



## HAEMATOLOGICAL PARAMETERS OF THE WEST AFRICAN DWARF BUCKS TREATED WITH *ALOE VERA* GEL EXTRACT

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### ABSTRACT

Twelve sexually matured West African Dwarf (WAD) bucks were used to investigate the variation in haematological parameters using two different concentrations of *Aloe vera* extract. The bucks were first used as control (pre-treatment) and later as two treatment groups of six animals each. The first six bucks received 10 millilitres of the 3 % extract while the other six received 10 millilitres of the 4 % of the extract for a 7 day period. Blood was collected from both the 3 % and 4 % extract treated bucks for the control (pre-treatment), on days eight (first week post-treatment) and fifteen (second week post-treatment) in each case. For the 3 % dosed bucks, there was no significant difference ( $P > 0.05$ ) between the mean values of WBC during pre-treatment and first week post-treatment. However, there was a significant difference ( $P < 0.05$ ) between the mean values of WBC during pre-treatment and second week post-treatment. The 4 % dosed bucks showed no significant difference ( $P > 0.05$ ) between the mean values of WBC and MCH during pre-treatment and first week post-treatment. There was a significant difference ( $P < 0.05$ ) between the mean values of MCHC during pre-treatment and first week post-treatment. There was also a significant difference ( $P < 0.05$ ) between the mean values of MCHC during pre-treatment and second week post-treatment. It can be concluded that the continued administration of *Aloe vera* extract has adverse effects on the haematological parameters of WAD bucks and should therefore be discouraged in the husbandry practices of livestock especially in WAD bucks.

**Keywords:** Haematological parameter, bucks, *Aloe vera*, extracts

### INTRODUCTION

The West African Dwarf (WAD) goats occurring in the tropical forest belt of West Africa are small sized breeds ranging from between 20-30 kg weight. The WAD goat is very important in developing countries, being able to thrive in adverse conditions and has a high fertility rate with a short generative interval allowing for a possible increase in population than cattle in West Africa.<sup>1</sup> Blood is composed of cells and plasma. Plasma is the liquid component of blood within which the cell and colloids are suspended and other transported materials are dissolved.<sup>2</sup> Plasma is yellow to colourless, depending on the quantity, the species of animal and its diet. Blood volume and plasma volume can be influenced by weight of the animal, nutrition, drugs and excessive exercise. The blood of mammals serves numerous functions as respiratory, excretory, nutritive, thermal regulation of the body, protective, and regulatory. *Aloe vera* (*Aloe barbadensis* Miller) is an evergreen perennial plant, growing to 0.8 m by 1m at a slow rate. It is a fairly well known herbal preparation with a long history of use. *Aloe vera* is widely used in modern herbal practice and is often available in proprietary herbal preparations.<sup>3</sup> The *Aloe vera* plant contains over 250 natural nutrients, vitamins and enzymes essential to health and the ingredients have been well documented over many years. It is believed, that perhaps some of the vital ingredients in the plant have not been identified.<sup>4</sup> The clear gel contained within the leaf makes an excellent treatment for wounds, burns and other skin disorders, placing a protective coat over the affected area, speeding up the rate of healing and reducing the risk of infection.<sup>5</sup> Apart from its external use on the skin, *Aloe vera* (usually the bitter aloes) is also taken internally in the treatment of chronic constipation, poor appetite, and digestive problems.<sup>6</sup> Various reports<sup>7-9</sup> have documented haematological and biochemical parameters of WAD goats in

Nigeria. Nevertheless, there is a dearth of information on the effect of the *Aloe vera* plant on the hematological parameters of WAD bucks. This study, therefore, was designed to investigate the haematological parameters of WAD bucks treated with varied concentrations of *Aloe vera* extract.

