

DETECTION OF *CRYPTOSPORIDIUM* OOCYSTS IN OVINE AND CAPRINE RAW MILK IN RELATION TO REARING MANAGEMENT

M.H. HASAN¹; A.F. AL-TAEE¹; A.K. AL-HUBAETY² and A.J. ALANI¹

¹ Department of Microbiology, College of Veterinary Medicine, University of Mosul, Iraq

² Department of Animal Resooses, College of Agriculture, University of Mosul, Iraq

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ABSTRACT

During the present study an investigation was made for the assessment of the availability of oocysts of *Cryptosporidium* spp. in 100 samples of raw milk of sheep and goats reared in various places (Baasheqa, Hamdania and Tilkaif) in Ninevah, Iraq. Results revealed that the incidence rate of *Cryptosporidium* spp. oocysts in raw ovine and caprine milk samples were 32 % and 46%, respectively. The type of rearing management has an effect on the incidence of oocysts in raw milk of these animals. Results showed that the contamination with *Cryptosporidium* oocysts in mixed (sheep and goats) rearing management of these animals was higher ($p < 0.05$) than separate rearing management.

Key words: *Cryptosporidium*, oocysts, raw milk, ovine, caprine.

INTRODUCTION

Cryptosporidium spp. are tiny protozoan parasite capable of infecting the digestive and respiratory tracts of human and most other animals (Naciri *et al.*, 1999; Urquhart *et al.*, 2003). Among these species *Cryptosporidium parvum* is the major zoonotic species causing neonatal diarrhea in farm animals. Shedding of oocysts of *Cryptosporidium* in the faeces of infected animals can be considered as an important contributor to environmental contamination world wide (Smith *et al.*, 1995). Haider *et al.* (2014) described that the oocyst is critical stage and mainly responsible for causing infection with typical gastrointestinal manifestation in human, and symptoms are watery diarrhea, nausea, vomiting, abdominal cramp and fever for immunocompromised persons. In Iraq (Rasheed, 1997) studied cryptosporidiosis in goat kids found a prevalence of (5.84 %) in Baghdad region, while (Abdulla, 2005) reported the prevalence rate was (26.6 %) in sheep in different localities of Ninevah province. (Casemore *et al.*, 1986, Casemore, 1990 a) mentioned that there is a strong association between occurrence of cryptosporidiosis with the consumption of unpasteurized raw milk in addition to other animal products in the rural population in England and similar reports have been mentioned by (Mann *et al.*, 1986, Smith, 1993) else where in the world.

(Harp *et al.*, 1996) reported that transmission of *Cryptosporidium parvum* oocysts came from contaminated water and unpasteurized raw milk. Many authors showed presence of viable oocysts in the raw milk, raw meat and other raw foods (Casemore 1990 b; Laberge *et al.*, 1996; Hassan *et al.*, 2002, Smith and Nichole, 2009).

MATERIALS AND METHODS

One hundred samples of raw milk from sheep and goats were collected from different localities in Ninevah governorate (Baasheqa, Hamdania and Tilkaif). These animals are of local Iraqi breeds their ages ranged between (1-3 years). These sheep and goats were reared under mixed rearing conditions, and another groups were kept separates from each other, the milk samples were kept in sterilized containers and transported directly under hygienic conditions to the laboratory of Parasitology in the College of Veterinary Medicine (Mosul) for laboratory investigations for detection of oocysts of *Cryptosporidium* spp., concentration technique was performed to these samples for the collection of oocysts of *Cryptosporidium* according to the method mentioned by (Dubey *et al.*, 1980; Deng and Cliver, 1999). Smears were made from the sediments and stained by the conventional method of modified acid fast stain (Forbes *et al.*, 2007) the data were analysed by chi-sequar according to (Katz, 2006).

Corresponding author: Dr. M.H. HASAN

E-mail address: manalhimmadi69@yahoo.com

Present address: Department of Microbiology, College of Veterinary Medicine, University of Mosul, Iraq

RESULTS

The results of this study showed that the incidence rate of *Cryptosporidium* spp. oocysts in ovine raw milk was (32%) (Figure 1 and Table 1) while that in caprine milk was (46%) (Table 2). Results also revealed the incidence rate of *Cryptosporidium* oocysts in raw milk varied with different location in Ninevah province. Raw milk of ovine contain oocysts higher in Baasheqa (39.1%) and lower (23.1%) in Hamdania (Table 1). *Cryptosporidium* spp. oocysts in caprine raw milk was higher in Hamdania (68.8%) (Table 2).

