CHAPTER 21

DISPOSAL OF CARCASES

INTRODUCTION

In an outbreak of FMD animals will be slaughtered, both on infected farms and in preventive slaughter of dangerous contact and contiguous premises. This chapter sets out the disposal options, the facilities available within the country, the relevant bodies that will be involved and the protocols for carrying out the procedures.

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1. METHODS OF DISPOSAL

1.1 Considerations

There are two major considerations in deciding on the method of disposing of slaughtered animals:
- preventing the spread of the virus
- minimising damage to the environment

1.2 Environmental perspective

a) The methods of disposal in order of preference are:
   - render
   - bury
   - burn

b) Incineration is currently not an option in Ireland.

1.3 EU legislation

a) The disposal of animal by-products from 1 May 2003 will be covered by Regulation 1774/2002. A summary of the categories of animal by-products and the permitted methods of disposal are listed in Annex 1 below.

b) Carcases containing SRM (i.e. those of ruminants) are included in Category 1 and must be disposed of in an approved SRM high risk rendering plant (or incinerator). Carcases of non-ruminants are included in Category 2 and must be disposed of in a high risk rendering plant (or incinerator).

c) Article 24.1 (c) of the Regulation allows a derogation from these requirements for carcases of animals disposed of by burning or burial in the event of an outbreak of an OIE List A disease, if the Competent Authority rejects transport to the nearest rendering plant (or incinerator) because of:
   - the danger of propagation of health risks or
   - lack of capacity at the rendering plants (or incinerators).

2. POLICY IN RELATION TO INFECTED HOLDINGS AND PREVENTIVE SLAUGHTER

2.1 The location and extent of any initial outbreak will determine which method of disposal is used at the beginning.

2.2 The guiding principle is to:
   - bury or burn carcases from infected herds on site
   - render carcases from herds culled as a preventive measure.
2.3 Individual circumstances will dictate the disposal strategy to be employed. This decision will be made by the NDCC in consultation with the National Expert Epidemiology Group.

3. **ROLE OF OUTSIDE AGENCIES**

There are three essential groups outside of DAF, with whom the logistics of disposal have to be agreed in advance:

- Federation of Irish Renderers (FIR)
- Local Authorities
- Environmental Protection Agency (EPA).

3.1 **Federation of Irish Renderers**

a) The managements of each high risk rendering plant have agreed to participate in any disposal programme that might be necessary in the event of an outbreak of FMD.

b) A written agreement to render a minimum of 10-12,000 tonnes (equivalent to 20-24,000 cattle or 200-240,000 sheep) weekly in the event of an FMD outbreak has been received from FIR.

c) A list of hauliers willing to provide transport vehicles has been compiled and will be updated annually.

3.2 **Local Authorities**

a) The co-operation and assistance of the relevant Local Authority is essential in disposing of carcases.

b) A County Council has:
   - A Veterinary Officer, who will liaise between DAF VIs and Local Authority officials.
   - An engineer, or engineers, who will choose the burning or burial site.
   - A civil defence section, which can provide logistical support to the transport of food, disinfectant and other essentials to disposal sites and assistance at burial sites.
   - Lists of contractors of lifting and digging equipment who can be called upon in an emergency.

c) Each County Council has chapters on FMD in its Emergency Plan.

3.3 **Defence forces**

a) Any decision to involve the defence forces will be made by the NDCC.

b) The role of the defence forces will be to assist in the logistics of transport and disposal.

3.4 **Environmental Protection Agency**

a) If there is an outbreak of FMD the rendering plant must obtain permission from the EPA to render diseased animals.

b) The EPA has undertaken to examine the possible locations for mass burial, should the need arise.
4. RENDERING

4.1 High risk rendering plants in Ireland

a) There are nine high-risk rendering plants, all of which are capable of rendering whole cadavers resulting from an FMD cull (see Table 1 below). Rendering of the carcases of ruminants must be carried out in a plant approved to handle specified risk material (SRM). There are currently three of these.

b) The decision on which rendering plant or plants to use will be taken at the NDCC. The rendering capabilities of each plant, their proximity to the centre of the disease outbreak and the ease with which non-FMD material can be diverted will all be taken into account in arriving at a decision. Contractual arrangements with the rendering plant will be agreed at the NDCC.

c) Meat and bone meal produced from material containing SRM must be disposed of by incineration.

