



Effect of Heat Stress on Peripheral Plasma Concentration Hormones Oestradiol , Progesterone , FSH and LH in Iraqi Buffaloes *Bubalus bubalis* During Summer and Spring Season

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Abstract

This study Was designed to evaluate the effect of thermal heat on the Peripheral plasma concentration hormones oestradiol, progesterone, follicle stimulating hormones (FSH) and luteinizing hormone ((LH). These hormones were measured by a competitive protein binding assay in six Iraqi buffaloes *Bubalus bubalis* at unprop irate stages of estrus cycle during warm season (March& April) and hot season (July& August). It is interest to note that levels of oestradiol and progesterone in the warm season were significantly higher($p < 0.05$) than those measured at the hot season, while there is no significant effects of the concentration of FSH during two different season, also our study showed an elevation of the concentration of LH in warm season compared with hot season but the effectiveness were not significant. The present study also showed none significant elevation of FSH concentration during hot season compared with warm season.

Key Words : Heat,Plasma Hormones,Buffaloes,

Introduction

Reproductive efficiency of buffaloes is hampered by inherent, late maturity and prolonged inter calving interval[1]. The improvement of the reproductive performance of female farm animals depends on the understanding of the physiology of the reproductive cycle and the hormonal changes associated with it.High ambient temperature is the major constraint on animal productivity[2]. And the effect of heat stress is aggregated when heat stress accompanied with high humidity, exposure of buffaloes to the hot condition evokes a series of drastic changes in the metabolism such changes result impairment of reproductive performance.

It was reported that buffaloes have a tendency to breed seasonally[3]. Showing a suspension of sexual activity during summer in almost all parts of the world[4]. And during heat stress they remain sexually inactive. The main factor regulating ovarian activity are gonadotropin releasing hormone from the hypo-thalamus and the heat stress causes hyper prolactinemia , reduced luteinizing hormone LH frequency, poor follicle maturation and decreased osteradiol production in oestrus buffaloes[5]. Leading to ovarian inactivity. Another important factor determining the reproductive seasonality of buffaloes is the photo period[6]. And the information regarding photoperiod is conveyed to neuroendocrine system by the circadian

secretion of melatonin from the pineal gland[7].

The present study was designed to evaluate the changes of plasma FSH, LH, progesterone and ostradiol levels in Iraqi buffaloes *Bubalus bubalis*. during two different seasons and climatic condition .

Materials and methods

Animal treatment

Six female Iraqi buffaloes *Bubalus bubalis* were selected from AL-Najaf veterinary institutes they were not inseminated. The age of the experimental animals ranged between 3-10 years and their weight about 500kg. They kept in a loose housing system. All the animals were at different stage of oestrus cycle. The animal checked for any clinical abnormalities .

Blood sample collection

10 ml of blood samples were separately collected from jugular vein of each animal during hot season (July & August) and warm season (March & April) in a heparinized plastic tubes . Plasma was separated by centrifugation at 300 rpm for 10 minutes and stored at 15°C .

Hormone Assay

Plasma hormones were measured by radio- immunoassay used routinely in our



laboratory . The source and the specificity of the anti-sear and the method and efficiency of

extraction did not differ from those described previously[8, 9, 10].

oestrus cycle during hot and warm season are given in

Statistical Analysis

The database was created, and the differences between the concentration of hormones in each season were analyzed by using T-test confidence probabilities ($p < 0.05$).

Results

Levels of both serum progesterone and oestradiole measured at different stages of

Table. (1) and Figure (1). It is interest to note that the levels of oestradiol and progesterone were significantly higher ($p > 0.05$) during warm season compared with hot season . Table (1) and figure (1) showed non-significant elevation in the concentration of LH during warm season compared with hot season while there were non-significant increasing in the concentration of FSH in hot season compared with warmseason .

Table(1) seasonal changes of plasma concentration hormones during warm and hot season in Iraqi female buffaloes.

