IDENTIFICATION OF ENDOPARASITE WORMS IN BEEF AT THE SLAUGHTERHOUSE GORONTALO CITY

Fadhilah Datau1), Arpin2), Mindy Eka Astuti3),
[1)]Bina Mandiri University Gorontalo
[2)]Bina Mandiri University Gorontalo
[3)]Bina Mandiri University Gorontalo
E-mail : fadiladatau34734@gmail.com

ABSTRACT

This study aims to determine the results of examination of endoparasite worms in beef at the Gorontalo City Slaughterhouse and to determine the factors that influence the presence of endoparasite worms in beef at the Gorontalo City Slaughterhouse.

This research method uses a quantitative research approach with the type of research used in this research is descriptive observational research. The population in this study was all sirloin meat in the Gorontalo City Slaughterhouse, amounting to 20. The sample used was 12 with the sampling technique using Accidental Sampling.

The results of this study showed that 12 samples were positively infected with endoparasite worms with a percentage (100%). Types of endoparasitic worms found included 2 species of Fasciola hepatica, 1 species of Strongyloides papillosus, 1 species of Paramphistomum, 1 species of Trichostrongylus, 1 species of Bunostomum, 1 species of Cooperia, 1 species of Strongyloides stercoralis, 1 species of Toxocara vitulorum, 1 species of Haemonchus contortus, Oesophagustomum 2 types.

Keywords: Meat Cow, Endoparasite Worm, Slaughterhouse

INTRODUCTION

One of the sectors whose role is more important in the lives of Indonesian citizens is the livestock sector. In order for the Indonesian livestock sector to be well organized, the government provides facilities in the form of Slaughterhouses. Slaughterhouse is a community service unit when it provides safe, whole, healthy and halal meat along with locations for monitoring and surveillance of livestock animal abnormalities (goats, sheep, chickens, cattle and others) [27].

Cows are one of the livestock animals that have important meaning for people's lives and are also animals that are kept by the community compared to other livestock. Cows also produce various benefits, such as being a source of milk, as working animals in rice fields, and producing meat as well as for meeting food needs, especially animal protein [3].

Beef is a food product that is more meaningful for the nutritional needs of the people as well as an economic commodity with very strategic value. Based on the survey results of staple food consumption in 2017, the need or consumption of beef reached around 704.9 thousand tons or around 2.70 kilograms per capita per year. Consumption of beef per capita per year in Indonesia is still very low compared to other countries such as Malaysia (15 kg) and the Philippines (7 kg) [4].

Beef produced in Indonesia is not optimal, due to high health problems such as disease disorders. Disease disorders are generally caused by the presence of bacteria, viruses, with parasites in the form of ectoparasites with endoparasites. Ectoparasites are parasites that grow on the outer surface of the host's body and on parts of the skin. As for the endoparasites themselves are parasites that grow in organs in the host body such as the liver, lymph, brain, digestive system, muscle flesh and other body tissues [18]. In order for beef to avoid infection with parasitic worms, it is necessary to prevent it by taking hygiene and sanitation measures, including efforts to protect the cleanliness of the cage. Sanitation of the cage includes efforts in the series of cage releases through nuisance seeds or other parasites [28].

Then the second prevention is vaccination. . Vaccination is carried out to deal with cows infected with nuisance, generally extension officers and local veterinarians carry out vaccination activities in a mass manner if the area is an area prone to infectious disorders, such as SE, anthrax with brucellosis [28].

The last prevention is the quarantine cage. The quarantine cage is one of the livestock isolation cages whose purpose is to cure and overcome the spread of an abnormality. Quarantine aims to monitor if there are symptoms of the disease that are not recognized during the purchase stage. Besides that also in adapting cows in a new environment. If newly arrived cattle are quarantined, it is better to give deworming medicine because it is due to observations that most cattle in Indonesia (mainly local cattle) have worms [28].

