Chelonian Conservation And Biology

Vol. 19 No. 1 (2024) | https://www.acgpublishing.com/ | ISSN - 1071-8443

DOI: doi.org/10.18011/2024.01(1).236.242

THE EFFECT OF COMPLETE FEED SUBSTITUTION WITH COFFEE PEEL WASTE ON THE PERFORMANCE OF THE FINISHER PHASE PIGS

Mien T.H Lapian, Petrus R.R.I Montong. Hapry F.N.Lapian
Fakultas Peternakan Universitas Sam, Ratulangi Manado, 95115

ABSTRACT

The primary objective of this research was to assess the impact of incorporating coffee husk waste as a complete feed replacement ingredient on pig performance. A total of 36 crossbred pigs, originating from Sterbyderby and Kirk, Topper and Exotic, and Abraham and Kirk, were subjected to a comprehensive study employing a 4-treatment, 3-repetition design. The analysis of variance (ANOVA) revealed that the inclusion of coffee husk waste as a partial substitute for the ration, alongside various treatment methods such as sun-dried, soaked, and boiled coffee husks, exhibited no statistically significant differences ($P>0.05$) in ration consumption.

However, the study did unveil significant differences ($P<0.01$) in body weight gain and ration efficiency ($P<0,05$) at the coffee skin substitution level. In contrast, The specific treatment of coffee skin had no significant impact on both body weight gain and ration efficiency ($P>0.05$), and the interaction between the two factors also did not yield significant differences ($P>0.05$).

In summary, this study affirms the potential of coffee skins as a substitute feed ingredient in select pig rations, with the most promising outcomes observed at a 5% substitution level with boiled treatment.

Keywords: Substitution, Coffee Peel, Pig farming

INTRODUCTION

The pig farming industry holds significant promise for development, driven by robust consumer demand. According to data from the Central Statistics Agency in 2020, the pig population in Indonesia stood at 9,069,892, with 401,827 in the North Sulawesi Province and 41,900 in Tomohon City. Among the contributors to Tomohon City's pig population is Degloty Farm, owned by Mr. Daan Kairupan, which has been raising pigs since 2011. This farm employs a mixed ration comprising corn, bran, and concentrate.

Pigs exhibit several advantageous characteristics, including prolificacy, rapid and efficient growth, a relatively short lifespan at slaughter weight, and a high carcass percentage, making them an ideal choice for development. Furthermore, as monogastric livestock, pigs efficiently convert food ingredients into meat.

Agricultural and food waste, including human food waste, can be effectively utilized by pigs for meat production. The conversion rate for pigs to ration is 3.5, signifying that 3.5 kg of ration can produce 1 kg of pig weight.

The primary obstacle to pig farming development is the relatively high cost of feed, constituting 75-80% of the overall feed production cost. Moreover, feed availability is subject to variations driven by factors such as harvest seasons and competition with other livestock, leading to price fluctuations (Timbulus et al., 2017).

High-quality rations are commercially available but can be expensive for breeders, particularly in areas distant from urban centers. As such, exploring alternative, cost-effective materials, such as waste, becomes essential. The utilization of waste as animal feed offers a prudent solution to meet livestock nutritional requirements.

One such waste product suitable for this purpose is coffee skin. The nutritional content of non-fermented coffee skins includes a crude protein content of 8.49% (Balitnak, 2013). This protein content is relatively comparable when considered as a replacement for a portion of the traditional ration. Additionally, research by Wiguna (2007) reveals that coffee skin contains 4140 kcal/kg of energy, 10.47% crude protein, 0.26% fat, and 32.26% crude fiber. It's worth noting, however, that coffee skin also contains substantial amounts of crude fiber, as well as tannin, caffeine, and lignin, which can potentially disrupt livestock digestion. Therefore, proper processing, including drying, soaking, and boiling, is essential to enhance digestibility and palatability, boost protein content, and reduce crude fiber, tannin, and caffeine content.

