

Scenarios for eradicating foot-and-mouth disease

E.J. Bos

M.G.A. van Leeuwen

J.J. de Vlieger

Project code 69001

December 2001

Report 2.01.15

Agricultural Economics Research Institute (LEI), The Hague

The Agricultural Economics Research Institute (LEI) is active in a wide array of research which can be classified into various domains. This report reflects research within the following domain:

- Statutory and service tasks
- Business development and competitive position
- Natural resources and the environment
- Land and economics
- Chains
- Policy
- Institutions, people and perceptions
- Models and data

Scenarios for eradicating foot-and-mouth disease

Bos, E.J., M.G.A. van Leeuwen, and J.J de Vlieger

The Hague, Agricultural Economics Research Institute (LEI), 2001

Report 2.01.15; ISBN 90-5242-695-3; Price NLG 19.- / €8,62 (including 6% VAT)

28 p., fig., tab., annexes

Research project commissioned by the Ministry of Agriculture, Nature Management and Fisheries. With the help of desk-research and input-output analysis quantitative information is assembled about the differences in cost for agribusiness and tourism of two eradication scenarios for foot-and-mouth disease. The first scenario was based on the eradication method used in the year 2001, vaccination with culling. The second scenario was based on vaccination without culling.

Orders:

Phone: 31.70.3358330

Fax: 31.70.3615624

E-mail: publicatie@lei.wag-ur.nl

Information:

Phone: 31.70.3358330

Fax: 31.70.3615624

E-mail: informatie@lei.wag-ur.nl

© LEI, 2001

Reproduction of contents, either whole or in part:

- permitted with due reference to the source
- not permitted



The General Conditions of the Agricultural Research Department apply to all our research commissions. These are registered with the Central Gelderland Chamber of Commerce in Arnhem.

Contents

	Page
Preface	7
Summary	9
1. Introduction	11
2. Effects on agribusiness	13
2.1 Points of departure	13
2.2 Methodology	14
2.3 Results	15
2.3.1 The 'vaccination with culling scenario'	15
2.3.2 The 'vaccination without culling sceanrio'	18
2.4 Conclusions	20
3. Other expenditure	21
4. Cost for the tourism sector	23
4.1 Validity of research carried out	23
4.2 Analysis of loss in sales in tourism/recreational sector in both scenarios	24
References	25
Appendixes	
1. The north-west Veluwe region	27
2. Duration of export restriction periods based on EU rules and OIE	28

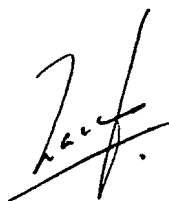
Preface

The Ministry of Agriculture, Nature Management and Fisheries wanted to have information about the differences in costs between two possible eradication methods for a conference on the eradication of foot-and-mouth disease that will take place in Brussels in December 2001.

The Ministry asked the Agricultural Economics Research Institute (LEI) and Wageningen University, department farm management studies to study the main financial consequences of two different eradication methods on agribusiness and tourism. The effects on sales, added value, employment, export and other costs (maintenance, cost of controlling the disease). The influences on price must also be taken into account.

The project was carried out on the basis of desk research. Information from experts has also been used. We express our thanks to them for their cooperation.

The managing director,

A handwritten signature in black ink, appearing to read 'L.C. Zachariasse', written over a horizontal line.

Prof. Dr. L.C. Zachariasse

Summary

In the overview below the costs of 'vaccination with culling scenario' and the 'vaccination without culling scenario' are calculated together according to the agreed points of departure and given in millions of euro ¹.

	Vaccination with culling scenario	Vaccination without culling scenario
Agribusiness		
Costs of agribusiness		
1. loss of sales	168.4	1,046.9
2. drop in added value	51.3	314
3. decline in employment (man years)	1,340	0
Government spending for maintenance and eradication	149	X
1. culling	144	0
2. maintenance	5	- a)
Other costs	1.4	-
1. health	-	-
2. rvv	0	-
3. private sector assistance	1.4	-
<i>Tourism/recreation</i>		
Loss of sales	79	39.5

a) To be more fully calculated by AID.

The costs for the agribusiness calculated from the moment of the last outbreak on are larger for the vaccination without culling scenario than for the vaccination with culling scenario. The reason is that the longer period with export bans has a larger influence on prices. However, under the vaccination without culling scenario there are no expenditures for the authorities for culling and destruction of animals. Furthermore there are fewer 'other expenditures' and the loss in sales in the tourism and recreational sector is also smaller.

¹ One euro is equal to 2.20371 guilders.

1. Introduction

In December 2001 an EU conference will take place in Brussels regarding the eradication of foot-and-mouth disease. For the purpose of the Dutch contribution to this conference LEI and WU have been asked to explore two foot-and-mouth eradication scenarios:

1. the consequent approach in 2001, 'vaccination with culling scenario';
2. scenario in which all vaccinated animals remain alive, with the exception of infected businesses, the 'vaccination without culling scenario'.

