Muscle distribution of Trichinella larvae in naturally infected pigs

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Some facts about pigs

• Domestication of pigs took place in China over 7500 BC.
• In average we will eat the equivalent of 28 pigs in our lifetime.
• Pork is the most widely consumed meat worldwide.
• Consumption per capita in Poland > 40 kg
• In Poland pigs are raised in uncontrolled housing condition in 2016 two farms applies for he certification.
Pig production in Europe

Source: Eurostat
Farms in Poland
And other farms in Poland
The pig are known to be the most common trichinella carrier

*Trichinellosis*, is caused by the consumption of raw or undercooked meat of infected animals. All animals equal but pigs are more equal than others.

The cuts of pig are not equal in sense of harboring *Trichinella* larvae.

There are plenty of experiments with laboratory infected pigs. But only few describe larval distribution in naturally infected pigs.
Risk based approach

- EU regulation 2015/1375 implements an alternative risk-based approach, in view of absence of positive findings in pigs under controlled housing conditions.
- Codex Alimentarius published guidelines for the control of *Trichinella* spp. in meat of suidae (CAC, 2015) and used in conjunction with the OIE terrestrial Animal health code, to provide guidance to governments and industry on risk based control measures to prevent human exposure to *Trichinella* spp. and to facilitate international pork trade.
- To support a risk-based approach in 2016 in Utrecht Quantitative Microbial Risk Assessment (QMRA) method was elaborated.
QMRA model to estimate Trichinosis

• The QMRA model was published by the Frits Fransen
• *Trichinella* data from Poland were used to validate the statistical model.
• Main advantages of the Utrecht QMRA model were:
  • All steps in the production chain were taken into account:
  • Quality of inspection of carcasses, - sensitivity
  • Number of *Trichinella* in meat portions,
  • Relative inactivation of *Trichinella* during processing.
  • Daily intake and others factors
• In the end QMRA model calculates level of illness based on the number of ingested *Trichinella* larvae.
Statistical models hardly depend on imput data
Aim of the study

• The aim of the study was to collect the data to calculate risk and course of infection due to consumption of infected pork meat.

• The predilection muscles of Trichinella spiralis were widely studied in experimental infections.

• There are little data on muscle distribution of naturally infected pigs.

• Collected data will allow to elaborate more precise QMRA models taking into account larval distribution in naturally infected pigs.
Everybody knows how the pig looks...
Types of cuts of pork


German, Duch, Finnish and Polish types are more or less the same thus used for the study.
Material for the study

• Infected pigs were collected since 2013.
• Pigs were obtained from farms suspected for trichinella (from farms where positive pigs were find during routine examination).
• In 23.07.2013 – we obtained information about the *Trichinella* positive pigs from the farm located in eastern part of Poland (Podlaskie province).
• We examined all pigs on the farm by ELISA for the presence of antibody.
• 14 pigs were find to be seropositive.
• Pigs were slaughtered and samples were taken for the study.
• Next 8 pigs were obtained from the same farm one month later.
• In 2014 another 5 were obtained from the farm located in Zachodniopomorskie (all pigs in the farm).
• In 2015 two pigs were obtained from Kujawsko-Pomorskie
• And the last one form Moglino nearly the middle of Poland
Muscle samples for the study

- Samples weighting at least 50g (except trachea) of muscle were taken parallely from left and right sight of carcasses.
- In general 17 muscles samples from each side were taken from each animal plus trachea.
- Samples were digested individually (nearly 1000 samples)
- Larvae were counted, species of larvae was examined.
Muscle samples

- corpus linguae
- m. masseter
- m. bachiocephalicus
- m. intercostales
- m. obliquus externus
- m. psoas major
- m. longissimus dorsi
- m. gluteus superficialis
- m. quadriceps
- m. trapesius
- m. flexor digitorum profundus:
  - m. supraspinatus
  - m. subscapularis:
  - m. triceps brachii
- biceps brachii
- m. biceps femoris:
- Diaphragma
- Trachea
Results

• Results were presented as no. of larvae per 100g respectively:
  • Mean – 6.5
  • Max. - 102
  • and Min – 0
• This are raw data uneusful for the modeling since the pigs for the study were in different age.
Sow 250 kg
**Wilcoxon signed-rank test for α=0,05**

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Where we are?

Bochnia 2016
Larval distribution L and R
Conclusion

• The initial dose was unknown it has to be highlighted that this study was done on naturally infected pigs, and according to our knowledge it’s a first study on such large group of naturally infected animals.

• *Trichinella* larvae were found in 70% (12 out of 17) of digested samples of trachea.

• The presence of these larvae in trachea indicate that organs from infected swine cannot be assured to be free of *Trichinella* larvae.

• Obtained data might be useful for quantitative risk assessment and predictive parasitology.
Aknowladges

• Regional Official Veterinarians:
  • Andrzej Blachura,
  • Bartosz Winiecki,
  • Sławomir Wołejko
  • Elżbieta Misiek
• Technicians:
  • Ewelina Antolak, Marek Prochniak and Katarzyna Grądziel-Krukowska.
Invitation

„Trichinellosis and other foodborne parasitic zoonoses” Białowieża 13-15. 09. 2017


14.09.2017 – *Trichinella* and *Anisakis*

15-09.2017 – *Toxoplasma Echinococcus* and on farm prophylactics.
Thank you for attention and welcome to Białowieża this year we move to the north-east to the oldest forest in Europe.

Zaborek 2015