### MATERIALS AND METHODS

#### Animal protocol

Twelve sexually matured West African Dwarf (WAD) bucks, weighing between 11 and 15 kg, were used for the study. They were kept at the Large Animals Ward II of the Veterinary Teaching Hospital (VTH), University of Ibadan, located between latitude 150° N and 300° S with relative humidity ranging from 50-80 %, rainfall is about 70 inches per annum and temperature between 28°C and 34°C. The animals were kept on guinea corn offal and grasses, water was provided *ad libitum*. The animals were dewormed using Albendazole® and Levamisole® while Ivomec® was used to control ectoparasites and mange. They were vaccinated against Peste des Petits Ruminants (PPR) using PPR vaccine (National Veterinary Research Institute, Vom, Nigeria) among other veterinary attentions. The research protocol for the study was approved by the University of Ibadan Research Ethics Committee.

#### Preparation and Administration of *Aloe vera* Extract

*Aloe vera* plant used for the study was identified and authenticated by Dr O. A. Ugbogu, Head of Taxonomy Section, Forest Herbarium Ibadan, Forestry Research Institute of Nigeria (FRIN), Jericho, Ibadan, Nigeria. The extract was collected from the plant by cutting the leaves open and the inner part scrapped. 3.0 g and 4.0 g of the scrapped *Aloe vera* gel were mixed with 100 milliliters of distilled water to give 3 % and 4 % solutions of the extract respectively. The bucks were first used as control (pre-

treatment) and later as two groups of six animals each. The first six bucks received 10 milliliters of the 3 % extract while the other six received 10 milliliters of the 4 % of the extract for a 7 day period.

**Blood sample collection**

5 milliliters of blood was drawn through the external jugular vein by venipuncture from both the 3 % and 4 % extract treated bucks for the control (pre-treatment), on days eight (first week post-treatment) and fifteen (second week post-treatment).<sup>2</sup> The blood sample from each of the goats was emptied gently into labeled tubes containing EDTA. The blood samples were sent for laboratory analysis immediately after collection for the determination of haematological parameters.

**Haematological analysis**

Packed cell volume (PCV) was determined by the micro haematocrit method.<sup>10</sup> Red Blood Cells (RBC) were counted

using the improved Neubauer haemocytometer.<sup>10</sup> Haemoglobin (Hb) concentration and White Blood Cells (WBC) were also determined.<sup>11</sup> Five hundred WBC were differentiated on Giemsa-stained blood smears and absolute values calculated from their percentile distribution using the total WBC counts. The mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were obtained by calculation from the PCV, Hb concentration and RBC counts.

**Statistical Analysis**

All data obtained were expressed as means with the standard errors and were subjected to analysis of variance (ANOVA) according to the standard procedure.<sup>12</sup> Duncan multiple range tests were used to compare means found to be statistically significant ( $p < 0.05$ ).<sup>13</sup>

