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Pregnancy and full-term development of embryos derived from natural mating and ai following estrous synchronization in swamp buffalo

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Abstract

This study was designed to evaluate the fertility of swamp buffalo synchronized by prostaglandin administration prior to both natural mating and artificial insemination (AI). Twenty-five multiparous swamp buffaloes, 4 - 7 years of age, were intramuscularly injected by 35 mg prostaglandin (Lutalyse™, Pfizer, Puurs, Belgium) twice in eleven consecutive days. Natural mating was performed in fourteen buffaloes 72 h after second prostaglandin administration, the remaining buffaloes were artificially inseminated twice, 72 h and 84 h following second prostaglandin administration. The pregnancy was determined on 60 days by per rectum palpation. Eleven of naturally mated buffaloes were pregnant (78.6%) significantly higher than AI result (6 of 11, 54.5%). Both natural mating and AI resulted 100% fetus survival and all embryo derived could perform full-term development. In conclusion, estrous synchronization by prostaglandin administration induced estrous and produced viable embryos following natural mating and AI in swamp buffalo.

Keywords: pregnancy, embryo development, estrous synchronization, swamp buffalo

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Pregnancy and Full-Term Development of Embryos Derived from Natural Mating and AI Following Estrous Synchronization in Swamp Buffalo

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Abstract

This study was designed to evaluate the fertility of swamp buffalo synchronized by prostaglandin administration prior to both natural mating and artificial insemination (AI). Twenty-five multiparous swamp buffaloes, 4 - 7 years of age, were intramuscularly injected by 35 mg prostaglandin (LutalyseTM, Pfizer, Puurs, Belgium) twice in eleven consecutive days. Natural mating was performed in fourteen buffaloes 72 h after second prostaglandin administration, the remaining buffaloes were artificially inseminated twice, 72h and 84 h following second prostaglandin administration. The pregnancy was determined on Day 60 days by per rectum palpation. Eleven of naturally mated buffaloes were pregnant (78.6%) significantly higher than AI result (6 of 11, 54.5%). Both natural mating and AI resulted 100% fetus survival rate, all embryo derived could perform full-term development. In conclusion, estrous synchronization by prostaglandin administration induced estrous and produced viable embryos following natural mating and AI in swamp buffalo.

Keywords: Pregnancy, embryo development, estrous synchronization, swamp buffalo

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Introduction

The swamp buffalo (*Bubalus bubalis*) has a significant role in many developing countries by providing meat and draught power. They are well-adapted to harsh environments and are capable of utilizing low quality roughages especially agricultural crop- residues and by-products (Wanapat and Cantakhoun, 2015). However, they suffer from low fertility and production. Reproductive efficiency is the primary factor affecting productivity and is hampered in female buffalo by inherent late maturity, poor estrous expression, distinct seasonal reproductive patterns, and prolonged intercalving intervals (Singh et al, 2000; De Rensis and Lopez-Gatius, 2007).

To improve the poorly reproductive efficiency of the water buffalo, several techniques such as artificial insemination (AI), superovulation, ovum pick-up, in vitro maturation, in vitro fertilization and embryo transfer have been applied with various achievements (Nam et al, 2010). The success of AI depend on appropriate estrous detection that less effective in female buffalo due to poor estrous expression. Overcoming this problem, estrous synchronization involves the use of one or more hormones to bring female buffalo into heat within a short time period (36 to 96 hours). The use of prostaglandin as luteolytic agent that bring the females into estrus were widely implemented. The research was undertaken to determine fertility of

swamp buffalo synchronized by prostaglandin administration prior to both natural mating and AI.

Materials and Methods

Twenty-five multiparous swamp buffalo cows (4-7 y of age) were used for experiment. All animal were intramuscularly injected by 35 mg prostaglandin (LutalyseTM, Pfizer, Puurs, Belgium) twice in eleven consecutive days. Natural mating was performed in fourteen buffaloes 72 h after second prostaglandin administration, the remaining buffaloes were artificially inseminated twice, 72h and 84 h following second prostaglandin administration. The pregnancy was determined on D 60 after AI, embryo marked as full-term developed when female cow had normal parturition.

The number of pregnant cows and the number of full-term developed embryos were assessed using chi-square test. A probability of $P < 0.05$ was considered significance. The SPSS program was used for all statistical analyses.

Results and Discussion

Pregnancy Rate

Fourteen buffalo females synchronized and conducted to natural mating, and eleven ones were artificially inseminated. The pregnancy rate resulted from natural mating was higher ($P < 0.05$) than AI (Table 1).

Table 1. Pregnancy rate of buffalo female following estrous synchronization

No	Treatment	Number of cow (head)	Number of pregnant cows (head (%))
1	Synchronization + natural mating	14	11 (78.6) ^b
2	Synchronization + AI	11	6 (54.5) ^a

The values in same column with different letters as superscripts were significant different ($P < 0.05$).

Prostaglandin administration was effective to commence estrous signs on all female. The pregnancy rate obtained by AI was 54.5%, lower than the result from Sianturi et al (2012) that got 77.8%. The difference came from different farm condition and feeding management. But, the result was equal compared to previous studies with pregnancy rate 40-60% (Baruseli et al, 2001 dan Berber et al, 2002; Barile, 2005).

Higher pregnancy rate derived from natural mating was proposed to caused by semen quality not by oocyte quality. High motility and dense sperms of fresh semen in natural mating directly ejaculated into vaginal lumen compared to, in AI, frozen-thawed semen with lower quality. The buffalo fresh semen had 70-80% motility, whereas frozen-thawed buffalo semen had 40-50% motility (Rosadi et al, 2015)

Fetus Survival Rate

The good quality of embryos derived from estrous synchronization in this study confirmed by 100% fetus survival rate (Table 2). All embryo could performed full-term development.

Tabel 2. Full-term development of embryos derived from natural mating and AI

No	Treatment	Number of pregnant cows (head)	Number of calves born(head, %)	Number of miscarriage (head, %)
1	Natural mating	11	11 (100)	0 (0)
2	AI	6	6 (100)	0 (0)

It was previously found about buffalo embryo development-related pathology cases in West Java Province (Indonesia) were 10% abortus and 2% dystocia (Martindah et al 1989). We did not find any embryo-related pathologic cases in this study. The embryos could pass all step of embryo development until birth. This indicated that the developmental competence of these embryos was independent to the way its inseminated that regarded to sperm quality.

Conclusion

It could be concluded that both natural mating and AI resulted in pregnancy in prostaglandin synchronized buffalo cows with natural mating got higher rate. The embryos derived form natural mating and AI performed equal full-term development.

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