THE CATTLE ARTIFICIAL INSEMINATION INDUSTRY IN MALAYSIA

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ABSTRACT. Artificial insemination (AI) technology is the most effective tool for genetic improvement in cattle. The AI service began in the 1960's and the number of annual cattle AI's has been steadily increasing up to 1990, after which it gradually dropped for about a decade. Since 2001 however there has been a modest recovery in the number of AI cases. In 2009 AI coverage stood at 4.2%. To rapidly improve the genetic composition of the cattle population in Malaysia, AI coverage needs to be increased to at least 10%. With AI costing up to RM85 per service, it will cost RM5.95 million annually to have a 10% AI coverage. This would annually input some 30,000 – 35,000 high quality animals into the cattle industry, a sufficient number to impact the industry. Full-time AI technicians and DIY inseminators need to be increased. Programmed training will also help improve service delivery. Private sector companies should be given incentives to provide AI services. Locally produced bovine frozen semen should be rebranded and better marketed so that the uptake by farmers will be increased, reducing the dependence on imported semen. The role of the NIVB in leading the development of cattle breeding in the country needs to be strengthened. Strategic international partnerships with world class centers of excellence should be pursued. With these interventions, the cattle industry will be able to improve product quality and cater not only for the local farming community but also the export market for tropical cattle genetics.

Keywords: artificial insemination, cattle, frozen semen, coverage

INTRODUCTION

Globally, artificial insemination (AI) in cattle has been commercially available since the 1930s (Foote, 2002). According to Mustafa (1974), in Malaysia the first usage of AI using deep frozen semen from ampoules was in 1963, when the semen was flown in from Australia to Singapore and then sent by rail to the Central Animal Husbandry Station in Kluang, Johor. This semen was from Holstein bulls and was used to inseminate Local Indian Dairy and Kedah-Kelantan crossbred cows. Subsequently frozen semen was imported from the United States of America, Great Britain, Denmark and Australia and used on farmers' cows. The initial impact of using AI was the obtaining of crossbreds with higher milk and beef production, the animals also being less susceptible to

TABLE 1: Number of Artificial Insemination Cases in Peninsula Malaysia (1981 – 2009)

Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Cases	13,375	15,466	19,282	20,459	20,532	19,930	22,072	19,533	22,787	25,864
Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Cases	19,145	23,372	24,862	22,393	15,972	22,325	19,243	16,560	15,845	17,527
Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Cases	16,208	18,276	16,867	15,810	15,676	18,369	19,021	19,752	18,599	

diseases as compared to the imported pure temperate breeds. As for the development of the artificial insemination service in individual states, Johore and Negeri Sembilan were the pioneers with the commencement of the service in 1963; followed by Selangor in 1965; Kedah, Perak and Terengganu in 1972; and Melaka, Pahang and Kelantan in 1973. In Perlis and Penang the service commenced after 1974. Many inputs were given to develop the Cattle Artificial Insemination Service in Peninsular Malaysia, particularly the technical training of a multitude of AI trainers and inseminators. Some of the early AI trainers received their training overseas from Japan, Australia and Sweden. In the early days, AI training for field technicians was undertaken at the Paroi AI Center in Negeri Sembilan and later this training moved to the Veterinary Training Center in Kluang, which is the site of the present day Malaysian Veterinary Institute. The Paroi AI Center transitioned briefly into the National Animal Breeding Center (NABC) and relocated to Air Hitam in Johore, before being developed into the National Institute of Animal Biotechnology (NIAB) based in Jerantut, Pahang and currently the National Institute of Veterinary Biodiversity (NIVB). The NIVB today has a Semen Bank and is the servicing centre for the artificial insemination service. The purpose of this paper is to show the trends in the utilization of artificial insemination in cattle and to suggest the possible interventions that can be taken to improve the impact of artificial insemination services within the country.

