



Effects of Season, Camel breed and Age on Some Minerals Concentrations in Serum of She-camels Slaughtered at Tumboul Abattoir

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ABSTRACT:

The aim of the study was to determine the status of some minerals (Calcium, Phosphorus, Manganese and Zinc) in serum of she-camels (*Camelus dromedarius*) slaughtered at Tamboul Abattoir from August 2017 to October 2018 and during dry and wet seasons. Blood samples were collected from eighty she-camels raised under traditional system and slaughtered at Tamboul abattoir. Serum samples were analyzed for measurement/estimation of Calcium (Ca), Phosphorus (P), Manganese (Mn) and Zinc (Zn) concentration. The variation factors included season, breed and age of she-camels.

The results showed that there was no significant effect of season on serum Ca and P but statistical significant differences ($P < 0.05$) on the serum Mn and Zn affected by season. The results of this study showed a significantly higher ($P < 0.05$) Ca and Zn concentration in serum of Butana and Darfur breeds compared to Bishari and Anafi breed. There was no significant ($P > 0.05$) differences in serum concentration of minerals due to age, although the highest concentrations of minerals were observed in older ages (> 15 years) and the lower levels were seen in younger ages. There is difference between this study and previous studies considering season, breed and age of she-camels. Therefore, we recommend further studies to be performed for estimation of minerals in serum of she-camels in the area.

Keywords: Minerals, Serum, Season, Breed, Age, She-camel.

المخلص

الهدف من الدراسة هو معرفة حالة بعض المعادن (الكالسيوم، الفسفور، المنجنيز والزنك) في مصل دم النوق وحيدة السنام المذبوحة بسلاخانة تمبول في الفترة من أغسطس 2017م وحتى أكتوبر 2018م اثناء فترتي الجفاف والامطار. جمعت عينات الدم من ثمانون ناقة ترعي بالنظام التقليدي وذبحت بسلاخانة تمبول. حللت عينات الدم لقياس تركيز بعض المعادن وتشمل الكالسيوم، الفسفور، المنجنيز والزنك. معاملات الاختلاف شملت الفصل من السنة والسلالة والعمر بالنسبة للنوق. أظهرت النتائج بأنه لا توجد فروق معنوية في قيم كل من الكالسيوم والفسفور بالإعتماد علي الفصل من السنة، وبالنسبة للمنجنيز والزنك فقد تزايدت قيمها في فصل الخريف وتناقصت في فصل الصيف. أظهرت النتائج زيادة معنوية في تركيز الكالسيوم والزنك في مصل دم سلالتي البطانة ودارفور مقارنة مع سلالتي البشاري والعنابي. لا توجد فروق معنوية في مصل دم النوق إعتماداً علي العمر بالرغم من أن اعلي تركيز وجد في الأعمار الأكبر من 15 عام والتركيز الأقل في الأعمار الصغيرة. يوجد اختلاف بين الدراسة الحالية والدراسات السابقة ترجع للفصل من السنة والسلالة والعمر بالنسبة للنوق. لذلك نوصي بإجراء مزيد من الدراسات لقياس هذه المعادن في مصل دم النوق في المنطقة.



عمادة البحث العلمي
DEANSHIP OF SCIENTIFIC RESEARCH

Journal of Camel Research and Production

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Introduction:

Camels are multi-purpose animals with high productive activity, and it's one of the ruminants that are well adapted to the harsh environment of desert and semi-desert. It is used for transportation, racing and agricultural working and considered as source of milk, meat and wool (Kamal, 2008).

Minerals are very essential for animal health and productivity by playing an important role in many physiological and biological activates (Abdelrahman *et al.*, 2013).

The levels of nutrition and minerals intakes are known to effect the productive and reproductive of male and female camels (Ali *et al.*, 2010; EL-Bahrawy and EL- Hassanein, 2011). Feeding minerals and other nutrients up to requirement is essential to achieve a high level of performance. These nutrients play a critical role in physiological processes related to health, growth and reproduction. Although camels are an important and dominant domestic animal species in AL-Butana area and most people in Tamboul area depend on camel meat, little has been done on the mineral status in camels. Therefore, the main aim of the present study was to assess the status of Calcium, Phosphorus, Manganese and Zinc in serum of she-camels (*Camelus dromedarius*) slaughtered at Tamboul abattoir and determine the effect of different seasons, breeds and ages of she-camels.

