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**IMPACT OF GASTROINTESTINAL NEMATODES  
AND SOME ENTERIC PROTOZOAL AFFECTIONS  
ON THE HEALTH OF BUFFALO CALVES**  
(With 5 Tables and 5 Figures)

By

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تأثير الإصابة بالديدان المعد معوية وبعض أنواع البروتوزوا المعوية  
على الحالة الصحية لعجول الجاموس

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في هذه الدراسة تم فحص ٨٢١ عجل جاموسي تتراوح أعمارهم من يوم إلى ستة شهور بالمناطق المختلفة بمحافظة بني سويف. تم فحص هذه العجول إكلينيكيًا وكذلك تم فحص عينات البراز للطفيليات المختلفة. أظهرت الدراسة أن نسبة الإصابة بالإسكارس ٩٨ (١١,٩٣%) ، الديدان المعد معوية ٩٠ (١٠,٩٦%) ، الكريبتوسبورديا ١٨٠ (٢١,٩٢%) فيما كانت نسبة الإصابة بالكوكسيديا ٣٠ (٣,٦٥%). تم أيضا تحديد مدى انتشار الإصابة بالطفيليات المختلفة في الأعمار المختلفة لعجول الجاموس حيث أظهرت الدراسة أن نسبة الإصابة بالكريبتوسبورديا والإسكارس أعلى في الأعمار الصغيرة وحتى شهرين، فيما تزداد نسبة الإصابة بالكوكسيديا حول سن الفطام عن غيره، كما تزداد نسبة الإصابة بالديدان المعد معوية في الأعمار من سن ٥ شهور. تم أيضا بيان تأثير فصول السنة المختلفة على مدى انتشار الإصابة بالطفيليات المختلفة في عجول الجاموس حيث وجد أن الإصابة بالكوكسيديا تزداد في فصل الشتاء والخريف عن باقي مواسم السنة، أيضا تزداد الإصابة بالديدان المعد معوية في الشتاء والربيع وكذلك أيضا تزداد الإصابة بالكريبتوسبورديا في فصل الشتاء والربيع عن باقي فصول السنة. تم أيضا في هذه الدراسة التعرف على الأنواع المختلفة من الكوكسيديا التي تصيب عجول الجاموس وهي اميريا بوفيز، اميريا صيفريكا، اميريا سيليندريكا ، اميريا زورنى ، واميريا البيسوداليس.

## SUMMARY

In this study 821 buffalo calves were clinically and parasitologically investigated for gastrointestinal nematodes infestations as well as some enteric protozoal affections. The results revealed that 98 (11.93%) were infested with Ascariasis, 90 (10.96%), with other G.I.N., 180 (21.92%); with Cryptosporidiasis, while 99 (12.05%) showed Eimeriasis. In relation to age; the highest rate of Ascariasis was in calves up to 1 month (17.24%), then decreased in older ages to reach the lowest level (6.66%) at 5-6 months old. The prevalence of G.I.N. was zero up to 1 month, then increased gradually to the highest level (32.32 %) at 3-4 months old, then decreased gradually. Meanwhile Cryptosporidiasis was in its highest prevalence (40.6%) up to one month, then decreased to (17.17%) at 3-4 months. The prevalence of *Eimeriasis* was (12.41%) at the first month, then decreased to (9.69%) at 3-4 month. As for seasonal variations, the highest rates of infestation were recorded in winter; (15.71%) for Ascariasis, (15.23%) for other G.I.N., (35.23%) for Cryptosporidiasis and (39.52%) for Eimeriasis. The lowest rate was observed in summer; as it was (5.63%) for Ascariasis, (7.042%) for other G.I.N., (8.15%) for Cryptosporidiasis and (8.92%) for *Eimeriasis*. The identified *Eimeria* spp. were; *E. bovis*, *E. subspherica*, *E. cylindrica*, *E. zeurnii* and *E. ellipsoidalis*.

## INTRODUCTION

Buffaloes constitute one of the most important sources of milk and meat production in Egypt. Although buffaloes are susceptible to most infectious diseases that affect cattle, they have a sort of resistance against infection compared with other domestic livestock (*Shalash, 1984*). Internal parasitic affections of buffaloes are considered as one of the most important problems, which seriously affect the animal production. This is due to a lot of harms exerted by the different types of parasites including competition for host nutrients, destruction of host's tissues, mechanical interference, as well as irritation and inflammatory reaction of the host's tissue. Moreover, parasites may also cause loss of blood and plasma protein, impaired absorption and decrease in weight gain of infested animals, (*Soulsby, 1982*). The aim of the present study was directed to through more light on:

1. The prevalence of gastrointestinal nematodes infestation, as well as some enteric protozoal affections among buffalo calves less than 6 months age.
2. The impact of these nematodes and protozoa on the health of buffalo calves.

