



# The 6<sup>th</sup> ISTAP International Seminar on Tropical Animal Production

“Integrated Approach in Developing Sustainable Tropical Animal Production”

# PROCEEDINGS

October 20-22, 2015  
Yogyakarta Indonesia

ISBN: 978-979-1215-26-8



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Faculty of Animal Science, Universitas Gadjah Mada Yogyakarta, Indonesia, 2015



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## PREFACE

On behalf of Faculty of Animal Science, Universitas Gadjah Mada, I am pleased to present you the 6th International Seminar on Tropical Animal Production (ISTAP) which is held on October 20 – 22, 2015 at Auditorium drh. Soepardjo, Faculty of Animal Science UGM, Yogyakarta. Under the main theme “Integrated Approach in Developing Sustainable Tropical Animal Production”, we expect that information and ideas on animal production systems in the tropics and its related problems will be shared among participants, thus we can elaborate an integrated approach in developing sustainable tropical animal production. I believe, this can be achieved since more than 250 animal scientists, researchers, students, and producers from more than 15 countries join this seminar.

In this moment, I have to address my great thanks to all people who have contributed for the success of this seminar. First, to all participants, thank you for your contributions, time, and efforts in participating in all sessions in this seminar. We also would like to extend our gratitude to the reviewers and editors for dedicate their expertise and precious time in reviewing and editing the papers. I deeply appreciate the hard work of all members of the Steering Committee, Organizing Committee, and students of Faculty of Animal Science UGM for making this seminar achieved a great success!

I hope all of you enjoy the seminar and Jogja as well!

Dr. Cuk Tri Noviandi

Editor in Chief

## REPORT FROM ORGANIZING COMMITTEE

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

Praise be to The Almighty for His Merciful and Beneficent to raise up this memorable moment for all of the scientists and delegates from all over the world who were interested in Animal Science field to meet up together.

On behalf of all the members of Board Committee, it is my great pleasure and honor to welcome all of you and impress thankful, and present a high appreciation for your participation in joining the 6<sup>th</sup> ISTAP 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 seminar.

During this event, we have distinguished scientists from all over the world to present plenary papers Livestock Management, Production, and Environment; Feed, Land, and Landscape for Sustainable Animal Production; Livestock Industry and Technology; Economics, Social, and Culture in Livestock Development; and Special issue on Halal Food, Safety and Regulation. It is noted that around 200 scientists as well as livestock producers, companies, graduate and postgraduate students from 15 countries attend the seminar; and more than 160 research papers will be presented. We can see 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.

The 6<sup>th</sup> ISTAP Program consists of scientific and technical programs as well as social and cultural activities. The scientific and technical programs offer 4 plenary sessions, field trip, and many scientific sessions (both oral and poster presentation). The social and cultural programs of the 6<sup>th</sup> ISTAP are very important as the scientific and technical programs since the promotion of friendship and future scientific cooperation are also central to this seminar. Opening Ceremony offers you the Seminar Program a glance. Participants will attend a warm invitation from Dean Faculty of Animal Science UGM in a Welcome Dinner that will give you the most memorable moment to attend. Field trip activity offers a wonderful sightseeing to the most spectacular natural landmark in Yogyakarta, Merapi Lava Tour and Ulen Sentalu Museum. We do hope that you will not miss any of these wonderful opportunities.

Closing Ceremony will be held on October 22<sup>nd</sup>, 2015, immediately after the last session of presentation. The 6<sup>th</sup> ISTAP award will be announced for some participant as an appreciation for their valuable research.

Finally, on behalf of 6<sup>th</sup> ISTAP Committee, I 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 in the seminar.

High appreciation I may acknowledge to the Rector of Universitas Gadjah Mada and Dean Faculty of Animal Science UGM, who have concerned to facilitate the seminar site host.

Special thank to the Steering Committee, Scientific Committee, Reviewers and Editorial Boards for their great contribution to make the seminar successfully organized.

*Terima kasih* (Thank you).

Sincerely Yours,

Prof. I Gede Suparta Budisatria, Ph.D

Chairman

The Organizing Committee of the 6<sup>th</sup> ISTAP



## WELCOME ADDRESS

*Selamat pagi* (Good morning)

Dear Rector of Universitas Gadjah Mada, all of Invited Speakers, honorable guests, all of delegates, participants, distinguished guests, Ladies and Gentlemen

Attendants of The 6th ISTAP,

It is my great pleasure and honor to extend a warm welcome to all of you at The 6<sup>th</sup> International Seminar on Tropical Animal Production, which be held on October 20 – 22, 2015 at Auditorium drh. Soepardjo, Universitas Gadjah Mada, Yogyakarta Indonesia. This seminar is proudly organized by Faculty of Animal Science Universitas Gadjah Mada.

