Prevalence of intestinal helminths in domestic goose (*Anser domesticus*) in Qingyuan, Guangdong Province, China

X. Q. Wang\(^1\), R. Q. Lin\(^1\), Y. Gao\(^1\), T. Cheng\(^1\), S. S. Zou\(^2\), Y. He\(^2\), G. Y. Li\(^2,3\), Y. B. Weng\(^2\) and X. Q. Zhu\(^1,4\)*

\(^1\)State Key Laboratory of Veterinary Etiological Biology, Lanzhou Veterinary Research Institute, Chinese Academy of Agricultural Sciences, Lanzhou, Gansu Province 730046, China.

\(^2\)College of Veterinary Medicine, South China Agricultural University, Guangzhou, Guangdong Province 510642, China.

\(^3\)Institute of Animal Health Supervision, Qingyuan, Guangdong Province 511515, China.

\(^4\)College of Animal Science and Technology, Yunnan Agricultural University, Kunming, Yunnan Province 650201, China.

Accepted 26 June, 2012

The prevalence of intestinal helminths in domestic geese (*Anser domesticus*) was investigated in Qingyuan city, Guangdong province, China between October 2010 and March 2011. A total of 330 intestine samples of adult geese from representative local markets in Qingyuan city were collected and examined for the presence of helminths using a helminthological approach. The worms were macroscopically examined, counted, identified to species according to existing keys and descriptions. Three species of helminths, namely *Hymenolepis coronula* (13.03%), *Drapanidotaenia lanceolata* (2.42%) and *Heterakis gallinae* (2.42%) were identified. The helminth prevalence in geese from family-type small-holder farms (25.55%) was significantly higher than those which came from modern commercial farms (6%). The results of the present investigation provide useful "base-line" data for executing control strategies and measures against helminth infection of geese in this region.

**Key words:** Qingyuan city, China, goose, helminths, prevalence.

INTRODUCTION

Meat of domestic goose (*Anser domesticus*) is an important part of Chinese cuisine worldwide, especially in People’s Republic of China (PRC). China is the largest producer of goose in the world, and Guangdong is one of the largest goose breeding and consumption provinces in China (Shi et al., 2003; Yang, 2003). 66 million geese are bred for human consumption in Guangdong province in 2009, which represents approximately 7.6% of the total goose production in China (He et al., 2010). Qingyuan city is one of the most important goose breeding bases in Guangdong province, and goose industry plays an important role in the district's economy.

Parasites cause significant economic losses globally as a consequence of deaths of infected animals, chemical treatment of infected animals, and reduced egg and meat production (Urquhart et al., 1996; Weng et al., 2005). Parasitic infections may have a symptomless but insidious manifestation in geese, whether they are reared in modern commercial farms or in family-type small-holder farms and the production performance may be decreased by parasitic infections (Gicik et al., 2003; Wang et al., 2004). It has been well documented that geese can be infected with a number of helminths, and many of them are not host-specific and can easily be transmitted to other species of poultry (Gicik et al., 2003; Olsen, 2009). For seldom causing mass mortality, infection of geese with intestinal helminths is often ignored in breeding management, but the limited published reports in China and other countries have revealed high prevalence rate, such as Shandong province (26.4%), Guizhou province (more than 50%), Kars District, Turkey (78.9%), Texas, USA (nearly 100%), so more studies on the epidemiology of helminthosis in geese are needed for developing...
Table 1. Prevalence of intestinal helminth infection in geese in Qingyuan city, Guangdong province, China.

| Geographical origins | No. examined | No. positive | Prevalence (%) | Infection intensity (worms per goose) |
|----------------------|--------------|--------------|----------------|-------------------------------------|
| Shijiao market       | 150*         | 9            | 6              | Hc: 1-10 (2), 11-50 (3), 51-100 (1), > 100 (1) |
|                      |              |              |                | Hg: 1-10 (2)                         |
| Sanjiao market       | 30*          | 12           | 40             | Hc: 1-10 (2), 11-50 (3), 51-100 (2), >100 (3) |
|                      |              |              |                | Hc/Dl: 11-50/1-10 (1), 51-100/1-10 (1) |
|                      |              |              |                | Hg: 1-10 (2)                         |
| Chengnan market      | 35*          | 4            | 11.43          | Hc: 1-10 (2), 11-50 (2), 51-100 (1) |
|                      |              |              |                | Hc/Dl: 11-50/1-10 (1)                |
| Hougang market       | 40*          | 5            | 12.5           | Hc: 11-50 (1), 51-100 (2), >100 (2)  |
| Zhongxin market      | 30*          | 7            | 23.33          | Hc: 11-50 (1), 51-100 (1), >100 (3)  |
|                      |              |              |                | Hc/Dl: 51-100/1-10 (1)               |
|                      |              |              |                | Hg: 1-10 (1)                         |
| Sankeng market       | 45*          | 13           | 28.89          | Hc: 11-50 (1), 51-100 (2), >100 (3)  |
|                      |              |              |                | Hc/Dl: 11-50/1-10 (1), 51-100/1-10 (1) |
|                      |              |              |                | Hg: 1-10 (2)                         |
| Total                | 330          | 50           | 15.15          | Hc: 1-10 (6), 11-50 (11), 51-100 (9), >100 (12) |
|                      |              |              |                | Hc/Dl: 11-10/1-10 (2), 11-50/1-10 (1), 51-100/1-10 (2) |
|                      |              |              |                | Hg: 1-10 (3)                          |

