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HELMINTHIASIS: A SUBSTANTIAL HINDRANCE TO PROFITABLE EGG-PRODUCTION IN THE DOMESTIC FOWL (*Gallus gallus domesticus)*: A CASE STUDY OF COMMERCIAL-POULTRY FARMS IN PORT HARCOURT AND ITS ENVIRONS.

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ABSTRACT

Helminthiasis of the domestic fowl (Gallus gallus domesticus: Galliformes) was evaluated. Its hindrance to profitable table-eggs production by layer domestic-fowl was observed and analyzed. This study, carried-out between July 2012 and December 2012, was conducted amongst commercial poultry-farms in Port Harcourt and its environs, covering the adjourning local government areas in Rivers State (namely; Port Harcourt City Local Government Area, Obio-Akpor, Eleme, Oyigbo and Tai Local. A total of five hundred (500) egg-laying domestic-fowls from various farms were investigated for helminthiasis at post mortem. Three hundred (300) birds were observed to be infected with helminthes in their gastro-intestinal tracts. The helminthes suspected to have caused or contributed to the death and/or poor-performance of the birds in this study) were recovered and identified by a standard procedure. Recovered helminthes were identified as: Nematodes (such as Ascariclia species, Heterakis species and Capillaria species) found in 295 birds, (98%), and cestodes (particularly Raillietina species) found in 5 birds (2%). No trematodes were found. The economic losses associated with helminthiasis in egg-producing domestic fowl production in Port Harcourt and its environs was estimated (based on the prevailing market prices) to be at least ₦65,000,000 per annum.

INTRODUCTION

As is the case in most (if not) parts of the world, the domestic-fowl (Gallus gallus domesticus: Galliformes) and commonly called chicken or simply 'fowl' (according to Smith, 1992; Kekeocha, 1998, and Elenwo, 2012, etc.) is a well-known souirce of valuable animal-protein in Nigeria (Bincan, 1992; Kekeocha, 1998 and Elenwo, 2002). The poultry industry (where the production of domestic-fowl belongs and contyributes over 90%, according to Smith, 1992), greatly contributes nutritionally and financially, to the Nigerian

economy. These contributions stem from the meat, egg. Faeces and other products the domestic fowls supply to humans, other animals and industries, etc.

Based on the above, many Nigerians (including those in Port Harcourt and its environs have taken to domestic-fowl production as a worthwhile venture. This they do either as a source of personal, family or community animal-protein consumption or income. Therefore, a substantial level of as well as local poultry production activities exist in OPort Harcourt and its environs.

Despite the fore-going importance and significance of domestic fowl production, vis-à-vis its economic, nutritional and social importance in the world, Nigeria and the Niger Delta Region in particular, gastro-intestinal parasites have been reported as a major barrier to profitable production of poultry in general and the domestic fowl (i.e chicken) in particular (Shah-Fisher and Say, 1981; Baines, 1979; Soulsby, 1982; Mcnitt,1983; Obioha *etal*,1983; Obanu *et al*,1984;Fraser *et al*,1986; Oyeka,1989; Olaka and Wekhe,1997; Vetech,2000; and Elenwo,2002). Furthermore, Elenwo, (2002), indicated gastro-intestinal parasites as responsible for tremendous losses (to the tune of millions of naira-infact not less than sixty (60) million naira annually (in Port Harcourt and its environs alone). This is in addition to the huge losses in the much-needed animal protein.

These losses and unpalatable experiences as a result of these adverse effects of gastro-intestinal parasites on domestic fowl production has, no doubts, discouraged quite a good number of people from continuing with or even embarking on poultry (domestic fowl) production over time.

There are many veterinary shops and doctors in Rivers State, especially in the area of study, rendering necessary animal-health services which in the opinion of these authors) do contribute to sustainable and (possibly) increasing poultry-production activities in Rivers State, and particularly, the area of study.

