RINGKASAN

DEWI FEBRINA. Pemanfaatan Hasil Biodelignifikasi Pelepah Sawit Menggunakan Kapang *Phanerochaete chrysosporium* sebagai Pengganti Hijauan Pakan pada Ternak Kambing. Di bawah bimbingan : **NOVIRMAN JAMARUN, MARDIATI ZAIN DAN KHASRAD.**

Pemanfaatan pelepah sawit sebagai pakan dibatasi oleh tingginya kandungan lignin yaitu 30,18%. Biodelignifikasi merupakan proses perombakan lignin menggunakan mikroorganisme. Kapang *Phanerochaete chrysosporium* dari kelas *Basidiomycetes* merupakan kapang pendegradasi lignin yang paling efisien dan pertumbuhannya dipengaruhi oleh ketersediaan mineral dalam substrat diantaranya Kalsium (Ca) dan Mangan (Mn).

Peningkatan kualitas pelepah sawit melalui proses biodelignifikasi harus dipadukan dengan optimalisasi bioproses rumen melalui peningkatan populasi mikroba rumen karena kecernaan pakan serat dalam rumen sangat tergantung pada kerja enzim mikroba rumen. Mineral Pospor (P), Sulfur (S) dan Magnesium (Mg) merupakan mineral penting untuk pertumbuhan mikroba dan sering defisien pada pakan berserat berkualitas rendah dan rendahnya *bioavaibility*.

Penelitian Tahap I bertujuan untuk mengetahui pengaruh penambahan mineral Ca dan Mn pada biodelignifikasi pelepah sawit menggunakan kapang *Phanerochaete chrysosporium* terhadap kandungan fraksi serat, kecernaan *in vitro* dan karakteristik kondisi rumen. Penelitian menggunakan Rancangan Acak Lengkap (RAL) pola Faktorial (3 x 3) dengan 2 ulangan. Faktor A adalah penambahan mineral Ca yaitu 1.000 ppm; 2.000 ppm dan 3.000 ppm. Faktor B adalah penambahan mineral Mn yaitu 50 ppm; 100 ppm dan 150 ppm. Hasil penelitian menunjukkan interaksi antara mineral Ca dan Mn mempengaruhi kecernaan bahan kering, bahan organik, NDF, ADF, selullosa, pHm NH3 dan konsentrasi VFA. Kombinasi 2.000 ppm Mn dan 150 ppm Ca memberikan hasil optimal yaitu kecernaan bahan kering tertinggi (41.914%), bahan organik (40,990%), NDF (66,429%), ADF (64,396%) dan selulosa (68,524%) dan konsentrasi VFA tertinggi (117,302%).

Penelitian Tahap II bertujuan untuk mengetahui pengaruh supplementasi mineral P, S dan Mg pada pelepah sawit hasil biodelignifikasi oleh *Phanerochaete chrysosporium* terhadap aktivitas fermentatif rumen dan kecernaan *in vitro*. Penelitian menggunakan Rancangan Acak Kelompok (RAK) dengan 4 perlakuan dan 4 ulangan. Perlakuan adalah : A = Pelepah Sawit Hasil Biodelignifkasi (PSHB); B = A + mineral P ; C = A + mineral P + S ; dan D = A + mineral P + S + Mg. Peubah yang diukur adalah sintesis protein mikroba, jumlah protozoa dan bakteri; karakteristik mikroba rumen (pH, VFA dan NH_3) dan serta kecernaan *in vitro* (bahan kering, bahan organik, NDF, ADF, hemiselulosa dan selulosa). Hasil penelitian menunjukkan penambahan mineral P, S dan Mg pada pelepah sawit hasil biodelignifikasi sebagai upaya optimalisasi bioproses rumen menghasilkan kecernaan bahan kering (31,82%), bahan organik (30,49%), NDF (58,87%), ADF (57,32%), selulosa (55,97%) dan hemiselulosa (78,63%) tertinggi,

konsentrasi VFA (111,00 mM) tertinggi dan sintesis protein mikroba (46,816 mg/ml) terbaik.

