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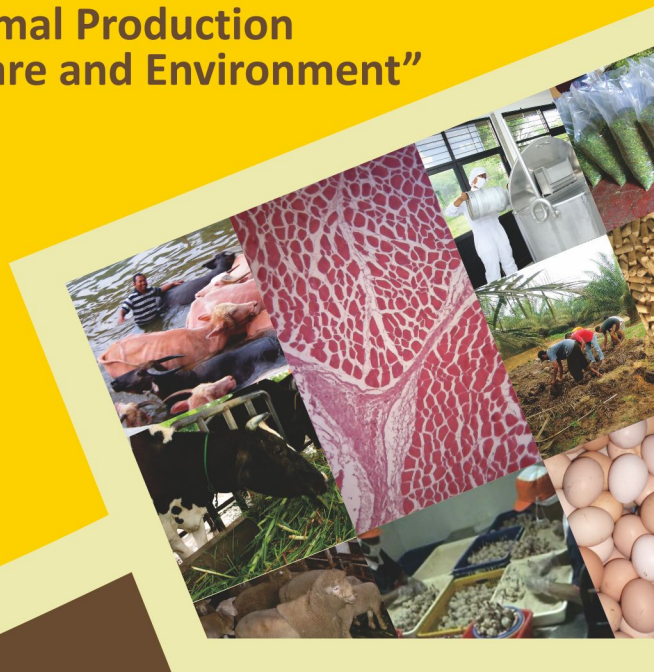


PROCEEDING

THE THIRD INTERNATIONAL SEMINAR ON ANIMAL INDUSTRY

“Sustainable Animal Production for Better Human Welfare and Environment”

September, 17-18 2015
IPB International Convention Center
Bogor-Indonesia



Organized by:



Sponsored by:



FACULTY OF ANIMAL SCIENCE
BOGOR AGRICULTURAL UNIVERSITY
2015

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FOREWORD FROM CHAIRPERSON OF ORGANIZING COMMITTEE

Good morning,

Selamat pagi, salam sejahtera bagi kita semua

Rector of Bogor Agricultural University, Prof. Dr. Ir. Herry Suhardiyanto, M.Sc.

Director General of Livestock and Animal Health, Ministry of Agriculture, Republic of Indonesia, Prof. Dr. Ir. Muladno, MSA.

Dean of Faculty of Animal Science, Bogor Agricultural University, Prof. Dr. Ir. Luki Abdullah, M.Sc.Agr.

All participants of the International Seminar on Animal Industry 2015

Distinguished guests, ladies and gentlemen.

It is my great pleasure to welcome you all, our distinguished guests, speakers and participants, to the Third International Seminar on Animal Industry (ISAI 3rd, 2015) held at the IPB International Convention Center Bogor Indonesia. This seminar with the theme “**Sustainable Animal Production for Better Human Welfare and Environment**” is organized by Faculty of Animal Science, Bogor Agricultural University in collaboration with Association of Indonesia Animal Scientist (HILPI).

Following the recommendations from ISAI 1 and ISAI 2, which were held in Indonesia in 2009 and 2012, the strategic issues of ISAI 3rd is emphasized on animal production systems and technology and the wise use of natural resources in relation with environmental aspects, toward a sustainable animal production. There will be 98 papers presented during the two days seminar; 9 by invited speakers, 69 for oral and 29 for poster presentations. The speakers came from different countries including Australia, Egypt, France, Korea, Germany, Netherland, Indonesia, Malaysia, Nigeria, Pakistan, Thailand and USA.

This is a great opportunity for scientist, researchers, private sectors and policy makers to discuss, share information and experiences on interesting topics in animal production in a broad sense, including good farming practices, recent technologies and save animal products. I believe, there is an open window for initiating and strengthening collaboration amongst scientist and institutions during and after the seminar.

On behalf of the Organizing Committee, I would like to express my sincere appreciation and thanks to IPB, and some units within, including Institute of Research and Community Empowerment, Faculty of Animal Science, Department of Animal Production and Technology, Department of Nutrition and Feed Technology, Diploma Program, Management and Business Program for all advice and funding support.