In spite of the above, and through cases reported and records kept in the various veterinary centres and clinics in the state, as well as the involvement of these authors in many of the cases of deaths and/or poor-performance of the poultry birds especially the egg-producing domestic fowls, the poultry farms and egg-production in particular are not as productive as they should be. This poor or dwindling performance of the poultry-farms in the area of study has prompted these authors to carry-out a close study on the possible causes and effects of such.

Although many studies have been carried-out by earlier researchers (such as Fabiyi, 1972; Hodasi, 1979; Fakae, *et al*, 1991; Mpoame and Agbede, 1995; Permin *et al*, 1997; Gadzama and Srivastava, 1986; Olaka and Wekhe, 1997; Fakae and Nwalusi; 2000, and Elenwo, 2002) on the parasites of poultry in general and helminthes in the domestic fowl in some cases, not much (if any) has been done in actually addressing and quantifying the hindrance (or its level) of helminthiasis to profitable egg-production in the domestic fowl (*Gallus gallus domesticus*). Based on the number of losses (due to poor performances and deaths) of birds reported for diagnosis of causes of their deaths or poor performances,

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most of which were found with presence of helminthes in their gastro-intestinal tracts, thereby incriminating these worms, and the observation that many of these birds were from the egg-producing stocks (commonly referred to as layers according to Kekeocha, 1998 and Elenwo, 2012), hence the current study and report.

Domestic fowls, according to Elenwo (2002), like other classes of poultry are known to be infected by a number and different types of parasites. However, from the post mortem examinations carried out by these authors, the work is concentrating on the helminth-infections (helminthiasis) of the domestic-fowl as a substantial hindrance to profitable egg-production in the domestic fowl (*Gallus gallus domesticus).*

The aims of this work include appraising the level of helminthiasis in the egg-laying domestic fowl; analysing the hindrance and the extent of such to profitable egg-production.

This is worked out from the productivity of such birds; financial returns or losses to the farmers in Port Harcourt and its environs and the effects on the nutrition of the people, especially in terms of the much-needed animal-protein.

MATERIALS AND METHODS

Commercial poultry production ventures exist across Rivers State Nigeria. However, this study is restricted to Port Harcourt and its environs. Although only very few of these poultry farms stock up to five thousand (5000) birds at a time, the number of farms recorded in the area (over two hundred and fifty of them) is enough to regard poultry production activities in Port Harcourt and its environs as significant.

Moreover, there are quite a good number of homes keeping the local and scavenging chickens in the state. The number of birds involved in the farms in Rivers State ranges between one hundred (100) birds and five thousand (5000) birds. This gives an average of between twenty-five thousand (25,000) and seven hundred and fifty thousand (750,000) birds in the area under study. However, there are some other farmers/keepers with less than one hundred (100) birds. These were not considered in this study.

Five hundred (500) domestic-fowls reported at various times as dead and/or poor-performing were brought to Raph Veterinary Clinic from various farms across Port Harcourt and its environs (adjourning Local Government Areas) in Rivers State of Nigeria. The birds were examined externally, by palpation and post mortem to ascertain the causes of their deaths and/or poor-performances, so as to reverse, stop or (at least)(reduce these causes. These examinations were carried out by these authors as follows:

Virtually all the farms from where the cases were reported were visited. Most of these farms had their birds raised on deep litter. Unfortunately, many of them had damp litters and/or patches of wet-areas, especially around the watering troughs. Over 90% of the birds involved in this study were dead before they were brought for examination/diagnosis. However, a few live-birds were also brought and were sacrificed where it was necessary to do post mortem examination on them.

