Hematologic And Serologic Changes Following Ivermectin Treatment In Mange Infested West African Dwarf Goats

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ABSTRACT

Twelve West African Dwarf (WAD) goats infested with mange were balanced for sex and weight and divided into two groups, the treated and untreated groups in a completely randomized design with six animals per treatment. The treated groups received ivermectin® injection by subcutaneous route at 1 ml per 50kg body weight in a single dose, while the untreated group received none. Blood samples were collected through the jugular vein at the onset, as well as two weeks and 4 weeks after the onset of the experiment. Hemoglobin (Hb) content and Red blood cell (RBC) counts increased significantly (p<0.05) in the treated goats two weeks after the commencement of treatment. White blood cell (WBC) was least in the treated WAD goats at the end of the experiment (p<0.05) compared with the untreated WAD goats. Total protein, albumin and globulin were not found to be different in both the untreated and treated WAD goats (p>0.05). At the end of the experiment, the untreated goats had an average body weight of 8.5kg while the untreated group has an average weight of 12.5kg. Behaviorally the treated goats were much more active and had gone back to feed while the untreated ones were yet to resume feeding.

Key words: WADG, Mange, Ivermectin, RBC, WBC.

Introduction

Mange has posed a serious economic problem in small ruminant animal production. It is a contagious skin disease, reducing the meat quality of goats by causing skin damage characterized by marked hyperkeratosis with lesions usually starting on the head and neck, weight loss, irritation and death in severe cases [13]. [4] reported that in goats, Sarcoptis scabiei var caprae is responsible for a generalized skin condition. The problem is even worse in the coastal areas of West Africa, which is humid and favors high prevalence of the disease. Physiological parameters assess the effect of parasite infection and the effectiveness of anti-parasitic treatment in animals [12]. A number of studies have reported effects of parasite on different blood constituents in domestic, laboratory and wild life species. [9,15].

Hafeez et al, 2007, investigated the effect of mange on different blood and biochemical parameters in healthy and infected sheep and found that in mite infested animals, total erythrocyte count (TEC), hemoglobin (Hb) and packed cell volume (PCV) was found to be lower, while erythrocyte sedimentation rate (ESR) and total serum proteins (TP) were higher as compared to healthy animals. Additionally, eosinophilia was also observed in infested sheep. [19] also reported decreased erythrocyte count in scab mite in sheep while [3] observed no changes in the blood of infested sheep. Ivermectin has also been reported to be effective in the treatment of mange in livestock [16,4]. In our environment mange has become one of the limiting factors to the production of small ruminant animals and any practice to control it will become a welcome husbandry practice.

The objective of the study is to evaluate the blood parameters of goats infected with mange and to evaluate the effect of ivermectin® treatment on the parameters.

Materials and Methods

Twelve West African Dwarf (WAD) goats infested with mange at the Sheep and Goat Unit, Teaching and Research Farm, Michael Okpara University of Agriculture, Umudike were used for the study. The animals were aged between 1-2 years (all females). They had a mean average weight of 9.42 ± 0.8 (kg). The does were divided into two
groups of 6 animals each, care being taken to balance for weight and age. The does were fed with forage and concentrate. The forage consisted of grasses, legumes and some browse leaves. The two groups were the treated and untreated groups. The treated groups received ivermectin® injection (Interchemie werken, Holland) by subcutaneous route at 1 ml per kg 50kg body weight in a single dose, while the untreated group received none. Blood samples were collected through the jugular vein for both hematologic and serologic studies. Collection was made at the onset of the study, two weeks after and then 4 weeks after the onset of therapy. Data obtained was analyzed using Student t-test (Steel and Torrie, 1980).

Results and Discussions

The results of the physical observation of the conditions of the experimental animals showed lesions on the face, back of neck, ears, shoulders, flanks and ventral aspect of the body. As treatment with ivermectin® progressed, the skin infested with mange gradually regained integrity. The results of the hematological parameters of the experimental animals at the onset of the experiment as well as 2 weeks and 4 weeks are presented in tables 1, 2 and 3.

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<th>Table 1: Initial haematology and serum biochemical values of infested WAD goats two weeks before the commencement of ivermectin® treatment.</th>
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<td>Parameter</td>
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<td>PCV (%)</td>
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<td>Hb (g/Dl)</td>
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<td>RBC (X10^6/mm³)</td>
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<td>WBC (X50/mm³)</td>
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<td>Total protein (g/dl)</td>
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<td>Albumin (g/dl)</td>
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<th>Table 2: Hematology and serology values of treated and untreated WAD goats two weeks after the onset of ivermectin® treatment.</th>
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NS=Not significantly different (p>0.05)
*=Significantly different (p<0.05)

Table3. Hematological and serum biochemical values of treated and untreated WAD goats at 28 days after ivermectin treatment.

