

## **SERUM ESTRADIOL AND PROGESTERONE IN IMMATURE MALE AND FEMALE WATER BUFFALO(*BUBALUS BUBALIS*) IN MARSHES OF IRAQ**

Khalid Al-Fartosi\*, Nessren H. Humaidan\*\*

\*Department of Biology, College of Science, University of Thi-Qar, Iraq.

\*\* Department of Environment, Center of Marshland researches, University of Thi-Qar, Iraq.

(Received 23 October 2011 ,Accepted 4 April 2012)

**Keywords:** Estradiol, Progesterone, Water buffaloes.

### **ABSTRACT**

The present study aimed to determine some of reproductive values of water buffaloes in marshes of Iraq which may be used as a primary values for assaying the reproduction and production of water buffaloes. The study performed on immature male and female water buffaloes. Estradiol and progesterone hormones were determined. The results showed effect of sex on the levels of estradiol and progesterone of male and female buffaloes. The age was effective in estradiol and progesterone levels of female buffaloes, while it was no effective on estradiol and progesterone levels of male water buffaloes.

### **INTRODUCTION**

The buffalo is a an important dairy animal in many developing countries. The buffaloes are suitable for this, because of their high disease resistance and the opportunities of milk production despite feeding with low quality roughage {1}. The buffaloes are multipurpose animals and have been used for milk production, meat production and draft power for more than 5000 years {2}. Reproduction management is a major concern for the dairy industry, because inefficient heat detection causes significant economic losses {3}.

Male water buffaloes are sexually mature at the age of 18 months {4} and can be used as sires from the age of 3 years {5}. {6} showed that female buffaloes are polyestral and their reproduction is seasonal. The highest percentage of females in heat was observed in November, the lowest in June. External symptoms are hardly noticeable, thus full acceptance of the male is the most reliable symptom. A common phenomenon is heat with no symptoms, known as silent oestrus {7}. Females are sexually mature at the age of 15–18 months and ready to reproduce when they are 24–36 months old {6}.

There are many idea regarding the back history of water buffalo in Iraq , the dominant one was that buffaloes had been domesticated since third millennium B.C in Mesopotamia during Sumerian Era {8,9}. Buffaloes is considered one of the animals that has wide spread in the marshes area in the south of Iraq. There is no house in the marshes area don't have it. Buffaloes lived with circumstances of the environment. It is considered as the main source for living the people of marshes. It was considered as a source of insurance for care taker and his family to face the requites in that area. The buffalo isn't get the sufficient importance in the past either by centers of investigation or

from the agriculture offices or veterinary college{10,11}. The number of buffaloes in Iraq was 250 thousand head in the middle of the last century, and was a source of livelihood for a large segment of the rural population and especially the inhabitants of the marshes. However, and due to political and economic circumstances experienced by Iraq during the last five decades, from wars, draining the marshes, economic blockade and removal of subsidies on feed, and thus migration of buffalo farmers from the South part to other regions in middle and north parts of Iraq, for more water and fodder is cheap, that number has dropped dramatically{12}. The latest Iraqi buffalo population is estimated about (285,537 heads and distributed on 15 provinces with highest percent on the Basra province in south marshes about (57704 heads), Thi-Qar province (49283 heads), Baghdad (47809 heads) mainly in Fadiliya village in the east boundary of the capital and Missan province(24345heads){13}.

Steroid hormones are secreted by the ovary, testes, placenta and adrenal cortex. The two classes of hormones produced by the ovaries are progestins and estrogens and have cholesterol as a common precursor. Progestins are a group of hormones with similar physiological activity, the most important being progesterone (P4). This latter has a dominant role in regulating the oestrus cycle. Estrogens are hormones produced by the ovary and are transported in the body by binding proteins. Estrogens act on the central nervous system in order to induce behavioral oestrus in females and the most important of these hormones is estradiol {14}.

The aim of the present study is to complete the above study by determine the levels of estradiol and progesterone in male and female of water buffalo.

## **MATERIALS AND METHODS**

**Animals:** Forty immature male and female water buffaloes at marshes of south of Iraq were used during the period between October 2007 – May 2008. The animals were divided into two groups of age, the first one was equal or less than 6 month and the other was more than 6 months (6-12 months). Blood samples were collected from jugular vein under possible minimal stress. These samples were put in a tube with out any anticoagulant to separate serum by using a centrifuge with 2500 for 15 minutes for assaying the levels of hormones.

**Measurements of hormones:** Levels of testosterone, estradiol and progesterone were determined by Enzyme Linked Immuno Sorbent Assay (ELISA) by using of Elisa reader type BioElisa ELX800, Germany, with kits, BioCheck, Inc, Germany.

### **Statistical analysis:**

Statistical analysis was performed using one way analysis of variance (ANOVA). If a significance was found, differences among individual group means were tested by the least significant difference (LSD) test. Values were considered statistically significant at  $P \leq 0.05$ .

