
Soil quality — Guidance for burial of animal carcasses to prevent epidemics

*Qualité du sol — Lignes directrices pour l'enfouissement des carcasses
d'animaux pour éviter une épidémie*





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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

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Introduction

The incidence of livestock epidemics such as bovine spongiform encephalopathy (BSE), swine fever, foot and mouth disease (FMD), Newcastle disease and avian influenza (AI) are becoming increasingly more frequent and geographically widespread. These epidemics spread quickly across country borders due to rapid exchange of people, animals and products between countries. Epidemics threaten the welfare of human beings through secondary infection on other livestock, economic loss and public health. Preventing the spread of epidemics to other areas where livestock are raised is the priority. However, when this fails and the epidemic has spread, rapid and effective action should be taken to prevent the further spread of infection. Slaughter followed by disposal of infected livestock is an essential means of preventing the spread of the epidemic.

Disposal methods for slaughtered livestock include: incineration, rendering, composting and burial. Burial is a method that has long been used, as it is relatively economical and does not require specialized techniques or equipment. However, it does have the potential to contaminate the receiving environment. Leachate from the buried animal carcass can pollute the soil and the surrounding waters (groundwater and surface water), and the gas caused by the decomposition of the carcass produces foul. Despite such drawbacks, burial continues to be used widely, because it can limit the spread of an epidemic when massive amount of carcasses must be disposed rapidly. The objectives of this International Standard are to curtail the spread of the disease, to destroy the causative agents, and to dispose of the carcasses by burial.

Soil quality — Guidance for burial of animal carcasses to prevent epidemics

1 Scope

This International Standard provides guidance on environment-friendly burial methods of animal carcasses to prevent epidemics, to curtail the spread of the disease, to destroy the causative agents, and to dispose of the carcasses.

This International Standard does not apply to the burial of animal carcasses resulting from natural death or by accident.

Other methods of disposal are outside the scope of this International Standard.

NOTE In some countries, infected animals or parts of animals cannot be buried on farms due to legislation but are subject to handling by licensed commercial landfills or incinerations.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 10390, *Soil quality — Determination of pH*

ISO 10694, *Soil quality — Determination of organic and total carbon after dry combustion (elementary analysis)*

ISO 11260, *Soil quality — Determination of effective cation exchange capacity and base saturation level using barium chloride solution*

ISO 11272, *Soil quality — Determination of dry bulk density*

ISO 11277, *Soil quality — Determination of particle size distribution in mineral soil material — Method by sieving and sedimentation*

ISO 13536, *Soil quality — Determination of the potential cation exchange capacity and exchangeable cations using barium chloride solution buffered at pH = 8,1*

ISO 14688-2:2004, *Geotechnical investigation and testing — Identification and classification of soil — Part 2: Principles for a classification*

ISO 25177, *Soil quality — Field soil description*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

affected animal

animal which has been infectious or is at present infectious or is suspected of soon becoming infectious and which is to be killed to prevent epidemics

3.2

animal carcass

dead body of an animal or parts thereof, or products of animal origin

NOTE Animal excreta are included in this definition.

3.3

burial

act of burying an animal carcass

3.4

discharge

action of releasing a substance such as a liquid or gas; a substance that is expelled from a defined area or location

3.5

disposal

collective noun for any operation to remove and discard waste

3.6

epidemic

large number of cases of a particular disease, usually infectious, occurring at the same time in a particular community

3.7

infectious waste

substance containing viable microorganisms or their toxins which is known or reliably believed to cause disease in man or other living organisms

[EN 13965-1:2004]

3.8

leachate

liquid percolated through a soil and containing substances in solution or suspension

3.9

livestock

domesticated animals, usually kept on a farm

EXAMPLES Cattle, sheep, horses, pigs, chickens.

3.10

permeability

measure of the ease with which gases, liquids, or plant roots penetrate or pass through a bulk mass of soil

3.11

quicklime

liming material consisting mainly of calcium oxide or a mixture of calcium oxide and possibly magnesium oxide, produced by the calcination of limestone, magnesian limestone or dolomitic limestone

[EN 12944-3:2001]

3.12

soil texture

relative proportions of the various particle size fractions (i.e. sand, silt, clay) in a soil according to a soil classification system

3.13

wildlife animal

all non-domesticated animals

EXAMPLES Deer, wild boar, rodents.

4 Objectives and constraints

In the event of an epidemic in which an infectious disease either kills animals directly or causes them to be killed, urgent action is required to

— curtail the spread of the disease,

- destroy the causative agents,
- rehabilitate those persons affected by the epidemic,
- return the land to profitable agriculture or other use,
- dispose of the carcasses, and
- dispose of excreta and other obnoxious material.

Four factors will constrain the work:

- a) The need for urgency arises because there will be a multiplicity of pathways by which the causative agents can be transmitted from live or dead animals within the area affected to animals in remote locations. The causative agent can be spread by birds, other wildlife, or transported by wind or wind-blown dust, and water. All of these mechanisms are difficult to control.
- b) In an attempt to arrest some of these pathways, the site shall be quarantined, with movements of people and other animals onsite and offsite being minimized, controlled and disinfected.
- c) As a consequence, the work shall be constrained by what is in hand or can readily be obtained.
- d) Further adaptation should be made to suit local ground conditions.

The number of animals involved shall also be considered.

