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OIE AD HOC GROUP ON CARCASS DISPOSAL

Paris, 6-9 November 2002

The meeting of the Ad hoc Group for Carcass Disposal was held at the OIE headquarters from 6 to 8 November 2002. The Agenda and List of Participants are given as Appendices I and II, respectively.

Dr B. Vallat, Director General de l'OIE, welcomed the Group members. He gave a background and history of Recommendation N° 2 by the OIE/FAO International Scientific Conference on Foot and Mouth Disease, Paris 17-18 April 2001, that indicate that OIE should set an Ad hoc Group of specialists to examine the problem of the safe and timely disposal of carcasses arising from the enforcement of a stamping out policy, and to recommend international guidelines for this purpose. This recommendation was endorsed by the OIE International Committee in May 2001 and included in the Foot and Mouth disease Commission working plan for 2002 Dr Vallat recommended that the Ad hoc Group should focus on proposed guidelines for inclusion in the Code.

The mandate of the Group and the operative procedures were then described by Dr A.Schudel.

Dr. N. Willis was elected Chairman of the Ad hoc Group, and the OIE Central Bureau provided secretarial assistance.

The Ad hoc Group then discussed on the various issues under consideration and agreed in the preparation of a basic document which addressed the fundamental general principles, available technologies, use of end products and alternatives to minimization of emergency animal slaughter included in Appendix III.

The report is to be submitted to the Foot and Mouth Disease and Other Epizootics Commission for their consideration.

…/Appendices

Appendix I

OIE AD HOC GROUP ON CARCASS DISPOSAL

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Agenda

Welcome and introductory comments

Working procedure

Election of chairman and rapporteur

Review of information

Conclusion and adoption of an action plan

Other matters

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Appendix II

OIE AD HOC GROUP ON CARCASS DISPOSAL

Paris, 6-9 November 2002

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List of Participants

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REPORT OF THE AD HOC GROUP ON ALTERNATIVES FOR SAFE AND EFFECTIVE DISPOSAL OF DEAD OR SLAUGHTERED ANIMALS

INTRODUCTION

Under normal circumstances the animal livestock industry comprises the production of livestock and the processing of slaughtered livestock primarily into human food, gelatin, pet food, leather, animal fat and animal protein concentrate.

In the event of an outbreak of an emerging animal disease these economic pathways are interrupted due to the implementation of measures to confine and eradicate the disease

It is becoming increasingly evident that the approach to the emergency slaughter of livestock as an integral part of the stamping out process of an emergency animal disease eradication, as defined by the OIE (Code Chapter 1 1 1), is requiring the consideration of alternatives approaches and technologies.

The increasing concentration of livestock production is magnifying the number of animals which would be involved in such an outbreak. As a result the impact of such an event is intensified and perhaps even crippling to the viability of industry.

The development of standards to increase environmental sustainability precludes the application of procedures which heretofore were considered acceptable

The reaction of society to each large scale slaughter of livestock to potential animal welfare considerations as well as the total waste of valuable animal products is becoming one of intolerance. This has led to an erosion of consumer trust and to a loss of confidence in the ability of authorities and industry to manage such an event.

Therefore it becomes imperative that the development of emergency managements plans, principles of animal disposal and alternatives to animal slaughter be sought taking into account existing pathways of utilization

These concepts must be incorporated into the plans in advance of an emergency crisis and in full cooperation with all actors of the involved industry, veterinary authorities and all other involved agencies.

A. General principles

Primary consideration must be given to disease control and eradication as the most important aspect.

- Speed is of the essence: the earlier the official intervention, the fewer the number of animals that will require disposal.
- Any approach that is adopted must insure the complete inactivation of the pathogenic agent.
- An emergency management plan must be comprehensively defined in advance and must be fully and regularly communicated to all levels of the agricultural system, including producers; it must be annually revised.
- All required legal authorities and links to industries involved must be determined and established in advance of an outbreak to permit immediate activation.
- The Veterinary Administration must assume primary leadership and control of an animal disease outbreak because of professional training and competence.
- It must be assured that communication to the Veterinary Administration for action proceed uncontrolled animal movement or pathogen spread resulting from presumptive unofficial communication.
- All aspect of potential consequences of an outbreak especially financial consequences should be assessed in advance of an event to permit selection of the most appropriate method of minimizing negative impact on involved industry sectors.

