

PEMANFAATAN ISOLAT CAMPURAN BAKTERI ASAM LAKTAT SEKUM DAN MIKROBA RUMEN UNTUK MITIGASI PRODUKSI METANA SECARA *IN VITRO* PADA KADAR GLUKOSA BERBEDA

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INTISARI

Penelitian ini bertujuan untuk mengetahui potensi isolat campuran Bakteri Asam Laktat (BAL) dari digesta sekum domba untuk mitigasi dan mengurangi produksi metana oleh bakteri metanogen rumen. BAL diinokulasikan pada media MRS sedangkan isolat mikroba rumen ditumbuhkan pada medium khusus pengkayaan mikroba rumen. Isolat tersebut diuji secara *in vitro* menggunakan metode modifikasi Theodorou. Terdapat tiga macam isolat campuran bakteri yang digunakan yaitu isolat campuran BAL sekum domba (D), isolat mikroba rumen (R), dan campuran kedua isolat tersebut (DR). Digunakan pula tiga level penambahan glukosa yaitu 0, 1,5, dan 3%. Data yang diperoleh dianalisis dengan analisis variansi pola faktorial 3x3 (3 level glukosa dan 3 jenis mikroba) dengan 3 kali ulangan. Dilakukan uji lanjutan Duncan's New Multiple Range Test (DMRT) pada variabel yang menunjukkan perbedaan signifikan. Adapun parameter yang diamati yaitu produksi gas total, nilai pH, nilai Eh, kadar asam laktat, kadar asam asetat, propionat, dan butirrat, serta produksi gas metana. Hasil penelitian menunjukkan bahwa penambahan BAL digesta sekum domba disertai dengan peningkatan level glukosa dapat meningkatkan produksi gas total, kadar asam laktat serta menurunkan pH dan nilai negatif Eh dengan sangat signifikan ($P < 0,01$). Penambahan BAL meningkatkan kadar asam propionat dengan sangat signifikan ($P < 0,01$), sedangkan penambahan glukosa belum dapat meningkatkan produksi asam propionat. Penambahan isolat BAL digesta sekum domba dan peningkatan level glukosa tidak berpengaruh terhadap kadar asam asetat, asam butirrat, dan produksi gas metana ($P > 0,05$). Kesimpulan dari penelitian ini yaitu pemberian isolat BAL digesta sekum domba disertai dengan peningkatan glukosa dapat mempengaruhi pola fermentasi rumen namun belum dapat menurunkan produksi gas metana pada rumen secara *in vitro*.

Kata Kunci: Bakteri asam laktat, mitigasi metana, ruminansia, sekum

UTILIZATION OF CECAL MIXED LACTIC ACID BACTERIA AND RUMEN MICROBES FOR *IN VITRO* METHANE PRODUCTION MITIGATION AT DIFFERENT GLUCOSE LEVELS

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ABSTRACT

This study aimed to investigate the potential of mixed culture of lactic acid bacteria (LAB) isolated from sheep cecal digesta to mitigate and reduce methane production by rumen methanogenic bacteria. LAB was inoculated on MRS media, while isolates of rumen microbials were grown on a specific medium for enriching rumen microbes. The isolates were tested *in vitro* using a modified Theodorou method. Three types of mixed bacteria were used in this research namely, mix LAB from sheep caecum (D), mix isolates of rumen microbial (R), and a combination of both (DR). Each group of combined microbes was cultured in three levels of glucose addition i.e. 0; 1,5; and 3%. The data obtained were analyzed using a 3x3 factorial pattern analysis of variance (3 levels of glucose and 3 types of microbes) with 3 replications. Significant differences between the treatments were tested by Duncan's New Multiple Range Test (DMRT). The parameters observed included total gas production, pH value, Eh value, lactic acid content, acetic, propionic, and butyric acid levels, also methane gas production. The research findings indicated that the addition of LAB inoculum from the caecum of sheep with glucose level elevation significantly enhanced the total gas production, Eh value, and lactic acid content, as well as reduced pH value and negative value of Eh with high significance ($P < 0,01$). The addition of cecal LAB inoculum enhanced the propionic acid content ($P < 0,01$), whereas the addition of glucose did not demonstrate the ability to increase propionic acid production. The addition of cecal digesta inoculum and the elevation of glucose levels did not impact acetic and butyric acid levels as well as methane gas production ($P > 0,05$). The conclusion drawn from this study is that providing LAB inoculum accompanied by elevated glucose levels can influence ruminal fermentation patterns, although it has not yet proven effective in reducing methane gas production *in vitro*.

Keywords: Lactic acid bacteria, methane mitigation, ruminant, caecum