

**TRICHINELLA INFECTION**

TERRESTRIAL ANIMAL HEALTH STANDARDS COMMISSION -  
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**USA COMMENTS**

Article 8.13.1.

**Introduction**

Trichinellosis is a cosmopolitan zoonosis caused by eating raw or undercooked meat from *Trichinella*-infected food animals or game. The parasite lives in the small intestine (adults) and muscles (larvae) of many mammalian, avian and reptile host species, including humans, pigs, rodents, horses, bears and walrus. Within the genus *Trichinella*, twelve genotypes have been identified, eight of which have been designated species. *Trichinella* genotypes may vary considerably between localities, districts, regions and countries.

Trichinellosis can be a fatal disease in humans and is clinically inapparent in animals.

Breaking the transmission cycle to humans currently relies on the provision of *Trichinella*-free meat for human consumption. ~~This is~~ In the past, this has been achieved by post mortem ~~inspection~~ testing and/or inactivation of the parasite in domestic or wild sourced meat. Processing of meat which ensures inactivation of *Trichinella* includes cooking, freezing and curing of meat (using specified time-temperature combinations). ~~In addition, appropriate measures should~~ Farm management and biosecurity measures can also be implemented to eliminate the risk of exposure to *Trichinella*. The goal is ~~be taken~~ to prevent the exposure of food animals to infected meat including uncooked food waste, rodents and other wildlife. Documentation and verification of good management practices is another equivalent option that can be taken and verified to break the transmission cycle of *Trichinella*.

**Rationale :**

- 1) Achieving *Trichinella*-free meat has been historically achieved by testing and/or inactivation procedures, and not just with a post-mortem inspection.
- 2) Including the words « in addition » implies that the farm measures are not effective without post-mortem inspection, Farm measures *are* effective and can be verified by post-mortem testing.
- 3) The goal is to provide meat that is *Trichinella*-free. On-farm measures provide mitigation that is equivalent to post-mortem inspection. References to support this equivalent outcome :
  - a. Gamble H.R., Pyburn D., Anderson L.A. & Miller L.E. (2000). - Verification of good production practices that reduce the risk of exposure of pigs to *Trichinella*. *Parasite*, 8 233-235.
  - b. Dupouy-Camet, J. and Murrell, K.D. (eds.) (2007). Guidelines for the Surveillance, Management, Prevention and Control of Trichinellosis. Paris: FAO/WHO/OIE. <ftp://ftp.fao.org/docrep/fao/011/a0227e/a0227e.pdf>
  - c. Gamble H.R., Bessonov A., Cuperlovic K., Gajadhar A.A., van Knapen F., Nockler K., Schenone H. & Zhu X. (2000). - Recommendations on methods for the control of *Trichinella* in domestic and wild animals intended for human consumption. *Vet. Parasitol.*, 93, 393-408.

Game meats should always be considered a potential source of infection, and should be tested or cooked properly. *Trichinella* found in game meats may be resistant to freezing (depending on the genotype present) and therefore untested, frozen game poses a public health risk.

Testing methods for the detection of *Trichinella* infection in pigs and other animal species include either directly demonstrating the parasite in muscle samples or indirectly demonstrating the parasite by detecting specific circulating antibodies to *Trichinella* spp., ~~although the latter method is not always reliable, because of certain situations where cross-reactive antibodies are present due to co-infections with other nematode parasites or infection is in the early stages and detectable antibodies are not yet present.~~ Direct testing by artificial digestion has a sensitivity of 3 larvae per gram or more. Serological testing has a greater sensitivity but can give false negative results until antibodies to *Trichinella* are formed.

**Rationale :**

- 1) The added text is suggested to recognize that either testing method has its limitations. Digestion is limited by its sensitivity at low levels of infection and serological testing will not detect circulating antibodies unless at least 7 to 10 days after exposure.
- 2) With respect to proposed deleted text, the United States requests the OIE provide the specific scientific references addressing this 'cross-reactive' antibody interference. US *Trichinella* experts know of no such reference.

References for point 1:

GAMBLE H.R. Detection of trichinellosis in pigs by artificial digestion and enzyme immunoassay. *Journal of Food Protection*, 1996, 59, 295-298.