- To achieve perspective, all costs of an outbreak should be transparent to reveal comparative cost and the positive effect of prevention or early intervention.
- Special consideration should be focused on producers to develop an economic understanding and compliance with the principles of disease control.
- General broader zoning areas can be predetermined and defined in advance for immediate implementation to limit animal movement control based on knowledge of normal trade routes of animal movements.
- A system of traceability should be established in advance to allow immediate trace back of disease.
- An established list of pathogens and their characteristics including methods of transmission, zoonotic potential, resistance in the environment and susceptibility to disinfectants and their availability should be established in advance.
- The availability of effective vaccines should be pre-determined.
- Determine in advance what technical capacities and pathways are available at every step for animal slaughter, storage and disposal including licensing for emergency situation.
- Environmental assessment should be conducted in advance to establish the location and accepted use of suitable burial sites.
- An information policy should be established in advance which would transparently generate, via de media, an understanding by the public of the approaches to be followed and their rationale.

B. Available Technologies

The hierarchy of technologies is based on reliability for pathogen inactivation and is presented as follows:

- Rendering
- Incineration
  - fixed incinerators
  - air curtain incinerators
  - municipal incinerators
- pyre burning
- composting
- burial
  - mass burial
  - on-farm burial
- mounding
- commercial licensed landfill
- fermentation

Rendering:

This is a closed system for the mechanical and thermal treatment of animal tissues leading to stable, sterilized products, e.g. animal fat and dried animal protein.

As a guide to estimating capacity, it is proposed that a medium sized rendering plant could process 12 tonnes per hour of operation.

Rendering has the advantage that facilities already exist and are in normal operation. Protocols of operation are already established which produce an efficient inactivation of all pathogens.

Under a state of emergency management, such plants should operate under strict official Veterinary Authority control and in compliance with environmental standards.

The resulting products of the process are stable, can be stored, and are suitable for further use.

There is a good knowledge of this technology and of the handling of such material, since it is in daily normal use. It is a closed system and there is control of the exhaust materials.

Facilities are already in place to allow disinfection of the transportation vehicles which bring the input animal material to the plants.

Since in some instances, rendering plants are privately operated, contracts must be negotiated in advance of the emergency with both slaughter plants and rendering plants, resolving any financial considerations, in order to permit immediate implementation.

Further, since the supply of input material will undoubtedly exceed immediate capacity, arrangements for temporary storage of such material must be established either as cold storage of slaughtered material, or alternatively as pre-slaughter live storage, e.g. through the use of vaccination.

Additional considerations.

The capacity of his technology may be limited and should be calculated in advance.

Plants are in fixed locations and therefore may require additional leakproof transportation of input material to these sites, with subsequent disinfection of the transport vehicles.

Because plants are normally privately owned, contracts for their use must be established in advance.

There is a requirement for leak-proof transportation of the input material to the fixed locations of the incinerators, and a requirement for subsequent disinfection of these vehicles of transportation

Incineration:

Fixed whole carcass incineration

This is an established facility in which whole carcasses or carcass portions can be completely burned and reduced to ash. This process is normally fueled by natural gas.

This process produces an effective inactivation of pathogens. Exhaust emissions can be subjected to air scrubbing procedures to meet environmental standards.

Additional considerations.

In the absence of additional technology, the exhaust emissions are not subjected to environmental control.

There is a limited capacity which must be calculated in advance.

The process is costly to operate

There is a requirement for leak-proof transportation of the input material to the fixed locations of the incinerators, and a requirement for subsequent disinfection of these vehicles of transportation

Mobile air curtain whole carcass incineration

This is a mobile system which can be taken on site. Whole carcasses can be burned and reduced to ash using wood as a fuel

Because it can be used on site, there is no requirement for transportation of the animal material.

It produces effective inactivation of pathogens and may actually achieve higher temperatures.

Additional considerations.

Because of the limited availability of the equipment, there may be a limited capacity.

There is a requirement for waste wood as a fuel and hence the logistics of obtaining this fuel must be considered.

There is no environmental control of exhaust emissions

Municipal incinerators

These are pre-established facilities which are normally used for the burning of household or industrial waste. They may not be currently licensed to burn carcasses.

Use of these facilities allows an expanded capacity for effective inactivation of pathogens.

Additional considerations

These facilities are not under Veterinary Services control

Because of the demand of normal usage, they may not be available for emergency use.