**Table 1: Mean and SEM values of haematological parameters of WAD bucks dosed with 3 % extract of *Aloe Vera***

| Parameters                      | Pre-treatment             | First Week Post-treatment | Second Week Post-treatment |
|---------------------------------|---------------------------|---------------------------|----------------------------|
| PCV%                            | 22.67 ± 2.91 <sup>a</sup> | 18.33 ± 1.86 <sup>a</sup> | 23.00 ± 0.58 <sup>a</sup>  |
| Hb g%                           | 7.4 ± 0.99 <sup>a</sup>   | 6.10 ± 0.61 <sup>a</sup>  | 7.67 ± 0.20 <sup>a</sup>   |
| RBC (X10 <sup>12/l</sup> )      | 24.63 ± 3.80 <sup>a</sup> | 18.91 ± 1.98 <sup>a</sup> | 22.39 ± 1.68               |
| WBC (X10 <sup>9/l</sup> )       | 20.33 ± 1.13 <sup>a</sup> | 23.23 ± 1.24 <sup>a</sup> | 12.33 ± 1.34 <sup>b</sup>  |
| Platelets (X10 <sup>9/l</sup> ) | 10.00 ± 0.00 <sup>a</sup> | 8.00 ± 0.00 <sup>a</sup>  | 8.00 ± 1.00 <sup>a</sup>   |
| MCV (fl)                        | 9.67 ± 0.33 <sup>a</sup>  | 9.33 ± 0.33 <sup>a</sup>  | 9.67 ± 0.67 <sup>a</sup>   |
| MCH (Pg)                        | 2.67 ± 0.33 <sup>a</sup>  | 3.00 ± 0.00 <sup>a</sup>  | 3.33 ± 0.33 <sup>a</sup>   |
| MCHC (%)                        | 32.00 ± 0.00 <sup>a</sup> | 33.00 ± 0.00 <sup>a</sup> | 33.00 ± 0.00 <sup>a</sup>  |
| LYM (%)                         | 66.33 ± 3.38 <sup>a</sup> | 66.67 ± 4.41 <sup>a</sup> | 67.33 ± 3.53 <sup>a</sup>  |
| NEUT (%)                        | 33.67 ± 3.38 <sup>a</sup> | 33.33 ± 4.41 <sup>a</sup> | 32.67 ± 3.53 <sup>a</sup>  |
| ESR (M min fall/24 h)           | 2.00 ± 0.58 <sup>a</sup>  | 3.00 ± 0.58 <sup>a</sup>  | 3.33 ± 0.67 <sup>a</sup>   |

Mean values with different superscripts are significantly different at 5 % level of comparison along the rows.

**Table 2: Mean and SEM values of haematological parameters of WAD bucks dosed with 4 % extract of *Aloe Vera***

| Parameters                      | Pre-treatment             | First Week Post-treatment  | Second Week Post-treatment |
|---------------------------------|---------------------------|----------------------------|----------------------------|
| PCV%                            | 22.00 ± 2.52 <sup>a</sup> | 19.33 ± 2.60 <sup>a</sup>  | 22.00 ± 2.89 <sup>a</sup>  |
| Hb g%                           | 7.20 ± 0.85 <sup>a</sup>  | 6.43 ± 0.87 <sup>a</sup>   | 7.33 ± 0.95 <sup>a</sup>   |
| RBC (X10 <sup>12/l</sup> )      | 22.76 ± 3.44 <sup>a</sup> | 19.87 ± 2.25 <sup>a</sup>  | 18.51 ± 2.17 <sup>a</sup>  |
| WBC (X10 <sup>9/l</sup> )       | 24.80 ± 3.67 <sup>a</sup> | 24.40 ± 2.60 <sup>a</sup>  | 13.80 ± 1.68 <sup>b</sup>  |
| Platelets (X10 <sup>9/l</sup> ) | 12.00 ± 0.58 <sup>a</sup> | 10.00 ± 0.58 <sup>a</sup>  | 11.00 ± 0.58 <sup>a</sup>  |
| MCV (fl)                        | 12.00 ± 0.58 <sup>a</sup> | 9.33 ± 1.20 <sup>a</sup>   | 11.33 ± 0.33 <sup>a</sup>  |
| MCH (Pg)                        | 3.00 ± 0.00 <sup>a</sup>  | 2.67 ± 0.33 <sup>a</sup>   | 4.00 ± 0.00 <sup>a</sup>   |
| MCHC (%)                        | 31.67 ± 0.33 <sup>a</sup> | 33.00 ± 0.00 <sup>bc</sup> | 33.00 ± 0.00 <sup>c</sup>  |
| LYM (%)                         | 67.67 ± 2.33 <sup>a</sup> | 68.33 ± 3.18 <sup>a</sup>  | 69.33 ± 3.18 <sup>a</sup>  |
| NEUT (%)                        | 32.33 ± 2.33 <sup>a</sup> | 31.67 ± 3.18 <sup>a</sup>  | 30.67 ± 3.18 <sup>a</sup>  |
| ESR (Mm in fall/24 h)           | 2.00 ± 0.00 <sup>a</sup>  | 2.67 ± 0.33 <sup>a</sup>   | 3.67 ± 0.67 <sup>a</sup>   |

Mean values with different superscripts are significantly different at 5 % level of comparison along the rows.

