

Effect of season on blood minerals in Iraqi bull buffalo

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Abstract

The present study was conducted to investigate some aspects of the reproductive system in Iraqi bull buffaloes and the effects of seasonal changes on physiological parameters. 96 blood samples of buffalo's bull were collected from the slaughter house during August 2013 to August 2014. Blood samples were analyzed to study the effect of season on the blood minerals during the different seasons of the year. The results of the minerals assays showed that there were no significant differences for (calcium, phosphorus, and sodium) which increased in autumn and winter, decreased in spring and summer. The calcium recorded (2.39, 2.41, 2.22, 2.51) m.Mol/L, the phosphorus (2.19, 2.18, 1.99, 1.92) m.Mol / L, and the sodium (140.78, 140.66, 140.33, 139.16) m.Mol / L in autumn, winter, spring, and summer respectively, while the results showed significant differences ($p < 0.05$) of copper reading during the different seasons which recorded a highest level in autumn and winter (68.63, 67.7, 64.15, 54.56) m.Mol / L.

Key words: Bull buffaloes, Iraqi buffalo, mineral, season, sodium, calcium, copper

تأثير الموسم على مستوى المعادن في دم ذكور الجاموس العراقي

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الخلاصة

اجريت الدراسة الحالية لمعرفة بعض جوانب التكاثر في ذكور الجاموس العراقي وتأثير الموسم على الصفات الفسلجية. جمعت 96 عينة دم للفترة الممتدة من اغسطس 2013 الى اغسطس 2014. عينات الدم تم تحليلها لدراسة تأثير الموسم على المعادن خلال الفصول المختلفة من السنة ، اظهرت نتائج الدراسة عدم وجود فروقات معنوية لمستويات الصوديوم ، والفسفور ، والكالسيوم وان معدل هذه المعادن يزداد في فصل الخريف والشتاء ويقل في فصل الربيع والصيف ، اذ سجل الكالسيوم (2.39 ، 2.41 ، 2.22 ، 2.51) m.Mol/L والفسفور (2.19 ، 2.18 ، 1.99 ، 1.92) m.Mol/L والصوديوم (140.78 ، 140.66 ، 140.33 ، 139.16) m.Mol/L على التوالي. وكما اظهرت نتائج الدراسة الحالية وجود فرق معنوي ($p < 0.05$) خلال فصول السنة المختلفة لعنصر النحاس وان اعلى معدل له كان في فصل الخريف والشتاء (68.63 ، 67.7 ، 64.15 ، 54.56) m.Mol/L .

الكلمات المفتاحية: ذكور الجاموس ، الجاموس العراقي ، المعادن ، الموسم ، الصوديوم ، الكالسيوم ، النحاس.

Introduction

The water buffalo has been associated with people since prehistoric times. It is one of the oldest species of domesticated livestock and continues to be used as a source of milk and meat, and as a draft animal. Water buffaloes have been classified into the river and swamp types (1). The river type is larger, used for milk, wallows in fresh-water and originates, the swamp type is smaller, used for draft and meat, wallows in muddy water and is

indigenous to most Asian countries (1). The Iraqi Buffalo contribute in supplying the local market with high nutritional value and to fill part of the shortfall in the case of dairy products in scarce during some months of the year, noting that most of the dairy products in the local markets is of buffalo milk during a period of drought, with cows male as well as the superiority of some local animals in the amount of milk production and content of fat (2). The

environmental factors associated with heat stress which affect the physiological systems governing thermal regulation and the maintenance of positive heat loss, high ambient temperature is the major constraint on animal productivity (3). In dry seasons nutrition is often cited as a major limitation to ruminant livestock production. Animals lose weight during the dry season because of low quality and quantity forage which includes low mineral concentration greater response to mineral supplementation has often been observed during the rainy season when forages are supplying adequate energy and protein (4), than during the dry season forages are supplying adequate energy and protein when these nutrients limit animal performance greatly. In male animals minerals may change spermatogenesis and reduce libido. Most of the non-conventional feeds are deficient in micro minerals and are likely to accentuate reproductive problems (5), for this reason the aim of this study to explain the effect of season on blood minerals on fertility in bull buffalo.

Materials and methods

Ninety six blood samples of healthy bulls buffalo, aged (3-5) years, were obtained from the slaughter house from August 2013 to August 2014, 3 visits / week before slaughter immediately, (8 samples) for each month from the (Jugular vein) then empties in test tube (Gel tube) size (8 ml) contains Gelatin substance which help to isolate the serum from the blood, then transported to the lab, the samples have been centrifuged at

3000/rpm for 10 minutes for determination the levels of minerals (sodium, calcium, copper and phosphor) with specific kits and according to the instructions of the company. Data were analyzed statistically by SPSS program, version 17 software 2010. Testing method used include one way ANOVA for comparisons among season followed by least significant differences (LSD) test for comparison between two groups. P value of $p < 0.05$ were considered to record statistical significances.