In the calculation the vaccination area must be taken into account: the Veluwe triangle (see appendix 1) in particular will be investigated regarding the consequences for the funding body for agribusiness and tourism with reference to:

- profit
- added value
- export (with possible transfer of sales to domestic market)
- employment
- miscellaneous costs; maintenance, costs of controlling the disease.

The influences on price must also be taken into account. The calculation will be made on main lines and will not just be representative of the outbreak in 2001. Because the difference between the two scenarios is the central issue, this is not necessary and it is sufficient to indicate the differences in general. Apart from agribusiness and tourism/recreation there are major repercussions for some other sectors. These damaging effects have not been included in the present calculation.

For the benefit of the calculations the following assumptions have been made:

1. the export loss is the same for both scenarios up to the moment of the last outbreak. The financial consequences will therefore only be calculated from the moment of the last outbreak;
2. the cost of fighting the disease is the same, with the exception of the costs associated with the culling and destruction of livestock and the costs of control and maintenance;
3. the point of departure is that in both scenarios there were equally as many outbreaks in the Veluwe triangle and the first and last outbreaks occurred at the same moment;
4. EU regionalisation. From the moment of estimation it is assumed that for the vaccination and supervision areas 'vaccination/supervised area' restrictions apply according to the annex I area (2001/223/EC). For the 'rest of the Netherlands' no restrictions apply. For vaccination/supervised areas, as well as annex I restrictions, the restrictions mentioned in the vaccination order 2001/279/EC also apply;
5. no breeding prohibition will be established;

6. estimations are made of approximate numbers of animals/export of these animals/production on the basis of export data from the previous two years (1999, 2000). From this it can be estimated to what extent the rest of the Netherlands will take over the export from the quarantined area. Products from quarantined areas can be sold on the domestic market;
7. psychological damage leading to economic losses does not have to be taken into account and neither do costs for storage of final products/semi-finished products;
8. in the OIE ruling (Office International des Epizooties) no regionalisation will take place.

In appendix 2 the expected export restrictions on the basis of EU regulations and OIE are included.

2. Effects on agribusiness

2.1 Points of departure

This section deals with the estimation of the economic effects of two different eradication strategies of foot-and-mouth disease for the Veluwe triangle (supervised and protected areas) in terms of profit, added value and employment. Furthermore, possible shifts in sales patterns (domestic and foreign sales) will be indicated between this area and the rest of the Netherlands. The calculations are made on a yearly basis. This means that temporary major shifts in, for example, export between Dutch regions over a one-year period are quite small and that a temporary export ban can be partially or entirely compensated by means of larger exports at a later period.

	Vaccination with culling	Vaccination without culling
Cattle in infected businesses	Culled	Culled
Cattle/beef products in vaccination area	Culled	Not culled, but product can be sold on domestic market
Cattle/beef products in supervised area	Export ban for: - EU: 2 months a) - non-EU: at least 4 months a)	Export ban for: - EU: 12 months - non-EU: at least 12 months
Cattle/beef products in the rest of the Netherlands	Export ban for: - EU: no restrictions - non-EU: at least 4 months a)	Export ban for: - EU: no restrictions - non-EU: at least 12 months

Figure 2.1 Differences in points of departure of the scenarios 'vaccination with culling' and 'vaccination without culling'

a) It is assumed that - from the moment of the last outbreak - one more month is necessary for all vaccinated animals to be cleared. Thereafter follows an export ban of 1 month (for EU export) and at least 3 months (for non-EU export).

In order to get a clear image of the difference between the eradication strategies of the two scenarios, it is necessary to separate the number of animals in infected businesses, the number of vaccinated animals (excluding culled animals), and the number of animals in supervised areas (excluding those culled) (table 2.1). Table 2.1 clearly establishes that one fifth of the Dutch veal production is found in the vaccination/supervised area. The share of vaccination/supervised areas in national stock of sheep, goats and other livestock amounts to 18%.

Table 2.1 *Number of animals in supervised areas, in vaccination areas, and in infected businesses, just as their share in the Dutch total, 2000*

	Supervised area		Vaccination area		Infected business	
	no. of animals	% in Dutch stock	no. of animals	% in Dutch stock	no. of animals	% in Dutch stock
Pigs	296,669	4.6	98,569	1.5	0	0.00
Dairy cattle	65,811	4.4	20,264	1.3	734	0.05
Beef cattle	13,648	3.0	4,202	0.9	152	0.03
Veal calves	114,495	14.6	35,254	4.5	1,277	0.16
Sheep, goats, other	94,488	13.5	32,395	4.6	1,562	0.22
Total livestock	585,111	5.9	190,685	2.2	3,726	0.06

Source: LASER and CBS Landbouwtelling.