GAMBLE, H.R. Sensitivity of artificial digestion and enzyme immunoassay methods for inspection of trichinellosis in pigs. *Journal of Food Protection*, 1998, 61, 339-343.

GAMBLE H.R., ANDERSON W.R., GRAHAM C.E. & MURRELL K.D. Diagnosis of swine trichinosis by enzyme-linked immunosorbent assay (ELISA) using an excretory-secretory antigen. *Veterinary Parasitology*, 1983, 13, 349-361.

GAMBLE H.R. & PATRASCU I.V. Whole blood, serum and tissue fluids in an EIA for swine trichinellosis. *Journal of Food Protection*, 1996, 59, 1213-1217.

GAMBLE H.R., RAPIC D., MARINCULIC A. & MURRELL K.D. Evaluation of excretory-secretory antigens for the serodiagnosis of swine trichinellosis. *Veterinary Parasitology*, 1988, 30, 131-137.

KAPEL C.M.O. & GAMBLE H.R. Infectivity, persistence, and antibody response to domestic and sylvatic *Trichinella* spp. in experimentally infected pigs. *International Journal for Parasitology*, 2000, 30, 215-221.

MURRELL K.D., ANDERSON W.R., SCHAD G.A., HANBURY R.D., KAZACOS K.R., BROWN J. & GAMBLE H.R. Field evaluation of the ELISA test for swine trichinosis: efficacy of the excretory-secretory antigen. *American Journal of Veterinary Research*, 1986, 47, 1046-1049.

NÖCKLER K., VOIGT W.P., PROTZ D., MIKO A. & ZIEDLER K. Intravitale Diagnostik der Trichinellose beim Schwein mit dem indirekten ELISA (Indirect ELISA for the diagnosis of trichinellosis in living pigs). *Berliner and Münchener Tierärztliche Wochenschrift*, 1995, 108, 167-174.

VAN DER LEEK M.L., DAME J.B., ADAMS C.L., GILLIS K.D. & LITTELL R.C. Evaluation of an enzyme-linked immunosorbent assay for diagnosis of trichinellosis in swine. *American Journal of Veterinary Research*, 1992, 53, 877-882.

Gamble H.R., Pozio E., Bruschi F., Nöckler K., Kapel C.M.O., Gajadhar A.A. 2004. International Commission on Trichinellosis: Recommendations on the use of serological tests for the detection of *Trichinella* infection in animals and man. *Parasite*, 11: 3-13.

Standards for diagnostic tests are described in the *Terrestrial Manual*.

Article 8.13.2.

### **Purpose and scope**

This chapter deals with methods for on farm prevention of *Trichinella* infection in pigs and for safe trade of *fresh meat* and *meat products* derived from pigs and equines. This chapter complements the Codex Alimentarius Code of Hygienic Practice for Meat (CAC/RCP 58-2005).

Article 8.13.3.

### **Prevention of trichinellosis in pigs**

This article applies to pigs kept under confined conditions.

#### 1. Constructing buildings and environmental barriers

- a) Buildings used to house pigs should be constructed to prevent entry of rodents (e.g. openings, such as those for air ventilation or water pipes should be covered with wire or specific devices) and wildlife.
- b) Areas within at least 30 metres ~~100 metres~~ of pig buildings should be free from rubbish and rodent harbourage.
- c) At least a 1 metre ~~2-metre~~ perimeter consisting of gravel or vegetation mowed to a height of less than 10 cm should be maintained around all pig buildings.

**Rationale :** The perimeters and areas suggested are too prescriptive. There is no scientific evidence to support specific areas or distances. The suggested minimum areas and perimeters are proposed as baselines.

#### 2. Feed and feed storage

- a) Feed should be stored and contained in closed silos or bins, which do not allow rodents to enter.
- b) Purchased feed should be obtained from an approved facility, which produces feed following approved Good Manufacturing Practices.
- c) Waste food containing meat products should be cooked to inactivate trichinae and in accordance with the provisions in the *Terrestrial Manual* (under development).