Whether dead or alive, the birds usually had their history taken. Each bird was placed on the post mortem table and examined

following the procedure recommended by Cornell Univesity's School of Veterinary Studies, reported in Smith (1992) and adopted by Elenwo (2012). In the said procedure, the birds were each and variously dissected and their digestive /alimentary canals examined for any presence and/or lesions of agents and/or other possible causes that could be attributable to the reported deaths and/or poor-performances. Some contents of the gastrointestinal tracts of the birds (such as the digestants and feaces) were also collected and examined accordingly, using standard methods which included concentration, sedimentation, etc. such as used by Olaka (1997) and reported in the work of Elenwo (2002). The helminthes were identified following methods recommended by Soulsby, 1982, Shah-Fischer and Say (1981), Olaka, O.S. (1997). Permin and Hansen,(2005), in addition to the present author's knowledge of the predilection sites, typical characteristics, lesions and signs associated with helminthes found in the study-birds. The helminthes found in the gastro-intestinal tracts were identified based on their sizes, shapes, predilection sites (location) as well as lesions and microscopic examination, following the standards recommended in the references above.

Economic Losses Associated with Helminthasis

These were examined and analysed based on and included:

1. Loss of Expected Eggs from Death of Fowls
2. Loss of Expected Financial Returns from Eggs
3. Loss of Expected Financial Returns from the Birds as Old/ Spent Layer
4. Total of Financial Losses Due to Helminthiasis in Egg- Producing Domestic-Fowl.

Loss of Expected Eggs

Under normal circumstances (good management and no loss of egg-laying birds), one egg-layer produces between 250 and 270 eggs per year. 300 layers lost due to helminthiasis would have laid 300 x 260 eggs (on the average) per year = 78,000eggs =2600 crates.

Loss of Expected Financial Returns from Eggs

As at December 2012, one crate of eggs was sold for ₦800

Cost of 2600 crates = ₦2600 x ₦800 = ₦2,080,000.00

Loss of Financial Returns from Birds (As Old Layer)

As at December 2012, one old layer was sold for ₦1,500.

Cost of 300 layers lost due to helminthiasis = ₦1500 x ₦300 =₦450,000.00

Total Financial Returns Lost Due to Helminthiasis

= loss from eggs + loss from spent/old layers

= ₦2,080,000 + ₦450,000 = **₦2,530,000.00**

This is not the only loss of expected returns from egg-layers had they not died. There are other losses resulting from death of layers due to helminthiasis, such as production cost of impute such as expenses on prophylaxis, utilities, etc and some unquantifiable costs such as labour (especially from farmer and his family) and psychological imput.

RESULTS

The results obtained from this study are as follows:

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Prevalence of Helminthasis

500 domestic-fowls were examined post-mortem for helminthiasis. Out of these, 300 birds (60%) had helminthiasis.

280 (90%) of the 300 birds and 56% of total (500) birds posted were layers. (Table 1 below)

Most of the helminthes found in the lumen of the examined gastrointestinal tract were elongate, cylindrical and tapering at both ends. They were whitish and range approximately between 20mm and 80mm long and about 0.5mm to 2mm in diameter. These were identified as nematodes (roundworms).

The other type of helminthes found were quite long (about 15cm to 20cm) with one end narrower and ending in a small knob-like structure with a diameter of approximately 2.mm, while the other end is a wide/tape-like form. These were identified as tapeworms (Cestodes). No other helminthe-types were found during the examination.

Table 1: Prevalence of Helminthasis in Examined/Posted Dead/Poor-Performing Domestic-Fowls

No. of birds posted/examined	No. of birdswith helminthiasis	No. of layers with helminthiasis	% of birds with helminthiasis	% of layers with helminthiasis
500	300	280	60% (of 500) and	56% (of 500) and 93.33% of 300

Types, Numbers, and % Age of Helminthes Found in the Birds Posted

As shown in table 2 below, two main types of helminthes were found, viz:

1. **Nematodes** (round worms) – most prominent, occurring in 295 birds (59% of 500 examined and 98% of 300 infected birds), No. of layers affected =280
2. **Cestodes** (tape-worms) very few, occurring only in 5 birds (1% of 500 birds examined, and 1.66% of 300 infected birds).
3. No other types of helminthes like **Trematodes** and **Acanthodephala** etc. were found in the birds examined.