Variation in incidence rate of *Cryptosporidium* spp. oocysts were presence according to type of rearing management of sheep and goats. Results indicated that the incidence rate of oocysts of *Cryptosporidium* was higher (51.9%) significantly ($p < 0.05$) in mixed rearing management of animals. While, incidence rate of oocysts were (19.2%), (31.8%) in sheep and goats respectively. However incidence rate of oocysts in sheep was significantly higher ($p < 0.05$) compared to mixed rearing management (Table 3).

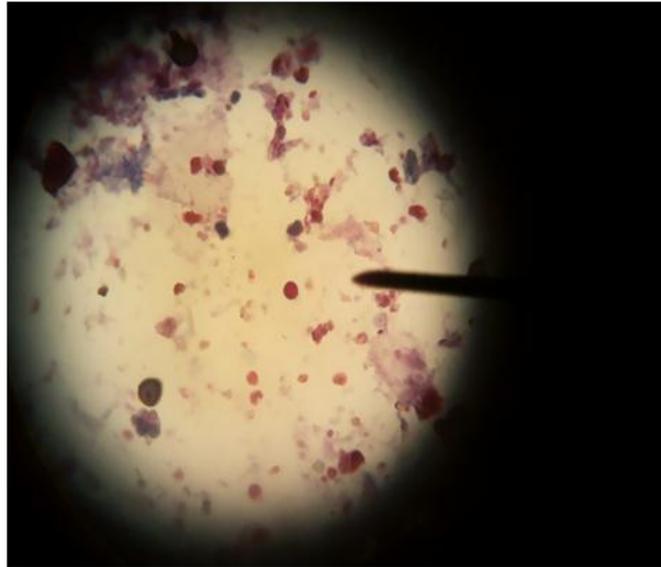


Figure (1): *Cryptosporidium* spp. oocysts recovered from raw milk samples stained with acid fast stain (100 X).

Table 1: Incidence rate of *Cryptosporidium* spp. oocysts in ovine raw milk: Ninevah.

Areas of study	No. of samples examined	No. of positive samples	Incidence rate of <i>Cryptosporidium</i> spp. %
Baasheqa	23	9	39.1
Hamdania	13	3	23.1
Tilkaif	14	4	28.6
Total	50	16	32 %

Table 2: Incidence rate of *Cryptosporidium* spp. oocysts in caprine raw milk in the areas of this study in Ninevah.

Areas of study	No. of samples examined	No. of positive samples	Incidence rate of <i>Cryptosporidium</i> spp. %
Baasheqa	21	17	33.3
Hamdania	16	*11	68.8
Tilkaif	13	5	38.5
Total	50	23	46 %

* Significantly different from Baasheqa group $p < 0.05$.

Table 3: Incidence rate of *Cryptosporidium* spp. oocysts in ovine and caprine raw milk according to rearing management.

Type of rearing management	No. of samples examined	No. of positive samples	Incidence rate of <i>ryptosporidium</i> spp. oocysts %
Sheep	26	5	19.2
Goats	22	7	31.8
Mixed (sheep& goats)	52	27*	51.9
Total	100	39	39 %

* Significantly different from the sheep group $p < 0.05$.

DISCUSSION

The results of the present study showed that the incidence rate of *Cryptosporidium* oocysts in ovine raw milk was 32.0% while that in caprine milk was 46.0%. This comes from the shedding of oocysts in the faeces of these animals leading to contamination of udder and subsequently of the milk with oocysts of *Cryptosporidium* (Deng and Cliver 1999, Duffy and Moriarty 2003). The high incidence rate of *Cryptosporidium* oocysts in raw milk of goats is due to the special behavioural pattern of the goat which includes the agility, more curious and is comparatively more active than sheep (Kligour and Dalton 1984). Further, udder and teats of milking goats are larger in size than that of ewes therefore the udder of goats become more exposed for contamination than ewes (Dyce *et al.*, 2010).

