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Short Communication

Effect of physiological status on progesterone, Oestrogen and thermal indices of west African Dwarf (WAD) Sheep

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Abstract

This research aimed at investigating the influence of physiological status on progesterone, oestrogen and thermal indices of West African Dwarf (WAD) ewe. Random blood samples were collected from 90 ewes (30 each from non-pregnant, pregnant and lactating) semi-intensively reared by local farmers within Makurdi in Benue State. Pregnant ewes used were at their third trimester while the lactating ewes were at their second week of lactation. They were all within the age range of 2-4years old and 20-25kg body weight. Serum progesterone concentration revealed significant difference (P<0.05) with highest value (4.45 ± 0.010ng/ml) recorded during pregnancy. In another hand, serum oestrogen concentration recorded significant (P<0.05) difference with highest value (57.96 ± 1.11pg/ml) recorded during lactation. Analysis of rectal temperature showed significant (P<0.05) difference (38.54 ± 0.62^{0}C) during lactation. Respiratory rate showed higher values (35.67 ± 3.77cpm) during pregnancy than in other physiological stages. Similarly, pulse rate revealed higher values during pregnancy (103.80 ± 11.17Bpm). In conclusion, the study revealed that progesterone, oestrogen and thermal indices were greatly influenced by physiological status of WAD ewe.

Keywords: Physiological status, WAD ewe, progesterone, oestrogen, thermal indices.

Introduction

The West African Dwarf (WAD) is a well known breed of sheep in Nigeria, commonly found in the southern forested ecological zone of the country[1]. The breed is a trypano-tolerant breed with small size body, short legs and short tail. Squires defined hormone as a chemical substance that is synthesized by a particular endocrine gland and then pass through the blood stream to be carried to target tissue, which has specific receptors that bind it[2]. Hormone is one of the major body chemical by which the system is controlled[3]. There are different hormones performing different function in the body. However, progesterone and oestrogen are known to be the two principal hormones for pregnancy in the body. Pregnancy cannot move on without the action of these hormones[3].

Assessment of progesterone and oestrogen levels during different physiological stages in animal is considered one of the most important parameters to determine their fertility status and state of reproduction[4]. Progesterone plays a pivotal role in the reproductive event associated with pregnancy establishment and maintenance[5]. Oestrogen is important in ensuring reduction of the membrane potential of the myometrical muscles thus increasing their sensitivity to oxytocin and prostaglandin. It stimulates duct growth in mammary gland and is involve in lactation[6]. The cardio respiratory system go through prominent changes at different stages of reproductive circle. It can be affected by pregnancy, lactation, ambient temperature, season and humidity[7]. Thermal indices (rectal temperature, respiratory rate and pulse rate) are important parameters in determining the state of stress in animals. Documentation of these parameters is helpful to establish suitable baseline values for various breeds of sheep.

Materials and methods

The study was performed during rainy season on 90 ewes (30 each of non-pregnant, pregnant and lactating WAD ewes). The animals were semi-intensively reared by local farmers within Makurdi, Benue State ($7^0 45^1$N $8^0 31^1$E). Pregnant ewes used were at their third trimester while the lactating ewes were at their second week of lactation. They were all within the age range of 2-4years old and 20-25kg body weight. Seven (7) mls of blood sample was randomly collected from jugular vein using syringe/needle.

The blood samples were released into anticoagulant free plastic tube and allow clotting at room temperature within 3hours of collection. Serum was separated by centrifugation of the hyperinised blood at 3000rpm for 10minutes. Seperated serum samples collected were stored at -20^{0}C for analysis.

The concentrations of progesterone and oestrogen were determined from stored serum sample using chemwell and ionic selective electrode analyser. Progesterone was determined using perfumed (Catalog number-10005) while oestrogen was done

using Accu-bind (product code-4925-300) according to the instructions of Egyptians company of biotechnology.

For each physiological stage, temperature of the rectum was determined by the use of digital thermometer, rate of respiratory was determined by visual observation using a stop watch to count uninterrupted flank movement of the sheep and pulse rate was taken using medical stethoscope.

Collected data were subjected to analysis of variance using minitab 16 and Duncan Multiple Range Test (DMRT) was used for means seperation.

Results and discussion

Shown in Figure-1 is the graphical representation of the variability of Progesterone and oestrogen concentrations as being affected by the physiological status of WAD Ewes. Significant (P<0.05) physiological stage differences were observed on both progesterone and oestrogen concentrations. Highest progesterone value (4.45±0.10ng/ml) was recorded in pregnant ewes followed by the non-pregnant (1.30±0.07ng/ml) class while the lactating class recorded least (0.63±0.0.07ng/ml) value. Oestrogen concentration however, had the highest value (57.96±1.11pg/ml) recorded in the lactating class followed by the pregnant (36.21±0.95pg/ml) class then the non-pregnant class recorded the least (33.55±1.79pg/ml) value.