Of the two types of parasites that infect beef the most, namely endoparasites. Endoparasite worms are divided into three classes, namely class Trematoda, Nematoda, and class Cestoda. The ones that often infect beef are in the Trematode class, including Paramphistomume sp., with Fasciole sp., while the Nematode class includes Trichostrongyluse sp., Strongyloidese sp., with the last in the Cestode class, Taenia sp. These endoparasitic worms are often found in the feces, digestive tract, and the outer meat of beef [3].

The problem of helminthiasis in trematodes is generally the species Fasciolae sp., based on WHO (2011) fasciolosis is now defined as emerging human diseases by estimating 2.4 million people are exposed. South American countries, Europe, Australia, have reported the incident. Combined infection in beef with Fasciolae giganticae with Paramphistomae in a prevalence of 10% has always been reported in Malaysia and 34.6% in Zambia.

Based on data from the Central Statistics Agency (2018), the highest fasciolosis cases in Indonesia were in West Sumatra Province with 320 samples of cow feces found 32 infected with Fasciola sp., while the prevalence of taeniasis reported in the provinces of Papua and Bali was in the range of 2%-48%. In Gorontalo Province, especially Gorontalo City, 54 cows were found positive for the incidence of Paramphistomum sp. worm infection, in the stomachs of cows in TPH Biau sub-district and 28 cows were found positive for Paramphistomum sp. worm infection, at a slaughterhouse, Andalas sub-district.
Based on initial data obtained by researchers through the Department of Marine Affairs, Fisheries, and Agriculture of the City of Gorontalo, the number of Slaughterhouses (RPH) in the Gorontalo City area is 3 RPH. Of the 3 RPHs, two of them are no longer operating and the RPHs that are still operating today are those in Tenilo Village, Kota Barat District (Department of Marine Fisheries and Agriculture, 2021). According to the veterinarian at the abattoir, the number of

cattle slaughtered in January and February was 20 each and in March 9 cows were slaughtered [20].

The beef part that is most in demand by the public is the Has Luar (Sirloin) part because it is in this part of the meat that there is a soft meat structure and when cooked it feels soft. People prefer the outer hash compared to the deepest hash which is presented at a percentage of 49% with 47% (Slaughterhouse, 2021). From the results of interviews, it was found that the most common types of endoparasitic worms found in beef are liver worms (Fasciolae sp.,) and gastric worms (Paramphistomume sp.,). The percentage of Paramphistomum sp., was more commonly found, which was around 70%, while the percentage of Fasciola sp., which was around 40% [29].

The type of research used in this research is descriptive observational research which when a study describes a representative sample such as numbers. In this study, researchers wanted to see how many endoparasitic worms were found in beef, especially the outer meat part at the Gorontalo City Slaughterhouse. This research was conducted over a period of one month starting from August to September 2021.

The type of data used in this study is the type of quantitative data. The primary data in this study were the results of examination of endoparasitic worms on beef hash at the Parasitology Laboratory, Bina Mandiri University, Gorontalo. Secondary data is obtained through observations which are taken from data at the Department of Marine Affairs, Fisheries, and Agriculture as well as at the UPTD (Regional Technical Implementation Unit) of the Gorontalo Animal Health Center.

The population in this study was the total of 20 beef tenderloin which were in the Gorontalo City Slaughterhouse. The sample in this study was some 12 samples of the external beef tenderloin in the Gorontalo City Slaughterhouse. The sample size in this study was calculated using the Stanley Lemeshow calculation formula.

Formula :

$$n = \frac{NZ^{21-\alpha/Z}\, P(1-P)}{(N-1)\, d2 + Z21\text{-}\alpha/ZP(1-P)}$$

The sampling technique used in this study is the Accidental Sampling technique. Accidental sampling was carried out based on spontaneous or accidental factors [14].

