SURVIVAL, LIVE AND CARCASS WEIGHTS OF GROWER PIGEONS (*COLUMBA LIVIA DOMESTICA*) EXPERIMENTALLY INFECTED WITH TWO TYPES OF *TRYPANOSOMA SPECIES*

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Abstract

The study evaluated the survival, live and carcass weight of 20 pigeons weighing 215g. The pigeons were divided into 4 groups. Groups 1, 2 and 3 were challenged with 0.2ml inoculum of 2.38×10^6 *Trypanosoma* (*T*) *congolense*, *T. evansi* and a combination of both respectively at 0.1ml each. Group 4 represented uninfected control. Their weights were measured weekly and carcasses of birds were weighed with a digital weighing scale. The survival was monitored daily for 63 days. Data generated were subjected to ANOVA, descriptive statistics and Duncan's pos hoc test. Histogram charts were also constructed. Ethical approval was obtained from University of Jos. Results of carcass weight revealed significantly ($P<0.005$) higher values for groups 1 and 2 than 3 and 4. The live weight and survival were insignificant ($P>0.05$). The descriptive statistics showed that group 4 had the highest maximum live weight and group 3 had the least minimum live weight. The survival period revealed group 4 as having the maximum days while group 3 had the least minimum days. The weekly trend in live weights for all groups revealed fluctuating values from week 2 to week 5 while week 1 was same. The most declines in live weights for groups 1 and 2 were observed at week 4 while group 3 had the least decline in live weight at week 2. In conclusion, the work provided empirical evidences of the negative effects of trypanosomiasis caused by *T. congolense* and *T. evansi* in the domestic pigeon's live, carcass weights and survival.

Key words: Pigeons, Trypanosomiasis, Survival, Live / Carcass weights.

Introduction

Columba livia domestica are domestic pigeons commonly reared around the world including states in Nigeria for several reasons such as for food, pets and experimental laboratory purposes (Agbolosu *et al*., 2021).. Young pigeons kept to grow for meat are called squabs and are able to fly after 30 days of age and some breeds of pigeons bred in Victoria, a state in Australia can attain up to 500g market weight (Bolla, 2007). In Maiduguri, the state capital of Borno, located at the north eastern part of Nigeria, a selected number of male *Columba livia domestica* were reported to have live weight range of 242g to 390g (Saleh, 2021). In parts of Ghana, male pigeons were reported to have higher weight than their female counterparts (Agbolosu *et al*., 2021). The range of healthy pigeon live weight and defeathered carcass weight reported by Agbolosu *et al*. (2021) were 267.77g to 280.30g and 236.20g to 259.13 (g) respectively.

Common diseases affecting pigeons are Chronic Respiratory Disease (CRD), ornithosis, canker, pigeon pox, coccidiosis, tuberculosis, paratyphoid, external parasites infestation (lice and mites) and that of internal parasite is the large round worm (Bolla, 2007). There is paucity of reported cases of trypanosomiasis in domesticated pigeons in Africa, although other poultry domestic birds (such as chicken) and wild pigeons are reported to harbor mild natural trypanosome infections (Mandal, 1991; Akinpelu, 2008 and Gimba *et al*., 2018).

Trypanosoma (*T*) *congolense* and *T. evansi* are non avian trypanosomastidae protozoan blood parasites that naturally affect mammals such as cattle, buffaloes, camels, horses, sheep, pigs and dogs (Scopus, 1987; Wada *et al*. 2015 and Abubakar *et al*., 2016). These trypanosomes are also virulent and pathogenic to rodents such as albino rats and mice frequently used in research laboratories (Ogbole *et al*., 2016 and Salifu *et al*., 2020). There is paucity of reported cases of trypanosomiasis in pigeons and the current study attempts to establish the pathogenicity of *T. congolense* and *T. evansi* experimental infections in *Columba livia domestica* using empiricals from survival, live and carcass weights of the squabs.

