SOUTH AFRICA

NATIONAL DEPARTMENT OF AGRICULTURE

NATIONAL DIRECTORATE VETERINARY SERVICES

SUBMISSION TO THE FOOT AND MOUTH DISEASE & OTHER EPIZOOTICS COMMISSION OF THE OIE FOR THE RE-INSTATEMENT OF A FOOT AND MOUTH DISEASE FREE ZONE WITHOUT VACCINATION

AUGUST 2001

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1.1. SHORT HISTORY OF FOOT- AND- MOUTH DISEASE (FMD) IN SOUTH AFRICA

Hutcheon made the first official record of foot-and-mouth disease (`klouwsiekte' or also known then as tongue or hoof sickness) in South Africa in 1892, when an outbreak occurred in Griqualand West . The scourge was, however well known to several farmers and, according to information obtained from other older inhabitants, it had been prevalent in South Africa for many years before this outbreak was reported. In the two following years mild epizootics occurred in different parts of the country, but the disease never assumed serious proportions, and no further outbreaks were reported after 1895.

In April 1903 foot-and-mouth disease reappeared in South Africa. This was caused by shipments of cattle from Argentine to the Cape Peninsula. Fortunately the disease was confined to two places only, namely a farm where the imported cattle were kept and a local dairy that harboured a runaway heifer from the Argentine shipment. Both areas were immediately placed under strict quarantine and premises were thoroughly disinfected. At the end of July the same year, there was no further evidence of the disease, and the quarantine restrictions were raised.

After the Rinderpest pandemic, foot-and-mouth disease disappeared from the region until April 1931, when it occurred in Zimbabwe. The reappearance of the disease was a source of great consternation at the time as the ability of buffalo to provide a reservoir of infection was unknown and many people believed that the infection had been re-introduced by imported animals or animal products, although no evidence for this could be found. In South Africa only the SAT1, 2 & 3 serotypes have ever been diagnosed prior to the introduction of Type O in September 2000 (KwaZulu-Natal).

Foot-and-mouth disease has occurred regularly in most southern African countries since 1931, during which, time and cost of control has undoubtedly eclipsed that of other viral diseases.

Foot and mouth disease (FMD) is a controlled disease in South Africa. It is endemic in the Kruger National Park (KNP) where the African buffalo (*Syncerus caffer*) act as the main carrier of the disease. They maintain the 3 SAT serotypes. The area adjacent to the KNP constitutes the FMD control or restricted area acting as a surveillance area between the endemically infected KNP and the FMD free zone. As no outbreaks of FMD had occurred in the FMD free zone since 1957 and no vaccination practiced in this area, South Africa applied to the International Committee of the OIE in 1995 to be allocated FMD free status without vaccination. The International Committee of the OIE subsequently during its meeting in May 1996, zoned South Africa free from FMD without vaccination. The areas excluded from the zone are the endemically infected Kruger National Park and the FMD control areas along the KNP and along the areas bordering Swaziland, Mozambique, Zimbabwe and Botswana.

The last outbreak of FMD, prior to 2000, in the free zone was in 1957 and the last outbreak in domestic animals within the FMD control zone adjacent to the KNP, was in 1983.

1.2. FOOT AND MOUTH DISEASE CONTROL POLICY IN SOUTH AFRICA

Prior to the first outbreak of the disease in the free area in September 2000, the only FMD control or restricted areas were the endemically infected KNP and a FMD surveillance zone stretching from the Ingwavuma area in northern KwaZulu-Natal bordering southern Mozambique all along the borders of Swaziland, the KNP, Zimbabwe and Botswana ( ). These areas are identified in terms of clear natural geographical borders and are excluded from the FMD free zone without vaccination. Limited vaccination is carried out twice a year along a small strip of land along the southern and western boundaries of the Kruger National Park within the surveillance zone (trivalent SAT 1, 2 & 3 vaccines). Strict movement control is enforced to prevent the movement of vaccinated animals from the restricted to the free zone and is reliant on a permit system.

Foot and mouth disease is a controlled (notifiable) disease in accordance with the Animal Diseases Act (Act 35 of 1984). The Regulations promulgated in terms of the Act lay down the more detailed requirements for disease control and measures to be taken in the event of an outbreak and to prevent the introduction of the disease through imports of animals and animal products.

The national Director of Veterinary Services constituting the *Veterinary Administration* as outlined in the *Code*, controls all Regulatory matters for disease control and also has legal precedence over the veterinary administrations of provincial veterinary authorities for disease control purposes.

Surveillance activities within the FMD restricted zone are carried out by para-veterinary personnel (Animal Health Technicians) under the control of a state veterinarian. The frequency of inspection of cloven-hoofed livestock in the FMD control areas varies from 7 - 14 days (7 days in the vaccination area and 14 days in the surveillance area). Sero-surveillance is only done from time to time to determine the immune status of animals within the limited vaccinated areas. Serum samples are submitted for testing prior to the translocation of animals and for export certification purposes. Active and passive surveillance is carried out on an ongoing basis within the KNP to monitor the incidence of the disease in wildlife—specifically African buffalo and impala.

In the free areas, surveillance for disease is done on an ongoing basis together with other disease control interventions (e.g. TB testing, etc.)

1.3. SUMMARY OF THE FOOT AND MOUTH DISEASE OUTBREAKS IN 2000/2001

South Africa lost its FMD-free status without vaccination after an outbreak of FMD virus type O was diagnosed on 14 September 2000 in a piggery in the district of Camperdown in KwaZulu-Natal (See 1.6,). It was the first time ever that Type O FMD virus was diagnosed in South Africa, which was presumably introduced with galley waste from a by-passing ship at Durban harbour and fed to the pigs. The disease was confined to a small area of 15 km radius within the Camperdown district. Stamping out was immediately instituted with limited vaccination after the disease spread to a 3rd focus, bordering the communal grazing areas. The disease was effectively brought under control with no further clinical cases after 5 November 2000. The Camperdown district will remain a controlled area for foot and mouth disease until November 2002, in accordance with Article 2.1.1.6 of the OIE International Animal Health Code.

On 29 November 2000 an outbreak of the disease was diagnosed in a cattle feedlot in the district of Middelburg in the Mpumalanga Province ( ). The feedlot is within the FMD free area. The virus type responsible was SAT1 and partial sequencing of the VP1 gene indicated that the virus causing the outbreak was related to buffalo isolates previously obtained from the south of the KNP. Emergency vaccination was immediately applied at the feedlot in accordance with Article 2.1.1.6 of the Code with the aim of slaughtering all the vaccinated cattle within a reasonable time. Slaughtering of the almost 15 000

cattle in the feedlot was concluded on 19 March 2001. The disease was only diagnosed in cattle in the feedlot. The almost 52 000 pigs in a separate holding in the feedlot never contracted the disease in the presence of strict bio-security measures. The pigs were vaccinated once only. All marketable pigs were slaughtered for the local market under strict veterinary control by the end of July 2001. The only remaining vaccinated animals in this strict quarantine facility are the commercial cattle that will all be slaughtered by the end of October 2001 and the breeding pigs that never developed the disease and were only vaccinated once.

Trace-back actions following the outbreak in the feedlot resulted in a suspicion that the origin of the disease was from possible buffalo/cattle contact in the Lowveld area of Nkomazi, bordering the southern KNP ( ). This area is part of the FMD control zone. Stray buffalo movements were observed after devastating floods in the first quarter of 2000, with subsequent severe damage to the southern and western KNP fence. Suspect lesions and healed lesions were detected and possible infection was later confirmed by the 3ABC ELISA at 3 dipping tanks. Clinical lesions were observed at only one dipping tank bordering on the Nkomazi/Swaziland border, and virus was isolated and typed as SAT 1. The whole area was immediately vaccinated, and vaccination was repeated after 3 weeks. No animals were culled. No further clinical cases were observed and all emergency restrictions applied during the outbreak were lifted on 31 March 2001. The area is within the FMD control area, as identified by the OIE, and falls outside the allocated FMD disease-free area.

On the 1st of February, FMD lesions were detected in cattle at a dipping tank in the Mhala district, within the foot and mouth disease control area of the Northern Province bordering the KNP ( ). As with the Nkomazi outbreak, contact between stray buffalo and cattle, following damage to the KNP fence after the floods, was probably the most likely cause of the outbreak. This was confirmed when nucleotide sequencing of a part of the VP1 gene indicated that the virus causing the outbreak was related to buffalo isolates previously obtained from the adjacent areas of the KNP. In this case the SAT2 FMD virus was diagnosed as the causative virus. The same control strategy as with the outbreak in Nkomazi was followed, with intensive vaccinations, strict movement control and surveillance. The restrictions will be lifted at the end of August 2001. The area will remain within the foot and mouth disease control area and also falls outside the proposed foot and mouth disease free area.

In summary, there were two outbreaks in the area previously recognized by the International Committee of the OIE as disease free without vaccination (Camperdown and Middelburg feedlot) and two outbreaks in areas previously excluded from the disease-free area i.e. within the FMD control area (Nkomazi and Mhala). Only the outbreaks in the previously disease-free areas would in terms of Article 2.1.1.6 of the Code, endanger the previously disease-free status.

1.4. RATIONALE FOR REQUEST OF SOUTH AFRICA FOR THE RE-INSTATEMENT OF ITS DISEASE-FREE STATUS WITHOUT VACCINATION

South Africa requests the Foot and Mouth Disease and other Epizootics Commission to consider the re-instatement of a zone within the country free from foot and mouth disease without vaccination as from 1 February 2002. The zone is essentially the same as the area previously recognized by the FMD Commission, with the exception of the district of Camperdown within the province of KwaZulu-Natal now excluded from the previous free zone. The rationale for the request is the following:

1.4.1. The serotype O outbreak in Camperdown was well contained with no infection detected after 5 November 2000. Due to reasons described in the report, the Veterinary Administration had to apply a limited vaccination strategy following an initial approach of total stamping out. Although there is no more active infection within the area under restriction and future vaccinations are prohibited, the area will only qualify for disease freedom without vaccination on 5 November 2002, in accordance with Articles 2.1.1.4 and 2.1.1.6 of the Code (a period of 12 months where no vaccination has been carried out and 2 years after the last case). This area would therefore be excluded from the previous free zone.

1.4.2. The second outbreak in the previous free area, the SAT 1 outbreak in the feedlot at Middelburg, was controlled on the principle of emergency vaccination and stamping out (controlled slaughter) in accordance with Article 2.1.1.6 of the Code. The infection only occurred in the cattle in the feedlot. All the cattle were slaughtered under strict veterinary control for local consumption. The disease never spread to the piggery on the farm. The pigs were vaccinated once as a precautionary measure. All marketable pigs were slaughtered at the end of July for local consumption. The vaccinated commercial cattle on the feedlot will all be slaughtered by the end of October 2001. A period of 3 months calculated after the slaughter of the last bovine after emergency vaccination, would be 1 February 2002.

1.4.3. The outbreaks in Nkomazi and Mhala were both in the FMD control zone adjacent to the Kruger National Park, which are not included in the free zone without vaccination.

1.5. FORMAL REQUEST FOR CONSIDERATION

The Foot and Mouth Disease and other Epizootics Commission is requested to reinstate a zone free of FMD in South Africa as from 1 February 2002, comprising the zone previously approved by the International Committee of the OIE with the exclusion of the district of Camperdown within the Province of KwaZulu-Natal. The previously approved free zone includes the whole of South Africa, excluding the Kruger National Park and the FMD control areas in the district of Ingwavuma and Camperdown (now excluded from previous free area) in the province of KwaZulu-Natal and the FMD control areas of the provinces of Mpumalanga and Northern Province.

2. FMD OUTBREAKS IN SOUTH AFRICA — COMPREHENSIVE REPORT

2.1. OUTBREAK OF FMD SEROTYPE O IN KWAZULU-NATAL (KZN) (SEPTEMBER - NOVEMBER 2000)

2.1.1. HISTORY

FMD has not occurred in Kwazulu-Natal (KZN) for more than 50 years. An FMD control area is maintained in the north of the Province along the international border with Mozambique and Swaziland. FMD vaccinations have been carried out within this control area from 1988 to 1993 when vaccination was limited to the control areas along the Kruger National Park. The area however remains under strict surveillance for foot and mouth disease with movement control.

The farming practices in the province can be divided into commercial activities (including intensive pork and beef production, as well as dairy and extensive beef production) and the communal (or traditional) areas where a system of communal grazing is practised. Cattle in these areas are dipped at 1066 government maintained and financed dipping tanks and are inspected at regular intervals by the local technical staff. Of the 2.3 million cattle in the Province 61 % are owned by the communal farmers, as are 25% of the sheep and 95% of the goats.

The province of KZN is divided into 51 administrative districts. The FMD outbreak was confined to one district only and a total of 16 districts were declared a control area during the control operation (See Fig.4)

For disease control purposes, the province of KZN is divided into 13 state veterinary areas each headed by a state veterinarian supported by trained animal heath technicians. A total of 108 technicians are employed. There are also 124 fence guards responsible for the fences and movement control in the FMD control area along the Mozambique border.

The province has two veterinary laboratories, the main provincial laboratory situated in Pietermaritzburg and a smaller laboratory situated in the north of the province at Vryheid. The Exotic Diseases Division, Onderstepoort Veterinary Institute performs all diagnostic tests for foot and mouth disease. The laboratory at Pietermaritzburg was responsible for the recording, packing and submission of the specimens during and after the disease outbreak as well as the correlation and reporting of results.

2.1.2. CONTROL MEASURES PRIOR TO OUTBREAK

Within the Province, strict FMD control measures were confined to the zone along the Mozambique border due to the perceived risk of the introduction of FMD from Mozambique.

The international border, of approximately 65 km in length, is controlled by the National Department of Agriculture and any illegal introduction of livestock is followed up with assistance from the Stock Theft Unit of the South African Police Service.

Approximately 20 km from the international border, a second control fence is maintained by the Provincial Department of Agriculture. The area between this fence and the international border is the FMD control zone. Cloven-hoofed livestock within the control zone are inspected at communal dip tanks on a 14-day cycle. Cloven-hoofed animals may only move out of the control area after quarantine and inspection in official quarantine camps. All movements into, within or out of the area are controlled by veterinary permits.

Products of cloven-hoofed animals are also subject to inspection before movement and veterinary permits are issued for movements out of the control area.

Within the rest of the province, FMD surveillance is combined with routine farm visits by officials, usually for tuberculosis and brucellosis testing. Surveillance also takes place during the inspection of all livestock at sales and the ante mortem and post mortem inspections of all livestock slaughtered at abattoirs. The commercial farming areas are also well serviced by a network of more than 60 private veterinarians.

