Physiological Responses of West African Dwarf Buck as Affected by *Datura Stramonium Linn* Seed Extract

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ABSTRACT

To evaluate the action of aqueous extract of Datura stramonium seeds on the physiological status of West African Dwarf (WAD) -bucks, the effects of aqueous extract of the seed of Datura stramonium Linn was investigated for some physiological parameters in twenty (20) West African Dwarf bucks aged 12- 18 months and averaged 8.76±1.23kg for a period of 2months. The bucks were grouped into five treatments consisting four bucks and using Completely Randomized Design (CRD). The bucks were subcutaneously administered with the plant extract at a dose of 0, 0.02, 0.04, 0.06 and 0.08ml/kg bodyweight respectively. The results of the study revealed that the treated bucks had higher ($p>0.05$) body weight than the control but treated had lower rectal temperature than the control ($p>0.05$). However, the extract produced significant effect ($p<0.05$) on the pulse and heart rate and this may be as a result of the active principles present in the extract used for the study. Based on the findings of the present study, the aqueous extract of Datura stramonium could serve as a stimulatory agent and if properly screened using additional solvents, pharmacologically active drugs could be obtained. The significant effect produced by the aqueous extract on the animals has provided scientific justification for the ethno medicinal uses of the plant in India and South Africa.

Keywords: *Aqueous extract, bucks, Datura stramonium, physiological parameters*

INTRODUCTION

Biotechnology is one of the most suitable strategies available to animal husbandry for developing herbivorous animals, through utilizing the resources from herbs efficiently, and improving the animal welfare for providing plenty of protein food for humans. Since the application of this technology the numbers of sheep and goats have increased rapidly. It is important to enhance the production of proteins from animal sources in Nigeria, because the standard of living of Nigerian people is getting continuously higher and there is an increasing need of such food by the increasing population. Economic and efficient solution of this production comes from improving the physiology potential of livestock, and their productivity (quantity of meat and milk) using biotechnology, couple with the convectional method of increasing the number of animals. Due to the non-availability and high cost, the

use of convectional drugs such as cocaine, morphine, atropine (Laviola, Fiore, Loggi and Alleva, 1994; Sell, Scalzitti, Thomas and Cunnigham, 2000) limited their use. To alleviate this problem there is room for the use of active principles from some herbs founds at backyards or around homes to improve the physiologic functions of the animal. There have been recent uses of plant extracts (Adebiyi, Adaikan and Prasad, 2000; Muhammad, Oloyede, Owoyele and Olajide, 2004) to reduce these problems.

Consumption of *Datura stramonium* and resulting *Datura* poisoning cases present a significant health hazard in many countries (Considine, 2001). Recent works (Iwu, 1993; Gill, 1999; Considine, 2001) have detected the existence of hyoscine, atropine and hyoscyamine as toxic principles which manifested as central nervous system stimulation or depression. Datura stramonium is a toxic plant which greatly affects bovines and ovines. The critical intoxication evidences nervous and gastroenteric symptoms together with a serious hepatic insufficiency. This toxic plant is ubicated normally under the heading of woody species, trees and shrubs of natural forests, wastelands, around village homes, on abandoned farmlands and poorly maintained parks (Iwu, 1993; Gill, 1999). This species is permanently toxic and throughout the whole cycle got enough toxins, including the dried parts (Considine, 2001). The assessments of metabolic status reflect the homeostasis of circulation and these could be determined by assessing the rectal temperature, pulse rate and respiratory rate. This increases blood flow from the core to the surface to give a chance for more heat to be lost by sensible (loss by conduction, convection and radiation) and insensible (loss of diffusion water from the skin) means. Little is known on the physiological responses of West African Dwarf bucks to *Datura* poisoning. The present study was designed to investigate the influence of *Datura stramonium* seed extract on some physiological responses and to assess the adaptability of the indigenous WAD- goat to the extract.

MATERIALS AND METHOD

The study was carried out at the Animal Production pavilion, Faculty of Agriculture, University of Ilorin, Ilorin, Nigeria. Twenty West African Dwarf bucks aged 12- 18 months and weighing 8.76±1.23kg were used for the study. The animals were kept under semi- intensive method. The goats were fed with guinea grasses *(Panicun maximum)* and supplemented with concentrate. The animals were maintained for 14 days prior to the commencement of the experiment. All animals were given water *ad libitum.* 250g dried seeds of *Datura stramonium* were subjected to cold extraction using 1litre of distilled water without agitation for 48 hours. The extract was retained for the experiment.

