

KAJIAN PEMANFAATAN AMPAS SAGU FERMENTASI SEBAGAI SUBSTITUSI ONGGOK PADA KONSENTRAT PENGHEMUKAN SAPI POTONG

INTISARI

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Ampas sagu (AS) merupakan produk samping dari ekstraksi pati, menjanjikan sebagai pakan ruminansia meskipun memiliki keterbatasan nutrisi yang melekat. Penelitian ini menilai efektivitas AS fermentasi (ASF) sebagai pengganti onggok pada pakan penghemukan sapi potong. Penelitian ini dibagi menjadi tiga tahap. Penelitian tahap I mengevaluasi AS yang difermentasi dengan level inokulum (LI) dan waktu fermentasi (WF) terhadap komposisi nutrisi ASF. Penelitian 1 menggunakan rancangan acak lengkap (RAL) pola faktorial 3x8 dengan 3 ulangan, di mana perlakuan LI adalah 0, 0,05 dan 0,1%, dan perlakuan WF adalah 0, 6, 12, 24, 48, 72, 120 dan 168 jam. Parameter yang diamati meliputi proksimat (air, abu, PK, LK, SK), Ca, P, NDF, ADF, BETN, TDN dan pH. Penelitian tahap II menyelidiki karakteristik fermentasi rumen dan pencernaan nutrisi *in vitro* pakan komplet yang mengandung ASF. Penelitian II menggunakan rancangan acak kelompok (RAK), di mana perlakuan adalah ransum dengan lima taraf substitusi ASF terhadap onggok (R.ASF): 0, 25, 50, 75 dan 100%. Parameter yang diamati yaitu parameter pencernaan *in vitro* yang meliputi pencernaan bahan kering (KcBK), pencernaan bahan organik (KcBO), pencernaan protein kasar (KcPK), dan pencernaan serat kasar (KcSK), serta parameter fermentasi rumen yang meliputi pH, amonia (NH₃), CH₄, CO₂, VFA, protein mikrobial, protein enzim, enzim CMCase, enzim protease, dan enzim amilase. Penelitian tahap III mengkaji peran R.ASF terhadap kinerja produksi sapi potong pada dua waktu penghemukan (WP). Penelitian III menggunakan rancangan *cross over* dengan tiga perlakuan ransum (0, 25 dan 50% substitusi ASF), dua periode lama waktu penghemukan (45 dan 90 hari) dan tiga ulangan (pen). Total ternak sapi yang digunakan dalam penelitian adalah 270 ekor. Parameter yang diamati adalah konsumsi pakan, efisiensi pakan, profil metabolit darah (NEFA, glukosa, urea dan total kolesterol darah), pertambahan bobot badan harian (PBBH), karakteristik fisik karkas dan daging (bobot potong, bobot karkas, persentase karkas, persentase daging, *meat bone ratio* (MBR), *fat to meat ratio* (FMR), pH, marbling, warna lemak, warna daging, bau, rasa dan konsistensi daging), dan karakteristik kimia daging (kadar air, protein, dan lemak daging). Tiga ulangan diberikan per perlakuan pada penelitian. Hasil penelitian I menunjukkan WF menurunkan serat kasar (SK) sebesar 1,10-9,60% ($P < 0,05$). Kelompok WF 72 jam memiliki SK yang lebih rendah ($P < 0,05$) dibandingkan kelompok 0 hingga 48, tetapi tidak berbeda ($P > 0,05$) dari kelompok WF 120 dan 168 jam. Selain itu LI memiliki efek signifikan ($P < 0,05$) terhadap kandungan protein kasar (PK). Kelompok LI 0,05% mempunyai kandungan PK tertinggi yaitu 2,71%. Namun interaksi LI x WF tidak berpengaruh terhadap SK dan PK. Penelitian II secara umum melaporkan kesetaraan ($P > 0,05$) profil fermentasi rumen dan pencernaan *in vitro* R.ASF pada semua taraf substitusi. Hasil berbeda hanya ditunjukkan oleh proporsi asetat:propionat yang secara signifikan lebih tinggi hingga 28% ($P < 0,05$) pada R.ASF 25% dibanding yang lainnya. Penelitian III memperlihatkan peningkatan level ASF dalam pakan komplet hanya

mempengaruhi ($P < 0,05$) konsumsi nutrisi (konsumsi pakan, konsumsi nutrisi), namun secara umum tidak mempengaruhi ($P > 0,05$) profil metabolit darah, PBBH, karakteristik karkas dan kualitas daging sapi. Konsumsi protein paling tinggi pada R.ASF 0%/kontrol sebesar 5,4-6,3% dibanding yang lain, namun hasil setara disajikan antara R.ASF 25 dan 50%. Hasil lebih tinggi 1,9-2,5% hanya ditunjukkan oleh protein daging pada sapi yang digemukkan selama 45 hari dengan pemberian R.ASF dibanding kontrol. Dengan demikian, disimpulkan bahwa fermentasi dengan LI multi-mikroorganisme 0,05% dapat meningkatkan PK dan WF yang efektif adalah 72 jam untuk menurunkan SK AS, meskipun di antara keduanya tidak terdapat interaksi. Ampas sagu fermentasi (ASF) dapat digunakan sebagai pengganti onggok yang layak dalam pakan ruminansia, di mana menunjukkan potensinya yaitu tidak mengurangi pencernaan pakan dan profil fermentasi rumen *in vitro*, serta tidak berdampak negatif pada kinerja produksi sapi potong heifer BX penggemukan. Pada level substitusi ASF terhadap onggok sebesar 25% dalam pakan komplet bahkan menunjukkan hasil terbaik pada kinerja produksi sapi potong.