#### 3. Rodent control

~~An ongoing approved programme for the control of rodents should be implemented. A program that successfully controls the rodent population must be implemented and documented.~~

**Rationale :** the statement/recommendation needs to be outcome based. (i.e. a successful program needs to be implemented and documented).

#### 4. Farm hygiene

- a) Dead animals should be removed from pig buildings immediately after detection to prevent exposure to other pigs and rodents, and disposed of as soon as possible in accordance with the provisions of Chapter 4.12. Disposal of animals.
- b) Garbage dumps should not be located near pig farm(s) in order to minimise the risk of infected rodents entering the farm(s).

#### 5. Identification and traceability

An *animal identification* and *traceability* system should be implemented in accordance with the provisions of Chapters 4.1. and 4.2.

#### 6. Introduction of animals

- a) It is preferable to obtain new animals from *Trichinella*-free farms or compartments; or
- b) if new animals are obtained from farms of unknown *Trichinella* status, they should be held in isolation and tested serologically to ensure the absence of antibodies to *Trichinella* (refer to the *Terrestrial Manual*). Adult pigs should be tested serologically on arrival and again five weeks after arrival. Weaner pigs should be tested serologically once five weeks after arrival.

If seropositive animal(s) are detected, all newly introduced pigs should be placed in quarantine and retested serologically. Animals which are serologically positive on retest, should be slaughtered and the meat subjected to artificial digestion for confirmation. Digestion-confirmed positive pork should be processed or rendered according to national regulations on the handling of unsafe meat. If positive, the animal(s) should be slaughtered and the meat processed or rendered according to national regulations on the handling of unsafe meat. The meat should also be tested directly by the pepsin digestion procedure (refer to *Terrestrial Manual*) to monitor the reliability of the serological test procedure and the validity of the test results.

**Rationale :** The language could cause confusion and be misinterpreted as requiring pepsin digestion for both serologically positive and negative samples - which could cause unnecessary duplication and waste valuable resources.

Pepsin digestion is appropriate as a confirmatory test for a sero-positive sample. The language as proposed clarifies this point without changing the intent of the paragraph.

#### **Recommendations for pigs exposed to outdoor environments**

While confinement production systems can be managed in a manner to reduce or eliminate the risk of exposure of pigs to *Trichinella*, pigs exposed to outdoor environments, or under conditions that facilitate contact with wildlife will always be at risk of *Trichinella* infection.

Pigs raised under these conditions should be tested at slaughter by detection methods, in accordance with the provisions in the *Terrestrial Manual*.

Recommendations in Article 8.13.3. for the prevention of *Trichinella* in pigs kept under confined conditions should also be applied where ever possible.

Article 8.13.5.

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### Official recognition for *Trichinella*-free pig farm(s) or compartment(s)

The *Veterinary Authority* may officially recognise pig farm(s) or compartment(s) already complying with Article 8.13.3. as *Trichinella*-free if ~~following additional requirements are met~~ surveillance by serology or by muscle sample tested by the digestion method is conducted annually with a sample size providing at least a 95% confidence interval for detecting *Trichinella* at a target prevalence of 40.1%.

- ~~a) muscle samples from all pigs sent for slaughter during the 12 months preceding recognition of the pig farms within the compartment as *Trichinella*-free should have been tested by a digestion method and found to be negative for *Trichinella* (refer to the *Terrestrial Manual*);~~
- ~~b) at least two visits, at a minimum of 6 months apart, should have been made in the 12 months preceding recognition of the pig farms in the compartment as *Trichinella*-free and annually thereafter to verify compliance with good management practices described in Article 8.13.3;~~
- ~~c) a serological survey of the on farm pig population in the compartment should be conducted annually with a sample size providing at least a 95% confidence interval for detecting *Trichinella* (refer to the *Terrestrial Manual*);~~
- ~~d) documentation of all management practices undertaken on farm;~~

~~If a positive animal is detected by a digestion method, or serology which is confirmed by digestion, the pig farm(s) or compartment(s) will lose its *Trichinella*-free status. An investigation should be carried out by the *Veterinary Services* to identify the origin of the infection and appropriate remedial actions to be implemented.~~

