

PREVALENCE OF TISSUE PARASITES AMONG SLAUGHTERED ANIMALS IN DAKAHLIA PROVINCE

Abu-Elwafa S. A. and Al-Araby M. A.

* Parasitology department, Fac.Vet.Med., Mansoura university

ABSTRACT

The existence of tissue parasites among slaughtered animals was studied in 5 abattoirs in Dakahlia Province namely Mansoura, Belquas, Senbellawine, Dekernes and Sherbeene. A total number of 2048 cattle, 648 buffaloes and 133 sheep were examined during the period extended from September 2005 till the end of August 2006. The overall tissue parasites prevalence was 18.2 % in large ruminants and 22.56 % in small ruminants. Five tissue parasites were detected named *C. bovis*, Hydatid cyst, *C. tenuicollis*, *C. ovis* and *Sarcocystis* spp. Examination of cattle carcasses revealed *C. bovis* (3.61%) and Hydatid cyst (0.15%). Also, Hydatid cysts were detected in 0.15% of examined buffalos. Moreover buffalo carcasses investigation revealed *Sarcocystis* spp. cysts (63.7%). Small ruminant represented by sheep revealed *C. ovis* (8.27%) and *C. tenuicollis* (14.29%). The prevalence and seasonal prevariations of each parasite was studied independently in each abattoir in the investigated area.

Key words: Hydatid, cysticercus, *Sarcocystis*, slaughter.

الملخص العربي

طفيليات الأنسجة الموجودة بالحيوانات المذبوحة بمجازر محافظة الدقهلية

صلاح أحمد أبو الوفا* - مصطفى عبدالسلام العربي*

قسم الطفيليات - كلية الطب البيطري - جامعة المنصورة*

أجريت هذه الدراسة بغرض عمل مسح وحصر لطفيليات الأنسجة الموجودة في ذبائح الحيوانات المذبوحة في مجازر خمسة مدن بمحافظة الدقهلية، تضمنت المنصورة وبلقاس والسنبلاوين ودكرنس وشربين، تم فحص ٢٠٤٨ ذبيحة أبقار و٦٤٨ ذبيحة جاموس بالإضافة إلى ١٣٣ ذبيحة أغنام في الفترة الممتدة من سبتمبر ٢٠٠٥ وحتى نهاية أغسطس ٢٠٠٦ وقد أوضحت النتائج أن معدل إنتشار طفيليات الأنسجة كانت ١٨,٢ في ذبائح المجترات الكبيرة بينما كانت ٢٢,٥٦ في ذبائح الأغنام، وقد أسفرت الدراسة عن تواجد خمسة أنواع من الطفيليات وهي اليرقة المثانية البقرية والأكياس المائية الهيداتيديّة والمتكيسات العضلية واليرقة المثانية ذات الرقبة واليرقة الغنمية، بفحص ذبائح

الأبقار وجد أن نسبة اليرقة المثانية البقرية (٣٦١٪) والأكياس المائية الهيداتيديية (٠١٥٪)، وأيضاً وجدت الأكياس المائية الهيداتيديية فى ٠١٥٪ من ذبائح الجاموس، كما وجدت المتكيسات العضلية فى ٦٣٧٪ من ذبائح الجاموس، وبفحص ذبائح الأغنام سجلت نسبة اليرقة الغنمية (٨٢٧٪) واليرقة المثانية ذات الرقبة ١٤٢٩٪، وقد تم دراسة معدل الانتشار وكذلك معدل الانتشار الموسمى لكل من الطفيليات بكل مجزر من المجازر موضع الدراسة كل على حدة.

الكلمات الدالة : اليرقة المثانية والمتكيسات العضلية والهيداتييد واليرقة الغنمية.

INTRODUCTION

Animal production is still considering one of the vital sources of national income all over the world. In Egypt, the rapid increased human population requires an increased demand of animal proteins, which in turn based on raising buffaloes, cattle, sheep and goats for meat and milk production. Such animals may suffered from parasitic constrains that affect their lives and / or production, through either direct or indirect adverse.