NOTE For example, in one small outbreak in 2007, over 350 cattle were slaughtered on one day, and 800 pigs and 50 more cattle were slaughtered on the following day.

5 Planning of burial programme

5.1 Time of burial

Carcasses should be buried as soon as possible after their death. However, it should be noted that postmortem livestock will gas up and increase volume by up to half. Therefore, if they are placed in a burial pit too soon and covered over, the carcasses will subsequently rapidly degas, causing large voids to form and causing cracking of cover material. Therefore, either the stock should not be covered immediately or the carcasses should be pierced to prevent them gassing up.

Once buried, decomposition and degradation processes will intensify after 24 h to 72 h (depending on the ambient temperature), which will pose additional threats to health and the environment.

Each country may have a specified time frame within which carcasses shall be buried.

5.2 Consideration of diseases and kind of animal carcasses infected

When livestock are sufficiently believed to be infected by an epidemic, owners of livestock in the area where the epidemic has spread or may spread can be ordered to immediately eradicate the livestock. Livestock eradication requirements can differ on a national scale, depending on the form of the epidemic. Diseases listed by the World Organisation for Animal Health (OIE) are given in Annex B.

5.2.1 Consideration of volume of carcasses to be buried

It might be necessary to bury the following:

- a) carcasses and parts thereof;
- b) excreta, including: urine, dung, sweat, saliva, snot (nasal mucus), tears, earwax, milk, semen, “afterbirth”;
- c) miscellaneous droppings, for example: hair, scurf, skin, blood;

d) infected straw, bedding mixed with dung, farmyard manure (if infected), etc.

Depending on the disease, some or perhaps all of these can transmit viable causative agents.

Burial volume is generally determined by the livestock's species and size. If the burial volume is uncertain, it should be assumed that no more than 300 kg of carcass per 1 m³ will be permitted. Table 1 gives an indication of average livestock weight.

Table 1 — Average livestock weight

Type	Kind of animal	Weight kg
Beef cattle	Cows and bulls	550
	Feeder cattle	450
	Replacement heifers	360
	Calves	135
Dairy cattle	Cows and bulls	600
	Replacement heifers	450
	Calves	135
Hog	Boars or sows	150
	Feeder pigs	100
	Weanling pigs	16
Poultry	Hens, cockerels, capons	1,8
	Chicks, broilers	1,5
	Hen turkeys, geese, ducks	8
Sheep		50

5.3 Selection of burial site

5.3.1 Deciding between onsite or offsite burial

In general, to avoid further spreading of the disease due to transport and handling, the infected livestock should be buried at the site where they are found.

The principal advantages of burial over incineration are that burial tools are simple, and movements off the site where infected animal carcasses occur are minimized.

When a suitable location for burial is not available on the farm, burial would have to be off the farm.

If the carcasses are buried on the farm, continuing maintenance and monitoring of the burial area are required (in relation to an existing national specification, if available); see also Clause 8. This area should be taken out of production.

NOTE The presence of the pit, even if landscaped, can reduce the value of the land.

5.3.2 Methods of burial

The following methods of burial are distinguished.

Simple burial: The carcasses are laid into a pit and soil is placed directly on top of them, perhaps with the addition of some quicklime. In this method, earth-dwelling worms, insects, and bacteria have direct access to the carcasses and assist in their disintegration. However, large volumes of obnoxious effluent are to be expected, and the causative agents are likely to escape with the effluent, meaning that complete disposal of

the carcasses cannot be assured. Although this method has been used in the past, it should now be regarded as unacceptable.

Aerobic burial: Although there appears to be a view that burial under carefully controlled aerobic conditions (presumably without earth-dwelling worms, insects and bacteria) would ensure complete disintegration and disposal of the carcasses, there appears to be little in the way of either scientific evidence or practical experience to support this view.

Anaerobic burial: Recent practice seems to have been to envelop the carcasses in impermeable membranes with a view to collecting the leachate. It seems probable that anaerobic conditions have developed in many cases when such systems have been used but there is some doubt as to whether disintegration does occur under anaerobic conditions.

5.3.3 Requirements for the burial site

Burial sites are limited to areas where human or livestock access can be controlled, and shall not be in the vicinity of water sources, surface water and principal aquifers, main roads or residential areas. In addition, other aspects, such as environmental designation, archaeological site history, existing underground services, field drains, statutory and legal issues, need to be considered.

When the candidate site is in the vicinity of a principal aquifer, the site should only be used for burial if the results of a trial pit and other investigations show that the site is safe.

The area selected should not be liable to flooding or become submerged during flood events.

Soft ground should be avoided in selecting sites.

Characteristics of the soil of the burial site, such as soil texture, permeability, slope, groundwater depth and its topography, should be taken into consideration. Escarpments and sandy soils shall be avoided.

In selecting a site for burial, soil information obtained from trial pits can be useful. A trial pit is a shallow excavation made to a depth of not greater than 5 m. The trial pit is to be used extensively at the surface for soil sampling and detection of services prior to borehole excavation (see, for example, ISO 10381-4).

SAFETY PRECAUTIONS — An important safety point to note is that all pits below a depth of 1,2 m shall be supported.

When preparing a trial pit, a log including such information as soil type, structure and groundwater levels should be made.

The basic characteristic parameters given in Table 2 should be considered to evaluate the potential contamination of soil and groundwater at the burial sites.

NOTE For more information regarding groundwater protection, ISO 15175 can be considered.