## RESULTS

The values of haematological parameters of goats dosed with 3 % extract are given in Table 1. There was no significant difference ( $P > 0.05$ ) between the mean values of WBC during pre-treatment and first week post-treatment. However, there was a significant difference ( $P < 0.05$ ) between the mean values of WBC during pre-treatment and second week post-treatment as well as a significant difference ( $P < 0.05$ ) between mean values of WBC during first week post-treatment and second week post treatment (Table 1). However, there was a drop in the value of PCV below the normal value, during the first week post-treatment. Also, there was an increase in the RBC count during the second week post-treatment and while WBC counts during first week post-treatment was above the normal value (Table 1). The values of haematological parameters of goats dosed with 4 % extract are given in Table 2. There was no significant difference ( $P > 0.05$ ) between the mean values of WBC and MCH during pre-treatment and first week post-treatment. There was a significant difference ( $P < 0.05$ ) between the mean values of MCHC during pre-treatment and first week post-treatment. There was also a significant difference ( $P < 0.05$ ) between the mean values of MCHC during pre-treatment and second week post-treatment. However, there was no significant difference ( $P > 0.05$ ) between mean values of MCHC during first week post-treatment and second week post-treatment (Table 2). There was an increase in the values of RBC and WBC, above the normal value during first week post treatment while there was a progressive increase in the Erythrocyte Sedimentation Rate (ESR) values above the normal from the first week to the second week post-treatment.

## DISCUSSION

Observations made on the haematological parameters of the bucks used for this study fell within the normal range for goats for the pre-treatment stage of the work. This therefore suggests that the bucks used for the study were in good state of health. Haematological parameters are useful tools in measuring the physiological status of animals because they may provide information for diagnosis and prognosis of diseases. These parameters have been used as physiological indicators of good health, diseases, stress or exposition to contaminants, as well as to assess degrees of dehydration in different animals.<sup>1</sup> Haematological parameters are a reflection of the effects of dietary treatments on the animal in terms of the type, quality and amount of the feed ingested and are available for the animal to meet its physiological, biochemical and metabolic necessities.<sup>14</sup> These factors inform why several biological researches engage haematological parameters to assess physiological changes in response to drugs and nutrition. Normal physiological processes are affected long before the death of an animal, there is therefore the need to check physiological and biochemical indicators of health and sub-lethal toxicant effects on livestock. The PCV values obtained during the pre-treatment stage of this work were similar to those reported for healthy goats.<sup>15</sup> The values of leukocytes observed during the pre-treatment stage of this work were similar to values reported for normal healthy goats.<sup>16,17,11</sup> The observed leukocytosis in the experimental stages of the work may be an indication that the blood cell production increases in attempt to combat the adverse effect of increased administration of *Aloe vera* extract, since leukocytes are known to be among body defense mechanisms

that fight against non-self or pathogenic organisms. Lymphocytes are responsible for humoral and cell-mediated immunity responses in animals.<sup>16</sup> This is in consonance with the reports on the haematological parameters of rabbit bucks in response to varied dietary treatments.<sup>18</sup> Leucocyte counts increase during infection and stress of capture and unfavourable conditions in the animal's habitat such as shortage of food and water.<sup>19</sup> The decrease in the values of RBC, PCV and Hb concentration from the pre-treatment stage up to the second week post-treatment for both the 3 % and 4 % concentrations of *Aloe vera* extract administration all point to the fact that the continued administration of the plant has an adverse effect on blood formation in animals. This is unlike the effect of the pumpkin plant on the haematological parameters of WAD bucks.<sup>20</sup> This is suggestive of a non-regenerative anaemia due to bone marrow depression.<sup>21</sup>

## CONCLUSION

It can be concluded that the continued administration of *Aloe vera* extract has adverse effects on the haematological parameters of WAD bucks and should therefore be discouraged in the husbandry practices of livestock especially in WAD bucks.

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