TRENDS IN ANNUAL INSEMINATIONS

The number of artificial insemination cases since 1981 is shown in Table 1 and illustrated in Figure 1. The number of annual cattle AI's has been steadily increasing since the early 1980's and was seen to peak in 1990. Thereafter the number of annual AI's dropped until 2002 when it started again to be on the rise. The larger number of annual AI cases in the 1980's mirror the development of the Dairy Industry in Malaysia. As the Dairy Industry grew, the dairy farmers demanded quality genetic material for their farms and relied a lot on

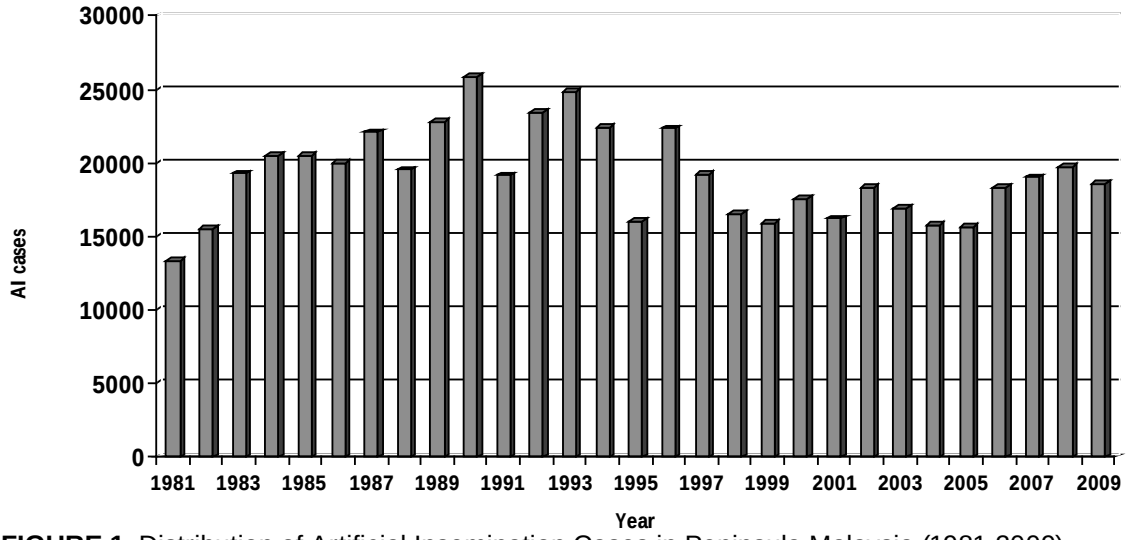

FIGURE 1. Distribution of Artificial Insemination Cases in Peninsula Malaysia (1981-2009)

the AI services provided by the Veterinary Services Milk Collection Centers, now called Dairy Industry Development Centers. The increase in AI cases since 2001 however is more related to the rise in artificial breeding of beef cattle and today inseminations with semen from dairy breeds about equal's inseminations with semen from beef breeds. This is at variance with world figures where inseminations with dairy breeds far exceed those with beef breeds (Thibier and Wagner, 2002). Annual AI's do not have consistent trends throughout the years, and some depressed annual AI figures are due to major disease outbreaks, mainly of Foot and Mouth Disease (FMD), causing the AI service to be halted for significant periods of time in affected states. The lesser number of full-time field staff employed in artificial insemination programs over the years has also affected the number of annual AI cases.

IMPACT OF ARTIFICIAL INSEMINATION PROGRAMMES

Artificial insemination is the most effective tool for genetic improvement. In Malaysia, it has had a tremendous effect on both the dairy and beef industries in producing crossbreds with higher productivity, while being reasonably adjusted to the tropical environment and sufficiently disease resistant as compared to the pure temperate breeds. In enabling sustainable production of dairy and beef crossbreds, the socio-economic status of farmers has improved and this has had a positive impact on the Livestock Industry. AI is also inexpensive, useful for grading up to get pure-bred animals, has low disease transmission risk,

allows passive immunity from native dams and involves simple transportation logistics (FAO, 1991). Overall AI has and will continue to be an important technology for cattle farming.