The contribution of this seminar to the development of national food security is truly significant for introducing of new scientific knowledge and equipments that is much needed in Indonesia to maintain a safe and secure environment and to look at more effective ways to meet future challenges. We can see great enthusiasm of the entire participant to present their latest research as well as to share valuable information and knowledge for human prosperity all over the world.

In these 3 days of seminar, 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.

Finally, on behalf of Faculty of Animal Science, we would like to extend our sincere gratitude to the Minister of Rural, Rural Development, and Transmigration, Republic of Indonesia, Mr. Marwan Jafar, for his generosity to be with us here to give Keynote Speech. Then, it is our great honor and pleasure to have qualified scientists and bureaucrats as Plenary Speakers and Invited Papers to share their valuable knowledge during the plenary and concurrent sessions. Moreover, special thank you is for the Steering Committee, Scientific Committee, Reviewers and Editorial Boards for their great contribution to make the seminar a great success. Also, we would like to congratulate and deliver high appreciation to the Organizing Committee as the organizer for their great contribution and generous efforts to make the seminar successfully organized.

And to all of the participants, I hope that this seminar will always success and bring some acknowledgement for all of us. Also, I wish all of the participants having a great achievement of success and fulfill the expectation as well as enjoying the interaction with all participants.

With all of our hospitality, we will try our best to make your brief visit to our country become a wonderful and memorable moments.

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

Wish you all a very pleasant and most enjoyable stay in Yogyakarta, Indonesia, beside you scientific journeys.

*Terima kasih* (Thank you).

Sincerely Yours,

Prof. Dr. Ali Agus

Dean Faculty of Animal Science UGM

## OPENING REMARKS

Dear all of Scientists, distinguished guests, delegates, participants, Ladies and Gentlemen,

On behalf of Universitas Gadjah Mada, I am happy to welcome you and present a high appreciation for your participation in joining the 6th International Seminar on Tropical Animal Production hosted by the Faculty of Animal Science UGM in Yogyakarta from 20 – 22 October 2015.

Under the theme of “Integrated Approaches in Developing Sustainable Tropical Animal Production”, we do hope that this seminar concludes with shared ideas and best practices, technology, and global networks that are required to increase animal production. The increase of animal production as one source of food is crucial to feed the world given that the population is expected to increase from 6 billion to about 8.3 billion in 2030. According to FAO (2008, 2009), the consumption of animal food increased from 10 kg/per annum in 1960, 26 kg/per annum in 2000, and it is expected to be 37 kg/per annum. Animal production is an integral part of food production and contributing for the quality of human food supply. Animal and agricultural production is an important component in the integrated farming systems in developing countries as this produces high quality foods, provides job opportunities in rural areas, as well as enriching livelihood.

As a tropical country with high animal biodiversity, Indonesia and other tropical countries, have a variety number of indigenous and local animal genetic resources and germ plasm. This variety of animal germ plasm could be explored and developed not only for animal and food production but also for animal conservation. Apart from being exploited as food resources, it is therefore important to consider animal conservation. Conservation will protect the genetic potency of local bred and their family, and the domesticated animal bred, and this would secure our future food resources.

In these 3 days of seminar, we believe those aforementioned issues will be discussed, and technical solution as well as recommendation will be provided to solve the existing problems in tropical animal production.

Finally, on behalf of Universitas Gadjah Mada, we would like to congratulate and thanks to the Faculty of Animal Science UGM as the organizer for their great efforts to make the seminar successfully organized. To all of participants, I wish all of you have a great discussion and interaction with other scientists participating in the seminar as well as enjoying your time in Yogyakarta.

