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III. INFLUENCE OF INTERNAL AND EXTERNAL PARASITES ON PRE AND POST WEANING PERFORMANCE OF CAMEL CALVES (CAMELUS DROMEDARIES) AT ERRER VALLEY, EASTERN ETHIOPIA

ABSTRACT

This experiment was conducted at Errer Valley, Harmya University camel research herd, eastern Harrarghe zone from August 2008–June, 2009. A total of 20 (9 female and 11 male) camel calves of 2 to 6 months of age were used for the study. The treatments were weaning at 6(T1), 8(T2), 10(T3) and 12(T4) months of age. T1, T2, and T3 were supplemented with concentrate consisting of a mixture of 60% wheat bran and 40% *Guzietia abyssinica,* nougseed cake (at 1.6 kg DM per 100 kg body weight) from the respective weaning age up to 12 months. The highest prevalence (83.33 %) and highest EPG (2908) of faeces were observed during the rainy season than during the dry season which was 59.26 % and 919, respectively. However, there were no significant (P> 0.05) differences in prevalence and EPG of faeces among all treatment groups and calf sex. Mean packed cell volume (PCV) of camel calves in the study area was 21%. Examination of larvae count showed five types of gastro intestine intestinal parasites (GIP) in the study animals. The parasites identified were Haemonchus spp, Trichostrongylus spp, Strongyloides spp, Nematodirus spp and Trichuris spp with prevalence of 80%, 80%, 73.33%, 6.67%, 6.67%, and 6.67%, respectively. Relatively, the parasite infestation was higher in T3 (39.6%) and lower in T1 (14.67). Mange mite prevalence was the highest for supplemented camel calves in T1 (80%) followed by animals in T3 (60) and T2 (40) while it was the lowest for T4 (20%).In general, EPG count revealed that calves in all treatment groups were equally highly infested, but the effect of parasitic infestation was well manifested in those camel calves supplemented for short period of time (T_3) and those not supplemented (T_4).15% mortality observed in T_3 and T_4 might be the lack of resistance to disease parasites and malnutrition where as those supplemented for more than 4 months might have developed resistance against parasite disease. It is thus recommended that pastoralists should be aware and oriented about importance of supplementary feed to calves in order to save the life of animals since effective prophylactic drug and curative treatments may costly and not available to the pastoral.

Keyword: camel calf; Parasite; egg per gram; prevalence; larvae; season; packed cell volume; treatment; supplement

INTRODUCTION

The camel (Camelus dromedaries) plays an important role in the subsistence economy of the pastoral society of the eastern Ethiopian Somali by providing milk, meat and it is also as sole source of transportation as well as socio-cultural aspects such as prestige, compensation for blood, dowry and the like. Pathogenic diseases, poor nutrition and traditional management systems as well as lack of veterinary services have hampered their full utilization, despite the important of dromedary in the semi-arid and arid areas where the environment is harsh and hostile (Bekele 2002).

Gastrointestinal helminths cause losses through morbidity and hidden effects on feed intake, efficiency of nutrient utilization and also reduce growth rate in young animals, as a result, it leads to reduction in productivity and performance of the infested animal (Bekele 2002). Another important camel disease in east Africa is sarcoptic manges which is caused by S*arcoptes scabiei var cameli* a minute burrowing mite which affect young, immature and stressed adult and develop the chronic generalized form of mange (Abdurahaman and Bornstein 1991; Dioli and Stimmelmayer 1992). In eastern Ethiopia, studies have been carried out on major parasites of the dromedaries (mostly on immature and adult camels) such as gastrointestinal helminths and *Sarcoptes scabiei* (Zelke and Bekele 2001; Bekele 2002). However, information on parasitic diseases is very scanty particularly to camel calves less than one year old. Overall effect of helminth infections may be reduced by ensuring an adequate level of nutrition especially proteins, although this should be no substitute for sound parasite control programmed (FOA 1998).

Therefore, the objectives of this study were to see effect of parasite infection on packed cell volume of blood camels and their deference in prevalence for parasitism as a whole between two sexes and seasons as well as group of calves with and without concentrate supplementation.