Coverage of AI is an important measure of the impact of AI services. Coverage of AI is calculated according to the following formula:

AI Coverage = (No. of Annual First AI's / Total Breeder Females) x 100

Using FAO data, Chupin and Thibier (1995) reported the average AI coverage in developed countries for dairy cattle was 64.0% and for beef cattle it was 7.8%. Still there was a high variation in AI coverage between developed countries. For Asian countries in general, Chupin and Schuh (1993) reported AI coverage standing at between 1 and 5 percent. In China however it was 12.6 % and in Indonesia it was 23.1%. From the information in a more recent report (Brandenburg and Sukobagyo, 2002), it was estimated that the AI coverage in Indonesia in year 2000 was 17.4 percent (assuming 40% of the total cattle population are breeder females and 80% of total inseminations are first inseminations). For Malaysia, the AI coverage in year 2000 was 4.3%, far below the coverage in Indonesia. For year 2009, the AI coverage stood at 4.2%, quite similar to the coverage in year 2000. This was due to the fact that although the number of annual inseminations from year 2000 was on an increasing trend, the cattle breeder population was also increasing. To rapidly transform the genetic composition of the cattle population in Malaysia, the breeding service should target AI coverage at 10% per annum. In order to facilitate the effective delivery of AI services, there should be investments on infrastructure such as bull stations, semen storage facilities and artificial insemination centers. As a rule of thumb, there should be one local AI center for every 5,000 breedable cows.

Another measure of the impact of AI services would be the services per conception (SC). For year 2000, Brandenburg and Sukobagyo (2002) reported SC for Indonesian dairy cattle as 2.5 while for beef cattle it was 3.6. Malaysian government cattle farms had a SC of approximately 2.5 – 3.0 from years 2001 to 2009. SC's of 1.7 have been achieved in the early 1980s and the breeding services must strive to improve delivery by increasing the field conception rates. Improved SC's will encourage the farming community to increase the use of AI and help to improve the genetic makeup of cattle in Malaysia.

AI has had some effect on the conservation of indigenous farm animals in that some of the crossbreeding programs using AI are so successful that the indigenous purebred population is greatly reduced in numbers and becoming endangered. There is also the event that AI has produced crossbreds in environments which make them unsustainable. For example, in Kelantan a 90% Charolais bull would be greatly prized and well managed

but the same animal born in another state may not receive the feeding and care to make it a tenable enterprise.

COST OF ARTIFICIAL INSEMINATION SERVICE

The cost of one insemination has increased from RM25 in the 1980's to RM60 currently. These are cases where heat is detected by observation and includes the cost of the AI technician, frozen semen, liquid nitrogen, AI equipment and disposable items. Heat synchronization adds RM25 to the cost per AI. Assuming 2 AI's are required per calf born, the cost per calf born would be RM120 without synchronization and RM170 with synchronization. If the AI coverage is 10%, then about 35,000 breeder cows would need to be inseminated twice yearly. The annual cost of breeding these animals with AI would be RM4.20 million without synchronization and RM5.95 million with synchronization. The impact of increasing AI coverage to 10% would be the annual birth of 30,000 to 35,000 calves of high genetic quality. The best bulls born can be used in AI and the rest in natural service and within 7-8 years the whole livestock industry will be highly impacted by the up-scaled AI service.

In Malaysia, AI services (including frozen semen) are provided free of charge except in the state of Perak where an AI service provided by the state is charged a nominal fee. Some private farmers import frozen cattle semen at their own cost. According to Chupin and Schuh (1993), in the developing world, 15 countries in Asia, 13 in Africa, 21 in Latin America and 8 in the Near East require payment for AI services. Perhaps our DIY (Do-It-Yourself) inseminators can be organized to provide a paid service to other farmers (breeding services as a business). Currently, there seem to be an interest among some entrepreneurs to provide private breeding services, including AI services, to farms. One such company has opened its operations in Kuala Kubu Baru in Selangor and currently is in the process of producing frozen semen from selected bulls. Where appropriate, some of the AI and ancillary breeding services (breeding soundness examination, fertility services and pregnancy diagnosis) may be outsourced to these breeding companies.

