The Effect of GnRH and PGF2α Administration on Estrus Onset and Dairy Buffaloes Conception Rate

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Abstract

The aim of this study was to investigate the effect of GnRH and PGF2α administration on the manifestation of estrus and on the conception rate in Romanian buffalo dairy buffaloes. Twenty-eight dairy buffaloes from the Șercaia Buffalo Breeding Research and Development Station, aged between 5 and 12, in the postpartum period, were divided into four batches of seven heads each, as follows: Lot I (between 25 and 30 postpartum days), Lot II (40 to 45 days postpartum), Lot III (55 to 60 days postpartum) and Lot IV (75 days postpartum). Dairy buffaloes were given intramuscularly GnRH (2.5 ml Receptal) on day 0, followed by intramuscular injection of PGF2α (2.5 ml Alfabedyl) on day 7 after GnRH injection. Estrus was observed 24-48 hours after PGF2α injection. Artificial insemination was performed 12-18 hours after visible signs of estrus. The results of the study showed that there were no differences ($p > 0.05$) between estrus treatments (100%), estrus onset (35.8 to 36.4 hours), estrus duration (17 to 18 hours) and conception rate (100%). In conclusion, in Romanian buffalo dairy buffaloes, estrus can be synchronized from 25-30 days after calving using a combination of GnRH and PGF2α.

Keywords: Romanian buffalo, postpartum, dairy buffaloes, estrus, calving.

1. Introduction

The breeding of the Romanian Buffalo has a number of advantages compared to cattle, namely a good adaptability to environmental conditions, because it is unpretentious to feeding conditions, capitalizes on a wide range of feed, high biological and productive longevity, good reproductive skills, milk with outstanding qualities and resistance to disease. Reproductive efficiency in buffaloes is the main factor affecting productivity and is hampered by late puberty, seasonal calving, prolonged postpartum anesthesia and the interval between two successive calvings. At the same time, artificial insemination (AI) is less practiced, the detection of estrus is difficult because the manifestation of heat is erased which can sometimes lead to the loss of a heat cycle. Uterine involution in buffalo usually ends in 20-30 days after farrowing, early restoration of cyclic ovarian activity is important from an economic point of view, treatments administered to initiate estrus in the first month after farrowing improve reproductive performance. The literature on the therapeutic efficacy of GnRH when administered less than 40 days after calving in combination with $PGF_{2\alpha}$ shows different results regarding the onset of estrus, its duration and the rate of conception. Prostaglandins alone or in combination with GnRH in buffalo cows increased the conception rate (CR) to 56% [1]. The ovsynch protocol (GnRH followed by prostaglandin 7 days later and a second GnRH 2 days later) was used successfully in buffalo cows with ovulation synchronization in 70-90% and conception rate (CR) of 33-60% [2]. Results on the use of GnRH and $PGF_{2\alpha}$ as a protocol for estrus synchronization and artificial insemination in Romanian buffalo buffaloes are few. Thus, the

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aim of the study was to determine the effect of estrus synchronization using the combination of GnRH and PGF2α on its onset and on the conception rate, in different periods after calving of buffalo cows.

2. Materials and methods

The study was conducted at the Șercaia Buffalo Breeding Research and Development Station. A number of 28 buffaloes after calving were selected by transrectal examination. The age of the animals ranged from 5 to 12 years. The maintenance was similar, they were kept on pasture during the day and in the shelter at night. Feeding consisted of green mass at discretion, by grazing and the addition of 2 kg of concentrated feed in the shelter during milking. The buffaloes were divided into four lots, each lot consisting of 7 heads. Lot I consisted of animals between 25 and 30 days postpartum, Lot II with a postpartum period of 40 to 45 days, Lot III with a postpartum period of 55 to 60 days, and Lot IV with buffaloes with 75 days. postpartum days. All buffalo cows in the four batches were injected intramuscularly with 2.5 ml GnRH (commercial product under the name Receptal) on day 0, followed by intramuscular injection with 2.5 ml $PGF_{2\alpha}$ (commercial product under the name Alfabedyl) on the seventh day. and observing the manifestation of estrus 24-48 hours later. Artificial insemination was performed within 12-18 hours after the manifestation of estrus was visible. The parameters monitored were estrus onset, estrus duration, estrus percentage, and conception rate. Early diagnosis of buffalo gestation was performed by transrectal ultrasound, within 21-28 days of artificial insemination. Data were statistically analyzed by simple variance analysis (ANOVA).