They may not be licensed to accept carcasses, and would therefore require the establishment of standards and licenses prior to their use in an emergency.

They are costly to operate.

They require leakproof transportation of input material and subsequent disinfection of the vehicles of transportation.

Co-Incineration

This is a process in which meat and bone meal, carcasses, or parts of carcasses are burned in conjunction with other substances, e.g.:

- Hazardous waste incineration
- Clinical waste incineration
- Other industrial incinerations such as:
  - Power plants
  - Cement kilns
  - Blast furnaces
  - Coke ovens

In practice meat and bone meal has been used as a secondary fuel on a large scale in cement kilns and power plants

Additional considerations

No experience is available for co-incineration of animal material in blast furnaces and coke ovens

Use of hazardous and clinical waste incineration plants may not be available for use because of current normal demand

Pyre burning

This is an open air system of burning carcasses either on-farm or in collectives sites fueled by additional materials of high energy content.

Because this process can be conducted on site there is no requirement for transportation of the input material.

This is a well established procedure.

Additional considerations.

This process is contrary to environmental standards for air, water and soil.

The process takes an extended period of time.

This is an uncontrolled process with no verification of pathogen inactivation. There is a possibility of particulate transmission from incomplete combustion.

Because this process is open to view, there is a negative reaction and lack of acceptance by the public.

Composting

This is a process of aerobic microbiological decomposition conducted in either open or closed systems. It preferably requires prior grinding of tissues and as well the addition of organic material for microbial maintenance. Additionally, mixing or aeration is required to assure homogeneous decomposition. The process can achieve temperatures of up to 70°C.

This is a simple process, which can be conducted on site at low cost.

Additional considerations

The process requires a significantly extended period of time

Additional material is required for the process

It is necessary to insure that a constant temperature is produced throughout all the material for the total time period.

The required conditions are difficult to control under all circumstances and it is difficult to verify the effectiveness of pathogen inactivation

During mixing, biohazard aerosols or emissions may be produced with an open system of composting

The process is unable to accommodate large carcasses and therefore requires prior mechanical grinding of carcasses for effective operation.

Mass burial or Open Farm Burial

This is a system to deposit whole carcasses below ground level and to be covered by soil, with no additional inactivation of pathogens.

This is an established procedure which if conducted on site, does not require transportation and is used to control the spread of disease.

Additional considerations

This process requires an environmental assessment because of the potential contamination of ground water, or of aquifers if leachate is not controlled.

The environmental impact increases with the number of carcasses.

The process does not inactivate all pathogenic agents.

The site of the burial is lost for future use for an extended period of time.

Licensed Commercial Landfill

This process involves deposition of carcasses in predetermined and environmentally licensed commercial sites.

Because the site has been previously licensed, all environmental impacts such as leachate management, gas management, engineered containment, flooding and aquifers have already been considered.

Additional Considerations

There is a requirement for transportation to the location and disinfection of the transport vehicles.

The area is open and uncovered for extended periods

There is a potential problem of disease transmission by vermin or birds

There is a potential emission of aerosols.

There is resistance from the public to such an approach.

Mounding

The process is one of mass burial above ground level.

Considerations are similar to those of mass burial.

Fermentation

This process is a closed system of anaerobic microbiological decomposition which requires prior mechanical and thermal treatment and which results in the production of biogas.

This process does not inactivate pathogens, but typically uses non-dried rendered product as the input material.

C. Use of end products

The recommended general aim is to use the products resulting from the slaughter of restricted animals at the highest possible value level consistent with principles of human and animal health.

The assumption applied to the complete hierarchy of product values is that all products have been safely inactivated.

The hierarchy of product values is as follows:

- **Animal tissue** (human food or human use such as leather, gelatin). The use of products for human food requires verification of pathogen inactivation with due consideration to public acceptance and possible impact on normal trade.

- **Molecular building blocks** (amino acids for animal feed and fatty acids for animal feed, oleo-chemistry). With suitable pathogen inactivation, products can be safely used for pet food and animal feed.

- **Elements** (Nitrogen/Phosphorus fertilizers). Since fertilizers are typically spread in an open system over wide areas of farmed land, pathogen inactivation must be guaranteed.