Direct adverse effects of parasitic affections may cause death, especially in heavy infections or untreated animals. Besides, direct losses during meat inspection at slaughtering due to either total condemnation of carcasses (e.g. generalized sarcocystosis and cysticercosis) or partial condemnation of affected organs (e.g. hearts in cysticercosis and / or lungs in hydatidosisetc.). Also, parasites may indirectly affect animal productivity and / or breeding in different ways as abortion, infertility, decreased weight gain as well as decreased milk and /or meat production. Tissue parasites are incriminated to affect both animal health and / or production beside their zoonotic importance.

Therefore, this study was planned to give an idea about the parasitic existence of tissue

parasites among animals slaughtered in Dakahlia province abattoirs. Also, to emphasize the important role of meat inspection to offer a healthy meat for human consumption, free from zoonotic hazards especially parasitic constrains.

MATERIAL AND METHODS

This study was carried out on animals slaughtered in Dakahlia province abattoirs. Regular weekly visits to abattoirs of five cities including Mansoura, Belquas, Dekernes, Senbellawine and Sherbeen during the period extended from September 2005 to the end of August 2006. A total number of 2048 cattle, 648 buffaloes and 133 sheep were examined at slaughtering for detection of tissue parasitic affections. Examination of these animals was adopted in two consequent ways:

A. During meat inspection, the whole carcasses were systematically examined as follows:-

1. Heart, esophagus, diaphragm, masseter and skeletal muscles were examined visually and incised for detection of cysticerci and other parasitic cysts.
2. Lungs and livers were examined grossly and palpated for detection of parasitic

cysts (e.g. Hydatid cyst and *Cysticercus tenuicollis*).

3. Peritoneal cavities of slaughtered animals were also inspected for parasitic cysts.
- 4- Material obtained from the above mentioned inspections were moved to Parasitology department, Faculty of Veterinary Medicine, Mansoura University for laboratory examination.

B. Laboratory examination and permanent preparation of the revealed parasites:

1. The revealed metacestodes were washed in tap water and kept in a little amount of water in a refrigerator either for few hours or overnight to be died in a relaxed condition.
2. Small cysts (e.g. *C.bovis*) were compressed between two glass slides, fixed in 10% formaldehyde solution for at least 24 hours.
3. The compressed specimens were then washed in water to get rid of formalin remnants and stained overnight in acetic acid alum carmine stain, washed in tap water to remove the excess of stain.
4. Differentiation, when needed, was carried out in acid - alcohol (70% ethyl alcohol + 4% Hcl) until reaching the proper staining degree. Then, dehydrated in ascending grades of ethanol, passed in xylene and finally mounted in Canada balsam.

5. The suspected protozoan cysts were squeezed on a clean glass slide using a needle and / or forceps. The resultant contents were spread on a glass slide (s), left to dry, fixed by absolute methanol and stained with Giemsa stain for detection of zoites and / or other protozoan stages.
6. Photos were taken by digital camera (Fuji A340 Finepix 4.0 million pixels) and computerized using ACDsee - version 6.0.

RESULTS

The investigated animals included 2696 large ruminants and 133 small ruminants (sheep) slaughtered in 5 abattoirs belonging to Dakahlia province. Namely, Mansoura (2282 large ruminants and 133 small ruminants; Belquas (126 large ruminants); Senbellawine (106 large ruminants); Dekernes (114 large ruminants) and Sherbeen (68 large ruminants). Small ruminants represented by sheep were slaughtered only at Mansoura abattoir.

Carcass inspection of large ruminants revealed the infection with (*Cysticercus bovis* in cattle; *Sarcocystis* spp. in buffaloes and Hydatid cyst in both animals. The overall prevalence of tissue parasites among large ruminants in 5 centers was found to be 18.2 %. The highest incidence was recorded in Belquas (30.9%) followed by Senbellawine (30.2%), Dekernes (28.9%) and Sherbeen (27.9%), while the lowest prevalence was recorded in Mansoura center (16.1%), (Table 1) .

Cysticercus bovis recorded an overall incidence of 3.61% in cattle. The higher incidence rate was recorded in Sherbeen (7.69%) followed by Dekernes (4.62%), Senbellawine (4%), Mansoura (3.58%); while the lowest was in Belquas (2.08%). Cysts of *Sarcocystis* were revealed from buffalo carcasses (63.7%); with its highest incidence in Mansoura (72.44%) followed by Dekernes (61.2%), Senbellawine (53.6%), Belquas (48.72%) and finally Sherbeen (32.73%).