Materials and Methods

Thirty (30) weaned pigeons were procured from "Kasua Kaji" market located at Kwararafa, Jos North Local Government Area (LGA) of Plateau State, Nigeria. Twenty (20) of the birds were selected and

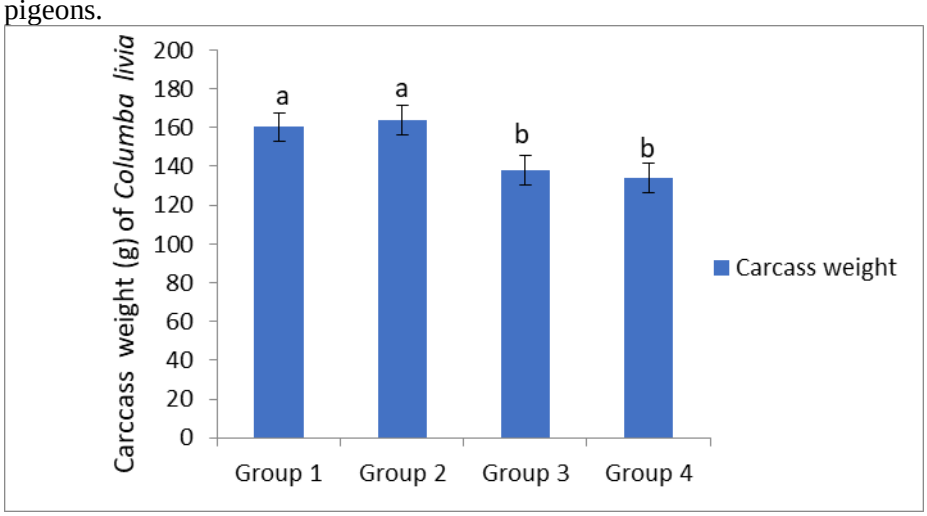
housed in 4 partitions of a metallic constructed cage of 60×30×57cm dimension per partition, with 5 pigeons of mixed sex in the ratio of 3:2 of male and female respectively, placed per partition in a completely randomized design.

They were treated with antibiotics and multivitamins before commencement of the experiment and fed with a commercial pelletized grower feed and potable water *ad libitum*. The experiment was conducted at the livestock division laboratory, Nigerian Institute for Trypanosomiasis Research (NITR) Vom, Plateau State, Nigeria.

The pigeons were divided into 4 groups with groups 1, 2 and 3 challenged with 0.2ml inoculum of 2.38×10^6 *Trypanosoma congolense*, *Trypanosoma evansi* and a combination of both trypanosomes respectively at 0.1ml each derived from 3 parasites viewed per field according to Herbert and Lumsden (1976). Group 4 represented the uninfected control. The parasites were obtained from parasitology division of NITR, Vom where they are stored in liquid nitrogen canisters. The live weights of the pigeons were measured on a weekly basis using a digital weighing scale while whole carcass of birds were also weighed with same digital weighing scale. The survival period was also monitored on a daily basis for up to 63 days. Data generated were subjected to one way analysis of variance (ANOVA), descriptive statistics and Duncan's pos hoc test carried out where there was a significant difference ($P<0.05$) using SPSS 24. Histogram charts were constructed using the 2007 Microsoft excels application. Ethical clearance was received from faculty of pharmaceutical sciences, University of Jos, Nigeria with reference number UJ/FPS/F17-00379.

Results and Discussion

Results of carcass weight revealed significantly ($P<0.005$) higher values of groups 1 and 2 than 3 and 4 as shown in Figure 1. The insignificant ($P>0.05$) difference between the control group 4 and group 3 may have been as a result of the lower inoculum doses of each trypanosome administered to the pigeons.



$P<0.05$, different a, b on bars are significant. I standard error, p-value 0.018

Figure 1. Mean carcass weight of pigeons infected with trypanosomiasis.
Group 1, inoculated with 0.2ml *T. congolense*; Group 2, inoculated with 0.2ml *T. evansi*,
Group 3, inoculated with 0.1ml each of *T. congolense* and *T. evansi*, Group 4, uninfected control.

