Culling Layer Hen Gastrointestinal Helminth Identification at Wonokromo Market Surabaya

[1*)]Fakhryyah Maharani Deviyanti, [2)]Poedji Hastutiek, [3)]Arimbi, [2)]Mufasirin, [4)]Dian Ayu Permatasari, [2)]Agus Sunarso

[1)] Student, Faculty of Veterinary Medicine, Universitas Airlangga
[2)] Division of Veterinary Parasitology, Faculty of Veterinary Medicine, Universitas Airlangga
[3)] Division of Veterinary Pathology, Faculty of Veterinary Medicine, Universitas Airlangga
[4)] Division of Veterinary Public Health, Faculty of Veterinary Medicine, Universitas Airlangga
***Corresponding author:** fakhryyahmaharani99@gmail.com

Abstract

This study aims to identify intestinal worms in culled layer hen sold at Wonokromo Market, Surabaya. 100 samples purchased from five traders at Wonokromo Market. The digestive tract taken for worm examinination. The manure observed for the presence of worm eggs. Manure examination using native, sedimentation and flotation methods. 85% of the chicken samples infected by worms. The indicated types of worms were *Ascaridia galli*, *Heterakis gallinarum*, *Raillietina tetragona* and *Mediorhynchus gallinarum*. *A. galli*, *H. Gallinarum* and *Raillietina* sp eggs found in the manure. The hen could be infected by single worm, or mixture of two and three worms. Single worm infection was 41%, mixed infection of two worm species was 23% and mixed infection of three worm species was 21%.

Keywords: Identification, Hen, Worm Infection

Introduction

The poultry farming development in Indonesia faster than other livestock (Jamaluddin et al., 2014). Laying hens population in East Java region in 2020 increased around 96,543,331 birds. The increase in the laying hen population followed by an increase in chickens being culled (Directorate General of Animal Husbandry and Animal Health, 2021). Old laying hens or unproductive discarded and sold to the market for public consumption (Soeparno, 2015). Wonokromo Market was one of the markets as a place to sell culled laying hens (Mait, 2012; Supriyanto, 2019).

The digestive tract parasites was an obstacle for laying hen breeders because it can faster the hen culling. Gastrointestinal parasites could reduce egg production by 15-30% (Winarso, 2016). The economic loss of digestive tract parasite infection around 2.49-3.48 million birds per year (Hambal et al., 2019).

Cases caused by intestinal worms and protozoa on laying hens were quite high, because Indonesia's environmental conditions with a tropical climate with high temperature and humidity were very supportive for the worms development. Digestive tract worms that attack laying hens were nematode classes such as *A. galli*, *H. galllinarum*, *S. avium* and *T. tenuis*. The trematode class was *E. revolutum*, and the cestoda class is *D. proglottina* and *Raillietina* sp. (Tabbu, 2006).

According to Pradana (2015), the prevalence of worm species on laying hens were *Strongyloides avium* 28%, *A. galli* 60%, *H. Gallinarum* 32%, *Davainea proglottina* 12% and *Trichostrongylus tenuis* 8%. The protozoa was *Eimeria* sp. by 32%. *Railletina* sp. with 66% prevalence in laying hens sold in several markets in Surabaya was high level of parasitic worm infection on laying hens digestive tract (Kusumaningtyas, 2012).

Parasitic infections influenced by several factors, namely climate change, henhouse sanitation and feed management. Indonesia was a country with a tropical climate. High rainfall and high humidity. Low sanitation quality in Indonesia has resulted in the emergence of various diseases which very suitable for the eggs development or infective worms larvae and protozoa which attack the digestive tract of laying hens. Worm infections transmitted through food, water, air, feces contaminated by worm eggs. Infection with protozoa caused by poor sanitation, with feces accumulating in the henhouse (Aprilliani and Mustafidah, 2017).

Considering there was no data regarding digestive tract parasites on culled laying hens sold at the Wonokromo Market, Surabaya City, it is necessary to conduct research on digestive tract parasites of rejected laying hens using digestive tract surgery methods and fecal examination methods.

Research Method

This was survey research, with a cross sectional study design. Samples of culled laying hens at the Wonokromo Market in Surabaya purchased from 5 traders. The sample in this study were 100 culled laying hens. This study used a surgical examination of the digestive tract using the scraping and staining method for worms using semichon's carmine and stool samples examined using native, sedimentation and flotation methods.

