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**FACULTY OF ANIMAL SCIENCE
BOGOR AGRICULTURAL UNIVERSITY**

THE SECOND INTERNATIONAL SEMINAR ON ANIMAL INDUSTRY
"Empowering Local Resources for Sustainable Animal Production in Adapting
to Climate Change"

Jakarta Convention Center, Jakarta-Indonesia
5-6 July 2012

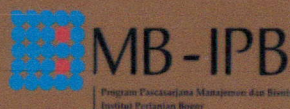
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The Second International Seminar on Animal Industry

“Empowering Local Resources for Sustainable Animal Production in Adapting to Climate Change”
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FOREWORD FROM CHAIRPERSON OF ORGANIZING COMMITTEE

Dear colleagues,

It is my great pleasure to welcome all of you to the Second International Seminar on Animal Industry 2012, and to Jakarta the capital city of Republic of Indonesia. This seminar is conducted by the Faculty of Animal Science - Bogor Agricultural University in collaboration with Animal Scientist's Association of Indonesia, Indolivestock 2012 Expo and Forum, Directorate General of Higher Education – Ministry of Education and Culture Republic of Indonesia, Directorate General of Livestock and Animal Health Services-Ministry of Agriculture, as well as Journal of Animal Science and Technology (Media Peternakan).

There will be 131 papers presented during the seminar consisted of 12 papers from invited speakers, and 119 papers from participants in which 72 papers will be presented orally and 47 papers will be presented as posters. The invited speakers come from several different countries including Australia, England, Japan, South Korea, South Africa, Sweden, Switzerland, United States of America, and of course Indonesia. The presenters for supporting papers come from several countries namely Malaysia, Thailand, Turkey, Iran, Irak and Pakistan, as well as from 22 different universities and research institutes in Indonesia.

This is a great opportunity for all of us to share knowledge and experience regarding the advanced development of animal science and technology in different part of the world especially related to the recent climate changes which may interferes animal production system. By closely collaborating and sharing information we will be able to overcome the problems better, faster and more comprehensive.

On behalf of the organizing committee, I would like to express my sincere thanks to Directorate General of Higher Education - Ministry of Education and culture for funding this seminar through Himpunan Profesi Grant, also to PT. Napindo Media Ashatama for partly funding the seminar and to Director General of Animal Livestock and Animal Health Services – Ministry of Agriculture for his support and collaboration. Thanks are also addressed to our sponsors namely PT. Nutreco, PT. Cheil Jedang, PT. Sinta Prima Feedmill, PT. Kaltim Prima Coal, CV. Swen IT. This seminar is also supported by some units of Bogor Agricultural University namely Department of Nutrition and Feed Technology, Department of Animal Production and Technology - Faculty of Animal Science, Graduate School, Diploma Program, and Graduate Business School.

Last but not least, I would like to thank the organizing committee who has been working very hard to make this seminar a successful event. For all participants, I

apologize for the inconveniences before, during, and after the seminar. I wish all of you will have a great time and a fruitful discussion. Thank you.

Jakarta, July 5th, 2012
Chairperson of Organizing Committee
Prof. Komang G. Wiryawan, Ph.D

Assalamualaikum warahmatullahi wabarakatuh

First of all, I would like to extend my warm welcome to all participants of the Second International Seminar on Animal Industry 2012 to Jakarta Convention Center. Together with us in this seminar are delegates from various parts of the world: South Africa, Switzerland, Japan, Australia, UK, Sweden, South Korea, Pakistan, United States of America, Turkey, Iran, Iraq, Thailand, and a part from the local delegates, our colleagues from various universities in Indonesia from Sabang to Merauke, representatives from the government livestock service agencies, research center as well as businessmen.

It is an honor for me, the Dean of Faculty of Animal Science, Bogor Agricultural University to be able to host such an important seminar. Let me begin by acknowledging the Nafindo-Media Tama Limited Corp. and Animal Scientific Society of Indonesia for their collaboration in organizing this event. In this special occasion, I would like to express my appreciation to Dr. Ir. Suswono, MSc., the Indonesian Minister of Agriculture for his support and encouragement. We also extend our gratitude to Directorate General of Higher Education, Indonesian Ministry of Education and Culture as main sponsor of this seminar. My appreciation goes to all invited speakers for their willingness to share their knowledge and experiences. To all participants and sponsors, I would like to express my great appreciation for their participation and organizing committee. I would like to express my sincere hope that the best effort to make this event successful.

