The 17th Asian-Australasian Association of Animal Production Societies Animal Science Congress

Proceedings

22-25 AUGUST 2016

CONGRESS VENUE: FUKUOKA JAPAN

www.aaap2016.jp
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.


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


Current 19 Member Societies of AAAP: ASAP(Australia), BHA(Bangladesh), CAAV(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

<p>| | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1980</td>
<td>Malaysia</td>
<td>S. Jalaludin</td>
<td>II</td>
<td>1982</td>
<td>Philippines</td>
<td>V. G. Arganosa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>1985</td>
<td>Korea</td>
<td>In Kyu Han</td>
<td>IV</td>
<td>1987</td>
<td>New Zealand</td>
<td>A. R. Sykes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>1990</td>
<td>Taiwan</td>
<td>T. P. Yeh</td>
<td>VI</td>
<td>1992</td>
<td>Thailand</td>
<td>C. Chantallakhana</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VII</td>
<td>1994</td>
<td>Indonesia</td>
<td>E. Soetirto</td>
<td>VIII</td>
<td>1996</td>
<td>Japan</td>
<td>T. Morichi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IX</td>
<td>2000</td>
<td>Australia</td>
<td>J. Ternouth</td>
<td>X</td>
<td>2002</td>
<td>India</td>
<td>P. N. Bhat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>XI</td>
<td>2004</td>
<td>Malaysia</td>
<td>Z. A. Jelar</td>
<td>XII</td>
<td>2006</td>
<td>Korea</td>
<td>I. K. Paik</td>
<td></td>
<td></td>
</tr>
<tr>
<td>XIII</td>
<td>2008</td>
<td>Vietnam</td>
<td>N. V. Thien</td>
<td>XIV</td>
<td>2010</td>
<td>Taiwan</td>
<td>L. C. Hsia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>XV</td>
<td>2012</td>
<td>Thailand</td>
<td>C. Kittayachaweng</td>
<td>XVI</td>
<td>2014</td>
<td>Indonesia</td>
<td>Yudi Guntara</td>
<td></td>
<td></td>
</tr>
<tr>
<td>XVII</td>
<td>2016</td>
<td>Japan</td>
<td>Seichi Koizumi</td>
<td>XVIII</td>
<td>2018</td>
<td>Malaysia</td>
<td>Loh Teck Chwen</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

AAAP is the equal opportunity organization
Copyright®: AAAP
Welcome Message

The 17th Animal Science Congress of AAAP will be held at Kyushu Sangyo University, Fukuoka, Kyusyu Area in Japan, from 22 to 25 August 2016. The aim of this congress is to provide a forum for the exchange of new information on animal sciences and technology, with a focus on successful strategies for the sustainable promotion of livestock considering the environment and welfare of livestock and human beings. At the same time, the congress will provide a venue for people from both inside and outside of the Asian Australasian region to make new contacts and renew friendships. Japanese Society of Animal Science is organizing the 17th AAAP Congress and is pleased to welcome everyone in this congress who is interested in animal science and production.

The venue of the congress, Fukuoka City, where tradition meets modernity, with delicious dishes and an excellent geographic location close to the Asian countries.

Prof. Mitsuhiro FURUSE
President of 17th AAAP
Committee Members

Mitsuhiro FURUSE  President
Seiichi KOIZUMI  Chair of Committee and Finance
Kei HANZAWA  Chair of Fund Raising, Public Relations, and Registration
Naomi KASHIWAZAKI  Chair of Accommodations & Tour
Masahiro SATOH  Chair of Program, Scientific Section and Publications
Koichi ANDO  Chair of Venue, Social Culture & Protocol, and Exhibition
Keitaro YAMANOUCHI  Secretary General

Naoshige ABE
Yoshikazu ADACHI
Ryozo AKUZAWA
Narito ASANUMA
Hisashi ASO
Takashi BUNGO
Hiroshi DOHI
Osamu DOI
Takafumi GOTOH
Tsutomu HASHIZUME
Satoshi HIDAKA
Kohzy HIRAMATSU
Hiroyuki HIROOKA
Toshiyoshi ICHINOHE
Masakazu IRIE
Yasuhiro KAWAMOTO
Tomoyuki KAWASHIMA
Kazuhiro KIKUCHI
Shinichi KOBAYASHI
Yasu KOBAYASHI
Tetsuo KUNIEDA
Hiroki MATSUI
Takashi MIYANO
Tetsuo MORITA