Observations regarding the identification of digestive tract parasites in rejected laying hens sold at the Wonokromo Market in Surabaya City presented descriptively in tables and figures.

Result and Discussion

The digestive tract and feces examination results of 100 rejected laying hens sold in Wonokromo, 85% hens infected by worms. The worm species found were *A. galli*, *H. gallinarum*, *R. tetragona* and *M. gallinarum*.

One chicken can be single or mixed infected (Table 1). The most common worm found in this study was single infection *A.galli* with 16% prevalence. This prevalence was the highest prevalence found around the duodenal lumen of hens. Ananda's research (2017) reported that the digestive tract parasites that attacked the most dominant laying hens was *A. galli* with 43% prevalence. Several factors caused prevalence difference of *A. galli* worms were climate, humidity, age, rearing management, and feeding systems. Feed ration that contains less vitamins A and B12 will disrupt the digestive system in the chicken's body. Adult *A. galli* worms were yellowish white. The *A. galli* worm seen in **Figure 1**.

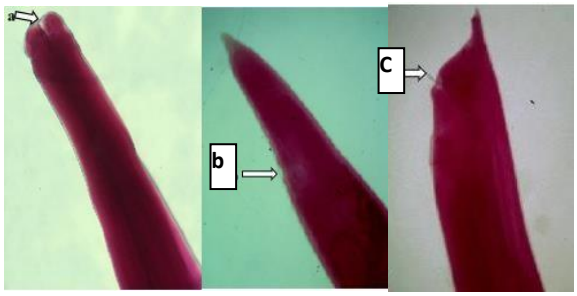

Figure 1. *A. galli* with 100x magnification microscope equipped with an optilab and uses carmine staining. (a) There were 3 large lips anteriorly; (b) An anus in the posterior section. The sign (arrow) shows the characteristic shape of female *A. galli* worms. (c) There were spicules posteriorly.

The prevalence of *H. gallinarum* infection in this study was 8% in a single infection. Worms found around the caecum of chickens. The results of this study slightly different from research conducted by Yunia (2006) which stated that culled laying hens infected with *H. gallinarum* in several Surabaya Traditional Markets with 77% prevalence. These different results are likely due to the environmental conditions of the cages, different rearing patterns for each laying hen farm distributed to Wonokromo Market, Surabaya City. The size of *H. gallinarum* found was 7 mm - 11 mm long with a transparent body. The morphology of the worm seen in **Figure 2**.

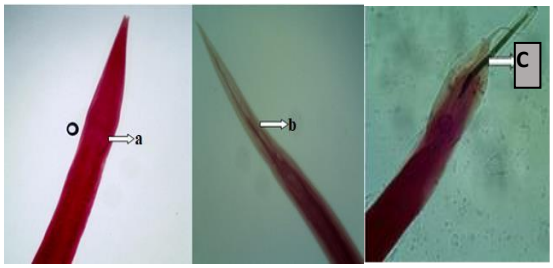

Figure 2. *H. gallinarum* with 40x magnification microscope equipped with an optilab and uses carmine staining worm. (a) There was a bulbous esophageal formation in the anterior part; (b) There were no spicules in the posterior part. The sign (arrow) shows the characteristic shape of female *H. gallinarum* worms. (c) There were spicules posteriorly.

Raillietina tetragona in this study categorized as single infection, had 3% prevalence found in the duodenum. The results of this study slightly different from the research conducted by Damayanti *et al.*, (2019) which stated that the type of Worm *Railletina* sp. was the most commonly found in chickens in Kramat Village, this related to the indirect life cycle of cestodes and poorly maintained henhouse sanitation.

R. tetragona found in intestinal examination has segmented body characteristics in the duodenum, yellowish white which cause nodules on the surface of the duodenum which can be seen in Figure 3.

