

The population of buffalo is declining sharply in Indonesia during the last 20 years. The data show that by year 1990, there were 3.5 million heads, then drop to 2,5 million head within 10 years. It seems that the decrease of the populations is continuously and timescale gets narrow. Based on the year 2011 census, the buffalo population was 1.3 million head, while prediction for year 2013 according to agriculture census, the buffalo population is approaching 1 million heads. Therefore, it is important to develop strategies to overcome the problems. The conference recommends, as follows:

- ⇒ To establish a communication forum for those who are interested in buffalo development.
- ⇒ To establish the Center for Indonesian Buffalo Development in NTB.
- ⇒ To establish Indonesian Buffalo Association (IBA) involving Academic, Businessmen, Government, Community, and International Buffalo Federation.
- ⇒ The International Conference on Buffalo is recommended to be conducted every two years.
- ⇒ All information that rose from this conference will be informed to all related stakeholders who are interested in buffalo development (Ministry of Agriculture, Ministry of Research and Technology, Ministry of Education and Culture, etc).
- ⇒ For communication between scientists who are interested in buffalo development, the Indonesian Buffalo Association will publish a scientific journal.

These recommendations are made on occasion of the Buffalo International Conference 2013, in Makassar, 4-5 November 2013 and signed by the the following senior scientists. The recommendation is called MAKASSAR DECLARATION

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Dear colleagues,

I have the great honor of welcoming all delegates, speakers, and invited guests to the Buffalo International Conference 2013. The conference is hosted and by the Faculty of Animal Science, Hasanuddin University, Makassar, Indonesia with the theme "Buffalo and Human Welfare". The theme covers a wide range of very interesting issues relating with the many roles that the buffalo hold in human welfare, the problems associated with that, and the developments or solutions to address the problems, locally, nationally, and internationally.

The buffalo plays an important role not only for fulling the need for red meat but also for cultural role in several communities. At the very heart of South Sulawesi, the district of Toraja is home to the endangered spotted buffalo. Despite endangerment, the spotted buffalo is in high demand for its pivotal role in Toraja's traditional culture. I wish for delegates to actively engage in discussion on the role of buffalo in their own societies and countries and what developments have been implemented, and therefore we look forward to hear our distinguished colleagues report on their recent research developments.

We have with us today representatives from research institutions, universities, livestock practitioners, and the government. I hope that this two day conference, a multinational platform in the current issues of buffalo development, will challenge all delegates to think about the issues and responses to those matters, and in turn inspire novel and applicable solutions to the situation.

Let me use this opportunity to thank the Rector of Hasanuddin University for his fully support to the event. I would like also to thank the Minister of Agriculture, the governor of South Sulawesi, and to the all sponsors for their invaluable contribution to this event. A deep appreciation is presented to the organizing committee for their hard work and effort to make this event to happen. We hope that this International conference can be the first of many to come in the future.

Finally, I sincerely hope that you will benefit from the conference through learning from each other, meeting people and building up friendship between each other, and enjoying your time in our beautiful campus and city. I wish everyone a successful and fruitful conference.

With best wishes,

Prof. Asmuddin Natsir

President of Buffalo International Conference 2013

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BUFFALO PRODUCTION AND RESEARCH IN INDONESIA: Obstacles and Opportunities

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Abstract

Buffalo is one of large ruminants playing pivotal roles in supporting the daily life and socio-economy of the Indonesian farmers. They primary utilize them as draft animal, meat and milk production, supporting some momentous religion and cultural obligations. Buffalo is mostly raised under traditional management systems with no special attention or treatment has been given to their feeding, breeding, reproduction, and health systems. Buffalo is a unique animal and they can still survive and reproduce even while consuming low quality roughage and living in harsh ecological condition. Presently, there is a limited scientific data and information has been published in relation to factors affecting the husbandry and distinctiveness of Indonesian buffalo. This paper firstly reviews and elucidates the current progress and obstacles of buffalo production. Then the research progress, opportunity and challenge for buffalo developments are outlined; and ultimately, considerable developmental strategies are formulated in order to improve the quantity and quality of Indonesian buffaloes.

***Keywords:** buffalo, draft animal, culture, meat, milk, religion obligation, ruminant, socio-economy*

A. Introduction

As one of the large ruminant animals, buffalo has long time been known to contribute to many aspects of life of Indonesian societies. Suhubdy (2013a) reviewed that the “socio-cultural roles” of buffalo has been the main factor making it is still existed and kept by the Indonesian farmers. Besides that, buffalo is a unique ruminant that has an ability to survive and reproduce even though rearing in harsh environment and consuming low quality roughages. These conditions may be related to its anatomy and physiology of the digestive system that can naturally be adaptive to variety of environment and climate change, large capacity of reticulo-rumen, huge and variety of

microbes living in the rumen, and longer retention time of feed ingesta, compared to those of cattle (Suhubdy, 2013b). Those adaptive differences are the main differences that the buffalo could be found in all islands of Indonesia.

