



Research Article

PREVALENCE OF COCCIDIA IN SHEEP AT THE BAUCHI ABATTOIR, INKIL, BAUCHI STATE

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ABSTRACT

Coccidiosis is a disease that destroys the intestinal mucosa which is caused by the protozoa parasites of the genus *Eimeria* or *Isospora* species. The symptoms include diarrhoea, fever, weight loss, emaciation and consequently, death. Many infections are subclinical (that is, not severe enough to cause readily observable symptoms). Coccidiosis is an economically important disease of cattle, sheep, goats, pigs, poultry and also rabbits, in which the liver and intestine are affected. In dogs, cats, and horses, coccidiosis is less often diagnosed but can result in clinical illness.

Keywords: Disease, Cattle, Sheep, Goats, Pigs, Poultry.

INTRODUCTION

Eimeria and *Isospora* typically require only one host in which to complete the life cycles. Some species of *Isospora* have facultative intermediate (paratenic or transfer) host. Coccidia are host-specific and there is no cross-immunity between Species (Peter, 2015). Further, it has been discovered that infection by more than one species of gastrointestinal parasites in sheep while grazing is common. Either concurrent or successive infection by coccidia then results in the common mixed infections of GIN and coccidia in grazing sheep. This is one of the most serious constraints challenging the production of grazing sheep. Both of these infections display similar clinical symptoms ranging mainly from digestive tract inflammation, damage to the integrity of gastrointestinal tissues, to nutritional disorders. These result in gradual weight loss, anaemia, limited growth and development, slowed weight gain, reduced efficiency of feed utilization, and exhaustion and even death in sheep in severe cases (Mohammed *et al.*, 2016; Seyoum *et al.*, 2018; Zajac & Garza, 2020).

Infection with *Eimeria* is one of the most economically important diseases of Bovine. Historically, some *Eimeria* species were thought to be infectious and transmissible between sheep and goats, but the parasites are now

considered host specific. *Eimeria crandallis* and *Eimeria ovinoidalis* (ninakohlyakimovae) are pathogens of 1-6 months old lambs; *Eimeria ovina* appears to be somewhat less pathogenic. Older sheep serve as sources of infection for the young. All other *Eimeria* disease of sheep are essentially non-pathogenic, even when large numbers of oocysts are present in faeces (Peter, 2015).

In Mammalia and Aves, infection by this parasite is costly to both the producer (higher feed conversion ratios, depressed growth and increased flock mortality) and the agricultural industry, causing billions of dollars in losses worldwide. Coccidiosis is seen universally, most commonly in young animals housed or confined in small areas contaminated with oocysts. Coccidia are opportunistic pathogens; if pathogenic, their virulence may be influenced by various stressors. Therefore, clinical coccidiosis is most prevalent under conditions of poor nutrition, poor sanitation, or overcrowding, or after the stresses of weaning, shipping, sudden changes of feed, or severe weather. Most animals acquire *Eimeria* or *Isospora* infections of varying severity between 1-12 months old. Older animals usually are resistant to clinical disease but may have sporadic unapparent infections. Clinically healthy, mature animals can be sources of infection to young, susceptible animals (Peter, 2015). A study conducted by Mohamaden *et al.*,

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(2018). Prevalence of *Eimeria* species among sheep and goats in Suez Governorate, Egypt have found that the infection of coccidiosis was affected by season. Of the seasons in which the infection was most prevalent was the summer and autumn seasons, which would correspond to the dry and wet seasons in Nigeria since it does not snow down here. This reflects that all season round there will be a susceptibility of the infection of the *Eimeria* species in sheep in Bauchi.

MATERIALS AND METHODS

Prevalence of Coccidiosis in Bauchi Abattoir

It is no doubt that sheep in the Bauchi Abattoir will be infected with pathogenic and non-pathogenic gastrointestinal nematodes. The reason being that, to a large extent, if not entirely, non-agricultural practices those sheep rearers overlook. And so, the reason is not far-fetched that there will be to a certain extent to which there will be a prevalence of the *Eimeria* specie of the GIN among the sheep slaughtered in the Bauchi Abattoir, Inkil. The extent to which this prevalence reaches is the aim of this study of which the processes underwent to find this out is documented below. Overall prevalence of *Eimeria* infection in sheep faecal samples was collected from selected sheep to determine the prevalence of *Eimeria* infection in the study area. Out of the 70 faecal samples examined, 61 (87.14%) sheep were positive for all types of *Eimeria* oocysts. The research shows how the presence of overall unsporulated non-pathogenic and pathogenic *Eimeria* oocysts and their prevalence was determined. This result shows that Bauchi has a higher prevalence of 87.14% as compared to the prevalence found in the Jos Plateau which has a prevalence of 49.43% in sheep prevalence(Kaze *et al.*, 2020).