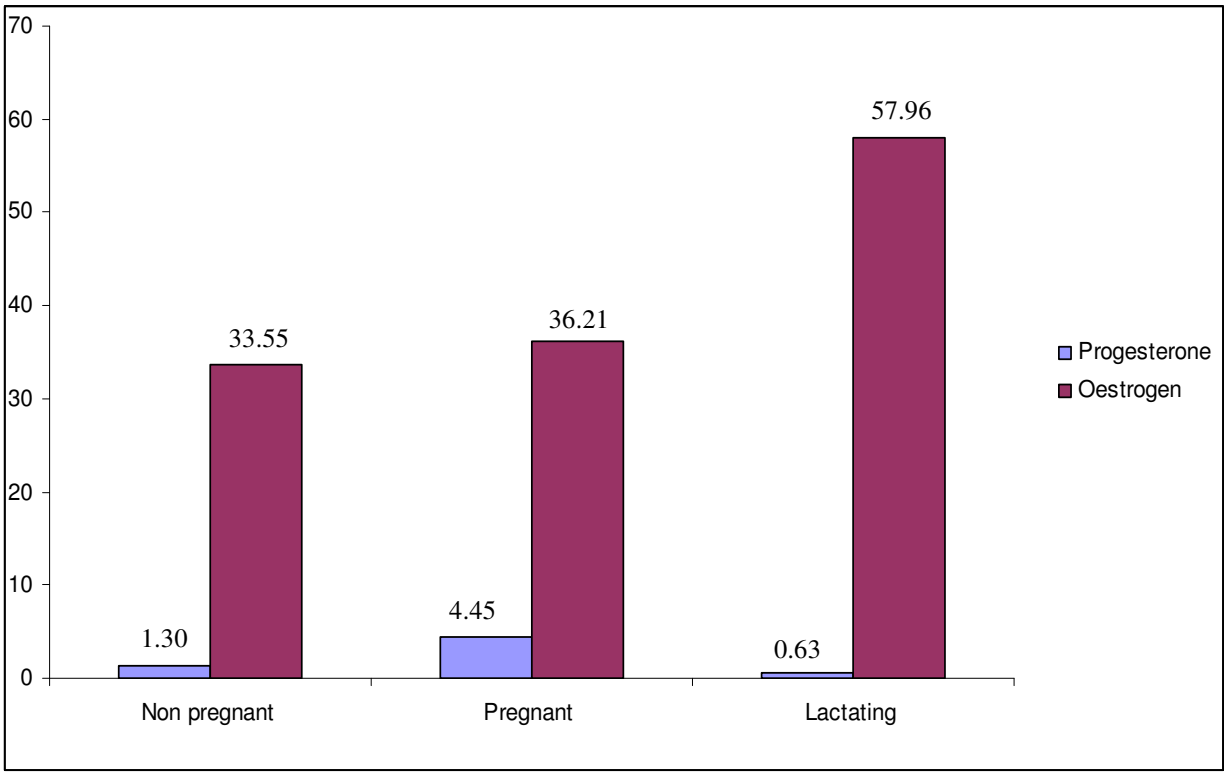

Figure-1: Effect of Physiological Class on Progesterone and Oestrogen Concentrations in Ewe.

Table-1: Effect of physiological Class on Some Thermoregulatory indices of WAD Ewe.

Physiological Class					
Parameters					
	Non-pregnant	Pregnant	Lactating	P-value	LS
RT (°C)	37.01± 0.08^{c}	38.54± 0.62^{a}	37.66± 0.48^{b}	0.00	***
RR (CPM)	22.17± 5.46^{c}	35.67± 3.77^{a}	34.87± 3.07^{b}	0.00	***
PR (BPM)	78.23± 10.25^{c}	103.80±11.1^{a}	96.67± 11.62^{b}	0.00	***

Means with different superscript significantly (P<0.05) differs, LS: Level of significance, NS: Non significant (P>0.05), CPM (Circles per Minute), BPM (Beats per Minutes).

Discussion: The significantly (P<0.05) higher concentrations of progesterone during pregnancy recorded could possibly be connected to the combine effect of corpus luteum, placenta, ovarian follicle and a protein called ovine interferon tau produced from the trophoblast of ovine blastocyte. This protein basically act to prevent the synthesis of Corpus luteum luteolytic agent (PGF2α). By preventing the synthesis of corpus luteum luteolytic agent, corpus luteum remained unaffected and active throughout pregnancy. Findings of Sharma[8] also reported higher progesterone during pregnancy and was attributed to the presence of corpus luteum verum on the ovary. The concentration of Progesterone obtained (4.45±0.01ng/ml) was slightly low than those obtained (5.16±0.76ng/ml) by Sharma[8]. On the other hand, significantly (P<0.05) higher oestrogen concentration during lactation suggested initiation of ovarian activity as reported by Sharma[8]. More so, the level of progesterone prior to parturition decreases and more oestrogenis generated which serves to relax the cervix and increase the uterine muscles sensitivity towards oxytocin. This could however be another reason for higher concentration of oestrogen during early lactation. The results in this study are similar to those documented by Sharma[8] who reported higher (60.97±1.24pg/ml) concentration of oestrogen during lactation.

The pregnant and lactating stages are demanding physiological stages known to present a serious nutritional challenge in animals and induce stress[9]. Thermal indices are major physiological indicators of stress in animals. Statistically higher (P<0.05) significant differences recorded on these indices across the physiological stages could be as a result of the stress induced by the physiological class. Significant (P<0.05) increase recorded in rectal temperature during pregnancy could probably be as a result of changes in hormonal concentrations or increase metabolic rate. Pulse rate recorded significant (P<0.05) difference in pregnant class which may be due to increase in blood flow during pregnancy. Pregnancy requires dramatic changes in blood flow, the most obvious being that which occur in the uterus and the development of placenta. Blood flow during pregnancy increases creating cardiovascular changes and increase blood flow to various organs of the body. Similarly, significant (P<0.05) increase in respiratory rate in pregnant class could be as a result of dramatic changes in blood flow during pregnancy.

Conclusion

This study concludes that physiological status has serious effect on progesterone, oestrogen and thermal indices of WAD sheep. It is suggested that more comparative study on several hormonal concentrations and thermoregulatory indices should be carried out across seasons, age groups and management practices so as to improve their productive performance.

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