The success of this seminar could only be achieved with all the valuable supports and sponsorship we received from some recognized parties and institutions in this country. In this regards, I would like to address my grateful thanks to Directorate General of Livestock and Animal Health, Ministry of Agriculture Republic of Indonesia for participation and funding support, Infovet and Trobos, Green TV as promotion agency. To: PT. Sierad Produce, Tbk, PT. Kaltim Prima Coal, Tbk, PT. BRIngin Life, PT. Adaro Indonesia, Tbk, PT. Trouw Nutrition Indonesia, PT. Nutricell Pasific, PT. Sweni Transfer Indonesia, PT. Charoen Phokphand Indonesia, Tbk, PT. Wide & Pin, PT. Pupuk Kujang, Tbk, and PT. ANTAM, Tbk, thank you so much with big appreciation, for having being part of this important event and such enormous contributions.

My recognition and gratitude are also forwarded to the Steering Committee for advice and assistanship, to international and national reviewers and the Scientific Committee for hard working and such great support. Last but not least, to all my dear colleagues of the Organizing Committee members, who have been working smartly and full of dedication and passion, to make this seminar a great successful event.

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To all participants, hopefully, the two days seminar may bring fresh ideas, and enhancing collaborations for future success toward sustainable animal production and industry. Big appologies for any inconveniences during the seminar, wish you all having fruitful discussions and good times.

During your short stay, please enjoy the surrounding of Bogor city, the Museum of Presidential Palace and Historical Botanical Garden of Bogor.

Bogor, September 17th, 2015

17th - 18th September 2015,

Chairperson of Organizing Committee

Asah M. Fua

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REMARKS FROM DEAN OF ANIMAL SCIENCE FACULTY

Prof. Dr. Muladno, MSA
Director General of Livestock and Animal Health-Ministry of Agriculture Republic of Indonesia,

Prof. Dr. Ir. Herry Suhardiyanto, M.Sc.
Rector of IPB

Dr. Ir. Asnath Maria Fuah
Chairperson, The 3rd International Seminar on Animal Industry

Our Colleagues from Indonesian universities and research institutes,
Distinguished foreign participants and speakers,

Representative of livestock services officers of local government from all over Indonesia,

Distinguished guests, ladies and gentlemen.

Assalamu'alaikum warahmatullaahi wabarakatuh,

I am pleased to welcome you all to Bogor city for attending "The 3rd International Seminar on Animal Industry 2015" held at Faculty of Animal Science, Bogor Agricultural University (IPB). As the Dean of Faculty, I am also really honored to host this conference.

First, let me introduce briefly about Bogor city. Bogor is one of the major scientific and educational centers in Indonesia. A significant part of academic and research base was laid in the period of Dutch colonization. In particular, since the beginning of the 19th century there were established laboratories and professional schools focused primarily on improving the efficiency of the colonial agriculture. Similar to the prevailing profile of research and academic activity was retained in Bogor after gaining independence. As in the second half of 20th century, and in the 2000s strongest areas were Agricultural sciences, Biology, Animal and Veterinary Sciences. The main educational and scientific center with the utmost national importance is the Bogor Agricultural University (IPB). It is therefore the city regularly hosted various international events, such as international seminars and conferences.

I would like to express my gratitude to IPB for supporting us to hold this conference, and also to the organizing committee of the present conference for their hard work and persistence. I convey my sincere gratitude to all the parties which is supporting this event, such as Directorate General of Livestock and Animal Health-Ministry of Agriculture Republic of Indonesia, Infovet Trobos, Agrina, Green TV as promotion agency and Sierad Produce, Kaltim Prima Coal, BRIngin Life, Adaro Indonesia, Trouw Nutrition Indonesia, Nutricell Pasific, Sweni Transfer Indonesia, Charoen Phokphand, Wide & Pin, Pupuk Kujang, and ANTAM thank you so much with big appreciation, for having being part of this important event and such enormous contributions. I am very pleased to see here the delegates from various foreign countries as well as representatives from many domestic institutions.

I hope you find this conference and the city, both interesting and stimulating and that you enjoy meeting up with your professional colleagues as well as having pleasure time during your stay in Bogor.

Thank you very much and
Wassalamu'alaikum warahmatullaahi wabarakaatuhu.

