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IDENTIFICATION OF ECTOPARASITES AND ENDOPARASITES IN VANAME SHRIMP *(Litopenaeus vannamei)* IN PEUKAN BADA INTENSIVE PONDS, ACEH BESAR

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Abstract

This study investigates the types, prevalence, and intensity of ectoparasites and endoparasites in vannamei shrimp (*Litopenaeus vannamei*) farmed in intensive ponds in Lamteungoh Village, Peukan Bada District, Aceh Besar. A total of 40 shrimp were collected using purposive sampling. Parasite observations were conducted on shrimp organs including the head, gills, walking legs, swimming legs, and tail. Three ectoparasites were identified: *Vorticella sp.*, *Zoothamnium sp.*, and *Epistylis sp.*, while no endoparasites were found. *Vorticella sp.* showed the highest prevalence at 100% and intensity at 19.35 individuals per shrimp. The tail was most frequently infected, with a prevalence of 82.5% and intensity of 9.81 individuals. Water quality data showed pH 6, temperature 26–27°C, salinity 25 ppt, and DO 2.4–2.6 ppm, which are considered suboptimal. Low dissolved oxygen levels and poor water conditions likely contributed to parasite proliferation. The absence of endoparasites may be linked to good management and the use of high-quality seed. This research provides useful insight into parasite threats in shrimp farming and underscores the importance of maintaining water quality for disease prevention and productivity.

Keywords: Vannamei shrimp, ectoparasite, endoparasite, prevalence, water quality.

INTRODUCTION

Whiteleg shrimp (Litopenaeus vannamei) cultivation is a leading sector in the Indonesian aquaculture industry. This shrimp is known for its various advantages, including rapid growth, resilience to environmental fluctuations, and efficiency when reared at high densities. Intensive cultivation systems have been widely implemented to increase productivity, including in Aceh Besar. However, the success of these systems depends heavily on environmental management and the health of the cultured organisms, particularly in controlling parasitic diseases.

Parasites are a significant cause of disease in shrimp farming. Based on the location of infection, parasites are divided into ectoparasites, which attack the external body, and endoparasites, which attack internal organs. Ectoparasitic infections such as *Vorticella sp.* , *Zoothamnium sp.* , and *Epistylis sp.* are known to cause irritation, respiratory problems, and reduced shrimp quality and survival. Meanwhile, endoparasitic infections can disrupt the function of internal organs such as the intestines and hepatopancreas, impacting shrimp growth.

Poorly managed pond environments, such as poor water quality and high stocking densities, are key factors contributing to high parasite prevalence. Water quality parameters such as

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temperature, pH, salinity, and dissolved oxygen significantly impact shrimp resistance to infection. Therefore, parasite monitoring and control are crucial for the sustainable success of whiteleg shrimp farming .

This study aims to identify the types of ectoparasites and endoparasites infecting whiteleg shrimp in intensive ponds in Peukan Bada, Aceh Besar Regency, and to analyze the prevalence and intensity of infection. The results are expected to serve as a scientific and practical reference for farmers in implementing effective parasite prevention and control strategies to improve whiteleg shrimp productivity and health.

RESEARCH METHODS

Time and Place

This research was conducted from March to April 2025 in an intensive pond located in Lamteungoh Village, Peukan Bada District, Aceh Besar Regency. Ectoparasite and endoparasite identification and observation were conducted at the Fish Breeding and Breeding Laboratory, Faculty of Marine Affairs and Fisheries, Syiah Kuala University, Banda Aceh.

Data Collection Method

a. Primary data were obtained through direct observation of 40 whiteleg shrimp taken from two intensive ponds using a purposive sampling method. Supporting data were obtained from interviews with pond technicians regarding cultivation practices and pond management.

b. Secondary data were collected from literature, technical reports, and previous research results relevant to parasite identification and water quality in intensive shrimp farming.

