

Characteristics of Organic Pig Production and risk analysis concerning *Toxoplasma* infection

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Abstract

A short written questionnaire was used to study certain characteristics of the organic pig production chain in The Netherlands and the circumstances on the farm that might play a role in the transmission of Toxoplasma infection to the pigs. Of the 81 certified organic slaughter pig farmers present in the Netherlands in 2006, 52 responded to the questionnaire (64 % response).

The farms could be divided into two populations. One population was represented by small organic pig farms with a mean number of 55 slaughtered pigs per year. These farms covered 40% of the total number of investigated farms, but only represented 2.5 % of the total number of slaughtered pigs. The second population had a mean annual production of 1460 animals. Almost 95% of these animals are currently slaughtered and further distributed by the Vion Food Group (de Groene Weg). A small part of the pigs (4%) is directly delivered to a slaughter company in Germany (Thönes) and 1% is sold via farm home sales.

For each farm an arbitrary Toxoplasma risk factor analysis was performed. Factors included the type of outdoor run (concrete or soil), feeding goat or sheep whey, number of cats, access of cats to outdoor run, stables and feed, rodent control and covering roughage fed to the animals. Calculation of the total risk score (summation of chance times severity scores for several factors) showed that many farmers already used management factors that decreased the risk for Toxoplasma infection. Analysis of a possible relation between risk score and farm size showed that a poor score was often seen on small farms. Because these farms mainly sell their meat in a frozen condition via home sales, this is not considered to represent a problem for food safety.

Further research is needed to investigate whether the risk for Toxoplasma can be maintained via on farm prevention or whether a Toxoplasma monitoring program should be implemented at slaughter, possibly with post slaughter decontamination. The fact that a recent report by the RIVM on food related infections has concluded that Toxoplasmosis has a markedly higher disease burden than Campylobacter or Salmonella, emphasizes the priority this subject should be given on the research agenda.

Introduction

The consumption of organic meat has shown a strong rise in The Netherlands in 2006 and now has a market share of 2.4%. The motivation of consumers to step over to organic is partly due to the fact that they strive to improve their own health and at the same time chose a product that benefits animal welfare.

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Recent studies from the Animal Sciences Group of Wageningen University and Research Centres have shown that animal friendly pig production systems are associated with an increased incidence of *Toxoplasma* as compared to conventionally held animals (Kijlstra et al. 2004a). A follow up study performed in 2004 showed that approximately half of the organic farms were *Toxoplasma* free, whereas the incidence in the positive farms varied between 1 and 93% (figure 1; Meerburg et al. 2006). This subject thus illustrates the dilemma between animal welfare and food safety. To find a solution to this dilemma more information is needed about the characteristics of the organic pig meat chain and the distribution of food safety risk factors within the chain. In the study described here we focussed on the parasite *Toxoplasma gondii*, since toxoplasmosis has recently been shown to produce the highest disease burden amongst food borne pathogens (Kemmeren et al 2006).

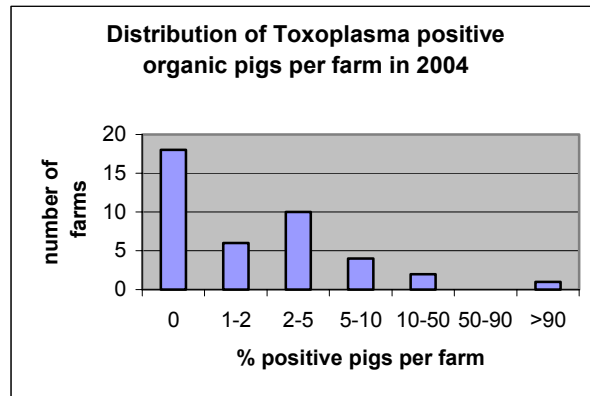


Figure 1. Distribution of *Toxoplasma* positive pigs per farm in The Netherlands in 2004.

Materials and methods

A short questionnaire was sent to all certified organic pig owners in the Netherlands. Information was obtained concerning the main activities on the farm, membership of the Dutch Organic Pig Farmers, number of pigs expected to slaughter in 2006, the slaughterhouse used and where the meat was distributed/sold. Furthermore information was obtained about a number of risk factors known from literature (Weigel et al. 1995; Kijlstra et al. 2004b) to play a role in *Toxoplasma* infection of pigs. *Toxoplasma* risk factors were each assigned a risk score which was calculated by multiplying the chance whether the described risk occurs on the farm with the severity. The severity gives an estimate of the number of animals possibly affected when the risk becomes manifest.

