

Species and Prevalence of Rabbit Gastrointestinal Parasites in Berastagi Farm Karo District, North Sumatra, Indonesia

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Abstract: Parasitic infection is one factor which hinder the success of rabbit breeding. The aims of this study was to identify the species, prevalence, and intensity of parasitic attacks. The sample used is feces from rabbits on the Berastagi farm, Karo District, Sumatera Utara. Rabbit feces samples were divided into young rabbits (age > three months) as many as 15 rabbits and adult rabbits (aged > 3 months) as many as 25 rabbits. Sample examination was carried out at the Parasitology Laboratory, Medan Veterinary Hall, Sumatera Utara using the flotation method. The results showed that in young rabbits, three species of parasites were found with their percentage of prevalences, namely *Eimeria* sp. (40%, common) and intensity of attacks 3,966 (super parasitic infections); *Strongyloides* sp. (20%, often) and the intensity of attacks 233 (very heavy parasites); and *Passalurus* sp. (13.33%, often) and intensity of attack 450 (very heavy parasites). In adult rabbits, only one species of parasite was found i.e. *Eimeria* sp. (12%, often) and intensity of attacks of 900 (very heavy parasites). Young rabbits have a greater risk of being infected with parasites than adult rabbits.

1 INTRODUCTION

Parasites often attack rabbits from both ectoparasites, i.e. mites, fleas and endoparasites, i.e. helminths and protozoa. Endoparasites that attack rabbits, both worms and protozoa are generally gastrointestinal parasites (parasites in the digestive tract). Worms that commonly attack the digestive tract of rabbits are *Passalurus ambiguus* and *Taeniapisiformis*, while protozoa which often attack the rabbit's digestive tract are *Eimeria* sp. and *Encephalitozoon cuniculi* (Harcourt, 2002). Endoparasites in the digestive tract generally take part in the host's nutrients, consume host tissues or use digestive organ cells to complete the phase of their life (Levine, 1994).

Eimeria causes coccidiosis. Coccidiosis has spread in almost all the world (Flynn, 1973). This disease is pathogenic and causes 48% death of livestock rabbits in Pelotas, Brazil (Varga, 1982). Mortality of coccidiosis in various species of animals ranges from 5-100% and can cause economic losses in the form of weight loss, decreased food efficiency and inhibits weight gain.

As many as fifty wild rabbits from urban areas near Aachen (Germany) found nine species of parasites consisted of four endoparasite species and

five ectoparasite species (Frank, et al., 2013). Wild rabbits on the island of Tenerife (Canary Islands) collected in 1998 and 2000 in seven zones based on altitude and purpose, found five parasitic species namely, three cestodes (*Taenia pisiformis* (larvae), *Andrya cuniculi* and *Mosgovoyia ctenoides*) and two nematodes (*Trichostrongylus retortaeformis* and *Passalurus ambiguus*). *Taenia pisiformis* showed an uneven distribution with a significant prevalence within zones. *Andrya cuniculi* were only found in two zones and there were no significant differences in prevalence values.

Mosgovoyia ctenoides have a broad distribution with a significant prevalence, which is higher in the north compared to the southern zone. *Trichostrongylus retortaeformis* does not exist at the bottom of the southern zone of the island. *Passalurus ambiguus* was found in all zones without significant differences in the prevalence of infection. Differences in prevalence tend to be caused by environmental factors in the case of *T. retortaeformis* and in the absence of compatible hosts and intermediates. All parasitic species in Tenerife are identified as common helminths in the Iberian Peninsula (Foronda, et al., 2003).

2 MATERIALS AND METHOD

The samples used in this research were feces from 15 puppies (ages 0-3 months) and 25 adult rabbits (age > three months). Feces collection was carried out at Brastagi ranch, Karo District, Sumatera Utara. Feces were inserted into the sample cup, covered with plastic and labeled 'Sp1' in the first feces sample and so on. The sample was put into a cool box and taken to Parasitology Laboratory, Medan Veterinary Hall.

The method used in this research was the flotation method. Feces was put into a test tube measuring 5 ml as much as 10 g; then the Saturated NaCl solution was poured into a tube to 2.5 ml. Feces homogenized using an applicator. The test tube was filled with a saturated NaCl solution to the brim. A glass cover was placed above the mouth of the test tube carefully. The glass cover was left idle for 10 minutes and make sure it came into contact with the liquid without air bubbles. The glass cover was lifted carefully, a drop of liquid must be left on the glass cover. The glass cover was placed on an object glass then the preparation was observed under a microscope. Identification was based on Yamaguti, (1963; 1971) and Kabata (1992). The rate of infestation by these parasites was calculated according to the standard method: Prevalence, mean intensity and abundance (Margolis, et al. 1982). Prevalence and intensity levels were categorized based on Williams & Williams (1996).

