

Detection of Trematode of Swine, *Fasciolopsis buski*, in Small Scale Farms in the Mekong Delta

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Received March 30, 1998

Abstract

To demonstrate the infection of pigs with *Fasciolopsis buski* in the Mekong Delta, an investigation into the actual conditions was carried out in the Mekong Delta. A total of 87 pigs from 38 farms were examined for the presence of the trematode. The infection was detected in 4 pigs 4 farms (5.7%). Three of them showed a low count of eggs pre gram (EPG) and no clear clinical signs such as diarrhes. One infected sow with an average of 1.000EPG showed constipation. Since only these 4 infected pigs had eaten water spinach (*Ipomoea aquatica*) as a supplement for feed, it is suggested that this vegetable may play an important role in the cycle of infection with *F. buski* of pigs in small scale farming systems. Infection in human can be anticipated because this fluke is involved in zoonosis and people eat commonly this vegetable. The *F. buski* eggs died by passing through the biodigester system. The digester may contribute not only to protect the environment but also to control a zoonosis caused by several flukes in the Mekong Delta.

Additional key words: zoonotic trematode, public health, water spinach, biodigester.

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Introduction

Fasciolopsis buski is an intestinal digenetic fluke which parasites pigs and also has a zoonotic potential. Fasciolopsiasis in the tropics is a very important disease causing economic loss in pig farms in the Mekong Delta.²⁾

Although considerable work has been carried out on the biology of the trematode in Asian countries, very little is known about the trematode in Vietnam.³⁾

One of the aims of the present study was to survey the actual conditions of the infection in the Mekong Delta area. An attempt was also made to observe the adult fluke worms in the Mekong Delta using a scanning electron microscope.

Materials and Methods

1) Sampling sites

Fecal samples were collected from pigs in seven districts in and around Can Tho City, Can Tho Province. The total number of samples was 87 from 38 farms. Amount of feces per sample ranged from 50-100g. Supplements for feeds of pigs were also examined in detail. In general, the fecal samples were brought into the laboratory and kept in a refrigerator until examination.

2) Fecal examination for detection of eggs

As a quantitative technique, the Watanabe sedimentation method⁵⁾ was applied to detect *F. buski* eggs in pig feces. Counts of eggs per gram (EPG) were carried out to estimate the degree of parasitism by using Dennis method¹⁾ for the eggs if necessary.

3) Observation of adult worms by scanning electron microscope (SEM)

Several worms collected from slaughterhouses were fixed in 10% phosphate-buffered formalin and washed 3 times in 0.1M phosphate buffer for 15 min. After dehydration through a graded series of ethanol, the specimens were immersed in isoamyl acetate and dried by critical point drying. The

specimens were coated with gold in an ion coater. The samples were examined using a scanning electron microscope (SEM, JEOL, JSM-5300).

4) Ovicidal effect of biodigester

A sow in a farm showed a high count of *F. buski* EPG. The sample containing the eggs was collected from the inlet and outlet of the biodigester (Fig.1). The samples were dissolved individually in tap water and washed frequently to remove the debris around the eggs. Then, the egg samples were transferred into Petri dishes with water and incubated at 29°C for 15 days. After the incubation, death of the eggs was assumed when no development to the next stage (or miracidium) was detected. The eggs of the pig nematode, *Ascaris suum* were also incubated by the same technique to examine the activity.

Results and Discussion

The adult *F. buski* worms in pigs from slaughterhouses (Fig.2), which was the largest intestinal trematodes, were 2.0 to 4.5 by 0.5 to 2.0cm in size. Fig.3 shows the posterior end of the worm body observed by SEM. An oral sucker,



Fig.1. Biodigester of tube type for production of gas using pig feces



Fig.2. Fluke worms, *Fasciolopsis buski*, collected from a slaughterhouse in Can Tho City