*Samples came from modern commercial farms; #Samples came from family-type small-holder farms; Hc: Hymenolepis coronula; Dl: Drepanidotaenia lanceolata; Hg: Heterakis gallinae

Effective control and prevention strategies (Purvis et al., 1997; Gicik et al., 2003; Wang et al., 2004; 2005). The goose industry in Qingyuan city has been gradually developing and this city is known for the excellent breed of geese. With the increasing trade exchange of goose products between Qingyuan city and other areas of China, parasitic diseases can also be widely transmitted. However, prior to the present survey, there had been no detailed data of helminth prevalence in geese in Qingyuan city in Guangdong province. To provide relevant “baseline” data for the better control of helminths in geese in this region, the objective of the present investigation was to estimate the prevalence of helminths in geese in Qingyuan city by a helminthological approach.

MATERIALS AND METHODS

Study site

Qingyuan city is situated in the north central part of Guangdong province, China, between north latitudes of 23°31’ to 25°12’ and east longitudes of 111°55’ to 113°55’. It has an area of approximately 19,000 km², and has approximately 4 million inhabitants (National Population Census data, 2008). This city has a subtropical climate, with an average annual temperature of 20.7°C. The average annual rainfall is approximately 1900 mm.

Sampling of geese

The survey took place between October 2010 and March 2011. Regardless of gender, a total of 330 intestine samples of adult geese were collected randomly from representative local markets in Qingyuan City. 150 of these geese were from modern commercial farms and the rest from small family-type farms (Table 1). The small intestines, large intestines and the caeca were separated, opened and rinsed with water, and macroscopic examinations of the washings and organs were performed.

Identification of parasite species and infection rates

Worm counts were performed on all washings or a proportion of the total washings depending on the total number of worms present and the site of occurrence was noted. Nematode specimens were fixed in 70% (v/v) warm ethanol and stored in 70% ethanol containing 5% glycerol before being cleared by lactophenol and identified to species according to existing descriptions and keys (Li, 2004). Tapeworm specimens were fixed in 70% ethanol, stained with carmine, differentiated in acid alcohol, dehydrated in serial
concentrations of ethanol, cleared in xylene, mounted in Canada balsam, and then identified morphologically to species according to existing descriptions and keys (Yamaguti, 1958, 1959; Schmidt, 1986).

A goose was recorded as infected with a certain helminth species if at least one worm was found in that animal. The mean prevalence rate was calculated by dividing the number of infected geese with the total number of geese examined, and was expressed as percentage of all animals sampled.

RESULTS

No gross lesions were observed in the intestines of 330 geese examined in the present investigation, and 50 of which harboured helminths. The helminths included one nematode and two cestode species, which represented two phyla, two classes, two families and three genera. *Heterakis gallinae* (2.42%) was the only nematode species found. Two cestodes, namely *Hymenolepis coronula* (13.03%) and *Drepanidotaenia lanceolata* (2.42%) were detected. The mean prevalence was 15.15%, and the examination revealed that helminth infection was more severe in small family-type farms (25.55%) than in modern commercial farms (6%). The most abundant parasite is *H. coronula* which was found in the small intestine of geese. One or two helminth species were found in the intestine of a single goose, and the number of helminth ranged between 1 and over 100. The species of worms found and their predilection sites, prevalence and intensities of infection (ranges) are presented in Tables 1 and 2.

DISCUSSION

The goose industry is well-developed in Qingyuan city as compared with some other areas of China. The mean prevalence of helminths in the present survey was 15.15%, which was less than some previous studies such as Shandong province (26.4%) and Qindongnan, Guizhou province (more than 50%), suggesting that better management and animal health and welfare standard are available in Qingyuan city, Guangdong province (Wang et al., 2004; 2005). As expected, the helminth prevalence in geese in modern commercial farms (6%), which have better management and animal welfare standards, was significantly lower than those that came from small family-type farms (25.55%) in Qingyuan city. Only one nematode (*H. gallinae*) and two cestodes (*H. coronula* and *D. lanceolata*) were found in this study, which were much fewer than in Qindongnan, Guizhou province (7 nematodes, 11 trematodes and 9 cestodes), and Jianjing, Chongqing city (5 trematodes and 1 cestodes). The dominant helminth in geese in Qingyuan city was *H. coronula*, but was mainly *D. lanceolata* and *Echinostoma revolutum* in other areas of China, possibly due to different ecological and geographical conditions (Jing et al., 2002; Ruan et al., 2003; Wang et al., 2005).