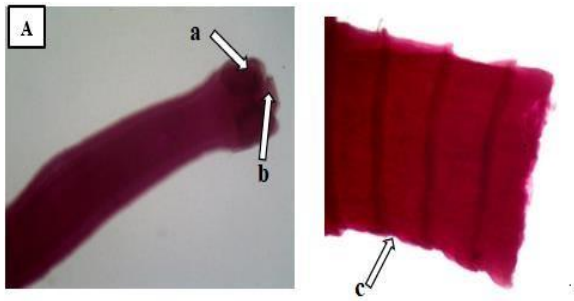

Figure 3. *R. tetragona* with 40x magnification microscope equipped with an optilab and uses carmine staining. (A) There was (a) an oval sucker

formation and (b) a small round rostellum anteriorly; (B) Body shape (c) The body appears segmented at the posterior. The sign (arrow) shows the characteristic shape of the *R. tetragona* worm.

Single infection of *Mediorhynchus gallinarum* worm also found in the ileum with 14% prevalence. Results of this study similar to Prastowo *et al.*, (2016) which stated that the Acanthocephala Phylum which attacks the laying hens posterior small intestine aged over 50 weeks was *M. gallinarum*, based on surgical examination of the digestive tract through morphological identification with carmine staining.

M. gallinarum worm found in the ileum. *M. gallinarum* could do single infection and sometimes infects together with *A. galli* worm. Gastrointestinal examination of this study showed the intestine appeared nodule, almost the same characteristics as infected by *Raillietina* sp., microscopic examination showed proboscis in the anterior part. Worms difficult to remove from chicken intestines because they have many hooks on the anterior and posterior parts of the body. Worms in clusters could be seen in **Figure 4**.

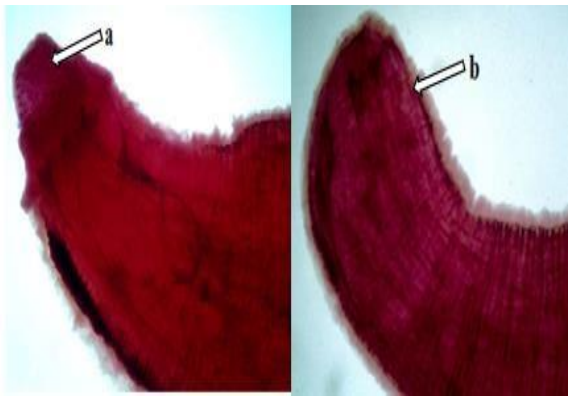

Figure 4. *M. gallinarum* with 40x magnification microscope equipped with optilab and uses carmine staining. (a) There was a proboscis formation like small spines in the anterior part; (b) Looks conical in shape posteriorly. The sign (arrow) shows the characteristic shape of the *M. gallinarum* worm.

Stool examination conducted by taking freshly excreted feces and large intestine to the cloca. The results obtained that there were *A. galli*, *Raillietina* sp., and *H. gallinarum* eggs. *M. gallinarum* worm eggs were not found. *A. galli* eggs were found during fecal examination using the sedimentation method which had 62.31 x 27.12 µm size which larger than *H.gallinarum* worm eggs. *A. galli* had an oval shape and had smooth egg walls which can be seen in **Figure 5**.

Figure 5. *A. galli* egg with 400x magnification.

H. gallinarum eggs in this study found by examining feces using the sedimentation method. *H. gallinarum* had 58.05 x 23.38 µm size. *H. gallinarum* eggs smaller than *A.galli* eggs, had oval shape and smooth egg walls which could be seen in **Figure 6**.

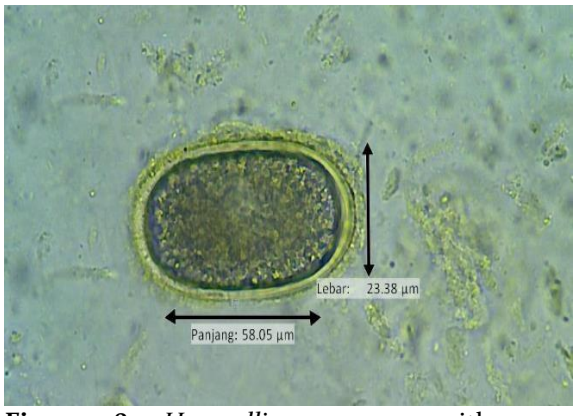

Figure 8. *H. gallinarum* egg with 400x magnification.