3. Results and discussion

The effects of the treatment protocol on estrus synchronization in buffalo cows are summarized in Table 1. The results of the statistical analysis indicated that there were no significant effects ($p > 0.05$) of GnRH and $PGF_{2\alpha}$ treatment on estrus onset, estrus duration, and conception rate between the four groups.

The data in Table 1 show that the administration of GnRH on day 0 and followed by the injection of $PGF_{2\alpha}$ on the seventh day caused spontaneous estrus to occur in all buffaloes between the second and fourth day with a percentage of 100%. It was characterized by abundant secretion of heat mucus, externalized to the lower commissure of the vulva, its edema and frequent urination. The onset of estrus in buffalo cows was reached after 35 to 37 hours. The difference was not significant ($p > 0.05$). This was consistent with other similar studies in buffaloes, which show that GnRH administration resulted in spontaneous estrus over the next 6 days [3]. Seven days after GnRH injection, newly formed luteal structures respond to $PGF_{2\alpha}$ treatment, improving the accuracy of estrous synchronization [4]. The results of the study indicated that all buffaloes with different postpartum periods were synchronized with GnRH and $PGF_{2\alpha}$ in terms of estrus onset. This was expressed by clear signs of estrus. The appearance of estrus, as well as its duration recorded in the present study (24 to 72 hours) is within the range determined in other research on buffalo cows [5]. The duration of estrus tended to increase slightly in the four groups of animals, when the postpartum period increased from 25 to 75 days. However, no significant difference ($p > 0.05$) was observed at this parameter.

Table 1. Estrus response rate and buffalo cows conception

Treatment	Onset of estrus after administration of $PGF_{2\alpha}$ (hours)	Duration of estrus (hours)	Percentage of estrus manifestation (%)	Conception rate (%)	The value of P
Lot I 25-30 days postpartum	36	17	100	100	NS
Lot II 40-45 days postpartum	36.4	17.4	100	100	NS
Lot III 55-60 days postpartum	36.2	17.8	100	100	NS
Lot IV 75 days postpartum	35.8	18	100	100	NS

NS: Not significant at 95% significance threshold ($p > 0.05$)

Regarding the conception rate, the administration of GnRH and $PGF_{2\alpha}$ resulted in a rate of 100% in the buffaloes from the experimental groups, even if the postpartum period was different. This was confirmed by transrectal ultrasound, which was performed 21-28 days after artificial insemination (AI). The conception rate obtained in this study is high compared to another similar experiment [1, 6], in which it was 42.4%. The differences may be due to race, environmental and management factors, nutrition, reproductive disorders and physiological condition at the time of treatment.

4. Conclusions

Treatment of buffaloes after different postpartum periods with GnRH on day 0, followed by $PGF_{2\alpha}$ 7 days later, improved reproductive efficiency. Thus, under the conditions of the study, it can be concluded that the protocol is effective for the resumption of ovarian activity from 25-30 days postpartum and can be a useful method of synchronizing estrus, as well as improving reproductive performance in the Romanian Buffalo breed.

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References

1. Borghese, A. 2005, Buffalo Production and Research In: Food and Agriculture Organization of the United Nations, Rome, Italy, Technical Series 67, pp.1
2. Baruselli, P.S., E.H. Madureira, V.H. Barnabe, R.C. Barnabe, J.A. Visintin, C.A. Oliveira and R. Amaral., 1999, Estudo da dinamica follicular em bufalas submetidas a sincronizacao da ovulacao para inseminacao artificial em tempo fixo, Arquivos da Faculdade de Veterinaria, UFRGS. 27: 210
3. Irikura, C.R., J.C.P. Ferreira, I. Martin, L.U. Cimenes, E. Oba and A.M. Jorge, 2003, Follicular dynamics in buffalo heifers (Bubalus bubalis) using the GnRH-$PGF_{2\alpha}$-GnRH protocol, Buffalo J. 3: pp. 323-327
4. Noakes, D.E., T.J. Parkinson and G.C.W., England, 2001, Arthur's Veterinary
Reproduction and Obstetrics. 8th ed. Baillier Tindall, London
5. Vidu, L., Bota, A., Particularitati fenotipice, genotipice si de crestere ale bivolului indigen, Ed. PIM, Iasi, 2014, pp. 119-158 (in Romanian)
6. Zain, A.E., A. KH. Abdel-Razek and M.M.Anwar. 2001, Effect of combined using of GnRH and PGF2α on ooestrus synchronization and pregnancy rate in buffalo-cow, Assiut Vet. Med. J., pp. 45: 89