

آية

قال تعالى :

(يرفع الله الذين آمنوا منكم والذين أوتوا العلم درجات
والله بما تعملون خبير)

صدق الله العظيم

سورة المجادلة الآية رقم (11)

Dedication

- **I dedicate this research work to my subject teacher who never failed to teach and guide us , to my family who supports me in everything , to my friends who helped me finished this project, and most of all to the **Almighty God** who gives me strength and good health while doing this.**

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Abstract

This study was carried out at the college of veterinary medicine and animal production. Sudan University of Science and Technology (hillat kuku). The objective of this study to determine the diurnal variation of clinical and physiological parameters of Nubian goats. Through measurement of rectal temperature (RT), respiration rate (RR), pulse rate (PR) and heart rate (HR), and proximate analysis on some blood constituents. RBCs count hemoglobin concentration (Hb), packed cell volume (PCV), and erythrocyte sedimentation rate (ESR) were carried out following standard procedures. Findings from our study showed that there were no significant differences on (RT), (PR), RBCs count and ESR during different times a day. (RR), (HR), (Hb) concentration and PCV values varied significantly.

Key ward :

RT= rectal temperature , RR= respiratory rate , PR= pulse rate, HR= heart rate

مستخلص الأطروحة

قد اجريت هذه الدراسة في كلية الطب البيطري والانتاج الحيواني جامعة السودان للعلوم والتكنولوجيا (كوكو). والهدف من هذه الدراسة هو تحديد الاختلاف النهاري في المعلمات السريرية والفسولوجيه للماعز النوبي عن طريق قياس درجة حرارة الجسم ,معدل التنفس,معدل النبض,معدل درجات ضربات القلب والتحليل المباشر على بعض مكونات الدم عن طريق قياس تركيز الهيموغلوبين (خضاب الدم) ومكداس الدم ومعدل الترسيب و اظهرت الدراسة عن وجود فروق ذات دلالة احصائية في درجة حرارة الجسم , معدل النبض و عدد كريات الدم الحمراء خلال الاوقات المختلفه.معدل التنفس و معدل ضربات القلب , تركيز(خضاب الدم), مكداس الدم اختلفت معنوياً.

المفاتيح:

درجة حرارة الجسم ,معدل التنفس , معدل النبض , معدل ضربات القلب

INTRODUCTION

The goat is a multipurpose animal; it produces meat, milk, skin, and hair, and is unique in its ability to maintain itself in tropical environment. Goats play an important role in the economy of the Sudan. For commercial purposes, goats are mainly kept for meat production and some time uses as a source of milk production for poor families who cannot afford to keep cattle.

Nubian goats can live in very hot climates and have a longer breeding season than other dairy goats.

The Objectives of this study were:

- To investigate the influence of minimum, maximum and mean air temperature on rectal temperature, respiration rates, pulse rates and heart rates.
- To study the effect of minimum, maximum and mean air temperature on some blood parameters.
- To assess the physiological status and some health parameters of the animals on summer.

CHAPTER One

Literature review

1.1. Heat:

Heat is a major factor affects on animal productivity, in the tropical belt and arid areas (Silanikove, 1992).

Exposure of animal to thermal heat stress lead to physiological response such as the elevation of rectal temperature ,respiration rates, pulse rates and heart rates with decline in feed intake and production (Hafiz, 1968; McDowell 1972).

The common index of heat tolerance in domestic animals is core body temperature which measure by rectal temperature (Liu, 1989). Changes in rectal temperature, respiratory rate and pulse rate used as indices of physiological adaptation to tropical environment (Oladimeji *et al*;1996), (Adedeji,2012) reported that high ambient temperature depressed body activities and such overheating creates physiological stress that could invariably affect production by promoting an unfavorable endocrine balance, metabolism or by reducing feed intake. Jean pagot, (1990)gave the normal body temperature of goats to range from 37-40°C.

The absorption of heat is associated directly with the degree of coat pigmentation and therefore resulted that coat pigmentation could be of importance in humid and sub-humid with high ambient temperature. The absorption rate increases from white, brown to black coat (Peter *et al*, 1982).

1.2. Respiration:

Respiration physiology is defined as the transport of oxygen from the outside air to the cells within tissues and the transport of carbon dioxide in the opposite direction the metabolic process by which an organism obtains energy by reacting oxygen with glucose to give water carbon dioxide and energy.

Physiological respiration is necessary to sustain cellular respiration and thus life in animals the processes are **distinct :cellular** respiration takes place in individual cells of the organism while physiologic respiration concerns the bulk flow and transport of metabolites between the organism and the external environment

Respiration can vary greatly depending on the goat's nervous state when the rates are taken. A highly excited animals will have a higher rate than “ normal, so use a little common sense and allow for variations with circumstances Nilsson *etal*.(2010).

Umaru (1988) noted that the normal respiratory rates in cattle and sheep are 20 and 25-30 breaths per minute.

