THESIS

EFFECT OF ILER (*Plectranthus scutellarioides (L.) R. Br.*) LEAF EXTRACT AS NATURAL ANTIBACTERIAL AGAINST *Staphylococcus aureus* and *Escherichia coli* ISOLATED FROM DAIRY CATTLE WITH SUBCLINICAL MASTITIS

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Thesis

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DECLARATION

I hereby declare that this thesis entitled

Effect of Iler (*Plectranthus scutellarioides (L.) R. Br.*) Leaf Extract As Natural Antibacterial Against *Staphylococcus aureus* and *Escherichia coli* Isolated From Dairy Cattle with Subclinical Mastitis

Submission is originally conducted by me and that to the best of my knowledge and belief, it contains no material previously published or written by other neither person nor material except those referred to in this manuscript are mentioned in the bibliography to obtain a bachelor degree from a particular institution.

Surabaya, June 28th 2022

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SUMMARY

Milk is the milking product of healthy and clean dairy cattle obtained by proper milking according to applicable regulations (Meutia, 2016). Dairy milk product is a natural food product with high nutrition that is used to meet human animal protein needs. Based on data from the Directorate General of Livestock and Animal Health in 2021, the number of domestic demand for milk is 4.3 million tons per year, while domestic fresh milk production is 0.9 million tons per year, so domestic milk products only contribute 22% of the milk demand amount and the rest is fulfilled with milk imports. Dairy farms in Indonesia are dominated by small-scale businesses where farmers have an average of 2-4 adult dairy cattle per family (Surani, 2011). Because small-scale businesses have limited workers, this results in a lack of good cattle management and care, so the production and quality of milk is low. Lack of knowledge about hygiene management and the correct way of milking can result in disease in cattle followed by decrease in milk production. One of the common diseases that are found in dairy cattle is mastitis (Tewari, 2014).

Mastitis is an inflammatory disease of the mammary glands caused by several factors, and is known to have 2 types of disease, the clinical mastitis and subclinical mastitis that does not show clinical symptoms and is usually identified through examination of mastitis, either by California Mastitis Test (CMT). Balemi *et al.,* (2021) and Keane (2019) stated that staphylococcus, streptococcus, and coliform bacteria

(*Escherichia coli, Klebsiella spp.,* and *Enterobacter spp.)* are the most frequent bacteria that cause mastitis.

Iler (*Plectranthus scutellarioides (L.) R. Br.)* plant is an ornamental plant that comes from the Lamiaceae family contains compounds such as saponins, flavonoids, eugenol, polyphenols, steroids, tannins, carvacrol, ethyl salicylate, alkaloids, methyl eugenol, rosmarinic acid, thymol, and camphor (Wasiah, 2014). Because it contains those compounds, iler (*Plectranthus scutellarioides (L.) R. Br.)* leaf act as antibacterial, antioxidant, antidiabetic, anti-inflammatory, immunomodulatory, antihistamine, and anthelmintic (Anita *et al.,* 2019; Novanti and Susilawati, 2017).

The type of this research is experimental laboratory research that aims to test the antibacterial activity of the iler (*Plectranthus scutellarioides* (L.) R. Br.) leaf extract against *Staphylococcus aureus* and *Escherichia coli* isolated from dairy cattle with subclinical mastitis by measuring its inhibition ability indicated by the presence of clear zone. The research is done by isolating the *Escherichia coli* and *Staphylococcus aureus* bacteria directly from the milk sample of cow which CMT score is (+) 3. The iler leaf extract used ethanol pro analysis as the solvent. The antibacterial activity test used the agar well diffusion method.

The result of the antibacterial test of iler *(Plectranthus scutellarioides* (L.) R. Br.) leaf extract with ethanol p.a. as the solvent showed antibacterial activity against *Escherichia coli* and *Staphylococcus aureus* bacteria isolated directly from cow's milk samples with subclinical mastitis at certain concentrations.

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Farah Shafina Hanum

ABSTRACT

Mastitis is one of the causes of low milk production in dairy cows, and can be caused by bacteria such as *Escherichia coli* and *Staphylococcus aureus*. Iler (*Plectranthus scutellarioides* (L.) R. Br). leaf has antibacterial compounds such as flavonoids, eugenol, polyphenols, steroids, tannins, and so on. The type of this research is experimental laboratory research that aims to test the antibacterial activity of the iler (*Plectranthus scutellarioides* (L.) R. Br.) leaf extract with ethanol pro analysis as the solvent against *Escherichia coli* and *Staphylococcus aureus* bacteria isolated directly from the sample of dairy cow's milk which CMT score is (+) 3, by measuring its inhibition ability indicated by the presence of clear zone using the agar-well diffusion method. The extract concentrations tested are 5%, 10%, 20% and 40%. The result of the antibacterial test of iler *(Plectranthus scutellarioides* (L.) R. Br.) leaf extract with ethanol p.a. as the solvent showed antibacterial activity against *Escherichia coli* and *Staphylococcus aureus* bacteria isolated directly from cow's milk samples with subclinical mastitis at certain concentrations.

Keywords: Iler (*Plectranthus scutellarioides* (L.) R. Br) Leaf, Extract, Mastitis, Dairy Cattle, *Staphylococcus aureus, Escherichia coli*

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The author realizes that this thesis is still far from perfect, both in terms of writing and in the scope of the study material. This thesis is hoped to provide enough information to the reader, and hoped to be useful for further studies

Surabaya, April 2022

Author

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ABBREVIATION AND SYMBOLS

CLSI	: Clinical and Laboratory Standards Institute
CMC	: Carboxymethyl Cellulose
CMT	: California Mastitis Test
EMBA	: Eosin Methylene Blue Agar
FAO	: Food and Agriculture Organization
IMViC	: Indole, Methyl red, Vogeus-proskeuer and Citrate
MHA	: Mueller Hinton Agar
MIC	: Minimum Inhibitory Concentration
MR-VP	: Methyl Red-Voges Proskauer
MSA	: Mannitol Salt Agar
NA	: Nutrient Agar
NaCl	: Natrium Cholride
p. a.	: Pro Analysis
SCA	: Simmons Citrate Agar
℃	: Degree Celcius
%	: Percent
ml	: Mililiter
mg	: Miligram
µl	: Microliter