Results

The results showed that there were no any statistical significant differences between different seasons of the year in the reading of blood level of calcium, sodium, and phosphorus. The level of calcium in autumn was (2.39 ± 0.06) m.Mol/L, winter (2.41 ± 0.24) m.Mol/L, spring (2.22 ± 0.06) m.Mol/L and summer (2.51 ± 0.21) m.Mol/L. The level of sodium in autumn was (140.78 ± 0.99), winter 140.66 ± 0.97 m.Eq, spring (140.33 ± 0.88) m.Eq and summer (139.16 ± 1.33) m.Eq. The level of phosphorus in autumn was (2.19 ± 0.12) m.Mol/L, winter (2.18 ± 0.21) m.Mol/L, spring (1.99 ± 0.41) m.Mol/L and summer (1.92 ± 0.14) m.Mol/L. Table (1). Also the results showed a statistical significant differences ($p < 0.05$) between different seasons of the year in copper blood level. The level of copper in autumn was (68.63 ± 11.35) m.Mol/L, winter (67.7 ± 2.69) m.Mol/L, spring (64.15 ± 5.22) m.Mol/L and summer (54.56 ± 2.68) m.Mol/L. Table (1)

Table (1): The effects of season on blood minerals of Iraqi bull buffalo

Mineral	Autumn (Mean± SE)	Winter (Mean± SE)	Spring (Mean± SE)	Summer (Mean± SE)
Calcium m.Mol/L	2.39±0.06 a	2.41± 0.24 a	2.22±0.06 a	2.51±0.21 a
Phosphorus m.Mol/L	2.19±0.12 a	2.18±0.21 a	1.99±0.4 a	1.92±0.14 a
Copper m.Mol/L	68.63±11.35 a	67.7±2.69 a	64.15±5.22 b	54.56±2.68 b
Sodium m.Eq	140.78±0.99 a	140.66±0.88 a	140.33±1.33 a	139.16±0.97 a

*The similar letters refers to the non-significant differences among months while different letters refers to the significant differences at ($p < 0.05$).

Discussion

There were no available references of the minerals levels in the blood bull buffalo during different seasons except for the seminal fluid. The calcium assays in the present study were revealed that the highest mean of serum calcium was recorded in summer 2.51 m.Mol/L, These findings as mentioned by (7), the total calcium level in seminal plasma was found in summer more than in winter while our results were not agree with the study of (6) which reported that the highest calcium level was found in spring and the lowest in winter season, also (8) was reported that the calcium levels in summer were more than in winter, and not significantly affected by season of the year (9), these results were in agreement with the present study, may be due to the availability of herbs rich in calcium, or decreases their pastures in the spring and increased in winter. The phosphorus levels in present study were recorded the highest mean in autumn 2.19 m.Mol/L. These results were supported by (10,11) that the total phosphorus level in buffalo semen was found decreased significantly in summer. (12) mentioned that there were an increase significantly during summer season, but these findings were disagreement with our study. The phosphorus level decreased in summer may be due to the low protein level in feeds when the grass becomes dry and phosphorus deficiency in some parts of Iraq. The highest mean of sodium was recorded in

autumn, These results were supported by (11,6) the sodium level were found decrease in summer more than in winter, (13) also mentioned that the sodium content of the seminal plasma had seasonal differences which indicated higher level in cold, and slightly lower values in hot and hot-humid climates. Our results agreed with (14) the low Na levels have been linked to general infertility and embryonic mortality in several farm animals, While our results not agreed with (10) which referred to significantly high Na level during summer more than in the other seasons of the year, that may be due to increase reproductive activity in winter more than in summer, the sodium plays a role in the increase of the sexual activity (15). The results showed that the means of copper in autumn was 68.63 m.Mol/L this results indicated that its highest mean during the year. These results agree with (16) which detected positive correlation between blood Cu and sperm motility, and also observed by (17) a positive correlation between the Cu concentration in the seminal plasma and sperm motility, and agreed with the researches of (18) and (19) which noticed positive correlate's between the Cu concentration in blood, sperm count in the ejaculate, progressive motility of spermatozoa (20). These findings were consistent with our results that the copper played a role in the reproductive ability of the animals in autumn and winter.

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