2.2 Methodology

The effect of the (temporary) loss of the export of cattle and meat products is verified by means of input-output analyses. The consequences of the transfer of export to the domestic market for sale, added value and employment is also calculated using this methodology. The export ban in the two scenarios to be discussed is not strictly enforced everywhere in the Netherlands (Figure 2.1). For the 'rest of the Netherlands' export to other EU countries, for example, remains possible. This area can therefore take over a section of the export from the quarantined area, depending on the production capacity (vaccination/supervised area, for which an export ban exists). The products from the quarantined area must be sold on the domestic market. In the analyses such shifting sales are taken into account. It is therefore assumed that the domestic and foreign sales patterns of both regions were the same as the Dutch pattern before the foot-and-mouth outbreak (table 2.2). The consumption and export shares are then related to the number of available animals in the vaccination/supervised area respectively and in the 'rest of the Netherlands'. This gives an indication of the shifts which are possible between domestic and foreign sales in both areas.

During the implementation of foot-and-mouth measures a shift in sales is taking place between the domestic market and in particular the internal EU market. Regarding the non-EU market there is no substitution of supply from another source, as the same ban applies throughout the country. Under the 'vaccination without culling scenario' the shift in the sales structure is further strengthened by the lack of culling of vaccinated animals. The products from this livestock can only be sold on the domestic market. By means of a better offer on the domestic market, the price of products for which the Netherlands is self-sufficient and which it never imports (such as veal and pork) will fall. The price pressure on dairy products and beef is probably less serious, as the import of these products can partially be reduced.

Table 2.2 Average export share in the average total sales of beef products a), and average share of EU export in the average total export value in the years 1999-2000

	Pork	Beef	Veal	Mutton	Dairy products
Export share (%)	65	68	92	21	65
Of which EU export (%)	86	95	100	100	72
Total gross production (ton)	1,645,000	282,000	203,000	16,700	123,000 b)
Those in the vaccination/supervised areas	99,956	11,430	39,500	3,103	655 b)

a) Exclusive export of live cattle. In the study the following export percentages of livestock have been taken into account: pigs (34%), beef cattle (2%), calves (2%), sheep and goats (40%); b) Production in millions of guilders.

Source: Statistical Yearly Reports of the PVE and PZ.

2.3 Results

The input-output analyses give insight per scenario in the macro-economic effects of the shifts between domestic and foreign sales of livestock and meat-products for profit, added value and employment. The effects are reflected as changes in relation to the macro-economic situation under normal circumstances.

2.3.1 The 'vaccination with culling scenario'

A number of the points of departure mentioned in figure 2.1 are further discussed and made concrete here.

- Culling of all livestock in vaccination area Veluwe triangle.
- The export ban for the vaccination/supervised area and for the 'rest of the Netherlands' does not entirely apply to dairy products. Some of them, when treated in the correct manner according to the statutory regulations (acidified and/or heated), can be exported to other countries. It is assumed that the total effect on dairy product export is equivalent to a two-month ban on export, half of the maximum effect.
- The calculations concern the duration of the export ban. The consequences after this period, for example following the take-over of export markets by other countries, is not taken into account.

The change in volume of the total export (intra- en extra-EU), the domestic consumption and the total sale of meat products in the two areas in comparison with the normal situation can be seen in table 2.3.

Table 2.3 *Volume indices a) of export, consumption and total sales in vaccination/supervised areas, the 'Rest of the Netherlands' and 'Total Netherlands' on a yearly basis in the 'vaccination with culling scenario'*

	Pork	Beef	Veal	Dairy products	Other meat
Vaccination area					
- export	0.81	0.83	0.83	0.83	0.83
- domestic consumption	1.12	1.12	1.92	1.08	0.93
- total	0.92	0.92	0.92	0.92	0.91
Rest of the Netherlands					
- export	0.96	0.99	1.03	0.96	1.04
- domestic consumption	1.07	1.02	0.67	1.07	0.99
- total	1.00	1.00	1.00	1.00	1.00
Total Netherlands					
- export	0.95	0.98	0.99	0.95	1.00
- domestic consumption	1.07	1.03	0.91	1.07	0.98
- total	0.99	1.00	0.98	1.00	0.98

a) Without foot-and-mouth the volume-index is 1.0. A volume index of 0.81 for the export means that through the occurrence of foot-and-mouth export dropped by 19% compared to the normal situation. An index of 1.12 means an increase of volume of 12%. The changes during a period of the year are here translated into the volume effect on a yearly basis.

As already indicated the vaccination/supervised area relates more to the domestic market. In this way the amount of veal available for domestic consumption from vaccination/supervised areas will double in two months due to the lack of sales from these areas to the EU market. The 'rest of the Netherlands' can compensate for approximately 50% for this export drop, but at the cost of its sales on the domestic market. A complete supply of all products for both markets (such as under normal circumstances) is not possible. The consequences for the Dutch export and consumption volume under the 'vaccination with culling scenario' are also given in table 2.3.

