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Methods to control swine fever in the Netherlands have repeatedly been brought in line with new data on the epizootiology of the disease and improved laboratory methods for diagnosis. The disease became notifiable in 1936 and records of outbreaks have been kept since. A partial slaughter system comprising affected, suspected, pregnant and very young pigs was adopted in 1961 and changed in favour of a stamping out policy for all pigs on infected premises in 1967. The partial slaughter system was supported by vaccination of the remaining pigs on infected farms with lapinised vaccine and swine fever hyperimmune serum. The use of attenuated vaccines was prohibited with the introduction of the total stamping out policy. At the same time vaccination of pigs on non-infected premises with crystal violet vaccine was no longer subsidised, as evidence had been obtained that the use of this vaccine hampered the progress towards final eradication. Despite the control measures, the disease maintained its position with peaks every 3 to 5 years. Cyclical changes in the structure of the pig population related to peaks in pigmeat prices are suspected of being responsible for the periodicity of swine fever outbreaks (1). The high pig density in areas of intensive farming (up to 1400 animals per km² of cultivated land), the movement over long distances of pigs for fattening - resulting in non-traceable contacts -- and the dissemination of the virus in swill seriously impeded the control of the disease. The situation was further complicated by the appearance of low virulent virus strains, causing atypical, chronic, persistent and inapparent infections (3). After field trials with pregnant sows and young pigs had shown no untoward side-effects from vaccination with the so-called "Chinese" (C) strain on various production parameters (2), emergency vaccination programs were introduced in swine fever enzootic areas in 1973. From 1973-1977 eight areas have been designated for vaccination by the Minister of Agriculture and Fisheries. This report describes the results obtained in the four most extensive regional programs, using C-strain virus vaccine*.

The areas varied in size from 210 to approx. 9000 km² and involved 126 x 10³ to 1.5 x 10⁶ pigs in the mass campaign (Table 1). In these campaigns all pigs over 2 weeks of age were vaccinated off-hand. Vaccinated animals were identified by numbered ear tags and care was taken by vaccination and identification teams to prevent the spread of swine fever. Vaccination was compulsory and supported by stamping out of affected herds and the usual veterinary police measures. Movements of pigs were prohibited during the mass campaigns, which usually lasted 2 to 3 weeks. The off-hand vaccination at the start of each campaign was supplemented thereafter by vaccination of young stock at the age of 6 to 8 weeks and of all pigs introduced from outside, once the stand-still order had been lifted. The duration of supplementary vaccination régimes was gradually reduced from 3 years till 6 months. A large scale survey on slaughter pigs from area no. 4 showed that 91 per cent had antibodies against swine fever.

On each occasion the number of outbreaks decreased from the start of vaccination. The decrease was most spectacular in areas no. 2 and 4, where a dramatic increase during the months prior to vaccination was reversed (Table 2). The majority of the 42 outbreaks observed during the first month of vaccination was diagnosed only a few days after the animals had been inoculated. On some occasions vaccination caused an outbreak on premises which had been under suspicion

for some time. Thirteen out of 25 outbreaks that occurred after 4 weeks of vaccination were due to introduction of virus from outside the area and 9 outbreaks became overt within a week following a supplementary vaccination. With some low virulent strains congenital infection may stay sub-clinical until the age of weaning or beyond (3), and in case of vaccination the virus is likely to be spread by nose to piglets which have lost their maternal antibodies.

Table 1. Details of vaccination campaigns

Area no.	Size km ²	Mass vaccination year	approx. no. of pigs	Additional vaccinations period (months)	approx. no. of pigs
1	210	1973	126.000	24-36	580.000
2	500	1973	285.000	12	470.000
3	780	1974	503.000	12	980.000
4	9.000	1977	1.500.000	6	1.700.000

Within 5 months after the start of the vaccinations, the disease had disappeared from the designated areas. Two cases of swine fever were diagnosed in area no. 1, 9 months after vaccination had started. The outbreaks were interrelated and originated from the feeding of unprocessed swill to vaccinated pigs. Areas no. 2 and 3 remained free of swine fever for over 2 years after vaccination had been suspended. The disease was introduced again later on and area no. 2 had to be incorporated in designated area no. 4. The latter was by far the largest vaccine proclaimed area and covered the whole central part of the country. The disease was eradicated, despite that the vaccination régime was maintained for only 6 months. Apart from 4 isolated outbreaks on farms with swill feeding in 1981, area no. 4 has remained free from swine fever for nearly 5 years.

Table 2. Monthly outbreaks of swine fever before and after the start of vaccination

Area no.	Months prior to vacc.					Months after vaccination				
	5	4	3	2	1	1	2	3	4	5
1	7	8	14	16	10	7	2	1	-	-
2	4	14	50	91	89	20	10	3	3	-
3	3	4	3	5	14	3	2	3	-	-
4	4	27	11	15	34	12	-	-	1	-

Conclusions

The approach has demonstrated conclusively that swine fever can be eradicated from enzootic areas with intensive pig farming by mass vaccination with C-strain virus, followed by systematic supplementary vaccination of weaned piglets for 6 to 12 months, and supported by stamping out and veterinary police measures. Outbreaks of swine fever due to the presence of residual virus in the designated areas have not been reported for up to 5 years after vaccination was suspended.

Selected references

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