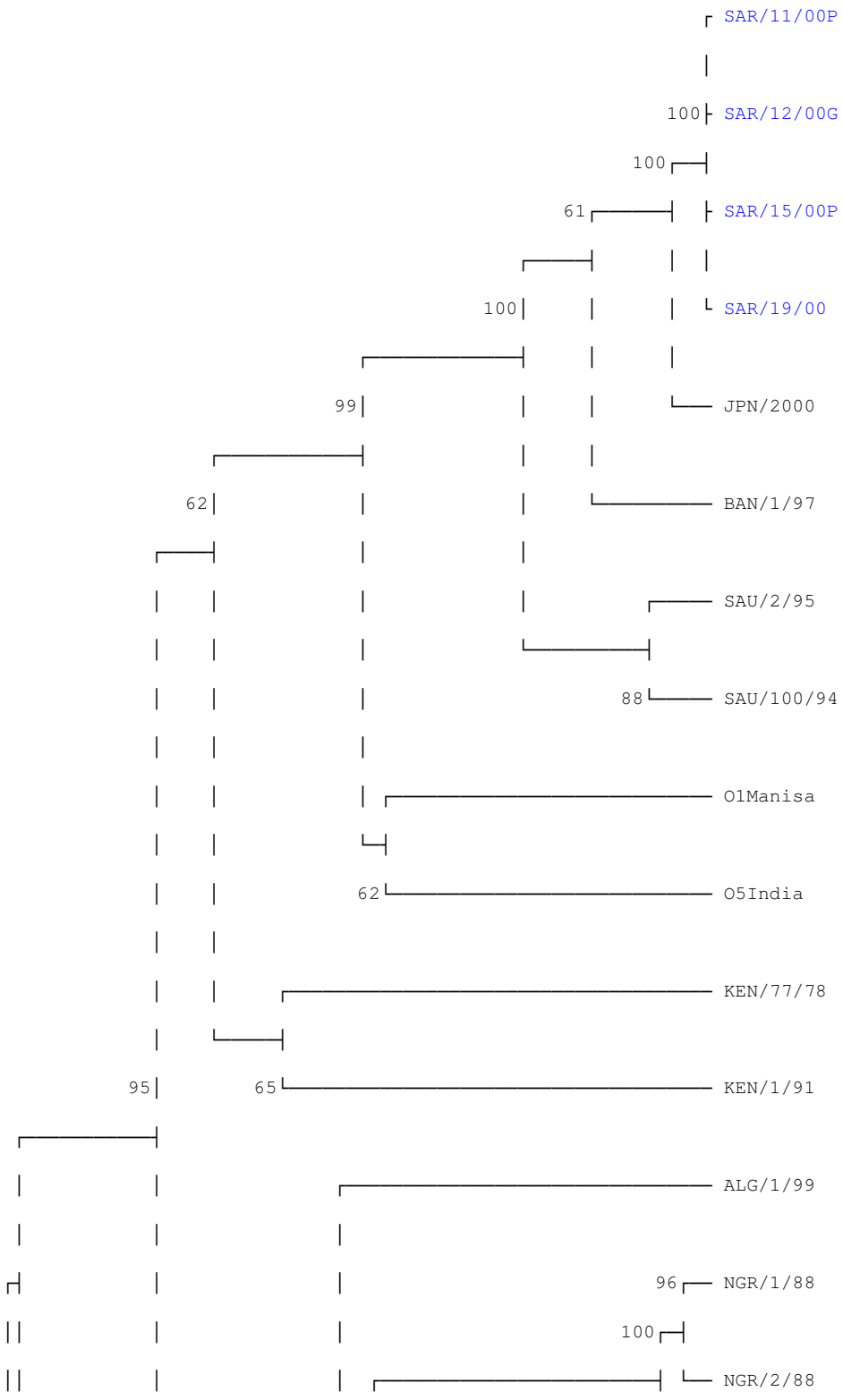
2.1.3. SYNOPSIS OF THE OUTBREAK OF FOOT AND MOUTH DISEASE

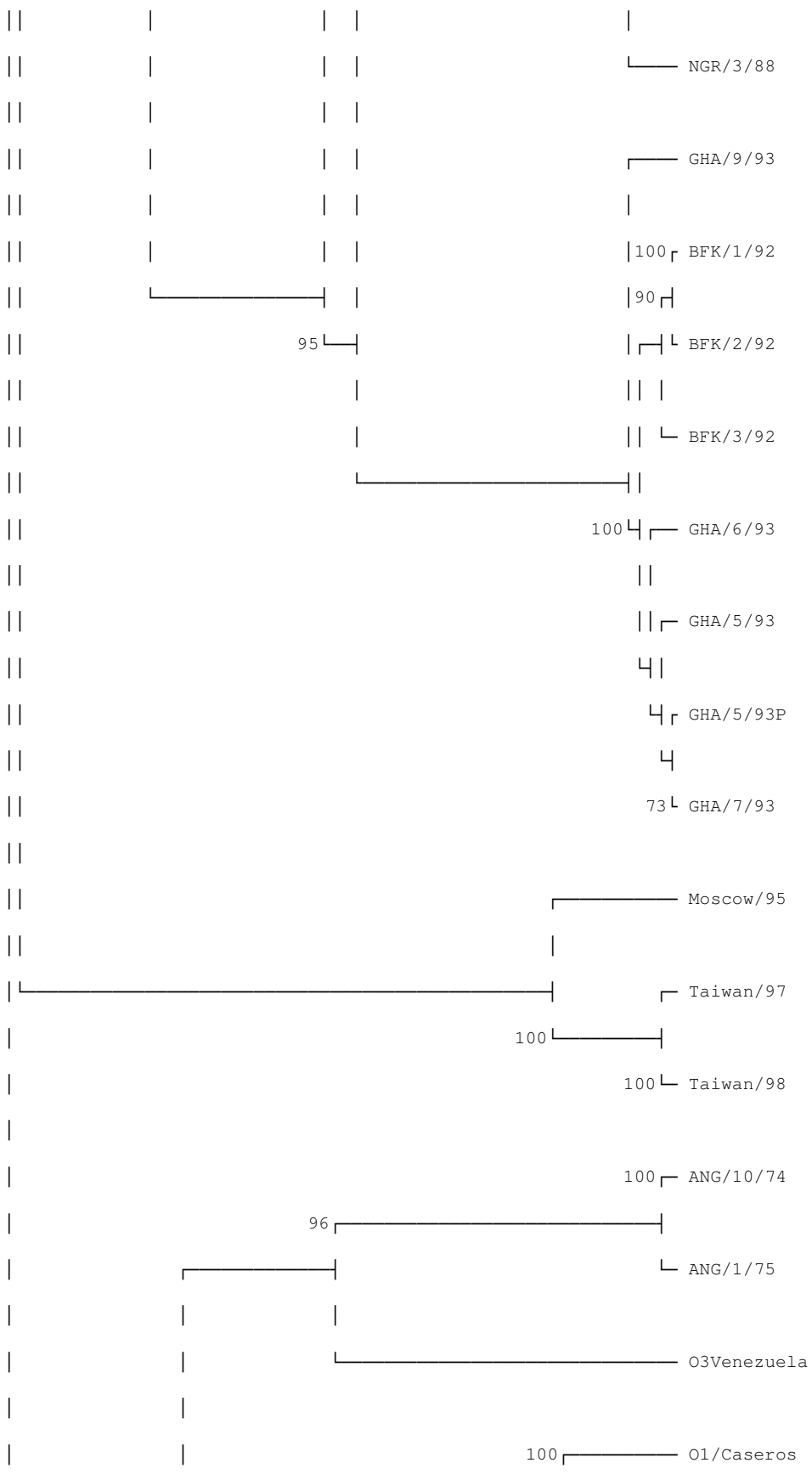
A private veterinarian investigated deaths in pigs on a farm in the Camperdown district and samples were submitted to a private pathologist. Vesicular lesions were detected and the local State Veterinarian was informed and investigations commenced.

Samples taken from swill-fed pigs on Tifton Farm, Camperdown on 14 September 2000 were confirmed positive for the FMD virus at the Exotic Diseases Division, Onderstepoort Veterinary Institute, Pretoria on the 15 September 2000. This initial diagnosis was made by using the sandwich ELISA to detect viral antigen, the serotype O specific PCR to detect viral genomic material and virus isolation on primary pig kidney cells and the liquid phase blocking ELISA to detect antibodies.

Partial sequencing of the 3' end of the VP1 gene was used to determine the phylogenetic relationships between various isolates made during the outbreak. These sequences were also compared to other serotype O isolates to determine a possible origin of the exotic virus found in South Africa. The isolates made from pigs, cattle and goats were all 100% homologous over the region sequenced and closely related to the Japan 2000 isolate. They fall into the Pan-Asian lineage, which points to a possible origin in

Asia (see Fig.5). This serotype has never been seen before in South Africa, whereas types SAT 1, 2 and 3 are endemic in the KNP.

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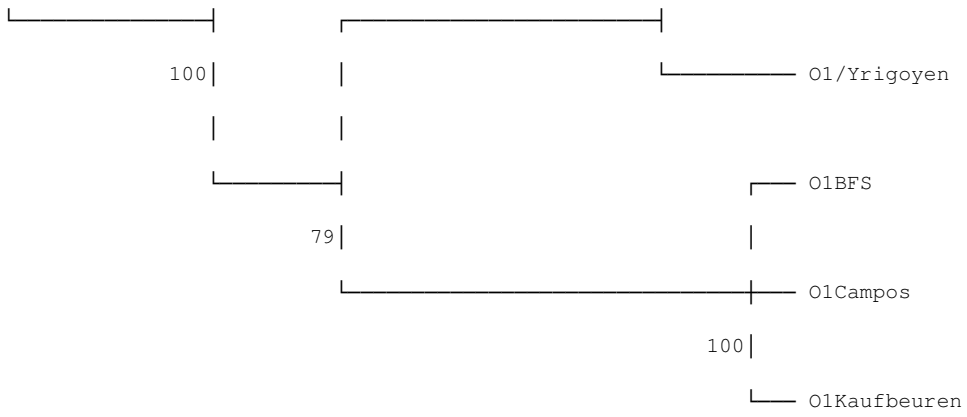

Scale: each ———————— is approximately equal to the distance of 1.79% *Compiled by Dr RM Dwarka, 15/06/2001, OVI-EDD*

Fig.5: UPGMA tree depicting VP1 gene relationships of O-type viruses. The South African outbreak strains are indicated in blue

It was suspected that the virus was brought into the country in swill derived from galley waste from shipping in Durban harbour, which was later fed to the pigs on Tifton Farm (labelled as "Original FMD outbreak" in). An investigation was launched to ascertain the source of the virus but the country of origin and the ship involved were never established.

2.1.3.1. Summary of outbreak

14th Sept	-Samples taken from Tifton Farm Camperdown District (30° 31' 59.2" E : 29° 44' 52.8"S). Tifton Farm is labelled as "Original FMD outbreak" in
15th Sept	-Confirmed positive type O, FMD virus
16th Sept	-Trace back of animal, human and vehicle movements started, all other properties visited by the farm staff and private veterinarian inspected and placed under quarantine
16th Sept	-The FMD control centre was established/call up of staff/ intensive surveillance begun/permit control started/culling of pigs on Tifton farm started
17th Sept	-Culling and burial of 677 pigs, 5 sheep and 14 goats on Tifton completed
18th Sept	-Quarantine notices served on all farms within 3 km of Tifton
	-10 km quarantine zone established with prohibition of movement of all animal and animal products ( )
	-Roadblocks established with assistance of Security force personnel
	-Intensive surveillance on surrounding farms

	-Further 20 km surveillance zone identified with movement controls and surveillance ( )
20th Sept	-Positive samples detected in one cow on Esparanza (neighbouring farm) during routine surveillance. (30° 32' 50.9" E 29° 44' 40.1 S) This farm is also part of the label "Original FMD outbreak" in Fig.4. A total of 5 clinical cases were seen during culling operation
	- Pigs on farm not infected but decision taken to destroy all animals on farm
22nd Sept	- To ensure that no animals enter the export trade, a total of 16 magisterial districts were declared as a FMD control area ( ).
	Movement control instituted with inspections before any movement of cloven-hoofed livestock or their products was allowed
29th Sept	-All cattle and pigs on Esperanza slaughtered, farms disinfected and surrounded by razor wire
	-3 km depopulation zone using natural barriers was identified around the two infected farms and depopulation started
1st Oct	-Depopulation of 3 km zone completed
10th Oct	-Positive FMD found on Thornhill farm (5 kms from original outbreak, geographical location: 29^0 42' 54.4" S 30^0 32' 50.9" E (, labelled as "First extension of FMD")
11th Oct	- All 19 livestock on Thornhill slaughtered
	-Sanitary cordon placed around infected zone by Security force personnel, including horse and foot patrols
	-Meetings held with traditional leaders in the surrounding communal areas
	-Fence erected to limit cattle movement into infected area
23rd Oct	-Positive animals identified in Killarney valley ( )
30th Oct	-Clinical cases identified in communal areas of Mophela/ Sankontshe. These areas border directly onto the Killarney Valley farms
	-Increased culling area identified and culling operations commence
8th Nov	-Completion of culling operations with 982 cattle, 1 102 pigs, 122 sheep and 814 goats being culled. During culling operations 37 animals seen with clinical symptoms
5th Nov	-Last clinical case seen during culling operation at the Eston culling site
8th Nov	-Four positive serological results obtained on samples collected during routine surveillance

	from cattle at a diptank in Valley of Thousand hills, using the liquid phase blocking ELISA ( ). No clinical cases seen. Samples retested using liquid phase blocking Elisa and results confirmed (log titres equal to or greater than 1.6). Samples retested using Virus Neutralization Test and proved to be negative (log titres equal to or less than 1.3). Results using 3 ABC Elisa were negative.
	-Due to these results the decision was taken to greatly increase the control zone and to implement a policy of vaccination due to the logistical difficulties of a large culling operation in the communal areas
11th Nov	-The diptank was revisited and a further 108 samples collected. These tested negative. For confirmation of these results all samples were submitted to the OIE World Reference Laboratory (Pirbright United Kingdom)
30th Nov	-The final results were received from Pirbright confirming the negative status of this diptank area
	-The conclusion was that this diptank area was not infected. As it had been more than 30 days since the last positive case in the Killarney Valley area, the enlarged control area was reduced to the original 30 km radius
Dec 2000	-During December all properties in the 16 magisterial districts previously declared as the FMD control area, were visited and inspected and random serum samples taken
Nov. to Feb	-A total of 9 738 cattle, 1 219 sheep and 1 457 goats were vaccinated within the disease control zone of 15km within the Camperdown district. All vaccinated animals were branded with a "F" brand on the left neck or cheek at the time of vaccination
Feb 2001	-Vaccinations ceased and surveillance continues in control area

Due to the sensitivity of the public mainly as result of intensive press coverage of the outbreak, numerous reports of suspicious cases were reported to state veterinarians throughout the province. These were all followed up, with an inspection by an official and collection of samples if needed. All these cases proved to be negative.