Materials and Methods:

Study area:

This study was conducted in Tamboul abattoir in AL-Butana area, Central Sudan in the period from August 2017 to October 2018 and during dry and wet seasons.

Study population:

The study was carried out on eighty she-camels (*Camelus dromedarius*) raised under traditional system and slaughtered at Tamboul abattoir. The study covered the two seasons; dry season (from April to June) and wet season (from July to October). The camel breeds included Butana, Darfur, Bishari and Anafi, distributed into four age groups as follows: 4-7, 8-11, 12-15 and > 15 years old, were used in the study.

Collection of blood samples:

Blood samples from the examined she-camels were collected from the jugular vein by vein punctures using sterile needles and tubes without anticoagulants/EDTA. Ten milliliters of blood samples were collected from each she-camel during both the dry and wet seasons. The blood was allowed to clot for 2 hours at room-temperature, then the samples were centrifuged at 4000 rotations per minute (r.p.m.) for 4 minutes, the serum was separated using disposable plastic pipettes, and stored at -20°C until analyzed.

Laboratory analysis:

Serum samples were analyzed for measuring the concentration of Ca, P,



Mn and Zn in the National Research Center Laboratory, Institute for Research Environment and Natural Resources (Khartoum, Sudan). All the samples were analyzed using atomic absorption spectrophotometry (Unicam929). The results were presented as mg/dl.

Statistical analysis:

The data were analyzed statistically using analysis of variance (ANOVA) using Microsoft Office Excel and the computation was facilitated by the Statistical Package for Social Sciences (SPSS, version 15).

The statistical differences between means were estimated by Duncan's Multiple Range Test. The limit of significant level was accepted at $P < 0.05$.

Results:

Effect of season on minerals concentration in she-camel serum:

As shown in Table 1 the comparison between the two seasons revealed no significant effects on serum Ca (mean 12.6 - 13.9 mg/dL) or on serum P mean values (3.7 - 4.0 mg/dL) of the examined 80 she-camels at Tumboul.

Zn concentration was significantly higher in the wet season (23.3 ± 11.0 mg/dl) compared to the dry season (17.3 ± 8.6 mg/dl). Also significant variations in serum Mn values were reported in this study, (28.7 ± 14.4 mg/dl) in the wet season and (7.4 ± 5.0 mg/dl) in the dry season.

Table (1): Effect of season on minerals concentrations (mg/dl) in she-camels serum

Season	No. of serum samples	Ca Mean \pm SD	P Mean \pm SD	Mn Mean \pm SD	Zn Mean \pm SD
Dry	30	12.6 \pm 9.7 ^a	3.7 \pm 0.9 ^a	7.4 \pm 5.0 ^b	17.3 \pm 8.6 ^b
Wet	50	13.9 \pm 4.9 ^a	4.0 \pm 0.6 ^a	28.7 \pm 14.4 ^a	23.3 \pm 11.0 ^a

a, b: Means with different superscripts in the same column differ significantly ($p < 0.05$).

(Ca= Calcium, P= Phosphorus, Mn= Manganese, Zn= Zinc).

Effect of breed on minerals concentrations in she-camels serum:

Mn also shows breed variations being higher ($P < 0.05$) in Butana breed (18.6 ± 13.9 mg/dl) followed by Darfur

In this study, higher Ca levels ($P < 0.05$) were found in Butana and Darfur breeds (14.5 ± 7.8 , 12.5 ± 9.3 mg/dl), respectively, compared to (10.3 ± 6.7 mg/dl) in Bishari and (10.9 ± 6.2 mg/dl) in Anafi breeds (Table 2). Phosphorus concentrations (3.6- 4.0 mg/dl) showed non-significant breed variations (Table 2).



breed (13.3 ± 15.7 mg/dl). Lower concentrations of Mn (10.7 ± 10.6 mg/dl and 11.8 ± 4.4 mg/dl) were found in serum of Bishari and Anafi breeds, respectively. Zn concentration followed the same trend of Mn where lower mean value was recorded in serum of Bishari (17.3 ± 9.4 mg/dl) and Anafi (17.1 ± 4.7 mg/dl) breeds. The higher Zn concentration was found in the serum of Darfur and Butana breeds (23.0 ± 7.8 mg/dl and 20.5 ± 13.2 mg/dl), respectively (Table 2).

