

Dept. of Animal Medicine
Faculty of Vet. Medicine-Assiut University
Head of Dept.: Prof. Dr. T. A. El-Allawy

**CLINICAL AND LABORATORY INVESTIGATIONS
ON DIARRHOEA IN CAMELS
IN ASSOCIATION WITH STRESS FACTORS
IN ASSIUT GOVERNORATE**
(With 3 Tables and 3 Figures)

By
A. S. SAYED; A. H. SADIEK; A. A. ALI*
and **M. N. ISMAIL**

*: Animal health research Institute (Assiut)
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**فحوصات إكلينيكية ومعملية على حالات الإسهال في الجمال
والمصاحبة للعوامل الضاغطة في محافظة أسيوط**

**عرفات صادق سيد، على حسن صديق، عبد الرحمن أحمد على
محمد نور الدين إسماعيل**

أجرى هذا البحث على عدد ٧٦ جمل تراوحت أعمارهم بين ٤ - ٨ سنوات حيث كان من بينهم عدد ٥٦ وردت من جنوب أسوان (دراو) إلى محافظة أسيوط، تعاني من الإسهال الذي تختلف درجاته من الطري إلى المائي الشديد مع الهزال وفقدان الشهية ونقص الوزن. قد تعرضت هذه الجمال للعوامل الضاغطة منها السفر الطويل، التغيرات المناخية، ونسبة الأكل والشرب. أما بالنسبة للمجموعة الضاغطة فقد اشتملت على عدد ٢٠ جمل أصحاء ظاهريا وإكلينيكية. قسمت الجمال المصابة إلى مجموعتين تبعا لدرجة الإسهال وشدته (مع الأخذ في الاعتبار الفحص البكتريولوجي والطفيلي والقطري لعينات البراز):

المجموعة الأولى: جمال تعاني من إسهال بسيط إلى متوسط الشدة. حيث تم بالفحص البكتريولوجي عزل الاشريشيا كولاي- بروتيس نرابلس ومورجاني- سودومونس ايروجونوزا وفلورسنس بنسب مختلفة، أما الفحص الطفيلي فأظهر الترايكوسترونجيلس والكابلاريا بنسب مختلفة، وأعطى الفحص القطري نتيجة سلبية.

المجموعة الثانية: جمال تعاني من الإسهال الشديد. حيث تم بالفحص البكتريولوجي عزل السالمونيلا- الاشريشيا كولاي- الكلبسيلا والاكوتوباسيلس بنسب مختلفة، أما الفحص الطفيلي فأظهر الأيميريا كاميلاي- الترايكوسترونجيلس والهيمونكس بنسب مختلفة. الفحص القطري أظهر وجود سبوروثيركس سيكنكاي. بالدراسات المعملية على عينات الدم للجمال السليمة والمریضة فقد تبين وجود نقص معنوی فی كرات الدم الحمراء والهيموجلوبين في كلتا

المجموعتين. بالتحليل الكيميائي الحيوي لمصل دم الجمال المريضة والسليمة تبين أنه ليست هناك تغيرات ملحوظة لكل من: البروتين الكلى - الألبومين - الجلوبيولين - نسبة الألبومين على الجلوبيولين. كما ثبت بالتحليل وجود تغيرات غير معنوية في مستوى كل من الكالسيوم - اليوريا - الكرياتينين، بينما تبين وجود انخفاض معنوي في مستوى كل من الجلوكوز - الصوديوم - البوتاسيوم - الكلورايد - الفوسفور والمغنسيوم. هذا وقد عولجت جمال المجموعة الأولى بالحقن العضلي لسلفات الجنتاميسين (٥ ملليجرام/ كجم من وزن الحيوان)، أما جمال المجموعة الثانية فقد تم علاجها باستخدام الثيوفينيكول (٢٠ ملليجرام/ كجم من وزن الحيوان)، ذلك مع حقن الايفرميكتين (١مل/٥٠ كجم من وزن الحيوان) مع تجريب مخلوط يتكون من: سلفاميثازين، سلفا ثيازول، شاركول، كاولين، سلفات البكتين و نترات البزموت في كلتا المجموعتين. نتج عن ذلك تحسن ملحوظ في الأعراض الإكلينيكية - صورة الدم والمكونات الكيميائية الحيوية لمصل الجمال.