Bogor, September 17, 2015
Prof. Dr. Ir. Luki Abdullah, MSc.Agr
DEAN

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SEMINAR PROGRAM

Conference Program Thursday, September 17, 2015

Time Slot	Venue : ICC Ballroom	
	Event	Speaker
08.00-09.00	Registration	Committee
09.00-09.05	Opening Ceremony	Master of Ceremony
09.05-09.15	Report from Organizing Committee	Dr. Ir. Asnath M.Fuah, MS
09.15-09.25	Welcome Address from Dean Faculty of Animal Science	Prof. Dr. Ir. Luki Abdullah, M.Sc.Agr.
09.25-09.35	Welcome Address from Rector of Bogor Agricultural University	Prof. Dr. Ir. Herry Suhardiyanto, M.Sc
09.35-10.00	Opening and Keynote Speech by Ministry of Agriculture / Directorate General of Livestock and Health Services	Prof. Dr. Ir. Muladno, MSA
10.00-10.05	Appreciation for Keynote Speakers from Dean Faculty of Animal Science	Prof. Dr. Ir. Luki Abdullah, M.Sc.Agr.
10.05-10.20	Sponsorship Appreciation from Chairman of Organizing Committee	Dr. Ir. Asnath M.Fuah, MS.
10.20-10.25	Photo session	Photographer
10.25-10.40	Coffee break	
	Plenary Session 1 <i>Moderator: Prof. Dr. Ir. Komang G. Wiryawan</i>	
10.40-11.00	Invited speaker 1	Prof. Dr. Ir. Bas. Kemp Preserving Health, Welfare and Productivity in a Challenging Environment
11.00-11.20	Invited speaker 2	Dr. Jean Pierre Bidanel Genomic Selection for More Sustainable Livestock Production
11.20-11.40	Invited speaker 3	Ir. Yunus Triyonggo, MM Building Human Resources Competency Model in Poultry Industry
11.40-12.00	Discussion	
12.00-12.05	Invited Speaker Appreciation from Scientific Committee	Prof. Dr. Ir. Dewi Apri Astuti, MS.
12.05-12.15	Sponsorship Appreciation from Vice Dean Faculty of Animal Science	Dr. Ir. Moh. Yamin, M.Agr.Sc.
12.15-12.25	Student Plenary	
12.25-13.20	Lunch	
13.20-13.50	Poster session	

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	Room A (Theme D)	Room B (Theme B and C)
1. Session 1	Moderator : Dr. Rajesh Jha	Moderator : Ummi Noorhakimah
14.00-14.10	Thongsuk Jetana Rain Tree Pod in Livestock Feeds: Opportunity, Challenges and Possibility	Yeni Widiawati Fermentation Kinetics Of Palm Oil Plantation By-Product Based Diet
14.10-14.20	Supriyati Kompiang Effect of Different Protein and Energy Levels in Concentrate Diets on Performances of Anglo-Nubian Goat During Pregnancy and Lactation Periods	Ainissya Fitri Utilization Of Haylage Of Local Agro-Industry By product Pretreated With Afex Method
14.30-14.40	Rusdi Evaluation of Eleutherine (<i>Eleutherine americana</i>) as Feed Additive for Poultry	H. A. Sukria Physical Quality And Storage Time Pellet Indigofera Spleaves
14.40-14.40	Discussion	Discussion
Session 2	Moderator :Thongsuk Jetana	Moderator : Imana Martaguri
14.45-14.55	Utsav Prakash Tiwari Nutrient Profile And In Vitro Digestibility Of Fresh And Ensiled Cassava In Swine	Moh Ali Hamdan Potential Of Dwarf Elephant Grass (<i>Pennisetum Purpureum</i> Schum. Cv. Mott) In Dry Land Areas Of Bojonegoro As Forage-Based Feed Sustainability
14.55-15.05	Alif Putri Effect of Combination Silkworm Pupae Meal and Garlic Meal on Blood Profiles, Visceral Organs and Carcass Broiler	Rido Pande Pardede Development Of Indigofera Zoolingeriana And Pueraria Javanica On Dry Land Integrated With Teak Forest In Bojonegoro
15.05-15.15	Burhanudin Sundu The effect of NaOH Concentrations and Polysaccharides Extract of Palm Kernel Meal on Performance of 4 Weeks Old-Broiler Chickens	Malcky Telleng Growth and Productivity of Different Sorghum Varieties Cultivated with Indigofera in Intercropping System
15.15-15.25	Discussion	Discussion
15.25-15.40	Coffee break	
Session 3	Moderator : Anis Mukhtiani	Moderator : Lisa T. Praharani
15.40-15.50	Muhamad Nasir Rofiq Combination Effect of Nutritech Feed Additive Containing Saponin, Tanin and Eugenol Essential oils on In Vivo Rumen Methane Production in Dairy Cattle Using Open Circuit Respiration Chamber Technique	Imana Martaguri Carbon Storage Capacity of Forage Native Grasses Growing in Palm Plantation at Transformation Forest Ecosystem in Jambi
15.50-16.00	Dwi Yulistiani Nitrogen Utilization and Ruminant Fermentation of Five Breed of Sheep Fed Concentrate Containing Different Levels of Rumen Undegradable Protein	I Gusti Ngurah Jelantik Herbage Production and Nutritive Value of Some Forage Legumes as Calf Feed Supplement
16.00-16.10	Sutresniwati A Willingness to Pay Evaluation for Silage Implementation for Small Dairy Farmers	Riesi Sriagtula Evaluation of Growth and Production of Sorghum Lines (Sorghum Brown Midrib) at Different of Harvest Time as Feed
16.10-16.20	Discussion	Discussion
Session 4	Moderator : Rusdi	Moderator: Veronica
16.25-16.35	Anita S. Tjakradidjaja Fermentability and Digestibility of Rice Straw - Concentrate Base Ration Added with Probiotic	Nur Rochmah Kumalasari Modelling of Forage Availability Response to Landuse Exchange in Bogor