Hydatid cyst were detected only in large ruminants slaughtered at Mansoura abattoir, with its prevalence was higher in buffaloes (0.24%) than cattle (0.16 %). Table (1).

Concerning seasonal dynamics of tissue parasites recorded among large animals in the five centers, the highest total tissue parasitic prevalence was found during winter (21.7%), which began to decline in spring (18.4%) and summer (15.6%) to be the lowest during autumn season (12.4%), Table (2).

In Mansoura district center, nearly similar seasonal fluctuation is observed, where the lowest incidence of tissue parasites was recorded in autumn season (11.3%) while, nearly similar incidences were recorded in other seasons. In Belquas center, the highest tissue parasites incidence was observed during Winter season (62.5%), which gradually decreased during Spring (43.8%) and Summer (32.0%) to reach the lowest prevalence during Autumn (4.4%). In Senbellawine center, the highest parasitic prevalence was recorded during Summer (40.6%) and Spring (33.3%), while decreased during Winter (29.3%) and Autumn (16.7%). In Dekernes center, the maximum

parasitic incidence was noted during Winter season (57.2%), which decreased during Spring (38.9%) toward Autumn and Summer seasons (13.2 and 10.5%). In Sherbeen center, the highest incidence rate was recorded in Summer season (37.5%), which began to decrease during Autumn (36.4%) toward Winter (28%) to reach its minimum incidence in Spring season (12.5%) ; Table (2).

Individual seasonal fluctuation of the revealed parasites was also studied. In Mansoura center, inspection of cattle carcasses (including livers and lungs) revealed Hydatid cyst and *C.bovis* infection. Hydatid cyst in lungs was only recorded during Autumn (0.18%) and Spring (0.69%). *C. bovis* infection was found to decrease during Spring (2.78%), which began to increase during Summer (3.2%) and Autumn (3.56%) to reach its maximum level in Winter (4.68%), Table (3).

In buffaloes (slaughtered at Mansoura abattoir), Hydatid cyst infection in lungs was only recorded during Summer season (0.56%). Cysts of *Sarcocystis* infection showed its highest incidence during Autumn (75.3%), being the lowest during Spring (50%), while nearly similar incidences were noted during Summer (58%) and Winter (58.8%), Table (3).

In Belquas, carcasses of slaughtered cattle revealed the infection with *C.bovis* only, which was recorded during Autumn season (2.6%). Meanwhile, *Sarcocystis* spp.was the only parasite revealed from buffalo carcasses, which was found to predominate in Winter (68.2%), being decreased during Spring (50%) and Summer (38.1%) reached its

minimum incidence during Autumn (14.3%), Table (3).

In Senbellwaine, cattle carcasses revealed two cases of *C.bovis* during Autumn season (10%). In buffalo's carcasses, *Sarcocystis* was found to be lowest during Spring (42.9%), while increased during Summer, Autumn and Winter (54.2%, 50% and 57.1% respectively), Table (3).

In Dekernes abattoir, *C.bovis* infection was recorded during Spring (7.7%), Summer (7.14%) and Autumn (3.03%) but not in Winter season. *Sarcocystis* infection was recorded allover the year, being the highest in Autumn (80%) and began to decrease in Winter (75%) towards Spring (56.5%) to reach its minimum incidence in Summer (20%), Table (3).

Lastly, cattle slaughtered at Sherbeen abattoir revealed one case of *C.bovis* infection (20% in Summer season). On the other hand, buffalo carcasses were found infected with *Sarcocystis*, which increased in Summer (45.5%) toward Autumn (50%) and decreased in Winter (30.4%) toward Spring (15.4%), Table (3).

The overall prevalence of tissue parasites among investigated small ruminants (sheep slaughtered at Mansoura abattoir) was 22.56%. Sheep carcasses were found infected with two species of parasites including *Cysticercus ovis* (8.27%) and *Cysticercus tenuicollis* (14.29%). The parasitic prevalence was the lowest during Autumn season (18.2%), which began to increase in Winter (22.6%) to reach its peak during Spring (31.3%) and declined in Summer (23.8%), Table (4).