SUMMARY

A total of 76 camels, 4- 8 years old were involved in this study. Twenty camels were clinically healthy and kept as control, however the rest of 56 camels were coming from the Daraw quarantine (Daraw city, Aswan Governorate) by means of trucks for marketing in the villages of Assiut Governorate. These camels were exposed to the stressors of transport, climatic and dietary changes. They showed gastrointestinal upsets. Clinical, haematological, biochemical, microbiological and therapeutical investigations were the main objects of this work. Clinical examination of diseased camels revealed intermittent passage of soft faeces to severe watery diarrhoea, weakness, partial loss of appetite, loss of weight and depression. According to the severity of the signs, the camels were classified into two groups. Group 1: Mild to moderate diarrhoea (30) and group 2: Severe diarrhoea (26). Marked macrocytic hypochromic anaemia and leucocytosis were observed in both groups. Significant decrease in blood serum Na^+ , Cl^- , P, Mg and glucose and significant increase in serum K^+ were noted in all diseased camels. Bacteriological findings of faecal swabs of group 1 revealed *E. coli* (21.4 %), *Proteus mirabilis* and *E. coli* (3.6 %), *Pseudomonas aurogenosa* & *E. coli* (21.4 %), *Pseudomonas aurogenosa* & *Proteus morgani* (3.6 %) and *Pseudomonas fluorescence* (3.6%). However 14.3 % of this group were also infested with *Trichostrongylus* and *Cappillaria spp.* In group 2, the microbial findings were *Salmonella typhi* and *E. coli* (14.3 %), *Kliebsiella* & *E. coli* (7.1 %), *Actinobacillus* & *E. coli* (10.7 %) and *Sporothrix shenkii* & *E. coli* (14.3%). *Eimeria cameli* (25 %), *Trichostrongylus* and *Eimeria cameli* (3.6 %), *Trichostrongylus* and *Haemonchus spp.* (7.1%) and *Haemonchus spp* (3.6 %) were the

parasites recognized in this group. According to the parasitological findings, bacterial culture and sensitivity, therapeutic trails were achieved. Oral antidiarrhoeal mixture containing sulphamethasine was given twice daily for 5 days and parentral administration of Gentamicin sulphate (5 mg / kg b.w), 2 times daily for 5 days) for all diarrhoeic camels except those suffering from salmonellosis, where they treated parentrally with thiophenicol (20 mg/kg b.w). Ivermectin was injected subcutaneously for camels suffering from parasitic infestation (1 ml/50 kg b.w). Mineral mixture and multivitamins were also given as a supportive treatment for diseased groups. All camels were gradually recovered except only two camels of group 2 were succumbed.

Key words: Camels, Diarrhoea, Stress.

INTRODUCTION

Camels are considered one of the most important group of the livestock, forming the animals resources of our country. It is an economic feeder which can uniquely survive in the desert as a net producer of meat, milk and other by-products such as wool, hair and hides from resources which might otherwise be unusable. Camels are employed for many other functions, as to carry load and transport and may also serve as a wealth reserve forming an important part of the social structure of many nomadic people. (Higgins, 1986 and Rathore, 1986).

The camels that coming yearly from the North of Sudan to the South of Egypt are collected and remained for several weeks in Daraw quarantine, Aswan-Egypt (Soliman, 1962 and Holler and Hassan, 1966). During the period of their transport and before their arrival to the quarantine area, they were exposed to the stresses of long distance transport, lack of food and water and climatic changes, that affects their tolerance and resistance resulting in breakthrough of their immunity (Higgins, 1986).

Gastrointestinal disorders are considered the commonest upset accompanying such types of stresses. Intermittent diarrhoea which may progress to severe watery diarrhoea, weakness and severe emaciation were the main signs among camels (Chyne *et al.*, 1977). Diarrhoea in camels is probably the commonest disorder which affects its incaptivity and performance and it was very common in all the expeditions (Higgins, 1986). Enteritis is not only associated with dietary factors, but

also, stresses of transport, climatic changes and lack of good management are frequently responsible. Infections with helminthes, protozoa, bacteria and viruses have all been incriminated (Altaif, 1974; Chyne et al., 1977; Omran et al., 1984 and Higgins, et al., 1992).

