

Prevalence and Morphometric Approach for Identification of Some Paramphistome Species in Sheep Slaughtered in Maiduguri Abattoir, Borno State

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INTRODUCTION

Paramphistomum cervi (Trematoda: Digenea: Paramphistomatidae), the representative species of the genus *Paramphistomum*, has adult flukes that inhabit the rumen and immature worms that parasitize the gallbladder and reticulum of ruminants, including cattle, sheep, goat, and some wild mammals (Xu Zhang, et al., 2014). Adult flukes parasitize the fore stomachs, causing mild disease that occasionally manifests as rumen inflammation, irregular rumination and wasting. Much more severe symptoms are caused by juvenile flukes as they migrate through the intestines and parasitize the submucosa of the duodenum, feeding on epithelial cells (Jones, 1990). This results in fetid diarrhoea, electrolyte and protein loss, generalized oedema, anorexia and, in rare cases, anaemia and emaciation of the animal (Sanabria & Romero, 2008, Sindičić, et al., 2016). Mature *Paramphistomum* are also responsible for ruminitis, irregular rumination, lower nutrition conversion and loss of body condition, decrease in milk production and reduction of fertility (Mogdy et al., 2009). High prevalence of paramphistomosis occurs in tropical and subtropical regions with reports from Africa, Asia, Australia, Eastern Europe, and Russia caused by specific species of the parasites depending on the region, which include *Paramphistomum cervi*, *Gastrothylax crumenifer*, *P. microbothrium*, *P. ichikawai*, *P. explanatum*, *P. epiclitum*, *Calicophoron calicophorum*, *Cotylophoron cotylophorum*, *Fischoederius elongates*, and *F. cobboldi* (Wang et al, 2010, Surapol, et al., 2016, Khedri et al. 2015). According to Nolan and Crib, 2005 the vast majority of taxonomy of digenean species has been described on the basis of their adult morphology and by reference to their host and geographical distributions; *P. cervi* is distributed worldwide and has been reported in many countries including Nigeria (Azyaz, et al., 2013, Bui and Oluwafunmilayo., 2004). The paramphistomes are conical or cylindrical digenean with thick bodies; the most familiar species are parasites of domesticated livestock. They are distinguished from other flukes by the possession of a posteriorly located acetabulum (Mage et al., 2002).

MATERIALS AND METHODS

Adult worms were collected from the rumen of naturally infected sheep slaughtered at the Maiduguri Metropolis abattoir, Maiduguri, Nigeria. The adult worms were washed extensively in physiological saline and identified to species based on morphological characters in the key of Toledo and Fried (2014) and Jones (2005). The adult worms attached to stomach surfaces were counted, average worms burden per animal were determined and individual adult worms were measured using vernier calipers (BL-body length and body width) and data were recorded (figure 1&2). Subsequently, the worms were stained in order to identify species based on morphology of flukes; shape, posterior sucker (acetabulum), anterior sucker, terminal genitalium and tegumental papillae following the standard guidelines given by (Urquhart et al. 1996, Singh and Srivastava, 1977).

STAINING PROCEDURE

The adult worms were washed in water and pressed between two glass slides in order to flatten the adult worms. The specimens were left in 10% formalin for 24 hours and then shaken in distilled water for few days. 2 grams of borax carmine was dissolved in 50 ml of distilled water and heated in a water bath for an hour and allowed to cool at room temperature. Subsequently, 50 ml of

absolute alcohol was added on it; each specimen was shaken in the solution for 4 days. It was removed from the stain and de-stained in 1% hydrochloric acid for 24 hours. The acid was thoroughly washed out from the specimen with water. The specimens were then dehydrated through 50, 70, 90, 95 and 100% alcohol for 1 hour each, and cleared by using xylene for 30 minutes. The cleared specimens were placed on glass slides while a drop of DPX was added to each glass slide and then covered with a cover slip. The mounted slides were allowed to air dry and viewed under the stereoscopic microscope to identify the organism using a procedure adopted by (Singh and Srivastava, 1977, Getchen, 1979, Biu and Oluwafunmilayo., 2004).