The results of this study also revealed that the incidence of *Cryptosporidium* oocysts in raw milk varied with different locations in Ninevah, it was found that ovine raw milk was higher in oocysts in Baashiq (39.1%) and lower in Hamdania (23.1%). While *Cryptosporidium* oocysts in caprine raw milk was higher in Hamdania (68.8%). These variation are attributable to difference in animal management, similar things were mentioned by others. Further more (Norhamizah *et al.*, 2011) mentioned that the management of the farm which was poor in nutrition and cleanliness led to *Cryptosporidium* spp. infection in the cattle compounded by stress factors. (Mohammed *et al.*, 1999) also mentioned the preweaning factors such as use of ventilation in calf rearing areas, daily addition bedding, feeding of milk replacer and other managemented factors significantly decreased the risk of an infection with *Cryptosporidium parvum*.

The results reported here also showed that the incidence rate of oocysts of *Cryptosporidium* was 51.9% which is higher significantly ($p < 0.05$) in mixed rearing management of animals. While those animals reared separately had incidence rate 19.2%, 31.8% in ovine and caprine raw milk respectively. The variation in these rates were due to the

characteristic of oocysts of *C.parvum* which lacks host specificity. Further more oocysts of this parasites are capable of infecting another hosts immediately following this shedding. This contribute to increase the chances of transmission of the parasite between different animals (Xiao *et al.*, 2004, Urquhart *et al.*, 2003).

Previous studies in Ninevah, however reported that infection rates of *Cryptosporidium* in sheep and goats were (35.1%, 26.4%) respectively (Bakir, 2005). Mosa (2016) found that incidence of *cryptosporidium* spp.in sheep and goat milk samples based on microscopic examination was 31.43 % and 20 %, respectively. The availability of this level of oocysts, however, contribute to contamination of the environment further more this parasites is known to be zoonotic and its transmission occurs through oral – fecal rout between hosts (Taylor *et al.*, 2007).

These findings suggest that sufficient care should be given to the raw milk before its consumption by the people. Further studies should be done to throw more light on the role of small ruminants in disseminating infection with *cryptosporidiosis* to humanbeing.

REFERENCES

- Abdulla, I.A. (2005):* Prevalence of *Cryptosporidium* in sheep in different localities of Ninevah province, Iraq. Rafi. J. Sci. 16(7): 93-101.
- Bakir, M.H.H. (2005):* The study of epidemiology, experimental, immunity and transmission for *Cryptosporidium* in Nineveh Governorate Ph.D. Thesis, College of Veterinary Medicine, University of Mousl – Iraq.
- Casemore, D.P. (1990a):* Epidemiological aspects of human *cryptosporidiosis*. Epidemiol. Infect., 104, 1-28.
- Casemore, D.P. (1990b):* Foodborne illness: food borne protozoal infection. Lancet 336, 1427-1432.
- Casemore, D.P.; Jessop, E.G.; Douce, D. and Jackson, F.B. (1986):* *Cryptosporidium* plus *Compylobacter*: an outbreak in semi-rural population. J. Hyg. 96, 95-105.

