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**Research Paper**

# Antimicrobial Activity of Bacteriocins from Lactiplantibacillus Pentosus Isolate Gambier for Mastitis Therapy in Cattle

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***ABSTRACT***: *Giving antibiotics to various diseases caused by bacteria can cause side effects, namely antibiotic resistance if you ignore the use of antibiotics. Alternative antibiotic substitutes such as bacteriocins are used to overcome these side effects. Bacteriocin is a protein compound that has a small molecular weight and has antibacterial or bacteriostatic activity and is produced by lactic acid bacteria naturally. This study aims to determine the antimicrobial activity of bacteriocins isolated from lactiplantibacillus pentosus bacteria gambir isolate for mastitis therapy in cattle. The results showed bacteriocins from lactiplantibacillus pentosus have antimicrobial activity against bacteria that cause mastitis, namely Escherichia coli O157 (8.23 mm), and Staphylococcus aureus (9.14 mm). This study showed that bacteriocins from lactiplantibacillus pentosus strain GM02 isolate Gambir have antimicrobial activity against pathogenic bacteria.*

***KEYWORDS***: *Bacteriocin, Mastitis, Escherichia coli O157, Staphylococcus aureus*

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## I. INTRODUCTION

Giving antibiotics to various diseases caused by bacteria can cause side effects, namely antibiotic resistance if you ignore the use of these antibiotics. Resistance is not inhibited by bacterial growth by using antibiotics systemically with normal doses or minimal inhibitory levels. Antibiotic resistance can occur due to intrinsic and acquired factors. Bacterial resistance can occur intrinsically or acquired. Intrinsic resistance occurs chromosomally and proceeds through cell multiplication to be derived into subsequent derivatives [4].

Acquired resistance occurs due to chromosomal mutations or due to DNA transfer. The sensitivity of bacteria to germs is determined by the minimal level of inhibition that can stop the development of bacteria [4]. Due to the side effects of using the wrong antibiotics, other alternatives are needed that can fight bacteria. One of them is bacteriocin, bacteriocin is a protein compound that has a small molecular weight and has antibacterial or bacteriostatic activity (Riley and Chavan, 2007). Lactic acid bacteria can produce these chemicals spontaneously without inhibiting their development [3].

Some strains of lactic acid bacteria have been shown to produce bacteriocins with antimicrobial action against decay and harmful bacteria. In general, bacteriocins can withstand temperatures as high as 100 degrees Celsius or 121 degrees Fahrenheit for 15 minutes, as well as very low temperatures and acidic environments [5].

Bacteriocins are bactericides that kill bacteria by making physical contact with cell membranes. Reducing cell permeability, this mechanism is known to disrupt the stability of the cytoplasmic membrane. By disrupting PMF, membrane instability causes pores and holes to develop in cell membranes [7]. Therefore, research is needed to see the bacteriocin antimicrobial activity of *lactiplantibacillus pentosus* strain GM02 against pathogenic bacteria that cause mastitis.

## II. MATERIAL AND METHOD

### 2.1 Material

The bacteriocins used in this study are bacteriocins that have been isolated from *lactiplantibacillus pentosus* strain GM02 gambier isolate bacteria. As well as pathogenic bacteria that cause mastitis, namely *Escherichia coli* O157 and *Staphylococcus aureus* which come from mastitis-positive cows.

### 2.2 Method

The method used in bacteriocin antimicrobial activity is the good agar method used in bacteriocin activity tests. A total of 50 µL of antibacterial supernatants were inserted into the well with a micropipette on NA media containing indicator bacteria (*E. coli* O157 and *S. aureus*). The diameter of the inhibitory zone produced around the well was measured using a caliper after incubating for 24 hours at a temperature of 37 ° C [1].

## III. RESULTS AND DISCUSSION

Antimicrobial activity of bacteriocins

| Sample code | Clear zone diameter (mm) | |
|---|---|---|
| | *E. coli* O157 | *S. aureus* |
| Bakteriosin | 10,83 | 11,45 |
| Ampisilin | 14,60 | 16,36 |
| Kanamisin | 13,43 | 15,52 |

The results of bacteriocin antimicrobial activity were carried out with three repetitions and obtained a clear zone for bacteria *E. coli* O157 and *S. aureus* amounted to 10.83 and 11.45, respectively. Clear zone activity is divided into four categories, namely weak (<5mm), medium (5–10mm), strong (>10–20mm), and very strong (>20–30mm) activity [4].

The results of bacteriocin activity tests revealed an inhibitory action against pathogenic bacteria. The formation of a clear zone indicates bacteriocin activity. Bacteriocins have an inhibitory impact on the development of pathogenic bacteria, the formation of clear zones is indicative of bacteriocin activity [6].

Bacteriocins produced by ribosomes show antibacterial abilities against a select group of bacteria that are closely related to the bacteria that produce them [2]. What distinguishes bacteriocins from antibiotics is this property. Bacteriocins are small molecules that bind to receptors on the surface of cells to enter. Bacteriocins kill bacteria through several different mechanisms, including pore creation, cell DNA degradation, and suppression of peptidoglycan production [8].

## IV. CONCLUSION

The results of bacteriocin antimicrobial activity tests from *lactiplantibacillus pentosus* strain GM02 found a strong inhibitory power against *Staphylococcus aureus* and *Escherichia coli* O157.

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