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Eradication of African swine fever from Brazil

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Summary: Several outbreaks of African swine fever (ASF), which appeared in the south of Brazil in 1978 and 1979, led the Brazilian authorities to apply emergency sanitary measures. 66,966 pigs were destroyed in 224 outbreaks of identified ASF. In order to eradicate ASF and to control classical swine fever (CSF) simultaneously, a vast national Programme was launched in November 1980. It provided for three stages of action:

— Attack stage (1980-1984)
— Consolidation stage (1984-1986)
— Maintenance stage (1987)

The attack stage of the Programme comprised surveillance of the disease at several levels: international transport, movement of pigs within the country, serologic and clinical control in breeding centres and abattoirs, declaration of farms free of ASF. Other sections of the Programme included systematic vaccination against CSF, restructuring of regional laboratories, training of personnel in animal health, and improvement of the national information system. The consolidation and maintenance stages were aimed at continuing epidemiological surveillance in the country and, if necessary, rapid extinction of new outbreaks of ASF.

The Programme has proved to be effective as no new outbreaks were reported between November 1981 and September 1984 and as the country was again declared free of ASF in December 1984.

KEYWORDS: African swine fever - Brazil - Classical swine fever - Diagnostic techniques - Disease control - Epidemiology - Eradication - Laboratories - Quality control - Vaccination.

INTRODUCTION

On 25 November 1980, the Ministry of Agriculture instituted the "Programme for the control of African swine fever" ("PCPS") in the national territory through a Presidential decree, with the support of the National Secretariat of Animal Sanitary Defence and of the National Secretariat of Agricultural and Animal Defence (SDSA-SNAD), after an emergency period of combating outbreaks of African swine fever, identified between the years of 1978 and 1979.

Its purpose was the total elimination of African swine fever (ASF) and the control of classical swine fever (CSF) in the national herds, by means of the application of determined activities and pre-established aims in a joint effort.

The general activities of the Programme have common characteristics, with the exception of the vaccination used in CSF, while serology was used in the initial phase of control for ASF only.

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The epidemiological determinants are the same for the two diseases as well as for the other diseases of swine, related to the concentration of the breeding establishments, movements of animals, social, cultural and economic aspects, and other characteristics of the ecological system.

On 5 December 1984, the country was finally declared to be free from ASF, according to the terms laid down in the OIE International Zoo-sanitary Code and the results of the work performed in the risk areas of the disease, in breeding farms, and on other determinants of the occurrence of the disease.

At first, attention was directed to the Southern region of the country (Area I), a major centre of swine production, considering the higher concentration of breeding farms in this area and the consequent possibility of maintenance of the disease, which could result in it becoming an endemic area, acting as a source of dissemination, constantly menacing the other disease-free regions. This culminated with the declaration of the region as an area free from ASF on 13 September 1983.

Activities were then started and intensified in the South-eastern region (Area II) (due to its neighbouring geographical situation and the risk involved), since 70% of the outbreaks of ASF occurring in the country were concentrated in these two regions. This work, with special emphasis on the state of São Paulo (main industrial pig producer of the region), included the testing of 20,000 serum samples, with negative results for ASF.

In the other breeding centres (Area III), pig production is not technically advanced, presenting a smaller pig concentration and less risk of contamination, especially in the state of Pará (extensive husbandry), where intensive surveillance was performed and virological and serological tests were carried out (a total of 7,442 tests) with negative results. These results enable us to conclude that the ASF agent has been completely eliminated from the pig breeding farms.

GENERAL INFORMATION

The Brazilian territory, with an area of 8,511,965 km^2, is situated between the parallels 5° 16' 19'' North latitude and 33° 45' 06'' South latitude and the meridians 34° 45' 54'' and 75° 59' 32'' West.

Brazil has borders in the west with Peru, Bolivia and Paraguay, in the north with French Guiana, Suriname, Colombia and Venezuela; in the south with Argentina and Uruguay; to the east is the Atlantic Ocean.

The country is divided into 24 states, 2 territories and the Federal District. The states are divided into five geographical and economic regions: North, Northeast, South, Southeast and Midwest. The Brazilian population comprises approximately 123 million inhabitants.

The swine population is estimated to be 34 million, the second largest in the American continent and fourth in the World. Its highest concentration is in the Southern region with 44.6% of the total; this same region is also responsible for 73% of the total production of pork meat. The Programme to Combat Swine Fever ("PCSF") concentrated its activities towards the areas of industrial breeding (high risk) and it was based upon the following guidelines:

– vaccination of piglets against classical swine fever (CSF) at 2 months of age and revaccination of the males;

– inspection of the breeding farms free from ASF and controlled for CSF;

– epidemiological surveillance;

– action in outbreaks of other vesicular diseases and reproductive disorders.