Faecal Examination Procedures

Various floatation methods have been used for coccidian oocyst purification of which saturated salt floatation and sheather’s sugar floatation methods are used. But the former has the challenge of repeated procedures which gave inefficient oocyst recovery rate as a continuous challenge. A comparison of both floatation methods gave a 99.3% recovery than the salt’s 35% ($p < 0.05$); (Qi *et al.*, 2020; Rokade *et al.*, 2018). Also, the Sheather’s sugar floatation method was chosen because it has a specific gravity of 1.27 which is most ideal for the suspension of most ova by sedimentation. Basic physics explains that if an oval had a higher specific gravity than the floatation medium will not float and neither will it be detected.

RESULTS AND DISCUSSION

After the oocyst purification and floating due to oxygen and moist, they were sporulated using potassium dichromate solution ($K_2Cr_2O_7$) which is the process of meiosis of the oocyst. (This is usually the stage at which they are ingested by the Bovine). This sporulation enabled the opg count and identification of the various species Below are tables showing the prevalence of the Bovine Coccidiosis in sheep as found in the sheep slaughtered at the Bauchi abattoir, Inkil. Table 1 shows the Prevalence according to species while Table 2 shows the prevalence according to age that is, 0-3 months, 4-6 months, then 7-12 months and even adult sheep because usually, it is older sheep beyond 12 months that are slaughtered under normal circumstances.

Table 1. Showing the percentage prevalence of *Eimeria species* found in the sheep.

Eimeria species	Positive samples	Sheep (n = 70)	
			Prevalence %
<i>Eimeria ovina</i>	13		18.30%
<i>E. parva</i>	6		8.57%
<i>E. pallida</i>	5		7.14%
<i>E. granulosa</i>	4		5.71%
<i>E. ashata</i>	15		21.42%
<i>E. ovinoidalis</i>	3		4.28%
<i>E. faurei</i>	6		8.57%
<i>E. crandalis</i>	16		22.85%
<i>E. intricate</i>	2		2.85%

Table 2. Percentage Prevalence of *Eimeria species* according to age.

<i>Eimeria Species</i>	No. of oocysts measured (µm)	Range of oocyst sizes(µm)	Average length (µm)	Average width (µm)
<i>E. faurei</i>	67	11.45 – 34.35 x 11.45 – 22.90	22.63	18.72
<i>E. intricata</i>	43	32.70 – 45.80 x 21.80 – 45.80	39.11	31.51

<i>E. ovinoidalis</i>	82	10.90 – 22.90 x11.45 – 22.90	16.90	18.72
<i>E. pallida</i>	11	10.90 – 11.45 x10.90 – 11.45	11.18	11.80
<i>E. granulosa</i>	52	22.90 – 32.70 x11.45 – 21.80	25.50	20.70
<i>E. ashata</i>	24	32.70 – 57.25 x11.45 – 45.80	42.74	51.80
<i>E parva</i>	22	10.90 – 11.45 x10.90 – 22.9	11.18	15.08

