

CODEX ALIMENTARIUS

INTERNATIONAL FOOD STANDARDS



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World Health
Organization

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GUIDELINES FOR THE CONTROL OF *TRICHINELLA* SPP. IN MEAT OF SUIDAE

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1. INTRODUCTION

Trichinellosis is a parasitic disease of major public health and economic importance in some countries. Human infection occurs from the consumption of raw or undercooked meat of many species (e.g. domestic pig, horse, game) containing infective *Trichinella* spp. larvae. Meat from animals of the family of Suidae (further referred to as "Suidae") is considered to be the most important means of transmission of *Trichinella* spp. to humans. The infection status of domestic pig populations is informed by knowledge of management practices and data from monitoring programs for live (serological survey) or slaughtered pigs. Human health data can also be used to support the determination of risk of exposure to *Trichinella* spp.

Post-slaughter control measures to protect consumers from exposure to *Trichinella* spp. in the meat of Suidae should be risk-based.

These Guidelines incorporate elements of the "risk management framework" (RMF) approach as developed by the Codex Committee on Food Hygiene for managing microbiological hazards (*Principles and Guidelines for the Conduct of Microbiological Risk Management* (CAC/GL 63-2007)) such as:

- Preliminary risk management activities;
- Identification and selection of risk management options;
- Implementation of control measures;
- Monitoring and review.

2. OBJECTIVES

The primary objective of these Guidelines is to provide guidance to governments and industry on risk-based control measures to prevent exposure of humans to *Trichinella* spp. in meat of Suidae.

The Guidelines provide a consistent and transparent technical basis for reviewing and implementing control measures based on epidemiological information and risk analysis. The risk-based control measures that are selected vary between countries and production systems. Measures applied at the national level should be taken into account in the judgement of equivalence¹ by importing countries, thereby facilitating international trade.

3. SCOPE AND USE OF THE GUIDELINES

3.1. Scope

These Guidelines address only the control of *Trichinella* spp. in meat from Suidae as this is considered the most important source of infection of humans. The control of *Trichinella* spp. in meat from other species (e.g. horses, bears, walrus, etc.) should however be taken into account where considered relevant to the control of *Trichinella* spp. in meat from Suidae.

These Guidelines apply to the control of all species and genotypes of *Trichinella* that may infect Suidae and cause foodborne disease. The Guidelines are based on the *Working Principles for Risk Analysis for Application in the Framework of the Codex Alimentarius*² and the *Code of Hygienic Practice for Meat* (CAC/RCP 58-2005) that provides generic advice on a risk-based approach to meat hygiene.

These Guidelines used in conjunction with the OIE recommendations (*Chapter 8.15 Infection with Trichinella* spp. of the OIE Terrestrial Animal Health Code), apply to all steps from primary production to consumption.

3.2. Use

These Guidelines, used in conjunction with the OIE recommendations (*Chapter 8.15 Infection with Trichinella* spp. of the OIE Terrestrial Animal Health Code), provide specific guidance for control of *Trichinella* in meat of Suidae with potential control measures being considered at each step, or group of steps, in the food chain. The Guidelines are supplementary to and should be used in conjunction with the *General Principles of Food Hygiene* (CAC/RCP 1-1969), the *Code of Hygienic Practice for Meat* (CAC/RCP 58-2005), the *Code of Practice for the Processing and Handling of Quick Frozen Foods* (CAC/RCP 8-1976), the *FAO/WHO/OIE Guidelines for the Surveillance, Management, Prevention and Control of Trichinellosis*³ and the *Recommendations on Methods for the Control of Trichinella in Domestic and Wild Animals Intended for Human Consumption* prepared by the International Commission on Trichinellosis (ICT) Standards for Control Guidelines Committee⁴.

¹ *Guidelines on the Judgement of Equivalence Sanitary Measures associated with Food Inspection and Certification Systems* (CAC/GL 53-2003)

² <http://www.fao.org/DOCREP/006/Y4800E/y4800e0o.htm>

³ http://www.trichinellosis.org/uploads/FAO-WHO-OIE_Guidelines.pdf

⁴ <http://www.med.unipi.it/ict/ICT%20Recommendations%20for%20Control.English.pdf>

The diagnostic techniques referred to in these Guidelines are those of the *OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals (Chapter 2.1.16 Trichinellosis)*.

Flexibility in application is an essential element of these Guidelines. They are primarily intended for use by government risk managers and industry in the design and implementation of food control systems. These Guidelines could also be used when judging the equivalence⁵ of different food safety measures for meat of Suidae in different countries for international trade purposes.

These Guidelines provide a framework for decisions regarding post-slaughter control measures to protect humans from consumption of meat of Suidae which may be infected with *Trichinella* spp. Pre-harvest preventative measures, prerequisite criteria and conditions for recognition of compartments of domestic pigs as negligible risk are described in *Chapter 8.15 Infection with Trichinella* spp of the OIE Terrestrial Animal Health Code.