EMERGENCY PERIOD (1978-1979)

– Immediate information of the occurrence of African swine fever (ASF) in Brazil and its neighbouring countries and notification of international organizations.

– Declaration of a disease emergency.

– Prohibition of movement of swine within and from the affected area.

– Killing and incineration of all swine living in the affected areas.

– Cleaning and disinfecting of vehicles, buildings and contaminated objects, including their destruction in cases where the necessary safety precautions were inadequate.

– Prohibition of the holding of shows, fairs and other meetings.

– Prohibition of the feeding of pigs with food wastes, and education of the public to this fact.

– Vaccination against classical swine fever.

– Improved notification of diseases occurring in pigs, demanded by the Ministry of Agriculture, to be complied with by official and private veterinarians.

TABLE I
Laboratory diagnosis of ASF in Brazil, 1978-1979

Year	Samples examined	Samples positive to ASF
1978	511	207
1979	202	17
TOTAL	713	224

In this phase, 224 outbreaks of ASF (Table I) were identified, requiring the slaughter and destruction of 66,966 pigs and payment of compensation amounting to Cr$ 44,313,945 (US$ 2,118,257 at the 1978 exchange rate).

All outbreaks of ASF were eliminated through the killing and incineration of pigs. For the adoption of these measures, the actions were integrated between the Ministry of Agriculture, the Ministry of the Army and the Military Police. After adoption of the control measures, the properties were periodically disinfected for four months. Sentinel pigs were then introduced for observation during 2 months, and then the premises could be repopulated. The total period of time established for a premises to be kept empty was 6 months.

The first diagnosis was made at the Plum Island Laboratory (USA). Subsequently a laboratory for official diagnosis was set up jointly with the Federal University of Rio de Janeiro. For this first work, the country received financial support of US$ 158,000 from the FAO. Later, the Ministry of Agriculture performed CSF and ASF diagnosis in its unit at Pedro Leopoldo in Minas Gerais State. The FAO also established an alert system for the neighbouring countries (5) (Table II).

TABLE II

Technical cooperation projects (TCP) of the FAO for the establishment of diagnostic facilities for ASF surveillance

(after Peritz, 1981)

Countries	Funds for TCP* (US$)	Year of approval
Argentina	105,000	1978
Bolivia	125,000	1978
Brazil	**158,000**	**1978**
Chile	71,000	1979
Colombia	96,000	1978
Dominican Rep.	127,000	1978
Ecuador	44,000	1979
Guatemala	11,500	1979
Haiti	90,500	1978
Panama	29,000	1979
Paraguay	100,000	1979
Peru	100,000	1978
Uruguay	100,000	1978
Venezuela	56,000	1978
TOTAL	1,213,000	

* Input : equipment, specialist consultancies and/or grants.

PREPARATORY PHASE

Approval of the legislation

The basic laws concerning the Programme refer to:

— Presidential Decree 81,798 of 15.6.78.

— Emergency measures.

— Ministry ordinance.

— Authorization entitling veterinarians to enforce the adoption of emergency measures.

Identification of resources

Information on breeding centres and the concentration of swine breeding in different States.

Community mobilization and motivation

The activities of the Programme were developed all over the country, selecting the Southern region as a priority area, where the work began in 1980 on account of the concentration of technologically developed swine breeding farms (44.65%) and the intense movement of animals and products to other regions, and also considering the international borders with other countries, and the concentration of the industrial facilities for processing the pork meat for export, as well as the high risk that this region might present for spreading the disease.

