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Full Length Research Paper

Prevalence of the intestinal parasite infection in cattle in Shaanxi province, northwestern China

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A survey of intestinal parasite infection in cattle was conducted in Shaanxi province, northwestern China from November 2010 to January 2012, including Qinchuan cattle and dairy cattle. A total of 1736 fecal specimens (783 and 953 for Qinchuan and dairy cattle, respectively) in 18 farms (including 7 Qinchuan cattle and 11 dairy cattle farms) were obtained. The prevalences of intestinal parasites in Qinchuan cattle were slightly different from that in dairy cattle but with no statistically difference (*P*>0.05) except nematodes. Coccidian oocysts were the most common intestinal parasite, which were found in all cattle farms with prevalences ranged from 17.44 to 67.69%. The nematode eggs were found in 17 of 18 farms investigated with prevalences ranged from 0 to 43.75%. *Cryptosporidium* oocysts and the cestode eggs were only found in 10 and 5 farms, respectively. The present study showed that the prevalences of the intestinal parasites were affected by the related factors of geographical region, breed, age, and season. Therefore, the integrated strategies and measures should be taken to control intestinal parasites infection in cattle in Shaanxi province.

Key words: Intestinal parasites, prevalence, Qinchuan cattle, dairy cattle, Shaanxi province.

INTRODUCTION

Intestinal parasites have been known as common and important pathogens of animals and human. Livestock infected by these parasites present to be anorectic, weak, depressive, and high fever, resulting in significant economic losses to the livestock industries and farming communities. Cattle raising is the predominant industry due to its importance in farming and economy (meat and milk) in the world, also including China. The prevalences of intestinal parasites in cattle have been reported in many areas in the world, also including some provinces in China (Agneessens et al., 2000; Borgsteede et al., 2000; Pfukenyi et al., 2007; Xu et al.,2011; Zhao et al., 2011; Liu et al., 2011). These studies showed that the infection of intestinal parasites was one of restrictive factors for the cattle industry (Perry and Randolph, 1999) associated with poor weight gain (Svensson et al., 1993, 1994) and output reduced of meat and milk. Some of these parasites, such as *Cryptosporidium* spp. and *Giardia* spp., could be transmitted to human by contacting with cattle, and their contaminated products and excretion (Ismail et al., 2010; Xiao, 2010).

Qinchuan cattle is one of the four famous native beef cattle in China. This cattle species is originated in Guanzhong plain in Shaanxi province, and now has been introduced to more than 20 provinces of China. However, there is no systemic study on infection of intestinal parasites in Qinchuan cattle except coccidia described by our group (Yu et al., 2011). The objectives of the present study were to investigate the common species of intestinal parasites and their prevalences in Qinchuan cattle in Shaanxi province, and compare them with dairy cattle in this province.

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Table 1. Prevalence and species of intestinal parasite infection in Qinchuan cattle and dairy cattle in Shaanxi province.

Species	Farm	Sample size	Coccidia positive (%)	*Cryptosporidium* positive (%)	Nematode positive (%)	Cestode positive (%)
Qinchuan cattle	Yangling 1	145	61 (42.07%)	29 (20%)	9 (6.21%)	0
	Yangling 2	112	45 (40.18%)	0	34 (30.36%)	0
	Yangling 3	74	29 (39.19%)	1 (1.35%)	29 (39.19%)	4 (5.41%)
	Yangling 4	165	30 (18.18%)	2 (1.21%)	35 (21.21%)	0
	Yangling5	65	44 (67.69%)	1 (1.54%)	23 (35.38%)	2 (3.08%)
	Tongchuan	84	31 (36.90%)	0	19 (22.62%)	2 (2.38%)
	Meixian	138	84 (60.87%)	0	47 (34.06%)	0
	Total	**783**	**324 (41.38%)**	**33 (4.21%)**	**196 (25.03%)**	**8 (1.02%)**
Dairy cattle	Yangling 1	83	29 (34.94%)	8 (9.64%)	1 (1.20%)	2 (2.41%)
	Yangling 2	98	30 (30.61%)	0	6 (6.12%)	0
	Yangling 3	41	21 (51.22%)	2 (4.88%)	14 (34.15%)	0
	Yangling 4	29	8 (27.59%)	1 (3.45%)	7 (24.14%)	0
	Yangling 5	48	9 (18.75%)	0	21 (43.75%)	0
	Yangling6	80	54 (67.50%)	0	12 (15.00%)	0
	Yulin	14	3 (21.43%)	0	1 (7.14%)	0
	Dali	86	15 (17.44%)	0	0	1 (1.16%)
	Xi'an	208	128 (61.54%)	5 (2.40%)	17 (8.17%)	0
	Meixian	78	49 (62.82%)	2 (2.56%)	13 (16.67%)	0
	Tongchuan	188	92 (48.94%)	8 (4.26%)	26 (13.83%)	0
	Total	**953**	**438 (45.96%)**	**26 (2.73%)**	**118 (12.38%)**	**3 (0.31%)**

