



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

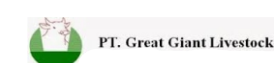
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**SUSTAINABLE LIVESTOCK PRODUCTION IN THE
PRESPECTIVE OF FOOD SECURITY, POLICY, GENETIC
RESOURCES, AND CLIMATE CHANGE**

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FULL PAPERS

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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 societies, 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 designed 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 hospitality, 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).

A handwritten signature in black ink, appearing to read 'Y. Guntara Noor', written over a diagonal line that extends from the bottom left towards the middle right.

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

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B 412 DZ	Effects of Marl and Kaolin on Growth Performances, Digestive Efficiency and Wet Droppings of Broiler Chickens <i>D. Ouachem, A. Meredef, A. Kalli, N. Kaboul, A. Mehdaoui, and Z. Ahmed Gaid</i>	1958

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B 788 TW	Effects of Dietary Supplementation of Sorghum Distillery Residue and Its Solid Fermented Product on Growth Performance and Immune Response in Broilers <i>P. H. Lin, Y. T. Chen, F. C. Tsai, S. M. Lee, and I. H. Chen</i>	1987
B 853 NG	Growth Performance and Organoleptic Properties of Broilers Fed Rumen Filtrate Fermented Shea Nut (<i>Vitellaria paradoxa</i>) Meal <i>D. N. Tsado and J. Akinwolere</i>	1991
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B 872 KR	Effects of Gromax [®] Supplementation on Growth Performance, Carcass Traits, Blood Profiles and Secretion of IGF-1 in Broiler Chickens <i>J. S. Hong, G. I. Lee, J. M. Kim, H. S. Choi and Y. Y. Kim</i>	1999

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B 957 LK	Effect of Phytase Enzyme on Phosphorous Availability of Broiler and Breeder Rations <i>M. A. J. P. Munasinghe, R. M. A. S. Bandara, B.C. Gallawattage and G. Weerakkody</i>	2005
B 1018 TW	Effect of Pelleting of Two Stage Fermented Process on Feed Composition, Broiler Growth Performance and Nutrition Digestibility <i>R. H. Yeh and K. L. Chen</i>	2008
B 1019 TW	Two Stage Fermented Process Improved Standardized Ileal Amino Acid Digestibility of Feather Meal in Broilers <i>K. L. Chen and R. H. Yeh</i>	2012
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B 1023 KR	Effect of Dietary CTCzyme® Supplementation on Broiler Performance Andde Novo Gut MOS Formation <i>S. Aditya, S. H. Jang, J. H. Min, W. S. Siau, J. H. Lee, M. Ahammed and S. J. Ohh</i>	2020
B 1027 TW	Metabolizable Energy of Local Grown Cassava in Taiwan and the Feasibility in Replacement for Corn in Broiler Feedstuff <i>S.R. Lee, L. Ananda, Y.H. Chen, B.H. Lin and S.Y. Wang</i>	2024
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Characteristics of Feed Supplement Containing Lingzhi (*Ganoderma lucidum*), Organic Chromium and Roasted Soybean at High Temperature and Humidity Storage

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ABSTRACT

Stability of feed supplement quality is depending on its content and storage condition. High quality of supplement is going to give high performance of animal production. The objective of this research was to determine the characteristics of feed supplement containing Lingzhi (*Ganoderma lucidum*), organic chromium and roasted soybean that stored at high temperature ($\pm 28^{\circ}\text{C}$) and high humidity ($\pm 86\%$) by evaluation the moisture content, the physical characteristics and the aflatoxin contamination. The experiment was designed using eight of feed supplements as treatments, five periods of storage and 3 replications. Eight kinds of treatments were S0: commercial supplement as control, S1: 3 ppm organic-Cr + 0.01% *G. lucidum*, S2: roasted soybean (1% of dietary fat) + 3 ppm organic-Cr, S3: roasted soybean (1% of dietary fat) + 0.01% *G. lucidum*, and S4: roasted soybean (1% of dietary fat) + 3 ppm organic-Cr + 0.01% *G. lucidum*, S5: 5% roasted soybean + 3 ppm organic-Cr, S6: 5% roasted soybean + 0.01% *G. lucidum*, and S7: 5% roasted soybeans + 3 ppm organic-Cr + 0.01% *G. lucidum*. Five long of storage were 0, 2, 4, 6 and 8 weeks. The supplements were put in the polyethylene plastic bag and every two weeks were analyzed the moisture content, the physical characteristics like color, texture and odor, also aflatoxin contamination. All parameters were analyzed using descriptive analysis, except the moisture data were analyzed using ANOVA (Analysis of Variance) and orthogonal contrast test. The results showed that the various of feed supplements, long of storage, and their interaction significantly increased on the moisture content of supplement ($p < 0.05$). All results showed percentage of moisture content less than 11% even on the longest of storage period. Compared to control, the moisture content increased 0.61% in high level of roasted soybean in the supplement (S5, S6 and S7) and 1.64% in low level of roasted soybean in the supplement (S2, S3 and S4). The odor became worse after 4 weeks storage, but no color and texture changing as well as no an aflatoxin contamination detected until 8 weeks storage. As conclusion, feed supplements containing Lingzhi (*Ganoderma lucidum*), organic chromium and roasted soybeans can be stored in high temperature and high humidity conditions using polyethylene plastic bags as packaging for no more than 4 weeks to maintain a good quality.