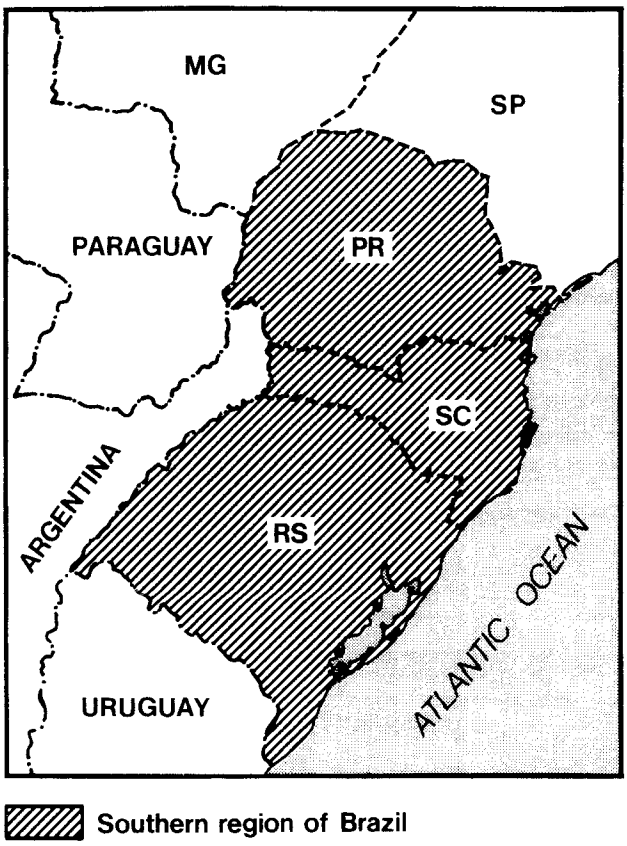
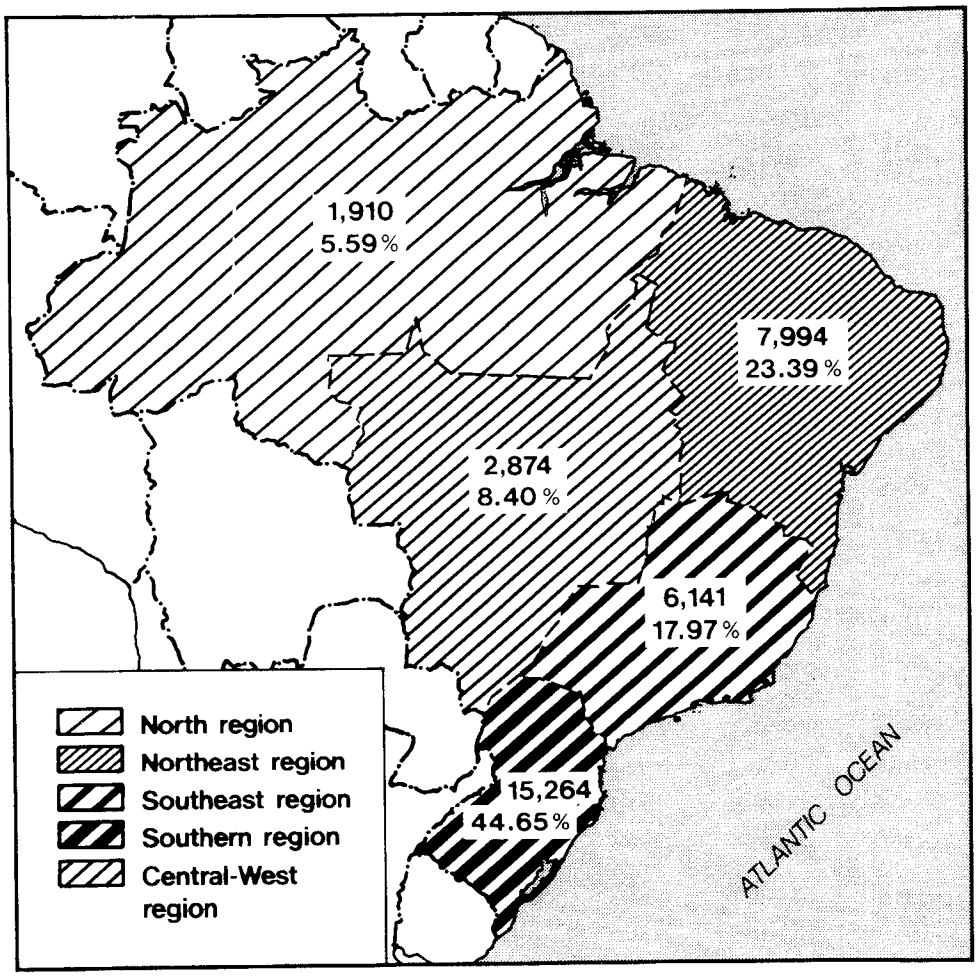


FIG. 1
Principal zone of pork production in Brazil
[States of Paraná (PR), Santa Catarina (SC) and Rio Grande do Sul (RS)]

The Southern region, with 577,723 km², has 15,264,000 pigs (Fig. 1). In the other regions surveillance activities were developed, but the risk of dissemination and maintenance of the disease was small because of the low concentration of herds and the almost non-existent movement of pigs, since the animals were mostly reared for home consumption only (Fig. 2).



Source: Brazilian Institute of Geography and Statistics (IBGE).