Kata kunci: Ampas sagu, *In vitro*, Pencernaan, Pakan komplet, Sapi potong, Silase.

STUDY ON THE UTILIZATION OF FERMENTED SAGO HAMPAS AS A SUBSTITUTE FOR CASSAVA PULP IN FATTENING BEEF CATTLE CONCENTRATE

ABSTRACT

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Sago hampas (SH), a byproduct of starch extraction, shows promise as ruminant feed despite its inherent nutritional limitations. This study assessed the effectiveness of fermented sago hampas (FSH) as a substitute for cassava pulp in the fattening of beef cattle. The research was divided into three stages. Stage I evaluated the impact of different inoculum levels (IL) and fermentation times (FT) on the nutritional composition of FSH. A completely randomized design (CRD) with a 3x8 factorial pattern and three replications was employed, with IL treatments of 0, 0.05, and 0.1%, and FT treatments of 0, 6, 12, 24, 48, 72, 120, and 168 hours. The observed parameters included proximate analysis (moisture, ash, crude protein (CP), crude fat (CF), crude fiber (CF)), calcium (Ca), phosphorus (P), neutral detergent fiber (NDF), acid detergent fiber (ADF), nitrogen-free extract (NFE), total digestible nutrients (TDN), and pH. Stage II investigated rumen fermentation characteristics and in vitro nutrient digestibility of complete feed containing FSH. A randomized block design (RBD) was used, with treatments consisting of rations with five levels of FSH substitution for cassava pulp (R.FSH): 0, 25, 50, 75, and 100%. The observed parameters included in vitro digestibility parameters such as dry matter digestibility (DMD), organic matter digestibility (OMD), crude protein digestibility (CPD), and crude fiber digestibility (CFD), as well as rumen fermentation parameters like pH, ammonia (NH₃), CH₄, CO₂, volatile fatty acids (VFA), microbial protein, enzyme protein, CMCase enzyme, protease enzyme, and amylase enzyme. Stage III examined the role of R.FSH in beef cattle production performance at two fattening times (WT). A crossover design was employed with three ration treatments (0, 25, and 50% FSH substitution), two fattening durations (45 and 90 days), and three replications (pens). A total of 270 cattle were used in the study. The observed parameters were feed intake, feed efficiency, blood metabolite profiles (NEFA, glucose, urea, and total blood cholesterol), average daily gain (ADG), physical carcass and meat characteristics (slaughter weight, carcass weight, carcass percentage, meat percentage, meat bone ratio (MBR), fat to meat ratio (FMR), pH, marbling, fat color, meat color, odor, taste, and meat consistency), and chemical meat characteristics (moisture, protein, and fat content). Three replicates were assigned per treatment in the study. The results of study I showed that FT reduced crude fiber (CF) by 1.10-9.60% ($P < 0.05$). The 72-hour FT group had lower CF ($P < 0.05$) than groups 0 to 48 but did not differ ($P > 0.05$) from the 120 and 168-hour FT groups. Additionally, IL significantly affected ($P < 0.05$) crude protein (CP) content. The 0.05% IL group had the highest CP content of 2.71%. However, the LI x FT interaction did not affect CF and CP. Study II generally reported equivalence ($P > 0.05$) in rumen fermentation profiles and in vitro digestibility of R.FSH at all substitution levels. The only difference was in the acetate:propionate ratio, which was significantly higher by up to 28%

($P < 0.05$) in R.FSH 25% compared to others. Study III showed that increasing ASF levels in the complete feed only affected ($P < 0.05$) nutrient intake but generally did not affect ($P > 0.05$) blood metabolite profiles, ADG, carcass characteristics, and meat quality. Protein intake was highest in R.FSH 0%/control at 5.4-6.3% compared to others, but similar results were observed between R.FSH 25 and 50%. Meat protein was 1.9-2.5% higher in cattle fattened for 45 days with R.FSH compared to the control. Thus, it was concluded that fermentation with 0.05% multi-microorganism IL could increase CP, and the effective FT was 72 hours to decrease SH CF, although there was no interaction between them. Fermented sago hampas (FSH) can be used as a viable substitute for cassava pulp in ruminant feed. It shows potential by not reducing feed digestibility and in vitro rumen fermentation profiles and not negatively impacting the production performance of fattening BX heifer cattle. The 25% ASF substitution level for cassava pulp in the complete feed showed the best results in beef cattle production performance.

Keywords: Beef cattle, Complete feed, Digestibility, In vitro, Ruminants, Sago hampas, Silage.