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Haematological and biochemical changes associated with lungworm infections in indigenous pigs in Ago-Iwoye, Ogun State, Nigeria.

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ABSTRACT: Haematological parameters were estimated in eighty uninfected and eighty Lungworms infected indigenous pigs slaughtered in Ago-Iwoye, Nigeria. The mean packed cell volume, haemoglobin concentration and red blood cell count were 42.68%; 12.34g% and 7.77×10^6 cu mm in infected pigs respectively.

There was a significant difference in the white blood cell count of the non-infected group with mean values of 16.06×10^3 cu mm in infected pigs. The fibrinogen value for non-infected and infected were 0.87gm% and 0.41gm% respectively. Albumin-globulin ratio was 0.53 and 0.30 for non-infected and infected respectively.

Lungworm infection is associated with anaemia, low serum protein and serum sodium values and hence low productivity of domestic pigs. Routine de-worming and raising of pigs on concrete floors limits access to earthworm, the intermediate host of lungworm. These exercises are therefore recommended. The results obtained in this study might be useful for the diagnosis, treatment and control of the lungworm infection.

Key Words: Lungworm infections; Haematological indices; Indigenous pigs.

Introduction

The commercial pig production in Nigeria is becoming increasingly important (Olufemi *et al.*, 1981). The pigs have been plagued by poor nutrition, and management practices and diseases (Ayoade *et al.*, 1993) and (Ikheloa *et al.*, 1992). Diseases in pigs may be caused by viruses, bacteria or protozoa. They are also susceptible to internal parasites such as round worms, tapeworms and lungworm, to attack by external parasites such as lice and many of the disease to which pigs are susceptible are highly contagious, so it is important to identify, isolate and treat sick pigs as early as possible.

The lungworm of the domestic pig belonging to the genus *Metastrongylus* spp. Four species are known to occur, of which *Metastrongylus elongates*, *M. pudendotectus*, *M. Salmi* are said to occur in local pigs. The lungworm infection results in irritation, coughing and pneumonia in affected pigs (Soulsby, 1968, Blood and Radostits, 1989).

Prevention of the disease is made by reducing infection piglets to a low level, cleaning the farrowing pen thoroughly with flamegun or disinfection, dose sow 2 weeks before farrowing and 24 hours later, wash her thoroughly with soap water to remove eggs, put sow in clean pen, making sure she does not walk over

infected ground, keep piglets on clean ground until they are 4 – 5 months old, prevent pig pastures from becoming heavily infected with pigs by putting them through a short arable rotation every 3 – 4 years, dose piglets 9 – 10 weeks with appropriate worm medicines.

However, information into the haematology and biochemistry of the host during infection is replete. A number of investigators had supplied information on direct or indirect observation, on the longevity of both the free-living, embryonated eggs and the larvae within the intermediate host enhancing empirical control (Rose, 1959).

More detailed information is necessary if the control measures are to be formulated on a sound basis. With this in mind, preliminary studies on the haematological parameters and biochemical studies in the definitive host have been carried out and recorded in the present work.

Materials and Methods

Blood samples were collected from indigenous pigs slaughtered at Ago-Iwoye Municipal abattoir, twice a week.

Two millilitres of blood per pig; were collected into bijov bottles containing ethylene diamine tetraacetic acid (EDTA) for haematology. twenty millilitres of blood per pig were also collected into sterile universal bottle for serum separation. After the meat inspection, blood from 80 positive pigs for lungworm infection and 80 negative lungworm cases were subjected to haematological and serum analysis.

Packed cell volume was determined using micro-haematocrit method. Total red blood cell count, white blood cell count and platelet count were determined using the improved aleubard Haemocytometer method.

The mean Corpuscular volume (MCV), mean corpuscular haemoglobin concentration (MCHC) and mean corpuscular haemoglobin (MCH) are indices calculated from the values of PCV, HB and RBC (Schalm *et al.*, 1975).

The serum levels of sodium, potassium, total protein and albumin were estimated. Sodium and potassium values were determined by flame photometry using the carning 400 photometer.