### MATERIAL and METHODS

#### (A) Animals:

A total number of 821 buffalo calves from different localities in Beni-Suef Governorate, aged from one day to six months were clinically examined for signs of health and disease. Special attention to body temperature, mucus membranes, appetite, diarrhoea, constipation, dehydration as well as signs indicating gastrointestinal disturbances according to the methods recorded by Radostitis *et al.*, (1994) were offered.

#### (B) Faecal samples:

Each faecal sample was used for:

1. **Microscopical Examination:** Each faecal sample was examined microscopically by both direct smear and floatation technique methods according to Soulsby (1982).
2. **Acid fast staining** for detection of *Cryptosporidia spp.* using modified Ziehl Nelson technique was carried out according to Ridely and Olsen (1991).
3. **Identification of Eimeria spp.** was carried out according to their morphology and sporulation time as recorded by Christensen (1941); Pellardy (1965); Joyner *et al.*, (1966) and Levine (1973).
4. **Faecal egg and oocyst count:** it was carried out according to Gordon and White (1939). Who reported that:

Parasitic affections	Significant No. of EpG.
<i>Ascariasis</i>	1000 EpG
<i>Other P.G.E.</i>	500 EpG
<i>Eimeriasis</i>	5000 oocysts

$$\text{No. of EpG.} = \frac{\text{Total No. of eggs}}{2} \times 100$$

## RESULTS

### I. Clinical investigation:

The clinical investigation of 821 buffalo calves revealed the presence of some abnormalities in 122 calves (14.85%) as shown in Table (1). These abnormalities were; signs of enteritis as yellowish, or greenish or clay coloured diarrhoeal faeces and some calves were dehydrated.

### II. Prevalence of different parasitic affections:

The results recorded in Table (2) indicated that 180 (21.92%) calves were infested with *Cryptosporidium* spp., 99 (12.05%) with coccidiasis, 98 (11.93%) with Ascariasis and 90 (10.96%) calves were infested with gastrointestinal nematodes. *Cryptosporidium* spp. oocysts are shown in Fig. (1). *Eimeria* spp. were identified according to their morphological characters and sporulation time, Table (3) and Fig. (2, 3, 4 & 5). Faecal egg counts shown that only 38 *Ascaris* infested calves and 12 gastrointestinal nematode infested calves showed the significant numbers of eggs. Calves were clinically affected, while buffalo calves showing non-significant numbers of eggs were apparently healthy.

### III. Epizootological investigation:

- Prevalence of different parasitic affections in relation to age of buffalo calves is shown in Table (4).
- Seasonal variations of the prevalence of different parasitic affections in buffalo calves are shown in Table (5).

## DISCUSSION

Parasitic affections among animals are considered to be one of the most important problems, which induce death, or decrease of animal production. In this study a total of 821 buffalo calves from day to six months were subjected to clinical and parasitological examination. The clinical examination revealed that 122 (14.8%) calves showed some clinical abnormalities (Table 1). Some buffalo calves showed diarrhoea, with passage of yellowish, greenish or clay coloured or fluidly offensive faeces. Other calves were dehydrated in variable degrees and emaciation was observed in some of them. Body temperature of most investigated calves was within normal level. Similar abnormalities were observed by Aurich *et al.*, (1990); Berghen *et al.*, (1990) and Azzam (1998) Faecal examination indicated that 98 (11.93%), 90 (10.96%), 180 (21.92%) and 99 (12.05%) of investigated buffalo calves