RESULTS

A cross-sectional study was conducted to identify and determine the Paramphistome species infecting the rumen and reticulum of Sheep slaughtered in Maiduguri central abattoir, Maiduguri, Borno state. A total of 100 sheep were examined based on distribution of breeds of sheep and the result revealed that, 73(73%) were Yankasa, 67 (67%) Balami and 89 (89%) Uddain male sheep while 27(27%) Yankasa, 33(33%) Balami and 11 (11%) Uddaas shown in (Table 1). Table 2 shows the infestation rate across different species based on the age group of Sheep examined. Among the >12 months of age sheep examined 28 (28%) were Yankasa, 18(18%) Balami and 10 (10%) Udda. Whereas those between the age 1-2 years had 22 (22%) Yankasa, 32 (32%) Balami and 28 (28%) Uda. Likewise those above two (2) years were Yankasa 50 (50%), 50 (50%) Balami and 62(62%) Udda respectively. Table 3 shows infestation rate (%) in Sheep species across different Body conditional status, the results revealed that 53 (53%) were body, 27 (27%) fair and 20 (20%) fatty for Yankasasheep. While 44 (44%) were body, 34 (34%) fair and 22 (22%) fatty for Balami. Whereas, 39 (39%) were body, 49 (49%) fair and 12 (12%) fatty for Uddasheeps respectively. Among breeds, 43 Yankasa were examined with 44.2% and worm burden of 189, while of the 37 and 20 Balami and Udda examined 64.9% and 50.0% were infected respectively. However, differences due to sex and breeds were non-significant as shown in table 4. Likewise, figure 1 and 2 shows the morphometric measurement technique and harvested worms from rumen and reticulum of sheeps.

DISCUSSION

The study revealed a prevalence rate of 43% for paramphistomosis of breeds of sheep (Yankasa, Balami and Udda) commonly found in the semi-arid zone of Borno state, Nigeria with a worm burden of 309 which is higher than 28% prevalence reported by (Biu and Oluwafunmilayo, 2004). This could be attributed to the gregarious influx of the sheep from neighboring countries of Chad and Niger during festive period and the disease has a definite seasonal pattern with higher occurrence during raining season (Chaudhri, 1983, Biu and Oluwafunmilayo, 2004). Recently scientists reported prevalence of various species of amphistomes in sheep in various countries like Egypt (Khaled, et al., 2010), Mexico (Rangel, et al., 2003), Thailand (Busaba, Et al., 2010), Pakistan (Tehmina, et al., 2014) and Iran (Meshgi and Halajian, 2009). It has been also reported in Europe, Asia, Africa Oceania and France (Devos, et al., 2013, Choudhary, et al., 2015). Paramphistomosis is caused by specific species of the parasite depending on the geographical locations (Choudhary, et al., 2015, Anuracpreeda, et al., 2008). The most common paramphistomes species found in the study area Paramphistome cervi and gastro which adult flukes are located in the rumen of sheep and the immature flukes in the small intestine mainly duodenum (Choudhary, et al., 2015, Ozdal, et al., 2010, Biu and Oluwafunmilayo, 2004).

Table 1: Distribution of Breeds of sheep examined for infestation of Paramphistomum species

| Sex | Yankasa | Balami | Udda |
|--------|-----------|-----------|-----------|
| Male | 73(73%) | 67(67%) | 89(89%) |
| Female | 27(27%) | 33(33%) | 11(11%) |
| Total | 100(100%) | 100(100%) | 100(100%) |

Table 2: Infestation rate (%) in Sheep across different Age groups

| Age group | Yankasa | Balami | Udda |
|---------------|-----------|-----------|-----------|
| >12 months | 28(28%) | 18(18%) | 10(10%) |
| 1-2 years | 22(22%) | 32(32%) | 28(28%) |
| Above 2 years | 50(50%) | 50(50%) | 62(62%) |
| Total | 100(100%) | 100(100%) | 100(100%) |

Table 3: Infestation rate (%) in Sheep species across different Body conditional status

| Sheep species | Different body conditional status | | | Total |
|---------------|-----------------------------------|---------|---------|------------|
| | Body | Fair | Fatty | |
| Yankasa | 53(53%) | 27(27%) | 20(20%) | 100 (100%) |
| Balami | 44(44%) | 34(34%) | 22(22%) | 100(100%) |
| Uda | 39(39%) | 49(49%) | 12(12%) | 100(100%) |

Table 4. Prevalence of Paramphistome infection in sheep based on the sex and Breeds

| SEX | No. of animal examined | No. (%) infected | Worm burden |
|---------|------------------------|------------------|-------------|
| Male | 78 | 32 (41%) | 206 |
| Female | 22 | 11 (50%) | 103 |
| BREED | | | |
| Yankasa | 43 | 19 (44.2%) | 189 |
| Balami | 37 | 14 (64.9%) | 101 |
| Udda | 20 | 1 0 (0.0%) | 19 |

Differences due to sex and breed were non-significant

Figure 1 and 2 shows the morphometric technique and harvested worm burdens of Paramphistome species.



Figure 1. Body width measurement using Vernier caliper **Figure 2.** Harvested worms from rumen

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