

EFFECT OF hCG HORMONE ADMINISTRATION ON ESTRUS INDUCTION AND REPRODUCTIVE PERFORMANCE OF ANESTRUS IRAQI BUFFALOES (*Bubalus bubalis*)

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ABSTRACT

This study was conducted to investigate the influence of human chorionic gonadotropin (hCG) hormone administration on estrus induction and reproductive performance (mating, pregnancy and calving rates) of anestrus Iraqi buffaloes during outbreeding season (May-October). Five hundred and ninety six adult buffaloes of 4 to 6 years old owned by 193 owners within three Iraqi provinces (Baghdad, Muthanna and Thi-Qar) were used in this study. Sixty days post-partum, Four hundred and ninety six buffalo cows were intramuscularly administrated with single 1500 IU hCG injection, whereas the hundred cows were left without any treatment as control group. Estrus rate, as well as mating, pregnancy and calving rates were estimated for each province. Estrus and mating rates were superior ($P \leq 0.05$) in buffaloes of Baghdad province (91%), followed by Muthanna (86.37%) and Thi-Qar (81.30%) provinces. Similarly, pregnancy rate was greater ($P \leq 0.05$) in buffaloes of Baghdad (85%) and Muthanna (81.63%) than Thi-Qar (67%) provinces. Higher ($P \leq 0.05$) calving rate was noted in buffaloes owned by Baghdad owners (82%) as

compared with those in Muthanna (79.6%) and Thi-Qar (66%) provinces. In conclusion, hormonal treatment with hCG induced estrus and enhanced reproductive performance of buffaloes during outbreeding season in Iraq. This treatment is practical, easy and low cost, and owners can easily perform it. These improvements were consequently increased owner income (\$645=948,000 Iraqi dinar /buffalo) from the sale of more milk.

Keywords: *Bubalus bubalis*, buffaloes, hCG, anestrus, reproductive performance, Iraqi buffaloes

INTRODUCTION

In Iraq, the buffalo contributes significantly to the food supply in the form of milk (5 to 8%) and meat (1 to 3%) (FAO, 2009). The buffalo in Iraq is characterized by low reproductive efficiency due to many reasons including feed shortage (Abdulkareem *et al.*, 2012a), seasonality and using traditional old reproductive techniques (Abdulkareem *et al.*, 2011, 2012b). Although

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buffaloes are polyestrous, their reproductive efficiency shows wide variation throughout the year. As reported by several researchers (Zicarelli *et al.*, 1997; Srivastava and Sahni, 1999; Sertu *et al.*, 2012), buffalo cows exhibit a distinct seasonal change in displaying estrus, conception rate and calving rate. This may be the cause of the prolonged inter-calving period, since buffalo calving during the unfavorable season may not resume their ovarian activity until the following favorable season, decreasing their reproductive efficiency.

Anestrus is one of the deleterious features to the reproductive performance in the buffalo. Estrus often passes unnoticedly, especially in the hot and dry seasons when grass, wallowing pools and shades are in deficiency which made the expression more dubious. A research in the Pakistani river buffalo showed that 51.5% of estrus was the silent heat (Qureshi and Ahmad, 2008).

Several strategies have been used to supplement the endogenous P4 supplied by the corpus luteum (CL). One such strategy is the administration of human chorionic gonadotropin (hCG) during the early luteal phase, which induces ovulation of the first wave dominant follicle and formation of a functional accessory CL, leading, in turn, to increased circulating concentrations of P4. This phenomenon has been exploited by many authors in an attempt to improve pregnancy rates (Lonergan, 2011; Rizos, 2012). Human chorionic gonadotropin (hCG) treatment induces ovulation and the formation of an accessory CL in buffalo (Rastegarnia *et al.*, 2004).

Accordingly, this study was conducted to investigate the effect of hCG hormone administration on estrus induction and reproductive performance of anestrus Iraqi buffaloes in different provinces.