Seasonal fluctuation of tissue parasites of sheep showed that *C.ovis* reached its maximum incidence in Spring (18.8%), began to decrease during Summer (7.2%) toward Autumn (6.8%) and Winter (6.5%). *C tenuicollis* predominated during Summer (16.7%) and Winter (16.1%), while decreased during Spring (12.5%) and Autumn (11.4%), Table (4)

RESULTS AND DISCUSSION

The results revealed higher incidence of parasitic prevalence in sheep than that of large ruminants which could be attributed to the fact that sheep are mostly reared with dogs, which are the final hosts of many tissue cyst forming parasites. No tissue parasites were recorded from buffalo calves, being agreed with **El-Mossalami, 1962 and Sedik et. al., 1976.**

The incidence of *C.bovis* was found within the rates recorded by **Mohamed, 1996** (4.2%); **Unger and Germano, 1992** (5.5%), and **Oryan et. al., 1995** (7.7%) and much higher than that given by Lis, 2002 (0.18%); **El-Metenawy, 1999** (0.77%) and **Dada and Belino, 2006** (2%).

Concerning the prevalence of *Sarcocystis* spp., the results were found within the range recorded by **Nassar, 1982; Darwish et. al., 1989 and Claveria and Cruz, 1999.** On the contrary, higher rates have been reported by **El-Menyawe and Saleh, 1998** (93.35%); **Fawaz, 1998** (72.63%); **Huong, 1999** (79%); **Retzlaf and Weise, 1969** (83.3%) and **Ghosal, 1979** (80%). Also, lower incidence has been recorded by **Latif et. al., 1999** (15%).

The Hydatid cyst prevalence in cattle was found near to that reported by **Sedik et. al., 1976** (0.2%) and **Hegazi et. al., 1986** (0.2%); but higher than that of **Dyab et. al., 2005** (0.00%) and **Jacob, 1988** (0.07%) and much lower than that revealed by **Umur and kadden, 2003** (13.5%). In buffaloes, Hydatid cyst infection was near to that recorded by Jacob, 1988 (0.16%), higher than that recorded by **Sedik et. al., 1976** (0.05%) but much lower than **Manadhar et. al., 2006** (10.6%). Such differences in Hydatid cyst prevalence may be attributed to its indirect life cycle, different hygienic circumstances and / or different number of animals examined in different occasions.

Concerning seasonal dynamics of the revealed parasites, the highest total parasitic prevalence was detected during Winter season (21.7%) then declined throughout Spring (18.4%) and Summer (15.6%) to reach its minimal level in Autumn (12.4%). In this regard, the highest prevalence of *C. bovis* was during Winter and Autumn (4.23% and 3.66%), and the lowest in Summer and Spring (3.35% and 2.9%). The achieved results is agreed with that recorded by **Karim, 1979** who found that the highest incidence was during Winter while it was different than that stated by **Mohamed, 1996** who mentioned that the prevalence was increased during Spring and Summer, and decreased in Autumn and Winter.

Dealing with *Sarcocystis* spp. cyst, in the present study Autumn was the highest season of infection in buffaloes with a prevalence of 68.3% and Spring was the lowest season of infection (47.8%), and moderate prevalences

in Winter and Summer (57.3% and 54.6%). The obtained results were agreed with **Singh et al., 2004** who mentioned that *Sarcocystis* infection was increased during the rainy seasons and decreased in **Summer, and Mohamed, 1996** who stated that the prevalence was increased during Autumn (96.9% in females and 55% in males).

Hydatid cyst in the present work was only found in cattle and buffaloes. In buffaloes, infection was only recorded in Summer (0.56%), while in cattle, it was observed in Spring (0.69%) and Autumn (0.18%). These results were partially agreed with that stated by **Dyab et al., 2005** who found that the infection was increased during Summer and Autumn (15.78% and 12.0%), and decreased in Winter and Spring (10.58% and 10.52%).

Regarding the ovine cysticercosis, the incidence of *C. ovis* was found higher than that recorded by **El-Masry, 1986** (0.00%); **El-Metenawy, 1999** (0.29%); Dada and Belino, 2006 (1%) and White, 1976 (4%); but lower than that of **Sissy et. al., 2007** (26%). These wide differences may be due to dog rearing beside sheep flocks. *C. tenuicollis* was found within the range of **Radfar et. al., 2005** (12.75%) and **Hasslinger et. al., 1988** (16.7%); but lower than that recorded by **Dada and Belino, 2006** (21.4%) and **El-Masry, 1986** (23.27%); while being higher than that of **El-Metenawy, 1999** (1.25%) and **Ameria et. al., 1994** (9.8%). *C. tenuicollis* reached its peak prevalence in Summer (16.7%) then declined in Winter (16.1%) while being the lowest in Spring and Autumn (12.5% and 11.4%). This is nearly similar to that re-

corded by Pathak and Guar, 1982 who found that the prevalence was increased in the rainy

seasons, while disagreed with El-Masry, 1986 who found that it decreased during Winter.

