Sustainable Livestock Production in the Perspective of
Food Security, Policy, Genetic Resources, and Climate Change

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The 16th AAAP Congress

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Ministry of Agriculture

Indonesian Society of Animal Sciences

Gadjah Mada University

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SUSTAINABLE LIVESTOCK PRODUCTION IN THE PRESPECTIVE OF FOOD SECURITY, POLICY, GENETIC RESOURCES, AND CLIMATE CHANGE

PROCEEDINGS

FULL PAPERS

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AAAP

Asian-Australasian Association of Animal Production Societies

✧ **Scope of AAAP**: AAAP is established to devote for the efficient animal production in the Asian-Australasian region through national, regional, international cooperation and academic conferences.

✧ **Brief History of AAAP**: AAAP was founded in 1980 with 8 charter members representing 8 countries-those are Australia, Indonesia, Japan, Korea, Malaysia, New Zealand, Philippines and Thailand. Then, the society representing Taiwan joined AAAP in 1982 followed by Bangladesh in 1987, Papua New Guinea in 1990, India and Vietnam in 1992, Mongolia, Nepal and Pakistan in 1994, Iran in 2002, Sri Lanka and China in 2006 , thereafter currently 19 members.

✧ **Major Activities of AAAP**: Biennial AAAP Animal Science Congress, Publications of the Asian-Australasian Journal of Animal Sciences and proceedings of the AAAP congress and symposia and Acknowledgement awards for the contribution of AAAP scientists.

✧ **Organization of AAAP**:

· President: Recommended by the national society hosting the next biennial AAAP Animal Science Congress and approved by Council meeting and serve 2 years.

· Two Vice Presidents: One represents the present host society and the other represents next host society of the very next AAAP Animal Science Congress.

· Secretary General: All managerial works for AAAP with 6 years term by approval by the council

· Council Members: AAAP president, vice presidents, secretary general and each presidents or representative of each member society are members of the council. The council decides congress venue and many important agenda of AAAP

✧ **Office of AAAP:** Decided by the council to have the permanent office of AAAP in Korea. Currently # 909 Korea Sci &Tech Center Seoul 135-703, Korea

✧ **Official Journal of AAAP**: Asian-Australasian Journal of Animal Sciences (Asian-Aust. J. Anim. Sci. ISSN 1011-2367.) is published monthly with its main office in Korea

✧ **Current 19 Member Societies of AAAP:**

ASAP(Australia), **BAHA**(Bangladesh), **CAASVM**(China), **IAAP**(India), **ISAS**(Indonesia), **IAAS**(Iran), **JSAS**(Japan), **KSAST**(Korea), **MSAP**(Malaysia), **MLSBA**(Mongolia), **NASA**(Nepal), **NZSAP**(New Zealand), **PAHA**(Pakistan), **PNGSA**(Papua New Guinea), **PSAS**(Philippines), **SLAAP**(Sri Lanka), **CSAS**(Taiwan), **AHAT**(Thailand), **AHAV**(Vietnam).

✧ **Previous Venues of AAAP Animal Science Congress and AAAP Presidents**

I	1980	Malaysia	S. Jalaludin	II	1982	Philippines	V. G. Arganosa
III	1985	Korea	In Kyu Han	IV	1987	New Zealand	A. R. Sykes
V	1990	Taiwan	T. P. Yeh	VI	1992	Thailand	C. Chantalakhana
VII	1994	Indonesia	E. Soetirto	VIII	1996	Japan	T. Morichi
IX	2000	Australia	J. Ternouth	X	2002	India	P. N. Bhat
XI	2004	Malaysia	Z. A. Jelan	XII	2006	Korea	I. K. Paik
XIII	2008	Vietnam	N.V. Thien	XIV	2010	Taiwan	L.C. Hsia
XV	2012	Thailand	C.Kittayachaweng	XVI	2014	Indonesia	Yudi.Guntara.Noor

Remark from Chairman of the 16th AAAP Congress

Dear all of the scientists, delegates, participants, ladies and gentlemen,

As the host of the 16th AAAP Animal Science Congress, we do impress, thankful, and present a high appreciation for your participation in joining the 16th AAAP Conference in Yogyakarta, Indonesia. We can see the very great enthusiasm of all the scientists to solve livestock problems as well as to share valuable information and knowledge for human prosperity all over the world.