3 RESULTS AND DISCUSSION

3.1 Identification of Gastrointestinal Parasites

Based on the examination results of 40 samples of rabbit feces on the Berastagi ranch, Karo District, Sumatera Utara by floatation method, threespecies of parasites were obtained which can be seen in Table 1.

Based on Table 1, it can be seen that 2 groups of parasites were found in rabbit feces. The first

parasitic group came from the protozoa group, *Eimeria sp.* found in feces with the oocyst stage. Oocyst *Eimeria sp.* found in both puppies and adult rabbits. The second parasitic group came from the nematode group, namely *Strongyloides sp.* found in the egg stage and *Passalurus sp.* which was in the larvae stage, where both species of nematodes were found only in baby rabbit feces.

Fifty wild rabbits in urban areas near Aachen (Germany) nine species of parasites were found. Four endoparasitic species consisting of *Cittotaenia denticulata*, *Graphidium strigosum*, *Passalurus ambiguus*, and *Trichostrongylus retortaeformis* and five species of ectoparasites: *Cheyletiella parasitivorax*, *Ixodes ricinus*, *Leporacarus gibbus*, *Haemodipsus ventricosus*, and *Spilopsyllus cuniculi*. When compared with the International survey found the prevalence and mean intensity of *C. denticulata*, *G. strigosum*, *P. ambiguus*, and *T. retortaeformis* parasites (Frank et al., 2013). The rate of infection in crossbreeding rabbits was 56.3%. Oocyst *Eimeria sp.* (52.7%) and *P. ambiguus* eggs (3.6%) were detected in rabbit manure (Sürsal et al., 2014).

As many as 71 wild rabbits (*Oryctolagus cuniculus*) aged around 5 to 12 months from the province of Fars, south of Iran. The sampling of healthy rabbit feces samples was conducted directly from the rectum and the oocyst was isolated using sedimentation and salt-flotation techniques. Spore forming oocysts were identified based on morphology and biological characteristics. Twenty-two (31.0%) rabbits were positively infected with *Eimeria* and six species including *Eimeria perforans* (18.3%), *E. magna* (16.9%), *E. media* (14.1%), *E. irrisidua* (11.2%), *E. flavescens* (4.2%), and *E. coecicola* (2.8%). Eighty-six percent of infected rabbits show mixed infections with two or three *Eimeria* species. Lack of clinical signs may be due to ecological and environmental conditions of rabbit habitat, especially dry and hot. Also, immunity is caused by long-term exposure to low-dose oocysts which may have an important role in disrupting the parasite development cycle and preventing acute coccidiosis (Razavi et al., 2010).

Table 1: Species of Gastrointestinal Parasites in Rabbits from Berastagi Ranch, Karo District, Sumatera Utara.

Group	Species	Stadium	Category	
			Puppies (0-3 Months)	Adult (>3 Months)
Protozoa	<i>Eimeria sp.</i>	Oocyst	√	√
Nematode	<i>Strongyloides sp.</i>	Egg	√	-
	<i>Passalurus sp.</i>	Larvae	√	-

Description: (√): exists, (-): none

3.2 Prevalence of Gastrointestinal Parasites

The prevalence of parasites based on the examination results of 40 samples of rabbit feces on the Brastagi ranch, Karo District, Sumatera Utara can be seen in Table 2. Based on Table 2, the prevalence value of the three species of gastrointestinal parasites in baby and adult rabbits is presented. The highest parasitic prevalence was found in *Eimeria* sp. in baby rabbits with a prevalence value of 40% and in the 'commonly' category. Prevalence value of *Eimeria* sp. in baby rabbits showed a higher number than the prevalence of *Eimeria* sp. in adult rabbit which was worth 12% and included in the 'often' category, this was due to *Eimeria* sp. have a direct life cycle which means that it does not require an intermediary host to cause constant infection of vulnerable animals such as younger animals (Rodríguez-Vivas et al., 1996).