Materials and Methods

Description of the study area

The study was conducted at Errer valley, in the eastern Hararghe region of eastern Ethiopia. The altitude ranges from 1300 to 1600 m above sea level. The annual precipitation of the area ranges from 400 to 500 mm with two peaks (March and April and July to September). The long dry season covers a 5-months period between October – February and the short dry seasons are from May to June. Vegetation commonly consists of dwarf shrubs (*Indigofera species*) interspersed with numerous large shrubs and trees such as *Acacia* and *Boscia* species, and densely populated Cacti plants (Tamire 1986).

Animals and management

Twenty camel calves of both sexes (11 male and 9 females) were used for the study from August 2008-June, 2009. Of these, 8 camels belong to the research herd of Haramaya University and 12 camels belong to pastoralists in the area. Before the start of the experiment, all calves were sprayed against external parasites, and dewormed against gastrointestinal parasites, and identified with plastic ear tag. During the day, experimental calves

were browsed together on communal range land and kept in a fenced enclosure at night. Calves were provided with clean water in large plastic bottle every day before they were late to browsing/grazing. Curative measurements were taken for those calves exhibiting ill health.

Camel calves were grouped into four treatments. T_1 consisting calves weaned at 6 months, T_2 at 8 months, T_3 at 10 months and T_4 at 12 months. Except T_4 (control), all animals were supplemented with concentrate mix from the age of respective weaning date to 12 months of age. Camel calves in the control treatment and those calves not yet weaned were allowed to suckle their dams before and after milking. Calves joined their respective treatments were weaned based on their birth date. Weaned calves were supplemented with 1.6 kg DM/100 kg live weight (Richard 1989) at a ratio of 40:60 nougseed cake and wheat bran mix. Supplementation was done two times a day, morning (8:00-9:00am) and evening (5:00-6:00) in the individual feeding pen (2m x 1.5m) each provided with plastic feeding bucket.

Sample collection and laboratory analysis

Data collected were, faecal samples, blood sample, and skin scrapped sample. A total of 66 faecal samples were collected during the months of August, November, February and May from the rectum of camel calves in the morning and kept in a universal bottles containing 5% iodine solution. Samples were properly closed and transported to the University laboratory where parasite egg count was made. Faecal egg counts were under taken using McMaster technique (Anon 1994). Helminthes egg prevalence was calculated as described by Putt et al (1988). Relative frequency of true prevalence of parasite were then calculated from P_1, P_2, P_3 and P_4 divided by sample size (n) where P_1, P_2, P_3, and P_4 were percent positive result of each sample.

$$P\ (\%) = P_1 + P_2 + P_3 + P_4 + P/n$$

Blood samples were collected from jugular vein with heparinzed vacutainers. A total of 35 blood samples were collected in November 2008 and February 2009 to measure packed cell volume of camel blood. The samples were immediately transferred to an ice box in which they were kept cool and transported to Haramaya University laboratory. Blood samples were placed in the macrohaematocrit centrifuge with the sealed end outer most and centrifugated for 5 minutes. PCV was determined by reading using the haematocrite reader (Murray et al 1983).

Skin scrapings were collected from a total of 10 camel calves exhibiting dermatological problems (skin lesions) in the month of November 2008. The scraped material was collected in universal bottles and taken to veterinary laboratory for determination of external parasites. The scraped samples were examined for the presence of mites by veterinary physician using standard diagnostic methods of Kaufmann (1996). Mange mite prevalence rate was calculated as:

Prevalence (%) = P/n × 100, where:

P = number of animals positive for the disease

n = total number of animals sampled

Statistical analysis

The data were transferred to Minitab 1998 software and general Linear Model to run analysis of variance (ANOVA) for comparison of calf treatment, calf sex, and seasons. Means of parameters that showed significant differences were separated by Tukey's pair-wise least significant difference.

The statistical model used was:

$$Y_{ijk} = U + T_i + S_i + Y_k + e_{ijk,}$$

Where, Y_{ijk} = observation of mean faecal egg count

U = overall mean

T_i = Fixed effect of treatment

S_i = Fixed effect of season of experiment

Y_k = Fixed effect of calf sex

e_{ijk} = Effects of random error for mean faecal egg count

Result and Discussion

Internal parasites

Among 66 faecal sample of camel calves examined, 72.7% were infested with helminthes eggs. The mean count was 1913 egg per gram (EPG) of faeces and the range was 100–13800. The prevalence and EPG of faeces among treatment groups, calf sex and season are presented in Table 1. The mean egg count and prevalence were significantly ($P<0.05$) influenced by season of the experiment. However, treatment groups and calf sex had no effect ($P>0.05$) on mean faecal egg count and prevalence. Similarly, there were no significant difference in mean egg per gram of feces (EPG) between all treatment groups and calf sex. Absence of significant difference in helminth infestation was also reported by Melesse (1996) for camels in Dire Dawa and eastern Oromia region. However, Suchitra et al (1999) indicated 55.17 and 26.17% prevalence for male and female camels, respectively. Moreover, Bekele (2002) reported significantly ($P<0.01$) higher prevalence and mean EPG of faeces in females than in male camels (between 3- 4 years old).

The highest prevalence (83.3%) and mean EPG of faeces (2908) were observed during the wet season than during the dry season in the current study confirms the previous finding by Bekele (2002). Seasonal variation in prevalence and mean EPG faeces were also noted for camels in India (Partani et al 1996).

Factors	Positive Samples	Prevalence (%)	Mean EPG	Transformed (mean+S.D)
Overall mean	48 (66)	70.54	1913	
Treatment		ns	ns	Ns
T_1	10 (15)	57.5	2612	2.29 ± 0.37
T_2	14 (18)	76.67	1526	2.21 ± 0.35
T_3	13 (16)	81.25	1913	2.68 ± 0.36
T_4	11 (17)	63.33	1200	1.81 ± 0.35
Season		*	*	*
Wet	25 (29)	83.33[a]	2908[a]	2.67 ± 0.26
Dry	23 (37)	59.26[b]	919[b]	1.82 ± 0.23
Sex		ns	ns	Ns
Female	22 (33)	64.63	1467	1.91 ± 0.26
Male	26 (33)	78.33	2360	2.59 ± 0.26

*Means with different letters (a, b) within a column are different at indicated P value, * = P< 0.05, ns = non significant difference, L. infestation = level of infestation (Garbber, 1973).*

Table 1. Mean faecal egg counts and prevalence of camel calves during the study period (2008-2009).

PCV of camel calves under the experiment

Mean packed cell volume (PCV) of camel calves in the study area was 21%. This was in the range of PCV reported for healthy camels (18-41%) by Schwartz and Dioli (1992). As indicated in Table 2, there was slight drop in PCV value in control (T_4) claves as compared to other treatment groups. Two male camels that belong to T_3 and T_4 recorded lower PCV (16%) value and these calves died at 309 and 299 days old, respectively. Low PCV indicates anemia and disease state in camel (Wilson 1998). PCV value less than 18% was not recorded in T_1 and T_2. As these treatments (T_1 and T_2) were supplemented for more than 4 months, they might have developed resistance against parasitic diseases compared to those animals in T_3 and T_4. Therefore, the EPG count revealed that calves in all treatment groups were highly infested, but the effect of parasitic infestation was well manifested in those camel calves supplemented for short period of time (T_3) and those not supplemented (T_4).

	N	**Mean PCV (%)**	**PCV Rang (%)**
Overall	35	21	(16-28)
Treatment		ns	ns
T_1	8	22	(18-24)
T_2	9	21	(18-28)
T_3	9	21	(16-26)
T_4	9	19.6	(16-24)

ns = non significant difference, N = number of samples examined, PCV= packed cell volume

Table 2. Mean PCV of camel calves during November 2008 and February 2009

Prevalence of gastrointestinal (GIT) parasites on camel calves

Helminthes larvae count and prevalence among the four treatment groups are presented in Table 3. Haemonchus spp, Trichostronglylus spp, Strongyloides spp, Nematodirus spp and Trichuris spp were prevalent in camel calves during November 2008. Examination of faecal samples revealed that Haemonchus and Trichostronglylus were the most frequent GIT parasites which accounts for 80% prevalence followed by Strongyloides (73.33%). Nematodirus and Trichuris were the least frequent which accounts for 6.67%. In line with the current finding, Melesse (1996) reported the highest prevalence for Haemochus (94.12%), Trichostrongylus (93.33%), and Strongyliodes (33.33%) in dromedary camels in Dire Dawa and eastern Oromiya during November. Polyparasatisim was observed in most camels examined that every infested calf can have at least more than 2 parasites (2.47) on average and is in agreement with that (2.11) reported by Melesse (1996).