FIG. 2
Swine population by region in Brazil in 1980
(one unit = a thousand pigs)

This programme aimed at identifying the areas free from ASF, starting with the Southern region and extending to the other regions.

Serological investigation

This was performed in 1980 on slaughter pigs, six months old, just before slaughter. Such pigs had remained for 6 months at the breeding farms and they represented over 30% of the total swine population.

The total sampling was calculated statistically from data for the relative distribution of the swine population in each district. The serological tests performed

were immunoelectro-osmophoresis (IEOP) (4), with positive results confirmed by indirect immunofluorescence (IFI) (1). In the diagnostic evaluation, 49,643 serum samples were tested and only 80 were positive, representing a proportion of 0.3%, showing that the problem was of small proportion and confined to a well-defined area (3).

Evaluation of the swine population

The rate of development of the swine population is dependent on the capacity of the breeding farms, corn production, the market for meat and other by-products, the activities of the pig farmers, the influence of the by-product industry and the health of the herds. Such development of swine herds can occur very rapidly due to the fast reproductive cycle characteristic of the species. For the three Southern states, where the swine production is most important, there is no evidence of a rapid increase of the swine population, but there has been an increase in pork production, showing that herd productivity has increased in the past three years, as shown in Table III. A decrease in the swine population during the past two years may be due to higher costs of feeding of the animals (such as the high cost of corn and other ingredients), and due to difficulties in obtaining low rate credits.

TABLE III

Production of fresh pig meat from abattoirs under federal inspection, in tonnes

States	1978	1979	1980	1981	1982	1983
PCPS areas						
Rio Grande do Sul	65,699	82,066	86,709	89,502	77,802	82,589
Santa Catarina	59,657	80,196	121,598	133,182	135,977	149,556
Paraná	47,051	63,395	78,917	78,928	66,796	55,803
TOTAL	172,407	225,657	287,224	301,612	280,575	297,948
BRAZIL						
TOTAL	246,344	319,798	394,281	415,998	373,555	380,096

Source : Ministry of Agriculture, Brazil (MA/SNAD/SIPA).

PERIOD OF ATTACK, 1980-1984

DISEASE SURVEILLANCE

Control of international transport of pigs

The inspection of ports, airports and post offices was intensified and, in the last two years, over 7,008 kg of products were confiscated and destroyed under 6,065 orders for seizure and destruction.

Airport supervision has concentrated on flights coming form the risk areas, and all pig products were eliminated. The same control is applied in ports. The country does not import pigs.

Control of the internal movement of pigs

Brazil is a Federal Republic and the various units of the Federation (States, Federal Territory and the Federal District) have their own laws. Because of this, and the regional differences in husbandry methods, social and economic development and the different health standards, a system of control of movement of pigs among the states was developed and is controlled by the Federal Service of Animal Sanitary Defence, by the State services and by official veterinarians.

The system aims at supporting all programmes for the control and eradication of transmissible diseases performed in the country, and the elimination of the possibility of reintroducing animals that may be carrying these diseases.

Interstate transport of animals for slaughter and other purposes (breeding, fattening, reproduction, animal shows, etc.) is allowed only with the certificate of animal health inspection, which is only issued for animals coming from breeding farms (or even regions) that do not have transmissible diseases.

The data obtained is analysed by a computer programme especially developed in order that movements are known, providing information required for epidemiological studies.

The surveillance of movement of pigs aims at supporting the control programmes for classical swine fever and African swine fever. Pigs coming into the Southern region of Brazil (Paraná, Santa Catarina and Rio Grande do Sul States) are submitted to a control and inspection scheme which has been specially developed, comprising serological tests both at the place of origin and destination, where the animals remain isolated before being incorporated into the herds of the region. About 1,407,887 pigs leave the Southern region alive, to be killed in the other regions of the country. The control of movement for other purposes (breeding, fattening, animal shows and fairs) involved a total of 20,320 pigs, of which 10,461 came from the Southern region. Only 287 pigs were brought into the Southern region: to Paraná State: 246 pigs (from Minas Gerais State), and to Rio Grande do Sul: 41 pigs (from São Paulo State), under the control system in force at the place of destination.

Animal shows and fairs

All animals taken to shows or fairs come from herds certified free from ASF and controlled for CSF. These farms are also tested for brucellosis, leptospirosis, tuberculosis and Aujeszky's disease, and the only animals allowed to take part in shows are those identified as negative (in at least 2 tests performed within a period of 3 months).

Active surveillance

The swine diseases (mainly those considered as haemorrhagic diseases and diseases of breeding) are also tested at laboratory level. In this period, 1,364 samples were examined, with 7 positive results for ASF. The last positive specimen occurred in 1981 (Table IV).