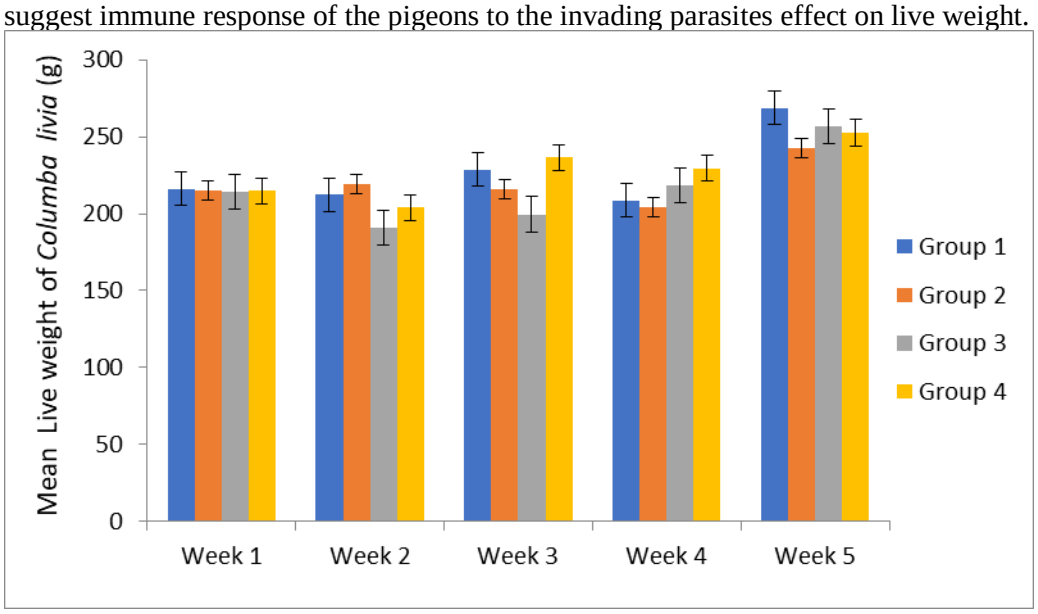
The live weights and survival were insignificant ($P>0.05$). The descriptive statistics showed that group 4 had the highest maximum values and group 3 had the least minimum values (Table 1). Agbolosu *et al*. (2021), reported higher live weight range of 267.77g to 280.30g for healthy pigeons of same species. According to Salifu *et al*. (2020), the least survival of infected control swiss albino mice was 12 days which is 5 days higher than this study. After 63 days observation, all birds died except 1that survived in group 4.

Table 1: Descriptive statistics and ANOVA of live weight (g) and survival (days) in *Columba livia domestica* infected with trypanosomiasis.

Parameters	Groups	Minimum	Maximum	Mean (SE±)	P – value (P>0.05)
Live weight	1	174.75	255.62	216.42±14.66	0.752

(g)	2	181.38	244.52	215.89±10.13	
	3	159.55	243.52	196.16±15.51	
	4	161.65	276.16	211.92±18.37	
	1	12	61	43.8±10.70	
Survival	2	41	61	51.6±4.02	0.46
(Days)	3	7	61	32.8±9.61	
	4	8	63	33.2±12.03	

The weekly trend in live weights for all groups provided fluctuating values from week 2 to week 5 while week 1 was same. The most declines in live weights for groups 1 and 2 were observed at week 4 while group 3 had the least decline in live weight at week 2. These fluctuations in weights strongly suggest immune response of the pigeons to the invading parasites effect on live weight.



I standard error.

Figure 2: Trend of mean weekly live weight of pigeons infected with trypanosomiasis.
Group 1, inoculated with 0.2ml *T. congolense*; Group 2, inoculated with 0.2ml *T. evansi*,
Group 3, inoculated with 0.1ml each of *T. congolense* and *T. evansi*, Group 4, uninfected control.

Conclusion and Recommendation

In conclusion, the work provided empirical evidences of the negative effects of trypanosomiasis caused by *T. congolense* and *T. evansi* in pigeon's live, carcass weights and survival. A further study on multiple incremental doses of inoculum is recommended to ascertain the pathogenicity on the birds.

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