under intensive management over a period of 28 weeks. Mean terminal live-weight ranged from 1662.50+122.65-2640.0+43.17g. The Bovan weighed highest but non-significantly (P>0.05) from the Nera and Harco but differed significantly (P<001) from the local cockerel in terminal weight. The cost of production and the revenue generated ranged from N803.52 – N980.68 and N961.90 – N1311.90, respectively per bird and differed significantly (P<0.05). The cost of production and revenue generated was lowest for the Nigerian cockerel. However, a net profit range of N158.38 – N394.11 per bird was recorded while return to Naira invested in the short and long-run ranged between 3-6k and 20-43k, respectively. The Break-Even Quantity was estimated to be 13.73-25.49.
This study revealed that the Bovan strain gave the highest short-run and long-run returns on investment and that intensive cockerel production is marginally profitable. Large scale production levels of more than a thousand birds may be the appropriate starting number for any strain to enhance profit level.

KEYWORDS: Cockerels, Comparative profit, Break-Even Point, Intensive management, Humid environment.

INTRODUCTION

The consumption of animal protein in the 21st century is decreasing at an alarming rate despite the level of technology and breed advancement. According to Nworgu and Egbunike, (1999), poultry is regarded as a means of livelihood and a way of achieving a certain level of economic independence. As such, the poultry industry occupies an important position in the supply of animal protein to the Nigerian teeming population (Nwajiuba et al, 2002). Unfortunately, Nigeria still remains amongst the least consumers of animal protein in Africa inspite of her enormous natural human resources (Egbunike, 1997). The average Nigerian cannot afford the Food and Agricultural Organization (FAO, 1988) animal protein recommendation of 35g/ head/ day. This problem is aggravated by the high cost of production, its uncertainty status and the emphasis being placed mainly on broiler production as a source of poultry meat. This situation therefore calls for alternative meat production.

Cockerels as by-products of hatchery operations can be used to augment this meat demand. They are cheaper to procure at day-old and are relatively hardy.

Several studies have been reported on the use of cheaper or unconventional feedstuff as partial or complete replacement for the expensive feedstuff in the diets of monogastric animals toward reducing cost of production (Eshiett and Ademosun, 1981; Aina, 1990; Adeleye and Odunsi, 1990; Esonu and Udedibie, 1993; Salami and Oyewole, 1994; Salami, 1999; Abiola and Tewe, 1992; Bashir et al, 2002 and Abiola and Tewe 2003).

However, reports indicating the economic implications of using the conventional or unconventional feedstuffs in cockerel production are limited (Abiola and Tewe, 2003 and Nworgu et al, 1997).

This study therefore was designed to investigate and compare the economic implications of rearing four strains of cockerels with a view to ascertaining which of the strains is economically more profitable using conventional feeds in a humid tropical region.

MATERIALS AND METHODS

The research was carried out in the University of Calabar, Faculty of Agriculture Teaching and Research farm, Calabar, in the South South Zone of Nigeria. A total of two hundred and forty day-old cockerels of four strains comprising of sixty chicks per treatment from the Nera (Treatment I), Bovan (Treatment II), Harco (Treatment III) and local Nigerian birds (Treatment IV) were used. The birds were raised in a deep litter system. Water and feed of known quantity were given ad libitum. Vaccination and medications similar to those given to laying birds were administered as highlighted by Onifade and Babatunde, (1996). Commercial feeds (vital feeds) were fed to the birds throughout the research period of twenty eight weeks.

Weekly body weight was measured for all the birds as well as terminal mean live weight per strain recorded. Similarly, feed consumed was measured daily by subtracting the quantity of left-over feed from the known quantity given and the weekly mean consumption recorded. All expenses incurred during the research were also kept. Equipment and housing cost were determined as 10% of their total cost (Oluyemi and Roberts, 2000). This is in line with the principles of annual depreciation of fixed assets. Total cost of production (TC) and Total revenue (TR) derived and Break Even Quantity (BEQ) were evaluated using these formulae (Jgingan, 1997).