Table (2): Seasonal dynamics of tissue parasites revealed from large ruminants in different abattoirs of Dakahlia province.

Season	Mansoura			Belquas			Senbellawine			Dekernes			Sherbeen			Total		
	No.	+ve	%	No.	+ve	%	No.	+ve	%	No.	+ve	%	No.	+ve	%	No.	+ve	%
Autumn	638	79	11.3	45	2	4.4	24	4	16.7	38	5	13.2	11	4	36.4	756	94	12.4
Winter	346	53	13.6	24	15	62.5	41	12	29.3	21	12	57.2	25	7	28	457	99	21.7
Spring	374	53	13.3	32	14	43.8	9	3	33.3	36	14	38.9	16	2	12.5	467	86	18.4
Summer	924	129	13.96	25	8	32	32	13	40.6	19	2	10.5	16	6	37.5	1016	158	15.6
Total	2282	314	13.76	126	39	30.9	106	32	30.2	114	33	28.9	68	19	27.9	2696	437	16.2

Table (1): Prevalence of tissue parasites revealed from carcasses of large ruminants including livers and lungs

District	No. examined	cattle				No. examined	buffaloes				Total		
		<i>C. bovis</i>		<i>Hydatid cyst</i>			<i>Sarcocystis spp.</i>		<i>Hydatid cyst</i>		No. examined	+ve	%
		+ve	%	+ve	%		+ve	%	+ve	%			
Mansoura	1872	67	3.58	3	0.16	410	297	72.44	1	0.24	2282	368	16.1
Belquas	48	1	2.08	--	0.00	78	38	48.72	--	0.00	126	39	30.9
Senbellawine	50	2	4	--	0.00	56	30	53.6	--	0.00	106	32	30.2
Dekernse	65	3	4.62	--	0.00	49	30	61.21	--	0.00	114	33	28.9
Sherbeen	13	1	7.69	--	0.00	55	18	32.73	--	0.00	68	19	27.9
Total	2048	74	3.61	3	0.15	648	413	63.7	1	0.15	2696	491	18.2

Table (3): Seasonal dynamics of *C. bovis*, *Sarcocystis*. Spp. and *Hydatid cyst* in Dakahlia

parasite	<i>Cysticercus bovis</i> in cattle															Total		
Abattoir	Mansoura			Belquas			Senbellawane			Dekerns			Sherbeen			Total		
Season	No. Ex	+ve	%	No. Ex	+ve	%	No.Ex.	+ve	%	No.Ex	+ve	%	No. Ex.	+ve	%	No.Ex	+ve	%
Autumn	561	20	3.56	38	1	2.6	20	2	10	33	1	3.03	3	--	0.00	655	24	3.66
Winter	278	13	4.68	2	--	0.00	20	--	0.00	5	--	0.00	2	--	0.00	307	13	4.23
Spring	288	8	2.78	4	--	0.00	2	--	0.00	13	1	7.7	3	--	0.00	310	9	2.9
Summer	745	24	3.2	4	--	0.00	8	--	0.00	14	1	7.14	5	1	20	776	26	3.35
parasite	<i>Sarcocystis spp. cysts</i> in buffalo															Total		
Abattoir	Mansoura			Belquas			Senbellawane			Dekerns			Sherbeen			Total		
Season	No. Ex.	+ve	%	No. Ex	+ve	%	No. Ex	+ve	%	No.Ex	+ve	%	No. Ex.	+ve	%	No.Ex	+ve	%
Autumn	77	58	75.3	7	1	14.3	4	2	50	5	4	80	8	4	50	101	69	68.3
Winter	68	40	58.8	22	15	68.2	21	12	57.1	16	12	75	23	7	30.4	150	86	57.3
Spring	86	43	50	28	14	50	7	3	42.9	23	13	56.5	13	2	15.4	157	75	47.8
Summer	179	104	58	21	8	38.1	24	13	54.2	5	1	20	11	5	45.5	240	131	54.6
parasite	<i>Hydatid cyst</i> in cattle and buffalo in Mansoura abattoir																	
Animal species	Cattle									Buffaloe								
Season	No.Ex.			+ve			%			No.Ex.			+ve			%		
Autumn	561			1			0.18			77			-			0.00		
Winter	278			-			0.00			68			-			0.00		
Spring	288			2			0.69			86			-			0.00		
Summer	745			-			0.00			179			1			0.56		
Total	1872			3			0.16			410			1			0.24		