<table>
<thead>
<tr>
<th>PLANT</th>
<th>TYPE</th>
<th>CAPACITY (TONNES/WEEK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monery, Crossdoney, Cavan</td>
<td>SRM</td>
<td>2,000</td>
</tr>
<tr>
<td>Premier Proteins, Ballinasloe, Galway</td>
<td>SRM</td>
<td>2,000</td>
</tr>
<tr>
<td>Waterford Proteins, Waterford</td>
<td>SRM</td>
<td>2,000</td>
</tr>
<tr>
<td>Western Proteins, Ballyhaunis, Mayo</td>
<td>High Risk</td>
<td>2,000</td>
</tr>
<tr>
<td>Dublin By-Products, Dunlavin, Wicklow</td>
<td>High Risk</td>
<td>3,000</td>
</tr>
<tr>
<td>Slaney Meats, Bunclody, Wexford</td>
<td>High Risk</td>
<td>2,000</td>
</tr>
<tr>
<td>Munster Proteins, Cahir, Tipperary</td>
<td>High Risk</td>
<td>3,000</td>
</tr>
<tr>
<td>National By-products, Cashel, Tipperary*</td>
<td>High Risk</td>
<td>2,000</td>
</tr>
<tr>
<td>College Proteins, Nobber, Meath</td>
<td>High Risk</td>
<td>3,000</td>
</tr>
</tbody>
</table>

**TOTAL: 21,000**

* There are three separate processing units at this facility, one for blood and one which is intended to process SRM. As this facility is the only blood processing plant in the country, and assuming some slaughtering will continue during an outbreak of FMD, it would not be suitable for disposing of carcasses.
4.2 Transport

a) Suitable leak-proof, sealable vehicles should be sourced from the rendering plants and from companies which transport animal by-products from slaughter plants. Only transport vehicles of the highest quality should be used. They should be checked before loading to ensure that the body and tailgate seals are in good condition. The vehicles will be authorised by the VIs at the rendering plants and a list of authorised vehicles will be kept at the plant.

b) The staff at the LDCC (Valuation, Slaughter and Disposal Section) will be responsible for arranging the collection and delivery of carcases from the place of slaughter to the rendering plant(s).

c) Strict biosecurity measures must be in place both at the slaughter site and at the rendering plant (See Chapter 15, Procedures for personnel biosecurity and Annex 2 below.)

d) Cleaning & Disinfection procedures applicable to persons and vehicles leaving an infected place must be stringently enforced at the culling site.

e) In addition, each transport vehicle should be lined with a layer of polythene in such a way that the carcasses can be completely enclosed by polythene to prevent leakage of fluids.

f) The driver must not leave his or her vehicle when it is at the slaughter site.

g) If the driver must leave the cab for any reason, he or she must undergo Cleaning & Disinfection before returning to the vehicle.
4.3 Documentation to accompany transport vehicles

a) The VI at the premises on which slaughter is carried out will issue a movement permit covering movement of carcasses from the slaughter site to the rendering plant. This will contain:
   • name and address of slaughter premises
   • name and address of rendering plant
   • number and species of animals loaded
   • herd/flock number
   • list of ear-tags
   • vehicle registration number
   • driver name
   • seal number
   • date and time of leaving the slaughter site.