Thank you

Prof. Ir. Dwikorita Karnawati, M.Sc., Ph.D.  
Rector of Universitas Gadjah Mada



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**ABSTRACT:** This research investigated the effects of liquid extract turmeric nanocapsule levels in drinking water on abdominal and subcutan fat and meat fatty acid of broiler chickens. Eighty-four Lohmann broiler chicks MB-202 were randomly divided into 7 treatments with 3 replications, each complied 4 broilers. Seven treatments were: drinking water (DW) + 12 mg/1000 ml additive bacitracin (P1), DW only (P2), DW + 2% liquid nanocapsule (P3), DW + 4% liquid nanocapsule (P4), DW + 6% liquid nanocapsule (P5), DW + 8% liquid nanocapsule (P6) and DW + 10% liquid nanocapsule (P7). The analyzed variables covered level and weight of abdominal fat, subcutan fat level and meat fatty acid composition of broiler chickens. The data were subject to one way ANOVA analysis followed by Duncan's test in case of significant effect. The results showed that the liquid nanocapsule levels had non significant ( $P>0.05$ ) effects on weight and level of abdominal and subcutan fat. However, liquid nanocapsule provided a positive influence on fatty acid composition and the ratio of omega-3 and omega-9 in broiler chicken meat. The use of liquid nanocapsule at low level (2%) equivalent to 1.73 mg/100 ml curcumin resulted in the lowest weight of abdominal and subcutaneous fat level. While liquid nanocapsule at medium level (6%) equivalent to 4.31 mg /100 ml curcumin had complete composition of meat fatty acid with EPA/DHA and 5: 1 omega-3 and omega-6 as a functional food.

**Keywords:** liquid-nanocapsule, turmeric-extract, fat, fatty-acids, broiler.

### **INTRODUCTION**

Fatty acids commonly found in broiler meat are oleic, palmitic and stearic. This is in accordance with Piliang and Djojosoebagio (2000) that animal products generally contain large amounts of saturated fatty acids e.g. palmitic and stearic, unsaturated fatty acids for example oleic and a small proportion of polyunsaturated fatty acids (PUFA). Balance ratio of omega-3 and omega-6 is essential because the poultry body is constituted of membrane lipid composition, metabolic and physiological function. The increasing absorption of omega-3 is always with the role of other fatty acids in feed, especially the balance of omega-3 and omega-6 can be utilized optimally in the body that plays a role in physiological functions. Zuheid (1990) reported that body fat resulted from the composition of ration and consumption of excess energy is stored in body tissue in form of intramuscular, subcutaneous and abdominal fat. Excess energy in chickens will produce a carcass that is high in fat, but low energy consumption causes fat and carbohydrates stored in low glycogen.



## MATERIALS AND METHODS

The research was subject to one-way completely randomized design, rationing 84 broilers aged 2 - 6 weeks into seven treatments each with three repetitions. The seven groups were given additive in drink water namely: drinking water + bacitracin 12 mg/1000 ml (P1), drinking water only (P2), drinking water + 2% nanocapsule (P3), drinking water + 4% nanocapsule (P4), drinking water + 6% nanocapsule (P5), drinking water + 8% nanocapsule (P6) and drinking water + 10% nanocapsule (P7). Feed and drinking water were given ad-libitum.

In this study, 400 g of turmeric was blended in 500 mL of aquadest (equivalent to 5 g turmeric extract with ethanol). Five g chitosan was dissolved in 400 mL of 2.5% citric acid concentrate and mixed with a blender for 20 minutes, then the 2.5 g STPP was dissolved in 100 mL aquadest and mixed with blender for 20 minutes. Nanocapsule was supplied to the drinking water of experimental animals in each treatment level during week 2 - 6. Broilers were fed with commercial diet BR1 from Japfa Comfeed ® from the age of 0 to 2 week, then fed with basal rations. The variables included percentage (relatively) of meat fatty acids and level of abdominal and subcutaneous fat. The data obtained were subject to analysis of variance (ANOVA), followed by Duncan's test in case of significant effect using SPSS-16.

## RESULTS AND DISCUSSION

**Table 2.** Relatively percentage of meat fatty acids (%)

Type of fatty acids	Treatments						
	P1	P2	P3	P4	P5	P6	P7
Lauric acids (C12:0)	-	-	-	-	0.07	-	-
Miristic acids (C14:0)	0.26	0.25	0.63	0.36	0.63	0.1	0.83
Palmitic acids (C16:0)	6.68	6.72	1.77	10.85	1.65	3.3	23.94
Stearic acids (C18:0)	9.57	9.64	3.12	15.59	24.09	4.76	31.7
Palmitoleic acids (C16:1)	0.98	0.72	0.18	1.37	2.29	0.35	2.79
Oleic acids (C18:1)	-	-	-	7.44	11.44	-	20.89
Linoleic acids (C18:2)	3.36	3.6	2.31	1.94	2.12	2.9	-
Linolenic acids (C18:3)	0.19	0.21	0.63	0.26	0.43	1.02	0.33
EPA	-	-	-	-	0.25	0.45	0.69
DHA	-	-	-	-	0.38	-	-
SAFA	16.51	16.61	5.52	26.8	26.44	8.16	56.47
MUFA	0.98	0.72	0.18	8.81	13.73	0.35	23.68
PUFA	7.55	6.81	1.94	3.2	4.48	4.37	1.02
n6/n3 ration	17.68	17.14	3.67	7.46	4.93	2.84	0.00

