

Pregnancy rate of Bali Cows following Artificial Insemination using Chilled Sexed Sperm under Intensive Management in Tropical Area

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ABSTRACT

Application of sexed sperm either in the form of chilled semen or frozen semen in artificial insemination of cattle is commonly used to produce the desired sex of offspring. In this study, 20 bali cows were used to evaluate the success rate of artificial insemination using chilled sexed sperm of bali cattle to induce pregnancy. All cows were kept in individual pens under intensive management with environmental temperature 30 to 32°C and fed native grass *ad lib* plus 1.5 kg rice bran per cow per day. Semen was collected from bali bull and sperm sexing using albumin column method was performed to produce sexed sperm. All cows were performed estrus synchronization using PGF2 α and artificial insemination was applied on day 3 after synchronization. Estrus detection was performed on day 2-3 following synchronization to evaluate the estrus percentage and estrus quality. Whereas pregnancy rate was determined on two occasions during sixty days following application of artificial insemination. Twenty one days after artificial insemination, pregnancy was judged by non return rate, while on day 60s following artificial insemination, the pregnancy was determined using rectal palpation methods. The results showed that only one cow (5%) showed sign of estrus again on day 21 after application of artificial insemination, while 19 cows (95%) did not show sign of estrus which expressed the early sign of pregnancy. However, on day the 60s after application of artificial insemination only 11 cows (55%) were predicted pregnant following rectal palpation. In conclusion, PGF2 α could promote estrus sign with good percentage and quality while chilled sexed sperm of bali cattle could induce pregnancy with fairly success rates.

Keywords: Synchronization, Chilled sexed sperm, Bali cattle, Artificial insemination, Pregnancy

INTRODUCTION

Sperm sexing is a technology of choice for improving reproduction efficiency in cattle breeding system. Through this technology, the desired sex of calf could be produced with moderate successful. Sex control in a certain herd of cattle has been the priority of producer in order to get optimum benefit in their production system. In beef cattle production for example, the more male produced the more benefit be gained. This is because the bull is naturally growth faster than heifer (Reyneke, 1976; Choi et al., 2002; Rasyid et al., 2006).

Seidel dan Garner (2002) claimed that sperm sexing method by using flow cytometer machine was the only proven, repeatable and reliable method. However, this method required expensive tools (flow cytometer) and highly trained personnel to operate the tools. Moreover, Seidel (2007) stated that sperm sexing could lower pregnancy rates but this technology could give us chance to produce the desired offspring (Johnson, 2000).

In Indonesia, sperm sexing method that has been successfully applied in the field are albumin column method (Saili et al. 2000; Said et al., 2005; Said and Afati, 2012) and percoll density gradient centrifugation method (Fernanda et al., 2014). Saili et al. (2000) described that the usage of albumen (egg white) as a medium in sperm sexing could decrease the sperm motility and intact plasma membrane, but still meets the standard for artificial insemination usage. Moreover, Said et al. (2005) reported that 81% of cow inseminated with sexed semen that predicted has more Y chromosome-bearing sperm than X chromosome-bearing sperm could deliver a male calf. Whereas, Gunawan et al. (2015) claimed 89.5% of calf was male following the application of Y-rich semen which was consistent with the expected sex of calf that would be produced prior to insemination. In this study, the percentage of estrus and pregnancy rates of Bali cows was assessed following synchronization and artificial insemination using chilled sexed sperm.

MATERIALS AND METHODS

The research was conducted in cattle station of Dinas Tanaman Pangan dan Peternakan, South-east Sulawesi Province. Twenty heads of Bali cows aged between 3-6 years old were used to evaluate the success rate of chilled sexed sperm of Bali bull to induce pregnancy following artificial insemination. All cows were kept in individual pens under intensive management with environmental temperature 30 to 32°C and fed native grass *ad lib* plus 1.5 kg rice bran per cow per day. Semen was collected from Bali bull and sperm sexing using albumin column method was performed to produce sexed sperm. All cows were performed estrus synchronization using 5 ml capriglandin (PGF2 α) per cow and artificial insemination was applied on day 3 after synchronization. Estrus detection was performed on day 2-3 following synchronization to evaluate the estrus percentage and estrus quality. While pregnancy rate was determined on two occasions during sixty days following application of artificial insemination. The first term of pregnant test was conducted on day 21 following insemination which indicated non return rate. In this term, all cows were observed whether or not the cow returned to estrus. Whereas the second term of pregnant test, it was conducted on day 60s following artificial insemination. In this term, the pregnancy was determined using rectal palpation methods instead of estrus detection. All data related to estrus percentage and estrus quality, non return rate and pregnancy rate were tabulated and analyzed using descriptive analysis.