1.3. Heart rate:

The first and second heart sounds are associated with valve closures, but turbulent blood flow and vibrations of large vessels induced by the closures are believed to be the actual causes of the sounds. Third and fourth heart sounds may be heard in some normal horses and cattle with relatively slow heart rates.

Both sympathetic and parasympathetic nerves innervate the SA node. By their actions on cells in the Sinoatrial Node (SA node), sympathetic nerves increase the rate of spontaneous action potentials and parasympathetic nerves reduce the rate. This is the means by which sympathetic stimulation increases heart rate and parasympathetic stimulation reduces heart rate.

1.4. General Composition and Function of Blood:

The blood is a non-Newtonian, fluid, consisting of cellular components suspended in plasma. The cellular elements of blood include red blood cells (erythrocytes), white blood cell (leukocytes) and platelets (thrombocytes) (Jain, 1986).

The main agent of O₂ transport, leukocytes are involved in the reaction to infections, and thrombocytes are involved in prevention of loss of blood (Bell *et al*; 1980).

The blood helps to regulate body temperature, maintain a constant concentration of water and electrolytes in the cells, regulates the body's hydrogen ion concentration

(pH) and the secretion of endocrine glands are spread throughout the body (Swenson, 1993).

1.4.1 Erythrocytic series:

The erythrocytic series includes the erythrocytes count, packed cell volume (PCV) of erythrocyte which expressed as a percentage volume of packed cell of the whole blood after centrifugation. The volume of cell in the circulating blood is usually less than plasma volume. The erythrocytic series includes also haemoglobin concentration (Hb) and erythrocyte sedimentation rate (ESR). The main function of erythrocyte is that it enables the blood to carry O₂ and also carried CO₂ from the tissues to the lungs buffering the carbonic acid formed in the red cell (Edward and Bouchier, 1995).

CHAPTER TWO

Material and methods

This study was conducted at the teaching and research farm of the sheep and goats Research institute.

Temperature, respiration rate, pulse rate and heart rate , in the goats across season (summer) and across day periods (minimum temperature in the morning , afternoon and night) to three days using Delta Trak thermometer.

2.1 Animals:

Thirteen adult male Nubian goats were used to obtain some clinical parameter (rectal temperature (RT), respiration rates (RR), pulse rates (PR), heart rates (HR) and some blood indices (RBCs count, Hb concentration, PCV and ESR). These parameter were measured three times a day 6 am (morning), 2pm (afternoon) and 10 pm (evening) for three days.

2.2. Feeding:

They were maintained on a well balanced ration of concentrates and roughage, and were fed twice daily. Clean water and salt lick blocks were available all the time.

2.3. Clinical parameter:

2.3.1. Rectal temperature (RT):The rectal temperature was measured using digital rectal thermometer (Delta Tract) inserted into the rectum and left in position thereafter the reading was taken.

2.3.2. Respiration rate (RR):

Respiration rate was recorded as the number of frequency of nose breathing per 15 second and later calculated as breaths /min.

The respiration rate was recorded as nostrils breathing.

2.3.3. Pulse rate (PR):

Pulse rate was recorded by number of beats per 15second by placing the hand on the femoral artery and later calculated as beats/min.

2.3.4. Heart rate (HR):

Heart rate was recorded by placing the stethoscope on chest of the goat 15 second to determine the rhythmic beats of the heart which was later calculated as beat/min.

2.4. Blood profile:

2.4.1. Collection of blood samples

The hair of the specific part of the neck was clipped closely and the area was wiped with a disinfectant (70% ethanol) before the jugular vein puncture. 10 ml samples of blood were drawn from the jugular vein using plastic disposable syringes. Immediately after withdrawal, 2 ml of blood sample was transferred to a capped test tube containing disodium ethylene diamine tetra acetate ($\text{Na}_2\text{-EDTA}$) as an anti-coagulant for haematological analysis.

2.5. Erythrocyte profile:

2.5.1. RBCs count:

The number of erythrocytes was determined using (Jain, 1986) method. The blood was drawn up to the mark 0.5 in the pipette ,then the diluted blood was sucked up to the mark indicated above the pipette pulp, then let to set for 2-3 minutes, two drops were dripped out . One drop was dripped on the two sides of the chamber and let to set in a covered place away from air draft .Then the red cells were counted using 40 * objective lens of the bright field microscope.

The counting area in the chamber, consist of primary nine squares. The central primary squares were used for the erythrocytes count and it present 25 secondary squares , each of which is subdivided into 16 tertiary squares. All erythrocytes in five of the secondary squares, 4 corners and the center square were enumerated, for counting cells; definite system was followed to avoid duplication in counting cells that touch lines.

Cells touching top and left center lines were counted and cells touching bottom and right central lines were not counted .

Cell from 5 squares were added and the sum of them was multiplied by 10.000.The calculation of the erythrocytes count was based on the following:

$$\text{Erythrocytes count } (\times 10^6 / \text{ml}) = N \times 50 \times 200 = N \times 10.000$$

-Where N is the sum of the counted cells .

