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

Proceedings
Full Papers

10-14 November 2014, Yogyakarta, INDONESIA

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

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The 16th AAAP Congress

Cataloguing-in-Publication Data

The 16th Asian-Australasian Associations of Animal Production Socities

Proceedings Full Papers

Sustainable Livestock Production in the Perspective of

Food Security, Policy, Genetic Resources, and Climate Change

10-14 November 2014, Yogyakarta, Indonesia / editors Subandriyo *et al*;

2825 p: ill.; 21 x 29,7 cm

Organized by Indonesian Society of Animal Sciences

In Collaboration with Ministry of Agriculture

Faculty of Animal Sciences Universitas Gadjah Mada

ISBN 978-602-8475-87-7

1. Livestock 2. Food Security 3. Policy

4. Genetic Resources 5. Climate Change

I. Title II. Subandriyo

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. http://www.ajas.info) 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

PREFACE

The proceedings of the 16th Congress of the Asian-Australasian Association of Animal Production Societies (AAAP) held on 10-14 November 2014 at Grha Sabha Pramana, Universitas Gadjah Mada, Yogyakarta, Indonesia, consist of two volumes. Those are Volume I of Plenary and Invited Papers and Volume II of Abstracts Contributed Papers. This is the second volume of the proceedings that contains a total of 754 abstracts, consist of 368 papers for oral presentation and 386 papers for poster. Papers were categorized into various disciplines, such as Nutrition and Feed Technology; Genetics and Reproduction; Physiology, Animal Welfare and Health Management; Product Technology and Food Safety; Waste and Environmental issues; Forage Agrostology; as well as Agribusiness, Marketing, Extension and Community Development. The scientific committee has initially received a total of 1,028 abstracts from 42 countries. After reviews have been made, 60 of them were rejected and 74 were cancelled by the authors. The reviewers consist of 4 international and 71 internal reviewers from 6 universities and 1 research institute in Indonesia. In the interest of time limitation for proceedings publication, we apologize for not including 140 submitted abstracts in the proceedings since they were not being followed up with full manuscripts until the extended due date we offered.

The scientific committee would like to thank all the reviewers and appreciate their effort to make significant contribution in reviewing the full manuscripts. Similarly, we would also like to thank supporting staffs at the secretariat office of the Faculty of Animal Science, Universitas Gadjah Mada as well as of the Indonesian Center for Animal Research and Development who have helped in the preparation of the proceedings. Finally, we would like to thank all the authors for their valuable contribution to the congress and make it useful for our societies.

Editorial Team

CONTENTS

ORAL PRESENTATION

POSTER PRESENTATION

Characteristics of Garut Lamb Fed Ration Containing Sunflower Seed Oil

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ABSTRACT

Sunflower seed oil (SSO) is a source of essential fatty acid, linoleic fatty acid, known has a good effect on reproductive performance, but the information about its effect on lamb quality of local sheep is still limited. This research was conducted to evaluate effect of SSO as a source of linoleic fatty acid in ration on local lamb characteristics. Six male Garut sheep about 2 mo old were devided into 3 group of ration treatments: without SSO (control), SSO 4%, and SSO 6%, with each two replications. The study was arranged in complete random design and analysed descriptively. After 3 mo feeding treatment, physical (water holding capacity, tenderness, and cooking losses) and chemical (pH, moisture, fat content, and thiobarbituric acid reactive substances/TBARS value) characteristics of lamb samples were analyzed. The result showed that the pH value and water holding capacity (WHC) of lamb fed ration containing SSO were higher than control. On the contrary, SSO treatment resulted in lower cooking loss than control without effect on tenderness of lamb. The SSO treatments in this research didn't result in high potency rancidity on lamb indicated by low TBARS values. In conclusion, the use of 4% and 6% of SSO on ration give a good effect on lamb characteristics with low rancidity potency.

Key Words: Garut lamb, Sunflower seed oil, Lamb characteristic

INTRODUCTION

Sunflower seed oil (SSO) is a source of essential fatty acid, linoleic fatty acid (Jeronimo et al. 2009), known has a good effect on reproductive performance since it is a substrate for the synthesis of PGF2α (Funston 2004). Jeronimo et al. (2009) reported that sunflower oil resulted higher conjugated linoleic acid content of lamb than linseed oil. The use of sunflower seed had no effect on growth performance, carcass characteristics (Santos-Silva et al. 2003; Badee and Hidaka 2013), pH, colour, WHC, WBSF and sensorial attributes (Santos-Silva et al. 2003) of lamb. The information about effect of SSO on lamb meat quality of local sheep including lamb fat is still limited. This research was conducted to evaluate effect of SSO as a source of linoleic fatty acid in ration on Garut local lamb characteristics.