were infested by Ascariasis, parasitic gastrointestinal nematodes, *Cryptosporidium* spp. and *Eimeria* spp. respectively. Meanwhile only 38 (4.62%), 12 (1.46%), 40 (4.87%) and 30 (3.65%) of the investigated buffalo calves were clinically affected, Table (2). Ascariasis in this study was detected in 98 (11.93%) buffalo calves, of which only 38 (4.62%) were clinically affected. Such higher prevalence may be due to prenatal infection or due to higher exposure of young buffalo calves to ingestion of larvae in colostrum as reported by Roberts *et al.* (1990). By aging, the prevalence decreased because of the acquired immunity due to previous exposure as reported by Berghen *et al.* (1990). Ascariasis infested calves in this study showed severe or mild diarrhoea interrupted with constipation and colicky pain. Such findings may be due to the voluminous occurrence of such large sized nematodes in the lumen of the intestine leading to pressure which results in such colicky pain as reported by Andrews *et al.* (1992). In older calves signs were so mild and even unnoticed. Similar findings were reported by Pandey *et al.* (1990). Ascariasis was prevalent in winter (15.71%) followed by spring (14.28%), autumn (12.37%) and summer (5.63%). The prevalence of other parasitic gastroenteritis in buffalo calves in this study was 90 (10.96%) of which only 12(1.46%) were clinically affected. The clinical findings observed in infested calves were emaciation, diarrhoea, rough coat and easily detached hair and are attributed to the harmful effect of such parasites on the mucosa of duodenum and/or intestine leading to enteritis with subsequent loss of body fluids and electrolytes. Parasitic gastroenteritis could be detected starting from two months and its peak was in calves at four months of age (32.32%), this may be due to high susceptibility of calves to such nematodes infestation in the first grazing season as reported by Berghen *et al.* (1990). The prevalence of parasitic gastroenteritis in buffalo calves was higher in winter (15.23%) followed by spring (13.26%), autumn (8.41%) and summer (7.042%). This may be attributed to the high rate of exposure of calves to infection during the first grazing season as reported by Berghen *et al.* (1990). Concerning Cryptosporidiasis among buffalo calves, *Cryptosporidium* oocysts could be detected in the faeces of 180(21.92%) calves, and while clinically affected calves were 40 (4.8%). *Cryptosporidium* spp. is a protozoan affecting the small intestine of calves leading to enteritis specially in newly born calves, Andrews *et al.* (1992). Cryptosporidiasis was previously reported in Egypt by Selim *et al.* (1990); Abo-Elhassan *et al.* (1995) and Azzam (1998). The higher prevalence of

Cryptosporidiasis in this study compared to those reported by Selim *et al.* (1990) may be attributed to the difference in the techniques used for the detection of the protozoan as well as due to difference in localities and the breeding and management systems. Generally, the prevalence may be high due to wide spreading nature of such protozoan and the high susceptibility of calves to be infected from adults (carriers). This observation was previously investigated and confirmed by several authors; Aurich *et al.* (1990); Nouri and Toroghi (1991) and Pavlasck (1994). The clinical findings that observed in infected calves in this study included greenish watery or mucoid diarrhoea and variable degrees of dehydration. Such abnormalities were also observed by Amedes *et al.* (1995). The prevalence of Cryptosporidiasis in relation to ages of calves was highest in the first month of age and decreased in older calves. This indicated the high susceptibility of calves at this age, which agrees with the results reported by Harp *et al.* (1990), Nouri and Toroghi (1991) and Matambo *et al.* (1997). The prevalence of Cryptosporidiasis was higher in winter, (35.23%), followed by spring (33.97%), summer (8.15%) and autumn (8.45%). In this study clinical Eimeriasis was detected in 30 (3.65%) of buffalo calves. Diseased calves showed sever diarrhoea, dysentery and straining with passage of mucous streaked with blood in most cases. These findings are mainly due to the massive destruction of the intestinal epithelial cells by the pathogenic stages of such protozoan leading to capillary bleeding and destruction of cells as reported by Radositis *et al.* (1994); Chibunda *et al.* (1997) and Azzam (1998). Identification of different *Eimeria* species was carried out according to the morphological characteristics of non-sporulated and sporulated *Eimeria* oocysts, as well as their sporulation time. The results shown in Table (3) indicated the prevalence of *E. bovis*, *E. cylindrica*, *E. ellipsoidalis*, *E. zuernii* and *E. subspherica* (33.33%, 23.33%, 20%, 13.33% and 10%) respectively. The same *Eimeria* spp. was reported in buffalo calves in Beni-Suef Governorate by Azzam (1998). These results indicated the high prevalence of Eimeriasis in buffalo calves in Beni-Suef Governorate. Infestation with *Eimeria* spp. in this study was detected in the first month of age and its peak was in buffalo calves of 4-5 months of age. The obtained results agree with those reported by Mage and Reynal (1993) who attributed the appearance of coccidiasis mainly in suckling calves due to the high rate of exposure and bad housing of calves. Moreover when calves are turned out to pasture at the 4<sup>th</sup> month of age, there will be an increase in the rate of exposure to infection.

This corresponds with Svenson *et al.* (1993) and Chibunda *et al.* (1997). The seasonal prevalence of Eimeriasis among buffalo calves was higher in winter (39.52%), followed by (11.88%) in autumn, (9.18%) in spring and (8.92%) in summer.

