Could a 400-µm mesh size sieve be used for *Trichinella* inspection at the slaughterhouse laboratory to facilitate pork export to third countries?

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Abstract

Background

Trichinellosis is a zoonotic disease caused by the nematode *Trichinella* through ingestion of raw or undercooked meat. In the European Union, the magnetic stirrer method (EU reference method, EU-RM) according to European regulation EC 2075/2005 is used for individual carcass control for *Trichinella* in pork. This method has been validated for the detection of live *Trichinella* muscle larvae (ML) and critical control points are well described. In international pig trade, different parts of the same carcass are shipped to countries both within and outside the EU. For export to countries outside the EU (third countries), meat producers may have to comply with regulations according to the food safety authorities of those countries, including the mandatory use of alternative equipment, such as a 400-µm mesh size sieve ($sieve_{400}$), instead of a sieve with a mesh size of 180 µm ($sieve_{180}$).

In its supervising role on the quality of *Trichinella* inspection at the slaughterhouse laboratories, the Dutch Reference Laboratory for Parasites (NRL-P) was asked to advise the Competent Authorities on the test sensitivity of a $sieve_{400}$, the performance of which is currently unknown. We evaluated the performance of a $sieve_{400}$, compared to a $sieve_{180}$, using spiked pork samples (0 - 10 *Trichinella* muscle larvae per analytical portion) in three evaluation experiments.

Methods

Experiment A, comparing a 180-µm mesh size sieve ($sieve_{180}$) with a 400-µm mesh size sieve ($sieve_{400}$) was conducted at the NRL-P. Registered parameters were meat weight, residual meat weight after digestion, volume of collected meat digest after the first sedimentation, *Trichinella* ML count, counting time and amount of debris in the final suspension that was evaluated microscopically. In Experiment B, the practically realised lower test limit was explored in a comparison of $sieve_{180}$ and $sieve_{400}$, using spiked pork samples (0 – 4 Trichinella ML) at the NRL-P and slaughterhouse lab SL1. In Experiment C, both sieves were compared under field conditions, for which spiked pork samples (3 – 8 *Trichinella* ML) were analysed at three slaughterhouse labs (SL1 – SL3) and the NRL-P. In experiments B and C only larval recovery was recorded, since slaughterhouse labs lack the possibilities to record the additional parameters mentioned under Experiment A.

Results

We show that the use of a $sieve_{400}$ results in significantly lower larval counts ($p = 2 \times 10^{-6}$), on average 147% more debris ($p = 7.6 \times 10^{-10}$) and 28% longer counting time ($p = 7.7 \times 10^{-6}$), compared to the use of a $sieve_{180}$. The overall probability to find larvae using $sieve_{400}$ (78.4%) is significantly lower than when using $sieve_{180}$ (90.1%). On the other hand, no false negative results were obtained using $sieve_{400}$, but prolonged counting times may have an impact on performance in a high-throughput environment such as a slaughterhouse

laboratory.

The results presented in this study support the recommended sieve mesh size of 180 – 200 µm in a recently developed ISO/NEN standard, which is to be published before the end of 2015.

Conclusions

Based on our results, the 180-µm mesh size sieve remains the sieve of choice for the meat inspection at the slaughterhouse labs, according to the EU-RM, and a 400- µm mesh size sieve should only be used supplemental to, but not replacing the standard 180- µm sieve. With the current study, we provide a useful contribution for decision makers to discuss a further harmonisation of meat inspection requirements between trade blocks.

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