A large numbers of representatives are participating in this conference, which indicates that the interest in the field of animal science is continuously increasing among member countries. We have invited some Plenary Speakers and Invited Papers who are qualified as scientists and bureaucrats in animal science field to share their valuable information and knowledge. Other participants can deliver their precious research through oral and poster presentations. This congress is also paralleled to symposium held by livestock organization and institution as well as some academic meetings.

The theme of the 16th AAAP Congress is "Sustainable Livestock Production in the perspective of Food security, Policy, Genetic Resources and Climate Change". We believe that animal production in Asia and Australasia has become important and strategic sector to provide high quality food, opening up job opportunities, as well as improving farmer's welfare. Animal science socities, therefore, have to support this growing interest by providing more appropriate and relevant technologies to improve efficiency of resources utilization to produce more animal protein food by member countries. Long term sustainable livestock production will, therefore, be significantly influenced by the national food policy, climate change issues, as well as conserved environments and genetic resources.

On behalf of 16th AAAP Committee and all associates, we wish all of the participants having a great achievement of success and fulfill the expectation as well as enjoying the interaction with all scientists participating the Congress.

High appreciation we may acknowledge to all of sectors, especially for His Majesty of Royal Palace of Yogyakarta, Sri Sultan Hamengku Buwono X, and Rector of Universitas Gadjah Mada, who have concerned to facilitate the Congress site host. Special thank to the Steering Committee, Scientific Committee, Reviewers and Editorial Boards for their great contribution to make the Congress successfully organized.

To you, your excellencies, invited guests and delegates, thank you for choosing to come to this conference and to Indonesia. We hope the arrangements we have put in place meet with your requirements. We wish you fruitful deliberations and an intellectually and socially rewarding stay in Yogyakarta.

We are looking forward to meeting you all in the future congress to continue.

Terimakasih (Thank you)

Budi Guntoro

Chairman of the 16th AAAP Congress

16th AAAP PRESIDENT'S REPORT

Selamat pagi!

Dear Ladies and Gentleman

Attendants of 16 AAAP congress:

It is my great pleasure and honor to welcome all of you at The 16th AAAP Congress on November 10 – 14, 2014 at Grha Sabha Pramana, Universitas Gadjah Mada, Yogyakarta Indonesia. This Congress is jointly organized by The Indonesian Society of Animal Science (ISAS), Indonesian Agency for Agricultural Research and Development, Indonesian Directorate General of Livestock and Animal Health Services-Ministry of Agriculture and Faculty of Animal Science Universitas Gadjah Mada. Universitas Gadjah Mada Campus is located in Yogyakarta, one of the Special Region in Indonesia where culture and tradition live in harmony with the modern nuance and educational spirit makes it a beautiful venue of this Congress.

The 16th AAAP Program consists of scientific and technical programs as well as social and cultural activities. The scientific and technical programs offer five plenary sessions, two satellite symposia, field trip, and many scientific sessions, both oral and poster presentations.

During this event distinguished scientists from all over the world will present plenary papers ranging from livestock policy, food security, local genetic resources, climate change, animal welfare, international trade, as well as global research agenda. I believe that around 1,200 scientists as well as livestock producers, companies, graduate and postgraduate students from 40 countries are attending the Congress and more than 770 research papers will be presented. The Congress also provides not only opportunities to discuss and exchange information and experience with scientists from different regions of the world, but also a good environment to build up friendship between nations is our ultimate goals for the Congress outcome. Moreover, this congress also keeps its tradition to be a forum of communication among researchers, academician, industries and related stakeholders among Asian-Australasian countries.

The social and cultural programs are specially desgined to be very important for the congress participants since the promotion of friendship and future scientific cooperation are also central to this AAAP Congress. The Opening Ceremony will offer you the Congress Program at a glance. In addition, participants will also join at a warm Welcome Dinner gathering at Keraton Yogyakarta. Sri Sultan Hamengku Buwono X, His Majesty of The Royal Palace of Yogyakarta will give you the most memorable moment during this event.

Moreover, cultural night offers us an opportunity to introduce significant culture from participants' countries and gives a spectacular performance to enjoy in order to strengthen our friendship and future cooperation. Field trip, on the other hand, provides a wonderful sightseeing to the most valuable ancient heritage around Yogyakarta, such as Borobudur and Prambanan Temples, and more other interesting places to visit. I do hope that you enjoy your stay in Yogyakarta and not miss all of these spectacular opportunities.

