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Embryo Transfer and Artificial Insemination Program of Belgian Blue Cattle in Indonesia: Pregnancy Rate, Birth Weight and Calving Ease

Bambang Purwantara[1]*, Oloan Parlindungan[2], Yuni Siswanti[2], Muhammad Imron[2], Yanyan Setiawan[2]

[1]Division of Reproduction and Obstetrics Department of Clinic, Reproduction and Pathology, Faculty of Veterinary Medicine, Bogor Agricultural University (IPB) – Indonesia
[2]Balai Embrio Ternak (BET) Cipelang, Directorate General of Livestock and Animal Health Services, Ministry of Agriculture of the Republic of Indonesia- Indonesia
*Corresponding author's email: purwantara@ipb.ac.id

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INTRODUCTION

The beef cattle industry in Indonesia hampered by low population and productivity. Apart from genuine adaptability to tropical condition and low input of production, local breeds basically have small body size and low daily weight gain. During the last few years, through artificial insemination (AI) program the government has introduced crossbred of various European breeds with local cattle. Moreover, embryo transfer (ET) program, has also been adopted to support the foundation of elite cattle.

Balai Embrio Ternak (BET) Cipelang, a centre to produce and distribute embryos of high genetic quality cattle is responsible to develop a modern breeding program through embryo technology. The center, since its establishment in 2000, has produced and distributed thousands of bovine embryos of local and exotic breeds [1].

BET Cipelang has mandated to implement a large-scale importation of Belgian Blue (BB) embryos. Nine hundred frozen BB embryos have been imported from Belgium and transferred to recipients at various breeding centres. To study the performance of the crossbred between local breeds and BB, 1000 frozen semen of BB bulls were imported and inseminated [2}.

The BB cattle has widely known as the breed with double muscling properties. The significance of this project is to study the BB capability on coping up with various local constraints to produce Indonesian BB. The breeding program of the local breed with BB through AI will direct the breeding policy on crossbreeding program. This study was developed to evaluate the success rate of AI and ET, calving ease, calves body weight, daily gains and some other phenotypic performance.

MATERIALS AND METHODS

Data were collected from 11 selected Centres responsible to conduct livestock breeding program in Indonesia. The Centers has been mandated to involved in the ET and AI program of BB cattle. Approximately 500 cow/heifer recipients were selected to receive transfer of embryos. For the AI program a total of 644 cow/heifer were selected to be inseminated. Approximately 900 frozen embryos and 1000 frozen semen of BB were imported from Belgium. The data collected includes the number ET recipients and cows/heifer received AI, The analysis were done on the ratio of available recipients vs transfer of embryos, the pregnancy rate of ET and AI recipients, birth weight, the ease of partus and the following daily weight gain. The transfer techniques including thawing, transfer of embryos and insemination follow the standard procedure as clearly desribed [2]

RESULTS AND DISCUSSION

The availability of ET and AI recipients were depending the size and the capacity of each Center, ranging from 7 to 135 and 5 to 172 cows/heifers, respectively. From February up to October 6, 2018, a total of 636 BB frozen embryos were transferred and 672 frozen semen were inseminated. Pregnancy diagnoses were done in 509 ET and 323 AI sessions/applications. Results of the ET and AI applications in local cows/heifers shown in Table 1.

Table 1. Result of ET and AI in BB cows/heifers

Embryo transfer (ET)	
Number of embryo transfered	636
Number of pregnancy diagnosis	509
Number and percentage of pregnant cows/heifers	125 (24.56%)
Artificial Insemination (AI)	
Number of insemination	672
Number of pregnancy diagnosis	323
Number and percentage of pregnant cows/heifers	147 (45.51%)

The pregnancy rate of embryo transfer of BB embryos was still low and need to be improved. This was lower than the pregnancy rate of similar techniques of ET in various breed [2]. The reason behind the lower pregnancy rate were the quality of embryos, the quality of recipients, the synchrony between donor and recipient, and the post-transfer management. Due to recipient availability, among the eleven Centers, only four has more than 90 transfer sessions. The availability of recipients may influence the pregnancy rate based on the limitation of the selection of recipients.

There are several factors affects a large number of pregnancy rates of fresh and frozen cattle embryos. Evaluation of a large number of transfer in fresh and frozen embryos in The Netherland revealed 68.3% and 58.4% pregnancy rates, respectively [3]. The study also reported there were no differences in the pregnancy rates of beef versus dairy embryos, but the pregnancy rate was higher in dairy and beef heifers and beef cows than in dairy cows [3]. Moreover, there was no influence of season on pregnancy rate. Estrous asynchrony between plus and minus 24 h did not affect pregnancy rate for frozen-thawed or fresh embryos. Neither breed nor parity of recipients affected the influence of asynchrony on pregnancy rates. Embryo grade was a significant factor in pregnancy rate for both fresh and frozen-thawed embryos, but neither embryo stage nor age was a significant factor.

The pregnancy rate of various breed of cows/heifers following AI using BB frozen semen was still low if compared to the other breed [4]. This is related to the quality of cows/heifers inseminated, which was selected from of those failed to be pregnant during the embryo transfer sessions.

Table 2. Birth weight of pure BB (ET) and crossing of BB-local breeds calves (AI).

Birth weight of calves	**Kg**
Pure BB calves (ET)	
Range	47.0-62.5
Average	(51.6)
BB-local breeds crossbred (AI)	
Range	15.0-55.0
Average	(34.5)

The pure BB calves born following ET has consistently to have birth weight of an average of 51.6 kg (ranging from 46.0 to 62.5 kg) with very small variation among calves. On the other hand, the crossbred calves born after AI of the local breed (i.e. FH/Holstein cows/heifers) with BB semen have a various birth weight ranging between 15.0 and 55.0 kg with an average of 34.5 kg. This is consistent with the report of [] showing that the pure BB calves has an excessive birth weight if compared with their crossbred counterparts.

Due to several cases of previous calving problems, all BB calves derived from ET received a special attention and assistance, by application of Caesarian section at the date of expected delivery. On the other hand, most of BB-crossbred calves born normally with a minor assistance, except the calves with birth weight above 50 kg. The calving problem in BB calves related very much with the conformity of pelvic area of calves which was larger if compared to their crossbred counterparts. Report on Caesarian section has indicated that the techniques (surgery, perinatal immediate care and post-partum treatment) were easy and safe as long as the application of surgery follows the regular procedure.

At calving, purebred animals of the Belgian Blue (BB) breed are compromised by the incompatibility in size and shape of the dam and her calf, resulting in a very high incidence of dystocia problems [5]. To clarify which body parts of the calf are of decisive importance to allow natural delivery and to investigate both the mean value as well as the variation among these body sizes within this breed measurements of various body parts.

CONCLUSION

In conclusion, the pregnancy rate of various breeds of recipients following the transfer of BB embryos and insemination frozen semen of BB bulls needs to be improved. Various improvement is need by better preparation and selection of the recipients, feeding and reproduction health management as well as improvement of the skills of operator on transfer and AI techniques. The Caesarian section has to be done for the delivery of BB calves to avoid the calve loss due to dystocia. In the long run, it is necessary to find the best crossbred program of BB with local breed with normal calf size for normal delivery.

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