Table (2): Effect of breed on minerals concentrations of she-camels serum (mg/dl)

Breed	No. of serum samples	Ca Mean \pm SD	P Mean \pm SD	Mn Mean \pm SD	Zn Mean \pm SD
Darfur	33	12.5 ± 9.3^a	4.0 ± 0.6^a	13.3 ± 15.7^b	23.0 ± 7.8^a
Butana	36	14.5 ± 7.8^a	3.9 ± 0.9^a	18.6 ± 13.9^a	20.5 ± 13.2^b
Bishari	5	10.3 ± 6.7^b	3.6 ± 1.2^a	10.7 ± 10.6^c	17.3 ± 9.4^c
Anafi	6	10.9 ± 6.2^b	3.8 ± 0.8^a	11.8 ± 4.4^c	17.1 ± 4.7^c

a, b, c: Different superscripts in the same column differ significantly ($P < 0.05$).
(Ca= Calcium, P= Phosphorus, Mn= Manganese, Zn= Zinc)

Effect of age on minerals concentration of she-camels serum:

No significant differences ($P > 0.05$) due to age were found between minerals concentration (Ca, P, Mn and Zn) in the serum of she-camels analyzed as shown

in Table 3. Highest Ca concentration (14.9 ± 7.1 mg/dl) was recorded for camels aged >15 years whereas, highest Zn (16.5 ± 7.8 mg/dl) was recorded in age group (4-7) years (Table 3).

Table (3): Effect of age of she-camels on serum minerals concentrations (mg/dl)

Age group (Years)	No. of serum samples	Ca Mean \pm SD	P Mean \pm SD	Mn Mean \pm SD	Zn Mean \pm SD
4-7	16	12.6 ± 6.2^a	4.5 ± 0.9^a	4.4 ± 9.5^a	16.5 ± 7.8^a
8-11	18	12.8 ± 7.4^a	4.1 ± 1.1^a	4.9 ± 10.6^a	15.4 ± 6.1^a
12-15	29	12.9 ± 8.5^a	4.4 ± 0.9^a	5.9 ± 11.6^a	15.8 ± 10.2^a



> 15

17

14.9 ± 7.1^a

4.4 ± 0.9^a

5.6 ± 11.1^a

14.1 ± 6.3^a

a: Means with the same superscripts in the same column do not differ significantly ($p > 0.05$). (Ca= Calcium, P= Phosphorus, Mn= Manganese, Zn= Zinc).

DISCUSSION:

Trace minerals play an important role as essential nutrients for animals. Either there is a deficiency or an excess of these compounds can cause a detrimental effect on the performance and health of ruminants (Abu Damir, 1998). In this study, the mean serum concentrations of Ca and P were found within the normal range as reported in other studies by Wahbi *et al.* (1984); Mohamed and Hussein (1999) and AL-Busadah (2007). Although the comparison between the two seasons revealed no significant effect on serum Ca and P, the concentration displayed a seasonal trend by declining during the dry season and increasing during the wet season. The authors on non weaning camel calves were due to their milk feeding which provided sufficient Zn in the diet (Faye *et al.*, 1995).

In the present study, lower values of Zn were found in oldest animals (<15 years). These low values of Zn in serum were probably due to Zn transfer into the milk and the active transfer of serum Zn to the fetus.

In conclusion, although the examined numbers of each camel category were unequal, the results indicated seasonal and breed differences in the values of minerals concentrations in camel serum.

during the wet season when the forage situation improved. The two seasons showed a significant effect on serum Mn and Zn ($P < 0.05$). This seasonal variation in serum Mn and Zn concentrations especially during the wet season can be attributed to the availability of plants and forage rich in minerals during the rainy season (Osman and AL-Busadah, 2003; Kuria *et al.*, 2006). The effect of breeds and regions on variations in trace elements were reported in camel serum and tissues by Abdelrahman *et al.* (2021) in Saudi Arabia and Aichouni *et al.* (2010) in Algeria. The mean values reported in literature for Mn concentration vary from 8.4 µg/100 ml in Morocco (Bengoumi *et al.*, 1995) to 30 µg/100 ml in Egypt (EL-Tohamy *et al.*, 1986) with no variations reported due to age. Although, the age variations of serum Zn were rarely reported, young camels below 2 years old showed generally lower values (Faye *et al.* 1995). The highest values observed by some

Recommendations:

It is recommended to implement further research for investigations with focusing on factors such as seasons, nutrition and physiological status which are necessary to justify information and for developing seasonal mineral supplementation programs.



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