MATERIALS AND METHODS

Sampling of feces

Between November 2010 and January 2012, seven Qinchuan cattle farms and eleven dairy cattle farms were randomly selected from six cities/counties/districts (Xi'an, Tongchuan and Yulin cities, Dali and Meixian counties, and Yangling district) in Shaanxi Province, northwestern China (Table 1). A total of 1736 fecal samples (including 783 and 953 of Qinchuan and dairy cattle, respectively) were obtained directly from the rectum of each animal using sterile disposable gloves, and then placed in clean plastic bags, marked with breed, age, gender, management mode and date (Tables 2 and 3).

Samples were then transported to lab for sporulation at 28°C and stored at 4°C until examined.

Intestinal parasite detection

About 25 g fecal samples were filtered to dislodge fecal debris and then concentrated parasites oocysts/eggs using Sheather's flotation technique and saturation salt solution float method. It is important to remove the fats in fecal samples from less than 3 month old by formalin-ethylacetate sedimentation method before oocysts/eggs concentrated using the above methods. The concentrates were examined under the cover slip with a microscope at 400 × magnification, and the parasites oocysts/eggs were identified according to morphological features described previously (Li et al., 1999).

Statistical analysis

Comparisons were made for the prevalences of the intestinal parasites among the factors of breed, geographical region, age, and season. Statistical analyses were performed using Statistic Package foe Social Science (SPSS) for Windows with 95% confidence intervals (CI). Probability levels (P) of <0.05 were regarded as statistically significant.

RESULTS AND DISCUSSION

Distribution of parasites oocysts/eggs

Of the 18 farms in 6 cities/counties/districts, the intestinal parasites were found in all the farms, with prevalence of 44.47%. The prevalence of intestinal parasites in Qinchuan cattle was 42.15%, which was lower than that in dairy cattle (46.38%), but with no significant difference ($P>0.05$). Coccidian oocysts were the most common intestinal parasite, which were found in all cattle farms with prevalences ranged from 17.44 to 67.69%. The nematode eggs were found in 17 of 18 farms investigated with prevalences ranged from 0 to 43.75% (Table 1). *Cryptosporidium* oocysts and the cestode eggs were only found in 10 and 5 farms, respectively. The prevalences of all the parasites investigated in Qinchuan cattle were

Table 2. Prevalence of intestinal parasites in Qinchuan cattle and dairy cattle in Shaanxi province by age.

Species	Age group	No. exam.	No. of positive (%)			
			Coccidia positive (%)	*Cryptosporidium* positive (%)	Nematode positive (%)	Cestode positive (%)
Qinchuan cattle	<3month	14	3 (21.43%)	3 (21.43%)	0	0
	3–11month	67	56 (83.58%)	17 (25.37%)	16 (23.88%)	2 (2.99%)
	12–24month	383	189 (49.35%)	9 (2.35%)	118 (30.81%)	4 (1.04%)
	>24month	319	76 (23.82%)	4 (1.25%)	62 (19.44%)	2 (0.63%)
	Total	**783**	**324 (41.38%)**	**33 (4.21%)**	**196 (25.03%)**	**8 (1.02%)**
dairy cattle	<3month	107	37 (34.58%)	0	2 (1.87%)	0
	3–11month	152	113 (74.34%)	7 (4.61%)	26 (17.11%)	1 (0.66%)
	12–24month	171	73 (42.69%)	6 (3.51%)	19 (11.11%)	0
	>24month	523	215 (41.11%)	13 (2.49%)	71 (13.58%)	2 (0.38%)
	Total	**953**	**438 (45.96%)**	**26 (2.73%)**	**118 (12.38%)**	**3 (0.31%)**