Even though buffalo has given a significant contribution to society, this livestock has been given lack of attention and neglected resources. Limited numbers of animal scientists in this country are interested to conduct such scientific research for development of buffalo. In addition, intensive in country cattle development program is becoming the main obstacle and threat to the existence of buffalo. For example, in some cases, budget for buffalo developments from the federal government could be shifted to support the cattle development program in the provincial level. Meanwhile, the national beef self-sufficient program known as *Program Swasembada Daging Sapi dan Kerbau - 2014 (PSDSK-2014)* is threatened failure due to several factors such as too concentrated to cattle as main sources of beef, miscalculation of the number of cattle's population and its structure, global livestock trading, and lack of recording of data and information of cattle as well as other potential livestock for beef production (Suhubdy, 2013b).

Therefore, this paper was written firstly to review the current state of art of buffalo production and development; secondly identification of obstacle of buffalo husbandry and research; and lastly several formulated strategies for buffalo research and development are proposed.

B. Dynamic of Buffalo Population and Production

According to available data, the number of buffalo in Indonesia tends to decrease every year by average 3%. In 1991 the number of buffalo was 3.3 million, while in 2011 was 1.3 million head (Dirjennak, 2012). Table 1 illustrates the population of buffalo in Indonesia as recorded based on the National Self-sufficient Meat Production Program 2011 (PSPK-2011).

Islands	Population	Percentage (%)
<i>Sumatera</i>	<i>512,816</i>	<i>39</i>
<i>Java</i>	<i>363,008</i>	<i>28</i>
<i>Bali, NTB, and NTT</i>	<i>257,587</i>	<i>20</i>
<i>Kalimantan</i>	<i>41,541</i>	<i>3</i>
<i>Sulawesi</i>	<i>110,393</i>	<i>8</i>
<i>Maluku and Papua</i>	<i>19,671</i>	<i>2</i>
Indonesia	1,305,016	100

Source: Dirjennak (2011).

Buffalo is spread out all over the country in which the population is more concentrated in four islands such as Sumatera, Java, Nusa Tenggara, and Sulawesi. The density of population in those islands is actually related to the use and role of buffalo in society as meat production, draft power, and cultural obligation (Suhubdy, 2013a). In some region, like in Tana' Toraja (South Sulawesi), the role of buffalo is very significant in supporting their cultural obligation (*Rambu Solo*). Every year in this region people kills huge number of the male buffalo. This event could be notable as one of the cause of the loss of genetic potential and in turn decreasing the number and quality of buffalo in Indonesia (see Toban Batusama in this volume). Besides, the use of productive female as carabeef is also invested to the declining the number of buffalo population Suhubdy, 2013). In the future, properly handling to the causes of declining the population may be very important in managing the dynamic of buffalo production, population, and developments.

C. *Samawa* Declaration: a historical milestone for Indonesian buffalo developments

It was located in Sumbawa Besar, capital city of Sumbawa Regency (West Nusa Tenggara Province), 4-5 August 2006, the first National Seminar and Workshop (NSW) was conducted discussing about the role of buffalo livestock farming in supporting the national beef self-sufficiency program. This national seminar was organized by the Directorate General of Livestock Services (DGLS) Department of Agriculture Republic of Indonesia in collaboration with the Office of Livestock Services of West Nusa Tenggara Province and Sumbawa Regency. The seminar was officially attended by delegates from the central and regional government especially from the DGLS, researchers from university and research agency, livestock traders, and innovative farmers from over the country. From intensive discussion and several suggestions during this NSW and such consideration related to the potency and capacity of buffalo (*Bubalus bubalis*) as livestock, then officially conclusion and agreement have been taken into consideration are as follow: (1) it is an urgent need to breed and develop of buffalo livestock in Indonesia, and (2) for supporting the first agreement, fifteen-regency have been chosen as an initial location for breeding and developing of Indonesian buffaloes. Those regencies are *Sumbawa* (NTB), *Batanghari* (Jambi) *Ogan Komiring Ilir* (South Sumatera), *Sawahlunto/Sijunjung* (West Sumatera), *Padeglang* and *Lebak* (Banten), *Cerebon* (West Java), *Brebes* (Central Java), *Ngawi* (East Java), *Poso* (Central Sulawesi), *Tana Toraja* (South Sulawesi), *Kutai Kartanegara* (East Kalimantan), *Kota Baru* (South Kalimantan), and

Sumba Timur and *Sumba Barat* (East Nusa Tenggara). This decision and agreement is then known as ***Deklarasi Samawa*** (Samawa Declaration).