2.1.3.2. Definition of area

It was decided after the initial surveillance results from the surrounding farms that a 10 km quarantine zone with strict movement controls and surveillance would be established. This was later expanded to 15 kms after the disease was confirmed in the adjoining communal area. The quarantine zone was surrounded by a further 20 km surveillance zone, in which increased surveillance was carried out. Movement control was also enforced. A further 16 magisterial districts were proclaimed in the Government Gazette as a foot and mouth disease control area with movement control and a prohibition of exports from this area ( ).

2.1.3.3. Animals at risk

Out of the 3,6 million head of cloven-hoofed livestock in the province, 260 000 were regarded at risk, as they occurred in the Camperdown magisterial district and the 6 adjoining districts.

Since the 5th November 2000, no clinical cases or positive serum samples outside the vaccination zone have been detected.

2.1.3.4. Field Surveillance results

2.1.3.4.1. *During Outbreak*

A total of 367 168 physical inspections and 34 324 serological examinations were recorded during the period 16 September 2000 until end of January 2001 within the infected and surveillance zones and surrounding areas. Properties surrounding the infected zone were visited on a weekly basis; farms in the surveillance zone were visited on a 14-day cycle.

Game animals were also inspected by officials in the three game reserves bordering the infected area. A total of 189 serum samples were collected from game animals and all proved to be negative.

2.1.3.4.2. *Ongoing surveillance in control area*

From 1 February 2001, surveillance in the Camperdown magisterial district was carried out on a 14-day cycle within the 15 km quarantine zone and on a 28-day cycle within the surveillance zone. A total of 78 properties are in the quarantine zone and 98 in the surveillance zone. A total of 14 895 cloven hoofed livestock are inspected on these properties every month. Random samples of animals are bled for serological testing. To date (end July 2001), all results have been negative.

2.1.3.4.3. *Sero-surveillance results*

Vaccination Zone

When the infection was confirmed in the communal area, a limited vaccination strategy was developed. This would include all the farms in the quarantine zone, excluding the pig farms, as at that stage no pig vaccine was available (see).

From a period 3 weeks post vaccination and 6 months later, vaccinated animals showing positive reactions to the blocking ELISA were subjected to the 3 ABC ELISA (purchased from United Biomedicals); all tested negative indicating that no active infection was present.

Number of animals bled and tested within vaccination zone:

Farms	Cattle	Pigs	Sheep	Goats	Game
	6,248	**1,137**	**629**	**751**	**122**

Surveillance in the free area (outside Camperdown Magisterial district)

All properties in the remaining 15 declared magisterial districts were visited, all animals inspected and a statistical sample submitted for serology with negative results.

From Sept 2000 until July 2001 the following serological samples from the free area were tested, all with negative results.

Farms	Cattle	Pigs	Sheep	Goats	Game
1,368	16,264	1,062	2,697	3,409	64

2.1.4. CONTROL

2.1.4.1. During Outbreak

Initially the control measures were based on a stamping out policy, in which all cloven hoofed animals were destroyed on the infected farm. This was extended to the adjoining farms using natural barriers to create a depopulated cloven-hoofed area of approximately 3 km around the initial infected farm. When infection was diagnosed in the communal farming areas, the decision was made to use a limited vaccination strategy and cease stamping out of animals.

2.1.4.1.1. *Logistical support*

As soon as the initial diagnosis was confirmed, an Operational Centre was established at Allerton Headquarters. The South African National Defence Force (SANDF) and the South African Police Services (SAPS) were informed and a Joint Operational Centre formed. A Joint Operational Committee (JOC) was established, involving all role players that met on a daily basis throughout the control campaign. The Road Traffic Inspectorate (RTI) and the provincial disaster management committee also formed part of the Joint Operational Centre. The SANDF, SAPS and RTI officials functioned at roadblocks, formed cordons for movement control purposes and assisted with the supply of the logistical equipment needed for the control operation i.e. tents, mobile showers, toilets, roadblock equipment, radio communications etc.

Veterinary staff from KwaZulu-Natal arrived at Allerton within 24 hours of the diagnosis being made and immediately started with movement control and surveillance. At the height of the campaign more than 300 members of KwaZulu- Natal personnel were involved.

Veterinary personnel were also drawn from other provinces to assist with inspections, surveillance and movement control and a total of 143 veterinary personnel from other provinces were involved in the control operations.

The SANDF committed up to 900 defence force members and the SAPS 70 members, who manned 23 roadblocks as well as performing other duties. The SANDF also provided aerial support, both fixed wing and helicopters.

Within 2 days of the outbreak a complete set of aerial photographs were taken and were made available for planning control operations. The Department of Agriculture seconded 80 extension officers to assist with the extension and communication in the communal areas. Quarantine camps were erected and all stray animals were impounded.

Daily press releases were prepared and numerous meetings with farmers in both the commercial and communal areas were held.

2.1.4.1.2. *Movement control*

Movement control of animals and animal products both into and out of the quarantine and surveillance zones was strictly enforced during these outbreaks and whereas, initially, there were only 9 roadblocks, the number rapidly increased to 23 with an average of 17 throughout the campaign.

A complete ban on the movement of animals, animal products and agricultural produce in the infected area was enforced.

Movement protocols were revised at regular intervals according to the latest disease surveillance results. A dedicated permit office, headed by a senior veterinarian, was established to control issue of all permits. All animals were inspected before the issuing of a permit.

Personnel were stationed at all abattoirs in the quarantine and surveillance zones and at other abattoirs in KwaZulu-Natal to control the arrival of animals, inspect all animals pre- and post slaughter and to ensure the correct documentation was present.

2.1.4.1.3. *Slaughter out*

A total of 6 773 animals were culled over the entire period (see table below):

Place	**Date**	**No. properties**	**Cattle**	**Pigs**	**Sheep**	**Goats**	**Total**
Initial plus 3 km zone	30 Sept	14	211	3 374	42	37	**3 664**
Thornhill	10 Oct	1	16	0	0	4	20
Killarney Valley Commercial	3-6 Nov	23	432	914	146	182	1 674
Sankontshe Communal *	3-6 Nov	*	771	5	2	637	1 415
Total		38	1 4301	4 293	190	860	6 773

*· Communal area regarded as one property

All farms where animals were culled were sanitized twice with a 10-14 day interval, by a commercial contractor under official supervision

2.1.4.1.4. *Vaccination*

A FMD type O water based vaccine (01 Manisa), imported by Intervet was used.

Over the period between November 2000 to February 2001, 9,738 cattle, 1,219 sheep and 1,457 goats were vaccinated. This was carried out on 138 commercial properties and at 10 sites in the communal areas.

2.1.4.2. Post Outbreak

2.1.4.2.1. Sentinel animals

No pig farms were vaccinated and these acted as sentinel animals. Two cattle farms within the vaccination zone were also left as sentinel herds.

Sentinel animals (cattle), placed on Tifton and Esperanza in December 2000 were still serologically negative 30 days later (8 January 2001) and by 2 February 2001, restocking had commenced.

2.1.4.2.2. *Movement control*

After the deregulation of the 15 districts, a revised movement protocol was approved during July 2001 to lessen the movement restrictions in the previously controlled areas with the exception of Camperdown. In the Camperdown district strict movement control over vaccinated animals, surveillance and inspections will remain in force until November 2002.

Vaccinated animals are only allowed out of the Camperdown district directly to an approved abattoir under strict veterinary permit control. Vaccinated farms are inspected at 14-day intervals and all stockowners are obliged to keep strict records of all vaccinated animals.

The Camperdown District in KwaZulu-Natal will not be included in the proposed free zone without vaccination, in accordance with the requirements of Article 2.1.1.4 (intended free zone without vaccination, but which has not yet been without infection for a period of 2 years after the last case without stamping out).

The area (District of Camperdown) will remain a FMD restricted area for a period of 2 years after which the FMD Commission will be requested to include the area in the proposed free zone without vaccination. No further vaccinations will be carried out in the area in order to qualify for disease freedom without vaccination in accordance with Article 2.1.1.4 of the Code*.*

The Camperdown district will therefore only qualify to be regarded as FMD free without vaccination on 5 November 2002 (2 years after the last case and 12 months without vaccination) in accordance with Article 2.1.1.6 of the Code).

2.2. TWO RELATED OUTBREAKS OF SAT 1 IN MPUMALANGA (MIDDELBURG AND NKOMAZI)

2.2.1. HISTORY OF FMD IN MPUMALANGA PROVINCE

The Mpumalanga Province of South Africa borders onto Mozambique in the east and Swaziland in the south. The KNP forms the northeastern area of the province. There are about 1 000 000 cattle, 1 100 000 sheep, 53 000 goats and 80 000 pigs in the province. The province is 80 000 km² in extent, of which 3000 km² (less than 4%) was affected by the 2000-2001 Nkomazi FMD outbreak.

FMD outbreaks were first recorded in livestock in Mpumalanga in 1937, and occurred sporadically every 1 to 7 years from then on. The last FMD outbreaks in Mpumalanga province, outside the endemically infected KNP, occurred in 1977—an extensive outbreak in cattle in the communal grazing area of the Nsikazi district on the western boundary of the KNP, as well as an unrelated, limited outbreak amongst commercial cattle in the Nkomazi area on the southern boundary of the KNP.

After 1977, spread of the disease had been effectively prevented through movement control by fences and a permit system, as well as by vaccination of livestock in areas adjacent to the KNP. Since 1992 the vaccination area in the Nkomazi area was reduced systemically according to the risk of spread of the disease and the improvement of effectiveness of veterinary fences, as illustrated in Fig.6.

2.2.2. CONTROL MEASURES IN PLACE BEFORE THE OUTBREAK

The routine control measures in place before the 2000 FMD outbreak consisted briefly of the following:

- The FMD controlled or **restricted area** proclaimed in terms of the Animal Diseases Act (no. 35 of 1984) includes the endemic area (the KNP and other game reserves and game farms where infected African buffalo (*Syncerus caffer)* occur), the vaccination area (a buffer area around the endemic area, traditionally called the red line area) and a surveillance area adjacent to the vaccination area. These areas are illustrated in Fig.7.

- **Veterinary fences** have been erected along the western and southern boundaries of the KNP as well as around all other game reserves and game farms where infected African buffalo are kept, in terms of the Animal Diseases Act (no. 35 of 1984)
- From 1979 to 1997, cattle, goats and sheep have been **vaccinated** in the areas indicated on the first map with a trivalent FMD vaccine, containing SAT-1, SAT-2 and SAT-3. Since 1998 only cattle in the red line area (see above map) have been vaccinated every six months
- Records of numbers and increases and decreases of all susceptible livestock in the controlled areas are to be kept by the owner, in terms of the Animal Diseases Act no. 35 of 1984. For this purpose **livestock registers** are kept by Veterinary Services, corresponding to stock cards or records to be kept by owners
- All increases and decreases and the reasons therefore are recorded during compulsory **livestock inspections** at intervals as follows:

Part of restricted area	*Cattle*	*Goats, sheep and pigs*
Red line area	7 days	28 days
Surveillance area (first 10 km)	14 days	28 days
Surveillance area (remainder)	28 days	28 days

During the above inspections, livestock are examined externally and counted by animal health technicians.

- A **permit system** regulates the movement of all cloven-hoofed animals and their products from, to and within the various areas, according to the 1998 FMD control measures

* Cattle from the red line area may only leave the area after being branded with an "F" on the right side of the neck and after 14 days quarantine and a negative inspection including a mouth examination. These cattle may only be moved to the surveillance area (first 10 km) or for direct slaughter at an approved abattoir in the restricted area

* Cattle from the surveillance area may only leave that area if not F-branded, and after 14 days quarantine and a negative inspection including a mouth examination. Cattle from previously vaccinated areas must however test serologically negative before movement out of the area, except for direct slaughter

* No buffalo are allowed to leave the red line area, except buffalo that were bred disease-free and which tested negative according to a rigid testing protocol. All buffalo movements in the entire South Africa area are subject to permit control and testing

* Cloven-hoofed game may only leave the red line area or surveillance area after 14 days quarantine and a negative serological test

* All products of cloven-hoofed animals from the red line area or surveillance area are subject to permit control

2.2.3. FOOT AND MOUTH DISEASE OUTBREAK: FEEDLOT IN MIDDELBURG (MPUMALANGA, RSA)

2.2.3.1. Background

A suspicion of FMD infection was raised by Swaziland when cattle from a feedlot on the farm Arendsfontein 464JS (Geographical locus 25° 53' 41" S, 29° 34' 02" E) in the Middelburg district (Mpumalanga Province of the Republic of South Africa) belonging to Kanhym Estates, were sent to the abattoir in Manzini, Swaziland. These cattle were sent on Thursday, 23 November 2000 and suspicious lesions were found during routine meat inspection on Friday, 24 November 2000. Samples were taken from live animals showing symptoms by the Swaziland authorities and dispatched to the Exotic Diseases Division, Onderstepoort Veterinary Institute (EDD-OVI), where they arrived on the evening of 28 November 2000. On Wednesday, 29 November 2000 at 08H00 the Director of Veterinary Services in Mpumalanga was notified of the positive diagnosis, as was the National Director of Veterinary Services. An investigation was immediately conducted on the farm Arendsfontein, which was placed under quarantine and all movements were stopped. Clinical lesions were detected in 30 cattle. Samples were immediately dispatched to the EDD-OVI and confirmed positive for SAT1 FMD virus late on the night of 29 November 2000. Subsequent samples submitted on Thursday, 30 November 2000 also yielded positive results for SAT1 FMD virus.

The isolates obtained from the outbreak in Kanhym (SAR/32/00), as well as those from Nkomazi (SAR/40/00), were investigated to determine the possible source of infection in cattle. Partial nucleotide sequencing of the 3'end of the VP1 gene was determined and the phylogenetic relationships determined with other isolates from southern Africa ( ). The origin of all isolates included in Fig. 8 is indicated in Table 1. The comparisons indicated that the virus found in the abattoir in Swaziland (SWL/01/00) was 100% homologous over the region sequenced to the isolate found in the feedlot in Kanhym, indicating that the Swaziland incidence was originally from the feedlot in South Africa. A mixed infection was found at Thabonkhulu, the one virus was 100% homologous to the other isolate obtained from Kanhym, while SAR/40/00 was significantly different ( ). Both isolates were related to viruses previously isolated from buffalo in the south of the KNP, indicating that buffalo were the most likely source of infection in the cattle.