Eimeria sp. has the highest maximal prevalence of 9% in adult pigs without clear geographical differences (Roepstorff, et al., 1998). According to Yadav, et al (2006) the prevalence of *Eimeria* sp from cow and goat feces was 6.73%. Prevalence studies were also reported from gastrointestinal parasites of cows, buffaloes, sheep, goats and poultry in the Korutla region of Andhra Pradesh's Karimangar (Telangana region) district. The highest prevalence was from *Toxocara vitulorum* in cattle and buffaloes with 16.7%, respectively. Prevalence of *Amphistome*, *Eimeria*, *Moniezia*, *Strongyle*, and *Trichuris* were less than 11% while prevalence of *Capillaria* sp. and *Eimeria* sp. in poultry were less than 7.0%. The overall prevalence of gastrointestinal parasites in cattle and buffaloes was 40.0%, 38.7% in sheep and goats, and in poultry was 13.0%. Two *Eimeria* species were identified from sheep, namely *Eimeria granulosa* and *Eimeria parva* (Murthy and Rao, 2014).

Total 580 goats were randomly examined in representative areas of five Zimbabwean regions during the dry and rainy season. Blood and feces samples were collected from each animal and eggs/oocysts per gram of feces (epg/opg) were measured using laboratory culture and packed cell volumes (PCV). Factors that influence parasitic infections were identified. The highest prevalence was identified from *Eimeria* oocysts with 43%, followed by *Strongyles* with 31%, and a few trematodes and cestodes. The parasites were identified were *Haemonchus*, *Strongyloides* and *Oesophagostomum*. Region, season, sex and age significantly influence the gastrointestinal infection pattern ($P < 0.05$). Statistical analysis showed that the composition of parasites varied by region and the impact of risk factors was also different. The infection risk was very high for samples of goats in Natural regions (NR) I, II, III ($OR = 6.6-8.2$; $P < 0.05$) compared to those in NR IV and V. The highest worm infections and *Eimeria* were observed in the rainy season vs the dry season ($P < 0.05$). Their study reported that newborn or young animals were more susceptible to parasitic infections ($P < 0.05$) and the prevalence was considerably intense in males than females, with the possibility of three times in infection to males than to females ($P < 0.0001$) (Zvinorova, et al., 2016).

The prevalence of puppies rabbit parasites was higher than the prevalence of parasites in adult rabbits. The high prevalence of parasites in baby rabbits was caused by the immunity of young animals is still less effective and is still in a state of weaning from the mother. Based on the survey results in the field, still found puppies-rabbits that were not weaned at the time they were supposed to, this was due to the lack of available cages. Levine (1990) stated that rabbits should be weaned as early as possible and separated from their parents, this is because adult rabbits are a source of infection for puppies rabbits.

Table 2: Prevalence of Gastrointestinal Parasites in Rabbits from Berastagi Ranch, Karo District, Sumatera Utara.

Species	Category			
	Puppies (0-3 Months)		Adult (>3 Months)	
	Prevalence	Category	Prevalence	Category
<i>Eimeria</i> sp.	40%	Commonly	12%	Often
<i>Strongyloides</i> sp.	13,33%	Often	-	-
<i>Passalurus</i> sp.	20%	Often	-	-

Description: (-): none

Table 3: Intensity of Gastrointestinal Parasites in Rabbits from Brastagi Ranch, Karo District, Sumatera Utara.

Species	Category			
	Puppies (0-3 months)		Adult (>3 months)	
	Intensity	Category	Intensity	Category
<i>Eimeria</i> sp.	3.966	Super parasitic infections	900	Very heavy parasite
<i>Strongyloides</i> sp.	233	Very heavy parasite	-	-
<i>Passalurus</i> sp.	450	Very heavy parasite	-	-

Description: (-): none

A total of 960 goat feces samples were sampled and processed by sedimentation and salt-flotation methods. The study reported percentage of prevalence reached 94.48% with dominant parasitic genus from *Coccidia* (82.4%), *Strongyles* (69.27%), *Amphistomes* 22.71%, and lesser parasites, i.e. *Fasciola*, *Moniezia*, *Schistosomes*, *Strongyloides* *Trichuris*. The parasites showed a higher infection during rainy season than in winter season.

The incidence of gastrointestinal parasitism was found to be higher in lambs (96.25%) compared to goats (93.89%) (Singh, et.al., 2015). The next highest prevalence value was *Passalurus* sp. in puppies rabbits with a prevalence value of 20% and in the 'often' category, whereas in adult rabbits this worm was not found, this can be caused by the *Passalurus* sp. has a direct life cycle which means it does not require an intermediary host to be infective, hence the babies are more susceptible to infection. The next prevalence is *Strongyloides* sp. with a value of 13.33% and included in the 'often' category.