Animal production is a subject that is very intense we hear daily. It affects the economy of a country including animal production system. The quality of the animal production system will determine our survival. The emphasis of the government in this sector is seen as a leverage factor of the development of animal industry. The development of animal industry is vital in producing significant contribution to animal production system as a whole.

The objective of this seminar is primarily to present the development of science and technology innovations in animal industry, to disseminate the results of animal research on livestock production improvement to broaden perspectives of stakeholders in livestock production and contribute to animal industry development with regard to animal breeding and genetic, feed and nutrition, animal

REMARKS FROM DEAN OF ANIMAL SCIENCE FACULTY

Ladies and Gentlemen,

Assalamualaikum warahmatullahi wabarakatuh

First of all, I would like to extend my warm welcome to all participants of the Second International Seminar on Animal Industry 2012 to Jakarta Convention Centre. Together with us in this seminar are delegates from various parts of the world: South Africa, Switzerland, Japan, Australia, UK, Sweden, South Korea, Pakistan, United States of America, Turkey, Iran, Irak, Thailand, and a part from the local delegates, our colleagues from various universities in Indonesia: from Sabang to Merauke, representatives from the government livestock service agencies, research centre as well as businessmen.

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Ladies and Gentlemen,

Global climate changing is a subject that is very intense we hear lately. It affects all sectors of our life including animal production system. The ability of our stakeholders to adapt to it will determine our survival. The emphasis of the seminar is on animal industry as this sector is seen as a leverage factor of the animal production system. The development of animal industry is vital in producing significant contribution of animal production system as a whole.

The objective of this seminar is primarily to present the development of science and technology innovations in animal industry, to disseminate the results of animal research on livestock production improvement, to broaden perspectives of stakeholders on potencies, prospects, and constrains on animal industry. Issue strategic with respect to animal breeding and genetic, feed and nutrition, animal

management and production, animal product's technology, socio-economic and policy, as well as animal disease and its prevention will also be discussed in depth.

Ladies and Gentlemen,

As we are all aware, the impact of globalization upon us is becoming manifest. To be able to join the mainstream, we have to improve our local competitiveness and uniqueness through optimalization of our local resources utilization. What needs to be strengthened may include persistency of culture identity since animal production systems in several countries are not only socio, technologic or economic aspects of the people. It is a culture of life.

Ladies and Gentlemen,

Over the next two days, I believe you will be discussing issues and matters regarding the empowering local resources for sustainable animal production in adapting to climate change. This seminar will include discussions based on more than 119 paper presentations that cover issues and topics encompassing animal breeding and genetic, feed and nutrition, animal management and production, animal product's technology, socio-economic and policy, as well as animal disease and its prevention. I believe you will find such topics interesting. Because the speakers are well known in their respective fields and will be able to provide you with the current state of the art of animal industry development in their region.

On this occasion, we will have the opportunity to work together to improve our contribution to animal industry development for the future. We have been fortunate enough to be given a great opportunity whereby we can learn from each other. I also hope that all of you will use this opportunity to strengthen the existing network. I am sure that all participants will greatly benefit from this seminar.

Let's get our act together for excellence and quality in research so that we can improve our contribution to the development of animal industry in the future.

Wabillahi taufiq wal hidayah
Wassalamualaikum warahmatullahi wabarakatuh

Jakarta, July 5th, 2012
Dr. Ir. Luki Abdullah, M.Sc.Agr.
Dean

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Training Programme of Biogas to Minimize Environmental Pollution in the Tempok Village Sub Tompasso District

