

Full Length Research Paper

Impact of Internal Parasitism on Milk Yield in Sudan's Semi-Intensive Dairy Systems

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A cross sectional study was conducted in the dairy cattle of Al-Rodwan dairy project in Omdurman town during the three different seasons of the year. The results of the faecal examinations (n=290) showed that the prevalence of the internal parasites was 16, 8.42, and 7.36% for dry cool, dry hot, and wet hot season, respectively. The prevalence of coccidiosis was found to be 13, 4.21, and 2.10% for dry cool, dry hot, and wet hot season, respectively, while the prevalence of Fasciolosis was 1, 4.21, and 4.21% for dry cool, dry hot, and wet hot season, respectively. Statistically, no association between season and the prevalence of internal parasites ($P > 0.05$). A positive association ($P < 0.01$) between the milk yield and the occurrence of internal parasites was observed (infection with internal parasite reduce milk yield of the animal). Similarly, an association was recorded for the breed and age of the animal with infection of internal parasites ($P < 0.05$). Application of odds ratio (OR) indicated that breed was considered to be a protective factor (OR = 0.294), while age of the animal was considered to be a risk factor (OR = 3.638) for presence of internal parasites.

Key words: Al-Rodwan dairy project, internal parasites, season.

INTRODUCTION

The high needs for animal proteins in tropical countries, especially milk and milk products in recent years, oriented the producers to import high milk foreign breeds to meet human consumption. However, the high susceptibility of crossbred cattle to internal parasites is regarded as an important role in dissemination of health problems in dairy farms. The effects of parasitic diseases on livestock include mortality losses, condemnation of meat, weight loss, and depreciation of animal products and reduced resistance to other diseases as well as high expenditure on drugs. Moreover, helminthes of the gastrointestinal tract are a major cause of reduced productivity in ruminants throughout the world (El Bihari et al., 1974).

In Sudan, in spite of the large animal population still the dairy products do not satisfy the national demand. This is

why the dairy industry faces many problems. For instance, parasitic diseases were known to exist in the country, way back as 1902. However, most cases reported were based on the tentative diagnosis, rarely supported by laboratory examination. In reviewing the available literature of Sudan veterinary services, no record was encountered while dealing with parasitic infestations or infections in dairy cattle in the different seasons of the year in Khartoum State. Therefore, the aim of this study was to provide basic information regarding the presence of internal parasites of dairy cattle in Omdurman district among different seasons (Karib, 1961).

MATERIALS AND METHODS

Study area

A cross sectional study was conducted in El-Rodwan Dairy Project which was located at the north western periphery of Omdurman town and regarded as one of the most important sites of the semi-

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Table 1. Description of the study population in El-Rodwan dairy project during the three different seasons.

Unit	Season frequency (%)		
	Dry cool	Dry hot	Wet hot
Total No. of animals examined breed	100	95	95
local breed	11 (11%)	11 (11.58%)	10 (10.53%)
cross breed	89 (89%)	84 (88.42%)	85 (89.47%)
Age (years)			
<1	33 (33%)	28 (29.47%)	28 (29.47%)
1-3	4 (4%)	4 (4.21%)	40 (42.10%)
> 3	63 (63%)	63 (66.32%)	27 (28.42%)
Milk yield (kg)			
< 4	39 (39%)	34 (35.79%)	34 (35.79%)
4-8	39 (39%)	39 (41.05%)	39 (41.05%)
>8	22 (22%)	22 (23.16%)	22 (23.16%)

intensive systems for milk production in Khartoum State. The climate of the study area is an arid type which is characterized by a wide range in daily and seasonal temperature. A temperature of 45°C may occur during the summer with hot dry weather and low humidity. During winter the weather is cool and dry with a mean daily temperature of 24°C. The maximum rainfall is from mid July to mid September, in this season there is an increase in relative humidity with a maximum of 68% in August.

Sampling

The study animals were cattle kept in El-Rodwan Dairy Project. For the purpose of sampling selection of pens was done according to cluster sampling method (two stage cluster) as described by Thrusfield (1995). Selection of clusters (10 pens) was done randomly and within each pen only 10% of the herds were sampled randomly. Description of the study population is shown in Table 1.

Faecal samples collection

Two hundred and ninety faecal samples were collected during the three seasons of the year. Accordingly, 100 faecal samples were collected during the dry cool season, 95 during the dry hot season, and 95 during the wet hot season. Samples were collected straight from the rectum of the animal or from the ground only if the animals were seen passing out their faeces. The faeces were then collected in plastic bags, labeled and immediately transferred to the laboratory for fecal examination (Angus and Todd, 1978).

Faecal examinations

Flotation method

This test was used to detect the presence of the eggs of nematodes and cestodes, as well as oocysts protozoa. Two to three grams of faeces were taken in a mortar and emulsified with 42 ml salt solution. The suspension was then poured through a tea sieve into a beaker to remove the large particles. The sieved suspension was then poured in a test tube. More of salt solution was added into the test tube until it was completely filled and then covered with a cover

slip. The cover slip was removed after 20 min and it was placed into a clean slide and examined under the microscope (Angus and Todd, 1978).