Given these considerations, our research seeks to assess the impact of substituting complete feed with coffee husk waste on the performance of finisher pigs.

Methods

Materials and Research Objects

The research was conducted at Degloty Pig Farm, situated in Lansot Village, South Tomohon District, Tomohon City. The study spanned a total of 5 weeks, with an initial 1-week adjustment (preliminary) period followed by a 4-week data collection phase. Thirty-six pigs, with a live weight range of 60-61 kg, were selected for the study. These pigs represented three distinct breeds resulting from the crossbreeding of Sterbyderby breed females with Kirk breed males, Topper breed females with exotic breed males, and Abraham breed females with Kirk breed males. Each pig was individually housed in battery cages measuring 161 x 47 x 80 cm, equipped with feeding and drinking facilities. The dietary components employed included fine bran, corn, concentrate, and coffee skin waste. The coffee skin waste was subjected to three different treatments: drying, soaking, and boiling.

Experimental Design

The research employed a 4 x 3 Factorial Randomized Block Design. Factor A encompassed four levels of substitution, ranging from 0% to 15% of coffee skins in complete feeds, while Factor B encompassed the treatment methods for coffee skins, which included sun-drying, soaking, and boiling. Statistical analysis was performed using analysis of variance (ANOVA).

Variables

The following variables were measured and analyzed in the study:

1. Weight Gain (Kg) per Ind./Day: Calculated as the difference between the final body weight and the initial body weight, divided by the number of research days.
2. Ration Consumption (Kg) per Ind./Day: Determined by subtracting the amount of remaining rations from the daily rations provided.
3. Efficiency of Ration Use: Calculated as the ratio of weight gain to the amount of ration consumed within the same timeframe following the weighing time

$$FE = \frac{Pbb}{JKM}$$

Keterangan :

FE = Feed Efficiency

Pbb = Weight Gain

JKM = Total Ration Consumption

Results and Discussion

Effect of Treatment on Weight Gain

Table … presents data derived from observations and calculations of the average increase in body weight for each treatment administered to the research subjects. The average daily body weight gain ranged from 0.80 to 0.96 kg/Ind./day. At substitution levels A0 (0%), A1 (5%), A2 (10%), and A3 (15%), the average body weights observed were 0.80, 0.96, 0.89, and 0.83 kg/Ind./day, respectively. In contrast, the treatments involving sun-dried (B1), soaked (B2), and boiled (B3) coffee skins resulted in average daily weight gains of 0.84, 0.87, and 0.89 kg/Ind./day, respectively.

It is noteworthy that the data obtained in this study surpasses the results reported by Timbulus et al. (2017) and Siagian et al. (2005), which documented daily weight gains of 0.47-0.63 kg/ind./day and 0.57-0.64 kg/ind./day, respectively.

Based on the results of the analysis of variance, the impact of coffee skin substitution levels on weight gain was highly significant ($P<0.01$). Conversely, the impact of various coffee skin processing methods, including drying, soaking, and boiling, did not yield statistically significant differences ($P>0.05$). The interaction between the two factors, i.e., level of substitution and coffee skin processing, did not have a significant influence ($P>0.05$). Further analysis using Duncan's test indicated that A1 was significantly different from A0 and A3 but not significantly different from A2, while A0 was significantly different from A1 and A2 but not significantly different from A3.

Weight gain in animals is known to be intricately linked to feed consumption (Talib et al., 2020; Uzer et al., 2013; Johns et al., 2009; Mahardika et al., 2015; Tamawiwy et al., 2016). The notable increase in body weight in A1 and A2 treatments is attributed to higher feed consumption, presumably leading to enhanced digestibility and nutrient absorption by the animals. Conversely,

the lower average body weight gain observed in treatments A0 and A3 is likely due to reduced feed consumption.