TABLE 1: List of viruses included in the phylogenetic tree

ISOLATE	COUNTRY	LOCATION	SPECIES
BOT 2/98	Botswana	Nxaraga	Buffalo
BOT 8/98	Botswana	Nxaraga	Buffalo
BOT 14/98	Botswana	Nxaraga	Buffalo
BOT 25/98	Botswana	Vumbura	Buffalo
BOT 37/98	Botswana	Vumbura	Buffalo
MAL 1/85	Malawi	Kasungu National Park	Buffalo
SWA 2/89	Namibia	Caprivi	Buffalo
NAM 272/98	Namibia	Mahili National Park	Buffalo
NAM 288/98	Namibia	Mahili National Park	Buffalo
NAM 306/98	Namibia	Mahamgo National Park	Buffalo
NAM 307/98	Namibia	Mahamgo National Park	Buffalo
NAM 308/98	Namibia	Mahamgo National Park	Buffalo
KNP 20/89	South-Africa	Numbi Gate, Kruger National Park (KNP)	Buffalo
KNP 148/91	South-Africa	Skukuza area, KNP	Buffalo
KNP 196/91	South-Africa	Berg-en-dal area, KNP	Buffalo

KNP 8/95	South-Africa	Orpen area, KNP	Buffalo
KNP 14/95	South-Africa	Orpen area, KNP	Buffalo
KNP 17/95	South-Africa	Orpen area, KNP	Buffalo
KNP 41/95	South-Africa	Orpen area, KNP	Buffalo
KNP 75/98	South-Africa	Shingwedzi area, KNP	Impala
KNP 131/98	South-Africa	Orpen area, KNP	Buffalo
KNP 22/96	South-Africa	Lower Sabie, KNP	Buffalo
KNP 01/01	South-Africa	Shingwedzi area, KNP	Buffalo
SAR 9/81	South-Africa	Pafuri, KNP	Game
SAR1/00	South-Africa	Phalaborwa	Buffalo
SAR2/00	South-Africa	Phalaborwa	Buffalo
SAR3/00	South-Africa	Phalaborwa	Buffalo
SAR10/00	South-Africa	Phalaborwa	Bovine
SAR 32/00	South-Africa	Kanhym Estate, Mpumalanga	Bovine
SAR 40/00	South-Africa	Nkomaas district, Mpumalanga	Bovine
SWL 01/00	Swaziland	Manzini	Bovine
UGA 1/97	Uganda	Hamukungu	Buffalo
ZAM 2/93	Zambia	Nanzhile Kafue National Park	Buffalo
ZAM 18/96	Zambia	Nanzhile Kafue National Park	Buffalo
ZAM 29/96	Zambia	Lochinvar National Park	Buffalo
HV 3/90	Zimbabwe	Hippo Valley National Park	Buffalo
GN 13/91	Zimbabwe	Gonarezou National Park	Buffalo
ZIM 3/88	Zimbabwe	Hwange National Park	
ZIM 14/90	Zimbabwe	Bumi	
ZIM 2/91	Zimbabwe	Bumi	
ZIM 14/98	Zimbabwe	Lubangwa Island, Kariba	

The farm Arendsfontein (also known as Kanhym Estate) is a dedicated feedlot system for cattle (14 308) and pigs (48 376) with excellent record keeping. Both groupings are housed in separate fenced facilities. The fact that there is strict control and biosecurity implies that these facilities can be regarded as quarantine facilities. There is no immediate physical or human contact between the two units. No clinical cases occurred in the piggery and serological samples taken were negative. Strict sanitary control to prevent cross contamination between the feedlot and the pig unit was maintained and a disinfection point, spraying all vehicles entering the infected area as well as a control point at entry to the cattle feedlot and the piggery was instituted. The feedlot and main piggery on Kanhym were included in the infected zone (see Fig 9). Other activities on the feedlot premises had to be kept in mind: feedmill producing feed for pigs, small feedlot for sheep (2 445), a herd of commercial cattle, manure for cultivation of gardens and crops; a small abattoir on the premises of the feedlot and renting of their truck fleet to outsiders.

Kanhym Estates also has a National Pig Development Unit (NPD unit) consisting of ± 5000 pigs about 5 kilometres from the feedlot and piggery. On the farm Driehoek, adjoining Arendsfontein, there is another small quarantine unit that had 24 pigs at the time of the outbreak.

The NPD unit and small quarantine unit mentioned in the previous paragraph had satisfactory bio-security measures in place and were excluded from the infected zone but included in the quarantine zone The quarantine zone also included some commercial cattle farms, one fairly big dairy farm (EDE Farming), two small-scale dairy farms (De Klerk and Du Plooy) and two fairly big piggeries (ALZU ± 7000 pigs and EDE Farming ± 12000 pigs). EDE Farming also has a small cattle feedlot (± 350 cattle), commercial cattle

(2200) and some sheep. Other farming activities in the quarantine zone consist mainly of crop production (maize and potatoes) (see).

Cattle for the feedlot are sourced from Namibia (30-40%), areas in Mpumalanga surrounding Kanhym (30-40%), Free State Province (5-10%) and Eastern Cape Province (5%). From the Western- and Northern Cape Provinces very few animals are sourced. Kanhym makes use of 2 agents buying animals from farmers and speculators.

An important business activity is the system of contract or custom feeding, whereby Kanhym feedlot feeds animals of outside customers in the feedlot. These animals are sourced from different people and areas by certain private individuals.

The majority of cattle leaving Kanhym go for slaughter. Occasionally younger animals are taken to a farm (Middelplaas) in the Ermelo district until they are ready for the feedlot.

The situation at the piggery is somewhat different to that in the cattle feedlot. Breeding pigs for the piggery come from their own NPD unit about 5km away from the piggery and from other units at Magaliesberg, Bapsfontein and Heidelberg in the Gauteng Province.

Kanhym piggery supplies various other piggeries with breeding stock (gilts, pregnant sows, boars and semen).

Immediately after confirmation of FMD, an infected area, quarantine zone and surveillance zone was identified ( ).

The livestock involved is the following:

INFECTED AREA (275 ha)

	CATTLE	SHEEP	PIGS	GOATS	GAME
CENSUS	14 308	2 445	48 376	0	0

QUARANTINE AREA (31 632 ha)

	CATTLE	SHEEP	PIGS	GOATS	GAME
CENSUS	30 185	4 373	25 671	235	0

SURVEILLANCE AREA (96911 ha)

	CATTLE	SHEEP	PIGS	GOATS	GAME
CENSUS	22 794	4 916	350	402	671

TOTAL

	CATTLE	SHEEP	PIGS	GOATS	GAME
CENSUS	68 426	11 760	73 988	637	671

2.2.3.2. Course and progress of the disease

Following confirmation of FMD at Kanhym Estates (Arendsfontein) on 29 November 2000, control measures were immediately instituted following a strategy of emergency vaccination. A Joint Operational Committee (JOC) similar to the process followed in KwaZulu-Natal was set up within 24 hours following the detection of the disease. The JOC consisted of the management from the provincial and national veterinary services, security forces and representatives from the farming community. The last clinical cases in the feedlot were seen on 14 December 2000. On 15 January 2001 controlled slaughter commenced. By 19 March all the feedlot cattle were slaughtered. From 19 March to the end of March, disinfection was continued and finished. Sentinel cattle (200) were introduced in April. During April these sentinel animals were bled when entering the feedlot and twice while in the feedlot (14 days apart). All results were negative on the liquid phase blocking ELISA. They were inspected every second day. At the beginning of May quarantine was lifted on the feedlot and the piggery. In the first week of May Kanhym estates started to introduce new animals in the feedlot.

2.2.3.2.1. *Sequence of events during outbreak*

DATE	**Event**
23 November 2000	70 Cattle exported from Arendsfontein to Manzini abattoir in Swaziland
24 November 2000	Matsapha (Swaziland) - suspicious FMD lesions on ante mortem inspection
28 November 2000	Tissue samples from Manzini to OVI
29 November 2000	• Matsapha samples SAT 1 positive • Arendsfontein RSA 08:00 quarantine and surrounding farms • Inspections and sero-surveillance commenced
1-3 December 2000	First vaccination of feedlot cattle using a trivalent SAT 1, SAT 2 and SAT 3 vaccine
1 December to 31 January 2001	• Feedlot and piggery = inspections daily, sero-surveillance 1 x per week • Rest of quarantine zone = inspections 2 x per week, sero-surveillance 1 x per week • Surveillance zone = inspections once a week, sero-surveillance 1 x per 2 weeks
4 December 2000	Vaccination of feedlot sheep
4 December 2000	4 road blocks instituted
8, 9 December 2000	Pigs in piggery vaccinated with monovalent SAT 1 vaccine with oil adjuvant
14 December 2000	Last clinical cases seen in feedlot
18-20 December 2000	Second vaccination of feedlot cattle
12 January 2001	Road blocks lifted
15 January 2001	Controlled slaughter of feedlot cattle and sheep started
1 February 2001 to 19 March 2001	• Feedlot and piggery = inspections 3 x per week, sero-surveillance, every 2 weeks in pigs • Rest of quarantine zone = inspections every 2nd week, sero-surveillance, once a month before slaughtering in the feedlot
19 March 2001	Controlled slaughter of feedlot cattle completed
19-30 March 2001	Disinfection of feedlot done

30 March	Vaccinated commercial breeding cattle released to grazing
2 April 2001	• 200 sentinel cattle introduced to feedlot pens • Sero-surveillance (200)
April 2001	Inspections 2 x per week
19 April 2001	Sero-surveillance 200 sentinel cattle
30 April 2001	Sero-surveillance 200 sentinel cattle
2 May 2001	Movement restrictions lifted on feedlot
May to date	Regular inspections and sero-surveillance

2.2.3.3. Control measures to keep disease contained:

2.2.3.3.1. *Backward and forward tracing*

Follow-up and trace-back actions carried out immediately revealed no spread of the infection from the feedlot.

Forward tracing:

Cattle:
The fact that very good records are kept and that the majority of animals go directly for slaughter, made forward tracing uncomplicated. Some 731 calves (groups of 76, 326 and 299) were moved from Kanhym to Middelplaas in the Ermelo district before the outbreak. The calves are reared there until they are ready to go to the feedlot. Blood samples were collected 3 December 2000. On 6 December 2000 the results were received—all samples were negative. Blood samples of these cattle were again taken on 28 December, and all results were negative.

Pigs:
The disease was kept out of the piggery through stringent control and biosecurity measures. The majority of pigs also go for slaughter. The selling of breeding stock was followed up and all reports were negative. Kanhym Estates is also renting facilities on a farm outside Middelburg in the surveillance zone. This farm was visited immediately and animals were inspected and sero surveillance was done. All samples tested negative.

Back tracing:

Cattle:
After sequencing of the virus it was obvious that efforts had to be concentrated on animals that came from the Lowveld area in the Mpumalanga Province. The virus was similar to other viruses of African buffalo occurring in the southern part of the KNP.

During the early months of 2000 severe floods washed away sections of the southern fence of the Kruger National Park resulting in contact between buffalo and cattle. Inspections and surveillance in the area south of the KNP were intensified.

Since the Kanhym agents source mainly from parts other than the Lowveld, it was clear that all efforts had to be concentrated on the custom feeders who source from the area south of the KNP. Detailed records were available from the feedlot and the state veterinary offices within the area. All areas where possible movement to and from occurred or were recorded, were included in the back-tracing exercise.

Pigs:
The piggery sources from their own farms, which are not in FMD restricted areas. The pigs had not contracted the disease, and back tracing in the pigs was uncomplicated. Serological testing was done, and all results were negative.

Normal stringent biosecurity at the piggery and the feedlot facilitated tracing of other activities.

Other activities:

Trucks:
All trucks entering and leaving the premises were disinfected routinely.

Manure:
The transport of manure from Kanhym with trucks to and from the Lowveld was also considered. The movements that were investigated proved not to have caused any problems.

Abattoir (Kanhym):
Since pig-, sheep- and cattle carcasses posed a threat of spreading the disease, the abattoir at Kanhym Estate was closed and the sheep and cattle carcasses were deboned. All meat from these animals was consumed on the estate by workers staying there. The pig carcasses, skins, offal, bones and everything else were disposed of under official supervision. .

Feed:
Feed was produced on site, at the estate. The distribution of dairy meal and pig feed was stopped. Only chicken feed was allowed to be distributed, while pig feed was allowed to go to the Kanhym piggery alone.

People:
Strict control over people (movement and disinfection) was put in place to prevent spread of the disease from the cattle feedlot as well as entering into the piggery.

2.2.3.3.2. *Movement control*

General

Following the confirmation of FMD at Kanhym feedlot, movement control was implemented immediately. Movement restriction notices were served on Kanhym Estates (infected area) and owners in the quarantine zone. The notices were further supported by a movement protocol explaining the detail.

A cordon sanitaire had been placed on farms within a 10km radius on surrounding farms with movement control on animals and animal products, backed by intensive sero-surveillance and physical daily inspections. Quarantine notices were served on all surrounding farms (28 owners) and all were inspected and subjected to sero-surveillance as well as the following three large farms (see)

- The SIS feedlot falls outside the quarantine area and has strict access and disinfection control. All 25 000 cattle were inspected regularly (including 3 000 ranch cattle). All inspections and sero-surveillance done regularily, were negative.
- ALZU Farm (in quarantine zone)— 6 000 pigs were inspected regularly and bled for sero-surveillance on a regular basis. All results were negative.
- EDE Farm (in quarantine zone)— 2200 cattle, 12 000 pigs and 200 sheep were inspected regularly and bled for sero-surveillance. Results were negative and no suspicious symptoms were noted.

In the Kanhym feedlot itself the animals showing clinical symptoms occurred mainly in the southern part of the feedlot. Some cattle in pens in the middle were also affected. After the first round of vaccination all animals in pens showing clinical symptoms were moved to the southern section of the feedlot. A section between these clinically affected animals and the other animals was left empty. These pens were disinfected with lime and a fence was erected with one entrance gate. Dedicated personnel performed duties in the two sections.

Two roadblocks were set up to monitor any movements out of and through the area with the assistance of security officials (South African Police Services, South African National Defense Force and Traffic Control). A further two roadblocks were set up on gravel roads in the area as well as at the main entrance to Kanhym and at the entrance to the piggery.

