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Prevalence of Gastrointestinal Endoparasites of Swamp Buffaloes (*Bubalus bubalis*) in Polewali Mandar

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Abstract

This study aimed to identify the prevalence of gastrointestinal endoparasite infections in swamp buffalo (*Bubalus bubalis*) in Polewali Mandar. This study was used 80 samples of buffalo feces taken from community farms in the three districts with the largest population in Polewali Mandar i.e., Tinambung, Luyo and Campalagian. The data obtained were analyzed descriptively. The results of the examination of 80 samples of buffalo feces in this study found 48 (60%) positive samples infected with gastrointestinal endoparasites. After microscopic identification, the following types of endoparasites were found with their respective prevalence levels: worms of the nematode class consisted of *Strongyloides sp*. (8,75%), *Toxocara sp*. (13,75%), *Ascaris sp*. (7,5%), *Bunostomum sp*. (11,25%), *Haemonchus sp*. (17,5%), *Trichostrongylus sp*. (36,25%), the cestode class consisted of *Moniezia sp*. (18,75%) and *Taenia sp*. (10%), Trematode class *Paramphistomum sp*. (13,75%). The types of protozoa found were *Eimeria sp*. (46,25%) and *Entamoeba sp*. (6,25%).

Keywords: buffalo, gastrointestinal endoparasites, Polewali Mandar, prevalence

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INTRODUCTION

In Indonesia, demand for animal protein has grown in tandem with the country's expanding population. Animal protein can be found in livestock raised on buffalo. According to data from the Central Bureau of Statistics for the past three years, the number of buffalo (*Bubalus bubalis*) has increased annually. This is especially true for the province of West Sulawesi, where the population of buffalo has continued to rise, reaching 9,412 heads in 2021 from 8,725 in 2019 and 8,948 in 2020 (Badan Pusat Statistik Provinsi Sulawesi Barat, 2022). Every year has seen a rise in the population of Polewali Mandar, which was 389 people in 2020 and 714 people in 2021 (Badan Pusat Statitsik Kabupaten Polewali Mandar, 2022).

Due to its high protein content, full and balanced essential amino acids, as well as a variety of minerals and vitamins, buffalo meat can be used to satisfy human nutritional demands. Animal protein is easier for the body to digest than vegetarian protein. Meat includes 75% water, 18% protein, 4% soluble protein with minerals, and 3% fat, and complex B vitamins are known to be present in meat (Talib *et al*., 2014).

Since they may significantly improve breeders' lifestyles, buffaloes continue to play a crucial role in their existence. In addition to serving as a source of protein in the form of meat, buffalo are also employed as a symbol of offerings at funeral rites in some Indonesian tribes. To realize this potential, efforts must be made to boost buffalo productivity in terms of both quality and quantity (Anshar, 2013).

Due to the fact that it is still a side industry, buffalo farming in rural areas currently does not have a lot of profit potential. With a semi-intensive maintenance system and little animal health intervention, maintenance management is still largely conventional. One infectious disease that may be brought on by these circumstances is a parasite infection of the digestive system (Nurhidayah *et al*., 2019).

Both domesticated and wild ruminants have been observed to have intestinal parasites. According to Taylor *et al*. (2016), parasitic worms and protozoa parasitize the whole digestive tract, including the colon, small intestine, and stomach. There have been numerous reports of significant differences in the frequency and severity of gastrointestinal parasite diseases in buffalo across different nations. According to Dermauw *et al*. (2017), this infection may cause clinical signs such as diarrhea, emaciation, anemia, colic, and intestinal blockage. Infection also results in financial losses due to slowed weight gain and elevated medical expenses (Ginting *et al*., 2019; Arifin *et al*., 2019).

Several studies have been carried out in Banten, West Java, East Java, and Lombok (Karim *et al*., 2016; Nurhidayah *et al*., 2019), but Polewali Mandar, one of the hubs for raising buffalo animals in West Sulawesi, has not yet received these data. In order to determine the incidence of gastrointestinal endoparasite infections in swamp buffalo in Polewali Mandar and identify the types of parasites present, an epidemiological study of parasites must be carried out. It is anticipated that this study will be able to offer fundamental information in the field of parasitic illness epidemiology.

MATERIALS AND METHODS

Samples

80 samples of buffalo excrement from community farms in the three Polewali Mandar districts with the highest populations—Tinambung, Luyo, and Campalagian—were used in this investigation. Fresh swamp buffalo feces weighing about 10 grams each were sampled by rectal palpation using hands covered in plastic gloves from inside the buffalo rectum. Younger buffalo do not allow rectal palpation, so samples were taken from freshly defecated buffalo feces. The feces were then placed in a plastic stool container and labeled with the sample number, date of sampling, gender, age, and district of origin.

Fecal Examination

The floating concentration method and the sedimentation method were the stool examination techniques used in this investigation. The floating technique involves adding water to a concentration of about 10% to 2–4 grams of feces, stirring until the mixture is uniform, and then filtering through a tea strainer to remove any large pieces. Fill the centrifuge tube with feces up to 34 of the way full. Centrifuge for three minutes at 1500 rpm. The flotation solution was added up to 3/4 of the centrifuge tube volume, mixed until homogenous, and then the tube was returned to the centrifugator and centrifuged at 1500 rpm for 3 minutes. The supernatant was then poured out of the centrifuge tube.