Season	FSH ng/ml	LH Pg/ml	Oestradiol Ng/ml	Progesterone Pg/ml
Warm	1.1	0.8	20.9	3.2
hot	1.13	0.3	7.8	0.14
T	0.6 non sign	0.2 non sign	3.3 sign	2.4 sign

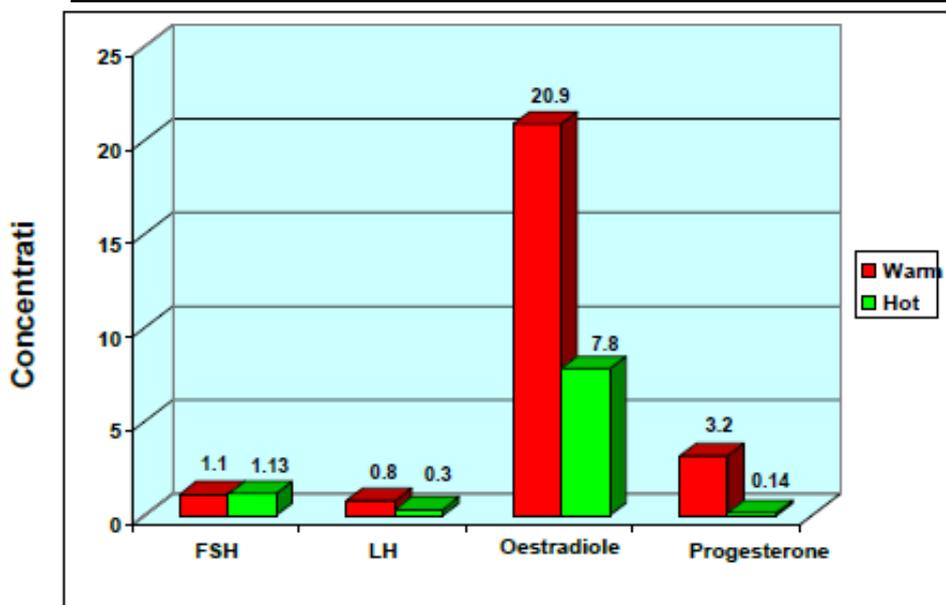


Figure (1) Distribution of serum levels hormones during two different season in Iraqi female buffaloes.

Discussion

In the present study we found a significant differences in oestradiol concentration in two season.. Preliminary measurement of oestradiol concentration also showed that values in the hot months (July & August) were lower than warm months (march& April) . These observation support the views that expression of oestradiol and secretion of LH required an appropriate

balance between oestradiol and progesterone[11].

Our result completely identical with other reported [12, 13, 14]. Their results indicated that heat stress had a direct effect on the neuroendocrine setup in buffaloes. Buffaloes are very susceptible to the thermal stress[15]. During summer especially when exposed to the direct sun rays as they have poor cutaneous evaporative cooling



mechanism owing to low density of sweat gland, buffaloes get a little protective by virtue of their scant hair coat [16]. and high relative humidity further accentuates causes hyper-prolactinemia, reduced LH frequency, poor follicle maturation and decreased Oestradiol production in an oestrous buffaloes [17]. leading to ovarian inactivity. The present data also showed a significant decrease in the progesterone concentration during hot season compared with warm season.

Our results were identical with those reported [18, 19, 20]. They reported that the duration of the luteal phase and the mean maximal value of progesterone showed a

They found that plasma inhibin concentration in summer are lower under heat stress in cows and cyclic buffaloes this reflecting reduced folliculogenesis since a significant proportion of plasma inhibin comes from small and medium size follicles leads to increase the concentration of plasma FSH during preovulatory period in summer this was associated with lower circulating concentration of inhibin [24]. The most studies report that LH levels are decreased by heat stress we are drawn to conclude that in summer the dominant follicle develops in low LH environment and this result in reduced oestradiol secretion from the dominant

The levels of LH were lower during hot season (July, August) compared with warm season (March, April), luteinizing hormone plays an important role in contributing ovarian inactivity in buffaloes during summer [26]. Secretion was lower during summer compared with winter [27]. Further the optimal LH surge was also reported to be absent in an oestrous buffaloes in summer and the decreased in LH level is attributed to the inhibitory action of progesterone [28].

seasonal variation in shaded heifers seem to be the most sensitive to environment and especially to temperature if the concentration of plasma progesterone is reduced by heat stress this would have consequence for fertility and compromise follicular development leading to abnormal oocyte maturation and decrease the fertility [21].

The present study also showed non-significant elevation of the concentration of FSH during hot season compared with warm season, the low reproductive efficiency of buffaloes in summer has been attributed to low luteal activity with low level of progesterone in low breeding season compared to normal breeding season [22, 23].

follicles leading to poor expression of oestrous, and hence reduced fertility. the small amount of published information available on the effect of heat stress on blood concentration of FSH and inhibin in cattle suggest that FSH is increased by heat stress and this may be due to decreased plasma inhibin further research is required before conclusion can be reached, however FSH if increased appeared in sufficient to overcome the effect of low LH concentration and therefore a reduced availability of androgen procured of oestradiol synthesis [25].



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