The data analysis used in this study was univariate with a descriptive test because it only saw the presence or absence of endoparasite worms in beef at the Gorontalo City Slaughterhouse. The presentation data is in the form of tables and is obtained in percentages using the formula as stated by [24].

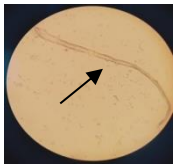
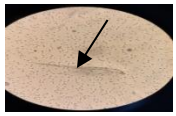
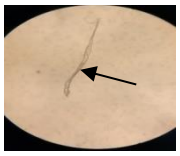
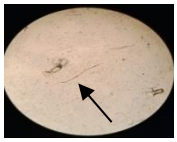
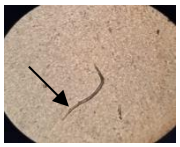
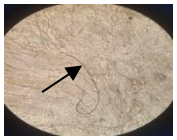
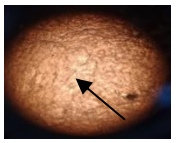
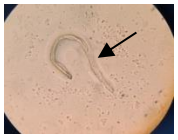
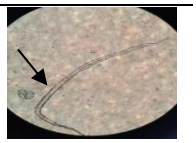
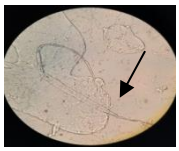
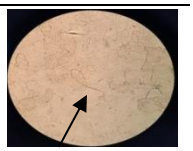
$$P = \frac{f}{N} \times 100\%$$

RESEARCH RESULT

In accordance with the research conducted on the Identification of Endoparasite Worms in Cattle at the Gorontalo City Slaughterhouse. For 1 week at the Laboratory of the University of Bina Mandiri Gorontalo with a total number of samples examined as many as 12 samples of beef from the outside obtained at the Slaughterhouse (RPH).

The results of the examination of the identification of endoparasitic worms in beef at the Gorontalo slaughterhouse obtained are then described in tabular form along with the following narrative:

Table. 1 Identification Results of Endoparasite Worms in Beef

No	Sample Code	Types of Endoparasitic Worms	Picture
1.	Sample 1	*Fasciola hepatica*	
2.	Sample 2	*Fasciola hepatica*	
3.	Sample 3	*Strongyloides Pappilosus*	
4.	Sample 4	*Paramphistomum*	
5.	Sample 5	*Trichostrongylus*	
6.	Sample 6	*Bunostom*	
7.	Sample 7	*Cooperia*	
8.	Sample 8	*Strongyloides stercoralis*	
9.	Sample 9	*Toxocara vitulorum*	
10.	Sample 10	*Haemonchus contortus*	
11.	Sample 11	*Oesophagustomum*	
12.	Sample 12	*Oesophagustomum*	

(Source: Research Primary Data August 2021)

In accordance with Table 1 shows where the results of the identification of endoparasitic worms in beef, the results of the examination showed that 12 samples were positive for infection with endoparasitic worms.

Table. 2 Frequency Distribution of Endoparasite Worm Identification Results in Beef

No	Results of Identification of Endo-Parasitic Worms in Beef	frequency	%
1	Positive	12	100%
2	Negative	0	0
	Amount	12	100%

(Source: Research Primary Data 2021)

In accordance with Table 2, where the results of the identification of endoparasite worms in beef, the results of the examination showed that 12 samples were positively infected with worms with a percentage (100%).

Table. 3 Number of Types of Endoparasite Worms in Beef

No	Types of Endoparasitic Worms	Amount
1.	*Fasciola hepatica*	2
2.	*Strongyloides papillosus*	1
3.	*Paramphistomum*	1

4.	*Trichostrongylus*	1
5.	*Bunostom*	1
6.	*Cooperia*	1
7.	*Strongyloides stercoralis*	1
8.	*Toxocara vitulorum*	1
9.	*Haemonchus contortus*	1
10.	*Oesophagustomum*	2

(Source: Research Primary Data 2021)

In accordance with Table 3, it shows that there are 2 types of worms, Fasciola hepatica, 1 species, Strongyloides papillosus, 1 species, Trichostrongylus 1 species, Bunostomum 1 species, Cooperia 1 species, Strongyloides stercoralis 1 species, Toxocara vitulorum 1 1 species, Haemonchus contortus, and 2 types of endoparasitic worm Oesophagustomum.