Takahiro NAGAI
Kunihiko NAITO
Yositaka NAKANISHI
Sueo NIIMURA
Takahiro NIKKI
Shotaro NISHIMURA
Takeyuki OZAWA
Hiroshi SASADA
Eimei SATO
Kazuhiro SHIMADA
Shigeru SHIOYA
Kunio SUGAHARA
Koji SUGIURA
Madoka SUTOH
Kenichi TAKEDA
Kumiko TAKEDA
Ryuichi TATSUMI
Yoshinori TERAWAKI
Atsushi TOYODA
Hiroko TSUKAMURA
Hitoshi USHIJIMA
Akira WATANABE
Nobuhiko YAMAUCHI
Tatsuyuki YOSHIDA

alphabetical order / titles omitted
# Outline of the congress

## Congress Name

The 17th Asian-Australasian Association of Animal Production Societies Animal Science Congress

## Theme

Strive toward Progress on Sustainable Animal Production Contribute to Environment and Welfare for Human and Livestock

## President

Mitsuhiro FURUSE (Professor, Animal & Marine Bioresource Sciences, Kyushu University)

## Date

22-25 August, 2016

## Venue

Kyushu Sangyo University  
hotel nikko fukuoka

## Official Website

http://www.aaap2016.jp/

## JAPANESE SOCIETY OF ANIMAL SCIENCE (JSAS)

201, Nagatani Corporas, Ikenohata 2-9-4, Taito-ku, Tokyo 110-0008, Japan  
FAX: +81-(0)3-3828-7649 / E-mail: support@jsas-org.jp

## Secretariat for AAAP2016

c/o Convention Linkage, Inc.  
2 Sanbancho, Chiyoda-ku, Tokyo 102-0075, Japan  
TEL: +81-(0)3-3263-8695 / E-mail: aaap2016@c-linkage.co.jp
Acknowledgements

Supporting Organizations

Association of Japanese Agricultural Scientific Societies
Fukuoka City
Fukuoka Prefecture
Fukuoka Veterinary Medical Association
Hokkaido Society of Livestock and Grassland Science
Hokushinetsu Society of Animal Science
Japan Embryo Transfer Society
Japan Ethological Society
Japan Poultry Science Association
Japan Society for Immunology of Reproduction
Japan Society of Reproductive Endocrinology
Japan Veterinary Medical Association
The Japanese Society of Animal Breeding and Genetics
Japanese Society for Applied Animal Behaviour
Japanese Society of livestock management
The Japanese Society of Swine Science
The Japanese Society of Veterinary Science
Kansai Animal Science Society
Kanto Society of Animal Science
Kyushu Sangyo University
Kyushu University
SCIENCE COUNCIL OF JAPAN
Society of Beef Cattle Science
The Society for Reproduction and Development
Tohoku Animal Science and Technology Society
TOKAI SOCIETY OF ANIMAL PRODUCTION
Warm Regional Society of Animal Science, Japan

Foundations

Fukuoka Prefecture
Fukuoka City
The Ito Foundation
JAPAN SOCIETY FOR THE PROMOTION OF SCIENCE

Grant-in-Aid for Publication of Scientific Research Results (JP16HP0305)
## Sponsors

**Silver Sponsor**

National Federation of Agricultural Cooperative Associations (ZEN-NOH)

[![ZEN-NOH](image)](image)

**Bronze Sponsor**

The National Federation of Dairy Co-operative Associations
NH Foods Ltd.
NIPPON ZENYAKU KOGYO CO., LTD.
Sumitomo Chemical Co., Ltd.
YPTECH CO., LTD.

[![ZEN-Raku-Ren](image)](image)
[![Nipponham](image)](image)
[![SUMITOMO CHEMICAL](image)](image)
[![YPTECH CO., LTD.](image)](image)

## Exhibitors / Advertisements / Contributions

Reprolife Corporation
Faculty of engineering Department of applied chemistry and biochemistry Kyushu Sangyo University
Meiji Seika Pharma Co., Ltd.
Sermas co., ltd.
Kyushukyodosyokuniku Co. Ltd.
Japan Racing Association
Alltech Japan
WILEY
All In One, Inc.
Evonik Japan Co., Ltd.
Morinaga Milk Industry Co., Ltd.