After seven years since this declaration initiated, many progresses and impacts have been achieved in particular to the activity of research and practical action for the development of locally available buffalo breeds. Those progresses and impacts are as follow:

- a. The establishment of National Roadmap of Indonesian buffalo development and breeding coordinated by the DGLS Department of Agriculture;
- b. Providing budgeting to support program and planning established in the National Roadmap;
- c. Officially directing the Provincial and Regional Livestock Services for elucidating and following up the mandates written down in the national roadmap to speed development of buffalo up by establishing the farmer group who will be conducting the breeding of buffalo in the village level;
- d. Suggesting the university and research institution to build collaboration with DGLS, regional government and/or farmers (breeders) to intensively conducting studies or scientific investigations to feeding, breeding, and management aspects of buffaloes; and
- e. Every year, scientific communication is established between researchers, government, businessmen, and farmers through national seminar and workshop of the Indonesian buffaloes.

It is important to summary that scientific communication has been periodically conducted (**Table 2**).

No.	Place and Year	Theme of Seminar and Workshop	Publication /Year
I	Sumbawa Besar (NTB), 4-5 August 2006	Buffalo farming for supporting the national beef self-sufficiency program.	Proceedings (2006) containing 33 scientific papers.
II	Muara Bulian, Batanghari (Jambi), 22-23 June 2007	Improving the productivity of buffalo in order to support self-sufficiency beef-2010.	Proceedings (2008) consisting 21 scientific papers and 9 action plan reports.

III	Tana Toraja (South Sulawesi), 24-26 October 2008.	Improving the role of buffalo in supporting the need of national beef.	Proceedings (2009) containing 16 scientific papers and 5 action plan reports.
IV	Brebes (Central Java), 11-13 November 2009.	Upgrading productivity of buffalo through the application of reproductive technology in order to improve the prosperity of farmers.	Proceedings (2010) containing 27 scientific papers and 10 action plan reports.
V	Lebak (Banten), 2-4 November 2010.	Acceleration of breeding and development of buffalo through the local wisdom and technology innovation for the success of national beef and carabeef self-sufficiency and improving the prosperity of farmers.	Proceedings (2011) containing 33 scientific papers and 18 action plan reports.
VI	Samarinda (East Kalimantan), 21-22 June 2011.	Developing buffalo farming through utilization of the excellence of adaptability and technology innovation to support the national beef program.	Proceedings (2012) containing 33 scientific papers and 18 action plan reports.
VII	Bukit Tinggi (West Sumatera), 13-15 September 2012.	Establishing the grand design of national buffalo breeding.	Proceedings (2013) containing 33 scientific papers and 18 action plan reports.

Data in **Table 2** illustrate that attention has been given to Indonesian buffalo developments since 5 August 2006 the “Samawa Declaration” announced for the commitment of the central, regional, and local government including such several Faculty of Animal Science in Indonesia. After that, under the organization of *Balai Penelitian dan Pengembangan Peternakan*, Bogor series national seminars and/or symposia have been organized to have broader information related to buffalo developments in particular in provincial and regency levels. Each year of the seminar has communicated the local and national information regarding to government programs

and research and development that conducted in both universities and governmental research institutes.

Besides the scientific communication, the central government is also establish the roadmap and grand design for the buffalo development. This national document contains the strategies for applying in each potential regencies for breeding and developing the local buffalo breed. The central and the provincial governments joint together providing financial and technical support for this program. Since the *Samawa Declaration*, several national program have been launched for the development of Indonesia buffalo.

D. Buffalo production and research: an experience from *sumbawa buffalo*

It is realized that limited scientific data is available regarding to Indonesia buffaloes. This condition may be related to limited number of scientists who paid attention as well as funding agencies that interested to the development of Indonesia buffaloes. Consequently, there is limited publication available especially for production and reproduction aspect of Indonesian buffaloes. Many aspect of Indonesian buffaloes may be needed to record in order to make valid and reliable roadmap and grand design for buffalo developments.

For further consideration, we in this Centre have been conducted such investigation to understand the production and reproduction characteristics of Sumbawa buffalo (Table 3).

