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Bovine fasciolosis in the human fasciolosis hyperendemic Binh Dinh province in Central Vietnam

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ABSTRACT

A cross-sectional survey on bovine fasciolosis was conducted in the Binh Dinh province of Central Vietnam that was previously identified as hyperendemic for human fasciolosis. In Vietnam, both pure *Fasciola gigantica* and hybrid and/or introgressed populations of liverflukes bearing genetic material from both *Fasciola hepatica* and *F. gigantica* infect humans and animals. In this study, 825 cattle were randomly selected from 8 of the 11 provincial districts for faecal collection; blood samples were taken from 400 of these animals. *Fasciola* eggs and antibodies against *Fasciola* were detected by a quantitative sedimentation method and an Enzyme Linked Immunosorbent Assay, respectively. Overall, 54.9% of the animals were shedding *Fasciola* eggs while 72.2% were *Fasciola* seropositive. Animals under two years showed lower *Fasciola* infection rates than older animals. There were no differences in infection rates between districts. These results indicate a very high prevalence of *Fasciola* infections in cattle in Binh Dinh province. It is concluded that a fasciolosis control programme should be designed in this region aiming at reducing infection in both cattle and humans.

1. Introduction

Fasciolosis is a cosmopolitan parasitic infection caused by the digenetic trematodes *Fasciola hepatica* and *Fasciola gigantica*. It affects mainly ruminants but also other animal species, such as horses and pigs. The disease causes important economic losses in the animal husbandry, estimated at US$ 3 billion per year, due to reduction in meat and milk production (FAO, 1994). Human fasciolosis is recognised as an emerging zoonotic disease, mainly in developing countries (Mas-Coma et al., 1999). In Vietnam, human fasciolosis has been reported in 45 of the 64 provinces. The number of cases has recently shown a sharp increase, mainly in the central part of the country, including Binh Dinh province (Hien and Dung, 2002; De et al., 2006; WHO, 2007, http://www.impe-qn.org.vn/impeqn/en/portal/InfoDetail.jsp?area=58&cat=1067&ID=499). *F. gigantica* is the main species causing fasciolosis in cattle, goats and humans in Vietnam. In addition, the presence of hybrid and/or introgressed populations of liverflukes bearing genetic material from both *F. hepatica* and *F. gigantica* was demonstrated in both humans and animals (Dang and Nawa, 2005; Le et al., 2007, 2008; Nguyen et al., 2009). Human infection is always associated with local endemic animal fasciolosis, although the distribution of human infection and level of prevalence may not always correlate with that observed in animals. Therefore, the reservoir role of the environmentally related domestic animals in transmission of re-emerging human fasciolosis has to be reconsidered (Mas-Coma et al., 1999, 2005). Few studies on bovine fasciolosis have been conducted in Vietnam, mainly in the Northern part of the country, where infection ranges between 20 and 90% (Thu and Linh, 1996; Anderson et al., 1999; Holland et al., 2000; Bui et al., 2003; Geurden et al., 2008). The objective of the present study was to investigate the prevalence and intensity of fasciolosis in cattle in Binh Dinh province that is hyperendemic for human fasciolosis. Both coprological and serological methods were used and the effects of age and geographical origin of the animals on the prevalence of infection were assessed.

2. Materials and methods

Binh Dinh province is located in the South central coast region of Vietnam and is composed of eleven districts (Fig. 1). The province is

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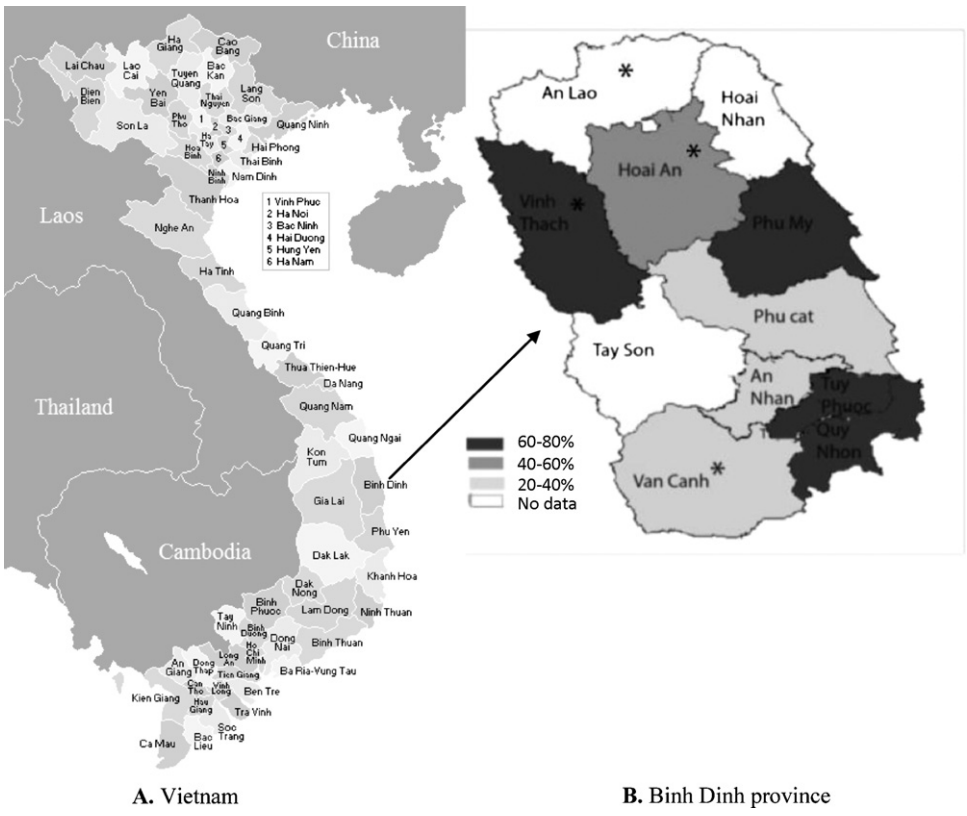