Key Words: Aflatoxin, *Ganoderma lucidum*, Organic chromium, Roasted soybean, Storage

INTRODUCTION

Quality of animal production is depending on the quality of its feed consumption. Nutrient balance in ration is ideal to support the productivity, but it is rare achieved due to expensive cost of the feedstuffs. To overcome this problem, supplement feed often become one of solutions. Most of commercials supplement contain synthetics compounds, those are left as residual substances in the animal products. To avoid the hazard effect to human health in which human is the user of animal products, the use of natural supplement should be considered as one of the best solutions.

One of natural candidates of feed supplement that contains pharmacological substances is Ling zhi (*Ganoderma lucidum*) due to its content has an ultimate role as immune modulator such as polysaccharides and b-D-glucan (Chang and Miles, 2004). The use of diets containing mix feed supplement of ling zhi, organic chromium and source of CLA (conjugated linoleic acid) from roasted soybean on dairy cow lactation showed that the percentages of consumption, digestibility, milk production and milk fat increased 13%, 18%, 16% and 22% than control, respectively and also increased egg production 11.3% and decreased the blood cholesterol concentration in Lohmann Brown line layer (Evyernie *et al.*, 2012; Putri *et al.*, 2013).

Based on those results, the mix feed supplement containing ling zhi, organic chromium and source of CLA (conjugated linoleic acid) from roasted soy bean should be maintain in good condition to avoid decreasing of the quality. The objective of this research was to determine the characteristics of feed supplement containing Lingzhi (*Ganoderma lucidum*), organic-Cr and roasted soybean that stored at high temperatures and high humidity conditions (average temperature was 28°C and humidity was 86%) through evaluation the moisture content, physical quality and aflatoxin contamination.

MATERIALS AND METHODS

The experiment was designed using eight of feed supplements as treatments, five periods of storage and 3 replications. Eight treatments were S0: commercial supplement as control (Top Mix from Medion Co, Bandung), S1: 3 ppm organic-Cr + 0.01% *G. lucidum*, S2: roasted soybean (1% of dietary fat) + 3 ppm organic-Cr, S3: roasted soybean (1% of dietary fat) + 0.01% *G. lucidum*, and S4: roasted soybean (1% of dietary fat) + 3 ppm organic-Cr + 0.01% *G. lucidum*, S5: 5% roasted soybean + 3 ppm organic-Cr, S6: 5% roasted soybean + 0.01% *G. lucidum*, and S7: 5% roasted soybeans + 3 ppm organic-Cr + 0.01% *G. lucidum*. Manufacture of roasted soybean and organic chromium have been reported by Evvyernie *et al.* (2012). The supplements as much 240 g were put in the polyethylene plastic bag with size 31 x 19 cm, then sealed and stored at high temperatures and high humidity conditions (average temperature was 28°C and humidity was 86%). Five periods of storage were 0, 2, 4, 6 and 8 weeks. The measured parameter in every two weeks was the moisture according to AOAC (1984); the physical characteristics like color, texture and odor by qualitative test; and aflatoxin contamination using thin layer chromatography according to AOAC (1990). All data were analyzed using descriptive analysis, except the moisture data were analyzed using ANOVA (Analysis of Variance) and further tested using orthogonal contrast.

RESULTS AND DISCUSSION

Moisture content of feed supplement during the storage

One of several factors that affect to the quality of feed supplement is the moisture content. High moisture content and improper storage conditions can accelerate the growth of microorganisms on feed, so that eventually it will be damage to its nutrition. In this study, Table 1 showed that long storage of feed supplement at high temperature and high humidity have positive correlation to moisture content due to of water absorption or respiration process occur in the supplement (Winarno *et al.* 1980).

The types of supplements, long of storage and their interactions showed highly significant different on the moisture content of feed supplements during storage ($p < 0.01$). Addition of roasted soybeans in the treatment S5, S6 and S7 showed higher increasing of moisture content during 8 weeks of storage. Compare to control, the moisture increased 0.61% in high level of roasted soybean in the supplement (S5, S6 and S7) and 1.64% in low level of

roasted soybean in the supplement (S2, S3 and S4) and no aflatoxin contamination detected in all treatments during 8 weeks of storage. The safety moisture content for storage was 13% - 14%, but for avoiding damage on food the moisture content should be 11% - 12% (Syarief and Halid, 1993). All results showed percentage of moisture content less than 11% even on the longest time of storage, in which indicated that all feed supplement have high safety from microorganism attack and other damage.

