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Identification of *Pseudomonas* sp. in drinking water sources for poultry farming in East Lombok District

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ABSTRACT: Biosecurity serves as the first line of defense to control the spread of diseases, both within and beyond farms. *Pseudomonas* sp. contamination of drinking water sources for livestock can occur due to fecal contamination. Therefore, a study was conducted to isolate and identify the presence of *Pseudomonas* sp. in drinking water sources for poultry farms in the East Lombok District. Twelve drinking water samples from poultry farms were analyzed, and one isolate (n=10) tested positive for *Pseudomonas* sp. This identification was supported by the isolation data, Gram staining, and biochemical tests. These findings provide valuable information for farmers and the public regarding the presence of *Pseudomonas* sp. in poultry drinking water, emphasizing the need to strengthen biosecurity and biosafety measures in poultry farming environments in the East Lombok District.

Keywords:
Pseudomonas sp., drinking water, poultry farming, biosecurity, East Lombok

■ INTRODUCTION

Water is essential for all living organisms including humans, animals, and plants. Beyond sustaining life, water is also crucial for agriculture, food production, industry, and animal husbandry. In agriculture, water supports irrigation, enhances crop yield, and ensures food security. Animal husbandry plays a vital role in metabolic processes, digestion, and toxin elimination, thereby contributing to overall health and productivity (Chandra, 2007). Despite these benefits, water can also be used as a medium for bacterial contamination. Bacteria in water are classified into two categories: pathogenic and non-pathogenic. Pathogenic bacteria such as Shigella dysenteriae, Salmonella typhi, Salmonella paratyphi, and *Pseudomonas* sp. pose significant health risks. Non-pathogenic bacteria, including fecal streptococci, iron bacteria, and actinomycetes, are commonly found in water but do not necessarily cause disease (Afif *et al.* 2015).

Pseudomonas sp. infections can lead to significant health and productivity issues in poultry farming. Infected chickens often exhibit symptoms, such as weight loss, dull feathers, decreased appetite, lethargy, and diarrhea. The presence of sticky or soiled feathers around the vent further disrupts growth and development, ultimately affecting livestock productivity (Kika *et al*. 2023).

Given these concerns, this study was conducted to identify the presence of *Pseudomonas* sp. in drinking water sources for poultry farms in East Lombok District. Understanding the bacterial contamination in these water sources is essential for improving biosecurity measures and ensuring the overall health and productivity of poultry in the region.

■ MATERIALS AND METHODS

This study analyzed 12 drinking water samples collected from poultry farms, consisting of eight samples from piped water sources and four from rainwater sources. To detect *Pseudomonas* sp., the samples underwent a series of isolation and identification procedures (Cowan & Steel 1993). The identification process involved Gram staining, biochemical tests, and carbohydrate fermentation tests, which are the standard methods for confirming *Pseudomonas* sp. contamination in water sources. These tests provided essential insights into the bacterial composition of poultry drinking water, highlighting the potential biosecurity risks in farm environments.

Figure 1. Isolation and identification of *Pseudomonas* sp.: (A) isolation *Pseudomonas* sp. used nutrient agar and (B) identification of *Pseudomonas* sp. using biochemical tests.

■ RESULTS AND DISCUSSION

The isolation and identification results confirmed the presence of *Pseudomonas* sp. in isolate 10 collected from rainwater stored in water tanks (Table 1). Gram staining of

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bacterial colonies from poultry drinking water samples revealed a pink color with a coccobacilli-shaped morphology, aligned with the characteristics of *Pseudomonas* sp., a gram-negative bacterium. Gram staining results indicated a correlation between the observed bacterial colonies and their microscopic morphology. Gram-negative bacteria possess a thin peptidoglycan layer, accounting for only about 10% of the total bacterial cell wall composition. Consequently, they do not retain the crystal violet dye and absorb safranin, which appears pink. These findings support those of Fardi (2012), who stated that *Pseudomonas* bacteria can break down proteins, carbohydrates, and other organic compounds into CO_2, ammonia gas, and simpler molecules.

Further biochemical analyses provided additional insights into the metabolic activity of this isolate. In carbohydrate fermentation tests using glucose, sucrose, and lactose, isolate No. 10 exhibited acid production, indicated by a color shift in the medium from blue to yellow. This suggests that bacteria metabolize glucose through fermentation, leading to acid formation (Azara & Saidi 2020).

Pseudomonas sp. is naturally found in soil and water, and survives in various environments with minimal nutrients. Contamination of drinking water by *Pseudomonas* sp. is often linked to cross-contamination, inadequate sanitation, and ineffective disinfection. Stagnant water provides an ideal environment for Pseudomonas to thrive, potentially leading to biofilm formation and corrosion. Biofilms can be developed on pipes and heat exchangers, thereby reducing the efficiency of filtration and water treatment systems. Biochemical tests suggested that some isolates exhibited characteristics consistent with those of *Pseudomonas aeruginosa*, an opportunistic pathogen capable of surviving in diverse aquatic environments (Suyono & Salahudin 2011). These findings underscore the importance of maintaining strict biosecurity and sanitation measures to minimize bacterial contamination of poultry drinking water sources.

