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

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The 16th AAAP Congress

Ministry of Agriculture
Indonesian Society of Animal Sciences
Gadjah Mada University
SUSTAINABLE LIVESTOCK PRODUCTION IN THE PREerspective OF FOOD SECURITY, POLICY, GENETIC RESOURCES, AND CLIMATE CHANGE

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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.


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.


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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)

[Signature]

Budi Gunarto
Chairman of the 16th AAAP Congress
Sekamat 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).

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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Membrane Status, Acrosome and Sperm Quality of Ongole Cross Bred Bull After Sexing Using Percoll Density-Gradient Centrifugation and Albumin Separation

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ABSTRACT

Sexing of spermatozoa has various methods such as Percoll density-gradient centrifugation and albumin separation. The study was assessing the membrane structure and bovine sperm quality using both methods after sexing until freezing processes. Semen sample was collected routinely twice a week using artificial vagina from one Ongole crossbred bull aged 2-4 years. The treatment using Percoll density-gradient centrifugation method was applied for 5 min and albumin separation method was done for 10 min. Semen quality was indicated by the percentage of sperm motility. The acrosome status was evaluated using FITC-PNA staining while the membrane status was observed by Scanning Electron Microscope (SEM). The observation was focused on Y sperm populations in which Percoll density-gradient centrifugation method was applied on the top layer while albumin separation was applied on the bottom layer. The study show that the sperm motility after sexing using albumin separation and Percoll density-gradient centrifugation were 61.4±5.30% and 67.55±5.30% respectively. The sperm motility after freezing using albumin separation and Percoll density-gradient centrifugation were 34.5±6.85% and 36.5±13.13% respectively. The SEM analysis shows that before sexing the condition of membrane in fresh semen and the connection between the sperm head and its tail were good, but it became damaged after sexing and freezing processes.

Key Words: Sexing, Sperm motility, Ongole crossbred cattle

INTRODUCTION

The possibility of gender pre-selection has always generated great interest among livestock producers and cattle industry. Sexed semen could increase the profitability of beef industries through production of the desired gender offspring. The best examples would be production of males for meat production. In Holstein cow, AI strategies using sexed semen have significantly modified the net profit (Hossen-Zadeh et al. 2010). Determination of the bovine offspring sex is very important for livestock farming, particularly for cattle genetic improvement (Alves et al 2006). For the separation of bovine X or Y Chromosome bearing spermatozoa (X or Y sperm) satisfactory result have been obtained through centrifugation of spermatozoa on two percoll discontinuous density gradients. In cattle Schwiderski et al (1991) used two centrifugations in percoll discontinuous gradients, consisting 10 layers of 0.6 mL of percoll solution with densities ranging form 1.034 to 1.068 g/ml. This method has provided an enrichment of over 75% and 65% of X or Y sperm fractions above and below, respectively, as verified by in situ hybridization. According to Susilawati (2003) it can be separated, non-negative effect on spermatozoa separation, easier in releasing from substance as well as creating their own gradient on centrifugation. Sexing using percoll density gradient centrifugation method with 850G x g velocity for five minutes can afford 85 percent on X and Y sperm separation which identified based on the length and head of spermatozoa (Susilawati 2000).
MATERIALS AND METHODS

Fresh semen samples were routinely collected twice a week from two Simmental bulls aged 4-9 years using artificial vagina at Airlangga University Laboratory. The sperm which had individual motility more than 70% were selected for the freezing process.

Sexing using Percoll density-gradient centrifugation and albumin separation was applied in this research, and it was replicated 10 times.

One ml semen was placed in a tube containing Percoll gradient concentration and centrifuged at 850 x g for 5 and 7 min. Two ml liquid from the centrifugation result was taken from the bottom fraction (X sperm population) as well as from the top fraction (Y sperm population). Moreover, they were washed in 3 ml of Andromed and centrifuged at 550 x g for 5 min. After centrifugation, the supernatant was carefully removed. Then, bottom fraction (2 ml) of sorted semen which contained more spermatozoa was taken (Susilawati, 2000).