The centrifuge tube was taken out of the centrifugator and set upright on the test tube rack. Using a pasteur pipette, steadily drip the flotation liquid into the liquid until the surface is convex (the addition of flotation liquid must not spill). In order to give worm eggs and protozoa oocysts an opportunity to float to the surface, I waited for two minutes. After that, I took a cover glass, touched it to the liquid's surface, and then glued it on the object glass.

Additionally, the floating method was used to remove half of the fecal fluid in the test tube in order to conduct an analysis utilizing the sediment method. The test tube is then homogenized after a drop of 1% methylene blue has been applied. A glass object was then covered with a cover glass after being dripped with one drop of the fecal solution. Examine using a 40x objective magnification microscope. Based on morphology, worm eggs and protozoa oocysts can be identified (Taylor *et al*., 2016).

Data Analysis

The collected study data was performed a descriptive analysis.

RESULTS AND DISCUSSION

In this study, 80 samples of buffalo feces were examined, and 48 samples tested positive for gastrointestinal endoparasite infection. According to gender, 35 samples of female buffalo had gastrointestinal endoparasites in them with a prevalence of 60,34%, compared to 13 samples of male buffalo feces with a prevalence of 59,1% (Table 1).

Table 1. Prevalence of gastrointestinal endoparasites in swamp buffalo in Polewali Mandar based on gender and age

Criteria	Number of samples	Positive	Prevalence (%)
Gender			
▪ Male	22	13	59,1
▪ Female	58	35	60,34
▪ Total	80	48	60
Age			
▪ Calf (< 6 months)	21	16	76,19
▪ Young (6–24 months)	33	19	57,57
▪ Adult (> 24 months)	26	13	50
▪ Total	80	48	60

Table 2. Type of gastrointestinal endoparasites in swamp buffalo in Polewali Mandar

Parasite type	Positive	Prevalence (%)
Nematode		
▪ *Strongyloides sp.*	7	8,75
▪ *Toxocara sp.*	11	13,75
▪ *Ascaris sp.*	6	7,5
▪ *Bunostomum sp.*	9	11,25
▪ *Haemonchus sp.*	14	17,5
▪ *Trichostrongylus sp.*	29	36,25
Cestode		
▪ *Moniezia sp.*	15	18,75
▪ *Taenia sp.*	8	10
Trematode		
▪ *Paramphistomum sp.*	11	13,75
Protozoan		
▪ *Eimeria sp.*	37	46,25
▪ *Entamoeba sp.*	5	6,25
Overall prevalence	48	60

Table 1 demonstrates that gastrointestinal endoparasite infestation is more likely to affect female buffalo than male buffalo. According to Barkah *et al*. (2021), which was supported by the findings of this study, female mud buffalo have a digestive tract worm infestation rate that is 30,43% greater than that of male mud buffalo, which have a rate of 26,46%. This can be because growing male and female buffalo has different goals. Male buffalo were raised by breeders at the study site until they reached adulthood, at which point they were sold as sacrifices for rituals or saved up by families, while female buffalo were retained as broodstock and cared for as long as they were still productive. Female buffalo are susceptible to re-infestation with worms (Nurhidayah *et al*., 2019).

According to the buffalo's age, the juvenile age group (6–24 months) and adults (> 24 months) are the most susceptible, followed by the calf age group (< 6 months). An analysis of buffalo feces revealed that the prevalence of gastrointestinal endoparasites ranged from 76,19% in the age group of calf (< 6 months) to 57,57% in young calves (6–24 months), with the lowest prevalence occurring in adults (> 24 months) and being equal to 50% (Table 1).

The data shows that Swamp buffalo of all ages can have gastrointestinal endoparasite infestations, but young buffalo are more vulnerable. Studies that demonstrate a decrease in gastrointestinal endoparasite infestation with aging livestock support this study. The findings of this study are in line with those of Karim *et al*. (2016), whose investigation found that the total worm infestation was higher in the younger age groups than in the older ones. The development of the immune system in mature livestock, which makes it more resistant to parasites, may have something to do with the low worm infestation in buffalo in the age group of 6–24 months and lower when the buffalo is > 24 months old.

According to Grencis *et al*. (2014), animals do not develop parasite immunity until they are between the ages of 5–8 months. The extent of livestock endoparasite infestation will be impacted by routine deworming. According to the findings of Putri *et al*. (2022), the use of deworming medications such albendazole and ivermectin was successful in treating helminthiasis and could lower Eggs Per Gram of Feces (EPG) values by up to 75–95%.

