CORRELATION BETWEEN PHYSIOLOGICAL PARAMETERS OF RED SOKOTO BUCKS FED HOG PLUM LEAF MEAL DIETS (*Spondias mombin*)

Bishir, B. B[1]., Ahmad, Y[1]., Yahaya, D[1]. and Hassan, I.T[2]
[1]National Agricultural Extension and Research Liaison Services, ABU, Zaria
[2]Abdullahi Aminci College of Advance Studies, Funtua
Corresponding author: bishirbellobakori@gmail.com; +2349163693399

ABSTRACT
The study was carried out to evaluate the physiological responses of hog plum leaf meal on red Sokoto goats (bucks). The bucks were randomly allocated to five treatments diet with 3 bucks per treatment in a Completely Randomized Design. The hog plum leaf meal was fed at levels of 0, 10, 20, 30 and 40% in treatment 1, 2, 3, 4 and 5 respectively. The experimental diets and clean drinking water were offered to the bucks *ad libitum*. All physiological values were measured in accordance with routine clinical procedures. There was a significantly ($P<0.05$) high and positive correlation between rectal temperature and respiratory rate. There was also a significantly ($P>0.05$) high negative correlation observed between rectal temperature and heart rat, rectal temperature, and capillary refill time.

Keywords: hog plum leaf meal, treatment diet, red sokoto bucks and physiological responses

Introduction

Conventional basal energy feeds are scarce and becoming increasingly expensive in Nigeria. The inclusion of alternative feeding stuffs in animal diet might be interesting in some circumstances (relative price, feed quality) which is limited because of lack of information in their value (Famino *et al*., 2003). Nutrition is the single most important factor militating against livestock production in Nigeria. Hog plum (*Spondias mombin*) is a small deciduous tree plant of up to 20m height and occurs in a great variety of humid tropical climates. Its fruits, bark, leaves, and roots are of great importance agriculturally and otherwise. Its leaves make excellent fodder for livestock. The fruits are also of great nutritional value (Oladele, 2008). The leaves are more readily available and cheap especially during the dry seasons when most other forages are in short supply. Well dried leaves can be stored for long periods of time (Aregheore *et al*., 2003). Domestic animals are homotherms which tends to maintain a constant body temperature through a balance of heat gain and loss. Body temperature is one of the good indicators of good health in animals. Its variation above and below normal is a measure of the animals' ability to resist stress factors of the environment. The allowable variation in the body temperature is small (Oladimeji *et al*., 1996). The body temperature of the animal is sometimes an excellent indicator of the animal's general health because temperature is not always the same in all parts of the body or even constant in one place, the rectal temperature is used to show the body's internal temperature. If you take an animal's mouth temperature, you will find that reading is lower than that of the skin, which may be much lower than the rectum, where most animal temperature are taken. Several factors influence body temperature in a healthy animal. The respiration rate is subjected to body size, age, exercise, excitement, environmental temperature and the degree of fullness of the digestive tract.

Materials and Methods

Experimental Site

The study was conducted at the Teaching and Research Farm of the Department of Animal Science, Faculty of Agriculture, Ahmadu Bello University, Zaria. Zaria is within Northern Guinea Savannah zone of Nigeria, located on latitude 11' 12^{o}N and longitude 7' 33^{o}E at an altitude of 610m above sea level (Ovimaps, 2015).

Sources and processing of Experimental Material

The Hog plum *(Spondias mombin*) fresh leaves were obtained from Bakori, Bakori Local Government Area of Katsina State. The fresh leaves were spread under the shade and allowed to dry for ten (10) days. All foreign materials such as branches and dead leaves were removed from the sample. It was packed into clean polythene bags and stored in a dry place until required for feed formulation.

Experimental Animals and Management

Fifteen (15) Red Sokoto Bucks of average weight range 10-11 kg were used. On arrival, the animals were quarantined for three weeks against internal and external parasites and bacterial infection. They were allowed 14 days to adjust to feed and confinement before the actual start of the experiment. The animals were de-wormed with Albendazol (10 mg/kg) against internal parasites during confinement period.