~~If a positive animal is detected by a digestion method, or by a serology test with subsequent confirmation by digestion, an investigation should be carried out by the *Veterinary Services* to identify the farm or compartment of origin of the infection. Appropriate remedial actions to be implemented preceding re-recognition of the farm or compartment as *Trichinella*-free are:~~

- ~~a) at least two visits, at a minimum of 6 months apart, to verify compliance with good management practices described in Article 8.13.3 and documentation of all management practices undertaken on farm or compartment; and~~
- ~~b) surveillance by serology or by muscle sample tested by the digestion method is conducted on all animals originating from the farm or compartment for a 12 month period.~~

Isolates that are obtained from an infected pig should be sent to an OIE Reference Laboratory for genotyping in order to provide epidemiological information.

**Rationale :** Article 8.13.5 has been rewritten to provide outcome based recommendations rather than methodology prescriptive recommendations. Prior documented evidence of being *Trichinella* free does not guarantee the success of excluding *trichinae* from the farm or compartment. The standard should be outcome-based as a result of a statistically valid surveillance system for the farm or compartment demonstrating *Trichinella* free status.

If surveillance detects a positive animal, an appropriate response plan would be to identify the farm or compartment of origin and, because *Trichinae* cannot be passed horizontally, before that farm or compartment can be re-recognized as negative, adequate biosecurity should be implemented and verified by a-visit, followed by surveillance specific to the farm or compartment to verify the success of the biosecurity implementation.

Also :

- The United States notes that testing may not always be done at the farm. In many instances, it will be more efficient and effective to test the pigs at points of concentration (i.e. slaughter plants).

Article 8.13.6

**Recommendations for the importation of fresh meat or meat products of domestic pigs**

*Veterinary Authorities* should require the presentation of an *international veterinary certificate* attesting that the entire consignment of *meat*:

1. comes from domestic pigs that have been slaughtered in an approved *abattoir*, AND
2. was subjected to post mortem sampling and the samples were subjected to a digestion assay for *Trichinella* with negative results, in accordance with the provisions in the *Terrestrial Manual*; OR
3. comes from domestic pigs that originated from a *Trichinella*-free farm(s) or compartment(s) in accordance with the recommendations in Article 8.13.5.; OR
4. has been processed to ensure the inactivation of the larvae of the parasite *Trichinella* in accordance with the recommendations in Article 8.13.10. (under development).

Article 8.13.7.

**Recommendations for the importation of fresh meat or meat products of wild pigs**

*Veterinary Authorities* of *importing countries* should require the presentation of an *international veterinary certificate* attesting that the entire consignment of *meat*:

1. comes from wild pigs that have been inspected in accordance with the provisions in Chapter 6.2.; AND
2. was subjected to a digestion assay for *Trichinella* with negative results, in accordance with the provisions in the *Terrestrial Manual*; OR
3. has been processed to ensure the inactivation of the larvae of the parasite *Trichinella*, in accordance with the recommendations in Article 8.13.10. (under development).

Article 8.13.8.

**Recommendations for the importation of fresh meat or meat products of domestic equines**

*Veterinary Authorities* of *importing countries* should require the presentation of an *international veterinary certificate* attesting that the entire consignment of *meat*:

1. comes from domestic equines that have been slaughtered in an approved *abattoir*, AND
2. was subjected to post mortem sampling and the samples were subjected to a digestion assay for *Trichinella* with negative results, in accordance with the provisions in the *Terrestrial Manual*; OR
3. has been processed to ensure the inactivation of all the larvae of the parasite *Trichinella* in accordance with the recommendations in Article 8.13.10. (under development).

Article 8.13.9.

**Recommendations for the importation of fresh meat or meat products of wild equines**

*Veterinary Authorities of importing countries* should require the presentation of an *international veterinary certificate* attesting that the entire consignment of *meat*:

1. comes from wild equines that have been inspected in accordance with the provisions in Chapter 6.2;  
AND
2. was subjected to a digestion assay for *Trichinella* with negative results, in accordance with the provisions in the *Terrestrial Manual*; OR
3. has been processed to ensure the inactivation of all the larvae of the parasite *Trichinella*, in accordance with the recommendations in Article 8.13.10. (under development).

Article 8.13.10.

**Inactivation of muscle larvae**

(under development)

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