TABLE IV
Laboratory diagnosis of ASF in Brazil, 1980-1984

Year	Samples examined	Positive to ASF
1980	270	0
1981	202	7
1982	221	0
1983	427	0
1984*	244	0
TOTAL	1,364	7

* Partial data until November 1984.

At the abattoir, selected samples are collected from sows for laboratory testing. Serological testing is always performed at two levels:

— pigs for slaughter — serum collected at the abattoir, sampled to represent districts, with identification of their origin;

— breeding pigs — the entire herd is examined. In small farms, rearing stock for slaughter (without trade in reproducers), samples are taken according to the following formula:

$$20 + \left(\frac{n-20}{4}\right)$$

n = total number of pigs in the farm

During the four years, the overall tests performed amounted to 288,368 serum samples, of which 128 were positive (0.04%) in 1980 and 1981. This is an excellent result considering that the positive results occurred during the phase of consolidation of ASF eradication. Table V indicates the results of tests performed up to the present day, complementing the surveillance of animals of different ages and of those bred for different purposes (for slaughter and for breeding).

TABLE V
Serological investigation for African swine fever

Year	Serum samples examined	Positive samples Number	Positive samples %
1980	49,643	80	0.16
1981	51,118	48	0.09
1982	59,506	0	0
1983	86,298	0	0
1984	41,804	0	0
TOTAL	288,369	128	0.04

In 1980, serological tests were performed with specimens from animals destined for cold storage plants, in a search for residual cases of the outbreaks of 1979. Since 1981, testing has been carried out on males at the breeding farms. The testing of samples collected at the cold storage plants is retained as a surveillance measure.

CERTIFICATION OF PROPERTIES TESTED

The official programme issues a certificate of the implementation of official control for classical swine fever and freedom from African swine fever. This certificate is valid for 6 months and allows the free movement of animals and their participation in shows and fairs. The basic conditions for the issuing of a breeding farm certificate are :

1. Monitoring by a veterinarian;
2. presentation of at least two negative serological tests, separated by an interval of one to six months, performed on animals for breeding;
3. adoption of techniques compatible with the necessary sanitary control;
4. systematic vaccination against classical swine fever;
5. provision of only one entrance to the farm, with the use of disinfectants (in the proper concentration) to which the virus of ASF is sensitive;
6. provision of a proper disinfectant tray at the entrance to all facilities, and the right concentration of disinfectant to which the virus of ASF is sensitive;
7. replacement of the animals by other pigs from proper herds or by animals from other certified farms, and
8. repetition of tests in breeding herds every six months.

The farms free from ASF represent the "Unit of supervised breeding". Table VI lists the certified breeding farms.

TABLE VI
List of certified breeding farms free from ASF and under control for CSF up to August 1984

State	Certified farms
Rio Grande do Sul	58
Santa Catarina	75
Paraná	52
São Paulo	10
Minas Gerais	1
TOTAL	196

VACCINATION AGAINST CLASSICAL SWINE FEVER (CSF)

According to the programme, there must be a systematic vaccination with live vaccine (e.g. the Chinese strain) against CSF. This activity, plus the other sanitary measures reduced outbreaks of the disease to only three in 1984, all in the Southern region. The control of CSF is important for the surveillance of ASF. During the three years of the programme, about 25 million pigs have been vaccinated.

All other sanitary measures adopted for the control of CSF are directed towards the common swine diseases and will be retained because, with vaccination alone, it is impossible to maintain the control of the situation and to begin its eradication. In the regions of extensive breeding (low technology), the risks of CSF outbreaks are reduced due to the slight movement of pigs and smaller concentration of susceptible animals in a determined area.

The control of CSF is fundamental for its eradication not only to avoid the losses caused by this virus, but also to help in the surveillance for ASF in breeding farms.

RESTRUCTURING OF REGIONAL LABORATORIES FOR DIAGNOSIS AND QUALITY CONTROL OF VACCINES

With the support of specific agreements between various government bodies and LANARA (National Animal Reference Laboratory of the Ministry of Agriculture), it has become possible to appoint various laboratories for serological testing for ASF, namely "Desidério Finamor" Veterinary Research Institute (Rio Grande do Sul), LANARA in São José (Santa Catarina), Marcos Enrietti Institute (Paraná), the Biological Institute (São Paulo) and LANARA (Pedro Leopoldo, MG). In this way, there are now five regional laboratories for serological diagnosis in the country which perform the immunoelectro-osmophoresis (IEOP) test, submitting the positive samples to the indirect immunofluorescence (IFI) test done at LANARA, Pedro Leopoldo, MG. All technicians who make the final diagnosis were trained at the Veterinary Research Laboratory at Maisons-Alfort, France. This laboratory also provided assistance for the establishment of diagnostic facilities in Brazil. These advances have made it possible to perform the most sophisticated diagnosis now used to recognize CSF and ASF. For the diagnosis of ASF, the haemadsorption test on leukocyte cultures and the immunofluorescence test, after inoculation of VERO cells, are used. The serological and virological diagnosis of Aujeszky's disease, Parvovirus and other diseases common to the species are also performed.