Raillietina sp. eggs found by examining feces using the sedimentation method. Had 40.48 x 39.71 µm size, round shape, had thick egg walls, and there was a hexacanth embryo formation in the middle of the *Raillietina* sp egg. The egg could be seen in **Figure 9**.

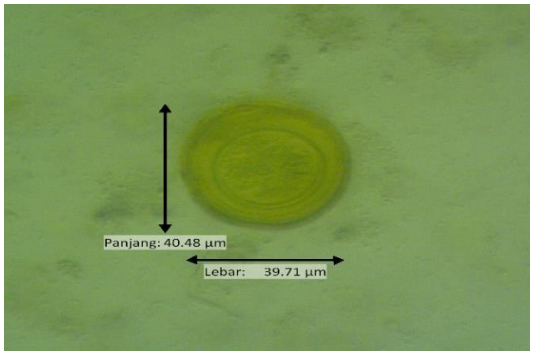

Figure 9. *Raillietina* sp. egg with 400x magnification.

Table 1. Culled Layer Hen Gastrointestinal Parasite Prevalence Based on Type of Infection at Wonokromo Market.

Sample	Gastrointestinal Parasites Prevalence Based on Type of Infection					
	Single	Prevalence (%)	Double	Prevalence (%)	Triple	Prevalence (%)
100	*A. galli*	16	*A. galli* *H. gallinarum*	8	*A. galli* *H. gallinarum* *M. gallinarum*	9
	H. gallinarum	8	*M. gallinarum* *H. gallinarum*	6	*A. galli* *H. gallinarum* *R. tetragona*	4
	R. tetragona	3	*A. galli* *R. tetragona*	4	*H. galinarum* *A. galli* *R. tetragona*	5
	M. gallinarum	14	*H. gallinarum* *R. tetragona*	5	*A. galli* *R. tetragona* *M. gallinarum*	3
Prevalence infection (%)		41		23		21
Prevalence (%)			85			

Double infections in this study had 23% prevalence and triple infections 21%, which lower than single infections prevalence. The results of this study differ from research conducted by Pradana (2015) showed that more than two infections that occurred in the field were more dominant than single infection by one class or type of worm in laying hens. This occurred because the wet climate was a supporting factor in the development of parasites.

Helminthiasis prevalence in laying hens quite high because they were traditionally cultivated and had a long cultivation duration, which makes them susceptible to several diseases, digestive tract parasites was one of them (Poulsen et al., 2000). Culled laying hens sold at the Wonokromo Market were rejected laying hens purchased from several different breeders in East Java, namely Kediri, Blitar, Jombang, Batu, Mojokerto and Pasuruan. The host population density and source of infection differ between farms, so it could no be known how the farmers cultivate the hens.

Preventive measures needed to reduce the gastrointestinal parasitic diseases prevalence that sustainable correct and efficient treatment. This disease could be prevented by improving cage sanitation, cleanliness of the surrounding environment, maintenance management and regular insecticide spraying. Treatments that usually given to treat nematode worms in the digestive tract of laying hens include piperazine, levamisole and phenothiazine, and to treat cestode nematode worm infections in the digestive tract of laying hens can be given albendazole (Kusnoto et al., 2017).

Conclusion

1. The digestive tract parasite species that infect rejected laying hens sold at Wonokromo Market, Surabaya City are A. galli, H. gallinarum, R.tetragona and M. gallinarum.
2. The prevalence of digestive tract parasite species in rejected laying hens sold at the Wonokromo market in Surabaya is 85%. Single worm infection was 41%, mixed infection of two worm species was 23% and mixed infection of three worm species was 21%.

Refferences

Ananda, R. R., Rosa, E. dan Pratami, G.D. 2017. Studi Nematoda Pada Ayam Petelur (*Gallus gallus*) Strain Isa Brown di Peternakan Mandiri Kelurahan Tegal Sari, Kecamatan Gading Rejo, Kab. Pringsewu, Lampung. Jurnal Ilmiah Biologi Eksperimen dan Keanekaragaman Hayati. 4(2): 23-27.

Aprilliani, P. F., dan Mustafidah, H. 2017. Implementasi Certainty Factor pada Diagnosa Penyakit Infeksi Tropis (Certainty Factor Implementation On Tropical Infection Disease Diagnostics). Journal Research Sains and Technology. 1(1): 22-36.

