

**PENGARUH SUPLEMENTASI PROBIOTIK, PREBIOTIK, DAN  
SINBIOTIK DALAM PAKAN TERHADAP EKSPRESI GEN,  
IMUNITAS NON-SPEKIFIK DAN KETAHANAN IKAN NILA  
MERAH (*Oreochromis sp.*) TERHADAP INFEKSI  
*Streptococcus agalactiae***

Tesis

Untuk memenuhi sebagian persyaratan mencapai derajat master  
Program Studi Ilmu Perikanan



disusun oleh  
**Putri Sasmitha Ritonga**  
24/536766/PPN/05249

PROGRAM PASCASARJANA  
FAKULTAS PERTANIAN  
UNIVERSITAS GADJAH MADA  
YOGYAKARTA  
2026

Thesis

**THE EFFECTS OF PROBIOTIC, PREBIOTIC, AND SYNBIOTIC SUPPLEMENTATION IN FEED ON GENE EXPRESSION, NON-SPECIFIC IMMUNITY, AND RESISTANCE OF RED HYBRID TILAPIA (*Oreochromis sp.*) TO *Streptococcus agalactiae***

submitted to

Study Program of Fisheries Science for the Degree of Master



submitted by

**Putri Sasmitha Ritonga**

24/536766/PPN/05249

POSTGRADUATE PROGRAM  
FACULTY OF AGRICULTURE  
UNIVERSITAS GADJAH MADA  
YOGYAKARTA  
2026

Tesis

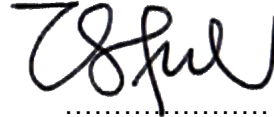
**PENGARUH SUPLEMENTASI PROBIOTIK, PREBIOTIK, DAN SINBIOTIK  
DALAM PAKAN TERHADAP EKSPRESI GEN, IMUNITAS NON-SPEKIFIK  
DAN KETAHANAN IKAN NILA MERAH (*Oreochromis sp.*) TERHADAP  
INFEKSI *Streptococcus agalactiae***

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telah dipertahankan di depan Dewan Penguji  
Pada tanggal 22 Januari 2026

Pembimbing Utama

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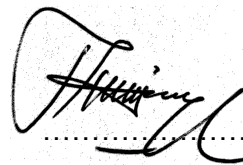
• Tanda tangan  
  
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Tanggal

10 Februari 2026

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Penguji


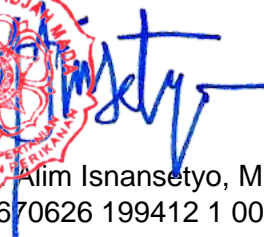
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10 Februari 2026

Tesis ini diterima sebagai salah satu persyaratan  
Untuk memperoleh derajat master  
Tanggal 13 Februari 2026

Mengetahui,  
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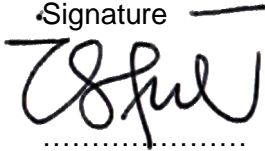
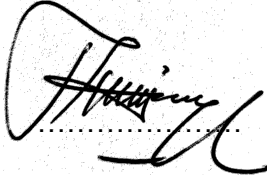
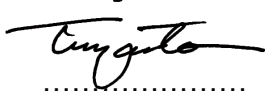
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Thesis

**THE EFFECTS OF PROBIOTIC, PREBIOTIC, AND SYNBIOTIC SUPPLEMENTATION IN FEED ON GENE EXPRESSION, NON-SPECIFIC IMMUNITY, AND RESISTANCE OF RED HYBRID TILAPIA (*Oreochromis sp.*) TO *Streptococcus agalactiae***

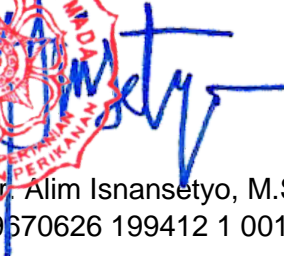

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This thesis was declared acceptable in partial fulfillment of the requirements for the master degree in Fisheries Science  
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Approved by,  
Chair of Department of Fisheries  
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