Den-en Shuzo Co.,Ltd.  Mizuhogiku Shu-jo Co.
Hombo Shuzo Co., Ltd.  Taikai Shuzo Co., Ltd.
KIRISHIMA SHUZO Co.,Ltd.  Unkai Shuzo Co.,Ltd.
Komasa Jyozo Co.,Ltd  YACHIYODENSYUZOU CO. LTD.
# List of collaborators

**Fukuoka Prefecture**
- Osamu IDE
- Kazuhiro IMAMURA
- Kazuki ISHIBASHI
- Yoshihiro ISOZAKI
- Motoyuki MAEDA
- Hiroyuki MATSUO
- Yuiko MORINAGA
- Masahiro NAGANO
- Seiji NAGASUE
- Kazuhiisa NAKAMURA
- Sumiko NATSUAKI
- Hiroaki RYU OU
- Seitarou SHIKITA
- Hitomi SHIRAKAWA
- Tomitarou TAKATA
- Katsuyuki YAMASHITA

**Kyushu University**
- Vishwajit S.Chowdhury
- Fuminori KAWABATA
- Mako NAKAMURA
- Yutaka NAKANO
- Wataru MIZUNOYA
- Masataka SHIMOJO
- Tomoki SOH
- Hideyuki TAKAHASHI
- Shinobu YASUO

**Kyushu Sangyo University**
- Koichi ANDO

**Ministry of Agriculture, Forestry and Fisheries**
- Keiji FUSHI MI

**University of Miyazaki**
- Seiji IEIRI
- Yasuyuki ISHII
- Genki ISHIGAKI
- Tetsuo MORITA
- Tomonori NAKANISHI
- Toshihiro TAKAHASHI
- Manabu TOBISA
- Tadaaki TOKUNAGA
- Yasuhiro TSUZUKI

**Kagoshima University**
- Yoshitaka NAKANISHI
- Ichiro OSHIMA
- Koji TAKAYAMA

**University of the Ryukyus**
- Yoshimi IMURA

alphabetical order / titles omitted
Oral Session 33: Animal Nutrition (Ruminants) (3)

Thursday, 25 August 11:00-13:00 Room N302

Chair: Pin Chanjula Prince of Songkla University

O-33-1 In vitro digestibility of fermented rice straw supplemented with cassava tuber and leaves using ruminal fluid of Bali cattle
Cuk Tri Noviandi, Zazin Mukmila, Ristianto Utomo, Subur Priyono Sasmito Budhi, Ali Agus, Andriyani Astuti
Faculty of Animal Science, Universitas Gadjah Mada, Indonesia

O-33-2 Rumen contents from slaughter house as alternative feed for replacing forage in ruminant diets
Ristianto Utomo1, Lies Mira Yusiati1, Cuk Tri Noviandi1, Aryogi2, Isnandar1
1Faculty of Animal Science, Universitas Gadjah Mada, Indonesia, 2Indonesian Beef Cattle Research Station, Indonesia

O-33-3 Influences of Parts of Frond Ensilage and Pelleting Methods on Chemical Physical and Degradability of Pellet Ensiled Oil Palm Frond
Ongarge Insung
Rajamangala University of Technology Srivijaya

O-33-4 Voluntary feed intake, rumen fermentation and microbial protein synthesis of beef cattle fed fermented cassava starch residue
Ruanyote Pilajun1
1Department of Animal Science, Faculty of Agriculture, Ubon Ratchathani University, Thailand

O-33-5 The influence of sowing date and trellising on the flowering of some promising herbaceous legumes for eastern Indonesia
Jacob Nulik1,2, Evert Hosang3, Debora Kana Hau4, Yanto Liunokas5, Yendri Aby5, Yakobus Uran5, Kendrick Cox2
1Department of Agriculture and Fisheries (Queensland), 2Departemen Pertanian Balai Pengkajian Teknologi Pertanian-NTT (BPTP-NTT)