Damayanti, E. A., Hastutiek, P., Estoepangestie, A. S., Lastuti, N. D. R., dan Suprihati, E. 2019. Prevalensi dan Derajat Infeksi Cacing

Saluran Pencernaan pada Ayam Buras (*Gallus domesticus*) di Desa Kramat Kecamatan Bangkalan Kabupaten Bangkalan. Journal of Parasite Science. 3(1): 41-46.

Direktorat Jenderal Peternakan dan Kesehatan Hewan, Kementrian Pertanian (Ditjen PKH). 2021. Statistik Peternakan dan Kesehatan Hewan. Direktorat Jenderal Peternakan dan Kesehatan Hewan, Kementerian Pertanian RI. Jakarta. 111.

Ekawasti, F., dan Martindah, E. 2019. Control of Coccidiosis in Chickens Through Herbal Medicine. Wartazoa. Indonesian Bulletin of Animal and Veterinary Sciences. 29(1): 1-12.

Hambal, M., Efriyendi, R., Vanda, H. dan Rusli, R. 2019. 34. Anatomical Pathology And Histopathological Changes Of *Ascaridia Galli* In Layer Chicken. Journal Medika Veterinaria. 13(2): 239-247.

Jamaluddin, Athiroh, N. dan Hayati, A. 2014. Respon masyarakat peternak ayam terhadap ramuan herbal sebagai anthelmintik di Desa Kambingan Tumpang Malang. Jurnal Ilmiah Biosaintropis. 98-102.

Kusnoto, Koesdarto, S., Mumpuni, S. and Prasetyo, R.H. 2017. Immunoglobulin Subclass in Experimental Murine *Toxocara Cati* Infection. Veterinary World, 10(11): 1333-1336

Kusumaningtyas, D. 2012. Prevalensi Infeksi Cestoda Pada Saluran Pencernaan Ayam Petelur Dan Ayam Pedaging Di Pasar Tradisional Kota Surabaya [Skripsi]. Fakultas Kedokteran Hewan. Universitas Airlangga.

Mait, Y. L. 2012. Perkembangan Pasar Wonokromo. Avatara, e-Journal Pendidikan Sejarah. 5(1): 90-95.

Poulsen, J., Permin, A., Hindsbol, O., Yelifari, L., Nansen, P. and Bloch, P. 2000. Prevalensce and Distribution of Gastro-intestinal Helminths and Haemoparasites in Young Scavenging Chicken in upper eastern Region of Ghana, West Africa. Preventive Vet Med. 45(3- 4): 237-245.

Pradana, D., Haryono, T., dan Ambarwati, R. 2015. Identifikasi Cacing Endoparasit pada Feses Ayam Pedaging dan Ayam Petelur. Jurnal Lentera Bio. 4(2): 119-123.

Prastowo, J., Sahara, A., Ariyadi, B., dan Widayati, I. 2016. Identification of Acanthocephala Worm in the Small Intestine of Laying Hens from Yogyakarta and Central Java Province, Indonesia. International journal of Poultry science. 15(1), 35-40.

Soeparno. 2015. Ilmu dan Teknologi Daging Edisi Revisi. Universitas Gajah Mada Press. Yogyakarta. 1: 199-312.

Supriyanto, A. 2019. Studi Kasus Penerapan Supply Chain Halal Management Daging Ayam di Pasar Wonokromo dan Pasar Asem Surabaya.[Skripsi]. Fakultas Ekonomi Dan Bisnis Islam UINSA. Surabaya.

Tabbu, C. R. 2006. Penyakit Ayam dan Penanggulangannya.Volume 2. Cetakan Kelima. Penerbit Kaninus. Yogyakarta. 36-37.

Winarso, A. 2016. Pengendalian Helminthiasis pada Peternakan Ayam Petelur Tradisional di Kabupaten Magetan, Provinsi Jawa Timur. Jurnal Kajian Veteriner. 4(1): 33-41.

Yunia, W. N. 2007. Prevalensi Heterakiasis Pada Ayam Petelur Afkir Yang Dijual Di Beberapa Cabang Pasar di Kota Surabaya. [Skripsi]. Fakultas Kedokteran Hewan. Universitas Airlangga.