Camels experimentally infested with gastrointestinal helminthes showed a combination of diarrhoea or soft faeces, listlessness, anorexia, wasting and in a few cases, colic associated with restlessness (Arzoun et al., 1984). Camels naturally infested with gastrointestinal parasites (*Trichuris spp.*, *trichostrongylus spp.* and others) showed emaciation, decreased body weight, variable degree of depraved appetite and diarrhoea (Jaskoshi and Williamson, 1958; Soliman, 1962; Bansel et al., 1971; Altaif, 1974; El-Magawary, 1980; Abdo et al., 1985 and Karram et al., 1986).

An outbreak of salmonellosis in Somalian camels was described by Cheyne et al., (1977) in which the symptoms included diarrhoea, enlargement of the superficial lymph glands, muscle twitching, fever, congestion of visible mucous membranes, rapid pulse, laboured respiration and collapse. Chronic salmonellosis is the cause of persistent diarrhoea, emaciation and deaths after months or longer periods. Salmonellosis has been reported to be the most important disease affecting suckling camel calves with an overall fatality rate approaching 20 % in some areas. *Salmonella* organism was reported to cause enteritis in adult camels (Pegram and Tarek 1981 and Seddek et al., 1996).

Regarding the haematological changes associating parasitic enteritis in camels, there were a reduction in the total erythrocytic count/mm³ blood, Hb content and packed cell volume (Bansel et al., 1971). Furthermore, leucocytosis associated with eosinophilia was also recorded in diarrhoeic camels. On the other hand, insignificant changes in the blood picture of diarrhoeic camels except increased packed cell volume were also described in camels suffering from dietetic diarrhoea (El-Magawary, 1980; Omran et al., 1984 and Manna, 1990).

Blood serum total protein and electrolytes (Na⁺, K⁺, CL⁻) were decreased in camels infested with helminth parasites (Holler and Hassan, 1966; Barakat and Abd El-Fattah, 1970; El-Magawary, 1983; Raisnghani and Iodha, 1983; and Omran et al., 1984). Glucose level in blood serum of camels naturally infested with gastrointestinal parasites showed an elevation than that of healthy group (Abdo et al., 1985).

This study aimed the following:

- 1- Description of the clinical picture and the probable cause of the diarrhoea, among camels coming from Sudan and South of Egypt.

- 2- Isolation and identification of bacterial agents and fungi from the faecal swabs as well as screening of the protozoa & parasites involved in diarrhoeic camels.
- 3- Studying of the accompanying haematological and biochemical changes including blood picture, blood serum electrolyte and protein pattern.
- 4- Carrying out of treatment trials.

MATERIALS and METHODS

1-Animals:

A total of 76 camels (*Dromedary Camel*) of both sexes, 4-8 years old were used in this work. 56 out of them were belonged to camels coming from Daraw quarantine (Daraw city- Aswan Governorate - Egypt) after their arrival from the North of Sudan. These camels were quarantined there for 2-4 weeks before their transport for a long distance by trucks to the villages of Assiut Governorate. Camels were suffering from intermittent diarrhoea, weakness and loss of weight within one week after arrival to El-Dewier, El-Berba and Kom Esfaht villages (Assiut Governorate). The rest of 20 camels, 6-8 years old of both sexes, were selected from the clinically healthy camels which raised in these villages. They were subjected for clinical and laboratory examination and proved to be healthy and were kept as control. Complete clinical examination of the diseased camels was done according to Higgins and Kock (1984).

On the basis of the severity of clinical signs, diarrhoeic camels were classified into two groups. Group 1: Mild to moderate diarrhoea and group 2: Severe diarrhoea.

