

# Comparison of haematological changes and strongyle faecal egg counts in donkeys in Kiambu district of Kenya

A.K. Lewa<sup>1</sup>, T.A. Ngatia<sup>2</sup>, W.K. Munyua<sup>2</sup> and N.E. Maingi<sup>2</sup>

<sup>1</sup>Veterinary Research Laboratories, P.O. Kabete, Kenya

<sup>2</sup>Department of Veterinary Pathology and Microbiology, Faculty of Veterinary Medicine, University of Nairobi, P.O Box 29053, Nairobi, Kenya.

## Abstract

Haematological data were obtained through analysis of blood samples taken from sixteen donkeys randomly selected from a donkey population in Kiambu District, Kenya. Nine out of sixteen of the donkeys examined were anaemic, with low RBC counts (ranging between 3.2 - 4.18 x 10<sup>6</sup>/ml) and low Hb concentrations (ranging between 6.6 - 9.7 gm%). Seven out of nine of these donkeys in addition, had relatively low PCV values (18% - 28.7%). The egg counts in the anaemic donkeys ranged between 0 and 3100. The total protein levels in all the sixteen donkeys were slightly elevated. The differential leucocyte counts were within the normal range in twelve out of sixteen donkeys. Two donkeys had leucocytosis, with WBC counts ranging between 18.6 and 24.8, and epg counts ranging between 100 and 200.

## Introduction

Donkeys are found in many parts of the world including Kenya, where they provide transport or act as draught animals. In some semi-arid and arid areas of Kenya, for example Garissa, Isiolo and Marsabit, donkeys are virtually the only available means of transport.

For maximum performance, it is imperative that the animal be healthy and well fed. Unlike its counterpart the horse, the feeding, management and the health aspects of the donkey have until recently been largely ignored. As a result, there is lack of knowledge regarding the type of disease conditions affecting this animal. The purpose of this study was to determine some clinicopathological changes in relation to work burdens as assessed by faecal egg counts of naturally infected donkeys.

## Materials and methods

Single blood samples were taken from sixteen adult donkeys, randomly selected from a donkey population in Kiambu District, Kenya, which had varying levels of helminth infections. Direct blood smears were made and examined for haemoparasites. Red blood cell counts (RBCs), leucocyte counts (WBCs), and packed cell volume (PCV) were determined using a cell counter (Model ZM; Coulter electronics Inc.; Florida). The mean red corpuscular volume was determined by multiplying the haemoglobin concentration by three. The total plasma proteins were determined using a refractometer. Faecal egg counts (eggs per gram - epg) were determined using the modified McMaster egg - counting technique (Soulsby, 1982).

## Results

The total plasma proteins, PCV, RBC, the haemoglobin concentration (Hb) and the epg counts from sixteen donkeys randomly sampled from the study area are shown in Table 1.

Nine of sixteen (56%) of the donkeys examined (Nos 1, 3, 4, 6, 7, 9, 10, 15 and 16) showed RBC counts ranging between 3.2 and 4.18 x 10<sup>6</sup>/ml, Hb values ranging between 6.6 and 10.2 gm% and PCV values ranging between 18 and 2.7%. The egg counts ranged between 200 - 3800. Seven of nine donkeys with low haematological values (Nos 3, 4, 6, 7, 9, 10 and 15) had significant epg counts (>400). The remaining seven out of sixteen (44%) donkeys (Nos 2, 5, 8, 11, 12, 13 and 14) had normal RBC counts (4.6 - 8.11 x 10<sup>6</sup>/ml); normal Hb concentration (10.6 - 14.3gm%) and PCV values ranging between 33 - 49.6%. The egg counts in these donkeys ranged between 0 - 3100 epg. In addition to helminth infection, donkey No.1 had babesiosis caused by *Babesia equi*.

The total plasma protein levels were relatively high in all sixteen donkeys ranging between 7.7 and 10.4. There was no correlation between the epg and the total plasma proteins ( $r^2 = 0.20$ ).

The total and differential leucocyte counts of the sixteen donkeys examined are shown in Table 2. The total WBC counts in 14 of 16 donkeys (Nos 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14 and 15) were within the normal range (6.7 - 16.6 x 10<sup>9</sup>/ml), and had epg counts ranging between 0 - 3800; while the remaining two donkeys, (donkeys Nos 13 and 16) had leucocytosis with WBC counts ranging between 18.6 - 24.8 x 10<sup>9</sup>/ml and epg counts ranging between 100 - 200. The differential leucocyte counts were within the normal ranges in all the sixteen cases.