O-33-6 BIOCONVERSION OF COCOA POD HUSK THROUGH FERMENTATION WITH MOL RUMEN CONTENT AS RUMINANT FEED
Nurhaita Nurhaita, Defiani Neli, Sullasih Sullasih
Muhammadiyah University of Bengkulu

O-33-7 Nutrients Quality of Fermented Complete Feed Based on By-Product of Sago (Metroxylon sp.) and Cassava (Mannihot esculenta Cranz)
Masitah Siti, Utomo Ristianto, Noviandi Cuk Tri
Faculty of Animal Science Gadjah Mada University

O-33-8 Improving Rice Straw Quality by Treated with Monosodium Glutamate by-Product (MSGB) for Ruminant Diets
Phongthorn Kongmun, Sittisak Kongsin, Nuttareakha Polsiri, Somkiet Prasanpanich, Kanokporn Pounpung, Choawit Rakangthong, Chaiyapoom Bunchasak, Wiriya Loongyal, Theerawit Poeikhampa
Department of Animal Science, Faculty of Agriculture, Kasetsart University, Thailand
Nutrients Quality of Fermented Complete Feed Based on By-Product of Sago (Metroxylon sp.) and Cassava (Mannihot esculenta Cranz)

Siti Masitah, Ristianto Utomo, Cuk Tri Noviandi
Faculty of Animal Science, Universitas Gadjah Mada, Indonesia

INTRODUCTION
Sago (Metroxylon sp.) was grown in the tropics and well-adapted on peat and swampy soil (Melling et al., 2005). The largest supply of sago comes from the South East Asia, particularly Indonesia and Malaysia. The trunk of sago tree may reach 3 to 5 cm in diameter at 24 months and may grow until 20 m tall (Bintoro et al., 2010). The main product of sago is the starch, which is extracted from the spongy center of sago's trunk and produced sago dregs as the by-product. Another by-product from sago is the leaves. In the past, sago leaves were commonly used to make roof, but nowadays people do not use sago roof anymore, thus the leaves were throw away and considered as waste.

Cassava (Mannihot esculenta Cranz) is another main agricultural product in Indonesia. Cassava mainly planted for its tuber, and left the leaves as by-product. Cassava tuber is a good energy source, while the leaves contain high crude protein (CP) which is ranged from 20 to 36% (Askar, 1996). Leaves of sago and cassava may be used as fiber sources in ruminant feeding, while sago dregs and cassava tuber can used as energy source.

In this study, the fermented complete feeds were formulated based on sago and cassava by-products. The purpose of this study was to formulate good fermented complete feeds made from sago and cassava by-products, thus the by-products of sago will be able to be used as feed for ruminants.

MATERIALS AND METHODS
Materials used in this research were: sago leaves, sago trunk, sago dregs, cassava tuber, and cassava leaves. All materials were dried directly under the sunlight until dry and the weight was constant. The materials were mixed into four complete feed based on their nutrient composition (Table 1) as follow: AS (sago leaves + sago dregs + cassava leaves), BS (sago leaves + grated sago trunk + cassava leaves), KP (sago leaves + cassava tuber + cassava leaves), and ASKP (sago leaves + sago dregs + cassava tuber + cassava leaves). All complete feeds were conditioned to reach water content of 65% (Sapienza and Bolsen, 1993), wrapped in airtight polyethylene plastic, and then stored for 21 days (Jaelani et al., 2014).

In the end of fermentation stage, all fermented complete feeds were analyzed for DM, CP, CF, EE, and ash (AOAC, 2005). The pHs of fermented complete feeds were tested by mixing samples with distilled water in 1: 10 ratio (Nahm, 1992). Ammonia determination of fermented complete feeds was done as explained by Chaney and Marbach (1962).

All data were analyzed using analysis of variance by following completely randomized design using SPSS ver. 16 software. If the results were significantly different, the analysis continued with Duncan’s new multiple range test (Steel and Torrie, 1960).

RESULTS AND DISCUSSION
The pH, NH₃ concentrations, and nutrient compositions of fermented complete feed formulated based on sago and cassava by-products are presented in Table 2 and 3.