The results of the microscopic analysis of the feces revealed that there were swamp buffaloes in Polewali Mandar that were infected with multiple gastrosinal endoparasites, including 32 feces and 16 feces that had a single infection. The majority of mixed infections occurred between worm parasites and protozoa parasites. According to morphological identification, the endoparasite eggs discovered originated from worm eggs belonging to the nematode class, specifically *Strongyloides sp*., *Toxocara sp*., *Ascaris sp*., *Bunostomum sp*., *Haemonchus sp*., and *Trichostrongylus sp*., a class of cestodes, specifically *Moniezia sp*. and *Taenia sp*. *Eimeria sp*. and *Entamoeba sp*. are examples of protozoan parasites (Table 2).

The strongyloid group, which was distinguished by the discovery of egg formations containing 4–16 cells clustered like grapes, was found to have the highest number of nematode-class helminth parasite eggs based on the results of the identification of gastrointestinal endoparasites in buffalo feces samples. With the highest incidence of 36,25%, *Trichostrongylus sp*. was categorized as a strongyloid (Suroiyah *et al*., 2018). In locations where buffalo are raised, the environment supports the growth of worm eggs and larvae. This, combined with low nutrition and infrequent deworming, results in a high prevalence of strongly-type worms. This is due to the direct life cycle of the strongyloid class, which starts with eggs hatching on the ground, which makes cattle susceptible to infection if sanitation standards are not up to par (Nurhidayah *et al*., 2019; Chaerunissa *et al*., 2019).

With a prevalence of 18,75% and 10%, respectively, *Moniezia sp*. and *Taenia sp*. are the cestode classes that infect swamp buffalo in Polewali Mandar. The *Moniezia expansa* tapeworm, which can grow up to 200 cm long, 1,5 cm wide, and has the appearance of a triangular egg, was found to be present in buffaloes in the study area. The eggs are distinguishable from *Moniezia benedeni* eggs, which have a quadrangular shape. The digestive tract of cattle can also be infected by *M. expansa*, despite this species often being found in goats or sheep (Taylor *et al*., 2016). The study site's suitable host habitat and the close proximity of the habitats (including stables and grazing field) between cows and buffalo may have contributed to the infection of buffalo. Moniezia genus in Greece (Founta *et al*., 2018) and India (Gupta *et al*., 2018), it has also been documented to infect buffalo.

In addition, worms of the trematode class, specifically *Paramphistomum sp*., were present in buffaloes in Polewali Mandar with a prevalence of 13.75 percent. The survival and spread of Paramphistomum species depend on the presence of snails (*Lymnea rubiginosa*) as an intermediate host (Tiuria and Noviara, 2020).

In the case of the buffalo infected with Paramphistomum species in Polewali Mandar, it is believed that an intermediate host was present because the buffalo grazed in rice fields and there were wallowing ponds close to the cages, increasing the likelihood of the spread of Paramphistomum species. Snails are intermediate hosts that can be found near ponds, lakes, rice fields, streams, and other bodies of water with healthy flora (Darmin *et al*., 2016).

In the Polewali Mandar, parasitic protozoa oocysts were also discovered in samples of buffalo feces. *Eimeria sp*., with a prevalence of 46,25%, and *Entamoeba sp*., with a prevalence of 6,25%, were the two types of protozoa that were discovered. Raising practices, the type of livestock, the gender and age of the livestock, environmental circumstances, the education and economic standing of breeders, livestock management, and the use of anthelmintics are all potential risk factors for *Eimeria sp*. infestation in swamp buffalo (Baihaqi *et al*., 2015). The adult cattle and juvenile are traditionally managed in the same cage, which has the potential to increase the risk of *Eimeria sp*. transmission (Hartono *et al*., 2020; Purnama *et al*., 2021).

The immunity of individual buffaloes is one of the inherent elements that affects the level of infection. Buffaloes with strong immune systems can block endoparasite activity. The pathogenicity of parasites can be decreased by strengthening livestock resistance (Kurniawati *et al*., 2020). Both the specific and non-specific immune systems are involved in the host immunological reaction to parasite infection (Van Hoy *et al*., 2022). The mucus lining of the digestive tract is the young swamp buffalo's first line of defense against endoparasite invasion. Goblet cells secrete mucin, and epithelial cells secrete galectin, a carbohydrate-binding protein that can interact with mucin on the surface of the parasite (Grencis *et al*., 2014).

Buffalo calves are more susceptible to gastrointestinal endoparasite infestation because to a lack of colostrum, environmental pollution, and poor sanitation. The colostrum provides the calf with antibodies (Cordero-Solorzano *et al*., 2022). Colostrum deficit in calf results in handicap by inhibiting an immune response on self-protection from gastrointestinal endoparasite infestations since antibody levels in calf are correlated with antibody in colostrum (Derbakova *et al*., 2020).

CONCLUSION

In conclusion, Polewali Mandar has a 60% (48/80) prevalence rate for swamp buffalo gastrointestinal endoparasites. *Strongyloides sp*., *Toxocara sp*., *Ascaris sp*., *Bunostomum sp*., *Haemonchus sp*., *Trichostrongylus sp*., Cestoda class, *Moniezia sp*., and Taenia class, and Trematoda class, *Paramphistomum sp*., were the different types of endoparasites identified. Protozoa of the species *Eimeria sp*. and *Entamoeba sp*. were discovered.

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