

**PENGARUH PENAMBAHAN BLEND ESSENTIAL OIL *Pinus merkusii* dan *Melaleuca leucadendra* TERHADAP PRODUKSI METANA dan KERAGAMAN METANOGEN pada FERMENTASI RUMEN SECARA IN VITRO**

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**INTISARI**

Penelitian ini bertujuan untuk mengetahui pengaruh penambahan *blend essential oil* (BEO) terhadap produksi metana, keragaman metanaogen serta parameter fermentasi rumen. *Blend essential oil* terdiri dari *essential oil* pinus (*Pinus merkusii*) dan kayu putih (*Melaleuca leucadendra*) dengan perbandingan 1:1. *Blend essential oil* yang ditambahkan ke dalam substrat pakan pada fermentasi rumen *in vitro* yaitu 0, 100, dan 200 µl media fermentasi. Pakan yang diberikan sebagai substrat fermentasi berupa rumput raja, dedak padi, dan *pollard* dengan perbandingan berdasar bahan kering 60:20:20. Metode yang digunakan dalam penelitian ini adalah *in vitro* produksi gas menurut Menke untuk mengetahui produksi gas metana dan parameter fermentasi rumen. Metode *in vitro* menurut Theodorou untuk menentukan keragaman metanaogenik. Keragaman metanaogenik dianalisis dengan metode *terminal restriction fragment length polymorphism* (TRFLP). Fermentasi rumen secara *in vitro* dilakukan dengan inkubasi pada suhu 39°C selama 24 jam. Data yang diambil setelah fermentasi adalah produksi metana, parameter fermentasi yang meliputi pH, volume produksi gas, konsentrasi *volatile fatty acid* (VFA), konsentrasi amonia, jumlah sel protozoa, protein mikroba, serta data keragaman dan kelimpahan metanaogenik. Data dianalisis dengan analisis variansi rancangan acak lengkap pola searah dilanjutkan dengan uji *Duncan's Multiple Range test* (DMRT) untuk melihat perbedaan antar nilai rerata sedangkan data keragaman metanaogenik dianalisis secara deskriptif. Hasil penelitian menunjukkan bahwa penambahan BEO sampai dosis 200 mg/l menurunkan ( $P<0,01$ ) produksi metana, jumlah protozoa, konsentrasi amonia dan cenderung menurunkan ( $P=0,08$ ) produksi butir, serta meningkatkan ( $P<0,01$ ) total VFA dan kadar protein mikroba. Penambahan BEO sampai dosis 200 µl tidak berpengaruh ( $P>0,05$ ) terhadap volume produksi gas, pH, asetat, propionat, dan rasio asetat:propionat. Penambahan BEO tidak berpengaruh terhadap keragaman bakteri metanaogenik. Kesimpulan yang dapat diambil dari penelitian ini yaitu penambahan BEO sebagai aditif pakan sampai dosis 200 µl mampu menurunkan produksi metana dan jumlah protozoa, tidak berpengaruh terhadap keragaman metanaogenik, serta tidak menimbulkan efek negatif terhadap fermentasi rumen.

Kata kunci : *Blend essential oil*, rumen, fermentasi, metan, analisis TRFLP

**METHANE PRODUCTION AND METHANOGEN DIVERSITY IN  
IN VITRO RUMEN FERMENTATION WITH ADDITIONAL  
OF BLEND ESSENTIAL OIL *Pinus merkusii* and  
*Melaleuca leucadendra***

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**ABSTRACT**

This study aimed to determine the effect of addition of blend essential oil (BEO) on methane production, rumen fermentation parameters and methanogen diversity. Blend of essential oils consists of essential oil pine (*Pinus merkusii*) and eucalyptus (*Melaleuca leucadendra*) with a ratio of 1: 1. The doses of BEO added to the feed substrate in rumen fermentation were 0, 100, and 200  $\mu$ l fermentation medium. The feed used as a fermentation substrate consisted of king grass, rice bran, and pollard in ratio of 60:20:20 based on dry matter. This study used vitro gas production technique according to Menke and Steingass for analysis of methane gas production and rumen fermentation parameters. The method of in vitro according to Theodorou was used on determination of the diversity of methanogenic. Methanogenic diversity was analyzed using terminal restriction fragment length polymorphism (TRFLP) method. Fermentation was conducted at 39°C for 24 hours. Data observed were methane production, pH, gas production, concentration of volatile fatty acids (VFA), concentration of ammonia, protozoa population, microbial protein, and methanogenic diversity and abundance. Data were analyzed by one way ANOVA and Duncan's Multiple Range Test (DMRT) to measure the difference between the means. Methanogenic diversity were analyzed descriptively. The results showed that the addition of BEO up to 200  $\mu$ l decreased ( $P<0.01$ ) methane production, the amount of protozoa, ammonia concentration and tended to decrease ( $P=0.08$ ) butyrate production, as well as increase ( $P<0.01$ ) total VFA and microbial protein content. The addition of BEO up to a dose of 200  $\mu$ l had no effect ( $P>0.05$ ) on the volume of gas production, pH, acetate, propionate, and acetate: propionate ratio. The addition of BEO did not affect the diversity of methanogenic bacteria. The conclusion that can be drawn from this study is the addition of BEO as a feed additive up to a dose of 200  $\mu$ l reduced methane production and the number of protozoa, does not affect methanogenic diversity, and does not cause negative effects on rumen fermentation.

Keywords : *Blend essential oil*, rumen, fermentation, methane, TRFLP.