MATERIALS AND METHODS

Experimental sheep, feed, and sample preparation

Six male Garut sheep about 2 mo old were fed ration concentrate with different level SSO as source of linoleic acid fatty acid (Table 1) and the same level of grass *Brachiaria humidicola*.Nutrient composition diets was shown in Table 2. Water and diets were given*ad libitum*.The sheepwere devided into 3 group of ration treatments: without SSO (control), 4% SSO, and 6% SSO, with each two replications. The study was arranged in complete random design and analysed descriptively.The sheep were slaughtered after 3 mo feeding treatment.Samples for physical and chemical analyses were prepared from *Longissimi thoracis et lumborum* muscle of left carcass.

Table 1. Composition of concentrate rationswith different level of sunflower seed oil

Diets Component	Ration Treatment[a]		
	R0	R1	R2
	---------- %DM[b] ----------		
Cassava meal	34.3	30.1	27.6
Coconut meal	57.1	57.1	57.1
Soyabean meal	6.4	6.4	6.6
Sunflower seed oil	0.0	4.0	6.0
$CaCO_3$	0.7	0.7	0.7
Salt	0.7	0.7	0.7
Premix	0.7	0.7	0.7

Note:[a]R0 = rationwithout sunflower seed oil (control);R1= ration with 4% sunflower seed oil; R2 = ration with 6% sunflower seed oil; DM[b]= dry matter.

Table 2. Nutrient composition of concentrate ration with different level of sunflower seed oiland grass[a]

Nutrient	Feed Treatment			
	Concentrate Ration[b]			Grass*(Brachiari ahumidicola)*
	R0	R1	R2	
	---------- %DM[c] ----------			
Dry mater	86.99	87.00	87.16	20.81
Crude protein	21.40	19.95	20.41	12.88
Ether extract	3.79	7.49	8.05	0.76
Crude fiber	7.59	8.13	8.64	33.20
NFE[d]	60.80	58.02	57.26	45.86
TDN[e]	70.00	73.00	74.00	55.01
Ca	0.97	1.07	0.98	0.63
P	1.07	0.89	0.88	0.35

Note: [a]Analysed by Laboratory Feed Science and Technology, Bogor Agricultural University (2012); [b]R0 = rationwithout sunflower seed oil (control);R1= ration with 4% sunflower seed oil; R2 = ration with 6% sunflower seed oil; DM[c] = dry matter; NFE[d] =nitrogen free extract; TDN[e] = total digestibility nutrient.

Variable analyses

Variables analysed covered pH value, water holding capacity (WHC), tenderness, cooking loss, moisture, fat content and potential rancidity. Value of pH was measured using meat pH meter Hanna HI 99163 (Romania, Europe). WHC was determined using Hamm method represented as percentage of free water of 0.3 g lamb pressed between 2 pieces of Whatman 41 by 35 kg force for 5 min. Tenderness was determined using Warner-Bratzler shear force (WBSF) method represented as kg/cm^2. WBSF and cooking loss were evaluated following procedure as described by Suryati*et al*. (2004c). Moisture and fat content of lambs were analysed accordingto AOAC procedure (2005). Potential rancidity was determined using thiobarbituric acid rective substances (TBARS) analysis procedure as described by Sorensen and Jorgensen (1996), and it samples preparation using modified destilation method as described by Suryati et al. (2014a). TBARS value was determined using 1,1,3,3-tetraethoxypropane (TEP) purchased from Sigma (Sigma Aldrich Co., USA)as standard and it was represented as mg MDA/100 g samples.TBA compound was purchased from Merck (Merck KGaA, Germany).

RESULT AND DISCUSSION

The pH value and WHC of lamb fed ration containing SSO at level 4% and 5% were higher than control (Tabel 3), but still in normal pH range of meat (5.3-5.8) (DSN, 1995). WHC indicated by percentage of free water had negative correlation with cooking loss, except for treatment 4% level of SSO. The higher percentage of free water indicated the lower WHC.Cooking loss of lamb treated by ration with SSO at level 4% and 6% were lower than

control (Tabel 3).The level of SSOtreatment had no effect on tenderness (Tabel 3).The tenderness of lamb in this trial ranged from 3.35 to 3.40 kg/cm^2. This result was in line with previous study demonstratedthat the use of n-6 fatty acids source had noeffect on meat tenderness (Santos-Silva et al.2003;Jeronimo et al.2009). Suryati et al. (2008b) reported that WBSF ranged from 3.3 to 5 kg/cm^2 was tender category range, thus the WBSF of lamb in this trial was catagorized tender.This phenomenon was probably caused by the age of lambsthat were still under 6 mo correlated with less of connective tissue and enzymatic activity, such calpain and calpastatin (Veiseth et al. 2004).

Table 3. Physical characteristics of lamb fed ration concentrate containing different level of sunflower seed oil

Variables	Ration Treatment[a]		
	R0	R1	R2
Meat pH	5.30±0.22	5.84±0.16	5.86±0.08
Percentage of free water (%)	35.44±7.70	30.56±6.25	32.83±0.80
WBSF[b] (kg/cm^2)	3.35±0.35	3.40±1.13	3.35±0.49
Cooking loss (%)	36.91±0.45	34.43±1.98	32.50±4.02

Note:[a]R0 = rationwithout sunflower seed oil (control);R1= ration with 4% sunflower seed oil; R2 = rationwith 6% sunflower seed oil; [b]WBSF = Warner-Bratzler shear force.