December 2000 up to 14 January 2001

Although the main aim of the FMD campaign was disease control, animal welfare issues had to be kept in mind, especially for the feedlots, piggeries and dairies. Certain decisions had to be made on scientific grounds. Protocols were drafted and revised on a regular basis for certain movements out of and within the infected area and quarantine zone based on the disease situation and serological results. Control measures at the affected feedlot included strict movement control of animals within the feedlot, disinfection, showering in and out and separate, dedicated work teams for the different areas within the feedlot.

The following movements were authorised:

Movements out of or within the infected farm:
Controlled slaughter of pigs and all other movements took place under strict veterinary control. Pigs were slaughtered at dedicated abattoirs under strict veterinary control and abattoirs were disinfected thoroughly afterwards. The following conditions were set and adhered to: The pH of carcasses had to drop below 6 within 24 hours and all carcasses were deboned. A further waiting period of 3 weeks for slaughtered carcasses were enforced pending the serological results of samples collected on the slaughter line. Bones were destroyed under strict control. Meat was used for local consumption only.

Movements out of the quarantine zone (excluding the infected farm):
Controlled slaughter of pigs from ALZU and EDE piggeries were allowed under the following conditions: Animals were inspected and bled before movement to the abattoir, pH of carcasses had to drop below 6 within 24 hours; heads and feet had to be destroyed and meat was only meant for local use. Meat was only released after 8 days taking into consideration that inspections and sero-surveillance samples were negative.

All movements of cloven-hoofed animals and animal products of cloven-hoofed animals from within the quarantine and infected areas, took place under strict veterinary control.

Movements into the quarantine zone (excluding infected farm) and surveillance zones were done under veterinary control.

Control measures as from 15 January 2001

Controlled slaughter of the feedlot cattle (14 308) and sheep (2 445) commenced on the 15th of January 2001. Since all the cattle were vaccinated, a 3ABC ELISA test had to be performed on representative samples of animals in the respective pens. An epidemiologist of the University of Pretoria determined statistically significant sample sizes.

Results of the 3ABC ELISA, as well as clinical signs, were used to determine whether pens were previously infected or not.

Controlled slaughter of the cattle took place at selected abattoirs under veterinary control.

On 19 March 2001 (8 weeks later) all the feedlot cattle were slaughtered. By the end of March the whole feedlot was disinfected. All movements of cattle took place under veterinary control (permits and sealing of trucks).

2.2.3.3.3. *Vaccination*

It was decided to do emergency vaccination in accordance with Article 2.1.1.6 of the *Code* to minimize virus excretion, instead of immediate stamping out, because killing and destroying all these animals would pose a greater risk of virus dissemination. The strict control measures in place at the feedlot and the infrastructure fitted that of a quarantine facility and it strengthened the decision. The idea was also to lessen the risk of the piggery becoming infected.

All cattle in the feedlot were vaccinated twice (1-3 December 2000 and 18-20 December 2000) with a trivalent SAT 1, 2 and 3 vaccine, produced at the EDD-OVI (see below). The commercial breeding cattle (1200) on the grazing were vaccinated on 4, 5 December while they were still on the grazing to ensure that they develop sufficient immunity. Only after the second vaccination were they moved into the northern part of the feedlot, furthest away from the southern part, where clinical FMD occurred. By moving the commercial breeding cattle into a section of the feedlot, an animal free zone was created around the infected farm.

The vaccinated F branded commercial cattle was released to grazing at the end of March 2001 and are now kept in 2 separate groups away from the feedlot and the piggery. . Inspections are done once a week and all animals are bled once a month. Animals reacting positive to the three ABC Elisa test are slaughtered.

Slaughtering of the vaccinated commercial cattle will be completed by the end of October 2001.

The sheep in the feedlot (2 445) were vaccinated once with the trivalent vaccine (4 December 2000). In order to protect the piggery, pigs in the piggery (48 376) were vaccinated once with an inactivated monovalent SAT 1 vaccine produced by EDD-OVI. The vaccination began on 8 December 2000 and was completed on 9 December 2000.

To determine the efficacy of the vaccines used, certain cattle in the feedlot were identified and bled regularly (days 3, 5 and 8 post vaccination) and tested on the liquid phase blocking ELISA. The same was done with the pigs and a further 5 vaccinated pigs were taken to EDD-OVI and challenged. None of these pigs contracted the disease while control animals developed symptoms.

The vaccine used during the outbreak was a formalin and binary ethyleneimine inactivated vaccine against FMD, produced at the EDD-OVI according to the processes described in the OIE Manual of Standards for Diagnostic Tests and Vaccines. FMD viruses were propagated on baby hamster kidney (BHK) cells in monolayer, inactivated and subsequently purified and concentrated. The resulting antigens were stored at ultra-low temperature until formulation of the final virus. The vaccine used in cattle, sheep and goats was made in an aluminum-saponin adjuvant (ALSA). The vaccine used in pigs was made in double oil emulsion adjuvant (ISA 206). The vaccine strains are all viruses isolated from buffalo in the Kruger National Park, except for one SAT 2 isolate, that was isolated from western Zimbabwe, but has a

broad antigenic coverage. The vaccine contained 2 SAT 1, 2 SAT 2 and 1 SAT 3 strains. The vaccine prepared for pigs contained only two SAT 1 strains.

All vaccinated feedlot cattle were slaughtered by 19 March 2001 in accordance with Article 2.1.1.6 of the *Code.*

By the end of July 2001 all vaccinated *grower pigs* were slaughtered.

Vaccinated breeding stock (pigs) on hand at the end of May 2001 was 4 747. Taking normal replacement policies into account, the estimation of vaccinated breeders left in the herd is as follows:

June 2001 - 95 %

June 2002 - 55 %

June 2003 - 30 %

June 2004 - 5 %

The piggery was not infected at any stage, as indicated by serological results produced using the liquid phase blocking ELISA prior to vaccination and the 3ABC ELISA post vaccination. Meat from these pigs will not be used for export. The pigs were only vaccinated once with the oil adjuvant vaccine. As there is no evidence of a carrier state in pigs, it does not pose a risk to keep these pigs. There is an embargo on the movement of live vaccinated pigs from the farm.

The outbreak in the feedlot was restricted to the cattle feedlot and dealt with in accordance with the requirements of Article 2.1.1.6 of the Code *i.e. emergency vaccination with slaughter of all cattle in the feedlot completed on 19 March. The only remaining vaccinated cattle are the commercial breeding cattle. All these animals will have been slaughtered by the end of October 2001.*

2.2.3.3.4. *Surveillance*

Before the outbreak
Normal disease surveillance was done by veterinary staff, namely collecting census data, testing for tuberculosis and contagious abortion, and visiting livestock auctions and abattoirs and using these activities to inspect for FMD.

During the outbreak
Inspections in the feedlot and piggery were done on a daily basis and sero surveillance once a week. In the rest of the quarantine zone inspections were done twice a week and once a week in the surveillance zone. These inspections were done *up to 12 January 2001*.

The last clinical case was seen on 14 December 2000 and it was decided that controlled slaughter of the feedlot cattle would start from 15 January 2001. With this the surveillance program also changed.

From ***15 January up to 31 January 2001*** inspections were done once a day in the infected area (feedlot and piggery) and once a week in the quarantine zone. Sero-surveillance was done once a week on cattle that were to be slaughtered from the feedlot and once a week in the piggery. In the quarantine zone, sero surveillance was done once a week.

From ***1 February 2001 up to 19 March 2001*** inspections in the feedlot changed to 3 times a week. Sero surveillance in cattle continued to be done before controlled slaughter, while sero surveillance in the

piggery was done every 2 weeks. In the quarantine zone inspections were done every second week and sero surveillance once a month up to the end of April 2001.

By 19 March 2001 all the feedlot cattle were slaughtered. Disinfection was completed by the end of March 2001, after which sentinel cattle (200) were introduced to the feedlot. These animals were all bled before entering the feedlot and again after 14 and 28 days after introduction into the feedlot. Inspections were done twice a week. From 19-31March inspections in the piggery were still done three times a week and sero surveillance every 2 weeks. Since 1 April up to the end of July 2001 inspections were done once a month.

At the end of March movement restrictions were lifted in the quarantine zone (except for the feedlot).

On 2 May quarantine was lifted in the quarantine zone. Marketing restrictions remain in force in the infected zone i.e. not for export purposes.

Summary of surveillance done during the period
A total of 1 708 943 cattle, 128 163 sheep and 3 570 363 pig inspections were performed up to the end of July 2001.

TABLE 2: Inspections and surveillance performed in the various areas between 29 November 2000 and 31 July 2001

INFECTED AREA (275 ha)

	CATTLE	SHEEP	PIGS	GOATS	GAME
Census	16 031	2 445	48 376	0	0
No. of Inspections Performed	648 153	61 690	1 819 751	0	0
No. of Rounds of Inspections	69	22	56	0	0
No. of Animals Mouthed	15 519	92	126	0	0
No. of Serum Samples Submitted	25 666	129	1 200	0	0
No. of Vesicular Samples Submitted	1	0	1	0	0
No. of Tissue Samples Submitted	14	1	1	0	0
No. of Vaccinations Performed	32 062	2 445	48 376	0	0
No. of Visits to Property	115				
No. of Herds	1				
No. of Farms	1				
No. of Farm Portions	1				

QUARANTINE AREA (31 632 ha)

	CATTLE	SHEEP	PIGS	GOATS	GAME
Census	30 185	4 373	25 670	235	98
No. of Inspections Performed	581 979	50 431	1 748 801	432	0
No. of Rounds of Inspections	23	16	71	8	0
No. of Animals Mouthed	4 810	203	219	9	0

No. of Serum Samples Submitted	2 382	1 194	898	70	0
No. of Vesicular Samples Submitted	1	0	0	0	0
No. of Tissue Samples Submitted	5	0	3	0	0
No. of Vaccinations Performed	0	0	0	0	0
No. of Visits to Property	402				
No. of Herds	77				
No. of Farms	28				
No. of Farm Portions	136				

SURVEILLANCE AREA (96 911 ha)

	CATTLE	SHEEP	PIGS	GOATS	GAME
Census	22 794	4 916	350	402	671
No. of Inspections Performed	478 811	16 042	1 811	586	0
No. of Rounds of Inspections	20	4	4	4	0
No. of Animals Mouthed	4810	203	219	9	0
No. of Serum Samples Submitted	1 579	152	2	86	0
No. of Vesicular Samples Submitted	0	0	0	0	0
No. of Tissue Samples Submitted	5	0	3	0	0
No. of Vaccinations Performed	0	0	0	0	0
No. of Visits to Property	445				
No. of Herds	118				
No. of Farms	101				
No. of Farm Portions	473				

DISEASE-FREE AREA

	CATTLE	SHEEP	PIGS	GOATS	GAME
Census	626	9	38	16	0
No. of Inspections Performed	498	7	34	2	0
No. of Rounds of Inspections	1	1	1	1	0
No. of Animals Mouthed	2	0	0	0	0
No. of Serum Samples Submitted	4	0	25	0	0
No. of Vesicular Samples Submitted	0	0	0	0	0
No. of Tissue Samples Submitted	0	0	0	0	0
No. of Vaccinations Performed	0	0	0	0	0
No. of Visits to Property	13				
No. of Herds	0				

No. of Farms	101				
No. of Farm Portions	473				

TABLE 3: Summary of activities in all areas from 29 November 2000 to 31 July 2001

	CATTLE	SHEEP	PIGS	GOATS	GAME	ALL
Census	69 052	11 769	74 025	653	769	156 268
No. of Inspections Performed	1 709 441	128 170	3 570 397	1 020	0	5 409 028
No. of Rounds of Inspections	113	43	132	13	0	250
No. of Animals Mouthed	25 141	498	564	18	0	26 221
No. of Serum Samples Submitted	5 228	1475	2 125	136	0	8 964
No. of Vesicular Samples Submitted	2	0	1	0	0	3
No. of Tissue Samples Submitted	24	1	4	0	0	29
No. of Vaccinations Performed	32 062	2 445	48 376	0	0	82 883
No. of Visits to Property	975					
No. of Herds	196					
No. of Farms	130					
No. of Farm Portions	610					

2.2.3.4. Summary Of The Outbreak In The Feedlot In Accordance With Article 2.1.1.6 Of The Code

The outbreak in the feedlot was restricted to the cattle in the feedlot and dealt with in accordance with the requirements of Article 2.1.1.6 of the *Code* i.e. emergency vaccination with slaughter of all cattle in the feedlot completed on 19 March. The vaccinated F branded commercial cattle was released to grazing at the end of March 2001 and are now kept in 2 separate groups away from the feedlot and the piggery. Inspections are done once a week and all animals are bled once a month. Animals reacting positive to the three ABC Elisa test are slaughtered. All vaccinated commercial cattle will be slaughtered by the end of October 2001

The piggery was not infected at any stage, as indicated by serological results produced using the liquid phase blocking ELISA prior to vaccination and the 3ABC ELISA post vaccination. Meat from these pigs will not be used for export. The pigs were only vaccinated once with the oil adjuvant vaccine. Furthermore, as there is no evidence of a carrier state in pigs, it does not pose a risk to keep these pigs.

2.2.4. NKOMAZI FOOT-AND-MOUTH DISEASE (FMD) OUTBREAK

2.2.4.1. Sequence of events

The veterinary fence along the western and southern boundary of the KNP was erected in the 1960's to prevent contact between endemically infected (SAT-1, SAT-2 and SAT-3) African buffalo in the KNP and cattle in adjacent farming areas in order to prevent FMD outbreaks in cattle.

Due to aging and deterioration of this fence, upgrading to a 2,4 m high-electrified game fence commenced in 1998. In Mpumalanga this upgrading was about 70% completed by 7 February 2000,

when a devastating 1 in 100 years flood damaged most of the fence along the southern boundary of the KNP severely. As soon as the dry season set in, the damage to the fence caused buffalo to stray out of the KNP into the adjacent Nkomazi area. The incidence of stray buffalo increased drastically as clearly shown in Fig.11.

Despite major efforts to control the straying of infected buffalo by chasing back herds using helicopters or destroying buffalo, contact between buffalo and cattle did occur. In some instances it was observed, reported and recorded, while in other cases it was suspected. However, no disease was detected in contact cattle herds during official inspections or reported by owners. No sero-surveillance was done in the area shortly before the outbreak, due to the fact that the whole of the Nkomazi area had been subject to compulsory vaccination. Earlier serological tests revealed that vaccinated cattle tested positive as long as 5 years after their last vaccination.

Following the diagnosis of FMD (SAT-1) in the Middelburg district on 29 November 2000, backward tracing and virus sequencing indicated the Nkomazi State Veterinary (SV) area as possible and probable source of the infection. All movements from the Nkomazi and Nelspruit SV areas, from where cattle had moved earlier to the Middelburg district according to the movement control measures, were stopped. A Joint Operational Committee (JOC) similar to the outbreaks in KwaZulu-Natal and Middelburg was set up within 24 hours. The routine surveillance actions were intensified and strengthened by collection of serum specimens. Three roadblocks were instituted to control movements from the Nkomazi SV area.