   The details on the permit must be reconciled with the carcasses delivered to the rendering plant.

b) A DAF official at the rendering plant will issue a Cleaning & Disinfection Certificate for a vehicle going from that plant to a slaughter site. This will have to be presented at the checkpoint on entry to the infected area.
4.4 Biosecurity at the rendering plant

a) A biosecurity protocol must be in place at the rendering plant.

b) Workers who live on farms must stay in alternative accommodation close to the rendering plant for the duration of the outbreak.

c) All workers must shower and change clothes before leaving the plant.

d) Other essential visitors (Department or County Council officials) to the plant must wear disposable protective clothing.

e) All vehicles leaving the plant must be thoroughly cleaned and disinfected and a certificate of cleaning and disinfection issued.

f) All wrapping material that accompanies cadavers to the rendering plant must be disinfected, baled and stored at the rendering plant until it can be safely disposed of by deep burial.

 g) The air from the intake room of the rendering plant must either be directed to a thermal oxidiser or treated with a disinfectant mist before being sent for further treatment to a heather bed.

h) Drivers arriving to collect meat and bone meal or tallow should be instructed to remain in the cabs of their vehicles.

i) Drivers who must leave their cabs, must undergo cleaning and disinfection before returning to their vehicles.

j) As far as is possible, tallow should be burned on the premises. The meat and bone meal produced should be stored in a separate, dedicated store as close to the rendering plant as possible.

k) To limit the risk to animals in the vicinity of the rendering plant, the local DVO SVI will arrange for all animals grazing within 0.5 km of the plant to be moved to alternative accommodation.

5. BURIAL

5.1 Location of sites for burial on infected premises

a) Burial is a safe method of disposal of large numbers of dead animals provided the burial pit is properly constructed.

b) A suitable burial site must be chosen by the engineering staff of the Local Authority, taking into account:
   • surface and groundwater (including river, stream, lake, canal, resevoir, aquifer, pond, watercourse or other inland waters – natural or artificial)
   • solid geology and overburden geology
   • gaseous discharges
   • liquid leachate
c) The location of the burial site should be identified on a map of the holding and a copy kept on file.

5.2 Construction of pits

a) Detailed instructions for the construction of pits are set out in Annex 3 below.

b) The pit must be at least 4 metres deep and 3 metres wide. The length of the pit will be dictated by the physical location of the burial site and by the number of animals to be buried. Examples are given in Annex 3. It may be necessary to dig more than one pit on an individual farm.

c) All pits should be lined with 2 mm High Density Polyethylene (Source: Lining Services (Waterford) Ltd., 31 The Mall, Waterford. Telephone: 051 855416) Details are on file in the NDCC.

d) Rumens should be punctured just prior to burial to prevent the build up of methane and carbon dioxide in the pit.

e) All directions given by the Local Authority engineer regarding collection of leachate must be complied with.

6. BURNING

6.1 Air Curtain Burner

a) The preferred method of burning involves the use of an Air Curtain Burner.

b) In these burners a large fan creates a laminar flow of air which is directed into the fire chamber and accelerates combustion. In a continuous operation, waste wood (e.g. pallets) and carcases are fed into the chamber alternately.

c) These burners:
   • take less time to set up than pyres
   • generate less noxious emissions than pyres
   • can burn up to 40 cattle per hour (depending on the model)
   • burn at higher temperatures than pyres (800-1200°C)
   • are less likely to lead to wind dispersal of ash, hair and skin than pyres
   • are mobile
   • leave very little residue to be disposed of (and the residue that remains is contained).

d) If an Air Curtain Burner is used it should be located at a suitable site, chosen in consultation with the Local Authority engineer and the carcases brought to it and burned.
c) If ruminants are burned it should be assumed that any ash remaining will contain SRM. This ash will therefore have to be collected and sent for high risk rendering at an SRM approved plant, prior to its ultimate disposal.

f) Contact details for suppliers of these burners is kept on file in the NDCC, and further information is available on the web at www.airburners.com.

6.2 Pyres

a) Pyres will only be used if burial on an Infected Premises is not an option. They take time to build, up to three days to burn and can be the cause of local objections and adverse publicity.

b) If a pyre is essential for the safe disposal of carcasses and to prevent further spread of disease, the Office of Public Works will be responsible for its construction.

c) Plans for the construction of pyres are contained in Annexes 4 and 5 below.
7. LOGISTICS

7.1 Worst case scenario

a) The following figures demonstrate the numbers of carcasses that may have to be disposed of in a worst case scenario. In Great Britain during the 2001 outbreak the following numbers of animals were disposed of:

