Survey of Cattle Fascioliasis in Tsuyama Abattoir

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Abstract

Objectives: The aim of this study was to survey the prevalence of fascioliasis in slaughtered cattle in order to provide breeders with feedback which may prevent cattle fascioliasis, as well as human fascioliasis.

Methods: The results of meat inspection and the information extracted from the Discriminative Data Base on Individual Livestock in Japan were analyzed statistically in 6,224 cattle slaughtered at the Tsuyama Abattoir during the fiscal year 2002.

Results: The age-adjusted fascioliasis and cholangitis rates of all cattle were 2.0% and 7.2%, respectively. When analyzed by cattle breed, both rates were significantly higher in Japanese native cattle than in Holstein or Jersey (Chi-square test, p<0.01). The cattle raised in Okayama Prefecture, Tochigi Prefecture and Shimane Prefecture were significantly different from cattle raised in other prefectures in the age-adjusted fascioliasis and cholangitis rates.

Conclusion: The age-adjusted fascioliasis and cholangitis rates of all cattle can be considered as nationwide rates for slaughtered cattle. The results of the comparisons suggest that cattle fascioliasis is related to feeding with rice straw and that the measures to prevent cattle fascioliasis might differ among prefectural governments.

Key words: fascioliasis, cholangitis, cattle, rice, age-adjusted rate

Introduction

Fascioliasis is a parasitic zoonosis. The main symptoms of human fascioliasis are right upper abdominal pain and discomfort. Humans become infected after eating aquatic plants containing encysted organisms or by drinking contaminated water (1, 2). In Japan, this disease occurs in farm villages where both rice growing and cattle raising are practiced. Metacercariae attach themselves to the stems of rice or wild grass and leaves grown around rice paddies. Infection spreads to persons handling the rice crop or wild vegetation and most patients are farmers (3, 4). In Shibaura Abattoir in Metropolitan Tokyo, the rate of fascioliasis for 73,011 cattle was 0.39% during the fiscal year 2001 (from April 1, 2001 to March 31, 2002) (5). On the other hand, in Egypt, the rate of fascioliasis for 2,624,239 cattle in governmental abattoirs was 3.54% over the years 1994–1997 (6). In Venezuela, the rate of fascioliasis for 763,065 slaughtered cattle was reported to be 1.3% in a recent study (7). In 2001, a cow infected with bovine spongiform encephalitis (BSE) was found in Japan for the first time. Since then, many abattoirs have restricted the slaughter of cattle, and many cattle bred throughout Japan are brought to the Tsuyama Abattoir where such restriction has not been imposed. In 2002, the Ministry of Agriculture, Forestry and Fisheries of Japan constructed the Discriminative Data Base on Individual Livestock in Japan in order to trace the BSE cattle back to their breeders. The information on slaughtered cattle, including the breeder, farm and birth date, can be acquired from this Data Base. If fascioliasis in cattle can be prevented, human fascioliasis may also be prevented. We attempted to classify and analyze the information from the Data Base and the results of inspections for fascioliasis conducted by the Meat Inspection Center, Okayama Prefectural Government (MIOP), which has jurisdiction over the Tsuyama Abattoir. These findings and the list of breeders who had reared the cattle with fascioliasis were submitted to the Division of Livestock Industry, Department of Agriculture, Forestry and Fisheries, Okayama Prefectural...
Government, which is in charge of guiding livestock breeders in Okayama Prefecture and making contact with the other prefectural governments.

Materials and Methods

The study population (Fig. 1) consisted of cattle aged one year or older slaughtered at the Tsuyama Abattoir, Okayama Prefecture during the fiscal year 2002 (from April 1, 2002 to March 31, 2003). The information in the Data Base and results of macroscopic inspection of the study population by MIOP were tabulated and analyzed. As the criteria of inspection, ‘cholangitis’ was defined as the detection of a thickened bile duct, and ‘fascioliasis’ as the detection of adult worms of *Fasciola hepatica* or *F. gigantica* from the liver with cholangitis, because fascioliasis in cattle accompanies cholangitis (3). As a reference, we used the standard population (Fig. 1) of cattle aged one year or older slaughtered in 38 abattoirs nationwide during the fiscal year 1999 (from April 1, 1999 to March 31, 2000) (9). Using this population, we calculated the age-adjusted fascioliasis and cholangitis rates for the study population. We also calculated the two rates by breed of cattle and by prefecture where the cattle were raised for more than 2 months. The reason for setting the raising period to more than 2 months is that liver flukes reach the common bile duct 40–45 days after infection (10) and the young flukes mature into adult worms in the bile duct 2–3 months after infection (11).