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Time	Room A (Theme D)	Room B (Theme B and C)
16.35-16.45	Gusti A. Gultom Effects of Solid or Liquid Probiotic Supplementation on Rumen Microbial Population and Enzyme Activity	Khalil The Diversity and Quality of Forages Used for Feeding of Goat in Payakumbuh of West Sumatra
16.45-16.55	Eissa M. M Effect Of Ammoniated Straw On Methane Production In An In Vitro System And On Growth Performance	P.D.M.H. Karti The Addition of Arbuscular mycorrhizal Fungi in Enhancing Productivity and Drought Tolerance Mechanisms of <i>Indigofera zollingeriana</i>
16.55-17.05	Discussion	Discussion

Time	Ballroom (Theme A)
Session 1	Moderator : Iis Arifantini
14.00-14.10	Fuah A.M Beef Cattle Production, Constraints and Opportunities for Small Farmers in South Central Timor Regency West Timor
14.10-14.20	S.N. Sirajuddin The Application of Tesang Sharing System at Cattle Farms in Indonesia
14.20-14.30	Niken Ulupi Production Performance of Laying Hen in Cage System with Different Housing Temperature
14.30-14.40	Lucia Cyrilla Evaluation of Good Dairy Farming Practice Implementation in Dairy Goat Farm
14.40-14.50	Discussion
Session 2	Moderator : Prof. Cece Sumantri
14.55-15.05	Lindawati Doloksaribu Constraints to, Challenges of, and Opportunities for Rearing Goats in Bali Province. A case study: Rearing Kids in Karangasem Regency
15.05-15.15	Hearty Salatnaya Trigona Spppropolis, Pollen, And Honey Production In Two Different Agroecosystem
15.15-15.25	Prabowo, S Distribution of Thermal Body Surface Ettawah Grade in Different Tropic Microclimates
15.25-15.35	Bram Brahmantiyo Hycole and Hyla Rabbits Performance were Raised in Indonesia
15.35-15.45	Discussion
15.45-16.00	Coffee break

Welcoming dinner. Venue ICC Ballroom

Time Slot	Event
18.20-19.00	Registration and Dinner (Instrument from Gentra)
19.00-19.05	Opening by Master of Ceremony
19.05-19.15	Speech from Chairman of Committee
19.15-19.25	Speech from Dean of Animal Science Faculty
19.25-20.00	Gentra Kaheman
20.00-20.20	Prof. Singer
20.20-21.20	Spontaneity from Country Representative
21.20	Closing