<table>
<thead>
<tr>
<th>HOLDINGS SLAUGHTERED OUT</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Infected premises</td>
<td>2,026</td>
</tr>
<tr>
<td>Dangerous contacts (inc. contiguous herds)</td>
<td>7,139</td>
</tr>
<tr>
<td>Slaughter on suspicion</td>
<td>247</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9,412</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ANIMALS SLAUGHTERED FOR DISEASE CONTROL PURPOSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
</tr>
<tr>
<td>Sheep</td>
</tr>
<tr>
<td>Pigs</td>
</tr>
<tr>
<td>Others</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ANIMALS SLAUGHTERED FOR WELFARE REASONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>All species</td>
</tr>
</tbody>
</table>

b) At the height of the crisis 50 new cases a day were being reported, with up to 600,000 carcasses a week to be disposed of.

c) This required the assistance of 1,500 extra vets and 2,000 soldiers.
ANNEX 1

DISPOSAL OF ANIMAL BY-PRODUCTS IN ACCORDANCE WITH REGULATION (EC) NO. 1774/2002 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

All animal waste, including offal, must be disposed of under official supervision, in such a way as to avoid the risk of FMD virus spreading and according to Regulation 1774/2002. This regulation classifies waste into 3 Categories and outlines the approved disposal options for such waste. The following summarises these measures:

CATEGORY 1

Material

1. All body parts, including hides and skins, of animals suspected of or confirmed as being infected by a TSE or animals killed in the context of TSE eradication measures.

2. Specified risk material, and where, at the time of disposal, specified risk material has not been removed, entire bodies of dead animals containing specified risk material (i.e. ruminants).

3. Products derived from animals to which prohibited substances (having a hormonal or thyrostatic action and of β-agonists) have been administered and products of animal origin containing residues of environmental contaminants or other substances (Organochlorine compounds including PcBs, Organophosphorus compounds, Chemical elements, Mycotoxins, Dyes and others) exceeding the level permitted by legislation.

4. All animal material (including screenings, materials from desanding, grease and oil mixtures, sludge and materials removed from drains) collected when treating waste water from Category 1 processing plants and other premises in which specified risk material is removed.

5. Mixtures of Category 1 material with either Category 2 material or Category 3 material or both, including any material destined for processing in a Category 1 processing plant.

Disposal

1. By incineration in an approved incineration plant.

2. By processing in an approved SRM rendering plant.
CATEGORY 2

Material
1. Manure and digestive tract content.

2. All animal material (including screenings, materials from desanding, grease and oil mixtures, sludge and materials removed from drains) collected when treating waste water from slaughterhouses other than slaughterhouses covered by Category 1 above or from Category 2 processing plants.

3. Products of animal origin containing residues of veterinary drugs and contaminants (antibacterial substances and other veterinary drugs e.g. anthelmintics, anticoccidials, carbamates and pyrethroids, sedatives, non-steroidal anti-inflammatory drugs, other pharmacologically active substances) exceeding the level permitted by legislation.

4. Animals and parts of animals, other than Category 1 above, that die other than by being slaughtered for human consumption, including animals killed to eradicate an epizootic disease (NB. non-ruminants only).

5. Mixtures of Category 2 material with Category 3 material, including any material destined for processing in a Category 2 processing plant.

6. Animal by-products other than Category 1 material or Category 3 material.

Disposal
1. By incineration in an approved incineration plant.

2. Processed in an approved rendering plant.
CATEGORY 3

Material
1. Parts of slaughtered animals fit for human consumption in accordance with legislation not intended for human consumption for commercial reasons.

2. Parts of slaughtered animals, which are rejected as unfit for human consumption but are not affected by any signs of diseases communicable to humans or animals and derive from carcasses that are fit for human consumption in accordance with Community legislation.

3. Hides and skins, hooves and horns, pig bristles and feathers originating from animals that after ante-mortem inspection were fit for slaughter for human consumption in accordance with legislation.

4. Blood obtained from animals other than ruminants that after ante-mortem inspection were fit for slaughter for human consumption in accordance with legislation.

5. Animal by-products derived from the production of products intended for human consumption, including degreased bones and greaves.