In the short term, during the period of active export limitations, export dropped by 3%. On a yearly basis, taking into account compensation (larger export) during the rest of the year the drop in the export of veal on a yearly basis is only 1%. The export ban on veal from vaccination/supervised areas is therefore almost entirely compensated for during the course of the year by larger exports from the rest of the Netherlands. This happens at the expense of the supply for the Dutch market, which is therefore lower than normal. It is assumed that the price of veal for the consumer will rise by 10%. On a yearly basis in this variant 5% less dairy produce will be exported, because the third country market (30% of dairy produce export) disappears for two months. The balance goes to the domestic market (7% extra). A drop in dairy imports prevents a price drop for consumers.

The consequences of the sales shifts (inclusive of price effects) between vaccination/supervised area and the 'rest of the Netherlands' under the 'vaccination with culling

scenario' are given in tables 2.4, 2.5 and 2.6 respectively for profit, added value and employment. For this reason a distinction is made in the land-tied livestock farming (beef and dairy cattle) and intensive livestock farming (pork, veal and poultry)

Table 2.4 Sales effect (in millions of euro) in the 'vaccination with culling scenario'

	Land-tied livestock farming	Intensive livestock farming	Total effect
Primary sector	-17.2	-17.7	-35.8
Processing industry	-25.9	-26.7	-53.1
Supply industry	-17.2	-34.9	-52.6
Distribution	-27.7	0.9	-26.8
<i>Total</i>	-88.0	-78.5	-168.4

Source: LEI calculations with agrarian input-output table.

Table 2.5 Income effects (in millions of euro) in the 'vaccination with culling scenario'

	Land-tied livestock farming	Intensive livestock farming	Total effect
Primary sector	-7.7	-6.8	-15.0
Processing industry	-4.5	-3.2	-8.2
Supply industry	-6.4	-8.6	-15.4
Distribution	-12.3	-0.9	-12.7
<i>Total</i>	-30.9	-19.5	-51.3

Source: LEI calculations with agrarian input-output table.

Table 2.6 Employment effects (working years) in the 'vaccination with culling scenario'

	Land-tied livestock farming	Intensive livestock farming	Total effect
Primary sector	-380	-110	-510
Processing industry	-70	-80	-150
Supply industry	-150	-140	-310
Distribution	-290	-90	-370
<i>Total</i>	-890	-420	-1,340

Source: LEI calculations with agrarian input-output table.

Under the 'vaccination with culling scenario' from the moment of the last outbreak the agrocomplex generates 170 million euro less sales (table 2.4) and 51 million less in income

(table 2.5) than under normal conditions; that means a fall of approximately 0.5%. In particular, the activities involving beef farming (part of the land-tied livestock farming), calf-rearing and pig-rearing produce less. On a yearly basis loss of employment comprises approximately (table 2.6) 1,340 working years ¹.

Should the export limitations remain for longer, then the results shown above for profit, added value and employment will increase respectively by 14 million euro, 4.5 million euro and 110 working years per month.

2.3.2 The 'vaccination without culling scenario'

The points of departure for the calculations are given in figure 2.1. A few are explained in more detail here.

- An export ban to third countries for at least 12 months applies for the vaccination/supervised area and the 'rest of the Netherlands'. Some dairy products can be exported to third countries after treatment following the necessary regulations laid down (acidified and/or heated). It is assumed that the total effect on dairy export is the same as a six-month export ban, half of the maximum effect.
- The calculations concern the duration of the export ban. The consequences after the take-over of the export markets by other countries are not taken into account.

Table 2.7 Volume-indices of export, consumption and total sales in the vaccination/supervised area, the 'rest of the Netherlands' and 'total Netherlands' on a yearly basis in the 'vaccination without culling scenario'

	Pork	Beef	Veal	Dairy products	Other meat
Vaccination area					
- export	0.00	0.00	0.0	0.00	0.00
- domestic consumption	2.86	3.10	12.40	2.57	1.25
- total	1.00	0.99	0.99	0.99	0.99
Rest of the Netherlands					
- export	0.92	0.99	1.09	0.90	1.23
- domestic consumption	1.16	1.02	0.67	0.00	1.00
- total	1.00	1.00	1.00	1.00	1.00
Total Netherlands					
- export	0.86	0.95	0.88	0.86	1.00
- domestic consumption	1.26	1.11	2.41	1.26	1.00
- total	1.00	1.00	1.00	1.00	1.00

a) Without foot-and-mouth the volume-index is 1.0. A volume index of 0.81 for the export means that through the occurrence of foot-and-mouth export dropped by 19% compared to the normal situation. An in-

¹ The loss of employment occurs because price rises in veal were calculated slightly too low at 10%. Only volume changes of production (see table 2.4) have an influence on employment, not price changes.

dex of 1.12 means an increase of volume of 12%. The changes during a period of the year are here translated into the volume effect on a yearly basis.