RESULTS AND DISCUSSION

All acceptor cows were performed rectal palpation prior to application of estrus synchronization to make sure that reproduction cycles of the cows were in luteal phase. The cows were then synchronized by injecting intramuscularly 5 ml of capriglandin (contained PGF2 α) and 3 days later, the estrus detection was performed. Artificial insemination using sexed sperm was performed on the same day (3 days following synchronization). Data related to estrus percentage and quality of estrus following synchronization with PGF2 α were summarized in Table 1.

Table 1. Percentage and quality of estrus following synchronization using PGF2 α in Bali cows

No.of Cows (heads)	No.of Estrus Cows (heads)	Estrus Quality (scale 1-3)
20	18	2.84

Data showed in Tabel 1. indicated that 90% of cows (18 cows) performed synchronization showed clear estrus sign on day 3 after synchronization. However, all cows were inseminated with sexed sperm following estrus detection. This is because eventually the cow actually in estrus but they do not show a clear sign of estrus (silent estrus). Percentage of estrus gained in this research was similar with the results of Richardson et al. (2002) reported in which 87.65% of beef cattle and 79.4% of dairy cattle showed sign of estrus following synchronization using GnRH, PGF2 α and progesterone. While Saili et al. (2011) reported that 80% of synchronized cows showed sign of estrus following intra vagina injection of PGF2 α (prosolvin, 2 ml/cows) in bali cattle and ongole cross (PO) cattle. However, Siregar et al. (2015) claimed that 100% of Aceh cattle showed sign of estrus following injection of either PGF2 α alone or in combination with CIDR. The estrus quality of those cows that showed sign of estrus in this research was 2.84 in averages. This result was lower than estrus quality reported by Kune and Solihati (2007) when Bali-Timor cattle was injected with PGF2 α .

On day 21 following insemination, estrus detection was performed to assess whether or not the cows conceived. Once the cow does not showed sign of estrus, then it can be grouped as a candidate of pregnant cows. The observation on day 21 is commonly indicated as non return rate (NRR). The results showed that 95% of inseminated cows did not show estrus sign on day 21 after insemination (Table 2). This results indicated that one of 20 cows did not show clearly sign of estrus when estrus detection performed on day 3 following synchronization.

Table 2. Non return rate and pregnancy rate of Bali cows following insemination using sexed sperm

No.of AI cows (heads)	No.of Re-estrus cows (heads)	NRR (%)	Pregnancy Rate (%)
20	1	95%	55%

NRR = *Non return rate*, cow that does not show estrus after 21 days of insemination

Rasyid et al (2006) reported that 65% of NRR was gained when ongole cross cattle was injected with sexed sperm. While Susilawati (2011) described that 100% of ongole cross cattle did not show sign of estrus during 30 days after insemination with sexed sperm.

The pregnant test was also performed on day 60 following insemination using rectal palpation methods instead of visual estrus detection method. The results showed that 55% of inseminated cows was pregnant indicated by unequal size of uterine horn. There was a decrease in number of cows that did not show sign of estrus (indicated by 95% of NRR) on day 21 following insemination and number of cow that had unequal size of uterine horn (indicated by 55% of pregnancy rate). This may be caused by the accident of early embryonic death during the first month of pregnancy. Inskeep and Dailey (2005) described that the main causes of pregnancy failure in cattle was embryonic death (57%) followed by late placentation (10%), early placentation (4%), male factors (10%), fetal (3%), lethal gene (5%), re-bred (1%), and ovum transport etc. (8%). Gunawan et al. (2011) reported that the average of pregnancy rate of bali cattle (using unsexed sperm) was 88,44%. That report was lower than result obtained in this study on day 21 after insemination (95%) but higher than result obtained on day 60 (55%). However, the

result of this study was higher than some previous researches. Pursley et al. (1997) reported that the conception rate of dairy cows after artificial insemination ranged from 37,8% to 38,9%. Chebel et al. (2003) also reported that after artificial insemination, the conception rate of lactating dairy cows was 25,42%. Demetrio et al. (2007) also reported similar result. Conception rates after artificial insemination of dairy cattles were 37,9% on day 21 and 29,1% on day 42.

CONCLUSSIONS

Based on the results, it was concluded that PGF2 α could promote estrus sign with good percentage and quality while chilled sexed sperm of bali cattle could induce pregnancy with fairly success rates.

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