Fig. 1. (A) Geographical localisation of Binh Dinh province on the map of Vietnam. (B) The prevalence of bovine fasciolosis in eight districts of Binh Dinh province, as measured by coprological examination. Provinces marked with an asterisk have a mountainous geography with hills between 500 and 700 m (www.Wikipedia.org).

divided into the highlands along the western border, with hills up to 500–700 m, and lowlands in the center and along the coast. Most of the population lives near the coast. The annual average temperature and rainfall are 26 °C and 1935 mm, respectively, with a dry season from December to August and a rainy season from September to November. The major economic activities of Binh Dinh are fisheries and agriculture, including rice production and pastoral herding of livestock, mainly pigs (N = 516,947), cattle (N = 316,071) and buffaloes (N = 21,135). Ruminants are kept by smallholder farmers, who commonly own 1–5 animals, mainly for draught power, but also for breeding and meat production. The animals are grazed on the banks between paddy fields, along the sides of irrigation canals or rivers, and on mountains.

Cattle were sampled in 8 of the 11 districts of the province from June to September 2008. In each district, smallholder farms in different communes were randomly selected for sampling of about 100 cattle. Sampling consisted of collecting about 50–100 g faeces from the rectum of all animals and 5 ml of blood from the jugular vein of half of the selected animals. A total of 825 stool samples and 400 blood samples were collected from the 8 districts. Faecal samples were kept at 4 °C before processing for examination for worm eggs within 48 h. Serum samples, obtained from the blood after clotting and centrifugation, were stored at −20 °C before examination for *Fasciola* antibodies. Information was recorded on the origin, sex and age of the animals.

The shaking sieve method, a quantitative method for the examination of faecal samples for *Fasciola* eggs was used as described by Anderson et al. (1999) with some modifications; instead of using an electric stirrer, samples were stirred well by hand and the homogenate was filtered three times over a sieve of about 6 cm in diameter and 120–150 μm mesh size to remove the coarse debris. Serum samples were examined for antibodies against *Fasciola* by an Enzyme Linked Immunosorbent Assay (ELISA) using purified excretory/secretory antigen of *F. gigantica* as described by Anderson et al. (1999). The cut-off value was determined from the mean optical density (OD) obtained from the sera of 20 newborn calves (samples taken prior to administration of colostrum, in zero-grazing farms in the peri-urban area of Hanoi) plus three times the stan-

Table 1
Results of coprological examination and sero-prevalence by ELISA for bovine fasciolosis in eight districts of Binh Dinh, Vietnam.

No.	District	Geographical characteristics	Coprological examination		ELISA	
			No. of samples	No. positive (%)	No. of samples	No. positive (%)
1	Quy Nhon	Lowland	108	77 (71.30)	50	40 (80.00)
2	Phu Cat	Lowland	108	31 (28.07)	50	24 (48.00)
3	Tuy Phuoc	Lowland	108	75 (69.44)	50	41 (82.00)
4	An Nhon	Lowland	100	27 (27.00)	50	36 (72.00)
5	Vinh Thanh	Highland	101	76 (75.25)	50	45 (90.00)
6	Van Canh	Highland	100	31 (31.00)	50	26 (52.00)
7	Phu My	Lowland	100	76 (76.00)	50	36 (72.00)
8	Hoai An	Lowland	100	60 (60.00)	50	41 (82.00)
Overall			825	453 (54.90)	400	289 (72.25)