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**POTENSI ANTI BAKTERI MULTI-STRAIN PROBIOTIK *Lactiplantibacillus plantarum* subsp. *plantarum* (STRAIN Dad-13 dan FNCC-0250) dan *Lacticaseibacillus paracasei* GMRMP-001 TERHADAP *Escherichia coli* FNCC-0091**

**SECARA IN VITRO DAN IN VIVO**

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**POTENSI ANTI BAKTERI MULTI-STRAIN PROBIOTIK *Lactiplantibacillus plantarum* subsp. *plantarum* (strain Dad-13 dan FNCC-0250) dan *Lacticaseibacillus paracasei* GMRMP-001 TERHADAP *Escherichia coli* FNCC-0091 SECARA IN VITRO DAN IN VIVO**

## ABSTRAK

*Lactiplantibacillus plantarum* subsp. *plantarum* Dad-13, *Lactiplantibacillus* subsp. *plantarum* *plantarum* FNCC-0250 dan *Lacticaseibacillus paracasei* GMRMP-001 merupakan strain probiotik yang diisolasi dari makanan fermentasi tradisional Indonesia. Penelitian ini bertujuan untuk mengevaluasi pemberian probiotik *multi-strain* dosis  $10^{-9}$  CFU/ml/hari selama 14 hari terhadap bakteri penyebab diare *Escherichia coli* FNCC-0091 dengan dosis  $10^{-11}$  CFU/ml/hari. Tiga puluh ekor mencit dibagi secara acak menjadi lima kelompok, yaitu kelompok kontrol, kelompok susu skim, kelompok *single-strain*, kelompok *multi-strain*, dan kelompok *E. coli*. Aktivitas antibakteri dianalisis secara *in vitro*, konsumsi pakan dan berat badan, analisis mikroba pada feses dan sekum, analisis *short chain fatty acid* dan pengujian morfologi usus tikus. Hasil penelitian menunjukkan bahwa zona hambat *single-strain* dan *multi-strain* pada uji *in vitro* menghasilkan potensi hambat yang sangat kuat ( $>9$  mm). Jumlah *L. plantarum* dan *L. paracasei* meningkat dan jumlah *E. coli* menurun secara signifikan pada feses dan sekum mencit yang menunjukkan tingkat kelangsungan hidup bakteri di saluran pencernaan dan kemampuannya melawan bakteri patogen. Konsentrasi asam asetat, asam propionat, dan asam butirat juga mengalami peningkatan yang menunjukkan bahwa saluran pencernaan berada pada pH rendah sehingga dapat menghambat pertumbuhan bakteri patogen pada tikus. Selain itu, konsumsi probiotik *multi-strain* tidak memberikan efek negatif pada morfologi usus. Kesimpulannya adalah probiotik *multi-strain* mampu menghambat bakteri patogen secara *in vivo* dan *in vitro*.

## Kata kunci

*Escherichia coli*, *Multi-strain*, Probiotik, *Short Chain Fatty Acid*



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ANTI-BACTERIAL POTENTIAL OF MULTI-STRAIN PROBIOTICS *Lactiplantibacillus plantarum* subsp. *plantarum* (strain Dad-13 and FNCC-0250) and *Lacticaseibacillus paracasei* GMRMP-001 AGAINST *Escherichia coli* FNCC-0091 IN VITRO AND IN VIVO

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## ABSTRACT

*Lactiplantibacillus plantarum* Dad-13, *Lactiplantibacillus plantarum* FNCC-0250 and *Lacticaseibacillus paracasei* GMRMP-001 are probiotics strain isolated from Indonesian traditional fermented foods. This study aims to evaluate the administration of *multi-strain* probiotics at dose of  $10^{-9}$  CFU/ml/day for 14 days against the diarrhea-causing bacteria *Escherichia coli* FNCC-0091 at a dose of  $10^{-11}$  CFU/ml/day. Thirty mice were randomly divided into five groups, including control group, skim milk group, *single-strain* group, *multi-strain* group, and *E. coli* group. Antibacterial activity was analyzed in vitro, feed intake, body weight was analyzed, microbial analysis was carried out on feces and caecum, short chain fatty acids were analyzed and intestinal morphology was measured. The result showed that the *single-strain* and *multi-strain* inhibition zone in in vitro test produces a very strong inhibitory potential ( $>9$  mm). The number of *L. plantarum* and *L. paracasei* increased and the number of *E. coli* decreased significantly in the feces and cecum of mice indicating the survival rate of the bacteria in the digestive tract and their ability to fight pathogenic bacteria. The concentration of acetic acid, propionic acid, and butyric acid also increased, indicating that the digestive tract is at a low pH so that it can inhibit the growth of pathogenic bacteria in rats. In addition, consumption of *multi-strain* probiotics does not have a negative effect and intestinal morphology. The conclusion is that *multi-strain* probiotics are able to inhibit pathogenic bacteria in vivo and in vitro.

## Key-words

*Escherichia coli*, *Multi-strain*, *Probiotics*, *Short Chain Fatty Acid*