2.5.2. Haemoglobin concentration ([Hb]):

Hb concentration was determined by a cyanomethemoglobin method as described by Van Kampen and Zijlstra, (1961)

Calculation

$$[\text{Hb}] \text{ (g/DcL)} = \frac{\text{OD of sample}}{\text{OD of standard}} \times 15$$

Where: OD is optic density

2.5.3. Packed cell volume (PCV):

The method describe by (Jain, 1986) was adapted for the determination of PCV.

The PCV was measure by using plain capillary tubes (Umedic, Germany). The capillary tubes (7.5mm × 1.0mm) were filled with fresh blood to three fourth, and one end was sealed by a crystaseal. The sealed capillary tubes were centrifuged for 5 minutes at 12000 r.p.m. in a micro haematocrit centrifuge (Bio-LAB, BL-135 D). A special reader was used to determine Hct as a percentage of whole blood.

Statistical analysis

Results generated were collated and presented as means with standard deviation of the physiological and hematological values for the Nubian goats, and tested for significance using Student's t. test according to Gomez and Gomez, (1984). The Statistical Package for Social Sciences Program (SPSS) was used for the analysis.

CHAPTER THREE

Result and Discussion

Table (3.1). Effect of diurnal variation on some clinical parameter of Nubian goats (Mean \pm S.D).

| Time Parameter | Morning | Afternoon | Evening | Significant |
|---------------------------------|------------------|------------------|------------------|--------------------|
| RT (C°) | 35.97 \pm 0.84 | 37.43 \pm 0.75 | 37.10 \pm 0.68 | N.S |
| RR(breath/min) | 16.48 \pm 2044 | 20.02 \pm 1.95 | 19.86 \pm 1.08 | ** |
| PR (beats/min) | 71.84 \pm 7.27 | 75.00 \pm 8.46 | 72.50 \pm 6.30 | N.S |
| HR | 50.43 \pm 6.06 | 83.38 \pm 6073 | 71.43 \pm 8.35 | ** |

Table (3.1):

Table (3.1) show RT, RR, PR and HR During a day. The RR and HR varied significantly

In this study there is no significant difference of rectal temperature during a day, this is due to good adaptation of Nubian goats which can live in very hot climates.

This results in line with Popoola *et.al* (2014). Kabuga,(1992) recoded lower values for rectal temperature of friesian cows.

Maria *et al*,(1997) reported that heat stress increase body temperature so this result similar to our result.

There is no significant difference in pulse rate. Adedji, (2012) and Popoola *et.al* (2014).found higher values than this study .

In other research Alam et al,.(2011) reported heat stress effect in body temperature had no significant among the group put pulse rate and respiration rate were significantly higher ..

Table(3.2): Effect of Diurnal variation on some physiological parameter of Nubian goat (Mean \pm S.D).

| Time Parameter | Morning | Afternoon | Evening | Significant |
|--|---|---|---|--------------------|
| Hb (mg/dl) | 7.02 \pm 1.08 | 6.78 \pm 0.88 | 7.47 \pm 1.20 | * |
| P.C.V. (%) | 18.67 \pm 3.05 | 20.85 \pm 3.29 | 23.33 \pm 4.50 | ** |
| E.S.R. mm/hour | 1.90 \pm 0.85 | 2.17 \pm 1.09 | 1.82 \pm 0.85 | NS |
| R.B.Cs \times(10⁶/ml) | 11.40 \times 10 ⁶ \pm 25.31 | 11.40 \times 10 ⁶ \pm 19.70 | 12.12 \times 10 ⁶ \pm 24.83 | NS |

Table (3.2):

The values of erythrocytic series are presented in table (3.2). P.C.V. % and Hb concentration was significantly higher in different times a day.

Kramer, (2000) reported a wide range of goat RBCs (8-18 \times 10⁶). The values of this study were within the lowest limit. Abdelatif *et al* (2009) found lower

values of RBCs ($9.9 \times 10^6/\text{ml}$) and ($10.88 \times 10^6/\text{ml}$)

The present erythrocytic series results obtained in this study are lower than those recorded by Marium(1997), who obtained RBCs count values ranging between ($12.06 \times 10^6/\text{ml}$) – ($10.88 \times 10^6/\text{ml}$) , PCV 28.95% – 26.25% , and Hb concentration 9.31 g/dl – 8.43g/dl for mature female Nubian goats, .Alam; *et al* (2011) reported that heat stress effected highly significant in RBC , P.C.V.% , Hb concentration. This variation can be attributed to age, breed or sex differences.

Conclusion and Recommendation

Some clinical and physiological parameters of the Nubian goats varied during different time a day.

It is apparent that extensive research of the reaction of Nubian goats to stress conditions is necessary.

Management plans are needed to improve Nubian goat production by minimizing thermal stress on goats.

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