The quality of the facilities and techniques used, as well as the high quality of the work performed, has led to international recognition of the Pedro Leopoldo Laboratory as the only Reference Laboratory for swine fever in South America (FAO-IICA). Specific vaccines for CSF are tested in official laboratories: sterility tests, efficiency and inoculation capacity of all batches prepared from the Chinese strain of lapinized swine fever virus.

ANIMAL HEALTH EDUCATION AND TRAINING OF PERSONNEL

Education is essential in all phases of the programme for the awareness and participation of veterinarians, farmers and workers in the meat industry.

The educational material was created using various audio-visual techniques and folders containing animal health information for pig production, for the use of farmers; also, a "Procedures manual" and folders containing information on the collection of material for laboratory tests, for veterinarians, and posters informing those travelling internationally. For all phases of the programme, 719 veterinarians and 4,863 assistants were trained.

INFORMATION SYSTEM

The purpose of this system is to receive reports from all veterinarians on the diseases occurring in breeding farms. A standardized form ("FORM/ASF") is used with the objective of recording the reports, to notify and send information on the antecedents, as well as to alert those responsible for taking action.

The veterinarian responsible for controlling an outbreak of the disease visits the breeding farm at least twice a month and he participates in the tracking of infected animals.

UPDATING SPECIFIC LEGISLATION

Ordinance of the SNAD Secretary, Number 073, of 7.12.81.

All legislation is capable of being updated in order to adapt the procedures to "Service Instructions".

CONSOLIDATION PHASE, 1984-1986

This aims at maintaining and improving the situation and is mainly based upon:

1. Epidemiological surveillance;
2. system of animal disease statistics;
3. control of outbreaks of swine diseases, aiming at differential diagnosis;
4. repetition of the attack phase, when necessary;
5. control of movement of animals.

MAINTENANCE PHASE, 1987

Application of the structure set up for the animal disease surveillance system to pig diseases.

EPIDEMIOLOGICAL ANALYSIS

In general, the slaughter and destruction of pigs did not permit the epidemiological follow-up of outbreaks of ASF. Meanwhile, in Santa Catarina, even with control measures applied to breeding farms, the slaughter activities were delayed and enabled the following analytic results to be obtained:

a) The attack rate averaged 7.51%.

b) The lethality rate averaged 72.64% but, in 18 out of 26 outbreaks, it reached 100%.

c) The maximum attack rate was 71.73%, and the minimum, 0.18%. These figures indicate that some of the outbreaks may not have been caused by the ASF virus even though they were confirmed by laboratory tests, because a single agent cannot present such inconsistent morbidity rates. They may indicate false negative results due to technical errors in the sending or handling of the samples in some cases. This aspect was important in the strategy to speed up eradication, and to avoid the risk of false-negatives that could maintain the disease.

d) Considering the swine population of the districts with outbreaks of ASF, the morbidity was 7.16 per 10,000 and the mortality 52.05 per 100,000. Considering the swine population of the state, morbidity was 1.3 per 10,000 and mortality 9.7 per 100,000.

In 1978, the serum samples stored since 1976 were examined by IEOP, and some gave positive results. This fact raised doubts about the first outbreak identified in

the country which, at the time, was considered as probably not having been the primary outbreak and that the disease had already spread to the national breeding farms. After intensive serological testing and the small number of positive results found, it may be concluded today that those tests performed with serum samples stored since 1976 presented false-positive results and that the first outbreak of ASF identified in Brazil — Paracambi/Rio de Janeiro — was, in fact, the primary outbreak. Our opinion is based upon the results of retrospective tracking serology with negative results, and upon the evidence that the IEOP test showed a certain number of false-positives confirmed in the analysis of 434 samples positive by the IFI test (3).

SOME FACTORS WHICH ASSISTED IN THE IDENTIFICATION, ELIMINATION AND ERADICATION OF THE ASF EPIZOOTIC IN BRAZIL

Identification

A pig owner had changed the brand of feed given to his pigs and attributed the mortality to food poisoning, requesting compensation through the veterinarian representing the feed industry.