On 15 December 2000 the first results of the newly imported 3ABC ELISA indicated possible FMD infection in cattle on 4 farms. On the same day epithelium specimens from cattle with suspicious fresh lesions, reported and confirmed at the Thambokhulu communal diptank, tested positive. Two SAT-1 viruses were isolated and sequenced from these specimens and proved to be closely related to a 1996 Lower Sabie buffalo virus and a 1991 Mbiyamiti buffalo virus respectively. Lower Sabie and Mbiyamiti are both in the southern part of the KNP. Subsequently serological evidence of infection was obtained on 5 more farms and at 12 communal diptanks, all in the Nkomazi SV area, while clinical signs were recorded in cattle on 4 farms and 2 communal diptanks.

Hence the entire Nkomazi SV area was declared an **infected zone**, **quarantine zone** and **vaccination zone** for the control campaign. A **surveillance zone** was declared comprising of the Nsikazi red line and adjacent areas, as well as the Phabeni, Nsikazi and Crocodile catchment areas in the Kruger National Park, so as to enclose the quarantine zone. The campaign control zones and the situation at the end of December 2000 are shown in .

From serological and clinical data a period prevalence of 20% was estimated in cattle in the Nkomazi SV area for the period December 2000 to March 2001.

The last clinical case was reported on 27 February 2001.

2.2.4.2. Diagnostic procedures

Collection of serological specimens commenced on 4 December 2000 and was done on all farms and diptanks in the Nkomazi and Nelspruit SV areas where susceptible livestock were kept, as well as in impala in the adjacent parts of the KNP in an attempt to detect any possible viral activity in the area. Epithelial tissue specimens were collected in all cases where suspicious lesions were detected during inspections and mouth examinations.

All tests were done at the Exotic Diseases Division of the Onderstepoort Veterinary Institute in Pretoria. Serum samples were tested using the liquid phase blocking ELISA. Positively testing sera were then

tested using the 3ABC ELISA. Tissue samples were tested by using typing ELISA, PCR and virus isolation.

The Thambokhulu communal diptank area was the only locality where virus was isolated during the outbreak (red area in the extreme south of the infected zone in).

2.2.4.3. Surveillance

The numbers of susceptible livestock at risk, and the numbers of inspections, mouthings and serum and tissue sample collections performed in the various control zones in the different species during the campaign period of December 2000 to March 2001 are shown in Table 4.

TABLE 4: Activities performed in the State Veterinary Areas during the FMD campaign period of December 2000 to March 200

CATTLE

SV AREA	SECTOR	ZONE	NUMBER OF DIPTANKS / FARMS	TOTAL CATTLE	CATTLE INSPECTIONS	CATTLE MOUTHINGS	SERUM SAMPLES COLLECTED	TISSUE SAMPLES COLLECTED	INFECTED DIPTANKS / FARMS
NELSPRUIT	COMMERCIAL	R	288	18088	23610				0/288 (0%)
NELSPRUIT	COMMERCIAL	S	63	4331	16312	1798	873	4	1/63 (2%)
NELSPRUIT	COMMUNAL	S	32	20435	181210	2341	1909	14	3/31 (10%)
NKOMAZI	COMMERCIAL	I	61	7542	33188	3486	2807	23	18/61 (30%)
NKOMAZI	COMMUNAL	I	39	55610	460484	2198	3673	10	43/47 (91%)
TOTAL			**483**	**106006**	**714804**	**9823**	**9262**	**51**	

SMALL STOCK			SHEEP				GOATS			
SV AREA	SECTOR	ZONE	TOTAL	INSPECTIONS	MOUTHED	SERUM SAMPLES	TOTAL	INSPECTIONS	MOUTHED	SERUM SAMPLES
NELSPRUIT	COMMERCIAL	R	1247	1223			872	139		
NELSPRUIT	COMMERCIAL	S	250	660	17	25	398	1304	36	67
NELSPRUIT	COMMUNAL	S	7	13		7	3214	2466	892	1096
NKOMAZI	COMMERCIAL	I	442	1204	11	21	351	1508	4	40
NKOMAZI	COMMUNAL	I	122	388	26	30	10865	12985	59	1591
TOTAL			**2068**	**3488**	**54**	**83**	**15700**	**18402**	**991**	**2794**

PIGS

SV AREA	SECTOR	ZONE	TOTAL	INSPECTIONS	MOUTHED	SERUM SAMPLES
NELSPRUIT	COMMERCIAL	R	4281	4628		
NELSPRUIT	COMMERCIAL	S	1494	9723	15	72
NELSPRUIT	COMMUNAL	S	923	958	4	3
NKOMAZI	COMMERCIAL	I	103	274	0	23
NKOMAZI	COMMUNAL	I	785	451	7	24
TOTAL			**7586**	**16034**	**26**	**122**

GAME		IMPALA	
SV AREA	SECTOR	INSPECTIONS	SERUM SAMPLES
NELSPRUIT	COMMERCIAL		
NELSPRUIT	COMMUNAL		
NKOMAZI	COMMERCIAL	4	4
NKOMAZI	COMMUNAL		
SKUKUZA	KNP	50	50
TOTAL		**54**	**54**

I = Infected zone S = Surveillance zone R = Rest of restricted area (not in campaign zones)

Clinical and serological surveillance was continued in cattle, goats, sheep and pigs on all farms and at all communal diptanks as well as some impala (*Aepyceros melampus*) in the infected and surveillance zones. Results revealed serological evidence of infection in cattle on 6 more farms and at 19 more communal diptanks, as well as in goats at 4 communal diptanks, all in the infected zone. Clinical lesions were recorded in cattle on 6 more farms and at 24 more communal diptanks. In summary, clinical or serological evidence of infection has been found at 43 out of 47 diptank sections and 18 out of 61 farms in the infected zone.

The situation on 31 March 2001 with regard to spread of the infection is illustrated in Fig.13.

Up to the end of March 2001, 714 804 cattle inspections, 18 402 goat inspections, 3 488 sheep inspections and 16 034 pig inspections have been done as part of the campaign. 9 823 cattle, 991 goats, 54 sheep and 26 pig mouthings were done, while 9 262 serum samples were collected from cattle, 2 794 from goats, 83 from sheep, 122 from pigs and 54 from impala. 51 tissue samples were collected from cattle, **but virus could only be isolated from the Thambokhulu communal diptank samples.**

2.2.4.4. Control of the outbreak

2.2.4.4.1. *During the outbreak*

Stamping out was not considered as a control option, because:

- the outbreak occurred in the routine FMD restricted area which had not been part of South Africa's FMD free zone;
- vaccination would not affect the status of a future FMD free zone of South Africa;
- the geographical extent of the outbreak rendered stamping out an impractical control option.

Movement control and vaccination were the main aspects of the control strategy of the outbreak.

Movement control

On 29 November 2000 all movements and issuing of movement permits for movements from the FMD restricted areas in Mpumalanga were stopped. From 2 December 2000, roadblocks were put up at all hitherto uncontrolled public exits from the infected zone, to prevent cloven-hoofed animals and products from leaving the zone.

A movement protocol was compiled with effect from 18 December 2000 to rule the movement of live cloven-hoofed livestock and game, as well as products of cloven-hoofed animals from, into and within the infected zone. This protocol was amended several times as the disease situation evolved.

Information pamphlets on movement restrictions were distributed and extension was done at all butcheries in the infected zone and the 3 border posts on the Mozambican and Swaziland borders.

As from 5 March 2001, controlled direct slaughter of cattle at approved abattoirs outside the infected zone but within the restricted area was allowed, the heads, feet and offal either being moved back to the infected zone or destroyed under official supervision.

The last roadblock was lifted on 31 March 2001.

TABLE 5: Summary of products seized, movement permits issued and animals and products permitted to move into the Nkomazi area, as well as traffic flow through the Nkomazi Plaza roadblock. Also cattle slaughtered from the quarantine zone

	DEC.2000	JAN. 2001	FEB.2001	MAR.2001	TOTAL
ROADBLOCKS	3	3	1	1	3
MEAT SEIZED (kg)	224,3	121,17	731,5	5 732	6 808,97
MILK SEIZED (litres)	34	26,5	2	150	212,5
PERMITS ISSUED	444	326	15	0	785
MEAT PERMITTED THROUGH (kg)	14 085	933	42	920	15 980
SHEEP PERMITTED IN	23	1	0	0	24
GOATS PERMITTED IN		1	0	0	1

CATTLE PERMITTED IN	1	5	0	0	6
TRAFFIC FLOW	184 088	165 618	87 028	81 377	518 111
CATTLE SLAUGHTERED		32	27	198	257

Vaccination

Immediately after the disease was diagnosed on 15 December 2000, a massive cattle, goat and sheep vaccination campaign was launched in the infected zone. Despite the holidays and festive season, cattle vaccination coverage of 78% had been achieved by 31 December 2000. Cattle were vaccinated twice with a trivalent (SAT-1, SAT-2 and SAT-3) water-based vaccine (vaccination coverage 89% and 83%), and goats (74%) and sheep (63%) once.

All vaccinations in the quarantine zone were suspended on 31 March 2001, except for cattle in the routinely vaccinated red line area, as well as an additional vaccination area (see section on vaccination after the outbreak in)

82% of the cattle in the Nsikazi red line area were vaccinated from February to April 2001, 6 weeks earlier than what was planned for the routine vaccination program in that area, following the Bushbuckridge outbreak, to decrease the risk of infection spreading to Nsikazi from the north.

Vaccine reaction in the infected area was assessed serologically in cattle. The liquid phase blocking ELISA was used and 73% of samples tested positive, indicating a good level of herd immunity.

TABLE 6: summary of vaccinations done from December 2000 to March 2001

CATTLE						FIRST ROUND		SECOND ROUND
SV AREA	SECTOR	ZONE	NO OF DIPTANKS/ FARMS	TOTAL CATTLE	CATTLE VACCINATED	% CATTLE VACCINATED	CATTLE VACCINATED	% CATTLE VACCINATED
NELSPRUIT	COMMERCIAL	S	63	4 331	(1) 242			
NELSPRUIT	COMMUNAL	S	32	20 435	(2) 1 171		(2) 16 763	82%
NKOMAZI	COMMERCIAL	I	61	7 542	6 876	91%	6 456	86%
NKOMAZI	COMMUNAL	I	39	55 610	49 498	89%	46 125	83%
TOTAL			**483**	**106 006**	**56 616**	**89%**	**52 581**	**83%**

SMALL STOCK			SHEEP			GOATS		
SV AREA	SECTOR	ZONE	TOTAL	VACCINATIONS	% SHEEP VACCINATED	TOTAL	VACCINATIONS	% GOATS VACCINATED
NKOMAZI	COMMERCIAL	I	442	244	55%	351	90	26%
NKOMAZI	COMMUNAL	I	122	112	92%	10 865	8 235	76%
TOTAL			**2 068**	**356**	**63%**	**15 700**	**8 325**	**74%**

PIGS				
SV AREA	SECTOR	ZONE	TOTAL	VACCINATIONS
NELSPRUIT	COMMERCIAL	S	1494	(3) 289
TOTAL			**7586**	**289**

I = Infected zone
S = Surveillance zone
(1) = Moved to infected zone after vaccination
(2) = Part of routine vaccination campaign
(3) = High risk herd, destined for eventual slaughter

Extension

Communication with and extension to animal owners to improve awareness and gain disease information received attention throughout the campaign. 14 Joint and 16 Veterinary Operational Committee meetings were held during the campaign of four months. Two meetings were held in Malelane with farmers from the Nkomazi SV area during December 2000.

On 4 January 2001 a meeting with stockowner committees in the Nkomazi district was held, to encourage owners to bring their cattle for the second round of vaccination, as well as goats, to keep the morale high, to explain the disease, to answer queries and to do extension. More than 100 cattle owners attended as representatives of all the communal diptank areas.

On a Nsikazi district Animal Health Forum meeting on 25 January 2001, attended by representatives from all the communal diptank areas, the FMD situation was discussed.

On 18 February 2001 a meeting was held at Magogeni in the infected area, where about 250 farmers were informed on the progress with the campaign and thanked for their co-operation during the campaign with regard to vaccinations and inspections.

2.2.4.4.2. *After the outbreak*

The Nkomazi FMD outbreak control campaign practically ended on 31 March 2001, but being in a permanent restricted area, actions such as movement control, inspections and routine vaccinations continues as a matter of routine indefinitely beyond March 2001.

Control of vaccinated animals

Movement of vaccinated animals from the infected zone (Nkomazi SV area) is subject to the movement protocol of 28 May 2001 and only allowed for slaughter.

Movement of vaccinated cattle from the Nsikazi district are subject to the 1998 FMD control measures (see 2 above).

All cattle, goats, sheep and pigs in the FMD restricted areas are still being regularly inspected and their numbers, increases, decreases and movements monitored as explained in 2 above.

Vaccination

All vaccinations in the infected zone were suspended on 31 March 2001, except for cattle in the routinely vaccinated red line area, as well as an additional vaccination area, which was demarcated according to the risk of contact between infected stray buffalo and cattle, pending completion of construction of the veterinary fence. It was planned to vaccinate all cattle in the red line area in June and October 2001 and all cattle in the additional vaccination area in July and November 2001. Thereafter the situation will be re-evaluated with regard to future vaccination. The vaccination situation as from June 2001 is shown in Fig.14.

Cattle in the Nsikazi red line area were vaccinated during June 2001, and are to be vaccinated again in October 2001, and from then on every six months in April and October.

Fences

The replacement of the flood-damaged sections of the veterinary fence along the southern boundary of the KNP is currently underway. By the end of June 2001 90% of this distance had been practically completed. The expected completion date is 31 August 2001.

Analysis of the incidence of stray buffalo following the upgrading of this fence since 1998, shows that the risk of spread of FMD by stray buffalo will decrease drastically once the upgrading and replacement have been completed.

Extension

Extension to communities in the FMD restricted areas and beyond is continuously done by veterinary officials. These activities include articles in the printed news media, presentations at farmers' days and meetings, exhibitions at agricultural shows as well as individual communications.

Regulations

No regulations have been amended as a result of the Nkomazi FMD outbreak. A decision was however taken to extend the restricted area slightly in Mpumalanga where it adjoins the Bushbuckridge area in the Northern Province due to epidemiological considerations such as constant and traditional cross border movements of cattle.