## **RESULTS**

### **1- Effect of sex and age on estradiol level**

The results of the effect of correlation between sex and age of the level of estradiol in immature male and female water buffaloes were presented in table (1). These results showed a non significant effect of age on estradiol level in male water buffaloes,

whereas there was a significant increase in estradiol level of female water buffalo at age more than 6 months compare with these female at age equal or less than 6 months. The results indicated a significant increase in estradiol levels in two age groups of female water buffalo compare with male water buffalo at  $\leq 6$  months and these at  $> 6$  months old.

**Table (1) : Effect of sex and age on Estradiol level of water buffaloes in marshes of Iraq (Mean  $\pm$  S.E.).**

Sex	Age	N of samples	Estradiol level
Male of water buffaloes	$\leq 6$ months	10	4.69 <b>c</b> $\pm 0.28$
	$> 6$ months	10	4.43 <b>c</b> $\pm 0.21$
Female of water buffaloes	$\leq 6$ months	10	30.13 <b>b</b> $\pm 0.98$
	$> 6$ months	10	50.66 <b>a</b> $\pm 2.27$

**L.S.D = 7.62**

## 2- Effect of sex and age on progesterone level

The results of the effect of sex and age of the level of progesterone in immature male and female water buffaloes were presented in table (2). The results was shown no significant differences between the male age groups. Also, the results indicated a significant differences between the female aged groups. The progesterone level of females equal or less than 6 months of age was higher than females aged more than 6 months. The results indicated a significant increase in progesterone levels in two age groups of female water buffalo compare with male water buffalo at  $\leq 6$  months and these at  $> 6$  months old.

**Table (2) : Effect of sex and age on progesterone level of water buffaloes in marshes of Iraq(Mean  $\pm$  S.E.).**

Sex	Age	N of samples	Progesterone level
Male of water buffaloes	$\leq 6$ months	10	0.16 <b>c</b> $\pm 0.00$
	$> 6$ months	10	0.14 <b>c</b> $\pm 0.00$
Female of water buffaloes	$\leq 6$ months	10	13.93 <b>a</b> $\pm 0.70$
	$> 6$ months	10	7.73 <b>b</b> $\pm 0.37$

**L.S.D =6.02**

## **DISCUSSION**

The results of the present study showed the influence of sex on the level of testosterone, estradiol and progesterone in male and female water buffaloes, while there was a significant effect for age on estradiol and progesterone levels in female water buffalo.

Sexual behavior is activated by hormones from the time of puberty throughout the animal's life. The increasing amounts of reproductive hormones during oestrus affect parts of the brain in female animals. This result in behavioral changes directed towards mating which varies considerably between species {15}.

In buffalo the general pattern of secretion of the estradiol-17 $\beta$  indicates a surge which takes place on the day preceding the LH peak {16,17} or frequently very close to the LH peak with blood levels ranging between 9 and 13 pg/ml {18} respectively in Murrah and Mediterranean buffaloes Estradiol 17- $\beta$  was significantly higher in postnatal calves up to two months of age, and E2 17- $\beta$  showed a negative correlation with age {19}.

The function of progesterone is to create favorable conditions for the fetus and neonate. Increased levels of progesterone influence the epithelium in the uterus. The glands in the endometrium grow and secrete nutrients, the effects of that are to prepare the uterus to have the right conditions for the development of the embryo. Progesterone prevents uterus contractions that can lead to abortion or too early parturition. Progesterone also contributes to growth and differentiation of the mammary tissue and prepare for milk synthesis {15}. The progesterone levels can be used for diagnosis of pregnancy. An animal that is not pregnant will have very low levels of progesterone in the plasma and vice versa. Since the range of progesterone concentration in the luteal phase overlaps with the pregnancy concentration repeated measurements are required to determine if the animal is pregnant or not {15}. The progesterone levels were higher in newly born calves and mature bulls. Otherwise, the levels continued to be low throughout the period of growth and development {19}.

{20} showed non significant differences between hematological and biochemical parameters of immature male and female buffalo. Also, the same results indicated there was a significant increased in these parameters of mature female buffalo when compared with immature females. {21} showed by the preliminary study on water buffalo in marshes of Iraq for defining some values of reproductive hormones (FSH, LH and Prolactin) the relationship between the sex and age of buffaloes with the levels of these hormones.

## مستوى الاستراديول والبروجستيرون في مصل ذكور وإناث الجاموس في مناطق احوار جنوب العراق

خالد كاطع الفرطوسي\*، نسرين حبيب حميدان\*\*  
\*قسم علوم الحياة / كلية العلوم ، جامعة ذي قار ، ذي قار ، العراق.  
\*\*قسم البيئة ، مركز ابحاث الاحوار ، جامعة ذي قار ، ذي قار ، العراق

### الخلاصة

هدفت الدراسة الحالية تحديد قيم بعض الهرمونات الستيرويدية في جاموس مناطق احوار العراق ، حيث درست مستويات هرمون الاستراديول وهرمون البروجستيرون لذكور وإناث الجاموس غير البالغة وضمن مجموعتين عمريتين (اقل من اوبساوي 6 اشهر ، اكثر من 6 اشهر (6-12 شهر) ). أظهرت نتائج الدراسة الحالية تأثير معنوي للجنس في مستوى هرمون الاستراديول وهرمون البروجستيرون في ذكور وإناث الجاموس. كما كان للعمر تأثير معنوي في مستوى الهرمونين المذكورين في إناث الجاموس العراقي ، فيما لم يكن للعمر تأثير معنوي في مستوى الهرمون اعلاه في ذكور الجاموس. وقد نوقشت النتائج من الناحية الفسيولوجية مقارنة مع دراسات علمية سابقة لاسيما وان هذه القيم بالنسبة للجاموس العراقي تعتبر قيم اولية جديدة.