**Table 1: Total plasma proteins (%), packed cell volume, (PCV, %), red blood cell (RBC) counts ( $\times 10^6$ ), Haemoglobin (Hb) concentration (gm %) and Strongyle egg counts (epg) from 16 donkeys randomly sampled from Kiambu district from August 1994-1995)**

Animal	PCV (%)	Hb (gm%)	RBC ( $\times 10^6$ /ml)	Total protein (%)	Egg counts (epg)
1	25	8.3	3.20	8.5	200
2	33	10.6	4.60	9.3	2500
3	26	7.9	3.84	9.5	1600
4	18	6.6	4.4.16	7.7	1100
5	40	12.5	5.80	10.4	400
6	30	9.7	3.93	8.6	3800
7	32	10.2	4.18	9.4	2100
8	36	12.7	5.39	8.4	0
9	29	8.9	3.77	8.8	2900
10	29	8.9	3.40	8.6	2000
11	43	12.2	6.24	9.8	1300
12	45	12.8	7.29	8.4	0
13	50	14.3	8.11	9.0	200
14	41	11.8	6.68	9.4	3100
15	24	6.0	3.12	9.4	1300
16	29	7.7	3.66	7.8	100

**Table 2: The total leucocyte counts ( $WBC \times 10^9$ /ml) and differential cell counts (%) for total neutrophils (TN), lymphocytes (L), eosinophils (E) and monocytes (M) and Strongyle egg counts (epg) from 16 donkeys randomly sampled from Kiambu district from August 1994-1995)**

Animal	WBC ( $\times 10^6$ )	TN (%)	L (%)	E (%)	M (%)	Egg counts (epg)
1	10.8	59	36	2	3	200
2	12.7	34	54	11	1	2500
3	16.3	38	57	4	1	1600
4	7.4	62	58	0	0	1100
5	6.7	34	62	4	0	400
6	7.7	41	45	14	0	3800
7	8.8	45	39	15	1	2100
8	13.1	50	42	16	2	0
9	14.2	65	26	9	0	2900
10	16.6	69	28	3	0	2000
11	12.1	38	59	3	0	1300
12	12.9	59	52	7	0	0
13	18.6	46	35	5	1	200
14	14.4	42	49	4	1	3100
15	8.9	42	58	0	0	1300
16	24.8	41	48	11	0	100

## Discussion

Some donkeys had normocytic or macrocytic anaemia, though in some cases, this was not severe even when egg counts were relatively high and the clinical condition extremely poor. Round (1968) observed that anaemia due to helminth parasites tends to occur in younger rather than older horses. Likewise, donkeys showing high faecal egg counts did not necessarily reflect the same haematological picture, implying that egg counts on their own may not be reliable indicators of helminth infection. The fact that some donkeys with as low egg counts as 100 or none at all had anaemia is an indication that apart from helminths and haemoparasites, other factors, such as nutrition may have contributed to the haematological values observed. In horses, persistent low grade normocytic or macrocytic anemia without jaundice indicate a possibility of a chronic haemorrhage, the most common cause of such an anaemia being attributed to strongylid nematodes (Dixon and Archer, 1974).

In a report by Ngatia and Kuria (1991), seven out of 12 donkeys examined at post-mortem had died due to a variety of causes; with malnutrition being a major associated factor. From their study it was apparent that internal parasitism probably together with malnutrition may be important conditions in donkeys just as they are in horses. Although most of the donkeys had high egg counts, their total protein levels were not severely reduced and this agrees with the findings of Round (1968), who observed that there are abnormal serum protein patterns in animals

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exposed to heavy natural infections of worm parasites.

In the present study, only two out of the 16 donkeys examined had leucocytosis. Usually little significance is placed on helminth infections as a contributory cause of increase in the number of white blood cells, although horses exposed to high levels of worm larvae on pasture usually have higher total leucocyte counts than do those kept in stables where the exposure to helminth infection is low (Round, 1968).

It can therefore be concluded from this study that internal parasites cause significant clinical pathological changes in donkeys. It is therefore necessary to take adequate parasite control measures to ensure the health of these animals.

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