2.2.4.5. Summary of the impact of the outbreak on the previous FMD free zone of South Africa

The outbreak in the Nkomazi area was within the FMD restricted area outside the FMD free zone approved by the OIE. The outbreak therefore would not have any affect on the free status should no outbreaks have occurred in the previous free zone (Camperdown, KwaZulu-Natal) and the feedlot at Middelburg.

2.3. OUTBREAK OF SAT 2 IN THE NORTHERN PROVINCE (BUSHBUCKRIDGE, FEBRUARY 2001)

2.3.1. HISTORY OF FOOT- AND- MOUTH DISEASE IN THE NORTHERN PROVINCE

The eastern side of the Province borders the KNP and private nature reserves where FMD-infected African buffalo are allowed to be kept.

The last outbreak in cattle in the Northern Province was in 1983, close to the town Phalaborwa, in a single dairy in the vaccination area of the foot- and-mouth disease restricted area.

2.3.2. CONTROL MEASURES IN PLACE BEFORE THE OUTBREAK

The eastern side of the province consists of an FMD vaccination area, which is a small strip of farms (redline area) adjacent to the KNP and a surveillance area adjacent to the vaccination area. As was the case with the Nkomazi area, this vaccination zone was decreased in size in 1995. The vaccination and surveillance area constitutes the FMD restricted (control) area, excluded from the FMD free zone as recognized by the OIE. The control area is separated from the free area by clearly defined geographical borders.

FMD control measures in this area of the Northern Province are very similar to those for the Nkomazi FMD control area (see) with the exception that in certain areas a cattle fence demarcates the vaccination zone from the surveillance zone.

The Bushbuckridge area (Mhala district), where the outbreak occurred, is a closed community and very few animals move out of this specific area. With follow-up investigations on movements in the area, the following were reported:

From June 2000 to Oct 2000 65 permits with 228 animal movement internally

From Nov 2000 to Jan 2001 41 permits with 147 animal movement internally

Only one movement out of the area occurred and that was in October 2000, when eight cattle went for direct slaughtering at Gaza beef at Giyani, which is in the FMD restricted area.

Vaccination

A trivalent Foot and Mouth Disease vaccine (SAT I, SAT 2, SAT 3), provided by the EDD-OVI is used in the vaccination area and is administered to cattle every six months.

2.3.3. THE BUSHBUCKRIDGE FMD OUTBREAK

The disease was clinically diagnosed in cattle on 1 February 2001 on the farm Orinoco in the Mhala district. Samples were examined by the EDD-OVI, where the diagnosis was confirmed on the same day. Virus identification was firstly based on positive PCR tests and virus typing using the sandwich ELISA, nucleotide sequencing confirmed the serotyping to be an SAT 2 FMD virus, which relates it to the virus that occurs in buffalo in the Orpen area of the KNP. The Orpen area is the area inside the KNP that is adjacent to the Bushbuckridge area. Due to the damage to the fence as a result of the floods in the first quarter of 2000, buffalo escaped from the KNP resulting in contact between cattle and buffalo in the adjacent communal farming area.

The nucleotide sequences of the 3'end of the VP1 gene of the initial as well as the last isolates obtained from the Mhala district were determined and compared with other isolates from southern Africa to determine the possible source of infection. The origin of all the isolates included in this comparison is indicated in Table 7. The two isolates (SAR/01/01, initial isolate and SAR/11/01, final isolate) differed by approximately 1.5% from each other, possibly indicating the selective pressure on the virus circulating in vaccinated animals (Fig. 16). Both isolates are related to buffalo isolates previously isolated from the Orpen area (KNP/19/89; KNP/18/95; KNP/31/95), which is very close to the district where the outbreak occurred. These groupings are supported by high bootstrap values, indicating that it is statistically significant. This indicated the possible role that buffalo had played in the transmission of the disease.

TABLE 7: List of viruses included in the phylogenetic tree

ISOLATE	COUNTRY	LOCATION	SPECIES
BOT 18/98	Botswana	Nxaraga	Buffalo
ERI 12/98	Eritrea	-	-
SWA 4/89	Namibia	Sigwe Village, East Caprivi	Bovine
NAM 286/98	Namibia	Mouma Game Reserve	Buffalo
NAM 292/98	Namibia	Mouma Game Reserve	Buffalo
NAM 304/98	Namibia	Mahango Game Reserve	Buffalo

RWA 01/00	Rwanda	Gishwati district	Buffalo
RWA 01/01	Rwanda	-	Bovine
KNP 07/88	South Africa	Lower Sabie area, Kruger National Park (KNP)	Buffalo
KNP 19/89	South Africa	Orpen area, KNP	Buffalo
KNP 5/91	South Africa	3 km SE Satara, KNP	Buffalo
KNP 141/91	South Africa	Phalaborwa gate area, KNP	Buffalo
KNP 143/91	South Africa	Phalaborwa gate area, KNP	Buffalo
KNP 160/91	South Africa	Orpen area, KNP	Buffalo
KNP 183/91	South Africa	Lower Sabie area, KNP	Buffalo
KNP 32/92	South Africa	Shingwedzi area, KNP	Buffalo
KNP 16/93	South Africa	Capricorn, KNP	Buffalo
KNP 18/95	South Africa	Orpen area, KNP	Buffalo
KNP 31/95	South Africa	Orpen area, KNP	Buffalo
KNP 6/96	South Africa	Crocodile bridge area, KNP	Buffalo
SAR 01/01	South Africa	Orinoco dip tank, Northern Province	Bovine
SAR 11/01	South Africa	Thulamashe, Northern Province	Bovine
ZAM 9/93	Zambia	Nanzhila, Kafue National Park	Buffalo
ZAM 10/93	Zambia	Nanzhila, Kafue National Park	Buffalo
ZAM 7/96	Zambia	Mulanga	Buffalo
ZAM 8/96	Zambia	Mulanga	Buffalo
ZAM 10/96	Zambia	Mulanga	Buffalo
ZIM 1/88	Zimbabwe	Hwange National Park	Buffalo
ZIM 2/88	Zimbabwe	Hwange National Park	Buffalo
ZIM 4/88	Zimbabwe	Hwange National Park	Buffalo
ZIM 7/88	Zimbabwe	Hwange National Park	Buffalo
ZIM 14/90	Zimbabwe	Doma safari area	Buffalo
ZIM/Gn 10/91	Zimbabwe	Gonarezhou National Park	Buffalo
ZIM 16/91	Zimbabwe	Matusadona National Park	Buffalo
ZIM 34/91	Zimbabwe	Urungwe National Park	Buffalo
ZIM 7/95	Zimbabwe	Sengwa	Buffalo
ZIM 267/98	Zimbabwe	Chizarira	Buffalo

2.3.3.1. Evolvement of the disease and disease control

Evolvement is given per farm, which may be one dip tank area, or up to three dip tank areas per farm.

Confirmed means that the virus Type SAT 2 was isolated and identified by the EDD-OVI.

1 February 2001	Orinoco	clinically fresh lesions and confirmed
		All cloven hoofed animal movements stopped - no permits
2 February 2001	Joint Operational Committee established	

	Angincourt	one fresh, three old lesions and confirmed
	Arthurstone	two old lesions, slipper formation and confirmed
3 February 2001	Joint Operational Center established at Thulamahashe	
4 February 2001	Newington	7 lesions and confirmed
5 February 2001	Movement protocol implemented	
	Vaccinations, intensive inspections and sero-surveillance start with 21 teams	
	Merry Pebbles Stream	80% of 31 lesions and confirmed
	Dwarsloop	Fresh lesions and confirmed
6 February 2001	7 Road blocks operational	
	Casteel	1 lesion and confirmed
	Rolle	1 mouth lesion, 7 feet lesions and confirmed
7 February 2001	New Forest	
8 February 2001	Dumfries	Lesions and confirmed
		Personnel strength -340 officials
9 February 2001	Zanthia	Lesions and confirmed
16 February 2001	First round vaccinations 88	7% completed
19 February 2001	Start with small stock vaccination	
23 February 2001	Allendale	Fresh lesions and confirmed
	Dingleydale	Fresh lesions and confirmed
28 February 2001	Violetbank	Fresh lesions and confirmed
	Edenburg	Lesions and confirmed
2 March 2001	Croquet Lawn	Fresh lesions and confirmed

	95,6% cattle and 45,1% small stock vaccinated first round	
4 March 2001	Maviljan	Fresh lesions and confirmed
5 March 2001	Second round cattle vaccinations starts	
6 March 2001	London	Fresh and recovered lesions
	Cunning Moor	Many fresh lesions and confirmed
11 March 2001	Wales	Old lesions mouth and feet
15 March 2001	Arthurseat	Fresh and old lesions and confirmed
25 March 2001	88,6% cattle vaccinated second round and 53,4% small stock first round	
2 April 2001	Welgevonden / Hebron	Salivation and feet lesions
9 April 2001	100% Mouthing inspection starts	
12 April 2001	Culcutta	one 2-3 week old lesion
13 April 2001	Rooyboklaagte	Eleven 2-3 week old lesions
18 April 2001	Oakley	3 old mouth lesions
11 May 2001	Salique	4 old mouth lesions Brooklyn animals
15 May 2001	Zoeknog	1 slipper formation
23 May 2001	Third round vaccinations starts Craigieburn and surrounding farms	
30 May	Old lesions found at Craigieburn	
15 June 2001	85% of cattle vaccinated for third round follow-up vaccinations (Craigieburn)	
25 June 2001	100% mouthing inspections start Craigieburn and surrounding farms	
	Fourth round follow-up vaccinations starts Craigieburn and surrounding farms	
2 July 2001	Fourth monthly vaccinations start for the rest of area excluding Craigieburn and surrounding farms	
19 July 2001	88% cattle vaccinated fourth round Craigieburn and surrounding farms with a repeat vaccination in the rest of the area	

Expected date of return to routine control measures in the infected zone: 31 August 2001.

See , which shows the evolvement of the disease per month

2.3.3.2. Details of diagnostic procedures The infected zone was divided into 23 wards all functioning on a seven-day inspection cycle. Within the first two weeks in February, random sampling of all dip tank area and farms (119) in the infected zone was done. A total of 2 858 serum samples were taken and tested on the liquid phase blocking ELISA (results discussed under the heading serology). At the same time tissue samples were taken wherever lesions were found.

A total of 119 tissue samples were taken during the outbreak on 29 farms. The results are as follows:

Virus isolation: pig kidney cell culture	**Direct typing ELISA**	**PCR**
21 positive on 13 farms	27 positive on 13 farms	40 positive on 19 farms

2.3.3.3. Surveillance

Surveillance was done in the infected zone and in a 10-kilometer surveillance zone around the infected zone, excluding the Kruger National Park, which is an FMD endemic area.

ANIMALS AT RISK:

Type of zone	**Properties**	**Cattle**	**Small stock**	**Pigs**
Infected zone	119	80 995	43 061	1 115
Surveillance zone	45	9 034	2 098	1 245
Total	**164**	**90 029**	**45 159**	**2 360**

2.3.3.3.1. I*nspections*

Infected zone:

The zone was divided into 23 wards all functioning on a seven-day inspection cycle. From 5 February 2001 to 13 July 2001, the following inspections were done:

Visual inspections on cattle	1 173 148
Visual inspection of mouth of cattle (mouthing)	195 087
Cattle found with lesions	1 507
Blood samples taken for serology: cattle	5 769
Visual inspection of small stock	53 912
Visual inspection of mouth of small stock	2 833
Small stock found with lesions	0
Blood samples taken for serology: small stock	1 727
Visual inspection of pigs	1 234
Pigs found with lesions	0

Surveillance zone:

The following inspections were done in the surveillance zone:

Visual inspections on cattle	61 325
Visual inspection of mouth of cattle (mouthing)	3 274
Cattle found with lesions	0
Blood samples taken for serology cattle	500
Visual inspection of small stock	3 076
Small stock found with lesions	0
Blood samples taken for serology small stock	0
Visual inspection of pigs	6 183
Pigs found with lesions	0
Game visual inspections	1 418

Surveillance in the rest of the Foot and Mouth Restricted area and in the FMD Free areas of the Northern Province.

Foot and Mouth Disease inspections were intensified and all veterinary officials and farmers were alerted. The normal inspection cycle of once a week in the vaccination areas and once every two weeks in the surveillance areas were maintained. Inspections at stock sales and at abattoirs were intensified. Veterinarians and animal health technicians investigated several alarms and samples were submitted to the laboratory when suspect clinical signs occurred, all with negative results for FMD.

2.3.3.3.2. *Vaccination*

Ten farms were randomly chosen and monitored serologically after the first and second round of vaccination. After analysing the serological response of the cattle to the first vaccination, it was found that 4 weeks after the primary vaccination there was an increase of 19.1% in the number of animals with a blocking ELISA titre of 1.6-2.0 and an increase of 8.3% in the number of animals with titres above 2.0. After the second vaccination, 86.8% of the samples tested above 1.6 and 63.7% tested above 2.0. This shows that the two rounds of vaccination stimulated a sufficient level of immunity.

Surveillance zone

In the surveillance zone around the infected zone, serologically representative samples from cattle were taken and tested negative on the liquid phase blocking ELISA, confirming that the infection did not spread out of the infected zone.

2.3.3.4. Control Measures During And After The Outbreak

2.3.3.4.1. *Control during the outbreak*

The entire Bushbuckridge area was placed under quarantine and no movements of cloven-hoofed animals were allowed. Seven roadblocks on roads leaving the area were operational within five days. These roadblocks were manned by Veterinary officials, Defense Force members, SA Police Services and Traffic officials. No animals or animal products were allowed to leave the infected area. Fourteen confiscations of animal products, three of animal manure and twelve of fresh grass took place at these

roadblocks. No animals were taken out. Movements for products for own consumption were allowed into and through the area controlled on a closely monitored permit system.

As was the case with the Nkomazi outbreak in Mpumalanga, control of the disease was based on a vaccination policy. On 5 February 2001, vaccinations started and within two weeks 88.7% of all cattle were vaccinated. Second vaccinations were done four weeks later and two weeks thereafter 84% of the cattle were vaccinated. Follow-up serology proved that this strategy was effective.

Up to 13 July 2001 a total of 233 032 cattle and 29 025 small stock were vaccinated in the area. A total of 1 234 473 cattle, 56 988 small stock and 7 417 pig inspections were performed. A total of 195 087 cattle and 2 833 small stock were mouthed.

2.3.3.4.2. *Control post infection*

Movement control with veterinary movement permits are enforced. Internal movements of animals are allowed with a veterinary movement permit. Cloven-hoofed animals from non-infected farms are allowed to be sent for direct slaughtering to approved abattoirs within the Foot and Mouth Disease restricted area after inspection, mouthing and an official veterinary movement permit has been issued.