Experimental Diets

Five diets containing graded levels of hog plum dry leaves meal at 0, 10, 20, 30, and 40% inclusion rates were formulated and designated as T1, T2, T3, T4, and T5. T1 served as the control (no hog plum leaves).

Feeding Trial and Design

The Red Sokoto Bucks were randomly allocated to five dietary treatments with 3 bucks per treatment in a Completely Randomized Design (CRD). The feeding trials lasted for ninety days (90days). The bucks were fed at 3% body weight. Water was provided *ad libitum.* Each buck was offered the treatment diet in 2 allocations daily, at 8:00 a.m and 4:00 p.m respectively. The left-over was collected the following morning and weighed before fresh feed was offered to determine the feed intake. All bucks were weighed at the beginning of the experiment and fortnightly thereafter to adjust the amount of treatment diet given to maintain the pre-determined level of 3% feeding of the animal's body weight for the period of the study.

Measurement of Physiological Response

Each of the experimental animals was restrained and calmed before taking readings to prevent them from undergoing unnecessary stress. All physiological values such as rectal temperature (ºC), respiratory rate (breath/minute), heart rate (beat/minute), and capillary refill time (seconds) were measured in accordance with routine clinical procedures. All physiological indices were measured as described by Kelly (1984). The thermometer was inserted into the rectum of the buck until a beeping sound was heard, usually in one minute. Respiratory rate was taken by counting the movement of the right flank at the paralumbar fossa of the goat (buck) for one minute and presented as the number of breaths per minute. The value was taken for one minute of regular breathing with the buck standing quietly. Heart rate was taken from the heart location which is behind the elbow, between the fourth and fifth rib on the left side of the buck using a Stethoscope by counting the number of heart beats per minute. Capillary refill time was measured by pressing on the gum of the buck for five seconds with a finger or thumb, and noting the time needed for the color of the gum to return once the pressure is released with the aid of a stopwatch.

Statistical Analysis

All data generated were subjected to analysis of variance (ANOVA) using the General Linear Model (GLM) procedure of Statistical Analysis System (SAS, 2002). The treatment means were separated using Dunnet test (Dunnet, 1955).

Results and Discussion

Chemical composition of test materials and experimental diets containing graded level of hog plum leaf meal diets.

The results of the chemical composition analysis of hog plum leaf meal from Table 1. below was found to be rich in dry matter (94.57%), Crude protein (13.36%), ash (9.86%) and Nitrogen free extract (67.87%). Chemical composition of experimental diets containing graded level of hog plum leaf meal diets fed the growing red Sokoto bucks are shown in Table 2 The crude protein (CP) content of the diet was approximately 12%. The CP value of Hog plum leaf meal in the present study (13.36%) was higher compared to the treatment diets. The dry matter (DM) contents which varied from 89.52-96.33 was quite high. The highest crude fibre (CF) level was recorded in the control diet (0%) hog plum leaf meal followed closely by diet 10, 20, 30 and 40% Hog plum leaf meal in that order. The level of Ash, Nitrogen free extract and Organic matter increased linearly with increasing level of Hog plum leaf meal, in contrast the level of ether extract decreased with increasing level of Hog plum leaf meal.

Table 1: Chemical composition of test materials and experimental diets containing graded level of hog plum leaf meal diets.