The veterinarian responsible for the feed industry searched for a diagnosis to exclude poisoning and requested help from the specialists of the Brazilian Enterprise of Agricultural and Animal Research (Embrapa) and from the Rural University of Rio de Janeiro, who suspected ASF. A consultant of the university confirmed the suspicion, due to his knowledge of the disease in other countries. His diagnosis was subsequently confirmed by another consultant of the PAHO and by LANARA (Pedro Leopoldo).

Evidence was found on the premises of feeding pigs with food waste from international flights; the pig owner worked at the international airport of Rio de Janeiro.

Elimination

The sanitary authorities immediately ordered the killing and destruction of the animals on the affected premises even though the laboratory diagnosis was non-existent. The limit of the outbreak area was immediately set, on the basis of epidemiological analysis. Live pigs were also eliminated and destroyed.

When the report from the Reference Laboratory for ASF in the United States* was received, the animal health authorities assumed responsibility for the adoption of eradication measures, as they considered the cases presented highly suggestive indicators of ASF. This instance may have led to the notification of some outbreaks, in reality, false positives, in the period between 1978 and 1979. This led to disbelief in the technical world and in the community in general, but these measures also contributed to the success of the eradication work.

An activity named "garbage operation" was included in the eradication campaign and it was based upon the registration and elimination of pigs kept in public garbage plants, slums, etc. This work, with emphasis on the urban centres of Rio de Janeiro, Espírito Santo and São Paulo, was performed with the participation of the

* Plum Island Animal Disease Center, USDA.

Health Ministry and Military Police. The social impact was enormous, due especially to warnings from the media that the government was taking nourishment from the poor or, alternatively, that this disease was a dangerous pest capable of infecting the whole population. The denials caused great controversy and the political repercussions led to the creation of parliamentary groups of enquiry to check the technical actions. Even with all the controversy, the activity was responsible for the end of the transmission cycle of the disease in the non-industrialized breeding establishments.

Eradication

— The adoption of a slaughter policy in the confirmed outbreak areas and in those areas of suspicion of ASF.

— Stratification of the herds, showing a low density of pigs/ha in most of the country, 60% of the owners having fewer than 50 animals. In these instances, the disease control was deficient, the pigs were fed waste food, but there was practically no transport of animals, these being destined for home consumption. On the other hand, the occurrence of the disease under these circumstances could pass unnoticed, its spread being self-limiting.

— The tick *Ornithodorus* has not been identified by the National Council for Scientific and Technological Development and has not been recorded by parasitologists. In general terms, classical and African swine fever were regarded as indistinguishable at the field level and for their impact on the action policy.

RESOURCES

In the emergency phase, the country had financial support from the FAO, for installation of the diagnostic laboratory, and also the technical and scientific support of consultants from various international organizations and of other countries. The specific funds for activities in the emergency phase and of the eradication programme came from the Government budget. The applied and estimated resources are expressed in readjustable national treasury bonds:

— Emergency stage: 1,796,984

— First stage (1980-1983): 358,865

— Estimated second stage (1984-1986): 1,312,328

It is clearly seen that the funds used in the two years of the emergency phase were greater than those given for the first and second stages of the eradication programme (6 years).

RESULTS AND CONCLUSIONS

From November 1981 until September 1984, there has not been one diagnosis of ASF in Brazil, that is in a total of 34 months. All outbreaks of ASF were eliminated by stamping-out procedures, and the serological tests for surveillance have been negative. This fact, and the absence of confirmation of the disease, excludes the possibility of existence of ASF virus.

The country is once again free from ASF. In order to maintain this position, the animal disease surveillance will be increased in the main areas of pig concentration and the State of Rio de Janeiro will be submitted to a special control of inspection at ports and airports, due to the occurrence of the disease in some European (Spain, Portugal) and African countries and also due to the intense air traffic and tourism between these countries and Brazil.

Because of its continental situation (8,511,965 km^2) and due to the concentration of swine in the Southern region, traffic control between this and other regions of the country will be maintained since, with this eradication programme for ASF, it has been possible to control other diseases of the species, namely classical swine fever (hog cholera). On 9 September 1983, the Southern region was declared free of ASF and, eventually, other diseases such as CSF may be included in this declaration.

The tick *Ornithodorus*, an inveterate reservoir of ASF virus, which can play an important role in its transmission, has not been identified in Brazil, even after research and reports by specialists in the area. On the other hand, the inoculation of the "Brazil 78" strain of ASF virus into insects and ticks (*Boophilus microplus*) showed little capacity of the strain to multiply in comparison with the strain "Lisboa 60" (2).