**Table 3.** Percentage of abdominal and subcutan fat

Treatments	Parameter		
	Abdominal fat weight <sup>ns</sup> (g)	Abdominal fat percentage <sup>ns</sup> (%)	Subcutan fat percentage <sup>ns</sup> (%)
P1 (positive control)	20.76 ± 1.56	2.05 ± 0.13	49.73 ± 18.16
P2 (negative control)	24.66 ± 3.10	2.53 ± 0.22	58.45 ± 8.52
P3 (2% nanocapsule)	14.55 ± 2.09	1.45 ± 0.55	45.74 ± 10.31
P4 (4% nanocapsule)	15.36 ± 4.75	1.61 ± 0.36	47.47 ± 13.26
P5 (6% nanocapsule)	17.06 ± 5.27	1.88 ± 0.73	48.31 ± 14.15
P6 (8% nanocapsule)	19.05 ± 2.02	1.98 ± 0.40	51.84 ± 11.52
P7 (10% nanocapsule)	24.89 ± 3.92	2.24 ± 0.68	46.24 ± 5.34

ns Non-significant

Results in Table 2. demonstrated that treatment of liquid nanocapsule turmeric extract influenced the ratio of omega-3 and omega-6. Balance ratio of omega-3 and omega-6 is essential because the poultry body is constituted of membrane lipid composition, metabolic and physiological function. Meliandasari *et al.* (2015) reported that the imbalance concentrations between omega-3 and omega-6 is obvious from high concentration of omega-6 that can inhibit the formation of omega-3 in the bird's body and vice versa. Sundari *et al.* (2014) reported that 0.4% nanocapsule could improve meat protein and fatty acids containing EPA /DHA because curcumin feed inhibited the metabolism of arachidonic acid and increased the synthesis of EPA and DHA in broiler meat (Calder, 1998). Coetzee and Hoffman (2002) supported that fatty acids in the diet is absorbed by monogastric animals (broilers) so fatty acids in feed is a viable alternative to manipulate fatty acid profile of body tissue.

Table 3. presented weight-abdominal and subcutaneous fat content of broiler research. The statistical results of abdominal fat weight and subcutaneous fat level showed no significant differences across treatments ( $P>0.05$ ). The lowest and the highest level of abdominal and subcutaneous fat was on P3 and P6, respectively. The percentage of abdominal fat ranging from 1.08 to 2.16% in this research was consistent with and even better than that of previous studies. Leeson and Summers (1980) suggested that abdominal fat level of live weight of male and female broiler was 1.4 to 2.6% and 3.2 to 4.8%, respectively. According to North (1984), abdominal fat percentage of 6-week-old male broilers was 2.62% while Yuniza (2002) is 2.85% of live weight. The use of turmeric extract caused a decrease in broiler abdominal fat (Al-Sultan, 2003). The decrease of abdominal fat levels by increasing supplemented levels of turmeric extract curcumin compound is suspected to cause immunostimulatory effects to stimulate the gall bladder wall to increase the secretion of bile in fat breakdown process (Wijayakusuma, 2005). Rations plus 0.4% nanoparticles could reduce levels of subcutaneous fat much more significantly ( $P<0.05$ ). Nanocapsule granting higher level did not automatically reduce subcutaneous fat because the antioxidant properties of curcumin worked on the low level (Sundari, 2014) and turned into pro-oxidant at high level (Lopez and Lazaro, 2008).

## CONCLUSIONS

The use of liquid nanocapsule at low level (2%) equivalent to 1.73 mg / 100 ml curcumin resulted in the lowest weight of abdominal and subcutaneous fat level. While liquid nanocapsule at medium level (6%) equivalent to 4.31 mg/100 ml curcumin had complete composition of meat fatty acid with EPA / DHA and 5: 1 omega-3 and omega-6 as a functional food.

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