### REFERENCES

- 1- Thomas, C.S. Milking management of dairy buffaloes. Acta Universitatis Agriculturae Sueciae. Swedish University of Agricultural Sciences. Uppsala, Sweden. Pages 7-9, 2004.
- 2- Nanda, A.S. and Nakao, T. Role of buffalo in the socioeconomic development of rural Asia: Current status and future prospects. *Animal Science Journal*, 2003, 74: 443-455.
- 3- Karir, T., Nagvekar, U.H., Samuel, G. *et al.* Estimation of progesterone in buffalo milk by radioimmunoassay. *Journal of Radioanalytical and Nuclear Chemistry*, 2006, 267(2):321-325.
- 4- Javed, M.T.; Khan, A. and Kausar, R. Influence of age and season on body mass, scrotal circumference and sexual behavior of Nili-Ravi buffalo (*Bubalus bubalis* L.) bulls. *Vet. Archiv.*, 1998, 68 (6): 219–299.
- 5- Högborg, M.S. and Lind, O. Buffalo Milk Production. [www.milkproduction.com/Library/Articles/ Buffalo\\_Milk\\_Production](http://www.milkproduction.com/Library/Articles/ Buffalo_Milk_Production), 2003.
- 6- Barile, V.L. Reproductive efficiency in female buffaloes. *Buffalo Prod. Res.*, FAO, IV, 2005, 77–108.
- 7- Zoheir, M.A.; Abdoon, A.S.; Mahrons, K. F. *et al.* Effect of season on the quality and in vitro maturation rate of Egyptian buffalo(*Bubalus bubalis*) oocytes. *J. Cell Anim. Biol.*, 2007, 1 (2): 029–033.
- 8- Zuener. History of domesticated animal ,London .Uk, 1963.
- 9- Sousa .A. History of Mesopotamian civilization .vol .1pp.572, Baghdad, Iraq, 1983.

- 10- Al-Fartosi, K. G.** The role of buffaloes breeding in the development of nation's economic. The first conference of Iraqi buffaloes. Ministry of Agriculture, Iraq, 2010, 22-12-2010.
- 11- Al-Saedy, J. and Al-Fartosi, K.** Iraqi buffalo status and perspectives. Buffalo Newsletter, International Buffalo Federation (IBF), 2011.
- 12- AL-Saedy, J.** Iraqi buffalo now. Vol2 of proceeding of 8 world buffalo congress held in Caserta/Italy, 2007.
- 13- M.O.A.** Ministry of Agriculture. National livestock census, 2008.
- 14 - Terzano, G. M.; Allergini, S.; Borghese, A.; et al.** Metabolic and hormonal parameters in buffaloes. In: Borghese, A. (ed).Buffalo production and research. Food and agriculture organization of the united nations(FAO). Rome, 2005.
- 15- Sjaastad, O.V.; Hove, K. and Sand, O.** *Reproduction.* In: *Physiology of Domestic Animals.* First edition. Scandinavian Veterinary Press, Oslo, Norway. Chapter 18, 2003.
- 16- Singh, B.; Dixit, V.D.; Singh, P. et al.** Plasma inhibin levels in relation to steroids and gonadotrophins during the oestrus cycle in buffalo. *Reprod. Dom. Anim.*, 2001, 36: 163-167.
- 17- Malfatti, A.** Recent advances in buffalo endocrinology. *Atti Secondo Congresso Nazionale sull'Allevamento del Buffalo.* Monterotondo, Roma, 28 - 30 Ag., 2003, 161-176.
- 18- Seren, E.; Parmeggiani, A.; Mongiorgi, S. et al.** Modificazioni endocrine durante il ciclo estrale nella bufala. *Agric. Ricerca*, 1994, 16: 17-24.
- 19- Sharma, I.J.; Agarwal, S.P.; Agarwal, V.K. et al.** Changes in profiles of serum sex steroid of male buffaloes from birth to maturity. *Theriogenology*, 1984, 22(2): 175-186.
- 20- Canfield, P.J.; Best, F.G.; Fairbum, et al.** Normal hematological and biochemical values for the swamp buffalo(*Bubalus bubalis*) in Australia. *Australian Veterinary Journal*, 1984, 6(3): 89-93.
- 21- Al-Fartosi, K. G.** Preliminary study on water buffalo(*Bubalus bubalis*) in marshes of Iraq (Defining some values of reproductive hormones). *J. of education College, Thi-Qar University, Iraq*, 2010, 1(1): 21-29.