4. DEFINITIONS

Compartment⁶	means an animal subpopulation contained in one or more establishments under a common biosecurity management system with a distinct health status with respect to a specific disease or specific diseases for which required surveillance, control and biosecurity measures have been applied for the purpose of international trade.
Cross breeds	means the progeny of domestic pigs with non-domesticated animals of the family Suidae.
Domestic pigs	means domesticated animals of the family Suidae living in a managed production system.
Feral pigs	means an animal of a domesticated species of the family Suidae that now lives without direct human supervision or control.
Finishing pigs	means domestic pigs kept solely for meat production.
Reservoir wildlife⁶	means feral animals, captive wild animals and wild animals that are known to be the most important potential direct or indirect sources of infection for <i>Trichinella</i> spp. to domestic pigs in a region or country.

5. PRINCIPLES APPLIED TO CONTROL OF *TRICHINELLA* SPP. IN MEAT OF SUIDAE

Overarching principles for good hygienic practice for meat are presented in the *Code of Hygienic Practice for Meat* (CAC/RCP 58-2005) section 4: *General Principles of Meat Hygiene*. Three principles that have particularly been taken into account in these Guidelines are:

- i. The principles of food safety risk analysis should be incorporated wherever possible and appropriate in the design and implementation of meat hygiene programmes.
- ii. As appropriate to the circumstances, the results of monitoring and surveillance of animal and human populations should be considered with subsequent review and/or modification of meat hygiene requirements whenever necessary.
- iii. Competent authorities should recognise the equivalence of alternative hygiene control measures where appropriate, and promulgate meat hygiene measures that achieve required outcomes in terms of safety and suitability and facilitate fair practices in the trading of meat.

6. PRELIMINARY RISK MANAGEMENT ACTIVITIES

Consumers are exposed to the risk of *Trichinella* spp. infection when they consume meat containing infectious larvae. Risk management activities should incorporate a “primary production-to-consumption” approach in order to identify all steps in the food-chain where control measures are required.

Preliminary risk management activities appropriate to these Guidelines include:

- Development of a national, regional, or compartment risk profile noting that a generic risk profile which takes into account the *FAO/WHO/OIE Guidelines for the Surveillance, Management, Prevention and Control of Trichinellosis*³ has been published.
- Evaluation of the epidemiological evidence supporting a negligible risk claim for domestic pigs consumed domestically or abroad.

⁵ *Guidelines on the Judgement of Equivalence Sanitary Measures associated with Food Inspection and Certification Systems* (CAC/GL 53-2003)

⁶ Definition in the OIE Terrestrial Animal Health Code.

7. AVAILABILITY AND SELECTION OF RISK-BASED CONTROL MEASURES

7.1 Availability of control measures at herd level

Measures to prevent *Trichinella* infection in domestic pig herds and to establish a compartment of negligible risk are described in *Chapter 8.15 Infection with Trichinella spp.* of the OIE Terrestrial Animal Health Code.

7.2 Availability of post-slaughter control measures

Post-slaughter control measures for *Trichinella* spp. include: laboratory testing and follow-up actions, freezing and heat treatment. Irradiation of meat of Suidae is also an option to destroy *Trichinella* spp. in meat prior to consumption. Control measures should be validated and then be approved by the competent authority, as appropriate. Non-weaned pigs slaughtered below the age of 5 weeks may be derogated from post-slaughter control measures⁷ when there is relevant information that can be verified by the competent authority.

Inactivation of *Trichinella* spp. by curing should follow the recommendations of ICT⁸.

7.2.1 Laboratory testing and follow-up actions

When laboratory tests are performed on individual carcasses, those selected analytical methods should be in accordance with the diagnostic techniques recommended in *Chapter 2.1.16. Trichinellosis* of the OIE *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals* (digestion assays) and the *ICT Recommendations for Quality Assurance in Digestion Testing Programmes for Trichinella*⁹ or ISO\CEN standards.

Any analytical method that is selected should have known performance characteristics, i.e. sensitivity and specificity, if a risk-based approach to ensuring food safety is to be applied.

If a *Trichinella*-positive carcass is identified during post-slaughter testing, the competent authority should be notified. The competent authority can then decide which follow-up actions are necessary including possible disposal of the carcass.

7.2.2 Freezing

Freezing of meat should utilise cooling regime parameters that ensure lethality for all *Trichinella* spp. present in different portions of meat or whole carcasses. Use of this method for inactivation of *Trichinella* spp. that are not cold tolerant should be in accordance with validated parameters such as those described in the "*Recommendations on Methods for the Control of Trichinella in Domestic and Wild Animals Intended for Human Consumption*" prepared by the ICT Standards for Control Guidelines. Freezing should not be used as a control measure in regions where *Trichinella* species and genotypes that are known to be cold tolerant such as *Trichinella* T6, *T. britovi*, and *T. nativa*, are endemic.