DISCUSSION

The observations used a sample of 12 samples. Samples were examined using the digestive method. The sample to be tested uses fresh beef outside. After sampling at the abattoir, the sample was put into a plastic clip so that the sample was not contaminated. The samples were then brought to the laboratory for testing. The first step, the researchers cut the outer beef into small parts. Then the meat is mashed using a porcelain cup. The second step, after the meat is mashed, the meat is transferred to a watch glass, then given a solution of HCl. The function of adding HCl solution is to dissolve the meat. Then the mashed meat is placed on a slide and covered with a cover glass. Third step, samples were examined under a microscope using weak magnification (10x) and medium magnification (40x). The results of the identification of endoparasitic worms in beef externally found 12 positive samples of worm species, namely Fasciola hepatica, Paramphistomum, Trichostrongylus, Bunostomum, Cooperia, Strongyloides papillosus, Strongyloides stercoralis, Toxocara vitolorum, Haemonchus contortus, Oesophagustomum.

Worms Fasciola hepatica including trematodes that can infect the host through food such as through grass or drinking water containing parasite eggs, which carry Lymneae snails [16]. The disease caused by Fasciola hepatica is commonly called Fasciolosis, this disease is known as a very major parasitic disorder in the world.*fasciolosis* distributed worldwide with prevalence in ruminants estimated to range up to 90% in various Countries such as Cambodia up to 85.2%, Wales 86%, Indonesia 80-90%. In Indonesia, fasciolosise is a livestock disorder that has long been known and spread widely. These worms often attack ruminants which generally consume grass that contaminates metacercariae, but can also infect humans [16]. Cattle exposed to Fasciolae sp., generally look pale, lethargic, have puffy eyes, thin body, coarse fur, and dull [8].

The results of the identification of endoparasitic worms in beef outer hash found 12 positive samples where in samples 1 and 2 found the type of worm Fasciola hepatica which has characteristics of ± 2.5 cm long, has broad shoulders, head sucking vanity and stomach sucking vanity side by side. , has a head shaped like a cone.

This is in line with this study which was carried out at the Biromaru abattoir which showed that the larger worms in cattle were Fasciola sp., especially Fasciola hepatica. Observations in various areas showed the prevalence of Fasciolae sp., 47% in Banyumas abattoirs and in

Purbalingga Cilacap and Banjarnegara abattoirs up to 50% [15].

The Strongyloides pappilosus type worm belongs to the Phylum Nemathelminthes. The nematode life cycle begins with eggs obtained from adult female worms from a definitive host and expulsion with feces. The embryonic egg can develop into Larva 1 (L1), which then develops into Larva 2 (L2) which maintains the skin (cuticles). Larvae 2 (L2) can develop into Larvae 3 (L3) which is included in the infective phase. As for the Strongyloides stercoralis worm, it is a soil-transmitted helminth in a more complex life stage. The comparison is that in addition to including parasites in the body of the host, it also has a free life stage that is more useful in the transmission of disorders [2].

The results of the identification of endoparasitic worms in beef outer hash found 12 positive samples where in sample 3 found the type of endoparasitic worm Strongyloides pappilosus and sample 8 found the type of endoparasite worm Strongyloides stercoralis which has a size of 2 mm x 40-50 m.