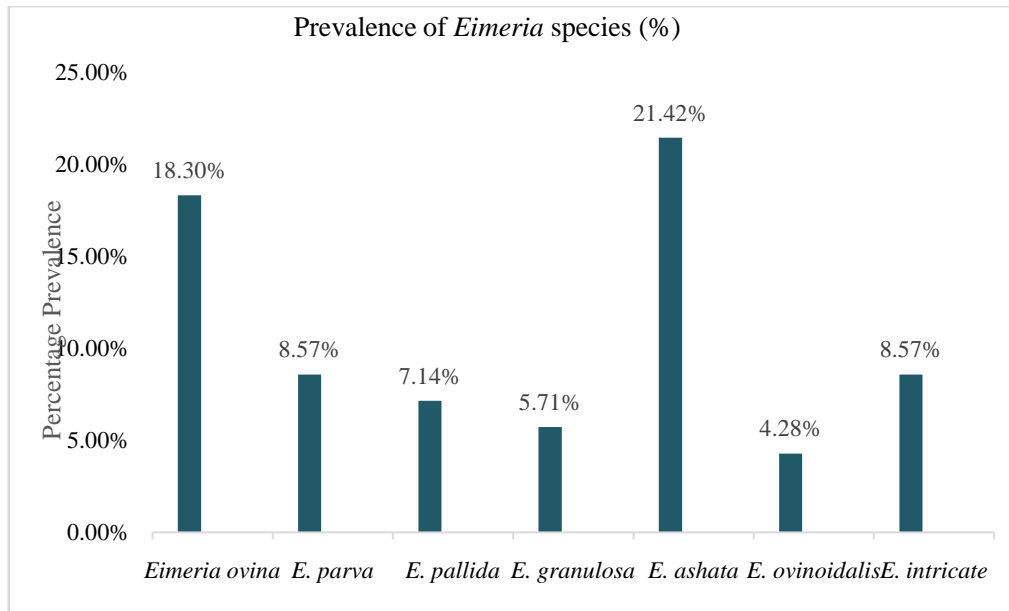
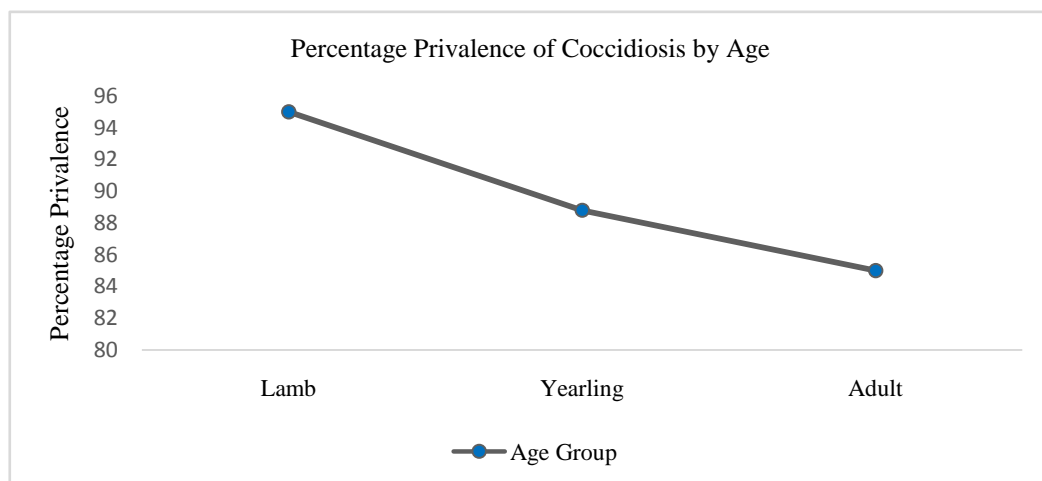


Figure 1. Showing properties of the oocysts found from the sheep sample.

Table 3. Graph of Percentage Prevalence of *Eimeria species* according to age.

Age Group	No. of Examined	GINs (%)	Coccidia(%)
Kid	20	11 (53.1)*	19 (95.0)
Yearling	18	16 (87.8)*	16 (88.8)
Adult	32	28 (86.4)*	27 (84.3)
Total	70	55 (78.57)	62 (89.2)*



There was nothing that seems unusual in the result that was found in the study of the prevalence of coccidiosis in the Bauchi abattoir, Inkil. But it is worthy of note that out of the 15 species of *Eimeria* found in sheep, nine (9) was found in the sheep investigated in the study. Out of the nine found, the most common were the genera *E. crandalis*, *E. ovina* and *E. ashata* that were most prevalent with 22.85%, 18.30% and 21.42% respectively. This corresponds with the findings of (Adeyemi *et al.*, 2021; Akerejola *et al.*, 1979; El-Alfy *et al.*, 2020; Hashemnia *et al.*, 2012; Yakhchali & Golami, 2008). Bovine and caprine diseases in Nigeria: a review of economic losses. The prevalence of these species especially where concurrent with those found in studies conducted in nearby state of Jos; research conducted by (Altaf & Hidayatu, 2014; Kaze *et al.*, 2020). The high prevalence of the *Eimeria species* amongst lambs and yearlings has indicated in Table 4 and Graph 4 is due to their susceptibility being without strong and properly developed immune systems meanwhile the adults have well developed immune systems and a development of immunity due to past infection. Economically coccidiosis is of necessary attention due to its effect, not on adult and ready for the market sheep but on young and growing lambs. Its effect could be detrimental to the sheep owner seeing that the disease affects sheep in various ways and causes expenditure in various ways. The main causes of quantifiable loss from clinical coccidiosis are: (a) impaired production, (b) mortality, and (c) cost of treatment. However, the losses due to subclinical infections probably far outweigh those of clinical disease. This is partly because of the widespread incidence of coccidian infestation in sheep. Many of these subclinical effects are unquantifiable but they include: (a) impaired alimentary function, (b) reduced feed conversion efficiency, (c) reduced growth, and (d) increased susceptibility to disease (Andrews, 2008). Particular to the Bauchi Metropolis, the economic effect of the disease is that market value drops due to poor growth of the lambs which eventually become the sheep to be taken to the market and consequently the abattoir. This translates to low income due to the lack of marketability of the sheep.