7.2.3 Heat treatment or irradiation

Inactivation of *Trichinella* spp. by these methods should be performed in accordance with validated methods such as those described in the "*Recommendations on Methods for the Control of Trichinella in Domestic and Wild Animals Intended for Human Consumption*" prepared by the ICT Standards for Control Guidelines Committee. Guidance on irradiation is given in the *General Standard on Irradiated Food* (CODEX STAN 106-1983) and the *Code of Practice for Radiation Processing of Food* (CAC/RCP 19-1979).

7.3 Selection of risk-based control measures

With the establishment of the negligible risk compartment as described in *Chapter 8.15 Infection with Trichinella spp.* of the OIE Terrestrial Animal Health Code, including consideration of the level of public health protection provided, the competent authority may provide derogation from specific post-slaughter controls or change the level of application of specific post-slaughter controls.¹⁰

8. IMPLEMENTATION OF RISK-BASED MEASURES

Implementation of selected control measures is dependent on official recognition by the competent authority of the *Trichinella* status of the compartment.

⁷http://www.aesan.msssi.gob.es/AESAN/docs/docs/evaluacion_riesgos/comite_cientifico/ingles/TRICHINELLA_SUCKLING_PIG.pdf

⁸ Validated methods for curing are currently under development by ICT

⁹ http://www.trichinellosis.org/uploads/Part_1_final_-_QA_Recomendations_7Feb2012.pdf

¹⁰ Illustrations of the levels of public health protection that can be achieved when establishing a compartment with negligible risk are provided by FAO and WHO. (<ftp://ftp.fao.org/codex/meetings/CCFH/cfh46/Trichinella%20Mtg%20Report%20241014.pdf>).

9. MONITORING AND REVIEW

After establishing a negligible risk compartment according to Chapter 8.15 Infection with *Trichinella* spp. of the OIE Terrestrial Animal Health Code, ongoing assurance of public health protection should be based on avoiding *Trichinella* spp. contaminated meat from going into commerce. Public health protection can be assured by:

- a) a review of evidence, in particular from audits of herds, demonstrating compliance with the conditions as described in Article 8.15.5 of the OIE Terrestrial Animal Health Code; or
- b) a risk based slaughter surveillance programme that takes into account information from historical testing results and is supplemented by regular review of information from audits of herds within the compartment; or
- c) a slaughter surveillance programme incorporating current testing data demonstrating that prevalence of infection does not exceed 1 infected carcass per 1,000,000 pigs slaughtered with at least 95% confidence.

In addition to the above, epidemiological investigation of human trichinellosis cases to confirm that the source of the contaminated meat was not from a negligible risk compartment according to Chapter 8.15 *Infection with Trichinella* spp. of the OIE Terrestrial Animal Health Code should be conducted to the extent possible.

Where applicable and available, slaughter and any other relevant data from outdoor pigs and wild animals can provide additional information on the conditions surrounding the negligible risk compartment and the potential for infection of animals within the compartment.

10. NON-DOMESTICATED SUIDAE, FERAL PIGS AND CROSS-BREEDS

All meat derived from non-domesticated Suidae, including wild boars, feral pigs and cross-breeds intended for human consumption should come from animals:

- a) tested in accordance with the diagnostic techniques recommended in the OIE *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals* (digestion assays); or
- b) be processed to ensure the inactivation of *Trichinella* spp. in accordance with one of the methods in section 7.2, validated and approved for post-slaughter control in these animals.

Positive carcasses should be disposed of according to recommendations of the competent authority.

11. RISK COMMUNICATION

Best practice in the control of *Trichinella* spp. in the meat of Suidae should be communicated to all stakeholders in domestic pig production. Similarly, all stakeholders should be aware of the benefits of obtaining *Trichinella* negligible risk compartment status.

Hunters should be informed on the risk of consumption of meat from reservoir wildlife, stressing the importance of testing even if for personal consumption or the need to properly cook any meat from wild game (e.g. a core temperature of at least 71°C as recommended by ICT). Hunters should be also informed of the risk of promulgating and maintaining the sylvatic life cycle associated with the common habit of leaving animal carcasses in the field after skinning, or removing and discarding the entrails, thereby providing the opportunity for transmission to new hosts.

Communication procedures on the occurrence of *Trichinella* infections should be established between the veterinary authority and the public health authority. The competent authority should ideally publish annual laboratory results in a form that demonstrates the epidemiological status of herds, compartments, regions or the whole country. Results of epidemiological investigations of any food-borne outbreaks should also be communicated.

Since each country has specific consumption habits, communication programs pertaining to trichinellosis are most effective when established by individual governments.

Retailers and consumers, including people who visit regions or countries where *Trichinella* is endemic, should be made aware that meat should be fully cooked e.g. a core temperature of at least 71°C as recommended by ICT in order to avoid becoming sick from consuming meat contaminated with parasites.