This is in accordance with observations carried out by [2] in 182 samples after identification of worm eggs similar to nematodes found in Bali cattle reared in wetlands and dry land in Badung Regency were Strongyles type worms (69.8%), Strongyloidese pappilosus. (11.5%), Trichuries sp., (3.8%), Toxocarae vitulorume (1.6%), and Capillariae sp., (1.1%). Strongyloides pappilosus worm has the second largest prevalence is 11.5%. The biggest consequence of the prevalence of Strongyloides pappilosus is that it is possible to keep cows protected in a simple manner and also to reduce hygiene.

Paramphistomum sp., which belongs to a worm in the nematode class and is found to be spread throughout the world.Paramphistomume sp. infection, arranged in two phases, namely the intestinal phase and the ruminal phase. In the intestinal phase, young worms cause bleeding, swelling and redness of the duodenum with abomasume. In the ruminal phase, helminths can cause alteration of the epithelium through the rument which impairs its resorption capacity. Clinical symptoms when a cow is infected with Paramphistomum sp., namely the cow will become weak, depressed, dehydrated, and anorexic. It is possible for cattle to die within 15-20 days after clinical symptoms have been tested [23].

The results of the identification of endoparasitic worms in beef outer hash found 12 positive samples where in sample 4 found the type of endoparasitic worm Paramphistomum. These worms have a sucking vanity in the abdomen (ventrale suckers) called the acetabulum, with the mouth having the smallest oral suckers (oral suckers).

This is in accordance with observations carried out by [6] regarding the prevalence of paramphistomiasis in Bali cattle in Holidayeng sub-district, Bone district, with a total of 100 samples, data obtained from 57 Bali cattle positive for paramphistomasis. Paramphistomiasis is a disorder caused by infection with Paramphistomum sp.

Trichostrongylus is called the hair worm because the thickness is quite similar to the hair. Worm eggs that are released with feces can develop into larvae when external arrangements, such as humidity, temperature, oxygen are more beneficial to life, for example the presence of a pile of feces.In certain circumstances the larvae can develop to form infective larvae. At the place of development the larvae can grow up to 6 months. The sensitivity of livestock to the attack of these worms depends on various impacts including age, quality of feed, genetics and external causes, such as the

administration of drugs. Young goats with poor quality feed can be very sensitive to worm attacks. Clinical symptoms that can be observed are young cattle in terms of stunted life, diarrhea in blackish green stools, thin which ends in death. Cattle can be transmitted by these worms by ingestion of embryonated eggs present in the grass or by ingesting infective larvae or larvae through the skin [32].

The results of the identification of endoparasitic worms in beef outer hash found 12 positive samples where in sample 5 found the type of endoparasitic worm Trichostrongylus. Trichostrongylus eggs are oval with a tapered end. Trichostrongyluse eggs are up to 41.48 m long with a dilation of 21.09 m.

This is in accordance with observations carried out by [11] identified the type of worm Trichhostrongylus sp., in 172 heads or 86% of the total 200 PO cattle, cattle that were not infected with worms were 28 (14%).

Bunostomum worms, also known as hook worms, have a direct life cycle. Clinical symptoms that can be observed include anemia, looking thin, skinny, rough, dull hair, decreased appetite, weakened body. Soft stool dark brown.Always recognized where the worm Bunostomum sp., firmly attached to the intestinal wall. Worms consume body tissues with blood, so even though the number of worms is quite small, livestock shows very real clinical symptoms [32].

The results of the identification of endoparasitic worms in the outer beef of the hash found 12 positive samples where in sample 6 found the type of endoparasitic worm Bunostomum. Male worms are 18 mm long and 28 mm female. The buccal capsule is alive well, the corona radiata is not working, but there are biting equipment such as teeth at the base of the buccal capsule on the ventral side. Bunostomume has the narrowest esophageal passage. The egg forms an ellipse with a size of 79-117 x 47-70 microns.

This is in accordance with the observations carried out [17] in accordance with the results of laboratory examinations in samples of beef cattle against concrete-floored cages with soil-floored cages, the type of nematode worm obtained which is Bunostomum. Bunostomum infection with heavy weight in farm animals in addition to experiencing anemia also hypoproteinemiae which may end up on the skin base, for chronic cases it can cause bottles jaws.