Effect of Treatment on Ration Consumption

The data concerning feed consumption in this research ranged from 3.01 to 3.19 kg/ind./day, with the highest average being recorded in treatment A1 at 3.19 kg and the lowest at the control group A0 (0%) with 3.01 kg. The overall average consumption across all treatments was 3.08 kg. Notably, the average consumption in treatment B3 exceeded that in treatments B1 and B2 (refer to Table ….). These figures contrast with the results observed by Timbulus et al. (2017), who reported daily consumption in the range of 2.19 to 2.51 kg with an average of 2.39 kg. Differences in feed composition are believed to influence the aroma and taste of the feed, thus impacting feed palatability for livestock, which, in turn, affects consumption (Sinaga et al., 2002).

The analysis of variance (ANOVA) revealed that the complete feed substitution with coffee husk waste at levels of 0%, 5%, 10%, and 15%, as well as coffee husk processing treatment, did not yield statistically significant differences ($P>0.05$) in feed consumption. This suggests that each treatment exerted a similar effect on ration consumption. This phenomenon may be attributed to the requirement for finisher phase pigs, which generally necessitates rations with 14-15% protein content and a metabolic energy range of 3200-3400 kcal (Toha, 1980). Furthermore, the consumption of rations is typically influenced by the palatability and energy content of the rations, as proposed by Sinaga et al. (2002). Sihombing (2006) supported this perspective, emphasizing that feed consumption is primarily influenced by the ration's palatability. Factors such as body weight, age, livestock condition, and environmental stressors like temperature, air humidity, and sunlight also play a role in ration consumption (Poluan et al., 2017). The quality of a ration is determined by various factors, including protein, energy, fiber, vitamins, minerals, and other components crucial for growth and biological digestive processes (Sinaga et al., 2010). Nutritional content that deviates from the livestock's requirements can affect growth and production. The presence of high crude fiber content, like that found in coffee skin, can hinder digestibility, whereas substances like tannin and caffeine may disrupt digestion and amino acid formation (Tandi, 2010; Tatilu et al., 2014).

Effect of Treatment on the Efficiency of Ration Use

In this study, the average efficiency of ration use ranged from 0.26 to 0.30, with an overall average of 0.28. Specifically, the averages for substitution levels A0, A1, A2, and A3 were 0.26, 0.30, 0.29, and 0.27, while coffee skin treatments B1, B2, and B3 yielded averages of 0.27, 0.29, and 0.29, respectively.

These results surpass those observed by Timbulus et al. (2017), who reported a range of 0.19 to 0.26 with an average of 0.23. The analysis of variance indicated that the effect of treatment on the efficiency of ration use at the coffee skin level was statistically significant ($P<0.05$), while the effect of coffee skin treatment did not yield significant differences ($P>0.05$). The interaction between the two factors, coffee skin level and skin treatment, did not have a significant impact ($P>0.05$). Duncan's test further revealed that the level of A1 coffee skin was significantly different

from A0 but not significantly different from A2 and A3. Conversely, A0 was significantly different from A1 and A2 but not significantly different from A3. These findings imply that substituting coffee husks for a portion of the ration affects the efficiency of ration use in pigs. The data in the table indicates that higher levels of coffee husk waste substitution led to decreased efficiency of ration use. This is primarily due to elevated crude fiber content, which can reduce nutrient digestibility and shorten digestion time in the digestive tract (Ngoc et al., 2013).

Among the tested treatments, the highest average efficiency was noted for pigs in the A1 level (5%) with B2 (soaked) and B3 (boiled) treatments, both recording an efficiency of 0.29. Elevated efficiency values suggest that the consumed food is rich in nutrients and is efficiently converted into meat, whereas lower efficiency values indicate less efficient conversion (Saud et al., 2019). Rumerung (2015) emphasized the connection between ration use efficiency, daily weight gain, and ration consumption.