Results and Discussion

Fig. 1 shows the age distributions of the study and standard populations. Regarding the study population, the median age and the quartile deviation were 5.9 and 2.5 years, respectively. The corresponding values for the standard population were 2.9 and 0.8 years. The age distribution of the study population was very different from the standard population.

Concerning the study population, the fascioliasis rates and the age-adjusted fascioliasis rates are presented in Tables 1 and 3 and the cholangitis rates and the age-adjusted cholangitis rates are presented in Tables 2 and 4. The present study population...
was large, with cattle coming from 32 prefectures in Japan. Therefore, the age-adjusted fascioliasis and cholangitis rates of the study population, 2.0% and 7.2%, respectively, can be considered as the nationwide rates for slaughtered cattle for one year. The true fascioliasis rate may be presumed to lie between these two figures considering the definitions of ‘fascioliasis’ and ‘cholangitis’.

The breeds of cattle of which the numbers exceeded 5% (311 cattle) of all the cattle in the study population (6,224 cattle) are Holstein (4,301 animals, 69.1%), Japanese native cattle (1,186 animals, 19.1%) and Jersey (437 animals, 7.0%).

Tables 1 and 2 show the age-adjusted fascioliasis and cholangitis rates, respectively, for the 3 breeds of cattle. We also calculated the two rates after excluding the cattle raised in Okayama Prefecture, which made up 56.5% (3,515/6,224) of the study population. The large number of the cattle in Okayama Prefecture might be a compounding factor. The results are also shown in Tables 1 and 2. All the age-adjusted rates were significantly higher in Japanese native cattle than in Holstein or Jersey (Chi-square test, p<0.01). A possible reason for these higher rates is the difference in cattle feed. Japanese native cattle are generally fed on rice straw, which is more...
expensive than any other roughage at present. It is said that rice straw can raise the quality of meat. However, the other breeds of cattle are not fed on rice straw. The high rates in Japanese native cattle suggest that cattle fascioliasis is related to rice straw feeding. To prevent fascioliasis in cattle, the following measures are recommended: examine Fasciola 

eggs in feces of cattle and identify the farms contaminated with liver flukes (12), stop feeding the cattle with rice straw in contaminated farms, store the rice straw for more than 4 months before feeding in order to kill the metacercariae on the rice straw (11), change the feed suppliers of contaminated farms, and administer anthelmintics to the infected cattle. Concerning these measures, the livestock hygiene service centers of each prefectural administration have provided guidance, and local governments have given subsidies to the cattle breeders in order to prevent fascioliasis in cattle.

The prefectures in which the numbers of cattle exceeded 5% (311 cattle) of all the cattle in the study population (a total of 6,229 cattle) were Okayama Prefecture (3,515 cattle, 56.4%), Tochigi Prefecture (574 cattle, 9.2%) and Shimane Prefecture (527 cattle, 8.5%). Tables 3 and 4 show the age-adjusted fascioliasis and cholangitis rates for the 3 prefectures. We also calculated the age-adjusted fascioliasis and cholangitis rates for these prefectures after excluding Japanese native cattle, because the high rates in Japanese native cattle presented in Tables 1 and 2 might be a compounding factor. Regarding both age-adjusted fascioliasis and cholangitis rates for these prefectures, the administration of livestock industry, we anticipate that the fascioliasis rates of slaughtered cattle could be estimated. The high fascioliasis and cholangitis rates in Japanese native cattle suggest that fascioliasis in cattle is related to rice straw, and the different fascioliasis and cholangitis rates among prefectures suggest that the measures taken to prevent cattle fascioliasis may differ among prefectural governments. Since we have submitted these findings and the list of farms to the administration of livestock industry, we anticipate that the measures to prevent cattle fascioliasis will be taken in the farms contaminated with liver fluke and that human fascioliasis will be prevented indirectly.

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References