- **Energy** (biogas, fuel fat, meat and bone meal). For the production of energy, products must first be preconditioned by the rendering process. Subsequently biogas can be used as a replacement for natural gas, fuel fat as a replacement for fossil fuel oil, and meat and bone meal as a replacement for coal as energy sources.

- **Destruction and/or Disposal** without further use. Destruction and/or Disposal without further use should only be considered as a final way of disposing of material when other ways of use are not available.

* The essence of Chapter B and C is summarized in TABLE 1 and FIGURE 1

Table I: Available Technology

TECHNOLOGY	FAVOURABLE	CONSTRAINTS	END PRODUCT
Rendering	- Existing network of facilities as an integral part of livestock industry - Closed treatment system - Every outlet under Veterinary and environmental control (air, water, products) - established, well documented transport system - effective inactivation of the all pathogens - established markets for rendered products - long experience in dealing with hazardous materials - existing disinfection facilities for the means of transport	- Limited capacity - fixed location	- animal fats a) pet food b) animal feed c) oleo chemistry d) biogas production e) fuel - animal protein concentrates for a) pet food b) animal feed c) fertilizer d) biogas production e) fuel f) landfill
(Fixed) Whole carcasses incineration	- effective inactivation	- fixed location - low capacity - high cost per treatment - high energy consumption - exhaust gas not environmentally control	- ash
(Mobil) Air curtain incineration	- effective inactivation	- low capacity - high cost per treatment - limited availability of equipment, - requires logistics for energy supply (wood) - exhaust gas not environmentally control	- ash
Municipal incineration	- effective inactivation - expanded capacity	- fixed location - high cost - not under Veterinary Service control - no hygienic layout of the reception of bio-hazardous material	- ash

TECHNOLOGY	FAVOURABLE	CONSTRAINTS	END PRODUCT
Pyre burning	- can be done at site - established procedure - no need of transportation	- no environmental control (soil, water and air) - extended period of time for complete combustion - no verification of inactivation (particulate emissions from incomplete combustion) - requires logistics for energy supply (wood, straw etc.) - public lack of acceptance	- ash
Composting	- simple process - on site process (under veterinary control) - low cost	- Requirement of additional material - Need of extended period of time - Difficult to ensure constant high temperature throughout the pile for sufficient time - production of aerosols when mixing - very difficult to control conditions under all circumstances - difficult to verify effectiveness - uncontrolled emissions to the environment - need of machinery for mechanical pre-treatment - compost made from animals not well accepted	- compost
Fermentation	- closed system - energy recovery (bio gas) - nutrient recovery (fertilizer) - no need for water-evaporation	- Not suitable for pathogen inactvation - Use only after rendering treatment - only suitable for biogas plants following fulfillment of hygienic standards	- biogas - liquid fertilizer