1. $TC = D.oc + Fdc + Mc + Lc + DC$

2. $TR = QbPb + QmPm$

3. $\pi = TR - TC = TR - TVC - TFC$

4. $RNI = \pi/TC$

5. $BEQ = \dfrac{TFC}{Price - AVC}$

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Where:

TC	=	Total cost
TFC	=	Total Fixed Cost
TVC	=	Total Variable Cost
D.OC	=	Day-old cost
Fdc	=	Feed cost
MC	=	Medication cost
Lc	=	Labor cost
Dc	=	Depreciation cost
TR	=	Total Revenue
Qb	=	Quantity of birds
Pb	=	Price of birds
Qm	=	Quantity of manure
Pm	=	Price of manure
π	=	Profit
RNI	=	Return to Naira Invested
BEQ	=	Break Even Quantity
AVC	=	Average Variable Cost

Data collected were analyzed using simple statistical tools such as percentages, means, standard error of means and Break Even Analysis. Results were tested for significance using Analysis of variance and least squares design techniques. (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Some performance characteristics of the four strains of cockerels are given in table 1. Mean terminal live-weight and dressing percentage ranged from $1662.50 \pm 122.65 - 2640.00 \pm 43.17g$ and $62.71 \pm 6.30 - 70.42 \pm 0.65\%$, respectively. These values are higher than those earlier reported (Aina, 1990; Awesu et al, 2000 and Abiola and Tewe, 2003) using cheaper diets at the same age. This finding thus implies that cockerels' performances are enhanced using conventional diets.

TABLE 1: SOME COCKERELS PERFORMANCE CHARACTERISTICS
TREATMENTS

PARAMETER	I	II	III	IV
Mean day-old weight (g)	42.59 ± 0.64^a	45.49 ± 1.81^a	46.00 ± 1.33^a	35.74 ± 2.29^b
Mean terminal live weight (g)	2507.50 ± 70.22^a	2640.00 ± 43.17^a	2625.00 ± 53.87^a	1662.50 ± 122.65^b
Average feed intake (g)	75.29 ± 5.98^c	78.90 ± 6.29^b	84.53 ± 0.63^a	61.39 ± 5.98^d
Total feed consumed (g)	2108.12 ± 23.92	2209.20 ± 25.12	2366.84 ± 22.05	1718.92 ± 32.12
Feed: Gain	12.23 ± 5.75	7.61 ± 1.83	10.66 ± 2.48	15.85 ± 3.71
Dressed percentage (%±SEM)	70.05 ± 0.45	69.40 ± 0.40	70.42 ± 0.65	62.71 ± 6.30

Different superscripts (a, b, c and d) along the same row indicate significant (P<0.001) differences.

Source: (Field Work)

KEY

I	-	Nera (Black Cockerel)
II	-	Bovan (White Cockerel)
III	-	Harco (Spotted Cockerel)
IV	-	Indigenous Cockerel

Table 2 reveals that housing, equipment, Day-old chicks, drugs, vaccines and feeding are major cost items incurred in intensive cockerel production. Total cost of production per cockerel ranged from N803.52 - N 980.68. Cost of day-old chicks and feed cost were the inputs which varied and differed (P<0.05) significantly between cockerel's strains. The Harco cockerel (Treatment III) gave the highest cost while the local birds (Treatment IV) had the least cost. Revenue and profits generated ranged from N 961.90 - N 1311.90 and N 158.38 - N394.11 per bird, respectively. The exotic cockerels sold for the same amount per live weight, per bird. However, higher profit was significantly (P<0.05) realized from the Bovan (Treatment II) cockerels. The local Nigerian cockerel had the least revenue and profit but a higher value of N 873.91 per kilogram of live weight. This higher sale price and market preference could be due probably to the general belief by the populace that the local bird is tastier in addition to the colour preference of the meat, hence the higher price tag per kg live –

weight. Returns to each Naira invested in the short and long-run ranged significantly (P<O.05) from 3-6 kobo and 20-43k, respectively. The Bovan cockerels (Treatment II) equally had the highest returns in the short and long-run with the least returns from the Nigerian cockerels (Treatment IV). This study implies that the Bovan cockerels are more profitable to rear compared to the other strains. The Break Even Quantity ranged from 13.73 to 25.49 and differed significantly (P<O.05) between treatments. (Table 2). This is the point of zero profit also known as the no profit, no loss or profit – beginning point. The farm begins to make profit above this production quantity. A minimum of 13-14 cockerels would be required for profit to be made in the exotic cockerels while 26 in the local strains at any given time.

The percentage contribution of each input of production is given in Table 3. The cost of feeding rated highest ranging from 65.14 - 73.48%. Other variable costs include; day-old chicks (2.72 – 8.49%), labour (6.32 - 7.71%), medication (4.20