Cooperia sp. is the dominant endoparasite infecting cattle. Single worm infection Cooperia sp., found in livestock (cattle, sheep, buffalo). This is due to the fact that the age of the cow is still said to be young until it is quickly infected with Cooperia sp. [25]. Symptoms of infection in cattle include: diarrhea, weakness, anemia, dehydration, with reduced body weight [31].

The results of the identification of endoparasitic worms in beef outer hash found 12 positive samples where in sample 7 found the type of endoparasite worm Cooperia has a digestive tract and has a ceacume with branching. The worms are hermaphrodites, their eggs have an operculum measuring 140 x 80 microns [12].

According to the observations carried out by [22], the cattle had been examined, the cattle were infected with Cooperia sp. The worm is attacked by cows at all ages, can be transmitted through food contact or through the mother's placenta which is transmitted to the fetus of the cow in the womb. Because through the disturbance of worms (toxocariasise), more emphasis on livestock productivity [32].

The results of the identification of endoparasitic worms in beef externally found 12 positive samples where in sample 9 found the type of endoparasitic

worm Toxocara vitulorum which has the characteristics of the head having cephalic alae, the size is 2.5-7.8 cm, the tail is circular.

This is in accordance with observations carried out by [1] in 720 samples of bali cattle obtained through three districts in the East Bali region, namely Bangli, Klungkung, and Karangasem districts when the prevalence of Toxocarae vitulorume in bali cattle in the East Bali area as a whole is 39, 4%.

Haemonchus contortus is a voracious blood-sucking worm, every day consuming 0.049 ml of blood, causing anemia.Anemia goes through 3 stages, where stage I, 3 weeks after infection, livestock can lose the largest amount of blood, this includes the acute stage. Stage II, between 3 – 8 weeks after infection, blood loss with animal iron compounds is always carried out but is still balanced by the presence of erythropoietic activity, and stage III, signs of erythropoietic system fatigue caused by the reduction of iron with protein, and this is a chronic stage [32].].

The results of the identification of endoparasitic worms in beef outer hash found 12 positive samples where in sample 10 found the type of endoparasite worm Haemonchus contortus male worm has a length of 20 mm with a female 30 mm, eggs size 69-95 x 35-54 microns.

This is in accordance with the observations carried out by [10] a sample of 19 cattle that could be examined. The results of the study through 19 samples observed that there were 5 positive samples for the worm Haemonchus contortus. [21] said where the intensity of worms was greatest in sheep, cattle, with the other smallest ruminant being Haemonchus sp.

Called the humpback worm because the larval form of the worm can cause lumps along the large intestine. Clinical symptoms obtained include lean cows, loss of appetite, paleness, anemia and bloating. Black, softened stools mixed with mucus or fresh blood [32].

The results of the identification of endoparasitic worms in beef outer hash found 12 positive samples where in sample 11 and sample 12 found the type of endoparasitic worm Oesophagustomum. The average size of adult worms, 13.8 – 19.8 mm for females and 11.2 – 14.5 mm for males, has a small buccal capsule with a clear corona radiata [19]. Infection with worms Oesophagustomum sp. With signs there are nodules or nodules [23].

According to observations conducted by [26] it was found that 11 samples of Bali cattle were positively infected with the endoparasite worm Oesophagustomum.

Parasitic diseases in livestock, especially cattle, are very detrimental to farmers. Because if a cow is infected with parasitic worms, both endoparasites and ectoparasites, it will cause losses including lack of body weight, decreased quality of meat, skin and offal.

Samples of beef from outside which were in the Slaughterhouse after laboratory examinations were found to be positive for infection with endoparasite worms. This is because before the cows were brought to the Slaughterhouse, farmers paid less attention to how to graze properly. Farmers graze cows freely, that is, they are released into the wild. This will increase the risk of animals being infected with larger parasitic worms. When the grass is formed, its original feed passes through its grazing fields where the livestock also releases its manure which contains worm eggs. The eggs can develop which then hatch to form larvae.

