動科物論叢(14) : 159~164

Equine infectious disease outbreak and control in Japan

Tomio Matsumura DVM PhD
Epizootic Research Station
Equine Research Institute
Japan Racing Association

INTRODUCTION

Horse population in Japan

More than one million horses were raised in Japan until middle of 1950's (Table 1). Since then, the horse population was decreased year by year to 1/10 in 20 years by the change of agricultural style. A stable horse population around 100 thousand has been observed for recent 20 years. About 60% of horses are light horses and involved in the racing industry, 10% are for riding, 10% are for meat, and the remaining 20% are for agriculture. In horses for agriculture, draft race horses are involved. Furthermore, eight kinds of native horses (about 3000 in total) are preserved and their numbers of each kind differ from 16 to 2400.

Japan Racing Association (JRA)

JRA currently operates ten racecourses nation wide, as set forth by law, holds a total of 36 race meetings with a maximum of five race meetings allowed for any one racecourse unless otherwise prescribed by law. One race meeting consists of eight days, which gives JRA an aggregate of 288 racing days a year. Among the ten racecourses, Tokyo, Nakayama, Kyoto and Hanshin are the four largest and almost all Grade I races are held at these so called "Big Four".

JRA has two training centers, the Miho and the Ritto Training Centers (TCs), in each of which more than 2000 racehorses are trained for races. The Miho TC

이 논문은 1999년도 동물과학연구소 국제심포지움에서 발표한 것임

is located 80 km and 120 km from Nakayama and Tokyo Racecourses, respectively, and the Ritto TC is 40 km, 90 km, and 150 km from Kyoto, Hanshin, and Chukyo Racecourses, respectively. All racehorses registered to JRA must be accommodated at and be trained within the confines of either the Miho or Ritto TCs of JRA. When race meetings are being held at either Tokyo or Nakayama Racecourses, the runners that are slated to race are transported by horse van from Miho on the morning of the race, and returned to the TC following the race. The horses stabled at Ritto are likewise transported for race meetings at Kyoto, Hanshin, and Chukyo Racecourses. When racing is held at other locations, the horses from Miho or Ritto TCs are transported to the individual racecourse where they will be racing. Each racecourse has stables to accommodate the visiting horses and there they can receive the necessary exercise and be trained prior to the race.

Some other facilities of JRA are the Equestrian Park, the Horseracing School, two Yearling Training Farms, and the Equine Research Institute. The Equine Research Institute has two branches, Joban Branch (Hot Spring Sanatorium for Racehorses) and my Tochigi Branch (Epizootic Research Station).

The Epizootic Research Station was established in June 1970 to protect racehorses from the prevalence of domestic and exotic infectious diseases, and to contribute to the development of horseracing and horse industry. Since then, we have greatly contributed to epidemic prevention by identifying pathogenic organisms and by developing methods of diagnosis, methods of disinfection, and vaccines during the outbreaks of equine influenza in 1971, the Getah virus infection in 1978, and the contagious equine metritis in 1980. At present, studies are conducted on various equine infectious diseases and, in order to cope with internationalization of horseracing, we energetically continues researches concerning diagnosis of infectious diseases abroad and the development of vaccines.

Regional Public Racecourses

Apart from JRA, there are 28 regional racecourses in 20 Prefectures. Regional Public Racing is fundamentally operated by each Prefecture.

OCCURRENCE OF EQUINE INFECTIOUS DISEASES IN JAPAN

Equine infectious anemia (EIA)

Sero-positive horses to EIA virus have been destroyed by law from old days to eradicate EIA from horse population in Japan. After introduction of immuno-gel-diffusion test to detect an antibody to EIA virus in 1978, number of horses diagnosed as EIA decreased rapidly and no sero-positive horse was detected for ten years since 1983 (Table 2). In 1993, however, two sero-positive horses were detected in a farm which had been escaped from an annual EIA examination conducted by the regional veterinary agency for long years. Since then, no horse has been diagnosed as EIA in Japan. All horses introduced into the JRA TCs from the outside have to be examined their sera by ELISA method for detection of EIA antibody. The EIA ELISA developed by us can get results within 3 hours after serum correction.

Japanese encephalitis (JE)

It is clear from the surveillance of antibody levels in pigs to JE virus that JE virus is active every year from July to October in Japan. However, only a small number of horses were diagnosed as JE early in the 1980's, although asymptomatic infection with JE virus would have occurred among horses in Japan (Table 2). All of the JRA racehorses have received 2 doses of inactivated JE vaccine one month apart before summer season (usually May and June) every year.

Equine influenza

The first and the last outbreak of equine influenza, so far, had occurred in a winter season of 1971-1972. Equine influenza type 2 virus (H3N8) was introduced into Japan by 5 imported riding horses from New Zealand by ship. After finishing quarantine on December 3, 1971, imported horses were distributed to four places in the eastern part of Japan, and then four of them manifested influenza symptoms soon after their arrival. Movement of horses without symptoms at the time of

transport, as well as movement of people, from the affected places distributed the virus widely, and finally 6782 horses at 26 places in 9 Prefectures were involved in the influenza epizootic in 39 days during a period from December 4, 1971 to January 11, 1972. During the epizootic, 956 (99.3%) of 963 racehorses at Tokyo Racecourse suffered influenza in 11 days (Figure 1), and 674 (93.3%) of 721 racehorses at Nakayama Racecourse in 12 days, which closed the race meetings at both Racecourses for 2 months. Since then, no occurrence of equine influenza has been observed among horses in Japan.