Table 2: Types, Numbers and Percentage of Helminthes in Examined Birds.

Type of helinth	Numbers of birds infected	No. of layers infected	% of layers infection out of examined birds	% layer infection in infected birds
Nematodes	295 birds	280 birds	56%	94.30%
Cestodes	5 birds	5 birds	1%	5.70%

Economic Losses Associated with Helminthasis

These include:

1. Loss of Expected Eggs from Death of Fowls
2. Loss of Expected Financial Returns from Eggs
3. Loss of Expected Financial Returns from the Birds as Old/ Spent Layer
4. Total of Financial Losses Due to Helminthiasis in Egg- Producing Domestic-Fowl.

Loss of Expected Eggs

Under normal circumstances (good management and no loss of egg-laying birds), one egg-layer produces between 250 and 270 eggs per year. 300 layers lost due to helminthiasis would have laid 300 x 260 eggs (on the average) per year = 78,000eggs =2600 crates.

Loss of Expected Financial Returns from Eggs

As at December 2012, one crate of eggs was sold for ₦800

Cost of 2600 crates = ₦2600 x ₦800 = ₦2,080,000.00

Loss of Financial Returns from Birds (As Old Layer)

As at December 2012, one old layer was sold for ₦1,500.

Cost of 300 layers lost due to helminthiasis = ₦1500 x ₦300 =₦450,000.00

Total Financial Returns Lost Due to Helminthiasis

= loss from eggs + loss from spent/old layers

= ₦2,080,000 + ₦450,000 = **₦2,530,000.00.**

This is not the only loss of expected returns from egg-layers had they not died. There are other losses resulting from death of layers due to helminthiasis, such as production cost of impute such as expenses on prophylaxis, utilities, etc and some unquantifiable costs such as labour (especially from farmer and his family) and psychological imput.

Moreover, the sum (**₦2,530,000.00)** stated above is only a reflection of financial-losses associated with the deaths and poor-performance of birds that were reported in/to only one veterinary centre/clinic out of over twenty (20) of such and over five hundred (500) poultry ventures in Port Harcourt(going by information obtained from the veterinary division of the Rivers State Ministry of Agriculture, Port Harcourt, in 2012, reported by Ikhiligi (2010). If the cases reported in other veterinary centres/clinics and poultry production ventures in Port Harcourt and its environs were all obtained and included in this study, the losses would be really colossal. Hence, it could be emphatically be said that domestic-fowl losses in poultry ventures(in the study area is not less than sixty-five million naira (N65,000,000) annually., This corroborates the report of Elenwo (2002) and that of Shane (2005) who reported that poultry farmers in the United States of America lose over three hundred thousand US-Dollars annually (a figure that is equivalent to over sixty-five million (65,000,000) naira).

DISCUSSION

Helminthiasis has been described to be ubitiquous by Tudor; (1967), Baines (1979); Olaka and Wekhe (1997) and Elenwo (2000). This infection has also been reported to cause between 40% and 60%

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loss among poultry birds (Shah-Fischer *et al*, 1981; Wekhe and Olanyinka 1999; Elenwo, 2002.). The foregoing has been corroborated by current study which shows between 56% and 60% loss of production and birds. 300 layers out of 500 dead domestic-fowls posted to determine (possible) cause of death, were found to have died of (or harboured) helminthes in their gastro-intestinal tracts (Table 1). 295 birds (94.30%) out of 300 layers had nematodes (round worms) and 5 birds (5.70%) of the layers had cestodes (Table 2).