Physical characteristics and aflatoxin contamination on feed supplement during storage

There was no changing in physical characteristics such as color and structure of feed supplement, as well as aflatoxin contamination were not detected during storage until 8 weeks. It means the polyethylene plastic bag could protect the supplement from microorganism attack. However, the odor of all feed supplements including commercial supplement as a control became worse after 4 weeks of storage (Table 2). The odor of roasted

Soybean and *Ganoderma lucidum* mix (S3 and S6) were worse than other supplement after 6

weeks storage might caused by mix odor from decay process of fungi and rancidity of unsaturated fat in soybean.

CONCLUSION

Feed supplements containing Lingzhi (*Ganoderma lucidum*), organic chromium and roasted soybeans can be stored in high temperature and high humidity conditions using polyethylene plastic bags as packaging for no more than 4 weeks to maintain a good quality.

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Table 1. Moisture content of several feed supplements during the storage (%)

Treatme nt	Long of Storage (Weeks)								Average
	0	2	4	6	8	8	8	8	
S0	8.44±0.41 BCD	8.86±0.12 CDEF	9.18±0.24 DEFGH	8.63±0.15 BCDE	9.61±0.56 FGHIJ	8.94±0.46 B			
S1	7.21±0.77 A	7.84±0.47 AB	8.78±0.31 CDEF	8.12±0.44 BC	9.13±0.39 DEFGH	8.22±0.76 A			
S2	9.87±0.86 HIJK	9.88±0.15 HIJK	9.93±0.48 HIJK	9.63±0.23 FGHIJ	10.24±0.05 IJKL	9.91±0.22 C			
S3	8.87±0.42 CDEF	10.14±0.22 IJKL	10.90±0.53 LM	10.47±0.42 JKL	11.61±0.54 M	10.40±1.02 C			
S4	7.82±0.14 AB	8.45±0.20 BCD	9.37±0.68 EFGHI	8.61±0.25 BCDE	9.78±0.52 HIJ	8.80±0.78 B			
S5	9.56±0.15 FGHI	10.25±0.08 IJKL	10.01±0.17 HIJK	9.86±0.23 HIJK	9.76±0.18 HIJ	9.89±0.26 C			
S6	9.96±0.09 HIJK	9.96±0.37 HIJK	10.10±0.13 IJKL	9.98±0.30 HIJK	9.71±1.18 GHIJ	9.94±0.14 C			
S7	9.49±0.14 FGHI	10.71±0.97 KL	10.19±0.56 IJKL	9.79±0.32 HIJ	10.11±0.19 IJKL	10.06±0.46 C			
Average	8.90±1.01 A	9.51±1.00 B	9.81±0.67 C	9.39±0.83 B	10.00±0.73 C				

S0: commercial supplement as control, S1: 3 ppm organic-Cr + 0.01% *G. lucidum*, S2: roasted soybean (1% of dietary fat) + 3 ppm organic-Cr, S3: roasted soybean (1% of dietary fat) + 0.01% *G. lucidum*, and S4: roasted soybean (1% of dietary fat) + 3 ppm organic-Cr + 0.01% *G. lucidum*, S5: 5% roasted soybean + 3 ppm organic-Cr, S6: 5% roasted soybean + 0.01% *G. lucidum*, and S7: 5% roasted soybeans + 3 ppm organic-Cr + 0.01% *G. lucidum*

Table 2. The odor and aflatoxin contamination on feed supplement during storage

Treatments	Long of storage (weeks)				Aflatoxin contamination	
	0-4	6	8	0-8 (weeks)		
S0	+	+++	+++	-		
S1	+	++	++	-		
S2	+	++	++	-		
S3	+	++	+++	-		
S4	+	++	++	-		
S5	+	++	++	-		
S6	+	++	+++	-		
S7	+	++	++	-		

S0: commercial supplement as control, S1: 3 ppm organic-Cr + 0.01% *G. lucidum*, S2: roasted soybean (1% of dietary fat) + 3 ppm organic-Cr, S3: roasted soybean (1% of dietary fat) + 0.01% *G. lucidum*, and S4: roasted soybean (1% of dietary fat) + 3 ppm organic-Cr + 0.01% *G. lucidum*, S5: 5% roasted soybean + 3 ppm organic-Cr, S6: 5% roasted soybean + 0.01% *G. lucidum*, and S7: 5% roasted soybeans + 3 ppm organic-Cr + 0.01% *G. lucidum*.