Table 3. Helminthes larvae identified on the study camels during November 2008 (n=15)

Types of parasites		**Mean larvae counted**					
	Prevalence (%)	**T_1**	**T_2**	**T_3**	**T_4**	**Total larvae**	**Infestation %**
Haemonchus	80	67	85	169	74	395	48.29
Trichostrongylus	80	24	79	89	69	261	31.9
Strongyloides	73.33	20	17	66	35	138	16.87
Nematodirus	6.67	9	0	0	0	9	1.1
Trichuris	6.67	0	0	15	0	15	1.83
Total larvae		120	181	324	178	818	
% larvae count		14.67	22.12	39.6	21.76		

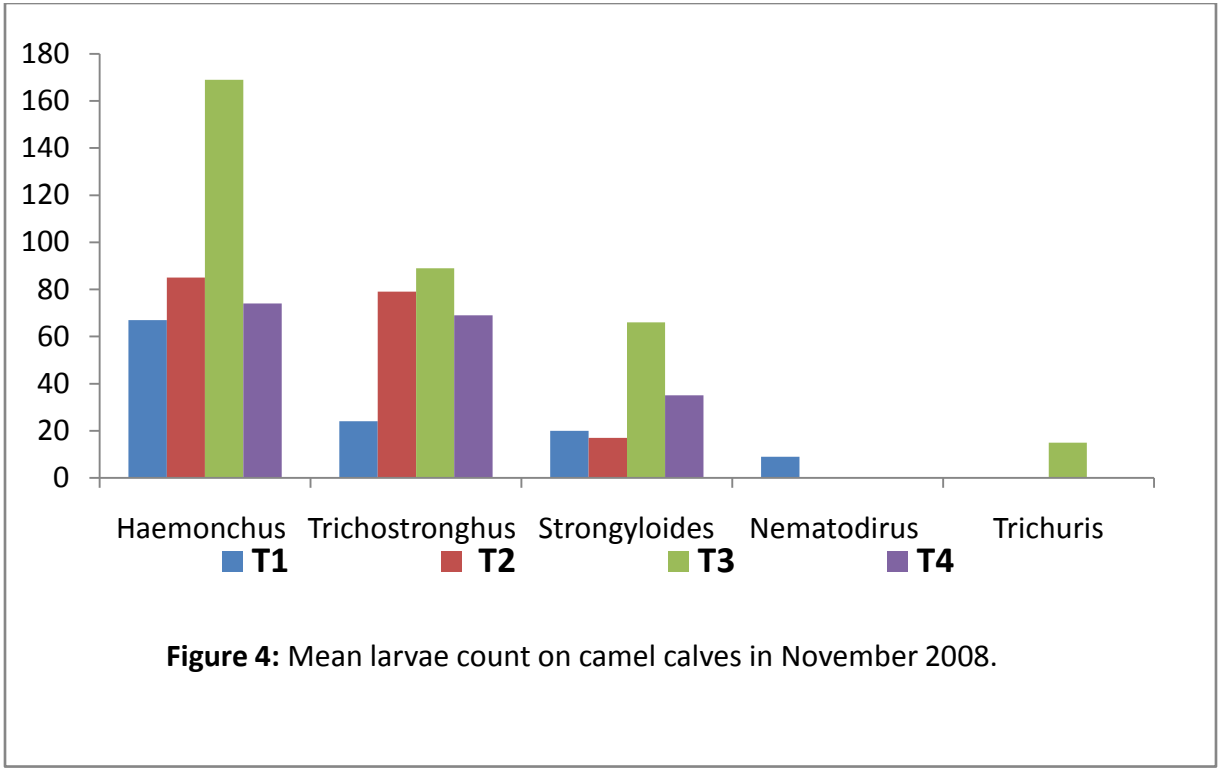

Figure 4: Mean larvae count on camel calves in November 2008.

Likewise, the highest parasites infestation was observed in T_3 while the least was recorded in T_1.

Parasitism is influenced by different conditions of the host such as physiological condition, nutritional and health status, sex and age of the host (Melesse 1996). Gastrointestinal helminthes also cause losses by affecting feed intake, efficiency of nutrients utilization and consequently reducing growth rate in young camels (Bekele 2001).