Table (4): Seasonal dynamics of sheep parasites in Mansoura abattoir

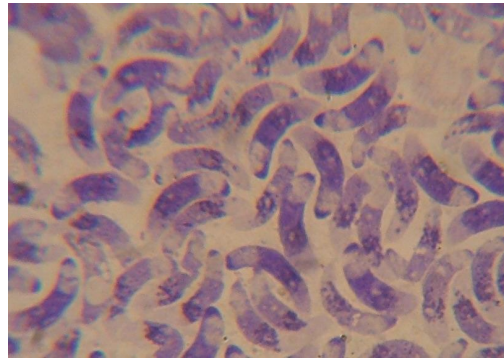
Season	No. of examined	<i>C. ovis</i>		<i>C. tenuicollis</i>		Total	
		+ve	%	+ve	%	+ve	%
Autumn	44	3	6.8	5	11.4	8	18.2
Winter	31	2	6.5	5	16.1	7	22.6
Spring	16	3	18.8	2	12.5	5	31.3
Summer	42	3	7.2	7	16.7	10	23.8
Total	133	11	8.27	19	14.29	30	22.56

Abu-Elwafa S. A. and Al-Araby M. A. * No sheep were slaughtered in other abattoirs

Tissue parasites revealed from slaughtered animals



Sarcocystis spp. (cysts in esophagus)



Sarcocystis (Bradyzoites from cyst)



C.bovis in heart



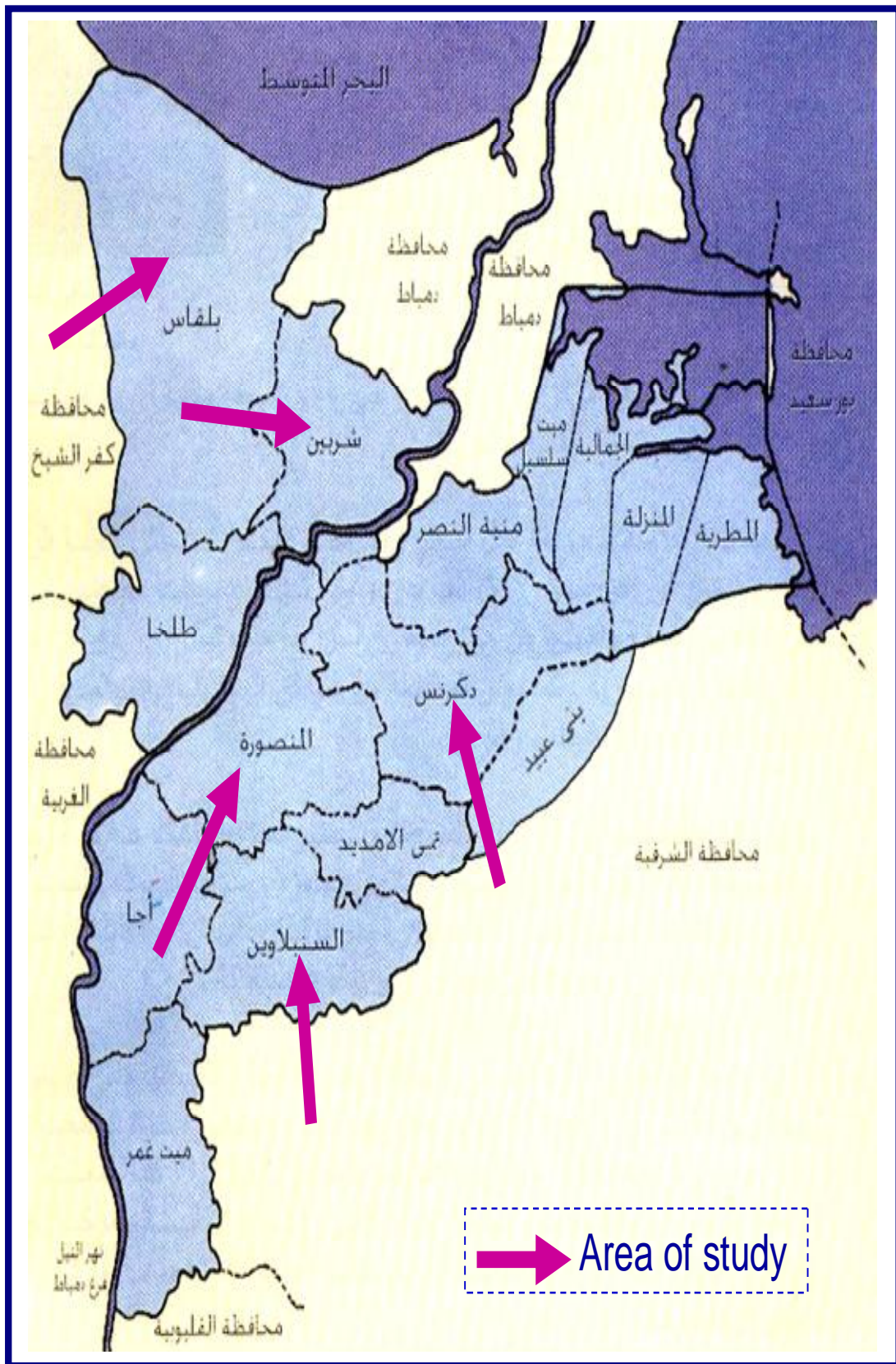
C.bovis (stained with Carmine)