Penelitian Tahap III bertujuan untuk mengetahui pengaruh penggantian hijauan pakan dengan Pelepah Sawit Hasil Biodelignifikasi (PSHB) dalam ransum terhadap penampilan produksi ternak kambing. Penelitian menggunakan Rancangan Acak Kelompok dengan 5 perlakuan dan 3 ulangan. Perlakuan adalah A : 40% Rumput Gajah (RG) + 60% konsentrat; B : 20% RG + 20% Pelepah Sawit Hasil Biodelignifikasi (PSHB) + 60% konsentrat ; C : 0% RG + 40% PSHB + 60% konsentrat; D 20% RG + 20% PSHB + 60% konsentrat plus mineral (P, S dan Mg) dan E : 0% RG + 40% PSHB + 60% konsentrat plus mineral (P, S dan Mg). Penggantian hijauan pakan dengan 100% PSHB plus mineral P, S dan Mg dalam ransum ternak kambing memberikan hasil terbaik karena menghasilkan konsumsi, kecernaan dan pertambahan bobot badan tertinggi (79,78 g/ekor/hari) dan konversi ransum terendah (7,66).

Kata kunci : pelepah sawit, biodelignifikasi, *Phanerochaete chrysosporium*

SUMMARY

DEWI FEBRINA. Utilization of Oil Palm Fronds Biodelignification Products using *Phanerochaete chrysosporium* as Substitute Forage on Goat. Supervised by **NOVIRMAN JAMARUN, MARDIATI ZAIN DAN KHASRAD.**

Oil Palm Fronds (OPFs) are limited as a feedstuff due to their high lignin content (30.18%). Biodelignification is a lignin breakdown process using microorganisms. Fungus Phanerochaete chrysosporium of the class Basidiomycetes are fungi that degrade lignin most efficient and growth are influenced by the availability of minerals in the substrate include calcium (Ca) and manganese (Mn).

Improving the quality of OPFs through a biodelignification process should be integrated with the optimization of rumen bioprocessing by increasing the population of rumen microbes; the digestibility of the fibre is dependent on rumen microbial activity. The elements P, S and Mg have low bioavailability but are essential for microbial growth; additionally, these elements are often deficient in fibrous low-quality feed

Phase I studies were to evaluate the effects of calcium and manganese supplementation during oil palm frond biodelignification by *Phanerochaete chrysosporium* on content of fiber fractions, *in vitro* digestibility and rumen fluid characteristics. This research used a Completely Randomized Design comprising two factors as treatments and each treatment was repeated three times. The factors were Ca dose (1.000, 2.000 and 3.000 ppm) and Mn dose (50, 100 and 150 ppm). The results indicated interactions between Ca and Mn in relation to the digestibility of dry matter, organic matter, NDF, ADF, cellulose, pH, NH3 and VFA concentration of rumen fluid. The optimal combination of the minerals used were 2.000 ppm of Mn and 150 ppm of Ca; these values yielded the highest values of digestibility of dry matter (41.914%), organic matter (40.990%), NDF (66.429%), ADF (64.396%) and cellulose (68.524%) and the highest concentration of VFA (117.302 mM).

Phase II studies was to evaluate the effects of sulfur, phosphorus and magnesium supplementation of oil palm fronds biodelignification product on rumen fluid characteristics and in vitro digestibility. This research was carried out using a randomized block design with 4 treatments and 4 replications. The following treatments were performed: A = oil palm fronds biodelignification product (OPFBPs); B = A + 0.4% P; C = A + 0.4% P + 0.3% S and D = A + 0.4% P + 0.3% S + 0.1% Mg. The observed parameters were microbial protein synthesis, the number of bacteria and protozoa and rumen fluid characteristics (pH, VFA and NH3) and in vitro digestibility (dry matter, organic matter, NDF, ADF, cellulose and hemicellulose). The result showed that supplementation of OPFBPs with P, S and Mg to optimize the rumen bioprocess results the highest digestibility of dry matter 31,82%, organic matter 30.49%, NDF 58.87%, ADF 57.32% cellulose 55.97% and hemicellulose 78.63% and in the highest concentration of VFA (111.00 mM) and the greatest amount of microbial protein synthesis (46.816 mg/ml)

Phase III study was to evaluate the effect of substitution of forage with OPFBPs in the ration on the performance of goat. This research was carried out

using a randomized block design with 5 treatments and 3 replications. The following treatments were performed: A : 40% Napier grass + 60% concentrate; B : 20% Napier grass + 20% OPFBPs + 60% concentrate, C : 0% Napier grass + 40% OPFBPs + 60% concentrate, D : 20% Napier grass + 20% OPFBPs + 60% concentrate plus mineral (P, S and Mg), E : 0% Napier grass + 40% OPFBPs + 60% concentrate plus mineral (P, S and Mg). Forage substitution of 100% with OPFBPs in ration will provide the best results because consumption, digestibility and highest body weight gain (79.78 g / head / day) and the lowest feed conversion (7.66).

Keywords: oil palm frond, biodelignification, *Phanerochaete chrysosporium*