The pH of fermented complete feed in this study was ranged from 4.76 to 5.37 (Table 2). According to McDonald et al. (1984), the optimal pH for silage was ranged from 3.8 to 4.4. In this study, the relatively high pH is due to that the fermented materials were complete feed, instead of silage. Therefore, pH of fermented complete feed cannot as low as pH of silage due to fermented complete feed consisted of soluble and structural carbohydrates as well as protein source that formulated to meet 12 - 13% of CP content. Furthermore, the addition of cassava leaves as protein source resulted in high buffering capacity of the feed, which caused the pH could not decrease to below 4.4 as that in the ensilage process. Previous researchers reported that feed with protein content more than 10% resulted in higher pH than the optimal pH for fermentation due to its high buffering capacity (McDonald, 1995 Angthong et al., 2007).

The pH of the AS and ASKP were higher than those on the BS and KP (5.37 and 5.03 vs. 4.76 and 4.90,
respectively \( P<0.05 \) Table 2). The high \( \text{pH} \) of the AS and ASKP was due to the addition of sago dregs in the AS as well as the mixtures sago dregs and cassava tuber in the ASKP did not provide enough rapidly degraded carbohydrates for microbes, thus the fermentation process did not optimum that lead to low lactic acids and acetic acids production, and resulted with the high \( \text{pH} \) of the AS and ASKP. Jaster and Moore (1988) reported that when fermentation process was not going well, it resulted in generating low amount of organic acids, thus the \( \text{pH} \) at the end of fermentation were higher.

Compared to the BS and KP, \( \text{NH}_3 \) concentrations of the AS and ASKP were greater (13.4 and 14.0 mg/dL, respectively \( P<0.05 \) Table 2). The great \( \text{NH}_3 \) concentrations of the AS and ASKP indicate that a secondary fermentation has occurred (Chamberlain and Wilkinson, 1996), which is related to the high \( \text{pH} \) of those fermented complete feeds (5.37 and 5.03, respectively, Table 2). The high \( \text{pH} \) caused proteolytic activity of microbes that convert proteins of complete feed into amino acids, and the N of amino acid formed into \( \text{NH}_3 \). Protein in feed might be used by microbes to form N of amino acids in feed, which caused \( \text{NH}_3 \) formation. Proteolysis process would occur during the fermentation if the optimum \( \text{pH} \) could not be reached (Sun et al., 2009 Kung et al., 2010). Low \( \text{pH} \) in the silage inhibits bacteria to perform proteolysis protease activity will take place optimally when the fermentation \( \text{pH} \) reached 4 - 7 (Slottner and Bertilsson, 2006).

Crude protein content of the KP was greater than that of the ASKP (12.4 vs. 11.0%, respectively \( P<0.05 \) Table 3), but did not differ with the AS and BS. The low CP content of the ASKP was due to the high rate of feed protein hydrolysis that occurred during fermentation process. The hydrolyzed feed protein formed \( \text{NH}_3 \), which reflected by greater \( \text{NH}_3 \) concentration of the ASKP compared to the KP (48.3 vs. 14.0 mg/dL, respectively, \( P<0.05 \) Table 2).

Crude fiber content of all fermented complete feeds did not differ, and ranged from 20.8 to 23.0% (Table 3). High fiber of sago leaves and cassava leaves are difficult to be digested and utilized by livestock, thus the ruminal degradation would be slow. Based on the CF content, the nutrient quality of fermented complete feed in this study was relatively low. Lubis (1992) reported that high CF content can limit the digestion of OM, thus the feed digestibility would be low.

Total digestible nutrients of the BS and KP were greater than those of the AS and ASKP (67.5 and 66.0% vs. 64.1 and 63.3%, respectively \( P<0.05 \) Table 3). The lower TDN of the AS and ASKP was due to the pH of those fermented complete feeds could not go down well. Higher pH in both treatments caused the activity of starch digester bacteria could not be inhibited and caused sugar were hydrolyzed.

**CONCLUSION**

The results of this study showed that the BS and KP had the lowest \( \text{pH} \) and \( \text{NH}_3 \), and also had greater CP and TDN contents than the other fermented complete feeds. Thus, it can be concluded that grated sago trunk and cassava tuber addition as energy source increase the nutrient quality of fermented complete feed.