Parameter		Dietary Treatment (%)				
	dry hog plum leaves	0	10	20	30	40
Dry matter	94.57	89.52	94.95	96.20	96.29	96.33
Crude protein	13.36	11.78	11.35	12.26	12.33	12.46
Crude Fibre1	0.34	19.83	18.06	16.24	14.32	13.47
Ether extract	2.95	2.69	2.63	2.58	2.53	2.61
Ash	9.86	8.17	8.45	9.86	9.75	9.68
Nitrogen free extract	67.87	47.63	54.59	55.85	57.68	58.32
Organic matter	84.71	81.35	86.50	86.34	86.54	86.65
ME (Kcal/kg)	2758.29	2285.324	2506.236	2628.374	2702.490	2732.452

Relationship between physiological parameters of Red Sokoto bucks

There was a significantly (P<0.05) high and positive correlation between rectal temperature and respiratory rate (r = 0.44). And a significantly (P>0.05) high negative correlation was observed between rectal temperature and heart rate (r = -0.27); rectal temperature and capillary refill time (r = - 0.15). There was also a significantly (P>0.05) high negative correlation between respiratory rate and heart rate (r = -30); respiratory rate and capillary refill time (r = - 0.40), a significantly (P>0.05) high negative correlation was also observed between heart rate and capillary refill time (r = - 0.44) The significant correlation values among rectal temperature, respiratory rate, heart rate, and capillary refill time in this studies agrees with the findings of Ayo and Minka (2003), when they examined the effect of confinement on some physiological parameters in Red Sokoto goat during the rainy season.

Correlation between Physiological Parameters of Red Sokoto Bucks Fed Hog Plum Leaf Meal Diets

	RT	RR	HR
RT	-		
RR	0.44*	-	
HR	-0.27*	-0.30*	-
CRT	-0.15	-0.40*	-0.44*

RT= Rectal Temperature, RR= Respiratory rate, HR= Heart rate,
CRT=Capillary refill time. brpm=breath per minute; bpm= beat per minute

Conclusion

Hog plum leaf meal is abundantly available and is a cheap alternative source of protein. Up 20% Hog plum leaf meal can be included in the goat diets without any adverse effect on physiological values, and It is concluded that Hog plum leaf meal is economical and affordable in goats production.

Recommendations

Further studies should be conducted using higher levels Hog plum leaf meal supplementation to determine the physiological responses of red sokoto bucks.

REFERENCES

Aregheore, E. M. Abdulrazak, S. A. Fujihara, T., (2003). Evaluation of some agri-industrial by-products available in Samoa for goats. Asian-*Australian Journal Animal Science*, 16(11): 1593-1598

Ayo, J.O and Minka, N. S. (2003). Effect of Confinement on some Physiological Parameter in Red Sokoto Goat during Early Dry Season. *Proceedings of the 28th Annual Conference of Nigeria Society of Animal Production*, 28:41-44.

Dunnett, C.W. (1955), "A Multiple Comparisons Procedure for Comparing Several Treatments with a Control," *Journal of the American Statistical Association*, 50:1096–1121.

Famino, A, O., Oduguwa, O.O., Aiade, A.A., Ogunnaikke, T.O and Adeshinwa, A.O.K. (2003). Growth performance, nutrients digestibility and carcass characteristics of rabbits fed cashew apple waste. *Livestock Resources for Rural Development*, 15 (3):1-7.

Kelly, W. R. (1984). "Veterinary clinical diagnosis" 3rd Edition. Baillier, Tindall. New York. pp261-300.

Oladele, EOP and Oshodi A.A. (2008). Effect of fermentation on some chemical and nutritive properties of berlandier nettle spurge (Jatrophacathartica) and physic nut of (*Jatropha curcas*) seeds. *Pakistan Journal of Nutrition*, 7:292-296.

Oladimeji B. S. Osinowo, V. A, Atawa J.P and Hambolu, J.P. (1996). Estimation of average pulse rate, respiratory rate and rectal temperature and a development of a heat stress, index for adult Yankassa sheep. Bull. *Animal Health and Production in Africa*, 44:105–107.

Ovimaps. (2015). Ovi location map; Ovi Earth Imagery. Retrieved on 16th November 2015.

SAS Institute, inc. (2002). SAS User's guide: Statistics. Version 9. SAS Institute, carry, NC.
27513, USA.

Silanikove, N. (2000). Effects of heat stress on the welfare of extensively managed domestic ruminants: a review of Livestock Production Science, 67:1-18.