MATERIALS AND METHODS

Experimental animals and design

Five hundred and ninety six adult buffaloes of 4 to 6 years old owned by 193 owners within three Iraqi provinces (Baghdad, Muthanna and Thi-Qar) were used in this study (162 in Baghdad, 287 in Muthanna and 147 in Thi-Qar). Buffaloes were fed as traditional feeding within each province, depending mainly on little quantities (4 kg/head/day) of green forage, wheat bran and wheat and barley straw. Sixty days post-partum, forty hundred and ninety six buffalo cows (132 in Baghdad, 257 in Muthanna and 107 in Thi-Qar) were intramuscularly administrated with single 1500 IU hCG injection (Yougie - dong JK san- Si, Jonbuk- do, Korea), whereas the hundred cows (30 in Baghdad, 30 in Muthanna and 40 in Thi-Qar) were left without any treatment as control group. Estrus rate, as well as mating, pregnancy and calving rates were estimated for each buffalo (Overton, 2005).

Statistical analyses

The statistical computation was performed using SAS system (SAS, 2012) to study the effect of hCG hormone treatment of Iraqi buffaloes in different province on estrus induction and reproductive performance parameters. Chi-square test was used to compare between significant percentages in this study (Steel and Torrie, 1990).

RESULTS AND DISCUSSION

During the whole experimental period, the control group did not exhibited any signs of estrus, therefore, the estrus, mating, pregnancy and calving rates were of zero percentage. Concerning

Table 1. Effect of human chorionic gonadotropin (hCG) on estrus induction and reproductive performance of Iraqi buffaloes in different provinces.

Province	No. of animals	Estrus rate (%)	Mating rate (%)	Pregnancy rate (%)	Calving rate (%)
Muthanna	257	86.37	86.37	81.63	79.60
Baghdad	132	91.00	91.00	85.00	82.00
Thi-Qar	107	81.30	81.30	67.00	66.00
Total	496	86.20	86.20	77.87	75.86
Chi-square value		4.055 *	4.055 *	7.462 *	7.633 *

* = $P \leq 0.05$.

the hCG-treated buffaloes, the estrus and mating rates were superior ($P \leq 0.05$) in buffaloes of Baghdad province (91%), followed by Muthanna (86.37%) and Thi-Qar (81.30%) provinces. Similarly, pregnancy rate was greater ($P \leq 0.05$) in buffaloes of Baghdad (85%) and Muthanna (81.63%) than Thi-Qar (67%) provinces. Higher ($P \leq 0.05$) calving rate was noted in buffaloes owned by Baghdad owners (82%) as compared with those in Muthanna (79.6%) and Thi-Qar (66%) provinces. It seems that administration of hCG to buffalo cows increases the area of luteal tissue of the original CL as well as causing the ovulation of the large dominant follicle present and the formation of an accessory CL, which is associated with an increase in circulating concentrations of P4. These conditions are associated with advanced conceptus elongation following embryo transfer on Day 7 and an associated increase in interferon tau (IFNT) secretion (Rizos, 2012).

Higher reproductive performance in Baghdad buffaloes may return to the improved feeding schedules used as compared with other provinces. Low pregnancy rate in Thi-Qar province as compared with the others may return to the bad

traditional customs of some breeders. They used to borrow their bulls (males) to the other breeders for mating their buffaloes which may result in reducing their fertility. Moreover, low body condition score (BCS) of these buffaloes might be another reason for this decline. The BCS plays an important role in ovarian cyclicity and consequently, on the response of the animals to treatments that aim to control the estrous cycle and ovulation (Baruselli *et al.*, 2000).

In conclusion, hormonal treatment with hCG induced estrus and enhanced reproductive performance of buffaloes during outbreeding in Iraq. This treatment is practical, easy and low cost (7,000 ID / animal), and owners can easily perform it. These improvements were consequently increased owner income (\$645=948,000 Iraqi dinar /buffalo) from the sale of more milk Table 1.