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Friday, September 18, 2015

Venue : IICC Ballroom		
Time	Event	Speaker
08.00-08.30	Registration	Committee
08.30-08.35	Opening Ceremony	Master of Ceremony
Plenary Session 2 <i>Moderator: Dr. Jean Pierre Bidanel</i>		
08.45-08.55	Invited speaker 1	Prof. Wayne Pitchford Outcomes of Selection for Residual Feed Intake in Australian Beef Cattle
08.55-09.15	Invited speaker 2	Prof. Myunggi Baik Molecular Mechanisms Regulating Beef Quality in Korean Cattle
09.15-09.35	Invited speaker 3	Prof. I Wayan Teguh W. Vaccination and Subclinical Manifestation of Avian Influenza in Indonesia
09.35-09.50	Discussion	
09.50-10.00	Appreciation to Invited Speaker	Prof. Luki Abdullah
Coffee Break		
Plenary Session 3 <i>Moderator: Prof. Wayne Pitchford</i>		
10.10-10.30	Invited speaker 1	Dr. Kai J. Kuehlmann The Role of Feed Additive in Animal Industry under Tropical Condition
10.30-10.50	Invited speaker 2	Dr. Anjas Asmara Samsudin Recent Advances in Gut Microbiology Research in Relation to Animal Nutrition
10.50-11.10	Invited speaker 3	Prof. Bustanul Arifin Social Economic and Policy in Animal Industry
11.10-11.25	Discussion	
11.25-11.30	Appreciation for Invited Speaker	Prof. Dr. Ir. Sumiati, M.Sc.
11.30-13.20	Lunch and Prayer	
13.20-13.50	Poster session	

Time	Room A (Theme D and G)	Room B (Theme F and J)
Session 5	<i>Moderator: Sutresniwati</i>	
13.50-14.00	Sumiati Effect of drinking gambir extract (<i>Uncaria gambir Roxb</i>) as Antioxidant on Performance of 40-43 Weeks Old of Laying Hens	Rudi Afnan Weight Loss And Mortality Of Broiler During Transportation From Different Distances To Slaughterhouse
14.00-14.10	Muktiani, A Live Weight Gain of Beef Cattle Fed on Complete Feed Silage of Water Hyacinth Supplemented with Mineral Zinc-Proteinate	Suharyanto Skim Milk Powder Substitution With Soymilk Powder Could Improve Physical Properties Of Beef Surimi-Based Sausage
14.10-14.20	Putri O. N The Effect of Adding Fermented Waste Cabbage in Calf Starter Pellets on Total Lactic Acid Bacteria And <i>Escherichia coli</i>	Iwan Prihantoro The Potency of <i>Azollapinnataas</i> A High Protein Forage for High Productivity Livestock
14.20-14.30	Discussion	Discussion
Session 6	<i>Moderator : Prof. Khalil.</i>	
14.35-14.45	Ninasari Ra Substitution of Fish Meal by Cricket or Indigofera Shoot Leaf Meal on Japanese Quail (<i>Coturnix japonica</i>) Performance	Lilis Suryaningsih Effects Of Local Flour Types On Physical Properties And Acceptability Of Beef Sausage