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Abstract

The cattle in the village Tempok traditionally maintained, in the sense that no caged animals. On the afternoon of cattle grazing in the garden, the evening brought home and left on the home page. The problem, waste of cattle can cause environmental pollution. Based on the problems of making biogas training was conducted with the aim to increase knowledge and awareness of peasant farmers in minimizing environmental pollution and produce biogas reactor. The goal of this group was the farmers' cattle Pinatoroan and Samperongan. The method used of the application of science and technology was extension and training program of making biogas. Waste of cattle produces methane (CH₄), which can increase greenhouse gas emissions. One of the activities that can be done is processing of biogas as an effort to improve environmental quality. Biogas reactor is made of 2 pieces and has successfully seen the fire coming out of the stove. This activity is done to reduce greenhouse gas emissions produced from waste of cattle. The result of the application of science and technology was to increase knowledge and awareness of peasant farmers in minimizing environmental pollution. Biogas reactor produces gas as a fuel substitute. Benefits derived from these activities is to reduce expenditures for kerosene, reducing the dependence of fuel wood, the home page be clean, pleasing to the eye and reduce odor.

Keywords: biogas, cattle waste, environment

Introduction

According to Putro (2007), global energy crisis caused world oil prices reached U.S. \$ 70/barrel. This condition influenced the life of Indonesian including rural people of the districts Tompasso. There is a need to provide an alternative energy supply through development non-fuel energy technologies which are environmentally friendly.

flammable gas. The CH_4 gas content in the biogas produced from cattle waste in this training were about 60%.



Figure 1. Biogas Reactors using Drum (Oley *et al.*, 2009)

The biogas reactor was connected to the reservoir gas, methane gas generated out through the hose to the gas reservoir. The resulting methane gas can come out through the hose from the gas reservoir to the gas stove. After 4 weeks, the gas can be heated up and used for cooking. Biogas production could partially replace fossil fuel energy so as to reduce the environmental impact. Biogas was cleaner fuels and renewable energy (Schievano *et al.*, 2009). Furthermore, Barnhart (2012) said that household-scale biogas technology could be used for cooking as a substitute to firewood and improved human health and the environment.

Training of making biogas for cattle farmers in the village of Tempok very beneficial to the availability of fuel energy. As a result, household expenditures for kerosene, which was increasingly expensive and scarce, could be suppressed. In addition, this activity could be beneficial for reduction of environmental pollution. According to Simpson (1979), biogas production may also benefited from reduction of flies and mosquitoes reproduction cycle. While, Aklaku *et al.* (2006) explained that the presence of biogas as an energy source would free the farmer from the dependence on wood fuel, reduced bad smell and the presence of animal pests such as flies. According to Biyatmoko and Wijokongko (2011), an important benefit of biogas as a fuel alternative was because of it was cheap, the raw materials were easily available, and because it was environmentally friendly. Methane gas that will burn and destroy ozone could be optimally utilized as a source of fuel in rural communities.

According to Amjid *et al.* (2011), the opportunity cost of women increased in the presence of biogas and gave a positive impact on households. But its application as an alternative energy source was limited because of several problems including costly investment for development of each farmer. Widodo *et al.* (2009) conducted a

Based on joint decision of the Minister of Home Affairs and Minister of Agriculture, No. 54 of year 1996: 304/KPTS/L.P.120/4/96, about Guidelines for Implementation of Agricultural Extension, a program to improve farmer groups, based on local conditions and potential resources, and considering the strategic environment that influence it, have been run (Department of Animal Husbandry, 1998). The program was primarily intended for low income rural households. One energy technology in accordance with the requirements of the rural households was biogas technology. According to Srisertpol *et al.* (2010), biogas was one kind of energy and sustainable development that were essential to energy and environmental planning. Biogas from cattle waste could substitute kerosene which were expensive and scarce in rural area.

In District Tompaso there were two groups of cattle farmers, namely group of cattle farmers Pinatoroan and Samperongan. The groups maintained their cattle traditionally and extensively. On the morning until late afternoon the cattle were let grazing in the field. In the afternoon, around 18:00 o'clock, the cattle were brought back and let slept in their home yard. The system caused environmental problem due to unmanaged of the cattle dung (El-Hadidi and A-Turki, 2007).

Based on these problems, we conducted a program to use cattle waste to make biogas. The purpose of program was to train members of the cattle farmer groups to convert their cattle waste into biogas. This program were consisted of two activities namely extention service and training. These activities were done as efforts to increase awareness of the cattle farmers in minimizing environmental pollution.