**Table 1:** Prevalence of buffalo calves showing clinical abnormalities in Beni-Suef Governorate.

No. of examined buffalo calves	No. of apparently healthy buffalo calves	No. of diseased buffalo calves
821(100%)	699 (85.15%)	122 (14.85%)

**Table 2:** Prevalence of different parasitic affections in buffalo calves.

No. of examined buffalo calves	Parasitic affection	No. of infested or infected buffalo calves	No. of diseased buffalo calves
821	Ascariasis	98 (11.93%)	38 (4.62%)
	Parasitic gastrointestinal nematodes infestation	90 (10.96%)	12 (1.46%)
	Cryptosporidiasis	180 (21.92%)	40 (4.87%)
	Eimeriasis	99 (12.05%)	30 (3.65%)
<b>Total</b>		<b>467 (56.88%)</b>	<b>120 (14.62%)</b>

**Table 3:** Identification of different Eimeria species affecting buffalo calves in Beni-Suef Governorate.

No. of examined buffalo calves	Eimeria species	Sporulation	No. of infected calves
30	<i>E. zuernii</i>	2-3 days	4 (13.33%)
	<i>E. bovis</i>	2-3 days	10 (33.33%)
	<i>E. subspherica</i>	4-6 days	3 (10%)
	<i>E. cylindrica</i>	2-3 days	7 (23.33%)
	<i>E. ellipsoidalis</i>	2-3 days	6 (20%)

Table 4: Prevalence of different parasitic affections in relation to age buffalo calves.

Age	No. of examined buffalo calves	Parasitic affections			
		Ascariasis	Other G.I.N.	Cryptosporidiasis	Eimeriasis
> 1 month	145	25 (17.24%)	0 (0.0%)	59 (40.6%)	18 (12.41%)
1 > 2 month	281	38 (13.52%)	12 (4.27%)	83 (29.5%)	22 (7.82%)
2 > 3 month	110	15 (13.63%)	17 (15.45%)	21 (19.09%)	18 (16.36%)
3 > 4 month	99	6 (6.06%)	32 (32.32%)	17 (17.17%)	9 (9.69%)
4 > 5 month	96	8 (8.33%)	18 (18.75%)	0 (0.0%)	19 (19.79%)
5 > 6 month	90	6 (6.66%)	11 (12.22%)	0 (0.0%)	13 (14.44%)

Table 5: Seasonal variations of prevalence of different parasitic affections in buffalo calves.

Season	No. of examined buffalo calves	Parasitic affections			
		Ascariasis	Other G.I.N.	Cryptosporidiasis	Eimeriasis
Spring	196	28 (14.28%)	26 (13.20%)	47 (23.97%)	18 (9.18%)
Summer	213	12 (5.63%)	15 (7.042%)	18 (8.15%)	19 (8.92%)
Autumn	202	25 (12.37%)	17 (8.41%)	41 (8.45%)	24 (11.88%)
Winter	210	33 (15.71%)	32 (15.23%)	74 (35.23%)	38 (39.52%)
Total	821	98 (11.93%)	90 (10.96%)	99 (21.92%)	99 (12.05%)

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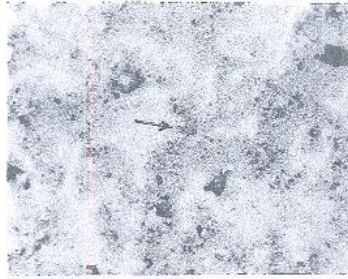


Fig. 1: Oocysts of *Cryptosporidium* spp. Recovered from faeces of diarrhiac buffalo calf (X100).

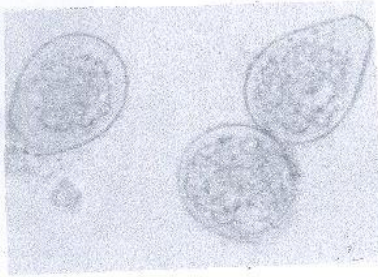


Fig. 2: Non sporulated oocysts of *E.bovis* recovered form faeces of Diarrhiac buffalo calf (X100).



Fig. 3: Sporulated oocysts of *E.bovis* recovered from faeces of diarrhiac buffalo calf faecal samples of diarrhiac buffalo calf (X100).

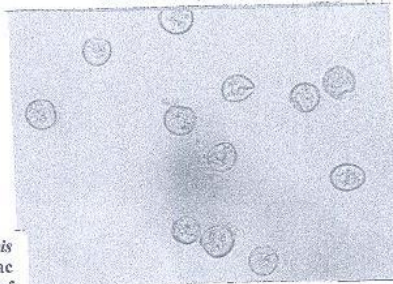


Fig. 4: *E.subspherica* non sporulated oocysts recovered from faecal sample of diarrhiac buffalo calf (X40).

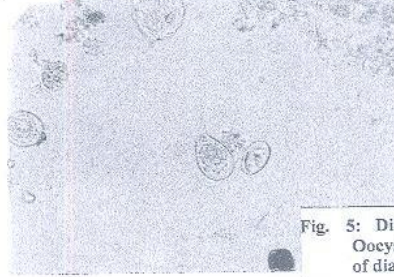


Fig. 5: Different types of *Elmeria* spp. Oocysts recovered from faecal sample of diarrhiac buffalo calf (X40).