CONCLUSION

From this study the following has been found out. That out of the 12 known *Eimeria* species found, three are most prevalent. The coccidiosis disease is one that is important to animal farmers in that, the young animals are most susceptible due to their not yet developed immunity while the adults are immune to the disease due to acquired immunity from past infection by the disease. Nonetheless, the adults serve as source of infection to the lambs because they become hosts to the various *Eimeria species*. Economically the disease is one that requires attention due to its effect on the marketability of animals who get infected by the disease. It is the recommendation of the conductor of this research that more studies first of all needs to be conducted by the appropriate authority on the Bovine Coccidiosis. This is because, the sheep is amongst the most marketable of animals reared in the Bauchi

metropolis, being that as it may, the economy of the state is dependent upon the wellbeing of the sheep population in the Bauchi area of the state. It is also the recommendation of the researcher that veterinary unions would engage more in the research conducted by students of the department of Biological Sciences Zoology in precise to enable in-depth study of such diseases to enable them have a bank of knowledge concerning the various diseases plaguing animals in the Bauchi State area.

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REFERENCES

- Adeyemi, O., Idowu, E., Ikenweuwe, J., & Otubanjo, O. (2021). Status of *Eimeria* infections of sheep and goat sold at small ruminant markets in Lagos State, Southwest, Nigeria. *Nigerian Journal of Parasitology*, 42(1), 137-146.
- Akerejola, O., Van Veen, T. S., & Njoku, C. (1979). Ovine and caprine diseases in Nigeria: a review of economic losses. *Bulletin of Animal Health and Production in Africa*, 27(1), 65-70.
- Altaf, A., & Hidayatu, A. (2014). Study of some potential risk factors associated with coccidia in sheep. *Journal of Agriculture and Veterinary Science*, 65, 11-13.
- Andrews, T. (2008). Reality? Or Soft Focus? *PLASA for the Gottelier Award Master Class*.
- Constable, P. D. (2015). Overview of Coccidiosis. College of Veterinary Medicine, University of Illinois at Urbana-Champaign Last full review/revision Sep. 2015.
- El-Alfy, E.-S., Abbas, I., Al-Kappany, Y., Al-Araby, M., Abu-Elwafa, S., & Dubey, J. P. (2020). Prevalence of *Eimeria* species in sheep (*Ovis aries*) from Dakahlia governorate, Egypt. *Journal of Parasitic Diseases*, 44, 559-573.
- Hashemnia, M., Khodakaram-Tafti, A., Razavi, S. M., & Nazifi, S. (2012). Experimental caprine coccidiosis caused by *Eimeria arloingi*: morphopathologic and electron microscopic studies. *Veterinary Research Communications*, 36(1), 47-55.
- Kaze, P. D., Karaye, G., & Karaye, K. L. (2020). A survey of gastrointestinal coccidiosis from fecal samples of cattle and sheep in heipang, plateau state, Nigeria. *Journal of Medical Research and Health Sciences*, 3(5).
- Mohamaden, W. I., Sallam, N. H., & Abouelhassan, E. M. (2018). Prevalence of *Eimeria* species among sheep and goats in Suez Governorate, Egypt. *International*

- Journal of Veterinary Science and Medicine*, 6(1), 65-72.
- Mohammed, K., Abba, Y., Ramli, N. S. B., Marimuthu, M., Omar, M. A., Abdullah, F. F. J., Lila, M. A. M. (2016). The use of FAMACHA in estimation of gastrointestinal nematodes and total worm burden in Damara and Barbados Blackbelly cross sheep. *Tropical Animal Health and Production*, 48(5), 1013-1020.
- Qi, H., Xiao, S., Shi, R., Ward, M. P., Chen, Y., Tu, W., Zhang, Z. (2020). COVID-19 transmission in Mainland China is associated with temperature and humidity: a time-series analysis. *Science of the Total Environment*, 728, 138778.
- Rokade, J., Kagate, M., Bhanja, S., Mehra, M., Goel, A., Vispute, M., & Mandal, A. (2018). Effect of mannan-oligosaccharides (MOS) supplementation on performance, immunity and HSP70 gene expression in broiler chicken during hot-dry summer. *Indian Journal of Animal Research*, 52(6), 868-874.
- Seyoum, Z., Getnet, K., Chanie, M., Derso, S., & Fentahun, S. (2018). Morbidity parameters associated with gastrointestinal tract nematodes in sheep in dabat district, northwest Ethiopia. *BioMed Research International*, 2018.
- Yakhchali, M., & Golami, E. (2008). Eimeria infection (Coccidia: Eimeriidae) in sheep of different age groups in Sanandaj city, Iran. *Veterinarski Arhiv*, 78(1), 57.
- Zajac, A. M., & Garza, J. (2020). Biology, epidemiology, and control of gastrointestinal nematodes of small ruminants. *Veterinary Clinics of North America: Food Animal Practice*, 36(1), 73-87.