CONCLUSION

According to the observational data regarding the identification of endoparasitic worms in beef at the

Gorontalo City Slaughterhouse, it can be concluded where:

1. The results of the examination of endoparasitic worms on beef outside of the Gorontalo City Slaughterhouse found 12 positive samples infected with endoparasite worms.
2. The results of the identification of endoparasitic worms in beef outside of the Gorontalo City Slaughterhouse showed that there were 12 positive samples with a percentage of 100%.

BIBLIOGRAPHY

[1] Agustina KK, Dharmayudha AAGO, Wirata IW. (2013). Prevalence of Toxocara vitulorum in Bali heifers and calves in the East Bali Region. Faculty of Veterinary Medicine. Udayana University. Udayana Veterinary Bulletin. Volume 5 Number 1 : 1-6.

[2] Ariawan KY, Apsari IAP, Dwinata IM (2018). Gastrointestinal Nematode Infection Prevalence in Bali Cattle in Wet and Dry Land in Badung Regency. Indonesia Medicus Veterinus. Volume 7. Number 4.

[3] Awaludin A., Hasanah N., Nurkholis., Nusantoro S., Kustiawan E., Wahyono, DN (2021). Prevention of helminthiasis in cattle in the Sido prosperous livestock group, Jember. Department of Animal Husbandry. Jember State Polytechnic. Scientific Journal of Scholar Filia. Volume 6. Number 1. March 2021.

[4] Central Bureau of Statistics. (2017). Study of Consumption of Staples. BPS RI. Jakarta.

[5] Central Bureau of Statistics. (2018). Animal Health Information. BPS RI. Jakarta.

[6] Darmin S. (2014). Prevalence of Paramphistomiasis in Bali Cattle in Libureng District, Bone Regency. Veterinary Study Program. Medical School. Hasanuddin University. Makassar.Essay.

[7] Department of Marine Affairs, Fisheries, and Agriculture. (2021). Data on the Number of Slaughterhouses in Gorontalo City.

[8] Ditjennak. (2012). Mammal Animal Disease Manual. Directorate General of Livestock and Animal Health. Jakarta. Sub-Directorate of Animal Disease Observation, Directorate of Animal Health.

[9] Djailani J. (2020). Overview of Taenia Saginata Larva Examination in Beef in Gorontalo City. KTI.

[10] Istirokah Y. (2018). Identification of Intestinal Parasitic Worm Eggs in Cow Stool in Tanjung Harapan Hamlet, Bojong Village, Sekampung Udik Subdistrict, East Lampung. Faculty of Tabbiyah and Teacher Training. Raden Intan State Islamic University. Lampung. Essay.

[11] Kahol I., Saiya HV, Fanggindae D. (2019). Case Study of Worm Disease Trichostrongylus Sp. On Cows in Semangga District, Merauke Regency. Faculty of Agriculture. Musamus University. Musamus Journal of Animal Livestock Science. Volume 1 No.2. April of 2019.

[12] Karnila, (2018). Identification of Worm Fasciola hepatica in Beef Liver at Anggoeya Slaughterhouse, Poasea District, Kendari City. Health Analyst Study Program, Kendari Health Polytechnic. KTI.

[13] Kurniabudhi, YM (2014). Prevalence of Liverworm (Fasciola sp.,) Infection in Beef Cattle at Pegirian Slaughterhouse Surabaya. Kusuma University Surabaya. Scientific articles.

[14] Masturoh I. and Anggita N. (2018). Health Research Methodology. Agency for the Development and Empowerment of Health Human Resources. Jakarta.