Work Procedure

a. Sampling

A total of 40 whiteleg shrimp, measuring 12–15 cm, were collected from intensive ponds in Lamteungoh Village, Peukan Bada District, Aceh Besar, using nets. The samples were placed in jars filled with pond water and equipped with battery-powered aerators to maintain oxygen supply.

b. Sterilization and Preparation of Equipment

Identification was conducted at the Fish Breeding and Breeding Laboratory, Faculty of Marine Sciences and Fisheries, Syiah Kuala University. Tools such as dissecting sets, slides, cover glasses, petri dishes, and trays were sterilized using 70% alcohol.

c. Ectoparasite identification

Each shrimp was measured for total length (cm) and weight (g). The organs examined included the gills, walking legs, swimming legs, head, and tail. The tissue was cut and placed on a glass slide, dripped with distilled water, covered with a cover glass, and then observed under a Zeiss light microscope (10x40 magnification). The results of the observations were documented, and ectoparasite identification was carried out according to Kabata (1985).

d. Endoparasite Identification

Endoparasite examination was carried out on the hepatopancreas and intestines. Then the hepatopancreas was taken by dissecting the head, after which it was dripped with distilled water, after which it was observed under a Zeiss light microscope (10x40

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magnification). Next, the intestine was opened and its contents were removed, then observed under a Zeiss light microscope (10x40 magnification). Next, Identification refers to Kabata (1985).

e. Water Quality Measurement
Supporting parameters such as water quality measured include temperature (thermometer), dissolved oxygen (DO meter), pH (pH meter), and salinity (refractometer) in intensive ponds in Lamteungoh Village, Peukan Bada District, Aceh Besar.

Research parameters

The main parameters observed in this study were the prevalence and intensity of ectoparasites in whiteleg shrimp (*Litopenaeus vannamei*). Parasite prevalence and intensity were calculated using the following formula from Kabata (1985):

$$\text{Prevalence} = \frac{\sum \text{Number of shrimp infected with ectoparasites}}{\sum \text{Number of shrimp examined}} \times 100\%$$

$$\text{Intensity (ind/tail)} = \frac{\sum \text{Number of Ectoparasites found}}{\sum \text{Number of infected shrimp}}$$

The results of the calculations of prevalence and intensity of ectoparasites and endoparasites are presented in tabular form. They are then adjusted according to the categories according to Williams and Williams (1996).

Table 1. Criteria for the prevalence of parasitic infections according to Williams and Williams (1996)

No	Prevalence	Category	Information
1	100-99%	Always	Very severe infection
2	98-90%	Almost always	Severe infection
3	89-70%	Usually	Moderate infection
4	69-50%	Very often	Infection is very frequent
5	49-30%	Generally	Common infections
6	29-10%	Often	Frequent infections
7	9-1%	Sometimes	Infection sometimes
8	<1-0,1%	Seldom	Rare infection
9	<0,1-0,1%	Very rarely	Infection is very rare
10	<0,01%	Almost never	Infection never

Table 2. Intensity criteria according to Williams and Williams (1996)

No	Intensity (Ind/Tail)	Information
1	<1	Very low
2	5-1	Low
3	6-55	Currently
4	51-100	Critical

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5	>100	Very serious
6	>1000	Super infection

RESULTS AND DISCUSSION

Results

The results of the study on the identification of ectoparasites in whiteleg shrimp (*Litopenaeus vannamei*) cultivated in intensive ponds in Lamteugoh Village , Peukan Bada District, Aceh Besar Regency, found three types of ectoparasites consisting of *vorticella, epiytlis, and zoothanium* that infect 40 whiteleg shrimp examined. Meanwhile, no endoparasites were found during the observation. The three types of parasites are then presented in detail in Figure 1.

Figure 1. Characteristics of each genus of ectoparasites that infect whiteleg shrimp (*Litopenaeus vannamei*) (a). *vorticella sp* . (c). *epiytlis sp* . (c). *zoothanium sp* . found in intensive ponds in Lamteungoh Village.

The results of the study showed that whiteleg shrimp (*Litopenaeus vannamei*) cultivated in intensive ponds in Lamteungoh Village, Peukan Bada District, Aceh Besar, were infected by three types of ectoparasites: *Vorticella sp.* , *Zoothamnium sp.* , and *Epistylis sp* . Meanwhile, an examination of the internal organs revealed no endoparasites. The data are presented in Table 3.

The highest infection rate was found in the second pond, with *Vorticella sp.* as the dominant ectoparasite. This parasite showed a prevalence of 100% and an infection intensity of 19.35 individuals per fish, which is classified as a "very severe" infection. In contrast, *Zoothamnium sp.* and *Epistylis sp.* had lower prevalence and intensity values. The first pond showed *a Vorticella sp.* infection rate of 65% with an intensity of 4.76 individuals per fish. These data are presented in Table 4.