6. Former foodstuffs of animal origin, or former foodstuffs containing products of animal origin, other than catering waste, which are no longer intended for human consumption for commercial reasons or due to problems of manufacturing or packaging defects or other defects which do not present any risk to humans or animals.

7. Blood, hides and skins, hooves, feathers, wool, horns, hair and fur originating from animals that did not show clinical signs of any disease communicable through that product to humans or animals.

Disposal
1. By incineration in an approved incineration plant.

2. By processing in an approved rendering plant.

3. By processing in a Category 3 processing plant approved in accordance with Article 17 of the Regulation.

4. By transformation in an approved technical plant.

5. By being used as raw material in an approved petfood plant.

6. By being transformed in an approved biogas plant.
ANNEX 2

PROTOCOL FOR COLLECTION AND DELIVERY OF CARCASES FOR RENDERING

VEHICLES
Dedicated, leak-proof, sealable transport - authorised by the rendering plant VIs
Drivers - no contact with livestock
Vehicles - remain at rendering plant overnight

SLAUGHTER SITE
VI checks - vehicle not leaking, cleaned and disinfected, record of vehicle number and details of animals, date and time

RENDERING PLANT
1. Wheelwash on entry
2. Driver puts on personal protective clothing
3. Vehicle weighed in
4. Wheel dip on entry to unloading area
5. Raw materials unloaded
6. Vehicle cleaned and disinfected under official supervision
7. Cleaning and disinfection certificate issued
8. Wheel dip at exit from unloading area
9. Vehicle weighed out
10. Driver takes off personal protective clothing
11. Wheelwash at exit

RECORDS
1. Authorisation from EPA
2. Intake - slaughter site, reg, weights, details, date, time - correlated with permit details
3. C&D log
4. Disinfectant concentration checks
5. Product weights (match with intake)
6. Destination of product
7. List of authorised vehicles
8. List of drivers

+ movement permit (see section 4.3a for details to be included)
+ C&D certificate
ANNEX 3

PROTOCOL FOR BURIAL

1. The first option for on-site disposal of carcases is burial. This may not be available because:
   a) in the pig and poultry sectors many production units are built on confined sites with little or
      no land adjacent. In some cases the unit consists of a number of houses on a concrete slab.
   b) the terrain may be unsuitable because of proximity to water or rock.

2. If burial on site does not appear to be possible on first appraisal, the senior officer at the LDCC
   should be advised immediately.

3. The selection of a site will be the responsibility of the Local Authority engineer. Where possible,
   the site selected should be out of view from public roads, yet reasonably accessible from yards
   and housing.

4. The construction of a temporary road surface may be necessary.

5. The hiring of plant and equipment will be arranged by the LA engineer. Because DAF will be
   responsible for the costs incurred, it is essential that a complete record of contractors, equipment
   used and time spent is kept by the Infected Premises Officer.

6. Work on digging the pit should begin as soon as possible so that slaughtered animals do not
   remain in houses and yards for extended periods. All plant and equipment should be on site at
   the earliest possible time. An adequate stock of fuel should be available for all equipment on site
   to avoid delays.

7. Animal slaughter can begin before the pit is ready, starting with infected animals.

8. Plant and equipment will be required for the movement of carcases to the burial site. It may be
   possible to make use of tractors and trailers on the premises for this purpose. The permission of
   the owner/occupier should be obtained in advance of any such use.

9. The LA engineer will arrange for the provision of chains for hoisting cadavars onto trailers for
   movement to the burial site. Ropes are not suitable unless they can be disposed of after use.

10. The movement of carcases and their burial must be carried out under the supervision of DAF
    personnel.

11. All plant and equipment used for pit construction and closure should be Cleaned & Disinfected
    before it leaves the site. Clothing worn by machine operators should be retained on site pending
    completion of all carcase disposal activities. Under no circumstances should outer clothing used
    on site be removed from the premises without cleaning/laundering or other suitable treatment
    See Chapter 15, Procedures for personnel biosecurity and Chapter 16, Local Biosecurity
    Centre).
12. Depending on the number of animals to be slaughtered, it may not be possible to complete burial and pit closure in one operation. If it is decided to work through the night it will be necessary to provide suitable lighting. If it is not available from the LDCC the LA engineer may be able to arrange its hire.

