

Sperm Freezability of Various Breed of Bulls at Lembang AI Center

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INTRODUCTION

Currently, artificial insemination (AI) techniques using cryopreserved semen have been widely used to improve the genetic potential of livestock species. Semen at the Lembang AI Center usually collected by artificial vagina (AV) then the semen should be evaluated to get the good quality of spermatozoa for the freezing process. Several efforts are being made to improve the quality of frozen semen for AI so as to get the most out of this technology. But there are certain obstacles in this path to achieve breeding goals. The trend now is to design procedures or refine methodologies so as to maximize the production of good quality semen without discarding too many poor quality ejaculates. Therefore, to minimize the poor or discarded spermatozoa used in the cryopreservation process, this study might elaborate more about the influencing factors.

MATERIALS AND METHODS

Comparative study of spermatozoa freezability using secondary data of Lembang AI Center on 2016 till 2017. The data presented were the percentage of discarded spermatozoa during evaluation and equilibration process also the number of frozen semen production. The method that used was deep analysis using study literature as references.

RESULT AND DISCUSSION

Discarded spermatozoa during cryopreservation process

The quality of spermatozoa influences the durability and freezability of spermatozoa. Therefore fresh semen before cryopreservation should be passed through the selection stage based on macro- and microscopical examinations to obtain the quality of semen that is feasible to be frozen according to standards.

Spermatozoa with poor quality have to be discarded from semen evaluation until equilibration process. Lembang AI center had

classified the discarded spermatozoa into exotic, local, and dairy bulls (Fig 1).

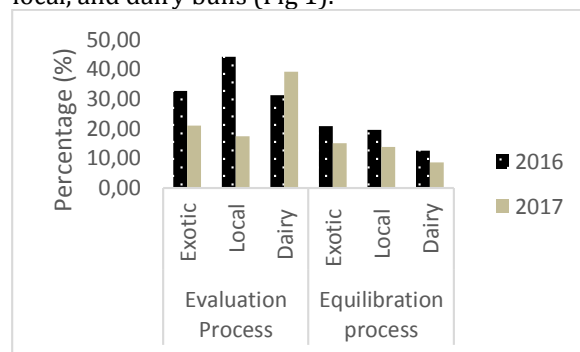


Figure 1. Spermatozoa rejected during cryopreservation process on 2016 until 2017 (modified) [1]

Lembang AI Center using SNI 4869-1:2017 of bull frozen semen as a guideline to discard the poor quality of spermatozoa. Spermatozoa will process to bull frozen semen if it has 70% of spermatozoa motility, and 40% of spermatozoa post-thawing motility. The concentration of spermatozoa frozen semen is about 25 million. Based on the Fig.1, semen evaluation process for the last 2 years, those could reach the assumption of SNI bull frozen semen standard that eligible for further process in all type of bull breeds. Actually, It also found that there was a decreasing in discarding spermatozoa level except in dairy bulls. In 2017, discarded dairy bulls spermatozoa are about 39,05% higher than in 2016 which is about 31,15%. The freezability and fertility of spermatozoa in dairy bulls are lower than indigenous bulls. In crossbred and dairy bulls, at least 50-55% of ejaculates were unsuitable for the freezing due to poor initial semen quality [2].

Dairy bulls also classified as *Bos Taurus* that is really susceptible to the temperature and season. According to [3] there were less frozen batches had to be discarded during winter than during summer. High temperature combined with increased humidity during the summertime was

related to the degree of decrease in semen quality. Therefore, the season is one major factor which influences the reproductive performance of these animals and it exerts its effect through macro and microclimatic factors like temperature, humidity, rainfall, photo-period. It may result in showing poor semen quality and also influence to spermatozoa survival during the equilibration [3]. It also supported by Lembang AI center of frozen semen production that the highest frozen semen production was during the wet season (September till December). (Fig. 2).

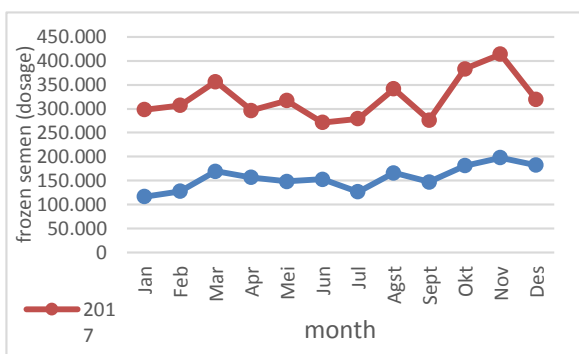


Figure 2. Frozen semen production

On the other hand, there was an important role in nutrition that influenced spermatozoa quality. Based on Fig 1 there were decreasing numbers of discarded spermatozoa, also in Fig.2, the improvement of frozen semen production started from the last 4 months in 2016 might be influenced by nutrition. Annual report of Lembang AI Centre in 2016 stated that there was an improvement in nutrition management by giving “jabon” (corn’s leaves and stalks) as additional forages from September 2016. Thus, spermatozoa quality could be influenced by *jabon*. Corn stover (leaves and stalks) contain a high percentage of effective degradability of major nutrient contents (e.g., dry matter (DM), neutral detergent fiber (NDF), and acid detergent fiber (ADF)), and highest of crude protein and oil or lipid [4]. In addition, NDF level could influence the high-density lipoprotein (HDL) level. According to [5] HDL are positively associated with levels of serum cholesterol. The diets containing lipid increased the level of HDL. Moreover, HDL plays a key role in the male reproductive system, which is associated with sperm capacitation and the acrosome reaction [5]. Energy (DM) and protein act on the hypothalamus-pituitary-gonadal axis by increasing the GnRH and LH pulse frequencies and the tonic secretion of FSH as well [6]. As the spermatogenic process responds rapidly to changes in crude protein, sperm motility is rapidly affected as well. They also found a strong influence of diets containing a source of fatty acids on sperm concentration [6]. So, *jabon* is revealed that could be increased the spermatozoa quality.

On the other hand, based on this study of

the equilibration process for the last 2 years, there has been a decrease in the number of discarded spermatozoa in all types of exotic, local and dairy bulls. It is induced by good extender that used in Lembang AI Center. Efforts to improve sperm resistance to the equilibration process are by adding antioxidants to diluents, such as glutathione. Dairy bulls are more resistant when equilibrating than exotic and local bulls. Whereas in this study show that dairy bulls had more rejected in the semen evaluation. So that, the suggestion is the maintenance management needs to be improved and the semen evaluation needs more accurate assessment through genomic analysis. A recent study suggested that there is a genetic basis for the variance of spermatozoa freezability.

CONCLUSION

Based on the study, we can conclude that there are many influence factors of discarded spermatozoa like breed, season, environment, nutrition and semen processing. According to the data, fresh semen should reach a minimum 70% of spermatozoa motility for the further process. The result of discarded spermatozoa data of dairy bulls is still high. So that, the suggestion is the maintenance management needs to be improved and the semen evaluation needs more accurate assessment through genomic analysis.

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