The first inactivated influenza vaccine became into use from August 1972, which contained two type 2 virus strains, Miami/63 and Tokyo/71 (an isolate during this epizootic), and a type 1 virus strain, Plague/56 (H7N7). According to the antigenic drift of equine influenza type 2 viruses prevalent in foreign countries, vaccine strains were changed to Tokyo/71 (H3N8), Kentucky/81 (H3N8), and Newmarket/77 (H7N7) in the second vaccine introduced in 1985, and to Kentucky/81 (H3N8), La Plata/93 (H3N8), and Newmarket/77 (H7N7) in the third vaccine introduced in 1996. Administration of influenza vaccine is conducted to all JRA racehorses twice a year in May and November.

Getah virus infection

In April, 1978, all racehorses around 2000 raised at Tokyo and Nakayama Racecourses moved to the newly established Miho TC. In October of this year, an outbreak of getah virus infection occurred among racehorses at Miho TC. A total of 722 (37.9%) out of 1903 racehorses manifested clinical symptoms (pyrexia, rash, and edema of limbs) by getah virus infection over a period of 43 days (Figure 2). Getah virus was known to have been distributed widely among Asian countries. This outbreak revealed that getah virus does possess the virulence against horses. Soon after this outbreak, we developed an inactivated vaccine against getah virus, and the field trials of vaccine had started from next spring in 1979. Since then, sporadic occurrence of getah virus infection has been observed in some regional racecourses. However, getah virus infection has never been recorded among vaccinated horse population. All the JRA racehorses have received two doses of primary vaccination one month apart in the first year and one dose of booster vaccination thereafter every year before summer.

Equine herpesvirus types 1 (EHV-1) and 4 (EHV-4) infections

Epizootiological schema of EHV-1 and EHV-4 infections in Japan is shown in figure 3.

Since the first isolation of EHV-4 in 1957, no evidence of EHV-1 infection had been observed among Japanese horse populations. In 1967, however, EHV-1 was introduced by imported pregnant mares from the United States to Japan, and the abortions of the imported mares provoked an epizootic of EHV-1 abortion among horse populations in Chiba and Hokkaido districts. In this epizootic, 96 pregnant mares in total aborted. Since then, a number of EHV-1 abortions have occurred annually among breeding mare populations (Table 2), although approximately 60% of pregnant mares have been administered inactivated EHV-1 vaccine commercially available since 1978. Most of the recent EHV-1 abortions are thought to have occurred by infection of foals with reactivated EHV-1, which would be hard to control by immunization with the inactivated vaccine.

EHV-1 also causes respiratory disease among racehorses at TCs in winter season. Most of the affected horses are 3-year-old horses which experience the first winter season at TCs. By infection with EHV-1, some horses manifested pyrexia with or without swelling of submandibular lymph nodes and/or nasal discharge, but many horses are protected from manifestation of disease by the cross protective immunity obtained from repeated infection of EHV-4 in breeding farms or in rearing farms. During the epizootic occurred at Ritto TC in 1989, some of the affected horses showed nervous disorders from mild paralysis of hind limb to severe disorders (recumbency, urinary incontinence, and paralysis of facial nerve). To protect racehorses in TCs from manifestation caused by EHV-1 infection, 3 doses of EHV-1 inactivated vaccine have been administered to 2-year-old horses with low antibody titers to EHV-1 in November, December, and February since 1996. Development of an attenuated live EHV-1 vaccine by gene engineering is now underway in my laboratory.

Respiratory infection with EHV-4 is common among foals and yearlings throughout the year. Reinfection with EHV-4 has readily occurred in the same populations by the short-lived immunity to the virus induced by the infection. Respiratory disease caused by EHV-4 infection also occurs among 2-year-old racehorses sporadically throughout the year. EHV-4 can cause abortion in

pregnant mares, but rare. No vaccine for EHV-4 is available in Japan.

Contagious equine metritis (CEM)

CEM is caused by infection with Taylorella equigenitalis and horses are infected usually by mating with infected stallions or mares. The first outbreak of CEM in the world was recorded at Newmarket, UK in 1977. Although retrospective serological studies suggested the existence of CEM affected horses from 1978, an occurrence of CEM among mares and stallions was firstly recognized in Hidaka district, Hokkaido, in 1980. Causal agent was isolated from 321 mares and 13 stallions (Table 2), and affected horses were stopped mating and treated with antibiotics. In spite of continuous surveys to detect carrier horses and thorough treatments, CEM is not yet eradicated from breeding horses in Japan. Recently, we have developed PCR to detect the DNA of causal agent, and utilizing the PCR for thorough survey to expose carrier horses.

Other infectious diseases

Equine rota virus infection and Rhodococcus equi infection are common among foals, and strangles and equine paratyphoid are observed in horses for agriculture in Japan.