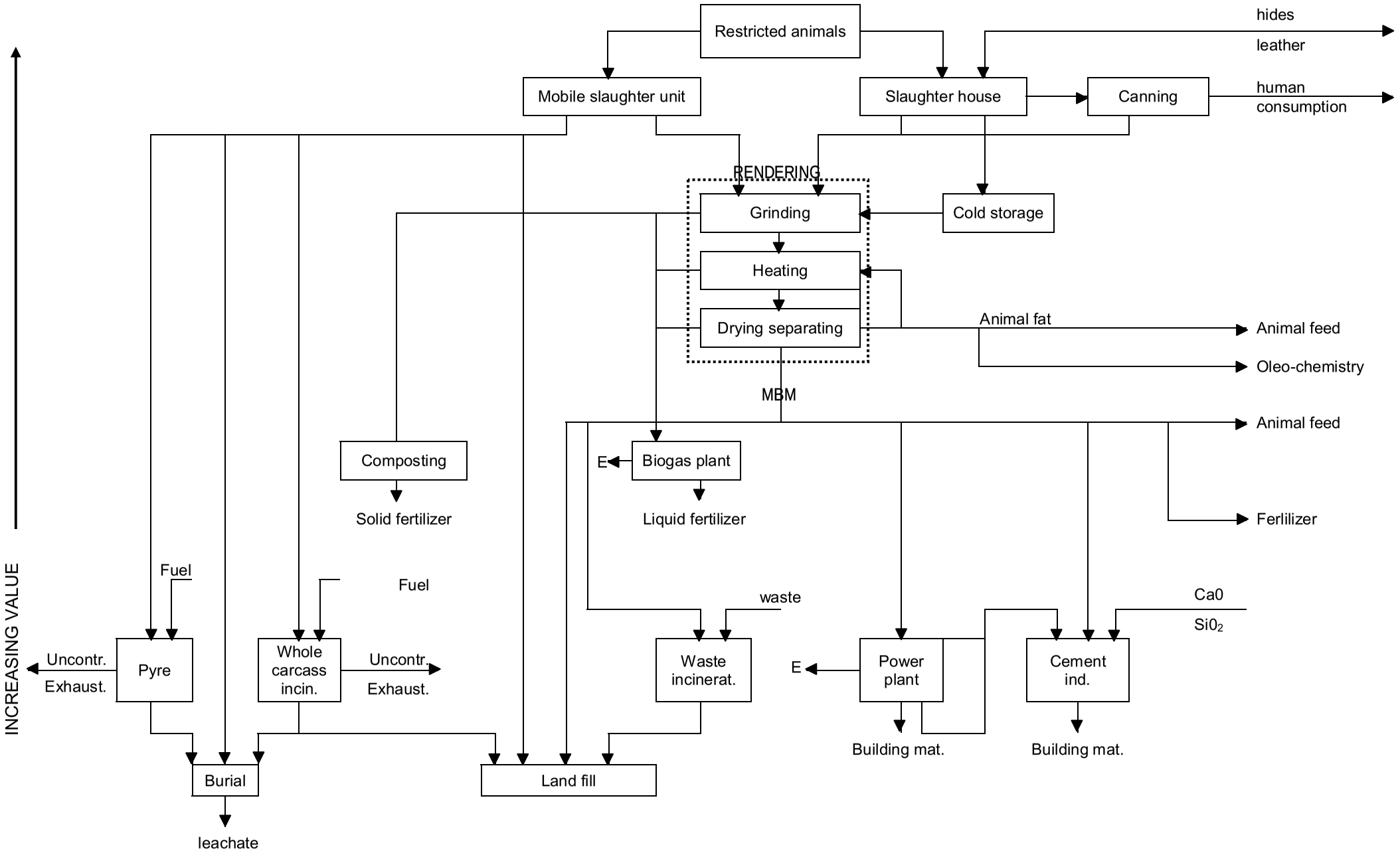
TECHNOLOGY	FAVOURABLE	CONSTRAINTS	END PRODUCT
Mass burial or on farm burial	- an established procedure - (can be on site)	- Requirement of an environmental assessment - No proper control of leakages to water and soil - Does not inactivate all pathogens - site is lost for future use - environmental impact increases with number of animals involved	
Mounding	- an established procedure - (can be on site)	- Requirement of an environmental assessment - No proper control of leakages to water and soil - Does not inactivate all pathogens - site is lost for future use - environmental impact increases with number of animals involved	
Landfill	- an established procedure - Sites pre-determined and licensed	- require transportation - open for extended periods (danger of rodents and birds) - leakage to –water-soil-air- if not properly controlled - does not inactivate all pathogens - site is lost for future use - environmental impact increases with number of animals involved - not suitable for all pathogens	

* Due to the lack of capacity there are possibilities such as:

1. Slaughter and cold storage, (need of slaughter and cool houses, need capacity for animal by products, kill and dry ice)

2. Live storage (vaccination of possible infected animals, cost of vaccination, production stop at the farm, quarantine).

Figure I: Flow chart for restricted animal disposal



D. Alternatives to or minimization of emergency animal slaughter

Principles:

- **Prevention** of disease occurrence is the ideal for avoidance of animal slaughter.

- **Speed** of disease detection and implementation of disease eradication procedures will minimize the number of involved animals.

- **Education** of livestock producers and the public at large as to the emergency disease management plan will permit rapid acceptance of the required disease control measures.

- To prevent disease, consideration should be given to the judicious use of **vaccination** as well as to import policies to address both legal and illegal entrance of animals or animal products.

- To speed the detection of disease, new and more rapid **diagnostic and surveillance technologies** should be pursued.

- To rapidly minimize the scope of an outbreak, **zoning** procedures should be established in advance so as to allow immediate implementation and limitation of animal movements. This should take into account normal trade movement patterns and the agreement of all involved parties.

- To allow vaccinated animals to be distinguished from infected and carrier animals **research** should be encouraged into the development of marker vaccines.