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PREVALENCE AND INTENSITY OF GNATHOSTOMA SP. PARASITES IN EELS (FLUTA ALBA) TRANSITED THROUGH THE FISH QUARANTINE, QUALITY CONTROL, AND BANJARMASIN FISHERIES PRODUCT SAFETY CENTER

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ABSTRACT
Eels (*Fluta alba*) are freshwater fish widely distributed in various aquatic habitats, including rivers, lakes, swamps, and canals. Data on the prevalence, intensity of *Gnathostoma* sp. parasites, and the health status of eels can be used as a basis for better policy-making and management. This study aims to analyze the prevalence and intensity of *Gnathostoma* sp. parasites in eels transited through the Fish Quarantine, Quality Control, and Fisheries Product Safety Center in Banjarmasin. The research was conducted at the Testing Laboratory of the Fish Quarantine, Quality Control, and Fisheries Product Safety Center in Banjarmasin. The eels analyzed came from Hulu Sugai Utara and Banjar districts, and the analysis was carried out every Wednesday, coinciding with the eel export schedule. The samples examined were eel commodities to be transited through the Fish Quarantine, Quality Control, and Fisheries Product Safety Center in Banjarmasin. Eel samples were taken randomly. Sample testing was conducted once a week for two months. Samples were taken every Wednesday according to the export schedule from the Fish Farming Unit. The number of samples taken was five eels. The prevalence of eels confirmed to be infected with *Gnathostoma* sp. parasites was 57.50% (very frequent infection rate). The intensity of *Gnathostoma* sp. parasites in eels was 2.74 parasites per eel (low). The organs of eels infected by *Gnathostoma* sp. included 46 *Gnathostoma* sp. in the liver and 17 *Gnathostoma* sp. in the eel's flesh.

KEY WORDS
Eel Fish, Prevalence, Intensity, *Gnathostoma* sp.

Eels (*Fluta alba*) are freshwater fish widely distributed across various aquatic habitats, including rivers, lakes, swamps, and canals. Eels, especially the Rice Paddy Eel variety, are a significant and widely traded species in Indonesia. They are commonly found in river or swamp waters in Sumatra, Java, Bali, South Kalimantan, Sulawesi, East Nusa Tenggara, and West Nusa Tenggara (Collins, 2002). Eels play a significant ecological role as both predator and prey in the aquatic food chain. They are land-dwelling, finless fish often found in rice paddies and swamps. Eels are typically used as a food source and hold substantial economic value for local communities (Priska, 2010).

Eels are an economically important freshwater fish species with a significant ecological role in aquatic ecosystems (Damamik et al., 2019). The eel population is often threatened by various health issues, one of which is infection by the parasite *Gnathostoma* sp. This parasite can cause Gnathostomiasis in eels, impacting their health, growth, reproduction, and even leading to death. The prevalence and intensity of *Gnathostoma* sp. infection in eel populations can be influenced by several factors, such as water temperature, fish population density, water quality, and other environmental factors (Lusiastuti et al., 2013).

Parasitic diseases in fish are a significant issue in aquaculture and the sustainability of aquatic ecosystems. The nematode genus *Gnathostoma* sp. is known as a parasite in fish

and mammals, including humans. Infection of fish by *Gnathostoma* sp. can affect the physical condition of the fish and the health of fish populations. *Gnathostoma* sp. is a parasite that can infect fish, including eels. Research on the infestation of *Gnathostoma* sp. parasites in transited eels can provide insights into this risk (Kurniawan, 2016). Fish health is crucial for maintaining balanced aquatic ecosystems and the sustainability of fish production. Parasites such as *Gnathostoma* sp. can compromise fish health, which in turn can impact fish populations. *Gnathostoma* species can also parasitize humans and cause the disease Gnathostomiasis. Research on the abundance of *Gnathostoma* parasites in fish is also relevant in the context of human health (Damanik, 2019).

The Fish Quarantine, Quality Control, and Fisheries Product Safety Agency (KIPM) plays a vital role in the supervision and management of fisheries, including the shipping of fish and fish products. This study was conducted to ensure compliance with food safety standards and fisheries regulations. The movement of eels from one location to another can pose potential health and safety risks, including the risk of fish disease transmission, such as those caused by parasites. Knowledge of the prevalence, intensity of *Gnathostoma* sp. parasites, and eel health status can be used to formulate effective control and risk mitigation strategies.

Fish shipments from one location to another can also have environmental impacts, particularly if there is a risk of spreading invasive species or diseases. This is also considered in this research. The results of this study contribute to sustainable fisheries management, including identifying health and safety issues in the eel supply chain. A lack of adequate information about fish parasitology in a specific area can hinder effective management. Data on the prevalence, intensity of *Gnathostoma* sp. parasites, and eel health status can be used as a basis for better policy-making and management. This study aims to analyze the prevalence and intensity of *Gnathostoma* sp. parasites in eels transited through the Fish Quarantine, Quality Control, and Fisheries Product Safety Center in Banjarmasin.

