

## Outbreaks of Concurrent Pneumonia and Coccidiosis in Sheep in South Darfur State, Sudan

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### ملخص البحث

تم إجراء خمسة تفشيات منفصلة لعدوى رئوية وطفيليات معوية متزامنة في الأغنام في ولاية دارفور جنوب السودان خلال فصل الشتاء. تم اعتبار العوامل المسببة لعدوى الرئة هي: *Streptococcus sp.*, *E. coli*, *Klebsiella sp.* و *Pseudomonas aeruginosa*. أما الطفيليات المعوية التي تم التعرف عليها فكانت: *E. faurei* 40%، *E. ovina* 30%، *E. ovinoidalis* 26%، *E. ahsata* 3% و *E. parva* 1%.

### Summary

Five separate outbreaks of concurrent pneumonia and coccidiosis in sheep in winter were investigated in South Darfur State, Sudan. Cold weather and pneumonia in addition to crowding, intensive grazing, ration change and contamination of environment with infective oocysts, were considered to be predisposing factors for coccidiosis. Bacteria associated with pneumonia were, *Streptococcus sp.*, *E. coli*, *Klebsiella sp.* and *Pseudomonas aeruginosa*. The species of *Eimeria* identified were, *E. faurei* 40%, *E. ovina* 30%, *E. ovinoidalis* 26%, *E. ahsata* 3% and *E. parva* 1%.

### Introduction

Coccidia are protozoal parasites of vertebrates and invertebrates and of worldwide distribution. They cause high mortality and morbidity among animals and birds, especially young ones. Acute forms may occur at any age when animals are under stress.

In the Sudan, ovine coccidiosis was reported as a serious emerging disease causing economical losses especially in animals destined for export. Outbreaks of coccidiosis in sheep and goats were reported in 1977 around Khartoum in feed lots (Anon, 1977a). Another severe outbreak of the disease was reported in 1990 in a sheep farm at Soba near Khartoum (Halima Osman *et al.*, 1990).

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This study report five separate outbreaks of coccidiosis accompanied with pneumonia in sheep in South Darfur State, Sudan. The epizootiology of the syndrome was discussed.

## **Materials and Methods**

### **Case History:**

Five outbreaks were investigated in South Darfur State. The first outbreak occurred in January 1995 in Sheiryia locality; about 50 km north eastern Nyala, where large numbers of sheep are raised. They were kept on natural pastures, watered from bore wells. Seven herds comprising 805 sheep, of which 186 were affected. The second outbreak occurred in February 1998 at Shadida area about 10 km northern west of Nyala. It involved 150 sheep of which 30 were affected. The third outbreak took place in November 2001 at El Seraif area about 8 km west of Nyala, in a flock of 100 Sheep, of which 30 were diseased. The fourth outbreak was in December 2002, at Mousiah 3 km South of Nyala, in 1168 sheep 204 were infected. The fifth outbreak was in February 2004, in 30 sheep kept in Nyala and out of those, seven were infected.

### **Clinical and laboratory investigations:**

Infected animals were clinically examined, their temperatures were recorded, samples of blood in EDTA and faecal samples were collected.

A total of eleven animals in these outbreaks were necropsied either immediately after death, or euthanized just before death and examined for gross pathological changes. Fresh samples from liver, lungs, kidneys and intestine were taken and cultured onto Blood and MacConkey agar, incubated aerobically at 37 °C for 48 hours. Bacteria were isolated and identified according to Cowan (1993). Blood smears were prepared, stained with Giemsa's stain. Faecal samples were processed by floatation technique and identification of coccidial oocysts was made after sporulation in 2.5% potassium dichromate, according to Anon (1977b).

## **Results**

All outbreaks took place during the cold season (December, November, January and February). The total morbidity, mortality and case fatality rates for these five outbreaks reached 20.3 %, 10.7 % and 53 % respectively (Table:1).

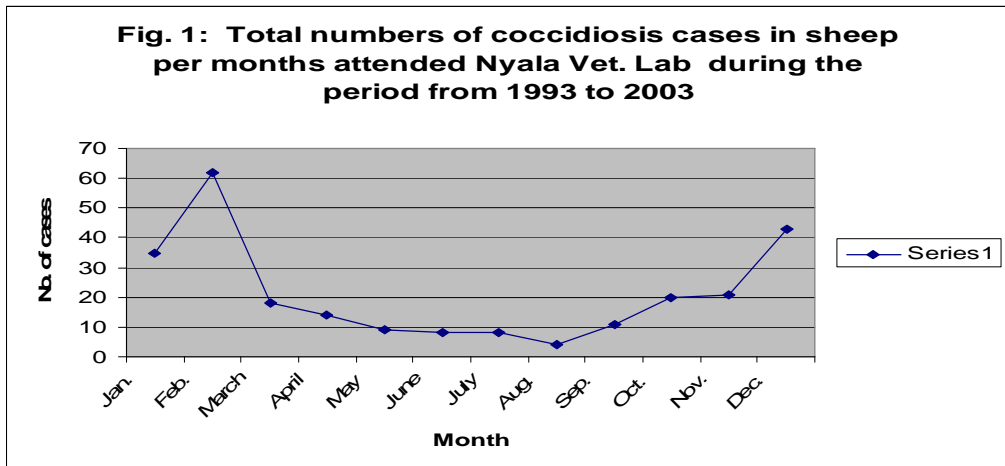
The infected animals showed anoeroxia, pyrexia, nasal discharges, cough, dullness, weakness and dark diarrhoea with soiling of the hind legs.