The changes in export volume (intra- and extra-EU), domestic consumption and total sales in the two areas and for the Netherlands in total are given in table 2.7. This concerns changes in sales under the 'vaccination without culling scenario' compared to the sales under normal conditions.

The 'rest of the Netherlands' will export a quarter more veal to other EU countries under this scenario, while the vaccination/supervised area concentrates on the domestic consumer. The total effect for the export and consumption volume of livestock production for the Netherlands as a whole is also included in table 2.7. On a yearly basis, it seems from this that the export ban on veal from the vaccination/supervised area is accounted for only a part by the export from the 'rest of the Netherlands', while the supply for domestic sales more than doubled. On a yearly basis 14% less dairy produce is exported in this variant, because the third countries market (30% of the dairy export) disappears for six months¹ (for the intra-EU market the initial ban for dairy products for 12 months has been kept). The surplus goes to the domestic market (7% extra). Reducing importation of dairy products prevents price drops. A similar situation exists for pork. On the basis of the calculations it is assumed that consumer prices of pork and dairy produce will drop by 10%, that of veal by 30%. The consumer prices of other livestock produce are assumed not to change. The extra supply of beef from the vaccination/supervised area on the domestic market can be compensated by reducing importation of beef throughout the Netherlands. The size of the vaccination/supervised area implies that a relatively small amount of the import has to be substituted. The difference in quality between inland production and imported beef is of little importance.

The consequences of the changes in sales (inclusive of price effects) between the vaccination/supervised area and the 'rest of the Netherlands' under the 'vaccination with culling scenario' for profit and added value respectively can be seen in tables 2.8 and 2.9. It concerns effects on a yearly basis.

Table 2.8 Sales effect (in millions of euros) in the 'vaccination without culling scenario'

	Land-tied livestock farming	Intensive livestock farming	Total effect
Primary sector	-87.1	-135.2	-228.3
Processing industry	-137.9	-213.7	-353.0
Supply industry	-96.2	-263.2	-363.9
Distribution	-83.5	-19.5	-102.6
<i>Total</i>	-404.8	-631.7	-1,046.9

Source: LEI calculations with agrarian input-output table.

¹ For dairy products having undergone the previously mentioned treatment, export to third countries is possible.

Table 2.9 *Income effects (in millions of euro) in the 'vaccination without culling scenario'*

	Land-tied livestock farming	Intensive livestock farming	Total effect
Primary sector	-40.4	-51.3	-93.9
Processing industry	-24.5	-25.0	-50.4
Supply industry	-38.1	-75.3	-114.8
Distribution	-36.8	-17.2	-54.9
<i>Total</i>	-139.8	-168.8	-314.0

Source: LEI calculations with agrarian input-output table.

In the 'vaccination without culling scenario' the agrocomplex generates 1 billion euro less in sales (table 2.8) and around 300 million euro less income than under normal circumstances; that produces a drop of 2 to 3%. Particularly activities relating to dairy produce (part of the land-tied livestock farming) do not bring in much income.

From table 2.7 it would seem that not much change in volume can be expected from this scenario. This means that there will be little effect on employment. Should the export ban last one month longer than the supposed 12 months, then the effects on profit and added value will increase respectively by 90 million euro and 26 million euro. Should there be a departure from the previously mentioned supposition that no price change for pork is expected, then the profit loss will only be 4% lower and income loss will remain much the same as in table 2.9.

2.4 Conclusions

- The export ban in the 'vaccination without culling scenario' lasts three times as long as the 'vaccination with culling scenario'. The economic loss in terms of sales and income loss is around seven times higher in the 'vaccination without culling scenario' as in the 'vaccination with culling scenario'. As long as the ban lasts, relatively more will be offered on the domestic market. This results in more price drops by which profit and income drop considerably.
- The economic losses in the 'vaccination with culling scenario' are the result of volume effects, while those in the 'vaccination without culling scenario' are mostly caused by price effects.

3. Other expenditure

In the calculation of national economic costs of the agribusiness detailed above a number of items which involve expenditure for the authorities, but do not strictly form part of the national economic costs, are not included. This involves among other things the compensation given by the authorities and the costs of combating disease and maintenance. Their extent is estimated below.