These facts lead us to believe that ASF virus probably did not find proper ecological conditions for its adaptation, interrupting in this way the transmission cycle and maintenance of the disease. This fact, in association with the unfavourable temperatures, may be the reason for more difficult dissemination of the disease under our home conditions.

It is vital to maintain surveillance, especially when a disease stops occurring. In this sense, the serology must be maintained in order to better analyse the region in question, and to make the authorities and veterinarians aware of a need for continuity in an official pig health programme. The costs of maintaining the programme are lower in comparison with the costs of an emergency, quite apart from the violent sociological impact caused by emergency action.

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ÉRADICATION DE LA PESTE PORCINE AFRICAINE AU BRÉSIL. — T.M. de Paula Lyra, V.E.V. Saraiva, G.R. Hermida Lage et M.S.R. Samarcos.

Résumé : *Plusieurs foyers de peste porcine africaine (PPA), apparus au sud du Brésil en 1978 et 1979, ont conduit les autorités brésiliennes à appliquer des mesures sanitaires d'urgence. Dans les 224 foyers de PPA identifiés, 66 966 porcs ont été détruits. Pour réaliser simultanément l'éradication de la PPA et le contrôle de la peste porcine classique (PPC), un vaste Programme national a été lancé en novembre 1980. Il prévoyait trois phases d'action :*

— *Phase d'attaque (1980-1984)*

— *Phase de consolidation (1984-1986)*

— *Phase d'entretien (1987)*

Dans la phase d'attaque, le Programme comprenait une surveillance de la maladie à plusieurs niveaux : transports internationaux, mouvements de porcs

dans le pays, contrôle sérologique et clinique dans les élevages et les abattoirs, déclaration des exploitations indemnes de PPA. Les autres volets du Programme étaient la vaccination systématique contre la PPC, la restructuration des laboratoires régionaux, la formation du personnel de santé animale, et l'amélioration du système national d'information. Les phases de consolidation et d'entretien avaient pour but de continuer la surveillance épidémiologique dans le pays et, le cas échéant, l'extinction rapide des nouveaux foyers de PPA.

Le Programme s'est révélé efficace puisqu'aucun foyer n'a été signalé de novembre 1981 à septembre 1984 et que le pays a été déclaré de nouveau indemne de PPA en décembre 1984.

MOTS-CLÉS : Brésil - Contrôle de qualité - Epidémiologie - Eradication - Laboratoires - Peste porcine africaine - Peste porcine classique - Prophylaxie - Techniques de diagnostic - Vaccination.

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ERRADICACIÓN DE LA PESTE PORCINA AFRICANA EN BRASIL. — T.M. de Paula Lyra, V.E.V. Saraiva, G.R. Hermida Lage y M.S.R. Samarcos.

Resumen : *Varios focos de peste porcina africana (PPA), que se presentaron en el Sur de Brasil en 1978 y 1979, condujeron a las autoridades brasileñas a aplicar urgentes medidas sanitarias. En los 224 focos de PPA identificados, se destruyeron 66.966 cerdos. Para llevar a cabo simultáneamente la erradicación de la PPA y el control de la peste porcina clásica (PPC), en noviembre de 1980 se promovió un amplio Programa nacional, en el que se preveían tres fases de acción :*

— *Fase de ataque (1980-1984)*

— *Fase de consolidación (1984-1986)*

— *Fase de mantenimiento (1987)*

En la fase de ataque, el Programa incluía la vigilancia de la enfermedad a varios niveles : transportes internacionales, movimientos de cerdos en el país, control serológico y clínico en granjas y mataderos, certificación de las granjas declaradas libres de PPA. Los demás capítulos del Programa eran la vacunación sistemática contra la PPC, la reestructuración de los laboratorios regionales, la formación del personal de salud animal, y el mejoramiento del sistema informativo nacional. La meta que se proponían las fases de consolidación y mantenimiento eran proseguir la vigilancia epidemiológica en el país, y llegado el caso, la rápida extinción de los nuevos focos de PPA.

El Programa resultó eficaz por cuanto no se registró ningún nuevo foco de noviembre de 1981 a septiembre de 1984, siendo el país declarado de nuevo libre de PPA en diciembre de 1984.

PALABRAS CLAVE : Brasil - Control de calidad - Control sanitario - Epidemiología - Erradicación - Laboratorios - Peste porcina africana - Peste porcina clásica -Técnicas de diagnóstico - Vacunación.

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