MATERIALS AND METHODS OF RESEARCH

The research was conducted at the Testing Laboratory of the Fish Quarantine, Quality Control, and Fisheries Product Safety Center in Banjarmasin. The eels analyzed came from Hulu Sungai Utara District and Banjar District. The analysis was performed every Wednesday to coincide with the eel export schedule.

The samples examined were eel commodities to be transited through the Banjarmasin. Eel samples were taken randomly. Sample testing was conducted once a week for two months. Samples were taken every Wednesday according to the export schedule from the Fish Farming Unit. The number of samples taken was five eels.

One of the main parameters observed was the prevalence rate of *Gnathostoma* sp. infecting eels in various target organs (liver, flesh, intestines, and kidneys). Prevalence represents the percentage of infected fish out of the total fish examined. The prevalence of endoparasites in eels was calculated as follows (Kurniawan, 2016).

$$\text{Prevalence} = \frac{\text{The number of eels infected with } \textit{Gnat hostoma} \text{ sp}}{\text{Total number of eels examined}} \text{ X } 100\%$$

Intensity refers to the number of parasites invading each individual fish. The intensity of parasite types in eels can be calculated as follows (Kurniawan, 2016).

$$\text{Intensity} = \frac{\text{Number of parasites that infect eels}}{\text{The number of eels attacked by } \textit{Gnat hostoma} \text{ sp}}$$

Analysis of the prevalence and intensity levels of the parasite *Gnathostoma* sp. on Eel:

- Data on the level of prevalence and intensity of the parasite *Gnathostoma* sp. on passing eels. This data can be in the form of the number of parasites found in each eel examined;
- Collected data was carried out by calculating descriptive statistics such as mean, median and standard deviation of the prevalence and intensity levels of the *Gnathostoma* sp parasite;

- The data was made into a histogram graph to display the distribution of parasite prevalence and intensity levels in eels.

RESULTS AND DISCUSSION

The prevalence of *Gnathostoma* sp. parasites in eels analyzed at the Fish Quarantine, Quality Control, and Fisheries Product Safety Center of Banjarmasin.

Table 1 – Prevalence of *Gnathostoma* sp. Eel

Year (2024)	Week	Date	Number of eels examined (tails)	Number of infected eels (tails)	Prevalence (%)
March	I	6-Mar-24	5	4	80.00%
	II	13-Mar-24	5	3	60.00%
	III	20-Mar-24	5	4	80.00%
	IV	27-Mar-24	5	3	60.00%
April	I	3-Apr-24	5	3	60.00%
	III	17-Apr-24	5	2	40.00%
	IV	24-Apr-24	5	1	20.00%
	V	30-Apr-24	5	3	60.00%
Total			40	23	57.50%

Analysis was conducted from March to April 2024 on 40 eels, with 8 analyses performed. Each analysis involved 5 eels, resulting in a total of 23 eels confirmed to be infected with *Gnathostoma* sp. parasites, representing a prevalence of 57.50% (very frequent infection rate).

According to Djazuli et al. (2012), eels in Indonesia tend to be infected by *Gnathostoma* sp. parasites. Their study, which analyzed 127 eels ranging from 17 grams to 120 grams, found that 35 eels were positive for *Gnathostoma* sp., resulting in a prevalence of 28%. Kurniawan (2016) stated that the category "commonly" or "usual" describes a parasite that typically infests fish if the prevalence ranges from 30-49%. *Gnathostoma* sp. worms commonly infect rice paddy eels, influenced by various factors, including poor aquatic environmental conditions.

Human activities, livestock, and wild animals around rice paddy areas can produce organic matter. During the rainy season, this organic matter dissolves and settles at the bottom of the rice paddy waters, flowing into the water bodies. High organic content enriches the rice paddy waters, leading to the emergence of nematode parasites, including *Gnathostoma* sp., originating from wild animals and potentially infecting (transmitting to) the internal organs of rice paddy eels through natural food sources in the water. Damanik et al. (2019) stated that human activities such as rice farming and buffalo husbandry, as well as wild animals, produce organic waste. During the rainy season, this organic waste flows into the rice paddy waters and settles at the bottom, creating a muddy substrate. High organic content combined with pesticide use can degrade water quality.

