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Economics of Inclusion of Essential Oils in Broiler Feed

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Abstract

The need to produce more high quality protein has led efficacious means of supporting healthy bird performance through the use of certain feed additives including essential oils. The main objective of this study is to determine the economics of usage of essential oils in broiler feed production. The specific objectives of the study are to: i. compare the effect of different essential oil on the cost of broiler feed; and determine the effect of essential oil expenditure on broiler weight gain. This study was carried for seven weeks with two hundred and fifty birds obtained at day old. They birds were grouped into five experiments and fed with premix made from essential oil made from one of lemon, maize, soybean, and pumpkin respectively. The fifth experiment comprised of birds that were not fed with essential oil and served as the control group. Descriptive statistics and one-way Analysis of Variance [ANOVA] were used for the analysis of the data. However, use of essential oil increased the cost of broiler feed by a minimum of N109.80, N76.62, N53.30, and N9.84 per broiler for maize, soybean, pumpkin, and lemon essential oil respectively. Essential oils from the different sources increased above the control feed by a range of 0.04 and 0.80Kg in the case of essential oil from lemon and maize respectively and average total weight of live birds increased with the addition of essential oil by 0.08Kg, 0.12Kg, 0.17Kg, and 0.22Kg above the control for pumpkin, lemon, and soybean respectively. Only lemon essential oil produced weight gain per feed expenditure that was higher than control. The differences in weight gain were however not significant. This study concludes that use of essential oil increased feed intake and consequently average total weight of poultry.

Keywords: Essential oils, Poultry feed, Broiler, Weight gain, Quality protein

1. Introduction

1.1: Background to the Study

The challenges of food insecurity and hunger in developing countries including Nigeria have been a source of concern to major stakeholders across the world [7]. The sufficient supply of animal protein is most critical in the global food basket crisis [10]. The role of food security in the development of any country cannot be overemphasized. This is because improvement in its food supply and the gradual elimination of dietary deficiencies normally go hand in hand with economic development [22, 27].

In sub-Saharan Africa, approximately 80% of rural households are engaged in smallholder poultry production [15]. Poultry products have seen the greatest increase in production in recent years [6, 9, 21]. High population growth and growing income [28] have led to increase in demand for poultry meat in recent years across large parts of Africa [10]. Hence, the important role played by poultry production in rural incomes in sub-Saharan Africa including Nigeria [16, 25]. This trend is very likely to continue over the next few years as the consumption of poultry is expected to increase by 200% by 2020 for at least some countries in sub-Saharan Africa [17, 24]. Apart from raising the global demand for animal products, this will offer potential opportunities for livestock farmers across the world [11].

The poultry industry has emerged as the most dynamic and fastest growing segment in the animal husbandry subsector. It represents an important source of high quality proteins, minerals, and vitamins to balance the human diet [23]. In Nigeria, where the

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production of animal protein falls far short of meeting the demands of a rapidly growing population [17], poultry is the most common livestock kept [3].

Despite the fact that it is likely to become the fastest growing agribusiness sector in sub-Saharan Africa, the sector is faced with feed-food competition and dependency on the importation of improved breeds [2]. The need to produce more high quality protein, more quickly against a challenging backdrop has led researchers to look for efficacious means of supporting healthy bird performance through the use of certain feed additives. The use of feed additives to increase the performance of animals, and poultry feeding practices has been very extensively adopted [4,12] not only to stimulate the growth and feed efficiency but to improve the health and performance of birds [1, 8, 20].

In past, several antibiotic growth promoters had been used in poultry feed aiming to prevent disease, to improve growth performance, and to increase some useful microorganism in intestinal microflora. However, because of emergence of bioresistance, researchers are now focusing for alternatives in place of antibiotics [26]. Other alternative products include prebiotics, probiotics, organic acid botanicals, and herbal essential oils [14]. Essential oils have been described as one of the tools available to support the challenges faced by those in the poultry sector [19]. Essential oils (Eos) are found to have antibacterial ability, and also exhibit antioxidant, antiinflammatory, anticarcinogenic, digestion stimulating, and hypolipidemic activities [26]. The EOs which are mixture of fragrant and volatile compounds that usually originate from plant, and are named with the aromatic characteristics considering the origin of plant [18] can be used as growth promoters in animal production [5, 13].