[15] Munadi. (2011). Liverworm Infection Rate Relation to Economic Loss of

Beef Cattle Slaughtered in Slaughterhouses in the Ex-Kresidenan Area of Banyumas.Agripet. Volume 11 Number 1: 45-50.

[16] Nguyen, TGT. (2012). Zoonotic Fasciolosis in Vietnam: Molecular Identification and Geographical Distribution. [Dissertation]. Faculty of Veterinary Medicine. University

[17] Purwatihningsing, Susanto ESPt, MP, Qomaruddin M. (2016). Comparison of Prevalence and Infection of Nematode Parasites in Beef Cattle Between Concrete Floor and Soil Floor Cages Models in Palang District, Tuban Regency. Animal Husbandry Study Program. Faculty of Animal Husbandry. Lamongan Islamic University (UNISLA).

[18] Putri M., Fauziah, NA, Agustin, VH (2019). Identification of Endoparasites and Ectoparasites of Freshwater Ornamental Fish at Sasana Mina Fish Market, Magelang. Aquaculture Study Program. Tidar University. Proceedings of the National Mathematics and Natural Sciences Seminar.

[19] Rahayu S. (2015). Gastrointestinal Nematodiasis Prevalence in Bali Cattle (*sondaicus boss)*in Maiwa District, Enrekang Regency. Medical School. Hasanuddin University.*Essay.*

[20] Slaughterhouse. (2021). Data on the Number of RPH and Part of Meat Interested by the Community. Gorontalo.

[21] Roeber F., Jex AR., Gasser RB. (2013). Impact of Gastrointestinal Nematodes of Sheep, and The Role of Advanced Molecular Tools For Exploring Epidemiology and Drug Resistance-An Australian Perspective.J Parasite & Vect. 153(6): 1-13.

[22] Safitri R., Ita., Harjanti DW, Setiatin ET (2015). Dairy Cow Health Evaluation. Department of Animal Husbandry, Faculty of Animal Husbandry and Agriculture. Diponegoro University. Agrippet. Volume 15 Number 2. October 2015.

[23] Subronto. (2007). Animal Diseases II (mammals) Livestock Health Management Gastrointestinal Parasitism and Metabolic Diseases: Gadjah Mada University Press. Yogyakarta (ID).

[24] Sugiyono. (2012). Statistics For Research. Issue 12. Alphabeta. Jakarta.

[25] Susilo H., Abdillah NA, Amelia KR (2020). Identification of Parasitic Worm Eggs in Animal Feces in Banten Province. Journal of Biology and Learning. Volume 15 Number 2. Mathla'ul Anwar University.

[26] Supriadi, Muhammad, KK, Seli N. (2020). Identification of Gastrointestinal Nematode Worm Parasites in Bali Cattle (Bos soundaicus) in Taman Ayu Village, West Lombok Regency. Mandalika University of Education. Scientific Journal of Biology.

[27] Tolistiawaty I., Widjaja J., Leonardo TL, Rina I. (2016). Gastrointestinal Parasites in Livestock at Slaughterhouses in Sigi Regency, Central Sulawesi. Health Research and Development Agency, Ministry of Health. Balaba.Volume 12, Number 2 December 2016.

[28] Triatmojo S., Erwanto Y., Fitriyanto NA (2016). Handling of Livestock Industry Waste. Edition 1. Gadjah Mada University Press. Yogyakarta.

[29] Regional Technical Implementation Unit (UPTD) Animal Health Center. (2021). Gorontalo City Worm Infected Cow Data.

[30] World Health Organization. (2011). fascioliasis.

[31] Widjaja Jl, Tl, Oktaviani., Puryadi. (2014). Prevalence and Types of Worm Eggs Soil Transmitted Helmints (STH) in Basil Vegetables Grilled Fish Traders in Palu City. Journal of Epidemiology and Animal Source Disease. 5(2):61-66.
[32] Zulkoni A. (2018). Parasitology. Edition 2. Nuha Medika. Yogyakarta.