Table 1. Biochemical test results from12 samples from poultry farm drinking water sources in East Lombok District.

KS	Biochemical test for *Pseudomonas* sp.													
	TSIA	SIM	U	Sc	I	MR	VP	G	L	Mn	A	Sr	S	K
1	Ac	+	-	-	+	+	-	+	+	+	+	+	+	+
2	Ac	+	-	+	+	+	+	+	+	+	+	+	+	+
3	Ac	+	-	-	+	+	-	+	+	+	+	+	-	+
4	Ac	+	-	-	+	+	-	+	+	+	+	+	+	+
5	Ac	+	-	-	+	+	-	+	+	+	+	+	+	+
6	Ac	+	-	-	+	+	-	+	+	+	+	-	+	+
7	Ac	+	-	-	+	+	-	+	+	+	+	+	+	+
8	Ac	+	-	-	+	+	-	+	+	+	+	+	+	+
9	Ac	+	-	-	+	+	-	+	+	+	+	+	+	+
10	**Ac**	**+**	**-**	**+**	**-**	**-**	**+**	**+**	**+**	**+**	**+**	**+**	**+**	**+**
11	Ac	+	-	-	+	+	+	+	+	-	+	+	+	+
12	Ac	+	-	+	+	+	-	+	+	+	+	+	+	+

Note: KS= sample code, TSIA= Triple Sugar Iron Agar, SIM= Sulphur Indole Motility, U= Urea, Sc= Simon Citrate, I= Indole, MR= Methyl Red, VP= Voges Proskauer, G= Glucose, L= Lactose, Mn= Mannitol, A= Arabinose, Sr= Sorbitol, S= Sucrose, K= Catalase, and Ac= Acid.

Govender *et al*. (2012) noted that Pseudomonas bacteria are motile and non-fermentative, utilizing sugars through oxidative metabolism, with oxygen as the terminal electron acceptor. These bacteria metabolize glucose to produce acids, reduce nitrates to nitrites, and decompose them into nitrogen. *Pseudomonas* sp. do not produce indole or exhibit a positive methyl red (MR) reaction. Biochemical tests by Lubis *et al*. (2013) on *Pseudomonas* sp. confirmed that they are gram-negative and rod-shaped, with positive results for Simmon's citrate agar (SCA) and glucose metabolism. The results for lactose, sucrose, and mannitol metabolism were variable (+/−), indicating different fermentation capabilities among the strains. Cowan and Steel (1993) reported that *Pseudomonas* sp. showed positive results for Simmon's citrate, glucose, and sucrose metabolism, whereas lactose and mannitol metabolism varied between strains.

■ CONCLUSION

Based on the results of isolation, Gram staining, and identification carried out on 12 samples of drinking water from chicken farms, it can be concluded that *Pseudomonas* sp. was found in one isolate of drinking water samples from chicken farms originating from rainwater reservoirs.

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■ REFERENCES

Afif F, Erly E, Endrinaldi E. 2015. Identifikasi bakteri *Escherichia coli* pada air minum isi ulang yang diproduksi depot air minum isi ulang di Kecamatan Padang Selatan. Jurnal Kesehatan Andalas. 4(2):376–380.

Chandra B. 2007. Pengantar Ilmu Kesehatan Lingkungan. Jakarta: Penerbit Buku Kedokteran EGC.

Cowan ST, Steel KJ. 1993. Cowan and Steel's Manual for the Identification of Medical Bacteria. 3rd Edition. Cambridge University Press.

Fardi S. 2012. Isolasi dan identifikasi bakteri Gram negatif pada preputium kerbau (*Bubalus bubalis*) berasal dari Aceh Barat Daya. [Skripsi]. Fakultas Kedokteran Hewan. Universitas Syiah Kuala. Banda Aceh.

Azara R, Saidi IA. 2020. Buku Ajar Mikrobiologi Pangan. Umsida Press. 1-28.

Lubis YPP, Yunasfi, Leidonald R. 2014. Jenis-jenis bakteri pada luka ikan patin (*Pangasius djambal*). Program Studi Manajemen Sumberdaya Perairan. Universitas Sumatera Utara. Medan.

Suyono Y, Salahudin F. 2011. Identifikasi dan karakterisasi bakteri Pseudomonas pada tanah yang terindikasi terkontaminasi logam. Jurnal Biopropal Industri. 2(1):8-13.

Kika TS, Cocoli S, Pelić DL, Puvača N, Lika E, Pelić M. 2023. Colibacillosis in modern poultry production. Journal of Agronomy, Technology and Engineering Management. 6(6):975-987.

Govender R, Amoah ID, Adegoke AA, Singh G, Kumari S, Swalaha FM, Bux F, Stenström TA. 2021. Identification, antibiotic resistance, and virulence profiling of Aeromonas and Pseudomonas species from wastewater and surface water. Environmental monitoring and assessment. 193(5):294.