- *The compensation paid to businesses where culling has taken place after vaccination*
This comprises in the 'vaccination with culling scenario' 60.4 million euro. (Source: Laser, October 2001) This excludes the culling in infected businesses. The costs of this are in both scenarios indeed the same. The other costs involved in fighting the disease (claims for compensation for fertiliser, milk and cattle feed, destruction costs and implementation costs) come to 83.5 million (Source: Laser, October 2001). In total therefore 143.8 million euro, of which 10% (14 million euro) is not declared to the EU or to the PVE (business covenant). Of the rest, 60% later paid by the EU (78 million) and the balance by the agribusiness (51.8 million). Under the 'vaccination without culling scenario' there are no costs for the culling of animals after vaccination. Other costs for fighting the disease can be ignored after vaccination in this scenario.
- *Health problems*
In the protected and supervised areas there is a period of 30 days in both scenarios after the last outbreak, in which health problems can occur in the animals due to ban on the movement of animals, which oblige the introduction of a regulation governing buying. The costs of this are probably the same for both scenarios and are therefore not included in calculations of differences between the scenarios. Buying will not take place outside the protected and supervised area because this area belongs to the 'rest of the Netherlands'.
- *The costs of maintenance*
This involves the costs of services such as AID, the military assistance granted, the customs and the police after the last outbreak. It therefore involves costs of maintenance during culling at businesses where vaccination has taken place. Based on the extra effort required after the last outbreak over two weeks at the average strength per week as applied to the crisis in the spring of 2001 and the share of the Veluwe triangle in the costs for the whole of the Netherlands, the costs under the 'vaccination with culling scenario' for the Veluwe triangle come to 5.6 million euro.¹ The maintenance costs for the scenario 'vaccination without culling' cannot be included in this report because the estimate was not ready on time for this conference. It will be reported later.
- *Income losses RVV*

¹ Article LNV *Sociaal-economische gevolgen en financiële gevolgen van de MKZ-crisis*, 27 April 2001.

Furthermore in the 'vaccination with culling scenario' there are extra income losses for the RVV. There are indeed fewer animals being culled. This loss of income can be estimated at 0.2 million euro (number of animals times tariff per animal¹). Supposedly, after the last outbreak, the RVV registered no loss of income through limited export, because other areas compensated fully or to a large extent for the reduced export from the vaccination/supervised area. It is also assumed that the import of meat and meat products remains the same.

- *Resolution concerning providing assistance to independent businesses*

Independent businesses (farmers and others) can make an appeal when in financial difficulty and will receive an allowance for subsistence. In the 'vaccination with culling scenario' this concerned 250 fulfilled applications, which receive 8,621.80 euro on a yearly basis. Of this 10% comes from infected businesses. This number is the same in both scenarios. It is furthermore assumed that in the 'vaccination without culling scenario', no other applications are made. The costs of the 'vaccination with culling scenario' assistance is estimated at $225 \times 8,621.80$ is approximately 1.9 million euro on a yearly basis. As calculated, that 2 months after the last outbreak the businesses are re-stocked, the costs are then 0.34 million. On top of this are the research costs to establish the honouring of payments, which are approximately 1.0 million. The total extra costs in the 'vaccination with culling scenario' are 1.34 million euro.

¹ Estimated are the figures for slaughtered animals from category 1 culled in businesses recognized on the grounds of article 9 of the Regulation for the export of fresh meat and meat products. No consideration is given to starting prices. Should these be calculated as well we can then start from the premise of four culling (for each type of meat1) and a starting price per day for a period of 30 days. The lost income of the RVV increases under such circumstances by almost 3,200 euro.

4. Costs for the tourism sector

For this section the estimates of the research already carried out in relation to the loss of sales from foot-and-mouth disease form the point of departure for this analysis. The validity of this research is therefore to be considered. Furthermore, costs are estimated on the basis of assumptions.

4.1 Validity of research carried out

The research results from TRN (2001) are based on telephone interviews with tourism/recreational companies. From this the following assumptions can be made:

1. *It cannot be ruled out that those interviewed estimate lost sales at a much higher figure than is actually the case*
Those interviewed were likely to assume that a higher figure of lost sales raised their chances of receiving compensation (from the government). The remark 'the willingness to participate in the research was relatively high' in TRN (2001) can be seen as evidence of this.
2. *Substitution-effects are not included in lost income estimates of 172 million euro*
TRN (2001) concludes 'the lost sales as a result of the foot-and-mouth crisis amounts for the tourism /recreational sector for the months April and May 2001 to around 172 million¹'. This figure relates to the months in which the crisis was worst. Furthermore, the intertemporal substitution-effect has not been included, with the effect that people who planned recreational events in April and May postponed them until later in the year. Also, in the figure mentioned, the inter-regional substitution-effect is not included resulting in the fact that people with vacations planned in foot-and-mouth regions simply moved their activities to elsewhere in the Netherlands. Should both these effects be taken into account the figure relating to loss of sales would be much lower.
3. *Loss of sales in supply and delivery sectors not included*
From TRN (2001) it does not appear that loss of sales in the supply and delivery sectors has been included. If they were included the value of loss of sales would be higher.
4. *Loss of sales is greater than loss of income*
In contrast to the loss of sales, businesses also have less variable costs, due to not having to buy raw materials or hire in extra personnel. The extent of these costs is not known.