Water quality parameters at the pond site showed a pH of 6, a temperature of 26–27°C, a salinity of 25 ppt, and dissolved oxygen (DO) ranging from 2.4 to 2.6 ppm. This low DO value is suspected to be a factor triggering high levels of ectoparasite infections in shrimp. Although still within the cultivation tolerance range, this condition is considered suboptimal and has the potential to exacerbate shrimp stress levels, ultimately making it easier for parasites to develop

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on the shrimp's body surface and reproduce in unfavorable environmental conditions. The data are presented in Table 5.

Table 3. Types of prevalence and intensity of whiteleg shrimp in Lamteugoh Village, Peukan Bada District, Aceh Besar.

Pool	Types of ectoparasites	Infected (tail)	Parasite (individual)	Prevalence (%)	Intensity (ind/tail)	
1	*Vorticella sp.*	13	62	65%	4,76	
	Zoothamnium sp.	2	2	10%	1	
	Epistylus sp.	3	7	15%	2,3	
2	*Vorticella sp.*	20	387	100%	19,35	
	Zoothamnium sp.	4	9	20%	2,25	
	Epistylus sp.	7	22	35%	3,14	

Table 4. Prevalence and intensity of parasites that attack the organs of whiteleg shrimp

Organ	∑ parasites (individuals)	∑ affected (tail)	Prevalence (%)	Intensity (ind/tail)
Footpath	40	10	25	4
Swimming legs	36	6	15	6
Gill	0	0	0	0
Head	89	17	42,5	5,23
Tail	324	33	82,5	9,81

Table 5. Range of results of water physico-chemical quality measurements in Lamteugoh Village, Peukan Bada District, Aceh Besar.

Pool	Parameter	Unit	Range data
1	pH	-	6
	Salinity	Ppt	25
	Temperature	˚C	26
	DO	Ppm	2,4
2	pH	-	6
	Salinity	Ppt	25
	Temperature	˚C	27
	DO	Ppm	2,6

The results of the study showed that whiteleg shrimp cultivated in intensive ponds in Lamteungoh Village, Peukan Bada District, Aceh Besar, were infected by three types of

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protozoan ectoparasites, namely *Vorticella sp., Zoothamnium sp., and Epistylis sp .*, with varying levels of prevalence and intensity between ponds and shrimp organs. All three are protozoa from the class *Peritricha* that commonly attack aquatic organisms in suboptimal environmental conditions (Kabata, 1985).

Vorticella sp. is an ectoparasitic protozoan commonly found in farmed shrimp. In the first pond in Lamteungoh village, *Vorticella sp* . had a prevalence of 65% with an intensity of 4.76 individuals per shrimp, while in the second pond the prevalence reached 100% with a much higher intensity of 19.35 individuals per shrimp. This indicates that *Vorticella sp* . is very dominant and widespread in the cultivation pond. This high intensity of infestation can cause disorders in shrimp, such as irritation on the body surface and gills that can inhibit respiration and shrimp activity. Environmental factors such as water quality, stocking density, and pond cleanliness greatly influence the level of *Vorticella* infestation (Rosnizar *et al* ., 2018).

Vorticella sp. has an inverted bell-like shape with a transparent body and experiences movement on its stalk. This ectoparasite does not have branches and is not colonial (solitary), *Vorticella* sp. only has 1 individual on each stalk (Putra *et al* ., 2018). *Vorticella* sp. is contractile which can lengthen and shorten, is solitary or individual, greenish or yellowish in color (Mahasri *et al* ., 2019). The type of *Vorticella* sp. found in the gill layer and swimming legs of shrimp with a shape similar to an inverted bell and is transparent in color and has a flat and cylindrical stalk. This parasite measures 35-120 microns (Zulkarnain, 2011).

Zoothamnium sp . was found in the first pond with a prevalence of 10% and an intensity of 1 individual per shrimp. Meanwhile, in the second pond, the prevalence was 20%, with an intensity of 2.25 individuals per shrimp. Although its prevalence and intensity are lower than *Vorticella, Zoothamnium* remains a parasite that requires attention because it can cause irritation and stress in shrimp. This parasite usually attaches to the net, especially in ponds with high organic matter accumulation (Mahasri, 1996).