Two ml liquid was taken from the top and the bottom fraction and each of them was added with 2 ml of Andromed extender. Then, these liquid were put in a tube containing warm water (30°C) and there were placed in cool tube (4°C). After the temperature decreased to 5°C, the diluted semen was inserted into straw (0.25 ml), and evaluated using Scanning Electron Microscope. Straw was equilibrated by putting it in liquid nitrogen steam for 10 min, and then put it in liquid nitrogen at -179°C. After 24 hours, straw was thawed by placing it in warm water (47°C) for 7 minutes (Hopkins and Evans, 2003).

Motility analysis using a light microscope while using haemacytometer concentration (Ax, et al., 2008). The acrosome status of sperm samples was assessed with fluorescein isothiocyanate-conjugated peanut agglutinin (FITC-PNA) using a slightly modified version of the procedure described by Fazeli et al. (1997). The media as well as the semen preparation procedure was modified from the Laboratory of Scanning Electron Microscopy (Laboratory of Scanning Electron Microscopy, 2012). Descriptive statistical analysis were applied for analyzing the data.

RESULTS AND DISCUSSION

The study shows that the sperm motility after sexing using albumin separation and Percoll density-gradient centrifugation were 61.4±5.30% and 67.55±5.30% respectively. The sperm motility after freezing using albumin separation and Percoll density-gradient centrifugation were 34.5±6.85% and 36.5±13.13% respectively. To observe that the acrosome status reagents developed a material, it can be observed in the acrosome status at the head of spermatozoa that contain fluorescein isothiocyanate-conjugated peanut agglutinin - FITC-PNA. The results of observations in each treatment is shown in Table 1. This suggests that the fresh semen contain 69.16±8.85 intact spermatozoa. This indicates that the spermatozoa in the fresh condition is still covered by intact acrosome, while sexing semen and frozen semen increase the number of ½ head end of spermatozoa covered by fluorescent. This suggests that the process of sexing and freezing triggers the acrosome reaction or acrosome not intact, although only a few are undergoing the acrosome reaction (acrosome not intact).
Figure 1. The results of staining with FITC–PNA
A. Acrosome intact spermatozoa  B. 1/2 fluorescent  C. Fluorescent at the top of the head

Table 1. Average ± SD picture of the acrosome reaction in various treatment

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<td>Fresh semen</td>
<td>69.16 ± 8.85</td>
<td>16.20 ± 14.26</td>
<td>11.07 ± 4.34</td>
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<tr>
<td>Frozen semen, without sexing</td>
<td>48.26 ± 45.10</td>
<td>49.89 ± 43.78</td>
<td>2.56 ± 0.57</td>
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<td>X- Sperm Frozen, After sexing using Gradient Density Centrifugation</td>
<td>44.61 ± 16.82</td>
<td>44.76 ± 19.66</td>
<td>10.78 ± 3.98</td>
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<td>Y- Sperm, After sexing using Gradient Density Centrifugation</td>
<td>42.62 ± 19.92</td>
<td>51.28 ± 20.94</td>
<td>18.12 ± 26.21</td>
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<td>X- sperm Frozen, After Albumin Separation</td>
<td>51.68 ± 10.02</td>
<td>32.28 ± 19.22</td>
<td>25.29 ± 18.86</td>
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<td>Y- Sperm Frozen, After Separation</td>
<td>32.70 ± 13.57</td>
<td>41.96 ± 23.02</td>
<td>14.25 ± 7.41</td>
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Spermatozoa sexing results using percoll density gradient centrifugation also has the same trend with no sexing and Y spermatozoa in the population is less intact spermatozoa compared to the acrosome reaction or absence of the acrosomal cap. The same trend also occurred in the sexing treatment with egg white albumin sedimentation method it shows that the spermatozoa are more susceptible to the loss of the acrosomal cap of X sperms or the possible effects of centrifugation is more effect on the Y sperms than X-sperm. The SEM analysis shows that before sexing the condition of membrane in fresh semen and the connection between the sperm head and its tail were good, but it became damaged after sexing and freezing processes.

CONCLUSION

Spermatozoa after sexing by percoll density gradient centrifugation method then in freeze was better quality than when done sexing by using egg whites sedimentation, this is caused by damage to the membrane and also in accordance with more non-intact spermatozoa acrosome.

REFERENCES


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Universitas Gadjah Mada, Yogyakarta – Indonesia
10th - 14th November 2014

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