13. On completion of carcase burial the top soil around the pit for a distance of 8 feet should be pushed into the pit prior to final closure of the site. The site should be levelled and marked. Prior to restocking, the burial site area should be fenced to prevent animal access.

14. A burial pit 6 metres long, 3 metres wide and 4 metres deep is suitable for the burial of:
- 20 cattle or
- 60 sheep or
- 60 pigs.

15. These measurements allow for a cover of 2 metres of soil above the carcases when the pit is closed.

16. If, during the operation, a contractor’s vehicle causes damage to the property the contractor is liable. Such damage should be inspected and a report made in writing to the veterinary officer in charge at the LDCC. The Infected Premises Officer should not admit to or accept any liability for damage done.
ANNEX 4

PROTOCOL FOR BUILDING A PYRE

1. If carcase disposal by burial on site is not an option, consideration should be given to disposal on site by burning. There are many practical difficulties associated with this method of disposal that make it the least attractive option.

2. The selection of a site for a pyre should be discussed with the owner/occupier. It should be in the most open area of the holding, out of view of housing and public roads yet affording reasonable access from yards and houses.

3. The quantities of materials required are large, so good access will be required for delivery to the site. It is important that materials are delivered to a specific plan and within a specified time limit, in order to ensure that the fire can be properly constructed.

4. To facilitate the delivery of materials to the location of the fire, it may be necessary to have either a four-wheel drive tractor or tracked vehicle on standby to assist vehicles in gaining access. Depending on the soil type and the time of year, it may be necessary to construct some form of temporary surface to the site. This can be arranged with the assistance of the Local Authority engineer.

5. Prior to the building of a fire, the local fire officer should be advised. The fire officer should also be advised when the fire is going to be lit.

6. The construction of a fire is labour intensive and it will be necessary to arrange for a work crew to be available on site. Department staff should not normally be used for this purpose, as it will deplete scarce manpower resources. The Office of Public Works has agreed to make personnel available. Defence forces personnel may also be asked to assist.

7. The materials for the construction of a fire are:

   a) **Railway Sleepers or Forestry Timber** (8 ft. x 1 ft.):
      • 1 per adult bovine animal (+ 5%)

   b) **Straw**
      • 1 standard size bale per adult bovine animal (50 bales per ton of coal)

   c) **Coal**
      • 4 cwt. per adult carcase (as the number of carcases increases it should be possible to decrease the amount of coal required)

   d) **Kindling**
      • 1 ton per 10 tons of coal (just under 1/2 cwt. per adult bovine)
e) **Plastic Bags** (fertiliser type):
   - 5 per infected carcase

f) **Diesel Oil**
   - 1 gallon per yard of pyre length. Paraffin oil should also be used at the firing points to assist ignition

8. The pyre should be orientated length-wise in north/south direction allowing 3 ft. in length per adult bovine carcase to be burned. The line of the pyre should be marked and the overall dimensions defined prior to commencing construction, to facilitate the laying out of materials.

9. When the pyre has been built diesel oil should be poured over all materials. When carcases are placed on the pyre, diesel oil should be sprayed or poured over the carcases to ensure that hair is singed as soon as the pyre is lit.

10. Houses neighbouring the pyre site should be advised of burning operations and advised that all windows should be kept closed and washing on clothes lines should be taken indoors. Cattle on premises in the line of the pyre should be removed indoors or placed in fields upwind of the fire.

11. Various items of small equipment will be required for tending the pyre e.g. hand-forks, rakes, heavy-duty gloves and goggles.

12. All equipment used for pyre construction and carcase movement and all personnel not required for igniting the pyre must move to a safe distance prior to lighting.

13. When the pyre is lighting it will have to be tended throughout the entire period, and for approximately two days afterwards, by competent individuals.

14. After 36 hours any unburnt material should be removed from the ashes and replaced on a part of the fire which is still burning.
ANNEX 5

Diagram of construction of pyres