Results

Of the 81 eligible organic pig farms, 52 sent in their questionnaire (64% response). Analysis of non responding farms showed that these were often farms with less than ten pigs. These farms considered themselves too small to be a representative of the organic pig meat chain. Farms could be divided into two populations depending upon

their size. Small farms with between 1-250 slaughtered pigs (mean 55) represented approximately 40% of the farms but only contributed 2.5 % of the number of animals produced. None of these small farmers is a member of the Dutch Society of Organic Pig Farmers. The large farms produced between 250 and 2800 pigs per year with a mean of 1460 per farm. Within the large farms one can also discern two separate subpopulations: one slaughtering between 1100-1650 pigs and the other producing between 2200-2800 animals. Most large farms have organic pigs as their main enterprise, although a combination with dairy farming is quite common. As mentioned earlier the very small farms (< 10 pigs) are under represented in our study.

Most of the pigs (95%) from 34 farms were slaughtered and further distributed by the Vion Food Group (Groene Weg). Of the other 18 farms, three exported their pigs to a German slaughterhouse (Thönes) and the other 15 used a local butcher. Most of the small farms sell their meat (frozen) from the farm itself.

Of the *Toxoplasma* risk factors, we attributed the highest number of points (9 points) to the use of an unpaved outdoor run. Only a few small farms use this type of outdoor run, whereas the larger farms all use a concrete paved run, which can easily be cleaned. Feeding animals goat or sheep whey was also given a large number of points (6 points). The presence of more than 3 cats was given 3 points. Various other factors concerning the presence of cats on various locations were given between 1 and 2 points each. In total a farm could obtain 32 points. Most of the farms had less than 10 points (33 farms) in total whereby five farms even had 0 points. Nineteen farms had a score higher than 10. The highest score was 24 points. Figure 2 shows that a relation exists between *Toxoplasma* risk score and the size of the farm. Of interest is that the middle size farms score best.

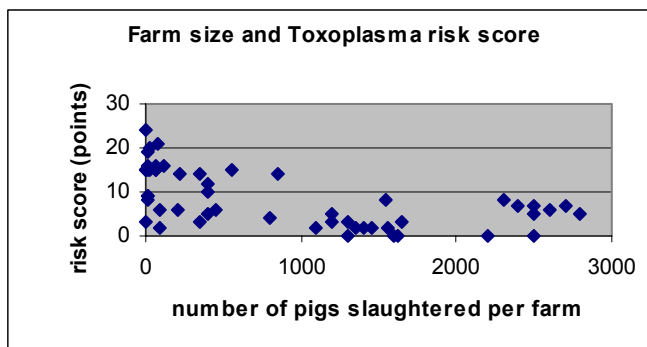


Figure 2. Relation between *Toxoplasma* risk score and farm size (number of expected pigs to be slaughtered in 2006).

Discussion and Conclusions

The organic pig farms in The Netherlands can be divided into a group of large professional farms and a group of small farms. The latter group represents a large number of farms but only produces a limited amount of animals. These small farms are not member of the Dutch Society of Organic Pig Farmers and may not have access to knowledge concerning food safety issues.

95% of the Dutch organic pigs are slaughtered and distributed by one company.

Cats are frequently present on organic pig farms. We recommend to keep cats away from the outdoor run, stables, feed, water and straw bedding materials. A feasibility study is needed to investigate the effect *Toxoplasma* vaccination of cats.

A small number of pig farmers feed whey obtained after cheese making to their pigs. As long as transfer of infection via milk has not been excluded we advise not to feed non pasteurised whey.

It can not be excluded that mice in the roughage transfer *Toxoplasma* infection to pigs. It is advised to cover roughage to prevent mouse access. Rodent control should be a continuous focus of attention on the farm.

Pigs from small scale pig producing farms have a higher chance to be infected with *Toxoplasma*. Meat from these farms should preferentially be frozen (which kills the parasite) before it is sold to the consumer.

Further research is needed concerning the usefulness of the developed risk score and the actual presence of infectious parasites in the meat. The density of infectious *Toxoplasma* cysts in organic pig meat has not yet been investigated and little is known about consumer handling of organic meat (barbecues, thoroughness of cooking procedure, kitchen hygiene). Further issues include the question whether a *Toxoplasma* monitoring should be set up at slaughter, the type of monitoring (serology versus parasite detection), or whether risk meat can be decontaminated post slaughter.

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