Closing Ceremony will be held on November 14, 2014 immediately after the last session of presentation. During this great moment we will welcome the next host of the 17th AAAP Congress to deliver a brief message. The AAAP Congress Award will provide and announce some participant who receive appreciation for their valuable research.

With all of our hospitability, we will try our best to make your brief visit to Yogyakarta and our beautiful country Indonesia, become a wonderful experience and memorable moments.

I wish you all a very pleasant and most enjoyable stay in Yogyakarta, Indonesia.

Terima kasih (Thank you).

Sincerely Yours
Mr. Yudi Guntara Noor
President
The 16th AAAP Congress

The Reduction of Lignin Content by Fermentation of Cocoa Pod Husk (*Theobroma cocoa*) using Different Microbes

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ABSTRACT

The study was aimed to determine the increase of nutrient content and the decrease of lignin content in the cocoa pod husk (CPH) when fermented with various microbes. The research was performed by formulating four treatments, i.e., T0 = CPH without microbial addition; T1 = CPH fermentation with Aspergillus niger; T2 = CPH fermentation with Phanerochaete chrysosporium and T3 = CPH fermentation with Tricoderma Viridae. Three replicates were applied for each treatment. The mixtures were put into containers aerobically for 7 days. The variables observed were DM, CP, CF, CFt, ash and lignin contents. This study was arranged in a completely randomized design with a unidirectional pattern analysis of variance (oneway ANOVA). Significant variables went through Duncan's Multiple Range Test (DMRT). The results showed that the best reduction of lignin content was found in T2 or the fermentation with Phanerochaete chrysosporium, i.e., 5.43 ± 0.20%. It could be concluded that the addition of fungus Phanerochaete chrysosporium in fermentation of CPH decreased the lignin content of CPH.

Key Words : Lignin, Fermentation, Cocoa pod husk, Microbial

INTRODUCTION

The main barriers to livestock farmers, especially to increase the livestock population is limitation on feed availability. The expansion of areas for planting grass for ruminant feed is very difficult, because the land is used for agriculture intensively. Considering the inadequacy of grazing land, then any efforts to re-use agricultural waste as feed need to be combined with other materials which have not been used as feed commonly.

The waste of crops and plantation has an important role and high potential in providing forage for ruminants such as cattle, goats, sheep and buffalo, especially during the dry season. In the dry season forage grasses are stunted, resulting in less available forage in terms of both quantity and quality. Even in certain areas fodder grass will dry up and die, causing a crisis of forage. In addition, ruminant farming is still largely dependent on the grass forage and other forage with little or no additional feed.

CPH has a potential for ruminant feed supply, especially for goats, during the dry season. Utilization of CPH as animal feed can be given in the form of raw material or in the form of powder after being processed. Research findings showed that sun-dried- fresh CPH and then milled can be used as animal feed.

CPH is an agroindustrial waste produced in cocoa (Theobroma cacao L.) processing. Cocoa fruit consists of CPH about 74%, cocoa bean 2 % and 24 % fruit flacent. The proximate analysis showed that it contains 88.98% dry matter (DM), 79.89% organic matter (OM), 9.14 crude protein (CP), 35.74% crude fiber (CF) (Alemawor et al., 2009). Other reported that CPH consists of DM 91.80%, OM 88.90%, CP 6.20%, and CF 45.90% and 50.8 % (Aregheore, 2002). Lateef et al. (2008) report that CPH contains OM 88.70%, CP 8.20%, CFt 4.70 and CF 18.30%. Suparjo et al. (2009) report that content of CPH consist DM 48.17% and OM 93.93%.

Research conducted on sheep, showed thatCPH can be used as a substitute supplement as much as 15% or 5% of the ration. Preferably before used as animal feed, CPH needs to be fermented prior in order to reduce the indigestible lignin content consumed by animals and to increase the protein content.

The specific objective to be achieved in this research was to examine the nutrient content and a decrease in lignin content of fermented CPH. It was expected that this research would produce a proper referential method in the processing of CPH by using molds.