C. tenuicollis attached to bladder



Hydatid cyst in lung tissue



REFERENCES

- Ameria, F. M. A. (1994):** Pathological studies on *Cysticercus tenuicollis* and *Fasciola gigantica* in farm animals in Sharkia Governorate. *Zag. Vet. J.*, 22 (1):60-61.
- Claveria, F. G. and Cruz, M. J. (1999) :** Light microscopic and ultrastructural studies on *Sarcocystis* spp. infection in Philippine water buffalo (*Bubalus bubalis*). *J. Prot. Res.*, 9 (1): 17-25.
- Dada, B. J. and Belino, E. D. (2006) :** Prevalence of hydatidosis and cysticercosis in slaughtered livestock in Nigeria. *Ann. N. Y. Acad. Sci.*, 1081(1): 339-346.
- Darwish, M.; Esa, S. and Mohammed, W. S. (1989) :** Sarcosporidiosis among Egyptian buffaloes. *Alex. J. Vet. Sci.*, 5 (1): 383-393.
- Dyab, K. A; Hassanein, R; Hussein, A. A; Metwally, S. E. and Goad, H. M. (2005) :** Hydatidosis among man and animals in Assiut and Aswan Governorate. *J. Egypt. Soc. Parasitol.*, 39(1): 157-166.
- El- Masry, A. A. N. (1986) :** Morphobiological studies on the larval stages of some cestodes. M. V. Sc. Thesis, Fac. Vet. Med., Cairo University.
- El-Menyawe, S. M. and Saleh, F. M. K. (1998) :** Some studies on buffalo sarcocystosis with reference to the biochemical alterations. *Vet. Med. J. Giza.* 46(2): 155-163.
- EL-Metenawy, T. M. (1999) :** An abattoir survey of metacestodes among the slaughtered ruminants at AL-Qassim area, Saudi Arabia. *Vet. Med. J. Giza.* 47(2): 199-204.
- El-Mossalami, E. (1962) :** Search for sarcosporidial infection in fetuses and real carcasses. *Arab. Vet. Med. Assoc.*, XXV (1-2): 237-239.
- Fawaz, A. A. (1998) :** Incidence of Toxoplasma and Sarcosporidia in slaughtered animals in Qena Governorate. Ph.D. Thesis, Fac. Vet. Med., Assiut University.
- Ghosal, S. B. (1979) :** Studies on Sarcocystis of the buffalo (*Bubalus bubalis*). Thesis abstr., 5: 140-142.
- Hasslinger, M. A. and Weber-Werringhen, R. (1988) :** Fecal survey in pastured sheep and the occurrence of *Cysticercus tenuicollis* in slaughtered sheep. *Angew. Parasitol.*, 29: 227-234.
- Hegazi, M. M; Abdel-Megied, J. A; Abdel-Wahab, F. M. and Atia, R. A (1986) :** Epidemiological study of echinococcosis in Dakahlia Governorate, Egypt. *J. Egypt. Soc. Parasit.*, 16 (2): 541-548.
- Huong, L .T .T. (1999) :** Prevalence of Sarcocystis spp. in water buffalo in Vietnam. *Vet. Parasit.*, 86: 33-39.
- Jacob, M. N. (1988) :** Hydatidosis in feed animals slaughtered at Behira. M. V. Sc. Thesis, Fac. Vet. Med., Alexandria University.
- Karim, M. A. (1979) :** A survey of bovine cysticercosis in Northern Iraq. *Trop. Anim. Hlth. and Prod.*, 11(4): 239-240.