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Time	Room A (Theme D and G)	Room B (Theme F and J)
14.45-14.55	Tresia G.E Benefit of Kemuning Leaves Meal (<i>Murraya paniculata</i> [L.] Jack) Addition in Ration Containing Date Fruit Waste to Suppress Gastrointestinal Parasites Infestation of PE Goat	Soenarno Ms Characteristic Of Lactic Acid Bacteria Isolated From Dangke From Sinjai, South Sulawesi
14.55-15.10	Sri Suharti Rumen Microbe, Protein Microbial Synthesis, Cellulase Activity and Nutrient Digestibility of Bali Cattle Rumen with the Addition of Calcium Soap-Soybean Oil In vitro	M. Aman Yaman Increase on Commercial Weight, Carcass Quality and Economic Benefit of Selected Local Meat Chicken Fed on Fermented Diet Contained Digestive Enzymes and Probiotics
15.10-15.15	Discussion	Discussion
15.15-15.30	Coffee break	
Session 7	Moderator : Dr. Lindawati Doloksaribu	Moderator : Dr. Asnath Maria Fuah
15.30-15.40	G. F. Bira Incremental Level Of Chromolaena Odorata In Complete Diet Does Not Impair Intake, Rumen Fermentation And Microbial Protein Synthesis Efficiency In Cattle	Salina A.B An Analysis Of Cattle Traders Practices On Animal Traceability In Malaysia
15.40-15.50	Arini NMJ Substitution Of Fish Meal By Cricket Or Indigoferasp Shoot Leaf Meal To Evaluate Protein Balance Of Japanese Quail (Coturnix Japonica)	Hotnida C H Siregar Effect Of Moisture Reduction Method, Storage Period And Temperature On Honey Quality
15.50-16.00	Mokhamad Faesal R. Hakim Feeding Ecology of Sumatran Orangutan (<i>Pongo abelii</i> , Lesson 1827) in West Batang Toru Forest Block, North Sumatra	Iman Rahayu Biodiversity Based On Fatty Acid And Amino Acid Profile Of Indonesian Local Chickens
16.00-16.10	Discussion	Discussion
Session 8	Moderator : Mokhamad Faesal Rakhman Khakim	Moderator : Dr. Burhanudin Sundu
16.15-16.25	D. Latipudin Level Of Malondialdehyde (Mda), Uric Acid And Lymphocyte: Neutrophil Ratio Of Laying Hen In The Different Temperature Humidity Index (Thi)	I M. A. Sudarma Weight Loss Of Inter-Island Transported Cattle From Kupang Is Reduced By Feeding High Protein-Mineral Mix Block During Quarantine And Sea Transportation
16.25-16.35	Windi Al Zahra The Using Of Thermograph As Non-Invasive Method To Observe Subclinical Mastitis In Tropical Dairy Cattle	Ummi Noorhakimah Abdullah Cattle Importation And The Trend Of Fmd Occurrence In Peninsular Malaysia From 2000-2010
16.35-16.45	A. Sudarman Physiological Responses And Blood Profiles Of Sheep Fed Cassava Leaves Silage (<i>Manihot Esculenta</i> Sp.) Reared Traditionally In Petir Village	Moh Yamin Harmony Between Livestock Behaviors: Birth Time and Sites Selection Behaviors in Sheep and Goats
16.45-17.00	Discussion	Erika B Laconi Strategy of Beef Cattle Development Based on Agricultural Product in Kuningan District, West Java
17.00-17.10	Discussion	Discussion

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14.00-14.10	Parsaoran Silalahi Effects Of Selection On The Efficiency And Variability Of Sow Reproduction And Maternal Abilities
14.11-14.20	Oktora Dwi Putranti Effect Of Caffeine On Morfology Of Epididymis Spermatozoa Of Bali Bull
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15.01-15.10	Anneke Anggraeni Association Of Growth Hormone (Gh Mspi) And Growth Hormone Releasing Hormone (Ghrh-Haeiii) Genes With Milk Components Of Hf Cows Under Small Farmers In Lembang, West Java
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15.51-16.00	Tuty L Yusuf Determination of Soy Extract Concentration In Tris Buffer of Frisian Holstein Chilled Semen
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17.25-17.35	Presence of Presents
17.35-17.45	Speech from Representative Invited Speaker: Prof. Wayne Pitchford
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INVITED SPEAKER

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The Potency of *Azollapinnata* as A High Protein Forage for High Productivity Livestock

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Abstract

Aquatic macrophytes, such as Azollapinnata has a wide range adaptation in growth and fast yield time. This plant has high nitrogen fixation ability and potency as high protein forage. The aim of this research was to measure production potency and protein content on several media. This research used complete randomized design with four kinds of media: control, control + 10% paddy field mud, 10% paddy field mud + NPK (N 200kg ha⁻¹, P₂O₅ 150 kg/ha, and K₂O 150 kg/ha), and 10% paddy field mud + compost (5g/l). The measured parameter were dissolved N absorption, doubling time cover area, biomass production, and protein content. Data were analyzed using ANOVA. The results showed that Azollapinnata has high dissolved N absorption (≥ 97.91%). Paddy field mud and kinds of media treatments significantly shortened doubling time cover area, increased biomass production and protein content compared with control. Compost + 10% paddy field mud was the best media to shortened doubling time cover area with the highest biomass production. Keywords : Aquatic macrophytes, Azollapinnata, high protein forage

Introduction

Forages are the main sources of feed for ruminant that plays livestock performance and productivity. Forage production is high at rainy season and low at dry season with relatively lower forage quality. The land use status for pasture was limited because of the other transformation. It is necessary to improve aquatic plants potency as a potential aquatic area utilization in Indonesia.