The area is a closed community and there are no requests to move animals from the area. Several requests to bring animals into the area were received and allowed. The entire Bushbuckridge area was vaccinated for a third time during July 2001 with a 95% success rate.

2.3.3.4.3. *Control after the area is declared free from the disease*

Movement control for animals and products are with veterinary movement permits and cloven-hoofed animals will only be allowed out of the area for direct slaughtering within the FMD restricted areas within the Northern Province or Mpumalanga Province.

Weekly inspections of all animals are performed and weekly stock totals, controlled via stock registers and owner's stock cards, will continue for at least another three years. FMD vaccination of cattle in the entire area will be repeated during November 2001 and in March 2002. Thereafter an evaluation of the area and the situation will be done and a smaller area adjacent to the nature reserves will be vaccinated twice a year as in the past.

The strict control measures enforced during the outbreak will be relieved on 30 August and be reverted back to the routine control measures specified in the Regulations for a FMD controlled area. Game and nature reserve fences have already been repaired and more effort will be directed towards inspection and maintenance of fences. Early warning systems to alert veterinary and environmental officials about the presence of stray and roaming buffalo within the farming communities were re-activated or established via dip tank and livestock committees.

2.3.3.5. Conclusion

The affected area is in a Foot and Mouth Disease restricted area and the communities are familiar with the disease. The disease did not spread to the FMD free area and as such did not have an effect on the status of the free zone. The area will remain excluded from the proposed FMD free area without vaccination as approved by the International Committee of the OIE in May 1996.

3. SURVEILLANCE AND PUBLIC AWARENESS IN OTHER PROVINCES (FMD FREE ZONE WITHOUT VACCINATION)

3.1. INTRODUCTION

The outbreaks of foot and mouth disease in the previous FMD free areas without vaccination (Camperdown, KwaZulu-Natal and Kanhym feedlot, Middelburg, Mpumalanga) and within the FMD Control areas (Nkomazi and Bushbuckridge) resulted in intensive follow-up and surveillance activities in all the remaining provinces of South Africa constituting the FMD free area without vaccination. The disease fortunately never spread from these small foci of infection to other areas within South Africa. There was however, as could be expected, an increased sensitivity throughout the country due to extensive press and media coverage. Many "suspect" cases were investigated outside the infected areas all of which proved to be negative.

The intensified surveillance activities were conducted over and above the requirements imposed on the import of animal and animal products as normal risk mitigation procedures to prevent the introduction of the disease.

The activities conducted in the other provinces, are summarized below:

3.2. GAUTENG

Introduction
The Foot and Mouth Disease outbreaks in both KwaZulu-Natal and Mpumalanga Provinces had a major impact on the workloads of all service centers in Gauteng Province. 18 animal health technicians and one State Veterinarian helped out in Kwazulu Natal. There was a significant increase in inspections of all animals and animal products into and out of Gauteng to other countries, at major entry points like the Johannesburg International Airport, feedlots, road stalls, auctions, abattoirs, cattle and pig farms, taxidermists, dairy plants and shows. Awareness projects were also launched in schools, communities and abattoirs by Agricultural and Veterinary personnel in all three service centres by showing the FMD video and issuing pamphlets on the disease. Animal health technicians showed the video to more than 200 farmers.

A Provincial Operational Co-ordination Committee, consisting of members of the SADF, SAP, Emergency Services and Veterinary Services Gauteng, met three times in December to ensure that the necessary structures were in place and necessary personnel were on standby in the event of a foot and mouth outbreak in Gauteng during the festive season.

Johannesburg International Airport
From April 2001 more than 120 days have been spent working at the Johannesburg International Airport. At random, luggage from European travelers was searched for animals and animal products. Farmers and residents on farms from Europe had their luggage and boots sprayed with an anti-viral disinfectant.

Feedlots and farm inspections
10 feedlot visits and 2 345 farm inspections were made to date in Gauteng for Foot and Mouth Disease monitoring.

Road stalls, sale pens and auctions
In spite of personnel shortages, 170 additional visits and inspections were made at the auctions, road stalls and sale pens.

Abbattoirs
In order to create awareness of the disease, public health staff were issued videos on FMD and showed them to the abattoir personnel. During the FMD outbreak in Mpumalanga, Gauteng Provincial Veterinary Services played a cardinal role in assisting with the logistics of slaughtering the animals on the affected property. About 22 763 pigs, 7 801 cattle and 2 016 sheep were slaughtered at various abattoirs in Gauteng under extremely strict bio-security control measures. A small percentage of animals slaughtered

were bled for sero-surveillance and all the carcasses' pH were checked before they were released. No breakdown of the bio-security control measures occurred.

Tracebacks and monitoring
All the piggeries in Gauteng that received pigs or feed from Kanhym (1/11/200 to 29/11/200) were inspected in early December and no clinical symptoms were found. Follow up inspections were done and at some farms the FMD video was shown to the farm owners.

Several "suspect" cases reported by stock owners were followed-up without delay. All of them proved to be negative.

Taxidermists and tanneries
These were regarded as potential sources of contamination and disease spread. Inspections were increased and inter-provincial movement of hides and skins between taxidermies was monitored. Trucks carrying hides and skins from neighbouring countries to RSA tanneries had to be strictly monitored.

Dairy plants
After the foot and mouth disease outbreaks in South Africa, certain countries decided to insist on: the trucks transporting dairy products to be disinfected and sealed, approval of all exporting dairy establishments, insist on regular monitoring and inspections of exporting dairy plants. There was an increase in demand for traceability of all raw materials and regular monitoring of temperature and pHs at which these products are subjected during processing in order to destroy the FMD virus in the event of contamination. This has put a lot of burden on the Animal Health personnel, since Gauteng is the centre for most trade.

General import and export
Many meetings and telephonic conversations between Gauteng Province, National Directorate Veterinary Services, other provinces, other countries and importers and exporters took place in connection with the new protocols and procedures regarding foot and mouth disease.

3.3. WESTERN CAPE PROVINCE

A total of 182 serum samples from 10 farms were submitted for investigation of which all were found negative. A Joint Operational Committee was established that met once a week to monitor the surveillance activities within the province and evaluate movements of animals to and from the province.

3.4. EASTERN CAPE PROVINCE

In view of the FMD outbreak in KwaZulu-Natal, the most important area of surveillance in the Eastern Cape Province was considered to be Umzimkulu, which is situated within KwaZulu-Natal. The following information relates to surveillance activities occurring in the Umzimkulu area. All serological tests for FMD were negative.

Animals inspected and bled in the Umzimkulu Surveillance Area

Table 1: Summary table of bovine inspected and bled in the Umzimkulu Surveillance Area

SPECIES CENSUS	INSPECTION		BLEEDING		PERCENTAGE INSPECTION		AVERAGE PERCENTAGE INSPECTED
	FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	

52 448,0	26 432,0	7 485,0	704,0	202,0	50,4	14,3	32,3

Table 2: Summary table of Ovine, Carpine and Porcine inspected and bled in the Umzimkulu Surveillance Area

NUMBER OF ADMIN AREAS	SPECIES	SPECIES CENSUS	INSPECTION		BLEEDING		PERCENTAGE INSPECTED		AVERAGE PERCENTAGE
			FIRST	SECOND	FIRST	SECOND	FIRST	SECOND	
42	OVINE	15 654	8 326	1 287	578	125	53	8	31
42	CARPINE	24 485	11 941	2 739	708	228	49	11	30
42	PORCINE	2 227	120	22	109	18	5	1	3

3.5. NORTHERN CAPE PROVINCE AND FREE STATE PROVINCE

Investigations of suspicious report cases were performed and all results were negative. Several roadblocks were set up to monitor movements to and from KwaZulu-Natal and the Free State Province. Numerous African buffalo herds were also tested during the year, all with negative results. It can be concluded that no foot and mouth disease has occurred in these provinces.

3.6. NORTH WEST PROVINCE (NWP)

FMD surveillance and other activities (September - December 2000) in the NWP

The FMD outbreak in KwaZulu-Natal triggered the NWP to implement the early activation of several preventative initiatives against FMD, i.e.

- gathering of information released and supplementing it with additional information (pamphlets) and distributing it to organized agriculture, the SAVA (private veterinary practitioners in NWP, Northern Cape and Free State Provinces) and the general public
- the use of such information for several newspaper articles at the regional and State Veterinary Area level, and for two radio transmission (30 min. each) in Setswana aimed especially at communal livestock owners
- augmenting such efforts at a generally increased awareness of FMD in the NWP with increased information and training meetings on FMD (presentations, video, slides, pamphlets, question and answer sessions) for departmental field personnel (Directorates of: Food Services, Environment & Conservation, Veterinary Services) in each region, as well as increased extension meetings with commercial and communal farmers, auctioneers and abattoirs in each region
- a high level meeting was held at the Department of Agriculture with major stakeholders (House of Traditional Leaders included) to discuss various aspects of FMD, risk for the NWP and preparedness of Veterinary Services
- updating of each Region's contingency planning
- a total of 43 Veterinary Service field personnel from NWP were sent to KZN in order to assist them with FMD control, and to return with experience to this province
- a 24- hour telephone service at the offices of the Directorate Veterinary Services, NWP, for responding from to possible reports of suspected cases of FMD in the NWP
- a stand-by of all personnel of the Department (NWP) for possible emergency requirements for FMD control in the NWP, including during vacation leave for the Christmas/New Year season
- a programme of intensified surveillance by means of visits and inspections of livestock production premises (auction places, abattoirs included) and clinical examinations of their animals, mainly in the Eastern Region, which was considered a higher risk area

- serological surveillance (during the above-mentioned programme) targeting specific animals, thought be at possible high risk

The activities of the NWP Veterinary Services during September to December 2000 are summarized below:

Inspections/examinations of-

- a total of 130 783 animals
- 982 carcasses
- the mouths of a total of 2 836 animals
- blood of 39 animals
- a total of 418 herds/flocks
- 363 auction places
- 6 feedlots
- 10 animal transportation establishments
- 81 abattoirs
- 18 meat retailers
- several hide & skin traders
- 1 tannery
- several municipal pounds.

No sign of FMD has been discovered/reported in the NWP to date and the province is thus considered to be FMD free.

4. OIE QUESTIONNAIRE: FMD FREE ZONE WHERE VACCINATION IS NOT PRACTISED

FMD FREE ZONE WHERE VACCINATION IS NOT PRACTISED

I. RESUME OF REPORT

Resumé of Report of Country which applies for status, under Chapter 2.1.1 of the *International Animal Health Code*, as having an FMD free zone where vaccination is not practised, in an FMD free country where vaccination is practised or in a country of which parts are still infected.

1. Regular and prompt animal disease reporting

(Describe here the national system and to who you provide international disease reporting)

South Africa has a National Animal Disease Database, which has been in place since 1987. State Veterinarians throughout South Africa send monthly reports of controlled animal disease outbreaks to their Provincial Directors of Veterinary Services, who then sent these reports to the National Directorate Veterinary Services, Epidemiology Section, where this information is entered into a database and monthly reports are compiled. Monthly reports on controlled (all OIE List A and certain OIE List B) animal diseases are sent to the OIE in Paris and also to all SADC countries and trading partners internationally. Emergency reporting also takes place whenever there is an outbreak or suspected outbreak of: Foot and mouth disease; African swine fever; Rift Valley fever; any disease that has already been eradicated in South Africa; and any disease that never occurred in South Africa. Emergency reports are also sent if there are any abnormal outbreaks of African horse sickness, Anthrax and Newcastle disease. These emergency reports are sent from the State Veterinarian directly to the National Director Veterinary Services and the OIE is then notified immediately via an SR1 form, as are all SADC countries and international trading partners.

2. No FMD outbreak in zone in past two years

(State date of last outbreak and refer to FMD eradication section)

The last outbreak of FMD in the free zone (this excludes the district of Camperdown in KwaZulu-Natal Province) was on the farm, "Arendsfontein" (Kanhym feedlot) on 29 November 2000. Emergency vaccination was undertaken - See report

3. No vaccination in zone in past 12 months

(State here whether vaccination in the zone is prohibited, since what date, and
briefly describe how this is enforced)

No vaccination is practised in the FMD-free zone (see initial application for FMD free zoning). The free zone does not include the Camperdown district of KwaZulu-Natal Province. Emergency vaccination with slaughter was implemented during the FMD outbreak at "Arendsfontein" farm in the Middelburg district of Mpumalanga Province _ see report. Vaccination against FMD is strictly controlled by the Government and the vaccine is only obtainable with the authorisation of the National Director Veterinary Services.

4. No entry of vaccinated animals into zone since cessation of vaccination

(State date of prohibition of entry of vaccinated animals, and refer to method of enforcement under section on FMD prevention)

Please see attached report.

5. Free and surveillance zone boundaries

(Concise geographic description of free zone and surveillance zones. Annex map with dimensions which includes both zones)

The free zone is the area previously (1996) approved by the International Committee of the OIE as a free zone excluding the district of Camperdown in the Province of KwaZulu-Natal.

6. Free zone

A. Surveillance

(Briefly describe system, refer to section on FMD surveillance in the free zone)

There has been no change in the FMD surveillance in the free-zone - see initial FMD submission by South Africa and see report.

B. Regulatory measures

(Briefly describe measures, refer to section on FMD prevention in the free zone)

There has been no change in the regulatory measures on FMD prevention in the free zone.

7. Surveillance zone

A. Surveillance

(Briefly describe system, refer to section on FMD surveillance in the surveillance zone)

The main aim of control in Camperdown district and in the surveillance area bordering the endemic infected Kruger national Park is to prevent vaccinated animals entering the FMD free zone of South Africa. The following measures will apply in Camperdown:

- monthly inspections of all cloven-hoofed animals on each farm; record keeping of all cloven-hoofed animals on each farm; movement control of all cloven-hoofed animals; cloven-hoofed animals from vaccinated farms will only be allowed to move to other vaccinated farms or to abattoirs for direct slaughter (all movements under veterinary control);
- Vaccinated animals may not be slaughtered at export abattoirs; and sero surveys will be carried out every 3 months in and around these areas.

The Nkomazi, Mhala, Mapulaneng districts and the Kruger National Park are all situated within the permanent FMD controlled area of South Africa. The same control measures as for Camperdown apply in these areas.

B. Regulatory measures

(Briefly describe measures, refer to section on FMD prevention in the surveillance zone)

Please see attached report.

NOTE: Annexes for the following sections which are not in one of the three official OIE languages should have a brief summary in one of these languages.

[1] INFECTIOUS DISEASES OF LIVESTOCK, VOLUME 2, Edited by, J.A.W. Coetzer, G.R. Thomson, R.C. Tustin, pages 825-852.