Twenty WAD bucks were divided into 5 treatment groups and each treatment group were subcutaneously administered with different levels of the aqueous extract consisting of 0, 0.02, 0.04, 0.06 and 0.08ml/kgBW of the extract for 10 consecutive days. Rectal temperature was measured by the insertion of a 10.5cm standard clinical thermometer into the rectum of the animal. Each reading was made at a constant depth 0f 10cm after an insertion time of 2 minutes. Respiration rate was obtained by counting the flank movements of the animals with the aid of a stopwatch for an uninterrupted period of one minute, with the animal standing. Pulse rate was taken by the use of a standard clinical stethoscope

placed over the chests; beats per minute were recorded with the aid of stopwatch. The data were subjected to analysis of variance using completely randomized design (CRD). Mean were tested using Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

Table 1 shows the mean values of the bodyweight upon administration of *Datura* plant extract to WAD bucks. The mean bodyweight of the animal placed on 0.04 and 0.08 had the highest as all the treatments had higher ($p>0.05$) values than the control. The mean pulse rate is shown on table 1. All treatments produced higher values than the control and they are statistically different ($p<0.05$) when tested. The mean pulse rate values are in the range 90- 100 beats/minute for the control and 104- 115beats/minute for 0.08ml treatment. The values of respiratory rate are shown on table 1.

Table 1: Effect of the aqueous extract of the seed of Datura stramonium Linn on the physiological parameters of the WAD-buck

	Treatments (ml/kgBW)					
Parameters	**Control (0)**	**0.02**	**0.04**	**0.06**	**0.08**	**S.E**
Bodyweight (kg)	6.91	7.13	7.23	7.12	7.22	0.376
Pulse rate (beats/min)	94.49c	99.13b	102.13b	103.50b	109.11a	2.555
Respiratory rate (beats/min.)	71.05	67.42	67.34	66.48	65.69	4.107
Heart rate (beats/min.)	111.00d	115.47c	119.43bc	122.41ab	124.50a	2.592
Rectal temperature (°C)	39.32	39.27	39.21	39.14	39.14	0.319

a,b,c means significant difference at $p<0.05$ S.E mean standard error

The mean values of beats/minute across the treatments were found to be statistically insignificant ($p>0.05$) indicating that the extract has little influence on the respiratory rate of the experimental animals. Fig 1 shows the mean (beats/minute) values of the heart rate of the WAD bucks upon administration of the extract. There was an increment across all the treatments groups and the control. The mean values when compared were found to be statistically significant ($p<0.05$) indicating that the extract produced pronounced effect on the heart rate of the experimental bucks. The mean values of the rectal temperature are shown on the table 1. Generally the rectal temperature values were lower ($p>0.05$) in all the treated groups than the control for all the reading when taken, leaving the highest dosage with the lowest value.

The observed effect of the different doses of *Datura* plant extract on physiological parameters confirms the efficacy of tropane alkaloids having potent effects on body functions (Martins, 1985). An animal must be healthy and be adequately fed before optimum growth is achieved. Therefore the increase in the bodyweight observed in this study is a normal phenomenon, which could be attributed to adequate feeding (*ad libitum* situation) that the animals were exposed to. The pulse rate recorded in this study was higher than 70- 80 beats/minute at rest reports by Boden (1999), but compared favourably with that of Frazer (1986) who reported 70-135beats/minute with an average of 90beats/minute for goats. Ganong (2005) reported that high environmental temperature, exercise, anxiety, drug and excitement could increase the cardiac output. The fluctuation in the pulse rate observed in this study also agreed with the finding of Ross and Wilson (1974) which showed that many factors do contribute to considerable variations in the pulse rate of an animal such as

position of the animal, sex (more in female than male) decrease with age and inversely related to bodyweight (Ross and Wilson, 1974). Although, the values recorded in this study for goats was higher than 10-16beats/minute reported by Gamble and Clough (1976) and 20-24 beats/minute by Boden (1999). Gamble and Clough (1976) however, reports that several factors such as age, posture, size, drug, sex, health profile status of the animals and the environment which affect respiratory rate are likely to be responsible for higher values recorded for experimental goats in this study. Findings of this study confirmed the report of Considine (2001) that increased pulse rate and heart rate are associated with Datura poisoning.

CONCLUSION

From this study goat was able to tolerate and utilise plants extract believed to contain appreciable amount of phytochemical. Attention should be drawn towards exploring the pharmaceutical potentials of this plant for ethnobotanical purposes in animal management strategies that will rationalise land usage but boost livestock production. This study particularly shows that the extract act as vasodilator which could be used to treat conditions such as hypertension (abnormally high blood pressure) as well as angina and congestive heart failure.

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