MATERIALS AND METHODS

The material used was cocoa pod husk (CPH), isolates of Aspergillus niger, Phanerochaete chrysosporium and Tricoderma viridae. The equipments used were test tubes, petri disks, ose, autoclave, aluminum foil, cotton and a set of laboratory equipment for proximate analysis. The research was arranged in acomplete randomized research design with unidirectional pattern. The CPH was fermented by using 3 types of microbes and and three replications for each treatment. namely: T0=CPH without the addition of microbial; T1=CPH fermentation with Aspergillus niger; T2=CPH fermentation with Phanerochaete chrysosporium; T3=CPH fermentation with Tricoderma Viridae.

Data were analyzed with analysis of variance (ANOVA) in an unidirectional pattern followed by Duncan 's Multiple Range Test Test (DMRT) (Christensen, 1996) when the ANOVA showed significant difference.

Research Procedures

The fermentation was carried out in an aerobic condition. Fresh CPH was chopped and dried. One hundred (100) g of CPH with water content of 61.23% was placedin a plastic container and inoculated with Aspergillus niger, Phanerochaete chrysosporium or Tricoderma viridae, and mixed thoroughly. The fermentation was carried out for 7 days. The CPH before and after fermentation were examined for the nutrient and lignin content analysis by using proximate analysis (AOAC, 2005). Parameters observed were dry matter (DM), crude protein (CP), crude Fiber (CF), crue fat (CFt), ash and lignin.

RESULTS AND DISCUSSION

The results of the proximate analysis and the calculation of lignin contents after fermentation of CPH with different types of microbes are listed in Table 1.

Table 1. Mean chemical composition of fermented CPH with various microbes (% DM).

Variable	Treatments			
	T0	T1	T2	T3
Lignin	$16.38^{e} \pm 0.20$	$7.90^{b} \pm 0.44$	$5.43^{a} \pm 0.20$	$7.65^{b} \pm 0.23$
Moisture	$61.70^{a} \pm 0.57$	$72.65^{b} \pm 0.26$	$77.67^{c} \pm 1.33$	$77.99^{c} \pm 0.32$
Crude Protein	$3.45^{c} \pm 0.07$	$2.66^{b} \pm 0.16$	$2.60^{b} \pm 0.09$	$1.95^{a} \pm 0.08$
Crude Fiber	$19.93^{d} \pm 1.09$	$8.47^{c} \pm 0.40$	$5.67^{a} \pm 0.29$	$7.25^{b} \pm 0.10$
Crude Fat	$0.37^{a} \pm 0.02$	$0.98^{c} \pm 0.15$	$0.73^{b} \pm 0.05$	$0.68^{b} \pm 0.12$
Ash	$3.61^{b} \pm 0.06$	$2.99^{b} \pm 0.36$	$2.26^{a} \pm 0.37$	$2.20^{a} \pm 0.29$

Superscript differences in the same row indicate high significance ($P < 0.01$).
T0 = Fermented CPH without addition of Microbes.
T1 = Fermented CPH with Aspergillus niger.
T2 = Fermented CPH with Phanerochaete chrysosporyium.
T3 = Fermented CPH with Tricoderma viride.

Lignin

The lignin contents of the CPH are listed in table 1. The mean were: T0 = 16.38 ± 0.20%, T1 = 7.90 ± 0.44%, T2 = 5.43 ± 0.20% and T3 = 7.65 ± 0.23%. Statistical analysis showed that the lignin contents of the CPH were highly significantly ($P<0.01$) affected by different

fermentation proces.The TO treatment (fermentation without the addition of microbes) showed that the lignin content was higher than other treatments.

This happenned because the lignin contained in the CPH is high and there should be special treatment to reduce the lignin content. The treatment T1, T2 and T3 using different types of microbes showed distinct decrease in lignin content among microbes. CPH fermentation by Aspergillus niger produced a higher lignin content as compared with the fermentation by Phanerochaete chrysosporyum and Tricoderma Viridae.

The T2 treatment (Phanerochaete chrysosporyum) produced lignin content of the CPH lower than the T3 treatment (Tricoderma Viridae).

Moisture Content

The mean of water moisture contents of the CPH are listed in Table 1. The mean of the treatments were T0 = 61.70 ± 0.57%, T1 = 72.65 ± 0.26% , T2 = 77.67 ± 1.33% and T3 = 77.99 ± 0.32%. Analysis of variance showed that the treatments affected the moisture contents significantly ($P < 0.01$).