Materials and Methods

Based on the background and the problems above, extention service and training for groups of cattle farmers Semporongan and Pinotoroan have been conducted. Pinotoroan group consisted of 23 members while the Samperongan group have 20 members. In livestock development, especially beef cattle, extension service take an important role especially in strengthening of farmer groups and increase adoption of farm technology (Abdullah, 2008). Extension service that have been conducted in the rural Tempok were aimed at changing of the farmer behavior toward a better direction (Pambudy, 1999). Materials and media used were brochures and LCD projector. After the extension services, the farmers were trained in making biogas reactor and how to produce biogas. Materials and equipment used was waste of cattle, two old drum container, hoses, and gas stove. Extension service have been successfully carried out can be seen from the compactness of the group members in response to the manufacture of biogas. Technology adoption is measured from the biogas reactor has been successful in producing a flame.

Results and Discussion

The number of cattle owned by members of the Semporongan group was 55 and Pinatoroan group owned 64 cattle. The cattle were privately owned by the group. The cattle released waste daily. Unmanaged cattle waste produced methane (CH₄), which increased greenhouse gas emissions (GHG). Methane was a greenhouse gas that accumulates in the atmosphere due to human activities (Masse *et al.*, 2003). Therefore, cattle farming have been blamed to cause global warming.

Livestock waste was a potential source of CH₄ emissions (Moss, 1993 in Masse *et al.*, 2003). Therefore, it should be converted into biogas. According to Yiridoe *et al.* (2009), production of biogas in general, was considered financially feasible if it was made from 50 cows or 200 sows.

In average, a family energy needs for cooking was 2000 liters per day. According Putro (2007), household cooking energy needs can be met from waste of 3 cattle. Therefore, biogas produced by the group was considered financially feasible (numbers of cattle owned by the group were more than 50 with average of cattle owned was 3).

Biogas technology has been introduced and developed quite a long time in Indonesia (Widodo *et al.*, 2009). Biogas technology can be applied to the scale of household, commercial or village (Eze, 2009). Bond and Templeton (2011) explained that the biogas contains 50-70% CH₄ and 30-50% CO₂. In nature, methane gas was always there, but there was a need for equipment and specific conditions to accelerate the formation of gas (Putro, 2007).

Biogas reactor was a device that can process waste into biogas. Each biogas reactor unit had been made from two drum container. The other two drums were used to build a gas reservoir. Cattle waste was mixed with water in the ratio 1:1, stirred until dissolved and then inserted into the biogas reactor. Biogas reactor was made simply to be accessible to the farmers (Figure 1). Lo *et al.* (1984) noted that unwillingness of North American farmers to adopt the biogas technology were due to the high capital investment for construction of biogas. The earlier reactor had been made for converting pig waste (Adl *et al.*, 2012).

A larger drum with a capacity of 200 liters were filled with water. The drum served as a control gas formation. Then a smaller drum with a capacity of 120 liters were then be put into the larger. The drum were fed with fresh cattle waste every day. The biogas process could reduce the ratio of carbon to nitrogen (C/N) 21.82 to 14.19 (Chen *et al.*, 2010).

The biogas were resulted after 3-4 weeks of cattle waste conversion in the biogas reactor. Biogas was produced by bacteria that convert organic material in the absence of oxygen (anaerobic process) (Putro, 2007). This process took place during processing or fermentation. The resulted gas was consisted mainly out of CH₄ and CO₂. If the content of CH₄ gas was more than 50%, then the mixture was highly

study to develop a biogas reactor for scale of the group farmers. In this case the development of the village Tempok need government intervention. According Biyatmoko and Wijokongko (2011), there was an urgency for socialisation of biogas uses and improving public perceiving in biogas utilization. This condition, especially in rural communities, including improvement of capacity in technical and management digester care.

Conclusion

Application of science and technology can improve farmer knowledge and awareness of in minimizing environmental pollution. The availability of two units of biogas reactor in the Tempok Village produced gas that can be used as a fuel substitute for petroleum. Benefits derived from these activities were reduction of expenditures for kerosene, reducing the dependence on fuel wood, produced a better environment for the farmer by means of cleaner yard and less smell of cattle waste.

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