The losses observed in this study were viewed and analyzed in three ways, viz;

1. Loss of expected eggs from the birds that died:
   78,000 eggs (2,600 crates).
2. Loss of the financial returns expected from the 300 birds that died of helminthiasis (had they not died) =
   ₦2, 080, 000
3. The loss of financial returns that would have come from the birds had they lived up to when they would have been sold off as old or spent layers. = ₦450,000.00.
   On the whole, the financial losses in egg-producing domestic-fowl production in Port Harcourt and its environs due to helminthiais summed up to **₦2,530.000.00**

From the above, the loss associated with helminthiasis in egg-producing domestic-fowls is substantial considering the difference ₦2,530,000.00 can help the farmers and in boosting their business. Moreover, the sum (**₦2,530,000.00)** stated above is only a reflection of financial-losses associated with the deaths and poor-performance of birds that were reported in only one veterinary centre/clinic out of over twenty (20) of such and over five hundred (500) poultry ventures in Port Harcourt(going by information obtained from the veterinary division of the Rivers State Ministry of Agriculture, Port Harcourt, in 2012, reported by Ikhiligi (2010). If the cases reported in other veterinary centres/clinics and poultry production ventures in Port Harcourt and its environs were all obtained and included in this study, the losses would be really colossal. Hence, it could be emphatically be said that domestic-fowl losses in poultry ventures (in the study area is not less than sixty-five million naira (N65,000,000) annually., This corroborates the report of Elenwo (2002) and that of Shane (2005) who reported that poultry farmers in the United States of America lose over three hundred thousand US-Dollars annually (a figure that is equivalent to over sixty-five million (65,000,000) naira).

From this study, its findings and observations, it is obvious that helminthiasis hinders or (at least) reduces the profitability of egg-production ventures in Port Harcourt and its environs.

There are other losses associated with helminthiasis which many not be easily quantified which include cost of labour (especially household), utilities; etc. Expenses on prophylaxis on the birds can also be counted as a loss. These, invariably affect profitability of egg-production not only in the study area but across the nation (if not the tropical world at large). Some of these deaths occurred even in birds that may have been dewormed earlier on. The sum (**₦2,530,000.00)** stated above is only a reflection of financial-losses associated with the deaths and poor-performance of birds

that were reported in only one veterinary centre/clinic out of over twenty (20) of such and over five hundred (500) poultry ventures in Port Harcourt (going by information obtained from the veterinary division of the Rivers State Ministry of Agriculture, Port Harcourt, in 2012, reported by Ikhiligi (2010). If, therefore, the cases reported in other veterinary centres/clinics and poultry production ventures in Port Harcourt and its environs were all obtained and included in this study, the losses would be really colossal. Hence, it could be emphatically said that domestic-fowl losses in poultry ventures(in the study area is financially not less than sixty-five million naira (N65,000,000) annually. This corroborates the report of Elenwo (2002) and Shane (2005) who reported that poultry farmers in the United States of America lose over three hundred thousand US-Dollars annually (a figure that is equivalent to over sixty-five million (65,000,000) naira).

The hindrance of egg production and its profitability by helminthiasis (despite the use of some conventional drugs, in some cases) is no longer in doubts. As such it is recommended to look for ways of stemming this down (if not total elimination) by further research into the activities of the helminthes, the management-systems in the various egg-production farms and/or, more effective but safer and affordable drugs and/or measures by those entrusted with the management of the health, diseases and/or profitable production of animals such as veterinary surgeons.

Those who emback upon poultry-production ventures are encouraged and advised to always seek and emback on management-practices to would redyuce or control if not eliminate the presence, propagation and adverse activities of helminthes in the birds they raise. They should always consult and follow the professional advice, guidiance, recommendations amd prescriptions of qualified, recognized and registered Veterinary doctors that reduce or control helminthiasis and its associated adverse-effects on sustainable profitable domestic-fowl production.

Veterinary doctors, Animal Scientists, Pharmacists, and other related, researchers, professionals and stakeholders in the poultry industry should pull their resources and knowledge together to ensure a sustainable reduction, if not completely elimination of helminthiasis and its adverse effects on profitable poultry production in Nigeria, if not the world in general.

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