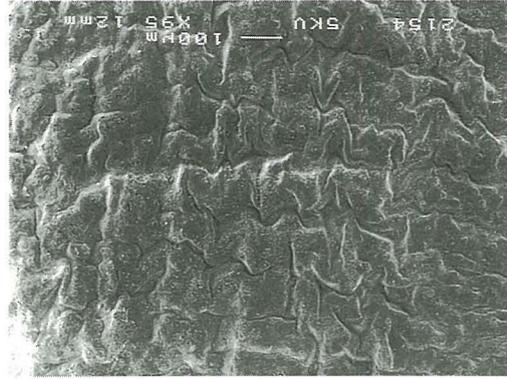


Fig.4. SEM of tegument of ventral surface of *F. buski*

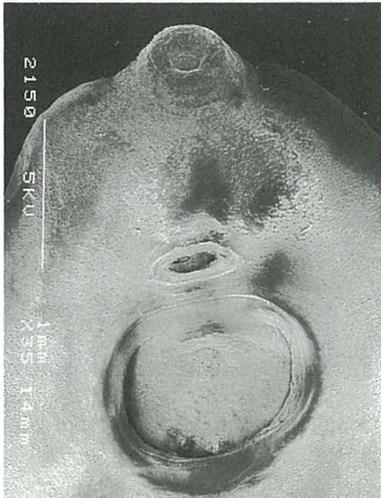


Fig.3. Scanning electron micrographs (SEM) of anterior end of a *F. buski* adult

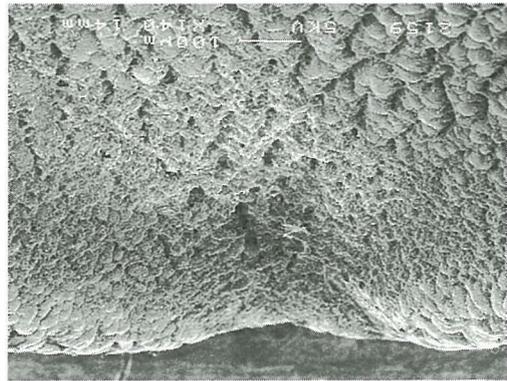


Fig.5. SEM of tail of *F. buski*

genital atrium and ventral sucker were observed. The middle of ventral surface appeared like crocodile skin (Fig.4). Fig.5 shows the tail of the worm. The excretory bladder opened near the posterior extremity of the body.

Eggs of the fluke (Fig.6) were detected in the feces of four pigs from four farms. The yellowish ellipsoidal eggs, 130 to 140 by 80 to 85 μ m, had a clear, thin shell with a small operculum at one end and were very similar to those of *Fasciola gigantica* (Japanese type). Three pigs showed low EPG

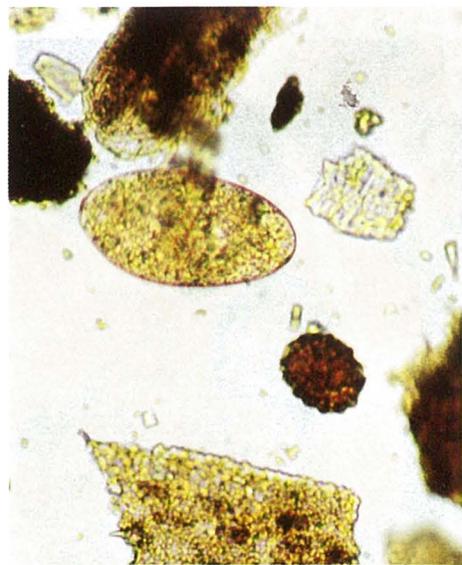


Fig.6. Eggs of *F. buski* (orange) and *A. suum* (light brown)

counts such as 10 or less. On the other hand, on average number of 1,000 EPG was observed in the feces of a sow with severe constipation. These eggs developed normally by incubation (Fig.7). Intermediate host, spiral-shelled snails, were detected in marshland, ponds, small rivers and rice fields near the pigpens (Fig.8).

All four infected pigs had eaten water spinach, *Ipomoea aquatica* as a supplement of pig feed (Fig.9). These findings, suggest that the vegetable may play an important role in the cycle of the infection with *F.buski*. Since many people eat water spinach, there is a possibility of human infection in the Mekong Delta.