TABLE 2: COSTS AND RETURNS (N PER BIRD) INVOLVED IN THE PRODUCTION OF FOUR STRAINS OF COCKERELS

ITEM	TREATMENTS I	II	III	IV
FIXED COST				
HOUSING	81.95	81.95	81.95	81.95
EQUIPMENT	35.00	35.00	35.00	35.00
Total fixed Cost	116.95	116.95	116.95	116.95
Variable cost:				
Day-old chick	80.00^a	25.00^d	40.00^c	60.00^b
Medication	41.17	41.17	41.17	41.17
Feeding	614.97^b	672.70^b	720.59^a	523.43^c
Labour	61.97	61.97	61.97	61.97
Total variable cost	825.11	800.84	863.73	686.57
Total cost	942.06^b	917.79^b	980.68^a	803.52^c
REVENUE:				
Manure	11.90	11.90	11.90	11.90
Sales of birds/live weight	1300.00	1300.00	1300.00	950.0
Total Revenue	1311.90^a	1311.90^a	1311.90^a	961.90^b
Sale of birds/kg	646.14^b	626.16^c	679.24^b	873.91^a
Profit	369.84^b	394.11^a	331.22^c	158.38^d
Short-run returns on investment	0.05^b	0.06^a	0.05^b	0.03^c
Long-run returns on investment	0.39^a	0.43^a	0.34^a	0.20^b
Break Even Quantity	14.41^b	13.73^b	14.37^b	25.49^a

Different superscripts (a, b, c and d) along the same row indicate significant (p< 0.05) differences.
Source: (Field Work)

TABLE 3: PERCENTAGE (%) CONTRIBUTION OF INPUTS UTILIZED IN PRODUCTION

ITEM	TREATMENTS I	II	III	IV
INPUT				
HOUSING	8.70	8.93	8.36	10.20
EQUIPMENT	3.72	3.81	3.57	4.36
TOTAL FIXED COST	12.42	12.74	11.93	14.56
DAY-OLD CHICKS	8.49	2.72	4.08	7.47
MEDICATION				
FEEDING	4.37	4.49	4.20	
LABOUR	68.15	73.30	73.48	
	6.58	6.75	6.32	
				5.12
				65.14
				7.71
TOTAL VARIABLE COSTS	87.58	87.26	88.07	85.44

Source: (Field Work)

– 5. 12%). This put total variable cost at 85.44 – 88.07%, thus constituting a substantial part of total cost. The fixed cost items, housing and equipment ranged from 8.36 – 10.20% and 3.57 – 4.36%, respectively. Total fixed cost accounted for 11.93 – 14.56% of total cost. These results agree with those of Larry (1993) and Aworgu et al, (1997) who reported that high cost of inputs especially feeds and day old chicks limit the opportunity and the amount of poultry production in Nigeria as feeds alone accounted for 60 – 70% 0f total production cost. In the same vein, Ogunfowora, (1984); Oluyemi, (1984); Babatunde, (1993) and Alabi et al; (1999) had reported 70% feed cost of total cost of intensively produced livestock. On returns to Naira, Nwajiuba et al, (2002) reported a 6 kobo returns in broiler production. This indicates that even in

cockerel production especially the Bovan, despite the time duration, possesses similar return to the broiler. These results show that intensive cockerel production using conventional feedstuff improves their performance.

The gain, however, can be improved through positive measures towards reducing cost of production such as continuous search for alternative sources of feeds.

CONCLUSION

Bovan cockerels have the highest return amongst the four strains studied. Day-old chicks of the Bovan cost only ₦25 compared to ₦80.00 for the Nera cockerel for example, i.e. 31.3% the cost of Nera day-old birds. For an investor with low capital outlay, it is advisable that the Bovan cockerels should form his production stock. Profit from the Bovan is ₦394.11 per bird compared to ₦369.84, ₦331.22, and ₦158.38 for the Nera, Harco and local Nigerian cockerels, respectively.

The Bovan also gave the highest short-run and long-run returns on investment. These figures were 6k and 43k to the Naira, respectively. Large scale production levels of more than a thousand birds may be appropriate starting number for any strain to enhance profit level in commercial enterprise while 13-14 exotic and 26 local birds will be needed to make profit by the rural community.

REFERENCES

Abiola, S.S. and Tewe, O.O., 1992. The effect of Cocoa Husk on the performance of Cockerels. *Journal of Agricultural Science and Technology*, 2 (2): 131-134

Abiola, S. S. and Tewe, O.O., 2003. Effect of Replacing Cocoa Husk for Wheat bran on internal Organs, Carcass Yield, Serum Metabolites and Economic of Production of growing Cockerels. *Nigerian Agricultural Journal*, 34: 110-115

Adeleye, I.O. A. and Odunso, A.A., 1990. Utilization of Rubber Seed Meal as a Protein Supplement in Broiler Finisher Rations. Nig. J. Animal Prod; 17 (1 and 2): 23-28.

Aina, A.B. J., 1990. Replacing Maize with Cassava Peels in Finisher Ration of Cockerels. The Effects on cut-up Pieces of the Eviscerated Carcass. *Nigerian Journal Animal Production*, 17:17-22.