1.2 Objective of the Study

The main objective of this study is to determine the economics of usage of essential oils in broiler feed production. The specific objectives of the study are to:

i. compare the effect of different essential oil on the cost of broiler feed; and
ii. determine the effect of essential oil expenditure on broiler weight gain.

2. Materials and Method

This study was carried for seven weeks. It involved two hundred and fifty birds obtained at day old. They birds were grouped into five experiments for the purpose of this study. Each of the experiments were fed with broiler starter for the first three weeks. Thereafter, each of the birds in four of the experiments was fed with premix made from essential oil made from one of lemon, maize, soybean, and pumpkin respectively. The fifth experiment comprised of birds that were not fed with essential oil and served as the control group. Broiler finishers were then fed to the birds in each of the five experiments for the remaining four weeks. Records of the quantity of the feed and costs as well as the weight of the birds were taken through the period of the experiment. Descriptive statistics and one-way Analysis of Variance (ANOVA) were used for the analysis of the data.

3. Results and Discussion

3.1 Effect of essential oil on broiler feed consumption and weight gain

This section discusses the effect of essential oil on broiler feed consumption and broiler production. The section compares the costs of broiler feed production using essential oil from maize, soybean, lemon, and pumpkin with feed without essential oil as control. Details are as presented in Table 1.

As shown in Table 1, soybean oil produced birds with highest average total weight of 2.72Kg. This was followed by those fed with maize oil with an average weight of 2.67Kg. The essential oils that followed were lemon oil and pumpkin oil with bird's average total weight of 2.62Kg and 2.58Kg respectively. The cost of feeds per unit broiler was estimated at a minimum cost of ₦847.78 without the use of essential oil. However, use of essential oil increased the cost of broiler feed by a minimum of ₦109.80, ₦76.62, ₦ 53.30, and ₦9.84 per broiler for maize, soybean, pumpkin, and lemon essential oil respectively. Table 1 further shows that addition of essential oils from the different sources increased above the control feed by a range of 0.04 and 0.80Kg in the case of essential oil from lemon and maize respectively.

Further analysis revealed that average total weight of live birds increased with the addition of essential oil by 0.08Kg, 0.12Kg, 0.17Kg, and 0.22Kg above the control for pumpkin, lemon, and soybean respectively.

3.2 Effect of Cost of Different Feed Types on Broiler Weight Gain

This sub-section discusses the effect of the cost of essential oil on broiler weight gain. Details of the comparison between the unit cost of the types of feed relative to the use and sources of essential oil and broiler weight gain are as presented in Table 2.

Table 1: Feed Consumption and Weight of Poultry Birds

Source of essential oil	Feed consumption Kg	Cost of feed (N)	Average total weight (Kg)	Weight per unit feed cost (g)
Control	5.99	847.78	2.5	11.04
Maize	6.79	957.58	2.67	10.22
Soybean	6.55	924.40	2.72	10.93
Lemon	6.05	857.62	2.62	11.66
Pumpkin	6.3	891.08	2.58	10.60

Source: Data Analysis (2018)

Table 2: Effect of feed expenditure on live weight of bird

Essential oil Sources	Control	Pumpkin	Maize	Soybean	Lemon
Control	-				
Pumpkin	-0.44g	-			
Maize	-0.82g	-0.38g	-		
Soybean	-0.11g	0.33g	0.70g	-	
Lemon	0.62g	1.06g	1.43g	0.73g	-

As shown in Table 2, expenditure on feed for birds fed with essential from lemon gave the highest weight gain to feed expenditure. The weight gain to unit feed expenditure was higher for lemon essential oil than the control was 0.62g per week. It was 1.06g higher than the weight per unit expenditure for feed in respect of pumpkin essential oil. Similarly, a unit expenditure on feed for the birds feed the maize essential oil was lower than lemon essential oil in term of weight gain for live birds by 1.43g per week. Finally, soybean essential oil had weight gain per unit feed expenditure lower than lemon essential oil by 0.73g. It could be observed that only lemon essential oil produced weight gain per feed expenditure that was higher than control while the other three essential oil produced weight gain per feed expenditure that was lower than the control experiment.

4. Conclusions

Inclusion of essential oil increased feed intake and consequently average total weight of poultry. However, such inclusion increased the average total cost of feed in production. In order to economically efficient, the essential oil sourced from lemon gave the highest average weight per unit feed expenditure. It is therefore recommended that the production of essential oil from lemon should be improved upon and popularized among poultry farmers.

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6. References

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