This is the first survey of intestinal helminth infection in geese in Qingyuan City, Guangdong province, China. In the geese examined in this study, the high prevalence of cestodes mainly may be caused by their living habits in water, which increase their exposure and infection with intermediate hosts. Although only three species of parasites were found, the results of the present survey indicate that helminth infections are highly prevalent in geese in Qingyuan city. The results of our study provide a foundation for developing and monitoring improved control strategies against intestinal parasites of geese in this region and elsewhere.

ACKNOWLEDGEMENTS

Project support was provided by the Program for Outstanding Scientists in Agricultural Research, the Open Funds of the State Key Laboratory of Veterinary Etiological Biology, Lanzhou Veterinary Research Institute, Chinese Academy of Agricultural Sciences (Grant Nos. SKLVEB2011KFKT004, SKLVEB2011KFKT011, SKLVEB2010KFKT009 and SKLVEB2011KFKT010) and the Yunnan Provincial Program for Introducing High-level Scientists (Grant No. 2009CI125).

REFERENCES

Gicik Y, Arslan MÖ (2003). The prevalence of helminths in the alimentary tract of geese (Anser anser domesticus) in Kars District, Turk. Vet. Res. Commun. 27:391-395.

He SQ, Zheng YR SK, Wang Z, Huang XJ, Zhang HL, Si ZD (2010). Analysis on waterfowl industry developing situation of Guangdong province in 2009. Guangdong Agric. Sci. 7: 250-252 (in Chinese).

Jing A, Li M, Su JY, Su JH, Wang LX, Nie K, He L, Yu BH, Pang HM (2002). Survey of parasitic infection of geese in Jianjing City. Chin. J. Vet. Parasitol. 10:19-21 (in Chinese).

Li XR (2004). Colour Atlas of Animal Parasites. Chinese Agricultural
Pressing, Beijing (in Chinese).
Olsen GH (2009). Bacterial and parasitic diseases of Anseriformes. Vet.
Clin. North. Am. Exot. Anim. Pract. 12:475-490.
Purvis JR, Gawlik DE, Dronen NO, Silvy NJ (1997). Helminths of
wintering geese in Texas. J. Wildl. Dis. 33:660-663.
Ruan ZX, Wang Q, Zeng ZM, Yang AS, Yang FF, Wang XN (2003). A
report of parasitic worm infection in ducks and geese in Bijie Region,
Guizhou Province. Chin. J. Vet. Parasitol. 4: 24-25 (in Chinese).
Schmidt GD (1986). Handbook of tapeworm identification. CRC Press,
Boca Raton. 675 pp.
Shi ZD, Sun AD, Huang YM, Zheng H (2003). The state of
development, problems and trends of goose industry in Guangdong
Province, China. Guangdong J. Anim. Vet. Sci. 5:3-5 (in Chinese).
Urquhart GM, Armour J, Duncan JL, Dunn AM, Jennings FM (1996).
Veterinary Parasitology, Second Edition. Oxford: Blackwell Science.
pp. 10-26
Wang BW, Jia XH, Wu XP, Zhang MA, Liu GL, Sun XH (2004).
Research on the epidemiology of goose parasites in Shandong
Province. J. Laiyang Agric. Coll. 21:185-188. (in Chinese)
Wang J, Long WP, Li YY, Chen J, Zhou CG, Wang YP, Liu XH (2005).
Survey of parasitic infection of chickens, ducks and geese, and
geographical distribution in Qindongnan, Guizhou province. Chin. J.
Vet. Parasitol. 13:13-17 (in Chinese).
Weng YB, Hu YJ, LiY, Li BS, Lin RQ, Xie DH, Gasser RB, Zhu XQ
(2005). Survey of intestinal parasites from intensive pig farms in
Guangdong Province, People’s Republic of China. Vet. Parasitol.
127: 333-336.
Yamaguti S (1958). Systema Helminthum, vol 1. The digenetic
trematodes of vertebrates. Interscience, New York. 1575 pp.
Yamaguti S (1959). Systema Helminthum, vol 2. The cestodes of
vertebrates. Interscience, New York. 860 pp.
Yang CZ (2003). Waterfowl industry status and development trend in
Guangdong Province, China. Guide Chinese Poultry. 20:8-9 (in
Chinese).