Azollapinnata is an aquatic fern which is potential as an alternative forage source of protein and mineral. Protein content of *Azollapinnata* is 21–37% (Khan 1988; Alalade and Iyayi 2006) and protein digestibility is 84% from total crude protein. Essential amino acid (lysine and methionine) on *Azollapinnata* has high content of lysine and methionine, 0.98% and 0.34% respectively (Alalade and Iyayi 2006). *Azolla* is rich in macro and micromineral such as Fe, Ca, P, Mg, Cu, and Mn (NDDDB 2012), so that potential as a mineral supplement for ruminant (Parashuramulu *et al.* 2013).

Azollapinnata has a short yield time (7–20 days) and a fast fresh biomass production (390 tons hectare⁻¹ year⁻¹) (Ferentinos *et al.* 2002). *Azollapinnata* has many benefits such as a biofertilizer, human food (Pabby *et al.* 2003), ruminant feed, fish meal, herb (Mithraja *et al.* 2011), biogas production, and phytoremediation (Kempen *et al.* 2013). The development of aquatic plant (*Azollapinnata*) as an alternative forage source has a high potential to support performance and productivity of livestock.

Lately, the study about *Azollapinnata* based on media type was limited. The aim of this research was to measure production potency and protein content of *Azollapinnata* on several media.

Materials and Methods

The materials used on this research consists of culture box (36×28.5×10 cm³), scale, pH meter, oven, cooling box, and furnace. The materials used were *Azollapinnata* R Br, water, urea, P₂O₅, K₂O, compost and paddy field mud.

The experiment was conducted in the laboratory of agrostology, Department of Nutrition and Feed Science, Faculty of Animal Science, Bogor Agricultural University, Bogor in October 2013 to February 2014. This research was designed using complete randomized design with four kinds of media: control, control + 10% paddy field mud, 10% paddy field mud + NPK (N 200kg/ha, P₂O₅ 150 kg/ha, and K₂O 150 kg/ha), and 10% paddy field mud + compost (5g/l). The measured parameter were dissolved N absorption, doubling time cover area, biomass production, and protein content. Data were analyzed using ANOVA.



Results and Discussion

Azollapinnata R Br is an aquatic plant that lives well on stagnant water, such as paddy field, swamp, and lake. Mutualism symbiotic between *Azollapinnata* with *Cyanobacteria* such as *Anabaena azollae* caused a high growth ability of this plant (Arifin 2003). *Anabaena azollae* has high nitrogen fixation ability from the air (van Reine&Trono 2001). Fast growing ability and high quality nutrient plant were the potential of this plant as animal forages. The environment condition such as grown media, is one of the main factor that determines productivity and quality of *Azollapinnata*.

Nitrogen Absorption Effectiveness of *Azollapinnata* on CultureMedia

The results of N absorption from culture media showed that absorption value for each treatment was high, more than 97.51% from total dissolved nitrogen in media (Table 1). This high absorption was not fully used by plant to grow. The total nitrogen content in media could be lost through several factors, such as plant immobilization, evaporation during N mineralization, and N-nitrate nitrification. The total amount of nitrogen that is absorbed by plant will affect productivity and quality of plant. Nitrogen plays an important role in forming all protein, chlorophyll, coenzyme, amino acids, and also growth hormones like cytokinin and auxin (Hanafiah 2010). A plant needs nitrogen supply at every stage of growth, moreover at early stage of growth. Cedergreen& Madsen (2002) said that aquatic plant has ability on absorbing N element in the form of NH_{4+} and NO_{3-} through its roots and leaves.

Table 1. The absorption of N media *Azollapinnata* culture

Media	N absorption (%)
Control	98.38
Control + 10% paddy field mud	97.51
NPK + 10% paddy field mud	99.10
compost + 10% paddy field mud	99.71

Doubling Time Cover Area (CA) of *Azollapinnata* Based on CultureMedia

Azollapinnata's CA doubling time is influenced by the characteristics of the planting media. Additional treatment of paddy field mud and fertilizer showed significant effect ($p < 0.01$) to the doubling time of CA as presented in Table 2. The addition of paddy field mud and fertilizer effectively accelerate *Azollapinnata* doubling time from 6.38 days to 3–4 days. Compost + 10% paddy field mud treatment is the fastest to doubling time of CA of *Azollapinnata*. This doubling time acceleration is reasonable because the addition of fertilizer improves nutrients adequacy for plants in its metabolism process. Hardjowigeno (1995) stated that the plant productivity is very determined by the soil nutrient status and the use of fertilizer, so the nutrient supply is adequately well. *Azollapinnata* has replication capability in 3–10 days (Hasan & Chakrabarty 2009).