2-Samples and adopted methods: Samples were taken from both healthy and diseased cases as follow:

- 1- Faecal swabs were taken aseptically from 56 diarrhoeic camels for bacterial examination, where isolation and identification of enterobacteriaceae, anaerobes and fungi as well as culture and sensitivity tests were carried out according to the methods adopted by Carter, (1984).
- 2- Faecal samples were collected from the diseased cases for parasitological examination according to Coles, (1986).
- 3- Whole blood samples with anticoagulant were collected for complete blood picture according to Coles, (1986).
- 4- Whole blood samples without anticoagulant were collected for the determination of blood serum levels of Na^+ , K^+ , CL^- , Ca, P, Mg, urea,

creatinine, glucose, total protein, albumin, globulin, and A/G ratio. Blood serum electrolyte (Na^+ and K^+) were determined by means of Flame photometry -Corning 400 and blood serum CL^- by Chloride meter-Corning 925. Blood serum Ca, P, Mg, urea, creatinine, glucose and blood serum protein pattern were estimated colorometrically by means of test kits supplied by Boehringer Mannheim GmbH Diagnostica.

3- Therapeutic trials:

Diseased camels (groups 1 & 2) were treated on the base of the results of clinical examination, culture and sensitivity tests, faecal analysis for parasites, severity and duration of the disease. Gentamicin sulphate was the antibiotic of choice for the most isolates of pathogenic *E. coli*, *Salmonella typhi*., *Proteus spp*, *Kliebsiella* and *Actinobacillus spp.* Bacterial isolates of *Pseudomonus spp.*, *E. coli* and *Salmonella typhi* were also sensitive for Thiophenicol and Nalidixic acid. Subcutaneous single injection of Ivermectin was given for camels infested with gastrointestinal parasites, 1 ml /50 kg b.w. Additionally oral antidiarrhoeal mixture containing 6 gm sulphathiazol, 2 gm sulphamethasine, 6 gm charcoal, 2 gm pectin sulphate, 100 gm Kaolin, 15 gm bismuth subnitrate 2 times daily for 5 days for each diseased camel.

Statistical analysis of the obtained data were done by means of a software computer program (Microsoft-Stat- USA).

RESULTS

1- Clinical findings:

Intermittent diarrhoea varying from frequent passage of soft faeces to severe watery diarrhoea were observed in all diseased camels (fig. 1 and 2). Internal body temperature, arterial pulse rate, respiratory rate were in their normal range. Bloody diarrhoea associated with straining, black faeces, rise of body temperature ($39.0-40.5^\circ\text{C}$) with moderate enlargement of prescapular lymph nodes were noticed in 5 camels (fig. 2). Partial to complete loss of appetite, weakness and gradual loss of weights were almostly observed in all diseased camels (fig. 3).

Two cases were suffering from severe watery bloody diarrhoea, severe emaciation and slight dehydration and complete loss of appetite resulting in their death.

3- Haematological and biochemical findings:

Packed cell volume (PCV, %), red blood cell count (RBCs, T/l), haemoglobin concentration (Hb, g/l), mean corpuscular volume (MCV, f/l), mean corpuscular haemoglobin (MCH, pg), mean corpuscular haemoglobin concentration (MCHC, mg%); total and differential leucocytic counts (WBCs, G/l) were found in table 1.

The results of biochemical analysis of blood serum of Na⁺, K⁺, CL, Ca, P, Mg, glucose, blood urea nitrogen (mmol/l), creatinine (μ mol/l), total protein, Albumin, globulin (g/l) and A/G ratio were illustrated in table 2.

3- Bacterial and parasitic examinations:

The results of bacterial isolation and identification of isolates as well as that of parasitic ones were illustrated in table 3.

4- Results of therapeutic trials:

All diseased camels which were treated with the above-mentioned medicaments showed gradual recovery except only two cases were succumbed within two weeks.

DISCUSSION

Camel like other animal species is affected by the various changes of the environmental condition. Changes of ration, scarcity of food and water, stress of management, transport and environmental pollution with industrial wastes were considered the predisposing factors for several diseases affecting camels. Diarrhoea is probably the commonest disorders which is associated with these stress factors. These factors lower the immune response of the camels and predispose them to the infection with different pathogenic microorganisms (Higgins, 1986 and Sayed, 1987).