Alabi, R. A., Aigbiremonlen, J., Oviaassogie, D. I., Ojelede, E.I. Babayemi, O. J. and Isah, O.A., 1999. Economic Analysis of Returns and Cost Structure in Poultry Industry in Edo State. *In Proceedings of 4th Annual Conference of Animal Science Association of Nigeria*. Ibadan, Sept. 14-16.

Awesu, J. R. Bamgbose, A. M., Oduguwa, O. O. Fanimo, A. O. and Oguntona, E.B., 2000. Utilisation of rice milling waste in diets of Cockerel finishers. In: Proc. 25th Ann. NSAP Conf. Umudike 19-23 March; 201-204.

Babatunde, G. M., 1993. The Tottering Nigeria Livesstock Sector: its Problems and Possibilities. An Inaugural Lecture, Ibadan, Ibadan University Press.

Bashir, Y.A. Abubakar, A and Nasurrzu, M., 2002. Effect of Replacing Wheat offal with Rumen Digesta in the Diet of Cockerels. Book of Proceedings: 27th Annual Conference. NSAP. Akure, March, 17-21:164-166.

Egbunike, G. N., 1997. What is Animal Science and how can Nigeria get out of Malnourishment? In: Livestock Products (Ologobo, A.D; Iyayi, E.A. Adesehinwa, A. O.K. and Bamgbose, A. M. Eds) Proceeding 2nd Annual Conference Animal Science Association of Nigeria Lagos. Sept. 16-17: 1-12

Eshiett, N. O. and Ademosun, A. A., 1981. Effect of Feeding Cassava Peel Meal to Growing Pullets on their subsequent laying performance. Bulletin of Animal Health Production in Africa. 29: 237-242.

Esonu, B.O. andd Udedibie, A.B. I., 1993. The effect of Replacing Maize with Cassava Peel Meal on the performance of Weaned Rabbits. Nigerian Journal of Animal Production. 20 (1 and 2): 81-85.

F.A. O., 1988. Food and Agricultural Organization Annual Report. Rome, Italy. 32-36.

Jhingan, M. L., 1997, Microeconomic Theory. Vrinda Publications (p) LTD, India.

Larry, E.U., 1993. Broiler Feeding and Management. Poultry International, 32:70-72.

Nwajiuba, C. U, Ekenyen, B.U. and Nwoke, B.C., 2002. The Profitability of Peri Urban Poultry Enterprises in Owerri. Book of Proceedings: 27th Annual Conference NSAP, Akure. March 17-21, 365-368.

Nworgu, F.C. Adebowale, E.A.Oredein, A. O. and Oni, A., 1997. Prospects and Economic of Broiler Production Using two plant protein Sources. In: Animal Production (A. D. Ologhobo, E.A. Iyayi: A. O. K. Adesehinwa and A. M. Bamgbose, eds) Proc. 2nd Annual Conference Animal Science Association of Nigeria Lagos Sept. 16-17 114-125.

Nworgu, F.C., Egbunike, G. N., 1999. Performance Characteristics of Broilers Fed Diets with Soybean Meal and Groundnut Cake as Protein Sources. Tropical Animal Production Investigation, 2: 51-59

Ogunfowora, O., 1984. "Structure, Costs and Rations in Feed Mills". Paper Presented at the Feed Mill Management Training Workshop. Department of Agricc economics, University of Ibadan. 10 April –2 May.

Oluyemi, J. A., 1984. "Techniques for Feed Formulation". A Paper Presented at the Feed Mill Management and Training Workshop. Department of Agric. Economics. University of Ibadaan. 10 April-2 May.

Oluyemi, J. A. and Roberts, F. A., 2000. Poultry Production in Warm Wet Climates. 2nd Edition. Ibadan, Spectrum Book Limited.

Onifade A. A. and Babatunde, G. M., 1996. Supplemental value of Dried Yeast in a High Fibre Diet for Broiler Chickens. Journal of Animal Feed Science and Technology. 62:91-93.

Salami, R. I., 1999. The use of two Empirical Methods of Substituting of Feedstuffs; Parboiled Cassava Peel and Meal Versus Maize in the Diets of Growing Cockerels. Nigeria Journal of Animal Production 26:78-83.

Salami, R. I. and Oyewole, S.O.O., 1994. Replacement of Fish Meal by Sun-Dried Poultry Visceral Offal Meal in the Diets of broiler starter and finishers. Journal of Production Resource 14:1-12.

Steel, R. G. O. and Torrie, J. H., 1980. Principles and Procedures of Statistics 2nd Edition. London, McGraw Hill Publishers.