External parasites

The external parasite observed was Mange *(Sarcoptes scabiei)*. *Sarcoptes scabiei* was prevalent in November to December 2008. Almost 50% of the camel calves were affected by this disease (Table 4). All the affected calves were freed after being treated repeatedly with Miconazole ointment. The highest prevalence was observed for supplemented camel calves in T_1 (80%) followed by T_3 (60) and T_2 (40) while it was the least for T_4 (20%). Zeleke and Bekele (2001) also reported 19.27% prevalence rate in the month of November and December. The variation in prevalence between this study and other could be attributed to climatic change of the year for the outbreak of the disease. The out break of of *Sarcoptes scabiei* in the study area may be

coinciding with the highest rainfall (122 mm) recorded in November (Table 6). The high point prevalence rates of S. scabiei during the wet months may be due to the favorable weather conditions for the transmission of the parasite from diseased to healthy camels (Zeleke and Bekele 2001). In addition, the crowding together of animals while being fed salt in the enclosure in the wet months might have facilitated the disease transmission since mange mite is known to be highly contagious (Dioli and Stimmelmayr 1992).

(November to December 2008)

Treatment	positive camels	Prevalence (%)
T1	4	80
T2	2	40
T3	3	60
T4	1	20

T1 = weaned at 6 months, T2 = weaned at 8 months, T3 =weaned at 10 months, and T4 (control)= weaned at 12months of age, N = number of camels examined

Table 4. Prevalence of mange mite on camel calves (N = 20)

Respiratory disease

Another most important disease recorded during the study was respiratory disease which affected all experimental camel calves (100%). An out break was observed at the start of short rainy season (March). The clinical symptoms of the disease were cough, nasal discharge, rough skin, emaciation, and lose of appetite, which is similar with that reported by Bekele and Zeleke (2001) for an out break of respiratory disease in eastern Ethiopia (after the end of the rainy season) which affected almost all camel herds (86%) with 6.4% mortality. Camel calves diagnosed for the disease in the current study reduced body weight during the treatment period, and the disease contributed to the death of three calves (2 belong to T_3 and one belong to $T_{4)}$, despite the treatment given to all animals.

Calf mortality

Three (15%) mortalities were recorded in the current study at the age of 299 (T_4), 309 (T_3), and 402 (T_3) days, respectively (Table5). The causes of death of the 3 calves were not confirmed by veterinarian, but we suspected the outbreak of respiratory disease and malnutrition to be the major contributing factors. Death of calves in T_3 which was supplemented for 60 days and T_4 which was not supplemented coincide with widely accepted notion that malnutrition disable ability of animal to resist diseases. Bekele and Zeleke (2001) have indicated that pneumonia and gastro-enteritis were

the main causes of camel calf mortality. In general, mortality observed in the current study is in agreement with 16.4% reported (Bekele and Zeleke 2001) for camel calves in eastern Ethiopia.

Treatment	Number of animals	Total mortality (%)
T1	5	Nil
T2	5	Nil
T3	3	10 (2)
T4	4	5 (1)

Figures in brackets are number of calves died during experimental period.

Table 5. Mortality of camel calves during the study

Month	Temperature (^{0}c)		Rainfall (mm)
	Minimum	Maximum	
August 2008	14.98	26.47	85 .0
September 2008	14.81	28.18	50.0
October 2008	14.7	26.5	42.0
November 2008	14.7	26.9	122
December 2008	13.8	28.0	0.00
January 2009	13.9	28.3	24.7
February 2009	12.8	29.7	0.00
March 2009	16.3	30.1	93.0
April 2009	16.6	28.7	85.0
May 2009	16.4	29.0	92.0
June 2009	16.2	27.8	24.2
July 2009	15.5	27.2	96.00

August 2009	16.3	26.8	77.0

Table 6. Average temperature and total monthly rainfall during the study

Summery and conclusions

- The EPG count revealed that calves in all treatment groups were equally highly infested, but the effect of parasitic infestation was well manifested in those camel calves supplemented for short period of time (T_3) and those not supplemented (T_4)

- 15% mortality observed in T_3 and T_4 might be the lack of resistance to disease parasites and malnutrition compared to those supplemented calves for more than 4 months which might have developed resistance against parasite disease.

- It is thus recommended that pastoralists should be aware and oriented about importance of supplementary feed to calves in order to save the life of animals since effective prophylactic drug and curative treatments may costly and not available to the pastoral.

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