REFERENCES

- Abdulkareem, T.A., S.A.M. Al-Sharifi, M.A. Ishak, S.M. Eidan, M.A. Alnimr, C.W. Passavant, R.R. Branen, and R.G. Sasser. 2011. Early pregnancy detection of Iraqi

- riverine buffalo (*Bubalus bubalis*) using the BioPRYN enzyme-linked immunosorbent assay for PSPB and the progesterone assay. *Reprod. Domest. Anim.*, **46**(3): 455-462. DOI: 10.1111/j.1439-0531.2010.01689.x
- Abdulkareem, T.A., S.A.M. Al-Sharifi, S.M. Eidan and R.G. Sasser. 2012a. Reproductive and productive performance of Iraqi buffaloes as influenced by pre-mating and pre-calving concentrate supplementation. *Pak. Vet. J.*, **32**(3): 345-348. Available on: http://www.pvj.com.pk/pdf-files/32_3/345-348.pdf
- Abdulkareem, T.A., S.M. Eidan, M.A. Ishak, S.A.M. Al-Sharifi, M.A. Alnimer, C.W. Passavant, J.R. Branen and R.G. Sasser. 2012b. Pregnancy-specific protein B (PSPB), progesterone and some biochemical attributes concentrations in the fetal fluids and serum and its relationship with fetal and placental characteristics of Iraqi riverine buffalo (*Bubalus bubalis*) *Anim. Reprod. Sci.*, **130**(1-2): 33-41. DOI: 10.1016/j.anireprosci.2012.01.002
- Baruselli, P.S., E.H. Madureira, V.H. Barnabe, R.C. Barnabe, R.C.A. Berber and R. Amaral. 2000. Timed insemination using synchronization of ovulation in buffalo. *In Proceedings of the 14th International Congress on Animal Reproduction*, Stockholm, Sweden. p. 14-18.
- FAO, 2009. *Food Outlook, Global Market Analysis*, Food and Agriculture Organization, Rome, Italy. p. 42-51.
- Loneragan, P. 2011. Influence of progesterone on oocyte quality and embryo development in cows. *Theriogenology*, **76**(9): 1594-1601. DOI: 10.1016/j.theriogenology.2011.06.012
- Overton, M.W. 2005. Incentives for increasing pregnancy rate, p. 35-42. *In* G.E. Billikope (edn.) *Dairy Incentives Pay*, Chapter 3, 4th ed. University of California, California, USA. Available on: <https://nature.berkeley.edu/ucce50/ag-labor/7dairy/DairyIncentive05.pdf>
- Qureshi, M.S. and N. Ahmad. 2008. Interaction of calf suckling, use of oxytocin and milk yield with reproductive performance of dairy buffaloes. *Anim. Reprod. Sci.*, **106**(3-4): 380-392. DOI: 10.1016/j.anireprosci.2007.05.019
- Rizos, D., S. Scully, A.K. Kelly, A.D. Ealy, R. Moros, P. Duffy, A. Al Naib, N. Forde and P. Lonergan. 2012. Effects of human chorionic gonadotrophin administration on day 5 after oestrus on corpus luteum characteristics, circulating progesterone and conceptus elongation in cattle. *Reprod. Fert. Develop.*, **24**(3): 472-481. DOI: 10.1071/RD11139
- SAS. 2012. *Statistical Analysis System, User's Guide. Statistical Version 9*, 1th ed. Statistical Analysis System Institute Inc. Cary, New York, USA.
- Sertu, S., M. Voiculescu, A. Pop, A. Bota, A. Grigorie and M. Paraschivescu. 2012. Research concerning the reproduction seasonality in Carpathian buffalo. *Animal Science and Biotechnologies*, **45**(1): 253-258.
- Srivastava, S.K. and K.L. Sahni. 1999. Effect of season on estrus and conception in village cows and buffaloes. *Indian Vet. J.*, **76**: 385-387.
- Steel, R.G.D. and J.H. Torrie. 1990. *Principles and Procedures of Statistics: A Biometrical Approach*, 3rd ed. McGraw-Hill, Kogakusha Ltd., Tokyo, Japan.
- Zicarelli, L. 1997. Reproductive seasonality in buffalo. *In The 3rd Course on Biotechnology of Reproduction in Buffaloes*, Caserta, Italy.