Table 2. Doubling time cover area *Azollapinnata* based on culture media

Media	Doubling time cover (day)
Control	6.38 ± 0.29 ^D
Control + 10% paddy field mud	4.24 ± 0.13 ^C
NPK + 10% paddy field mud	3.98 ± 0.08 ^B
compost + 10% paddy field mud	3.79 ± 0.04 ^A

Biomass Production of *Azollapinnata* Base in CultureMedia

The results showed that the addition of paddy field mud and fertilizer to the *Azollapinnata* culture media significantly increased ($p < 0.01$) biomass production (Table 3). The best increase in biomass production was in the compost + 10% paddy field mud media. It indicates that the nutrient adequacy in compost + 10% paddy field mud media is better than the others. According to Taiz & Zeiger (2002) that a complete nutritional content media consisting of macronutrients and micronutrients. Prihantoro *et al.* (2014) stating



that Lemna minor productivity is optimal when added with fertilizer that contains complete macro- and micro-minerals needed for plant growth.

Table 3. Fresh biomass production rate of *Azollapinnata* based on culture media

Media	Doubling time cover (day)
Control	1.34 ± 0.69 ^c
Control + 10% paddy field mud	3.57 ± 0.69 ^b
NPK + 10% paddy field mud	4.17 ± 0.57 ^b
compost + 10% paddy field mud	6.16 ± 0.58 ^a

Protein Content of *Azollapinnata* Based on Culture Media

The results showed that the addition of paddy field mud and fertilizer significantly ($p < 0.05$) increase the protein content of *Azollapinnata* (Table 4). NPK + 10% paddy field mud treatment was the highest ($p < 0.05$) in improving the crude protein content of *Azollapinnata* compared with the others. Increasing of protein value illustrates the plant has high effectiveness in using nutrient component from the media that would be a positive impact on improving the protein content. Parman (2007) said that increased nutrients uptake will contribute to plant protein synthesis which resulted in increased protein content in plant tissues.

Table 4. Crude protein content of *Azollapinnata* based on culture media

Media	Doubling time cover (day)
Control	14.86 ± 0.84 ^c
Control + 10% paddy field mud	09.19 ± 0.37 ^b
NPK + 10% paddy field mud	23.66 ± 0.10 ^a
compost + 10% paddy field mud	20.78 ± 1.43 ^b

Conclusion

Azollapinnata has high dissolved N absorption ($\geq 97.51\%$). Paddy field mud and kinds of media treatments significantly shortened doubling time cover area, biomass production and protein content compared with control. Compost + 10% paddy field mud is the best media to shorten doubling time cover area with the highest biomass production.

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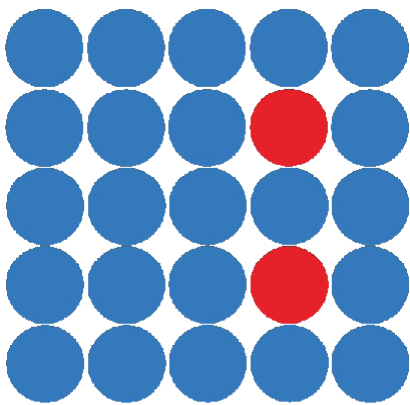


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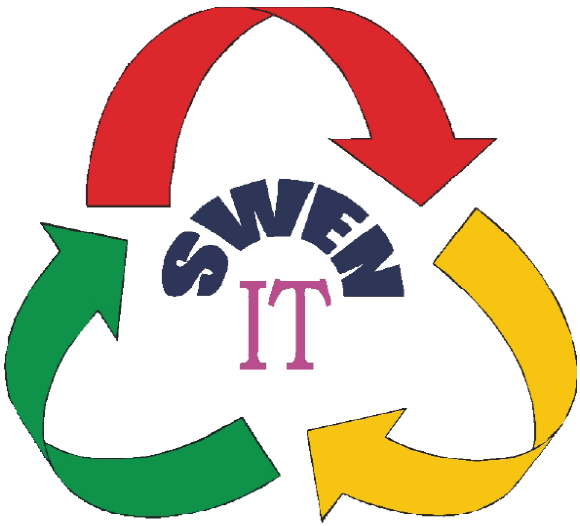
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