Zoothamnium sp . is a type of parasite that often attacks cultivated shrimp, both larvae and adults. *Zoothamnium* sp. is often found as a cause of death in shrimp because *Zoothamnium* sp. is able to penetrate the shrimp carapace, causing damage to the inner skin surface. This parasite usually appears in shrimp farming with poor water quality (Novita *et al* ., 2016). This parasite attaches to the surface of the body, gills, walking legs, and swimming legs of shrimp, causing moss disease on the shrimp's body (Widiani and Ambarwati, 2018). *Zoothamnium* sp. found to have globular or rounded zooids like an inverted bell, transparent in color, has *macronucleus* and *micronucleus* and contractile vacuoles. *Zoothamnium* sp. lives in colonies where there are 2-31 zooids in one colony. (Mahasri *et al* ., 2019).

Epistylis sp is an ectoparasitic protozoa that attacks shrimp and will thrive in aquatic environments rich in organic matter (Widiani and Ambarwati, 2018). *Epistylis* sp has a flat, elongated zooid shape, with cilia on the periostome. *Epistylis* sp attaches to the substrate (sessile) using a non-contractile, dichotomously branched stalk (Bick and Organization, 1972). *Epistylis* sp lives in colonies composed of branched stalks, with one individual per stalk (Setiyaningsih and Haditomo, 2014). *Epistylis* sp is connected by a contactable stalk; this parasite measures 50-250 microns (Zulkarnain, 2011).

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Epistylis sp in pond 1 with a prevalence of 15% and an intensity of 2.3 individuals per fish while in pond 2 the prevalence was 35% with an intensity of 3.14 individuals per fish. This ectoparasite is also less common than Vorticella sp., but its infection rate is slightly higher than Zoothamnium . Ectoparasites have a higher infection rate in pond 2 compared to pond 1. Although its prevalence is lower than Vorticella, Epistylis can cause similar effects, namely irritation of the gills and body surface of shrimp which has the potential to reduce shrimp health and productivity (Sari, 2013). This parasite usually develops in less than optimal water conditions and can be an indicator of declining water quality.

The most commonly infected organ in shrimp was the tail, with a prevalence of 82.5% and an intensity of 9.81 individuals per shrimp, followed by the head (42.5%), walking legs (25%), and swimming legs (15%). No gill infections were found. This indicates that the tail and head are preferred attachment sites for the parasite due to their frequent direct interaction with the substrate and water currents (Boyd and Tucker, 1998).

Water quality observed at the Lamteungoh village research site showed a water temperature of 26–27°C, salinity of 25 ppt, pH of 6, and DO of 2.4–2.6 ppm. Although the temperature and salinity are still within the optimal range for whiteleg shrimp growth (FAO, 2011), low DO values and slightly acidic pH are stressful for shrimp and open up the opportunity for parasitic infections (Boyd, 1990). Low DO (<3 ppm) plays a major role in reducing the shrimp's immune system and accelerating the growth of ectoparasites such as *Vorticella sp. and Epistylis sp.* , which are known to thrive in oxygen-limited conditions (Widiani and Ambarwati, 2018). Limited aeration systems in ponds are the main cause of the lack of circulation and low DO. Other factors that contribute to ectoparasite growth are high stocking densities and excessive feed waste, which increase organic matter and degrade water quality. Conditions like this are commonly found in intensive pond systems that are not balanced with good water management (Makmur *et al.*, 2018).

Meanwhile, the absence of endoparasites in hepatopancreatic and intestinal observations may be due to several factors, including relatively stable water quality, the use of high-quality seeds, and a standardized feeding system that does not use natural feed that carries the risk of spreading endoparasites (Ramadan *et al.*, 2012). Overall, these findings emphasize that water quality management and pond sanitation play a crucial role in controlling parasitic infections. Adequate aeration, stocking density control, feed management, and routine monitoring are essential in intensive pond systems to maintain shrimp health and reduce parasite prevalence and intensity (FAO, 2011).

CONCLUSION

Based on the results of research on the identification of ectoparasites and endoparasites in whiteleg shrimp (*Litopenaeus vannamei*) in intensive ponds in Lamteungoh Village, Peukan Bada District, Aceh Besar Regency, it can be concluded that there are three main genera of ectoparasites found, namely *Vorticella* sp., *Zoothamnium* sp., and *Epistylis* sp., with the highest infection prevalence in *Vorticella* sp. and the tail organ as the most frequently infected body part. No endoparasites were found in the internal organs of the shrimp, which is thought to be related to the implementation of good cultivation management, the use of quality seeds, and optimal management of feed and water quality. This study emphasizes the importance of

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environmental management and water quality in intensive cultivation systems to reduce the risk of parasitic infections in whiteleg shrimp, as well as providing useful information.
and disease control in vaname shrimp in intensive ponds.

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