Table 3. Reproduction characteristics of Sumbawa buffaloes		
Variable	Unit/period	values
• Age of puberty (male vs female)	month	24.7 vs 27.2
• Age of first calving	year	3.98
• Estrus after post-partum	month	1.85
• Mating postpartum	month	4.62
• Conception rate	time (n)	2.69
• Duration of pregnancy	month	11.00
• Calving interval	month	17.30
• Age of first mating (male vs female)	year	2.54 vs 3.04
• Age of selling (male vs female)	year	4.77 vs 11.07
• Duration used in breeding (male vs female)	year	2.30 vs 8.00

Source: after Suhubdy at al. (2004)

Suhubdy at al. (2004) also reported that *sumbawa buffalo* produced milk 0.6 liter per day milk during the period of lactation for those female that raised under traditional management and it milk production could be improved till 3 liter per day when given supplemental feeding. The low rate of daily milk production is distinguished as main cause of high mortality rate of the calves. In this region, buffalo is raised by farmer under traditional management causing low productive rate. Therefore, it is a need to record all aspect of this buffalo and other Indonesia buffalo breed in order to improve their current condition.

Data of *sumbawa buffalo* is as an illustration of the condition of other Indonesian buffalo breeds. Intensive investigation may be needed to elucidate the potentiality of Indonesian buffaloes.

E. The Future of Buffalo Developments in Indonesia: Challenges and Opportunities

It was identified from survey to *sumbawa buffalo* and several publication related to Indonesian buffaloes that the following are obstacles to increase and develop of buffalo population (Suhubdy 2013b):

1. low level of milk production during the period lactation (± 0.6 liter);
2. the mortality of the calves were high (30-40%) due to feeble condition in the time of birth as a result of low status of nutrition during the period of pregnancy;
3. in the dry season, decreasing live weight and were susceptible to illness;
4. there was no farmer intervention in the progress of buffalo mating (such as artificial insemination);
5. there was no grassland area belong to farmers, and also no effort has been given to the improvement of communal grazing land;
6. many productive female buffaloes giving birth in onset of dry season (April-July) causing lack of calf's survival ability;
7. high rate of slaughtering of productive female; and
8. limited number of top bull available for breeding due to increasingly demand of the certified bull in country and overseas.

Survey in cybermedia (internet) conducted by Suhubdy (2011) cited by Suhubdy (2013) found that very rare scientific publication or article related to buffalo and related Indonesian livestock (**Table 4**).

Table 4. The number of information of scientific articles published in international scientific journals.

Keywords (terminology)	Scientific Journal	
	Journal of Animal Science of America (USA): 1910-2011	Journal of Dairy Science of America (USA): 1915-2011
• <i>sumbawa buffalo</i>	0	0
• <i>sumbawa horse</i>	0	0
• <i>ongole cattle</i>	9	0
• <i>madura cattle</i>	2	0
• <i>grati cattle</i>	0	0
• <i>sandalwood horse</i>	0	0
• <i>bali cattle</i>	9	3
• donkey	83	18
• llama	47	20
• deer	304	27
• buffalo	306	167
• horse	2,018	172
• goats	2,360	898
• sheep	10,282	1,157
• cattle	14,313	4,719
• livestock	6,880	1,016

Source: after Suhubdy (2013b).

It can be seen in Table 4, comparing information to other domesticated herbivores (cattle, goats, horse, and sheep); scientific information on buffalo is relatively limited. Meaning that there are more space for researchers to elucidate the biological, genetic, environmental, economical aspects of buffaloes. The challenges and opportunities for future research and developments of Indonesian buffalo are as follow:

1. Identification of biological characteristic and habitat of buffalo.
2. Establishing of the Indonesian feeding standard for buffalo and/or other herbivores.
3. Improving the feeding, breeding, and management aspects of buffalo.
4. Application of molecular techniques in elucidating the genetic potential of buffalo.
5. Identification of production (milk and milk) and establishing of the harvesting technology.
6. Identification of potentiality in socio-cultural and economic aspects of local breed.
7. Establishing the effective roadmap of research and breeding of Indonesian buffalo.
8. Application of biotechnology in all aspect of buffalo development.

9. Encouraging the scientists and researchers at universities and research institutes to be more aware of the scientific and economic of buffalo.
10. Establishing collaboration to international agencies that have interests to buffalo developments such as FAO, IFAD, CGIAR, IBF, ABA, and so on.
11. Internationalization of Indonesian buffalo by increasing the number and quality of scientific publications.

F. Concluding remark and Implications

Buffalo (*Bubalus bubalis*) is a potential and prospective ruminant that must be bred and developed for the prosperity of human being. There is limited data and information regarding to Indonesian buffalo and huge aspect of research need to be conducted for understanding the nature of buffalo. International and national collaboration must be established for supporting the development of Indonesian buffaloes.

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