- Haider, S.S.; Sherwani, S.K.; Khan, R.U.; Ziaulla; Shah, M. and Manir, S. (2014): Cryptosporidium; a diarrhea causing parasite. Can. J. App. Sci., 1(4): 18-25.
- Harp, J.A.; Fayer, R.; Pesch, B.A. and Jackson, G.J. (1996): Effect of pasteurization on infectivity of *Cryptosporidium parvum* oocysts in Water and milk. Appl. Environ. Microbiol., 62(8): 2866-2868.
- Hassan, M.G.; Al-Hayali, N.S. and Sultan, I.A. (2002): Incidence of protozoa pathogens in some meat products. Raf. J. Sci. 14(4): 16-21.
- Katz, M.H. (2006): Bivariate statistics. In: Katz (editor), Study design and statistical analysis. Cambridge, University City Press, New York, USA.
- Kligour, R. and Dalton, C. (1984): Lives tock behaviour: A practical guide. 1st ed. Granada publisher. London. PP.85-97.
- Laberge, I.; Griffiths, M.W. and Griffiths, M.W. (1996): Review article prevalence detection and control of *Cryptosporidium parvum* in food. Int. J. Food Microbiol., 32: 1-26.
- Mann, E.D.; Sekla, L.H.; Nayer, G.P.S. (1986): Infection with of *Cryptosporidium* spp. In human and cattle in Manitoba. Can. J. Vet. Res. 50:174-178.
- Mohammed, H.O.; Wade, S.E; Schaaf, S. (1999): Risk factors associated with *Cryptosporidium parvum* infection in dairy cattle in southeastern. NeW York State. Vet. Parasitol. 83 (1-13).
- Mosa, A.I. (2016): Occurrence of *Cryptosporidium* species and *Toxoplasma gondii* as protozoan parasites in raw milk. Ph.D. Thesis, Fac. of Vet. M. Assiut, Egypt.
- Naciri, M.; Lefay, M.P.; Mancassola, R.; Poirier, P. and Chermette, R. (1999): Role of *Cryptosporidium parvum* as a pathogen in neonatal diarrhea complex in sucking and dairy calves in France. Vet. Parasitol., 85(4): 245-257.
- Norhamizah, A.H.; Julaida, S.; Slamah, B.; Saudah, S. and Rasidah, A.L. (2011): Cryptosporidiosis in A commercial dairy cattle farm in Malaysia. Malaysian Journal of Veterinary Research. (2)2: 33-39.
- Rasheed, R.N. (1997): Cryptosporidiosis in Iraqi goat kids. The veterinarian, 6(1): 5-8.
- Smith, H.V.; Robertson, L.J.; Ongerth, J.E. (1995): Cryptosporidiosis and giardiasis, the impact of waterborne transmission. Journal of water supply: Research and Technology – AQUA 44, 258-274.
- Smith, J.L. (1993): Cryptosporidium and Giardia as agents of food borne disease. J. Food. Prot. 56, 451-461.
- Smith, H.V. and Nichols, R.A.B. (2009): Cryptosporidium: Detection in water and Food. Experimental Parasitology XXX(1-19) .
- Taylor, M.A.; Coop, R.L. and Wall, R.L. (2007): Veterinary Parasitology .3rd edition. Black wall publishing Ames, Iowa, USA: 180-181.
- Urquhart, G.M.; Armour, J.; Dun can, J.L.; Dunn, A.M. and Jennings, F.W. (2003): Veterinary Parasitology, 2nd, Black well publishing company, Oxford, PP: 72-73, 233.
- Xiao, L.; Fayer, R.; Ryan, U. and Upton, S.J. (2004): Cryptosporidium oonomy: recent advance and Implications for public health. Clin. Microbiol., 17(1): 72-97.

الكشف عن أكياس بيض طفيل الأبواغ الخبيثة في حليب الضأن والمعز وعلاقتها بنمط التربية

منال حمادي حسن ، احلام فتحي الطائي ، عارف قاسم الحبيطي ، عبد العزيز جميل العاني

E-mail: manalhimmedi69@yahoo.com Assiut University web-site: www.aun.edu.eg

تضمنت الدراسة الحالية تحديد نسبة تواجد اكياس بيض طفيل الأبواغ الخبيثة *Cryptosporidium* spp. في حليب الضأن والمعز حيث جمعت 50 عينة حليب لكل من الضأن والمعز ومن مواقع مختلفة من محافظة نينوى (بعشيقية ، الحمدانية ، توكيف). أظهرت الدراسة أن نسبة تواجد أكياس بيض طفيل الأبواغ الخبيثة في عينات حليب الضأن والمعز كانت 32% و 46% على التوالي. وأشارت هذه النتائج الى أن نمط تربية الحيوانات لها تأثير على نسبة تواجد أكياس بيض الطفيلي في حليب الضأن والمعز حيث وجد أن نسبة تلوث الحليب بأكياس بيض الطفيل في حيوانات نمط التربية المختلطة (الضأن والمعز) 51,9% وكانت أعلى معنوياً (p<0.05) مقارنة مع حيوانات نمط التربية المنفرد (الضأن).