Eggs of *Ascaris sum* in the outlet of the biodigester developed normally by incubation. On the other hand, all the *F.buski* eggs were inactivated by passing through the biodigester (Fig.9). The inactivation of the eggs may mainly be due to the presence of ammonia in the biodigester, since fluke eggs were killed by a low concentration of ammonia.^{4,7)} Furthermore, Weng et al.⁶⁾ reported that the *F.buski* eggs were killed at 50°C for four hours. The results obtained indicate that the biodigester may contribute to the prevention of fasciolopsiasis in farming systems.



Fig.8. Intermediate host, spiral-shelled snails, collected from marshland near Can Tho University



Fig.9. Water spinach cut for supplement of pig feed in a small farm



Fig.7 An incubated egg of *F.buski* containing an active miracidium



Fig.10. Inactivated eggs of *F.buski* collected from the outlet of a biodigester

Acknowledgements

This work was conducted under the research project between Japan International Research Center for Agricultural Sciences (JIRCAS), Tsukuba, Japan and Cantho University (CTU) and Cuu Long Delta Rice Research Institute (CLRRI), Cantho, Vietnam. The authors thank Dr. Yoshiji Ando, National Institute of Animal Health, for the preparation of the photographs.

References

- 1) Dennis, W. R., Stone, W. M. & Swanson, L. E. (1954). A new laboratory and field diagnostic test for fluke ova in feces. *J. Am. Vet. Med. Assoc.* **124**: 47-50.
- 2) Hung, N. H. (1990). Situation of infection and treatment of helminth on pigs in Haugian province. *In* Result of Veterinary Research in the Mekong Delta. ed. Loc C. B., Cantho University, Cantho, 41-53 (In Vietnamese with English summary).
- 3) Le, N. T. (1978). Study on the biology of trematode *Fasciolopsis buski* (Lankaster, 1857) in Vietnam. *Med. parasitol. (Mosk.)*. **47**: 81-84 [translated title, In Russian with English summary].
- 4) Pietsch, W. & Buchwalder, R. (1971). Experimentelle Untersuchung über den Einfluß von Rindergülle auf die Eier von *Fasciola hepatica*. *Mh. VetMed.* **26**: 737-739 [In German with English summary].
- 5) Watanabe, S., Nagayama, F. & Iwata, S. (1953). A simple fecal sedimentation test for detection of *Fasciola* eggs. *Jpn. J. vet. med. Assoc.* **6**: 176-177 [translated title, In Japanese].
- 6) Weng, Y. L., Zhuang, Z. L., Jiang, H. P., Lin, G. R. & Lin, J. J. (1989). Studies on ecology of *Fasciolopsis buski* and control strategy of fasciolopsiasis. *Chung kuo chi Sheng Chung Hsueh Yu Chi Sheng Chung Ping Tsa Chih.* **7**: 108-111 [In Chinese with English abstract].
- 7) Yoshihara, S. (1979). Ovicidal effect of cattle urine against *Fasciola* eggs in cattle manure. *J. Tokyo Vet. Med. Anim. Sci.* **27**: 57-60 [In Japanese with English summary].

メコンデルタのファーミングシステムにおける豚の肥大吸虫
(*Fasciolopsis buski*) について

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摘 要

豚の小腸に寄生する肥大吸虫は豚の生産性に影響を及ぼす損耗要因の一つである。そこで、この寄生虫感染の実態を把握するために、メコンデルタのファーミングシステム内で飼育されている豚、87頭について寄生虫検査を実施したところ、4頭の糞便から肥大吸虫卵が検出された。糞便1g中の虫卵数であるEPGの範囲は、概ね数個であり、下痢などは認められなかった。一方、1,000前後の一头では強固な便秘が観察された。肥大吸虫感染は

豚に野菜の代わりにウォータースピナッチ (*Ipomoea aquatica*) を給与していた4軒の農家のみに見られ、この植物の給与と肥大吸虫感染との因果関係が示唆された。また、人もこの野草を食べるので、人への感染も危惧された。このこととは別にバイオダイジェスターの寄生虫卵などの殺滅効果を調べた結果、豚回虫卵などには無効であったものの、肥大吸虫卵の殺滅には極めて有効であった。

キーワード：寄生虫，人畜共通感染症，ウォータースピナッチ，バイオジェスター

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