Fermentation by the addition of microbial showed higher water content compared with the treatment without the addition of microbial. This is due to the activity of microbes in the fermentation activity in the CPH which produce CO_2 and water.

Crude protein

The mean of proteincontent of the CPH is listed in table 1. The protein levels were 3.45 ± 0.07%; 2.66 ± 0.16%; 2.60 ± 0.09% and 1.95 ± 0.08%, for T0, T1, T2 and T3, respectively. Statistical analysis showed that the fermentation treatments affected the crude protein significantly ($P<0.01$).

The addition of microbial fermentation produced a lower protein content compared with no addition of microbial fermentation. The activity of microbes in the fermentation proceses of the CPH are expected to increase the protein content. Therefore if the fermented CPH is used for ruminant ration, other feedstuff still needs to be added to meet the protein requirement of the livestock.

Crude Fiber

The mean of crude fiber contents of the fermented CPH are listed in Table 1. The mean of the crude fibre contents were 19.93 ± 1.09%; 8.47 ± 0.40%; 5.67 ± 0.29% and 7.25 ± 0.10% for T0, T1, T2 and T3, respectively. Statistical analysis showed that the fermentation treatments affected the crude fibre levels of the CPH significantly ($P<0.01$).

The results showed that the crude fiber content was lowest on T2 treatment and highest on the T0 treatment. This suggests that the addition of microbial fermentation can reduce the crude fiber content of the CPH, so when used as animal feed it can be more efficient in the process of digestion.

Crude Fat

The mean of the crude fat contents of the fermented CPH are listed in Table 1. The mean of the crude fat contents were 0.37 ± 0.02%; 0.98 ± 0.15%; T2 = 0.73 ± 0.05% and 0.68 ± 0.12for T0, T1, T2 and T3, respectively. Statistical analysis showed that the fermentation treatments affected the crude fat levels of the CPH significantly ($P<0.01$).

The results showed that the highest crude fat content was found in treatment T2 and T3. This suggests that the addition of microbial fermentation can increase the fat content of the CPH.

Ash

The mean ash contents of the fermented CPH are listed in Table 1. The mean of the ash content of the CPH were 3.61 ± 0.06%; 2.99 ± 0.36%; 2.26 ± 0.37% and 2.20 ± 0.29%, for T0, T1, T2 and T3, respectively. Statistical analysis showed that the fermentation treatments affected the ash levels of the CPH significantly($P<0.01$).

The results showed that the the lowest ash content was found in the treatment of T2 and T3. While the highest ash content was found in T0 treatment. This suggests that the addition of microbial fermentation can reduce the ash content of the CPH.

CONCLUSION

It could be concluded that the addition of fungus Phanerochaete chrysosporium in fermentation of CPH decreased the lignin content of CPH.

REFERENCES

Alemawor, F., V.P. Dzogbefia, E.O.K. Oddoye and JJ.H. Oldham. (2009). Enzyme cocktail for enhancing poultry utilization of cocoa pod husk composition. *Scientific Research and Essay.* 4 (6) : 555-559.

Aregheore, E.M. 2002. Chemical evaluation and digestibility of cocoa (*Theobroma cacoa*) by product fed to goats. *Trop. Anim. Health and Production.* 34 : 339-348.

Association of Official Analytical Chemists. (2005). *Official Methods of Analysis.* 15th Ed. Association of Official Analytical Chemist, Washington, DC., USA.

Christensen, R. (1996). *Analysis of Variance, Design and Regression* : Applied Statistical Methods. Chapman and Hall. London

Lateef, A., Oloke, J.K., Kana, E.B.G., Oyeniyi, S.O., Onifade, O.R., Oyeleye, A.O., Oladosu, O.C., Oyelami, A.O. 2008. Improving the quality of agro-wastes by solid-state fermentation : Enhanced antioxidant activities and nutritional qualities. *DIG World J. Microbiol* . Biotechnol., DOI : 10.1007/s11274-008-9749-8. 24 : 2369-2374.

Suparjo, Wiryawan, K.G., Laconi E.B., dan Mangunwidjaja, D. (2009). Perubahan komposisi kimia kulit buah kakao akibat penambahan mangan dan kalsium dalam biokonversi dengan kapang Phanerochaete chrysosporium. *Media Peternakan* 32(3) : 203-210.