The clinical signs observed on camels in this study were in the form of weakness, emaciation, wasting and intermittent diarrhoea which progressed to severe watery diarrhoea. All the diseased camels responded to the respective treatment except only two camels which were suffering from bloody diarrhoea, exhaustion, severe weakness, slight rise of the body temperature and were positive for *Eimeria spp*, *Salmonella typhi* and *E. coli*. Both camels did not respond to the respective therapy and resulted in their deaths. Similar signs associated with similar circumstances were previously mentioned (Higgins *et al.*, 1992 and Seddek *et al.*, 1996). The intermittent diarrhoea under these conditions may be explained by the fact that the stresses of long

transport, lack of food and water and climatic changes lowered the resistance of the camels, facilitating the invasion and flourishing up of normal bacterial inhabitants ending with gastrointestinal disturbances and diarrhoea. Parasitic infestation of camels may act as a co-factor in the lowering of animal immunity during the stress of transport and climatic changes.

The bacterial isolates of Enteropathogenic *E. coli*, *Salmonella Typhi.*, *Proteus spp.*, *Pseudomonas spp.* from diarrhoeic camels support the fact that stress of hunger, lack of water and climatic changes during long transport, facilitate such infection (El-Magawary, 1980; Higgins and Kock, 1984 and Seddek, *et al.*, 1996).

About 54 % of the diarrhoeic camels were also suffering from parasitic infestation, beside their bacterial infection (table 3). Previous infestation with parasites and protozoa may predispose the camels for bacterial infection specially with the exposure to variable degree of stress, that may aggravate the condition and disease hazards. The two succumbed camels were suffering from both salmonellosis and coccidial infection and eventually failed to respond to the respective therapy. Many report dealt with similar problems were previously published (Jaskoshi and Williamson, 1958; Soliman, 1962; Altaif, 1974; Arzoun *et al.*, 1984; Abdo *et al.*, 1985; Higgins, 1986 and Rathore, 1986).

Eimeria cameli. (Gut dwelling coccidia) is widely distributed among camel populations with high prevalence rates of infection of several species of *Eimeria*. Disease caused by *Eimeria* appears to be restricted to camel calves, however in this study, it was noticed in adult ones. Overcrowding or unhygienic conditions may contribute to the problem (Gill, 1976). Adult camels which are infected with and shed oocysts are usually healthy and show no clinical signs (Hussein *et al.*, 1987). Parasites may affect food utilization, decrease synthesis of protein in the skeletal muscles and cause tissue damage, inflicting stress on the animal (Kawasmeh and El-Bhairi, (1983).

Regarding to the results of haematological findings, diseased groups 1 & 2 showed macrocytic hypochromic anaemia, where a significant reduction in RBCs counts, Hb concentration, MCH and MCHC with significant increase in MCV (tab. 1). Macrocytosis in diarrhoeic camel in association with anaemia may be attributed to deficiency of vitamin B12 & folate in these camels (Norbert, 1983). Slight insignificant elevation in PCV in diarrhoeic camel was also noted. This is because the camels are able to conserve water mainly by reducing urinary and faecal excretion and also due to the powerful

antidiuretic action of arginine vasopressin in camels (Schmidt-Nielsen, 1984).

A significant increase in the total leucocytic count in both groups of diseased camels may reflect the condition of bacterial enteritis which may be primary or secondary to parasitic infestation (Bansel *et al.*, 1971; El-Magawary, 1980; Pegram and Tarek, 1981; Omran *et al.*, 1984; Abdo *et al.*, 1985 and Manna, 1990).

Insignificant alteration in the levels of blood serum total protein, albumin, globulins, A/G ratio, Ca, urea and creatinine may reflect the ability of the camel to conserve water and to compensate losses (Barakat and Abdel-Fattah, 1970 and 1971 and Higgins, 1986).