**ACKNOWLEDGMENT**

This study has been financially supported by Lembaga Pengelola Dana Pendidikan (LPDP) Scholarship from Ministry of Finance, Republic of Indonesia.

**KEYWORD:** Sago dregs, Sago trunk, Cassava tuber, Cassava leaves, Fermented complete feed
Table 1. Nutrient composition (%) of sago leaves, sago dregs, grated sago trunk, cassava tuber, and cassava leaves

<table>
<thead>
<tr>
<th>Items</th>
<th>Dry matter</th>
<th>Crude protein</th>
<th>Crude fiber</th>
<th>Ether extract</th>
<th>Ash</th>
<th>TDN¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sago leaves</td>
<td>60.7</td>
<td>9.11</td>
<td>36.0</td>
<td>5.53</td>
<td>7.29</td>
<td>50.1</td>
</tr>
<tr>
<td>Sago dregs</td>
<td>35.2</td>
<td>0.76</td>
<td>13.1</td>
<td>0.27</td>
<td>4.53</td>
<td>85.6</td>
</tr>
<tr>
<td>Grated sago trunk</td>
<td>41.0</td>
<td>1.49</td>
<td>10.4</td>
<td>1.08</td>
<td>4.17</td>
<td>77.2</td>
</tr>
<tr>
<td>Cassava tuber</td>
<td>30.8</td>
<td>1.83</td>
<td>3.40</td>
<td>3.22</td>
<td>3.74</td>
<td>82.4</td>
</tr>
<tr>
<td>Cassava leaves</td>
<td>30.9</td>
<td>24.5</td>
<td>18.8</td>
<td>4.70</td>
<td>5.89</td>
<td>65.3</td>
</tr>
</tbody>
</table>

¹ Calculated based on formula in Harris et al. (1972) cit. Utomo (2012).

Table 2. pH and NH₃ concentrations (mg/dL) of fermented complete feed based on sago and cassava by-products

<table>
<thead>
<tr>
<th>Treatments</th>
<th>pH</th>
<th>NH₃</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS</td>
<td>5.37&lt;sup&gt;c&lt;/sup&gt;</td>
<td>35.6&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>BS</td>
<td>4.76&lt;sup&gt;a&lt;/sup&gt;</td>
<td>13.4&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>KP</td>
<td>4.90&lt;sup&gt;a&lt;/sup&gt;</td>
<td>14.0&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>ASKP</td>
<td>5.03&lt;sup&gt;b&lt;/sup&gt;</td>
<td>48.3&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a,b,c</sup> Means in the same column with different superscripts differ at P<0.05.

Table 3. Nutrient compositions (%) of fermented complete feed

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Dry matter</th>
<th>Crude protein</th>
<th>Crude fiber</th>
<th>Ether extract</th>
<th>Ash</th>
<th>TDN¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS</td>
<td>58.2</td>
<td>12.1&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>23.0</td>
<td>3.96</td>
<td>5.71</td>
<td>64.1&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>BS</td>
<td>58.0</td>
<td>12.0&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>21.1</td>
<td>4.05</td>
<td>5.25</td>
<td>67.5&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>KP</td>
<td>58.6</td>
<td>12.4&lt;sup&gt;b&lt;/sup&gt;</td>
<td>20.8</td>
<td>4.11</td>
<td>4.55</td>
<td>66.0&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>ASKP</td>
<td>57.4</td>
<td>11.0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>21.4</td>
<td>4.42</td>
<td>5.51</td>
<td>63.2&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a,b</sup> Means in the same column with different superscripts differ at P<0.05.

¹ Calculated based on formula in Harris et al. (1972) cit. Utomo (2012).
REFERENCES


CERTIFICATE OF PRESENTATION

This is to certify that

Siti Masitah
Ristianto Utomo
Cuk Tri Noviandi

made an oral presentation on the following paper at

the 17th Asia-Australasian Association of
Animal Production Society Animal Science Congress
held in Fukuoka, Japan from 22 to 25 August 2016

Nutrients Quality of Fermented Complete Feed Based on By-
Product of Sago (Metroxylon sp.) and Cassava (Mannihot
esculenta Cranz)
(O-33-7)

Mitsuhito Furuse, Ph.D.
President of the 17th AAAP Animal Science Congress