Post-mortem examination revealed severe haemorrhagic enteritis, at the lungs, there was signs of pneumonia. Blood smears revealed no blood parasites. Faecal samples examination showed considerable numbers of oocysts of *E. faurei* 40%, *E. ovina* 30%, *E. ovinoidalis* 26%, *E. ahsata* 3% and *E. parva* 1%.

**Table 1: Morbidity, mortality and case fatality of sheep in five outbreaks of coccidiosis and pneumonia**

	Total No. of animals	No. of diseased animals	Morbidity rate	No. of died animals	Mortality rate	Case fatality rate
1 <sup>st</sup> outbreak	805	186	23 %	66	8.2 %	35 %
2 <sup>nd</sup> outbreak	150	30	20 %	11	7.3 %	36.7 %
3 <sup>rd</sup> outbreak	100	30	33.3 %	13	13 %	43.3 %
4 <sup>th</sup> outbreak	1168	204	17.5 %	150	73.5 %	12.8 %
5 <sup>th</sup> outbreak	30	7	23.3 %	2	28.5 %	6.7 %
Total	2253	457	20.3 %	242	10.7 %	53 %

Pneumonia was evident in the first outbreak, but it's causative agent was not investigated at that time. Cultures of samples from internal organs of sheep in subsequent outbreaks revealed no bacterial growth except from lungs, both acute-catarrhal bronchopneumonia and catarrhal-purulent bronchopneumonia were observed. Bacteria isolated were *Streptococcus sp.*, *E.coli*, *klebsiella sp.* and *Pseudomonas aeruginosa*. Fig. 1 shows the number of sheep coccidiosis cases submitted to Nyala Veterinary Laboratory during the last ten years (1993- 2003) reached 64% of the total number.



### Discussion

Many workers attributed the increased severity of coccidiosis to concurrent infection with parasitic nematodes (Halima Osman *et al.*, 1990; Abakar, 1996) or bacteria. It was found that coccidia favours the

establishment and development of colibacillosis in lambs (Gouet and Yvone, 1989) and goats (Randa Abdeen, 1997). The same interaction between coccidia and *E. coli* infection was investigated and proved in chickens (Nakamura *et al.*, 1990). It was noticed that in some pneumonic cases are associated with fibrinous adhesions of pleural surfaces (Lotze, 1952; Lima, 1979).

In these recent outbreaks there was already an infection with coccidia. The corals of animals near water points, where accumulation of faecal materials under unhygienic conditions favours sporulation of coccidial oocysts. The parasites also could be present inside the animals in large numbers but these animals could tolerate the development of coccidiosis. This tolerance to coccidia may be disturbed by stress factors. It was observed that all these outbreaks were reported during the cold season when pneumonia prevails, suggesting that pneumonia in addition to crowding, intensive grazing, change of ration after wet season and contamination of the environment with infective oocysts, all these may act as predisposing factors for coccidiosis. Stress can act directly (Subba Roa and Glick, 1970) or indirectly (Jackson and Farmer, 1970) to increase the susceptibility of infection due to secretion of corticosteroids which in some way render the lymphoid and reticuloendothelial systems ineffective against protozoal infection (Niilo, 1970a; Ernst and Benz, 1980). It has been reported that when coccidia infection is established, an increase in saprophytic bacteria occurs (Suleiman, 1997). This increase of bacteria with presence of stress factors such as (aging, cold, transportation...etc) may lead to pneumonia which may aggravate coccidiosis by turns. It is of worthy to note that through the last ten years (1993- 2003) sheep coccidiosis reached its peak during the cold seasons (Fig. 1) and that represented 64% of the total sheep coccidial cases submitted to Nyala Veterinary Laboratory in these mentioned years (Anon, 1993-2003). Our findings are in agreement with those of the workers who reported on winter coccidiosis and their results suggested that cold increases the host's susceptibility to clinical coccidiosis, but may not increase the severity of the signs once the clinical infection is established (Niilo, 1970c). However, some authors reported that the severity of the disease increases mainly in rainy seasons (Mossalam, 1972; Woji *et al.*, 1994).

It was stated that coccidiosis is a disease of young animals (Blood and Hunderson, 2002; Solusby, 1982). But it was found that under stress even adult animals will be affected (Halima Osman *et al.*, 1990), and this is in agreement with our findings.

Natural coccidiosis were of multiple eimerial infections (Marguardt, 1976; Catchpole *et al.*, 1975; Vercruysse, 1982). In a survey of *Eimeria*

species in the region of South Darfur it has been reported that mixed infection is a rule (Abakar, 1996). This is in agreement with our findings of these outbreaks. Hence it is of importance to take measures at appropriate time in the year to control these episodes of such diseases.

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