The use of 4% and 6% SSO level in concentrate ration increased moisture and fat content of lamb (Table 4). These indicated that the fat catabolism and anabolism in lamb fed ration containing SSO in this study were higher than control. The high fat catabolism was indicated by high lamb moisture content as a result of fatty acid oxidation, and the high fat anabolism was indicated by high lamb fat content. The high fat metabolism rate in this case was correlated with fast growth phase of young lamb (under 5 mo). Although the lamb fed ration containing SSO contained high fat, the oxidation rate of lamb was still lower than control (Table 4). This was indicated by lower TBARS value reflecting potential rancidity (Campo et al. 2006). The high WHC in lamb treated by SSO probably inhibited oxidation process depended on free water to hydrolize fatty acid from triglyceryde as an early phase of oxidation.

Generally, the use of ration concentrate containing SSO was increased pH value, WHC, and decreased cooking loss, without resulted tough lamb. This treatment also increased moisture and fat content without increased potential rancidity. This experiment suggested that the use of SSO at 4% and 6% level in the ration gave good characteristics of lamb under 5 mo old.

Table 4. Chemical characteristics of lamb fed ration concentrate containing different level of sunflower seed oil

Variables	Ration Treatment[a]		
	R0	R1	R2
Moisture (%)	70.14±2.33	70.74±3.01	75.64±0.48
Fat (%)	3.31±1.19	4.81±0.11	4.23±0.91
TBARS value[b] (mg /100g)	4.087x10^{-3}	3.724x10^{-3}	3.403x10^{-3}

Note: [a]R0 = rationwithout sunflower seed oil (control);R1= ration with 4% sunflower seed oil; R2 = rationwith 6% sunflower seed oil; [b]TBARS =thiobarbituric acid reactive substances.

CONCLUSION

In conclusion, the use of 4% and 6% of SSO on ration give a good effect on lamb characteristics with low rancidity potency.

REFERENCES

Association of Official Analytical Chemists (AOAC). 2005. Official Methods ofAnalysis of the Association of Official Analytical Chemists. Washington D.C: Agricultural Chemistry.

Badee, G and S. Hidaka. 2013. Growth performance, carcass characteristic, fatty acid composition, and CLA concentration of lambs fed diets supplemented with different oil source. Anim. Sci. J. 85(2):118-126. (Abstr).

Campo, M. M., G. R. Nute, S. I. Hughes, M. Enser, J. D. Wood and R. I. Richardson. 2006. Flavour perception of oxidation in beef. Meat Sci. 72:303-311.

Dewan Standardisasi Nasional (DSN). 1995. Daging Kambing/Domba. *SNI* 01:3948. Dewan Standardisasi Nasional. Jakarta.

Funston, R. N. 2004. Fat supplementation and reproduction in beef females.J. Anim. Sci. 2004. 82(E. Suppl.):E154-E161.

Jerónimo, E., S. P. Alves, J. A. M. Prates, J. Santos-Silva and R. J. B. Bessa. 2009.Effect of dietary replacement of sunflower oil with linseed oil on intramuscularfatty acids of lamb meat. Meat Sci. 83:499-505.

Santos-Silva, J., R. J. B. Bessa and I. A. Mendes. 2003. The effect of suplementation with expanded sunflower seed oil seed on carcass and meat quality of lambs raised on pasture. Meat Sci. 65(4):1301-1308.

Sorensen, G andS. Jorgensen. 1996. A critical examination of some experimentalvariables in the 2-thiobarbituric acid (TBA) test for lipid oxidation in meatproducts. Z Lebensem Unters Forsch. 202:205-210.

Suryati, T., M. Astawan, H. N. Lioe, T. Wresdiyati and S. Usmiati. 2014a. Nitrite Residue and Malonaldehyde Reduction in *Dendeng* - Indonesian Dried Meat – Influenced by Spices, Curing Methods and Precooking Preparation. Meat Sci. 96(3):1403-1408.

Suryati, T., I.I. Arief and B.N. Polii. 2008b.Korelasi dan kategori keempukan daging berdasarkan hasil pengujian menggunakan alat dan panelis. J. Anim. Prod. 10(3):188-193.

Suryati, T., M. Astawan and T. Wresdiyati. 2004c. Sifat Fisik Daging Domba yang Diberi Stimulasi Listrik Voltase Rendah dan Injeksi Kalsium Klorida. Med. Pet. 27(3):88-100.

Veiseth, E., S. D. Shackelford, T. L. Wheeler, M. Koohmaraie. 2004. Factor regulating lamb longissimus tenderness are affected by age at slaughter. Meat Sci. 68:635-640.