| Parameter | N | Untreated WAD goats | Mean ± SE | Treated WAD goats | Mean ± SE | Remark |
|---------------------------------------------------------------|
| PCV (%) | 5 | 34.9±3.9 | 6 | 23.0±1.8 | NS |
| Hb (g/dl) | 5 | 4.4±1.2 | 6 | 6.7±0.6 | * |
| RBC (X10^6/mm³) | 5 | 389.5±31.4 | 6 | 641.2±76.2 | * |
| WBC (X50/mm³) | 5 | 95.6±8.1 | 6 | 98.7±3.1 | * |
| Total protein (g/dl) | 5 | 12.7±1.2 | 6 | 15.3±1.0 | NS |
| Albumin (g/dl) | 5 | 3.5±0.4 | 6 | 3.9±0.3 | NS |
| Globulin (g/dl) | 5 | 9.2±1.1 | 6 | 11.4±0.7 | NS |

NS= Not significantly different (p>0.05)
*=Significantly different (p<0.05)

Discussion:

Ivermectin treatment has been shown to reduce the prevalence and intensity of parasitation in WAD goats [6]. From the results obtained haemoglobin and red blood cell counts showed significant (p<0.05) differences between the treated and untreated goats. This implies that the treatment with ivermectin effectively rid the skin of the goats of the infestation of the mange mites and thereby relieving the treated goats of the adverse effects of the mites especially on the blood. Mites have been reported to consumes
The final WBC counts in the treated goats were lower than the untreated goats (Table 3) and this tends to agree with the reports of [8], who found an eosinophilia accompanying mange infestation in sheep. Even though the present study did not embark on a WBC differential count, the lower levels of WBCs in treated goats appeared to depict a reduction of mange burden. Higher immune responses after ivermectin treatment have been reported and were considered to be related to massive release of antigen due to synchronous death of parasite, although the type of immune changes seems to depend on the type of parasite and the host species [17,14,18,5]. [22,1] reported that the effect of ivermectin seems to depend not only on its parasiticidal action but relies also on an activation of host immunocompetence. Even though the globulin content of the treated and untreated goats were not significantly different, our observations showed that the treated group of goats had better responses to feeding and body weight possibly due to the effect of ivermectin which raised their immunocompetence. Of course the infection increased in the untreated goats with death resulting in one of the experimental animals.

The treatment seemed to improve the Hb and PCV values of the treated WAD goats thereby conferring on them the strength to feed (Table 3). Lethargy and anorexia typically accompany anemia. As a result of this, the treated groups were more active, resumed feed consumption with increased intake and had better body weight and hair growth. Physical observations of the goats reveal these even though parameters on feed intake and weight gain following treatment were not collected.

Final packed cell volume (PCV) of the treated group in this study fell within the range 25.7 ± 3.1% obtained for red Sokoto goats [21]. The normal PCV values for WAD does as reported by [6] was 30.0 ± 2.1. Earlier report in Baladi goats [2] and Red Sokoto goats [21], showed PCV values of 27.25 ± 0.59 and 25.7 ± 3.1 respectively. These reports by [2] and [21] show that PCV varies from breed to breed. The values obtained from our study shows the adverse effects of mange burden on the untreated goats and reveals the curative effect of ivermectin on WAD goats 28 days after treatment. There was no significant difference, but numerically the PCV for the treated WAD goats was higher than that of the untreated WAD goats and this results appears to be in line with [3] who observed no changes in the blood of sheep suffering from sarcoptic mange. However this slight numerical increase in PCV values of the treated WAD goats may imply a gradual sign of healing with an attending gradual increase of PCV values following ivermectin treatment. PCV varies proportionately with serum total protein and this suggests that PCV is beneficial in assessing the protein status and possibly forecasting the degree of protein supplementation in goats at different physiologic states [6].

Haemoglobin (Hb) of the treated group at the end of the experiment (Table 3) fell within the range of values obtained for the normal WAD does as reported by [6]. West African Dwarf goats seem to possess relatively high Hb values and this is an advantage in terms of the oxygen carrying capacity of the blood [6]. The reports of [11] also collaborates the very low Hb levels observed among the untreated goats in our study.

The lower level of RBC coupled with low Hemoglobin values for untreated WAD goats indicates that the RBC’s that are responsible for carrying oxygen to the body tissues are few, and this may have contributed to the fact that the untreated WAD goats were off-feed and weak.

RBC’s are the tiny workhorses responsible for carrying oxygen to the body’s tissue, and fewer red cells in the body results in anemia [7]. The RBC value was slightly lower in the final treated WAD goats when compared to the value obtained for normal WAD goats (Table 1). But there is an indication from the result that RBC value for the treated group (Table 3) will still continue to increase as the animal kept on recovering. If closely observed, the differences between the first treated (Table 2) and the last treated WAD goats (Table 3) show an increase in RBC count of the animals.

Managing goats in the humid tropics usually predisposes them to mange infestation. Goat keepers should therefore endeavor to provide dry beddings for animals so as to discourage rapid multiplication of mange mites in a farm. Prompt treatment should be practiced to control further spread of the mites in a farm. Since it is established that mites interfere with the blood picture in goats it may be excellent practice to increase the protein intake of infested goats in other to minimize the effect of blood loss due to the parasites.

References