HUMAN RESOURCES AND AI TECHNOLOGY

The artificial insemination service has currently 20 staff, most of them employed as state AI coordinators or their assistants. For several years now, the Department of Veterinary Services has trained farmers to undertake AI on their farms. Training has been undertaken at the Malaysian Veterinary Institute in Kluang, Johor. These farmers are called 'Do-It-Yourself' inseminators or DIY inseminators. Currently there are 75 DIY inseminators, 63 of whom are active. These DIY inseminators are mainly from Kelantan and Terengganu. For developing countries, the average number of full-time and part-

time AI technicians per country was 196 and 104 respectively; for Asian countries, it was 485 and 60 respectively (Chupin and Schuh, 1993). Malaysia's human resource input into the AI service is quite low compared to the Asian average. There is also a great need to train AI trainers at world-class centers of excellence and for the systematic, programmed retraining of all field AI technicians. An organized mentor-mentee system should be put in place for full-time, part-time and DIY inseminators. For government employed field inseminators, a special scheme should be devised to provide them with incentives based on the number of monthly AI's accomplished.

FULFILLING NATIONAL BREEDING OBJECTIVES

Artificial insemination is mainly a tool for genetic improvement. What genetic material cattle are bred with through the use of AI is of major concern. For cattle, the National Institute of Veterinary Biodiversity (NIVB) has its own program of producing frozen semen mainly from the Mafriwal (synthetic dairy-beef breed), but also from individual acquired animals from beef or dairy breeds. Even so, most of the uptake of frozen semen is still from imported stock. For example, in the first half of 2010, a total of 8,558 doses of imported semen comprising of Holstein, Sahiwal, Jersey, Brahman, Charolais, Limousin, Boran, Bali, Belgian Blue and Simmental breeds were distributed to farmers. Only 327 doses of locally produced semen comprising Mafriwal, Brahman, Kedah-Kelantan and Low-Line Angus breeds were dispensed to farms. Certainly farmers need to be enlightened on the high quality of locally produced genetic material so that the uptake of NIVB produced semen and other breeding materials can be increased. Emphasis should be given to establishing breeding structure (at nucleus and multiplier level) and capacity building. NIVB should also be involved in providing more coordinated breeding advisory services to farmers. It should also establish a computerized AI recording service so that the performance of the AI field services can be monitored and evaluated on a real-time basis. NIVB should also seek strategic alliances with other world-class breeding agencies to improve its international standing. Other than providing an AI service, ancillary services such as breeding soundness examination (BSE – for breeding males), fertility examination (for female breeders) and pregnancy diagnosis should be expanded.

CONCLUSION

Since the initiation of AI services in the 1960's, the country has come a long way in the development of cattle breeding in Malaysia. However, the national artificial breeding service needs up-scaling so that on an annual basis, at least 10 percent of the breeder female cattle in Malaysia are mated with superior breeding stock through

artificial insemination. This will enable the AI service to impact the Livestock Industry by producing sufficient numbers of high quality genetic material and ultimately increasing the productivity of cattle farms and improving the socio-economic status of farmers. Human resources involved in the AI service need to be increased and undergo a systematic and planned training and retraining program. AI trainers need to be trained at world-class centers of excellence. The DIY inseminator program should be expanded and DIY technicians should be allowed to service the cows of other farmers and charge a fee. This will expand the reach of the AI field services. In addition to this, private breeding companies should be given incentives to provide breeding services, including artificial insemination, to farms. Sufficient financial inputs need to be given to the AI service and NIVB to enable these entities to deliver effective breeding services to the livestock industry. A better monitoring system should be established so that real-time evaluation of AI field services can be achieved. The role of NIVB in leading the development of cattle breeding in the country needs to be strengthened. Locally produced breeding material should be improved in terms of product quality and they should be marketed to cater for the local farming community and for the export market, as Malaysia has the potential to become a leader in tropical cattle breeding.

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