¹ See table 7 of TRN (2001).

From the above assumptions it appears that the estimates by TRN (2001) could be improved. Whether the actual loss of sales from the tourism/recreational sector, including supply and delivery, are higher or lower than 380 million is not known. From recent figures regarding the number of foreign visitors it appears that in 2001 the numbers are much the same as in other years.

Furthermore there is documentation from MKB-Nederland in which estimates for loss of sales from the tourism/recreational sector have been made. For this documentation similar difficulties arise as for TRN (2001). However, to supplement this, the following inadequacies apply:

1. owners of businesses are asked *in advance* what their expected losses will be. An approximate ex ante is undoubtedly less accurate than an actual realised sales loss such as TRN (2001) has done;
2. it is unclear what exactly comprises the foot-and-mouth region; the Veluwe or Friesland as well?
3. there are only figures for the national sales loss as a whole, and therefore not separately for the foot-and-mouth region.

On the basis of the difficulties mentioned we can conclude that research by TRN (2001) is more trustworthy than that of MKB-Nederland. We will therefore use TRN (2001) for further analysis.

4.2 Analysis of loss of sales in tourism/recreational sector in both scenarios

The estimates by TRN (2001) for loss of sales in the tourism/recreational sector relate to the 'vaccination with culling scenario' as it is in reality. The months in question are April and May. The month of April was a month in which there were several different outbreaks. The last one was on 24 April 2001. In order to estimate from the moment of the last outbreak, in other words the last vaccination, the costs from 1 May must be calculated. As we had assumed that in this period the daily loss of sales is constant, this loss is estimated at 79 million euro¹. It is therefore assumed that there is no great difference between both periods in the number of vacation days and holidays. The effect on added value in the Netherlands as a result of reduced sales is not known.

In the 'vaccination without culling scenario' it is established that the area can be reopened 14 days earlier than in the 'vaccination with culling scenario'. In the case of constant daily loss of sales, the losses for the tourism/recreational sector are 39.5 million euro.

This present approach has been decided upon as it is not known which factors/proven variables are influential upon the sales losses of the tourism/recreational sector, while the value of these factors/variables in the 'vaccination without culling scenario' in comparison with the 'vaccination with culling scenario' is not known.

¹ (172.4 mln./61) x 28. The number of days in the period April and May 2001 is 61 and 28 is the number of days that the area has been closed.

References

Memorandum LNV, *Socio-economic and financial effects of the foot-and-mouth crisis*. April 2001.

Memorandum MKB Nederland, *The foot-and-mouth crisis examined*. April 2001.

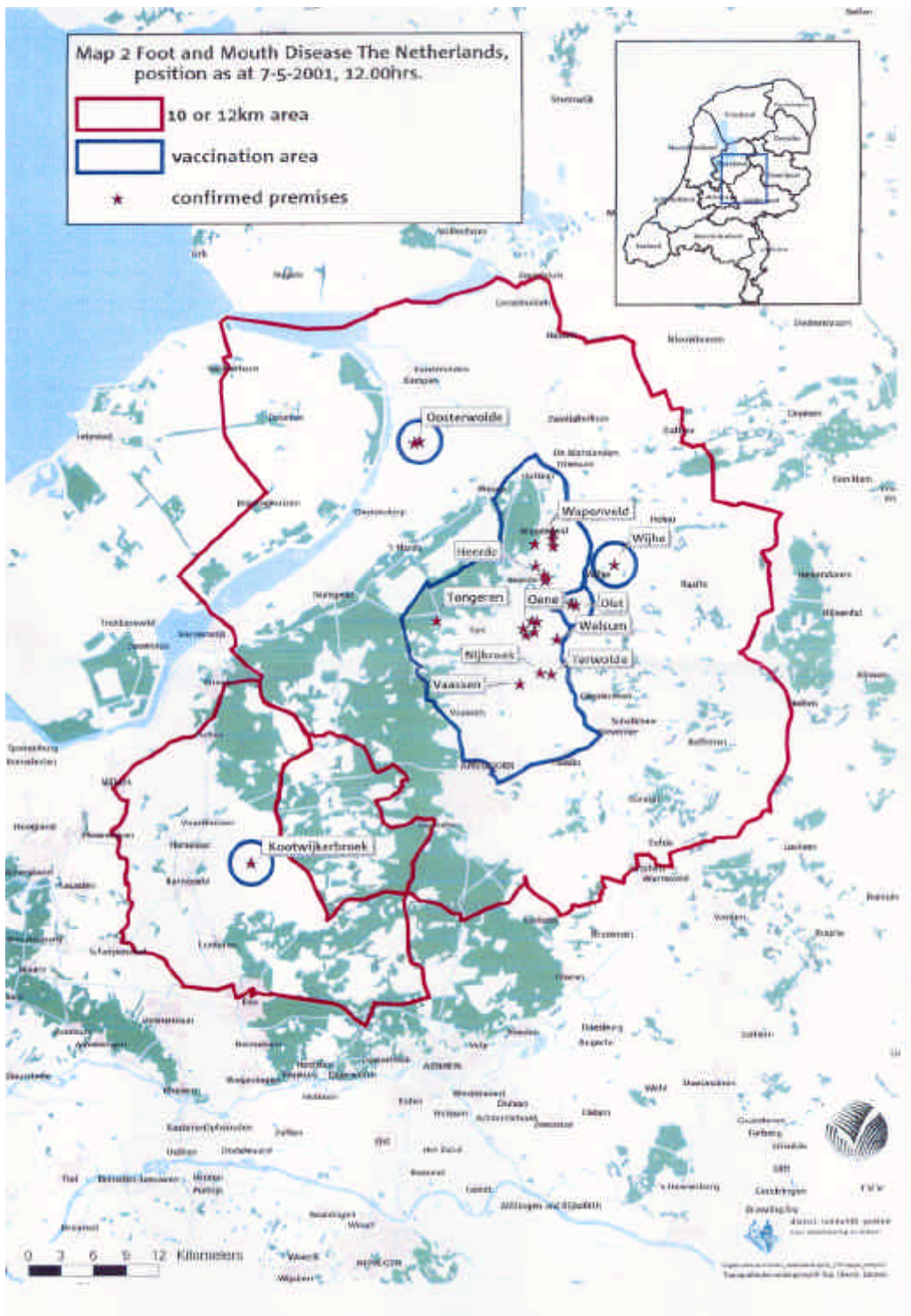
TRN (Toerisme Recreatie Nederland), *Omzeteffecten toeristisch /recreatieve sector als gevolg van de MKZ-crisis*. 2001