Please provide more specific details on the statistical tests used and connect the findings to existing literature where relevant. Additionally, ensure that the formatting and structure align with the journal's guidelines.

Conclusion

Coffee skins demonstrate potential as a viable substitute feed ingredient in certain rations, with the most favorable results obtained at a 5% substitution level coupled with the boiled treatment.

DAFTAR PUSTAKA

Belstra, B. 1999. Effect of Lactation Length and Exogenous Progesteron or Estradiol on Embryonic Survial in Multiparous Sows. Journal Animal Science 77:48-54.

Belstra, B. A. 2003. Parity Associated Changes in Reproductive Pervormance: Phisiological Basis or Record Keeping Artefact.

Blakely, J. and H. B. David. 1991. The Science of Animal Hubandry. Printice-Hal Inc. New Jersey.

Dziuk, P. J. 1970. Estimation of Optimum Time for Insemination of Gilts and Ewes by Double Mating at Certain Times Relative to Ovulation. Journal
Reproduksi. Fert. 22:277-282.

Dziuk, P. J., C Polge dan L. E. Rowson. 1964. Intrauterine Migration and Mixing of Embryos in Swine Following Egg Trasfer. Journal Animal Science. 23: 37-442.

Day, B. N. 1972. Reproduction of Swine. Dalam: E. S. E. Hafez (editor). Reproduction in Farm Animal Lea & Febiger. Philadelphia. Pp 521-545.

Endrawati, E., Biliarti E., Budhi S. P. S. 2010. Performance of Simmental-Ongole Crossbred Cow and Ongole Crossbred Cow Fed with Forage and Concentrate Feed. Buletin Peternakan. 34(2): 86-93.

Feradis. 2010. Bioteknologi Reproduksi pada Ternak. Alfabeta. Bandung.

Geisert, R. D. and R. A. M. Schmitt. 2002. Early Embryonic Survival in the Pig. Can
it be Improved. Journal Animal. Science 80:54-85.

Geisert, E. E. Jr,. H. G. Johnson, L. I. Binder.