Latif, B. M. A; Al-Delemi, J. K. Mohammed, B. S; Al-Bayati, S. M. and Al-Amiry, A. M. (1999) : Prevalence of Sarcocystis spp. in meat producing animals in Iraq. *Vet. Parasit.*, 84: 85-90.

Lis, H. (2002) : Results of veterinary inspection of slaughtered animals and meat inspection in Poland 2000. *Medycyna Weterynaryjna*, 58(4): 267-269.

Manadhar, S.; Horchner, F.; Morakote, N.; Kyule, M. N. and Bawmann, M. P. (2006) : Occurrence of hydatidosis in slaughter buffaloes (*Bos bubbalis*) and helminthes in stray dogs in Kathmandu Valley, Nepal. *Beri. Munch. Tierarztl Wsohr.*, 119 (7-8): 308-311.

Mohamed M. S. (1996) : Muscular parasites in slaughtered animals in Assiut Goernorate . Ph. D. Thesis, Fac.Vet. Med., Assiut University.

Nassar, A. S. H. M. (1982) : Studies on Sarcocystis infecting buffaloes in Egypt. Ph.D. Thesis, Fac. Vet. Med., Cairo University.

Oryan, A.; Moghaddar, N. and Guar, S. N. S. (1995) : *Taenia saginata* cysticercosis in cattle with special reference to its prevalence, pathogenesis and economic implications in Fars province of Iran. *Vet. Parasit.*, 57: 319-327.

Pathak, K. M. and Guar, S. N. (1982) : The incidence of adult and larval stage *Taenia hydatigena* in Pradesch (India). *Vet. Parasitol.*, 10 (1): 91-95.

Radfar, M. H.; Tajalli, S. and Jalalzadeh, M. (2005) : Prevalence and morphological characterization of *Cysticercus tenuicollis* (*Taenia hydatigena cysticerci*) from sheep and goats in Iran. *Veterinarski Archiv*, 75 (5): 469-476.

Retzlaff, H. and Weise, N. (1969) : Sarcocystis of man and animals. *Nordisk Veterinaer Medicin*, 32: 96-99.

Sedik, M. F.; Roushdy, S; Zidan, M. and Abdel-Salam, M. (1976) : Incidence of echinococcosis among slaughtered animals at Cairo abattoir. *Assiut Vet. Med. J.*, 4: 173-183.

Singh, B. B; Sharma, J. K.; Juyal, P. D. and Gill, G. S. P. (2004) : Seroprevalence of Sarcocystis species of cattle in Punjab. *Vet. Parasit.*, 18 (1): 75-76.

Sissy, M. M.; Ugglä, A. and Waller, P. J. (2007) : Prevalence and seasonal incidence of larval and adult cestode infections of sheep and goats in Eastern Ethiopia. *Trop. Anim. Hlth. and Prod.*, 84: 1-8.

Umur, S. and Kadden, O. R. (2003) : Prevalence and economic importance of cystic echinococcus in slaughtered ruminant in Burdur, Turkey. *J. Vet. Med.*, 50 (5): 247-252.

Unger, M. L. and Germano, P. M. (1992) : Prevalence of bovine cysticercosis in the state of Sao Paulo (Brazil). *Rev. Saude. Publica*, 26 (3): 167-172.

White, J. B. (1976) : Incidence of *Cysticercus ovis* in sheep and lambs at Albany, Western Australia. *Aust. Vet. J.*, 52 (3): 118-122.