Based on the survey results on the ranch site, rabbit cages at the research site are usually cleaned at least once a day, but feces that is not immediately cleaned when the rabbits are defecated causes the worm larvae to have the chance to infect rabbits. Levine (1994) stated that infective larvae of *Strongyloides* sp. infect animals by penetrating the skin and having a very short premenstrual period hence regular cleaning of the cage once a day still allows the occurrence of strongyloides infection.

Based on the survey results at the research site, rabbit feed is generally a vegetable crop residue, in contrast to rabbit breeders in the lowlands who generally feed rabbits in the form of pellets and weeds, this is because Brastagi is a fertile area so vegetables are very easy to obtain. The time for collecting the forage varies, this is due to managers adjusting the time for taking forage with farmers harvesting the vegetables, but because farmers in Brastagi generally harvest vegetables in the morning, taking forages used to feed rabbits is often done in the morning.

The high prevalence rate of parasites can be caused by the taking of forages by farmers conducted in the morning and evening, where at that time forages tend to be polluted which increases the likelihood of rabbits being attacked by disease. The cause of low prevalence in an area is probably caused by taking food during the daytime in which the parasite will die when exposed to sunlight even though sanitation in the area is classified as dirty. Moist forage drying needs to be done to minimize contamination of forages by parasites.

3.3 Gastrointestinal Parasite Intensity

The intensity of parasitic attacks based on the examination results of 40 rabbit feces samples on the Brastagi ranch in Karo District, Sumatera Utara can be seen in Table 3.

Based on Table 3, the intensity value of the three species of gastrointestinal parasites in puppies and adult rabbits. The highest parasitic intensity was found in *Eimeriasp.* from baby rabbits with an intensity value of 3966 and was in the category of 'super parasitic infections'. The intensity value of *Eimeria* sp. in baby rabbits showed a higher intensity value than the intensity of *Eimeria* sp. in adult rabbits which was worth 900 and included in the category of 'very heavy parasite'. Observations on feces samples from 197 cows, 37 horses, 11 sheep, 25 pigs, 21 dogs, one cat and 62 chickens from livestock of 10 large private properties and 75 from rural settlements in the Atlantic Rain Forest in Brazil found *Eimeria* sp. appear in almost all hosts, except horses, dogs and cats (Sevá, et al., 2018)

The intensity value is a degree of parasite species that infects an animal. Some rabbits with high parasitic intensity show less healthy symptoms such as less weight, diarrhea and bloody feces. Some rabbits were even found dead. Based on the interview results with livestock managers, the death of rabbits is a common thing, especially at the age of less than one month. Symptoms of unhealthy and death in

rabbits may be caused by parasites that infest the rabbit too high.

According to Barnes et al. (1984), a disease caused by *Eimeria sp.* can be acute or chronic depending on the number of oocysts that are swallowed by the host. In infections with less than 150 infective oocysts there will be a bleeding point on the mucosal surface of the cecum with a slight discoloration of the cecum wall. The dose of 150-500 oocysts will result in bleeding, injury and thickening of the cecum wall. In 1000-3000 infections of oocysts will potentially cause death in animals. Infection of 5000 or more oocysts can cause the highest mortality in two weeks old host.

Some other infected rabbits did not show any clinical symptoms; this may be due to the rabbit's immune system that is different in each. Antibiotics and vitamins treatment was also one of the factors that cause rabbits to look healthy even though they were attacked by quite severe parasites.

The next highest intensity value was *Passalurus sp.* with an intensity value of 450 and was in the category of 'very heavy parasite'. The lowest intensity value was found in *Strongyloides sp.* with a prevalence value of 233 and also included in the category of 'very heavy parasite'.

Cheng (1973) stated that infection by the *Strongyloides sp.* is rare except in humid conditions. Based on the measurement results, the location of rabbits ranch in Brastagi has a moderate temperature of 21°C and the humidity is quite high at 71.6%. Larvae that live in humid conditions will produce large numbers of infective larvae.

4 CONCLUSIONS

The species of gastrointestinal parasites found in rabbit feces on Brastagi ranch, Karo District, Sumatera Utara were three species, namely: *Eimeria sp.* found in puppies rabbits (ages 0-3 months) and adult rabbits (> 3 months old), *Strongyloides sp.* and *Passalurus sp.* were only found in baby rabbits.

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