1990. Expression of Microtuble- Associated Protein 2 by Reactive Astrocytes. Proc Nalt Acad Science USA. 87:3967-3971.
Hardjopranjoto, S. 1995. Ilmu Kemajiran pada Ternak. Airlangga University Press. Surabaya.
Iswoyo dan Widiyaningrum, P. 2008. Performans Reproduksi Sapi Pernakan Simmental (PSM) Hasil Inseminasi Buatan di Kabupaten Sukoharjo Jawa Tengah. Jurnal Ilmiah Ilmu-Ilmu Peternakan. 11(3):125-133.
Kusuma H. R., Kuswati K., Huda A. N., Prafitri R., Yekti A. P. A., Susilawati T. 2021. Evaluasi Tingkat Keberhasilan Inseminasi Buatan Double Dosis (Jam ke 2 dan ke 8) terhadap Kualitas Berahi pada Sapi Persilangan Ongole. Jurnal Ilmu Ternak Universitas Padjajaran. 21(2): 94101.
Kim S. W, W. L. Hurley, I. K. Han, R. A. Easter. 2000. Growth of Nursing Pigs
Related to the Characterristics of Nursed Mammary Glands. Journal Animal
Science 78:1313-1318.
Ligaya, Tumbelaka I. T. A., Siagian P. H. 2007. Pengaruh Sistem Pengawinan dan Paritas Terhadap Penampilan Reproduksi Ternak Babi di PT Adhi Farm, Solo, Jawa Tengah. Jurnal Ilmu Ternak. 7(2): 145148.
Manurung D. P. 2014. Performa Reproduksi pada Induk Babi di PT Mahakarta Farm Sukses Kabupaten Karo Provinsi Sumatera Utara. Skripsi. Institut Pertanian Bogor: Bogor.
Melrose, D. R. 1963. Artifical Insemination in Pig. A Review of its Development.
Brint Verteriner. Journal 199, 532.
Mclntosh, B. 2005. Mclntosh A. B. Consultans. Available at
http://www.dbi.919.9ov.au/pigs/4545.htm
l.
Ohin m. H., Kune P., Kihe J. N. 2014. Tampilan Kinerja Reproduksi pada Ternak Babi Betina Peranakan Landrace dan Peranakan Duroc. Jurnal Nukleus Peternakan. 1(20):130-134.
Pranatalia D. 2018. Kinerja Reproduksi pada Bangsa Babi yang Berbeda di Peternakan CV. Adhi Farm Karanganyar. Skripsi Thesis. Universitas Mercu Buana Yogyakarta: Yogyakarta.
Polge, C. 1956. Artifical Insemination in Pig. Journal Veteriner. Rec. 68: 62—75.
Parakkasi, A. 1990. Ilmu Gizi dan Makanan Ternak Monogastrik. Fakultas Peternakan Istitut Pertanian Bogor. Bogor.
Partodiharjo, S. 1992. Ilmu Reproduksi Hewan. Mutiara. Jakarta.
Satrivi K., Wulandari Y., SYB Subagyo., Indre R., Sunarto S., Prastowo S., Widyas S. 2013. Estimasi Parameter Genetik Induk Babi Landrace Berdasarkan Sifat Litter Size dan Bobot Lahir Keturunannya. Tropical Animal Husbandary. 2(1): 145148.
Siagarini, V. D., et al (2014). Service per Conception (S/C) dan Conception Rate (CR) Sapi Peranakan Simmental pada Paritas yang Berbeda di Kecamatan Sanankulon Kabupaten Blitar. Fakultas Peternakan. Universitas Brawijaya. 2-5.
Sulaksono, A., Surhayati, S., dan Santoso, E. P. 2010. Penampilan Reproduksi(Service per Conception, Lama Bunting, dan Selang Beranak) Kambing Boerawa di Kecamatan Gedong Tataan dan Kecamatan Gisting. Fakultas Pertanian Universitas Lampung. Lampung.
Sihombing, D. T. H. 1997. Ilmu Ternak Babi. Gadjah Mada University Press.

Yogyakarta.
Signoret, J. P., F. Du Mensil Du Buisson dan P. Mauleon. 1973. Effect of Mating on The Onset and Durration of Ovulation in The Sow. Journal Reproduksi Fert. 30:327-330.
Sinaga, S. 2012. Tips Pemeliharaan Ternak Daerah atau Musim Panas. http://blogs.unpad.ac.id/saulansinaga/?cat =1. Di Kunjungi 11 Okt. 2012.
Salisbury, G. W. dan N. L. Vandemark. 1985. Fisiologi Reproduksi dan Inseminasi Buatan pada Sapi. Terjemahan R. Djanuar. Fakultas Peternakan Univeritas Gadjah Mada. Yogyakarta.
Toelihere M. R. 1993. Inseminasi Buatan pada Ternak. Angkasa, Bandung.
Toelihere, M. R. 1993. Inseminasi Buatan pada Ternak. Angkasa. Bandung.
Varlos. 2003. Metabolic State of the Sow, Nursing Behaviour and Milk Production Livest. Prod Sci 79:155-167.
Wicaksono A. 2012. Perbandingan Keberhasilan Perkawinan (IB) antara Babi Jantan Duroc dan Duroc Pietrain dengan Betina Landrace. Skripsi. Universitas Sebelas Maret: Surakarta.
Wahyuningsih N., YBP Subagyo, Sunarto, Prastowo S., Widyas N. 2012. Performan Anak Babi Silangan Berdasarkan Paritas Induknya di Usaha Peternakan Babi PT. Adhi Farm , Solo. Sains Peternakan. 10(2), 56-63.s
Walker, D. 1972. Pregnancy Diagnisis in Pigs.Jurnal Veteriner. Rec. 90: 139-144.