Water quality will decrease, causing eels to become stressed and more susceptible to diseases, especially from parasitic groups. Additionally, the role of small organisms such as crustaceans, which are both food for rice paddy eels and the first intermediate host, also affects the presence of *Gnathostoma* sp. in eels' bodies. Ulkhaq (2020) stated that endoparasitic worm infections in eels are caused by consuming natural food containing *Gnathostoma* sp. larvae. Natural food containing *Gnathostoma* sp. larvae will transmit from the food to the eel's body, causing the eel to become infected and serving as the second intermediate host for the endoparasitic worm. Khati et al. (2013) stated that the highest infection of *Gnathostoma* sp. worms in eels occurs from June to October, during the rainy season, and parasite infections significantly decrease after the rainy season ends. Based on the examination results of eel sample tests and the prevalence values obtained, these factors do not affect the shipment of eels out of South Kalimantan Province for local consumption or export. There are currently no regulations prohibiting the shipment of eels between areas if they are found to be infected with *Gnathostoma* sp. parasites. Meanwhile, after China removed the requirement for eels to be free from *Gnathostoma* sp. parasites, and

no other countries have enforced it, eel exports can still be conducted even if sample test results indicate the presence of *Gnathostoma* sp. infections.

The Center for Fish Quarantine and Fish Health Security (2016) explained that *Gnathostoma* sp. parasites are not included in the list of fish diseases that must be free of aquatic product requirements for fish exports. *Gnathostoma* sp. parasites are zoonotic, so caution is needed in handling them. Prevention of the spread of *Gnathostoma* sp. parasites to other areas can be achieved through laboratory examinations of rice paddy eel samples intended for shipment outside South Kalimantan Province or for export and by including *Gnathostoma* sp. parasites in regulations prohibiting the shipment of eels if sample tests show the presence of *Gnathostoma* sp. infections.

Table 2 – Intensity of *Gnathostoma* sp. Eel

Year (2024)	Week	Date	Number of infecting parasites (tails)	Number of infected eels (tails)	Intensity
March	I	6-Mar-24	15	4	3.75
	II	13-Mar-24	10	3	3.33
	III	20-Mar-24	9	4	2.25
	IV	27-Mar-24	6	3	2.00
April	I	3-Apr-24	10	3	3.33
	III	17-Apr-24	5	2	2.50
	IV	24-Apr-24	2	1	2.00
	V	30-Apr-24	6	3	2.00
Total			40	23	2.74

Analysis was conducted from March to April 2024 on 40 eels, with 8 analyses performed. Each analysis involved 5 eels, resulting in a total of 23 eels confirmed to be infected with *Gnathostoma* sp. parasites. The total number of *Gnathostoma* sp. parasites infecting eels was 63, resulting in a parasite intensity of 2.74 parasites per eel (Low).

Table 3 – Eel Fish Organs Infected with *Gnathostoma* sp.

Year (2024)	Week	Date	Number of eels examined (tails)	Kidney	Liver	Intestine	Meat	Total
March	I	6-Mar-24	5	0	10	0	5	15
	II	13-Mar-24	5	0	5	0	5	10
	III	20-Mar-24	5	0	6	0	3	9
	IV	27-Mar-24	5	0	6	0	0	6
April	I	3-Apr-24	5	0	7	0	3	10
	III	17-Apr-24	5	0	4	0	1	5
	IV	24-Apr-24	5	0	2	0	0	2
	V	30-Apr-24	5	0	6	0	0	6
Total			40	0	46	0	17	63

Analysis revealed that 46 eels were infected with *Gnathostoma* sp. parasites in the liver, while 17 eels were infected in the flesh. Parasite intensity represents the number of parasites invading an organism in a given space and time unit (Nofasari et al., 2019). Observing intensity serves as an important indicator in assessing the health status of eels to be transited. According to William and Bunkley (1996), the infection rate occurring in wild fish falls into the usual or infected category. Ohoiulun (2002) stated that the value of parasite intensity is determined by the age of the fish and may increase with the fish's age. Arpia et al. (2012) suggested that another factor affecting the high presence of parasites in large-sized fish could be the influence of the types of food consumed by the fish. Alifuddin et al. (2003) mentioned that the older the fish, the higher the parasite intensity value, as the larger body surface of the fish may also increase parasite colonies. Older fish have larger body sizes and spend more time in the water, increasing their vulnerability to parasite infections. Rohde (1982) stated that parasites generally prefer to inhabit parts of the fish's body if those parts are easily occupied, provide space, and offer the necessary food for the growth and reproduction of the parasites.

CONCLUSION

The prevalence and intensity of *Gnathostoma* sp. parasites in eels transited through the Fish Quarantine, Quality Control, and Fisheries Product Safety Center in Banjarmasin are as follows:

- The prevalence of eels confirmed to be infected with *Gnathostoma* sp. parasites is 57.50% (Very frequent infection rate);
- The intensity of *Gnathostoma* sp. parasites in eels is 2.74 parasites per eel (Low). Among the infected eels, 46 eels have *Gnathostoma* sp. parasites infecting their liver, and 17 eels have *Gnathostoma* sp. parasites infecting their flesh.

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