Sedimentation method

This test was used for detecting those eggs which do not float well in available flotation solutions. Those are the operculate eggs such as fluke infestation, Fasciola, Paramphistomes and Schistosoma. Two to three grams of faeces were taken in a mortar and emulsified with 42 ml tap water. They were grounded with pestle and mixed well. The suspension was then poured through a tea sieve into a beaker to remove the large particles. The sieved suspension was then poured in a centrifuge tubes and centrifuged at 1500 rpm for two min (this was the first wash). The dirty supernatant was poured off and re-suspended in water and centrifuged at 1500 rpm for two min. This was repeated four times till the supernatant fluid was clear. A bit of the deposit was taken and smeared on slide covered and examined under the microscope (Angus and Todd, 1978).

Data analysis

Stata 6.0 for Windows 98/95/NT was used for data analysis. Chi-square (χ^2) was used for assessing the statistical associations of various factors with presence of internal parasites. Logistic regression model was employed only for those factors which gave statistical significant by using chi-square (χ^2). Student t-test was employed to find out the relationship between milk yield and infection with internal parasites.

RESULTS

The results of microproscopic examinations from dairy cattle at El-Rodwan dairy project using flotation and sedimentation tests (n = 290) showed that the presence of internal parasites was 16% (n = 100) during the dry cool season, 8.42% (n = 95) during the dry hot season and 7.36% (n = 95) during the wet hot season.

Table 2. Prevalence of internal parasites infection detected during the study period.

Season	No. examined	Results			Over all prevalence n (%)
		<i>Coccidia</i> species (%)	<i>Fasciola</i> species n (%)	<i>Parmphistomum</i> species n (%)	
Dry cool	100	13 (13%)	1 (1%)	2 (2%)	16 (16%)
Dry hot	95	4 (4.21%)	4 (4.21%)	0 (0.0%)	8 (8.42%)
Wet hot	95	2 (2.10%)	4 (4.21%)	1 (1.05%)	7 (7.36%)

Prevalence of coccidiosis was observed during the three different seasons of the year given high prevalence of 13% (n = 100) during the dry cool season. While, prevalence of fasciolosis was low 1% (n = 100) during the dry cool season (Table 2). There was no effect of the season on the presence of internal parasites ($P > 0.05$). A positive association ($P < 0.01$) between the milk yield and the occurrence of internal parasites was observed. An association was obtained for the breed and age of the animal with infection of internal parasites ($P < 0.05$). Application of odds ratio (OR) indicated that breed was considered to be a protective factor (OR = 0.294), while age of the animal was considered to be a risk factor (OR = 3.638) for presence of internal parasites.

DISCUSSION

The presence of internal parasites in El-Rodwan dairy project was mostly due to the poor hygiene in the pens resulting from crowd of animals in the center of the pen where there was a partial shade and this made it difficult to achieve thorough removal of animal dung. Moreover, animals were fed on fodder purchased from the market which increased the risk of infection with internal parasites as contamination with the infective stages can happen at any point as well as introduction of new animals particularly from areas known to be endemic for internal parasitic infections such as Gezira and White Nile areas.

Our study revealed that there was no relationship between the season and the occurrence of internal parasites. This result is not in line with a study conducted in Central Kenya by Waruiru et al. (2000) who stated that the season had a significant influence on the prevalence and intensity of helminth and coccidial infections in dairy cattle and they indicated that the higher intensity of infection with helminth and coccidia was found in the wet season. Similarly, the same authors stated that the total worm burden in the animals were highest during the rainy season and lowest during the dry season. This disagreement was attributed to the type of husbandry and management of the dairy cattle as most of these studies were conducted in pastoral production systems while our

study was done in closed or semi-intensive production system. A positive association was obtained between the age of the animal and the presence of internal parasites. This result was confirmed by Duval (1997) who stated that the age as well as the weight of animal determines susceptibility to infection with parasites. Young animals do not have strong immunity to parasitic infection during the first year in pasture. He also revealed that adult animals are much less susceptible to most parasites, unless they are in poor living conditions. A significant association was obtained for the breed of the animal and the presence of internal parasites. This result was confirmed in Uganda by Magona and Mayende (2002), who explained that infections with fasciola and gastrointestinal nematodes were higher in the exotic breed compared to the local breeds. Furthermore, another study conducted by Duval (1997) revealed that an animal which had never been exposed to infections with worms cannot develop resistance and immunity. Local breeds have strong ability to prevent the establishment or limit the subsequent development of parasitic infection due to the previous continuous exposure to worm infection.

However, the limited number of local breed included in this study could not be taken a definite reflection of breed susceptibility. Also the cross-bred animals have varying ratios of foreign blood. There was a highly significant association between the milk yield and the presence of internal parasites. This result was confirmed by Bliss and Todd (1976) who demonstrated increased milk production after treatment of dairy cows, thereby passing fewer than 10 epg of faeces. Also they demonstrated that milk production was suppressed in cows given 200,000 trichostrongylid larvae when the larvae were administered in the first 90 days of lactation.

In conclusion the results of this study showed that infections with internal parasites were common during the different seasons of the year in the selected dairy cattle in the study area. Many investigations on internal parasites in dairy cattle had been documented from different production systems in Sudan. Saad (2004) reported infection with fascioliasis in White Nile and Gezira states. He also stated that paramphistomiasis was common in White Nile and Gezira States. Based on results of this

study it could be concluded that infections with internal parasites were prevalent in the dairy cattle of Al Rodwan dairy project. The seasonal variations had no influence on the prevalence of internal parasites in a closed dairy production system if other factors such as good management and adequate nutrition were controlled. Reduced milk production level is the most important feature for infection with internal parasites.

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