Significant decrease were noted in blood serum level of glucose, Na^+ , Cl^- , P and Mg. The lowered level of glucose may be attributed to the scarcity of food and water in addition to diarrhoea and malabsorption due to bacterial and parasitic enteritis. The obtained result of glucose is in contrary with that obtained by Abdo *et al.* (1985) who recorded an elevation of glucose in blood serum of camels naturally infested with parasites. Sodium is the most abundant ion in the extracellular fluid and its losses through the intestinal tract occur in enteritis resulting in hyponatremia. Hypochloremia occurs as a result of an increase in the net loss and sequestration of large amounts of chloride ion in enteritis. (Holler and Hassan, 1966; Barakat and Abd El-Fattah, 1970; El-Magawary, 1980 and Raisnghi and Iodha, 1983). Hypophosphataemia and hypomagnesaemia mainly due to the decrease in feed intake and malabsorption (Blood and Radostits, 1989). Slight increase in the serum level of K^+ was found. Serum K^+ level is not an indicative to the K^+ status of the body specially on diarrhoeic animals with acidosis, where K^+ leave the intracellular space to the extracellular one instead of hydrogen ion to compensate acidosis (Blood and Radostits, 1989 and Sadiek and Schlerka, 1996).

It could be concluded that stresses of long distance transport, scarcity of food and water, changes of diet and climatic changes lowered the resistance of the camels resulting in flourishing up of the normal microbial inhabitant and expose them to several gastrointestinal disorders. Correct management and administration of suitable antibacterial, antiparasitic, antidiarrhoeal and supportive treatment proved improvement of the health status of the camels suffering from diarrhoea.

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Table 1: Means & S.D. values of the blood picture in clinically healthy and diseased camels suffering from enteritis.

Parameter	Groups	Healthy Camels (Control)		Group 1 Mild-moderate diarrhoea		Group 2 Severe diarrhoea	
		N	20	30	26	Mean	S.D
PCV	(%)		Mean	Mean	S.D	Mean	S.D
RBCs	(T/l)		11.01	8.27*	1.62	8.61*	.88
Hb	(g/l)		143.95	84.2**	11.26	86.00**	11.21
MCV	(fm)		25.38	36.00*	4.26	35.20*	7.37
MCH	(pg)		12.99	10.52*	1.41	10.14*	1.89
MCHC	(g%)		52.89	29.12**	2.12	29.03**	4.07
TWBCs	(G/l)		9.43	15.65**	3.43	17.95**	7.09
Stab.	(%)		4.60	3.23	2.05	2.53	1.73
Neut.	(%)		50.90	42.69	12.57	48.53	12.72
Lymph.	(%)		30.30	48.5	14.40	35.53	12.09
Mono.	(%)		6.70	3.85*	2.19	3.27*	3.24
Eos.	(%)		6.50	10.15*	6.11	9.47*	7.34
Baso.	(%)		.10	.23	.44	.20	.42

T/l = Terra/liter (1×10^{12}) Giga/liter (1×10^9)

Table 2: Means and S.D.values of Blood serum Na⁺, K⁺, CL⁻, Ca, Ph, Mg, Urea, Creatinine, glucose and protein pattern in healthy and diseased camels suffering from enteritis.

	Groups	Healthy Camels (Control)		Group 1 Mild-moderate diarrhoea		Group 2 Severe diarrhoea	
		N	20	30	26	Mean	S.D
Parameters		Mean	S.D	Mean	S.D	Mean	S.D
Na ⁺	(mmol/l)	150.10	10.29	141.26*	5.51	145.39	5.39
K ⁺	(mmol/l)	4.69	.62	5.46*	.87	5.85*	.85
Cl ⁻	(mmol/l)	118.00	3.33	81.27**	6.66	85.08**	7.96
Ca	(mmol/l)	2.97	.71	2.62	.43	2.76	.52
P	(mmol/l)	1.99	0.34	1.43*	.49	1.42*	0.45
Mg	(mmol/l)	1.26	0.52	1.04*	.26	1.65	0.17
Urea	(mmol/l)	5.43	2.18	5.21	2.32	5.62	3.00
Creatinine	(μmol/l)	165.50	15.88	187.40	67.18	146.75	31.73
Glucose	(mmol/l)	5.24	1.77	1.74**	1.64	2.26**	1.42
T. prot.	(g/l)	74.31	6.87	69.00	7.07	72.54	5.22
Albumin	(g/l)	37.30	4.69	35.29	4.63	36.58	4.12
Globulin	(g/l)	36.61	5.25	34.47	5.44	35.98	6.49
A/G		1.19	.29	1.045	.23	1.06	.28

* = P < 0.05

** = P < 0.01

Table 3: Bacterial and parasitic findings in diarrhoeic camels.