significantly affected by the locations ($P<0.05$), but only the prevalence of coccidia was affected by geographical origins for dairy cattle ($P<0.05$). The overall prevalence of coccidia infection in cattle was lower than that in Anhui province (Li et al., 1999, 2004), Henan province (Zhao et al., 2011) and Shanghai city (Zhao et al., 2007). In addition, higher infection rate of *Cryptosporidium* spp. were observed in cattle in Shanghai city (Xu et al., 2007), Anhui province (Xu et al., 2007), Henan province (He et al., 2001) and Heilongjiang province (Liu et al., 2009) in China, England (Brook et al., 2009) and Korea (Yu et al., 2004). These differences may be related with climate and ecological conditions, and the management of cattle.

Age related to intestinal parasite infection

Microscopic examination showed that cattle in all age groups were positive for intestinal parasite infection. There were an age pattern about the prevalences of coccidia, *Cryptosporidium* spp. and cestodes in Qinchuan cattle ($P<0.05$). The prevalences of coccidia, *Cryptosporidium* spp. and cestodes in 3-11 month old cattle were highest. These results were similar to the previous reports from western Turkey (Cicek et al., 2007), Pakistan (Rehman et al., 2011), and Beijing city (Xu et al., 2011) and Henan province (Wang et al., 2011) in China. This phenomenon could be due to the protection acquired from their mothers for cattle under 3-month-old, but the lower resistance immunity in 3-11-month-old cattle (Li et al., 1999).

Season related to intestinal parasites infection

Seasons were defined as follows: spring (December-February), summer (March-May), autumn (June-August) and winter (September-November). Coccidian oocysts were found in all seasons, with the highest infection rate (67.69 and 67.50% in Qinchuan cattle and dairy cattle, respectively) in winter (Table 3). These results were consistent with previous studies by Pfukenyi et al. (2007) who reported that the high humidity and moderate temperature during the rainy season (from November/December to March/April) were helpful to the survival and sporulation of the oocysts. For *Cryptosporidium* spp., a peak of 7.90% for Qinchuan cattle ($P > 0.05$) and 4.01% for dairy cattle ($P < 0.05$) appeared in autumn. These results were not consistent with the previous reports that the highest percentage was found in the winter (Hamnes et al., 2006; Huetink et al., 2001) or summer (Trotz-Williams et al., 2007). No clear association was found between season and the prevalence of nematodes ($P > 0.05$) in Qinchuan cattle. For Qinchuan cattle, cestode eggs were found in all seasons, but the winter was highest season with 3.08% of the prevalence of cestodes. Dairy cattle samples, however, were not positive for cestode eggs in spring and winter, and there was no significant difference in the occurrence of cestodes between summer and autumn ($P > 0.05$).

Conclusion

The present survey indicated that the prevalences of internal parasites were relatively high in both Qinchuan cattle and dairy cattle in Shaanxi province. Therefore, the integrated strategies and measures should be taken to control intestinal parasites infection in cattle in this province.

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Table 3. Prevalence of intestinal parasites in Qinchuan cattle and dairy cattle in Shaanxi province by season.

Species	Season	Sample sizes	Coccidia positive (%)	*Cryptosporidium* positive (%)	Nematode positive (%)	Cestode positive (%)
Qinchuan cattle	Spring	112	45 (40.18%)	0	34 (30.36%)	0
	Summer	239	59 (24.69%)	3 (1.26%)	64 (26.78%)	4 (1.67%)
	Autumn	367	176 (47.96%)	29 (7.90%)	75 (20.44%)	2 (0.54%)
	Winter	65	44 (67.69%)	1 (1.54%)	23 (35.38%)	2 (3.08%)
	Total	**783**	**324 (41.38%)**	**33 (4.21%)**	**196 (25.03%)**	**8 (1.02%)**
Dairy cattle	Spring	123	40 (32.52%)	2 (1.63%)	14 (11.38%)	0
	Summer	177	35 (19.77%)	1 (0.56%)	29 (16.38%)	1 (0.56%)
	Autumn	573	309 (53.93%)	23 (4.01%)	69 (12.04%)	2 (0.35%)
	Winter	80	54 (67.50%)	0	12 (15.00%)	0
	Total	**953**	**438 (45.96%)**	**26 (2.73%)**	**118 (12.38%)**	**3 (0.31%)**

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