Total protein was also measured by the Bivret method (Coles, 1986) and albumin by the method of Doumas *et al* (1971). Fibrinogens were estimated by the heat precipitation refractometer method. The difference between the protein content of the heated and the unheated plasma gives the estimation of the fibrinogen (Coles, 1986).

Thin blood films were prepared and examined for the possible presence of any intercurrent blood parasites. The Student t-test was employed in testing for statistical significance of data (Steel and Torrie, 1980).

Results

As shown in Table 1, the packed cell volume and haemoglobin concentration in non-infected pigs were 42.68% and 12.43gm% respectively, whereas these values were very low in infected pigs.

The Red Blood cell count for non-infected and infected were 7.78×10^6 cu mm and 4.76×10^6 cu mm respectively.

Statistical testing of data revealed a highly significant difference in the white blood cell count of the non-infected and infected groups with mean values of 16.06×10^3 cmm non-infected and 29.66×10^3 cmm in infected.

The plasma protein values for non-infected and infected were 7.89gm% and 8.76gm% respectively and the mean fibrinogen values were also 0.87gm% and 0.4gm% for non-infected and infected respectively.

Albumin, globulin, sodium and potassium for non-infected and infected pigs are shown in Table 2.

The infected pigs had lower values of albumin, sodium and potassium but higher globulin compared to non-infected pigs. No protozoan parasites were detected in the prepared blood films of the slaughtered pigs. Both *Metastrongylus elongates* and *M. Salmi* were identified in the mixed infections in lungs of pigs as well as *Metastrongylus pudendotectus* (Soulsby, 1982).

Table 1: Mean blood values of non-infected and lungworm infected local pigs.

Treatments	PCV %	HB gm%	Plasma Protein	Fibrinogen gm%	WBC x10 ³ cmm	RBC x10 ⁶ cmm	Platelets	MCV.	MCHC	MCH-pg
Non-Infected pigs (n = 80)	42.68±5.15	12.34±1.41	7.89±1.10	0.87±0.49	16.06±6.12	7.78±0.73	360.23±152.03	54.18±9.44	30.73±3.57	16.57±1.97
Infected pigs (n = 80)	28.99±3.72	8.26±1.52	8.76±1.47	0.41±0.20	29.66±12.57	4.70±0.70	4777.22±256.38	62.18±5.40	28.57±3.62	17.60±2.31

Values represent the means ± S.E. Significant at P 0.05.

Table 2: Mean Serum biochemical value for non-infected and infected pigs.

Treatments	Albumin g%	Globulin g%	Algraxco	Na mEq/l	K mEq/l
Non-infected	2.67 ± 0.69	5.08 ± 0.88	0.53 ± 0.14	134 ± 16.12	6.49 ± 1.56
Infected pigs	1.87 ± 0.47	6.64 ± 1.66	0.30 ± 0.14	117.36 ± 19.79	5.65 ± 2.18

Values represent the means ± S.E. Significant at P < 0.05.

Discussion and Conclusion

From this investigation, it is obvious that anaemia and low serum protein occurred in lungworm infected indigenous pigs. This is contrary to the view of some workers (Siegmun *et al.*, 1979) who simply reported that lungworms are of less importance in swine. Most authors are silent on the haematology of pigs infected by lungworms (Taylor, 1989; Blood and Radostits, 1989).

There is high level of infection in local pigs and any group of pigs raised on pasture where earthworms, the intermediate host, are many (Fagbemi *et al.*, 1996). The finding of fall in serum levels of albumin and a rise in the level of serum globulin in the infected pigs are consistent with helminth infections in general (Blood and Radostits, 1989).

It is now obvious that lungworm is one of the most important internal parasites responsible for low productivity of the local pigs in the tropics (Fagbemi *et al.*, 1996). The need for a comprehensive deworming programme and health care need not be over emphasised in management. Where many pigs are raised on pasture, the technology of using irradiated larvae as in vaccination against lungworm in cattle should be exploited and the raising of pigs on concrete floors limiting access to earthworms the intermediate host of lungworms as in the intensive system of husbandry are therefore recommended.

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