Groups	Microorganism	Bacterial isolates		Parasitic findings	
		No. of cases	%	30 (53.6%)	No. of cases
G 1 Mild-Moderate diarrhoea N= 30 (53.6%)	Bacteria & Fungi			Parasites	
	<i>E. coli</i>	12	21.4	<i>Trichostrongylus</i>	6
	<i>Proteus mirabilis</i> & <i>E. coli</i>	2	3.6	<i>Cappilaria spp.</i>	2
	<i>Pseudomonas aurogenosa</i> & <i>E. coli</i>	12	21.4		
	<i>Pseudomonas aurogenosa</i> & <i>Proteus morgani</i> <i>Pseudomonas flourescence</i>	2	3.6		
G 2 Severe diarrhoea N= 26 (46.4%)	<i>Salmonella typhi</i> , <i>E. coli</i>	8	14.3	<i>Eimeria Cameli</i>	14
	<i>Kliebsella</i> & <i>E. coli</i>	4	7.1	<i>Trichostrongylus</i> & <i>Eimeria Cameli</i>	2
	<i>Actinobacillus</i> & <i>E. coli</i>	6	10.7	<i>Trichostrongylus</i> & <i>Haemonchus spp.</i>	4
	<i>Sporothrix shenkii</i> & <i>E. coli</i>	8	14.3	<i>Haemonchus spp.</i>	2
Total		56	100		30

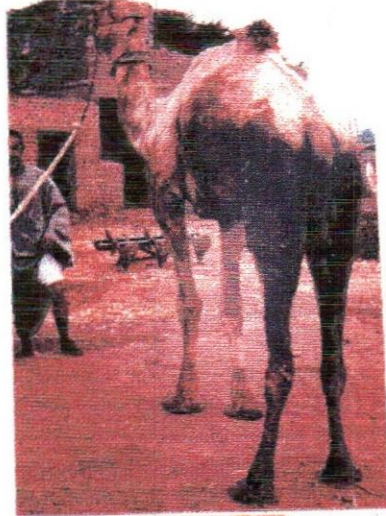


Fig.1: Severe watery, blood stained diarrhoea in setting camel, 3 days after arrival.

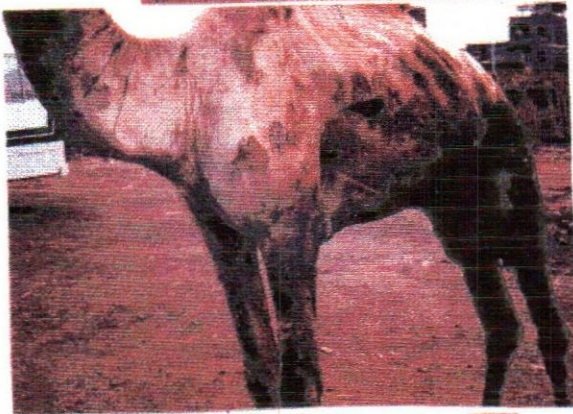


Fig.2: The hind quarters & hind limbs of the camel are muddy with faeces.

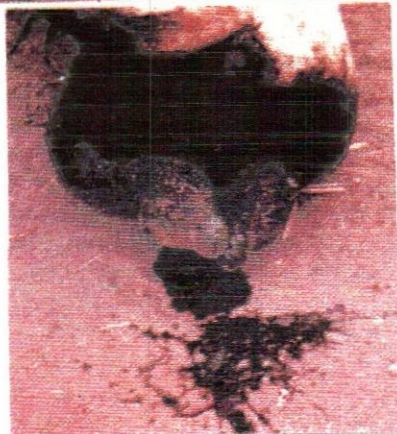


Fig.3: Emaciation and weakness in diarrhoeic camel