Directive of the Council of 18 November 1985 (85/511/EEG) tot *Vaststelling van gemeenschappelijke maatregelen ter bestrijding van mond- en klauwzeer*.

Order of the Commission of 21 March 2001 (2001/223/EG) tot *Vaststelling van beschermende maatregelen in verband met mond- en klauwzeer in Nederland*.

Order of the Commission of 5 April 2001 (2001/279/EG) tot *Wijziging van beschikking 2001/246/EG/houdende vaststelling van voorschriften voor de bestrijding en uitroeiing van mond- en klauwzeer in Nederland op grond van artikel 13 van richtlijn 85/511/EEG*.

Appendix 1 The north-west Veluwe region



**Appendix 2 Duration expected export restriction periods
based on EU rules and OIE**
(Moment of departure is the last outbreak/vaccination unless otherwise stated)

		'Agricultural scenario'				'Social scenario'			
		Vaccination area + buffer		rest of the Netherlands		vaccination area + buffer		rest of the Netherlands	
		EU	OIE/third countries	EU	OIE/third countries	EU	OIE/third countries	EU	OIE/third countries
Trade/ export live ani- mals	- 0-30 days not possible - free 1 months after culling last vaccinated animal	- 0-3 mths restrictions - 3 months after culling last vaccinated animal	no restrictions	- 0-3 months restrictions - 3 months after culling last vaccinated animal	- 0-12 months restrictions - free 12 months after last outbreak/vaccination, (however vaccinated animals not to be traded)	- 0-12 months restrictions - free 12 months after last outbreak/vaccination	no restrictions	- 0-12 months restrictions - free 12 mths after last outbreak/vaccination	
Trade/ export meat	- 0-30 days restrictions - free 1 months after culling last vaccinated animal	- 0-3 months restrictions - 3 months after culling last vaccinated animal	no restrictions	- 0-3 months restrictions - 3 months after culling last vaccinated animal	- 0-12 months restrictions - free 12 months after last outbreak /vaccination	- 0-12 months restrictions - free 12 months after last outbreak/vaccination	no restrictions	- 0-12 months restrictions - free 12 months after last outbreak/vaccination	
Trade/ export dairy pro- duce	- 0-30 days restrictions - free 1 months after culling last vaccinated animal	- 0-3 months restrictions - 3 months after culling last vaccinated animal	no restrictions	- 0-3 months restrictions - 3 months after culling last vaccinated animal	- 0-12 months restrictions - free 12 months after last outbreak/vaccination	- 0-12 months restrictions - free 12 months after last outbreak/vaccination	no restrictions	- 0-12 months restrictions - free 12 mths after last outbreak/vaccination	
Costs of culling and destruction	Details RVV, total number of culled animals in Veluwe				Details RVV; total number of animals culled in infected businesses in the Veluwe				
Column adjoining agricultural sector									
Maintenance									
Segment affected outside agricultural sector									