

**The risks associated with tail biting in pigs and possible means
to reduce the need for tail docking
considering the different housing and husbandry systems¹**

Scientific Opinion of the Panel on Animal Health and Welfare

(Question No EFSA-Q-2006-013)

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PANEL MEMBERS

The Scientific Panel for Animal Health and Welfare (AHAW) of the European Food Safety Authority adopted the current Scientific Opinion on 6 December 2007. The Members of the AHAW Scientific Panel were:

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SUMMARY

Council Directive 91/630/EEC², as amended, laying down minimum standards for the protection of pigs, requires the Commission to submit to the Council a report, based on a scientific opinion of the European Food Safety Authority (EFSA), concerning the welfare various aspects of housing and husbandry systems for farmed pigs. Following a request from the European Commission, the Panel on Animal Health and Welfare was asked to deliver a Scientific Opinion on the risks associated with tail biting in pigs and possible means to reduce the need for tail docking considering the different housing and husbandry systems. The Scientific Opinion was adopted by the Panel on Animal Health and Welfare (AHAW) on 6 December 2007.

Based on the scientific data presented in the Scientific Report conclusions and recommendations were drawn, as well as some recommendations for future research.

Evidence indicates that tail-biting pigs are likely to be frustrated and hence experiencing reduced welfare. Tail-biting can cause very poor welfare and tail-docking is likely to be painful, both in the short term and as a result of possible long-term pain from neuroma formation. Tail biting is associated with a variety of pathological changes ranging from spinal abscesses to pyaemia in different parts of the body. Such changes may be associated with reduced growth rate or in more severe cases, total carcass condemnation.

Tail biting is considered as an abnormal behaviour. The need to perform exploration and foraging behaviour is considered to be a major underlying motivation. The occurrence of tail biting has a multi-factorial origin and there is evidence in the report that some causal factors have more weight, such as the absence of straw, the presence of slatted floors and a barren environment. Absence of straw or a particulate, rootable substrate is an important hazard for tail biting. However, both the amount of straw (full bedding better than limited provision from a rack) and its form (long straw better than chopped) are also of importance. It was concluded that there is little evidence that provision of toys such as chains, chewing sticks and balls can reduce the risk of tail biting.

Heritability of tail-biting has been evaluated and its value found to be high enough for selection. Moreover, a phenotypic correlation between tail-biting behaviour and higher lean tissue growth rate has been reported.

A hazard for tail biting is competition for feed and/or inadequate feed intake, inadequate dietary sodium, deficiency of dietary essential amino acids, and a sudden change in diet composition, especially to a lower nutrient density.

In relation to climate condition, tail biting risk seems to be increased in autumn season, and hazards for tail biting are heat stress as well as cold stress and high airspeed.

Circumstantial data, anecdotal reports and practical experience strongly suggest poor health status to be a hazard for tail biting.

The efficacy of tail docking to reduce the frequency of tail biting is very difficult to estimate since it depends on the level of tail biting in control undocked pigs. Indeed, tail docking is all the more efficient in current intensive housing systems for pigs since environmental and possibly also genetic hazards for tail biting are prevalent. Under common intensive farming conditions, tail docking reduces the frequency of tail biting, but does not completely eliminate the problem when unfavourable conditions persist.

² E.C.O.J. n° L340 of 11/12/1991. p. 33.

In relation to the results obtained in the Risk Assessment process, some of the above mentioned hazards that have a high prevalence in the EU population came out as major risk factors for tail biting.

In order to further assess risks associated with tail biting and the severity of docking tails in pigs, research is needed that addresses, among others, the difference in prevalence of tail biting between docked and undocked pig populations in different housing systems, the severity and the duration of chronic pain, and the genetic, environmental, age and sex differences of tail-biting behaviour performance. Research is also needed to better understand the fundamental causal factors leading to tail biting and to define tools for early detection of tail biting in farms.

The methodology and the results (Conclusions and Recommendations) of this opinion as well as the previous opinions on Pig Welfare, should be further analysed identifying welfare indicators (in particular animal-based) suitable for the development of an animal welfare monitoring system.

Key words: Pig Welfare, tail biting, tail docking, docked, undocked.

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BACKGROUND AS PROVIDED BY THE EUROPEAN COMMISSION

Council Directive 2001/88/EC³ amended Council Directive 91/630/EEC⁴ laying down minimum standards for the protection of pigs and requires the Commission to submit to the Council a report, based on a scientific opinion of the European Food Safety Authority (EFSA), concerning various aspects of housing and husbandry systems for farmed pigs. In this context and upon requests from the Commission, EFSA has already issued opinions on welfare aspects of the castration of pigs and the animal welfare and health aspects of different space allowances and floor types for weaners and rearing pigs.

Council Directive 2001/88/EC also provides for the Commission to report to Council, on the basis of an EFSA scientific opinion, on numerous other aspects of housing and husbandry systems for farmed pigs, such as the effects of stocking density, including group size and methods of grouping the animals; the animal health and welfare implications of different space requirements, including the service area for individually housed adult breeding boars; the impact of stall design and different flooring types; the risk factors associated with tail biting and possible means to reduce the need for tail docking; the latest developments of group-housing systems for pregnant sows and also loose-house systems for sows in the service area and for farrowing sows which meet the needs of the sow without compromising piglet survival.

It should be noted that for weaners and rearing pigs EFSA has already issued a scientific opinion on the impact of different space allowances and flooring types, and so in respect of these two issues the new EFSA opinion should consider other categories of pigs (e.g. sows including farrowing sows, boars, pigs recruited for breeding programmes etc.). The Commission's report to Council will be drawn up also taking into account socio-economic consequences, consumers' attitudes and behaviour, sanitary consequences, environmental effects and different climatic conditions concerning this issue.

TERMS OF REFERENCE AS PROVIDED BY THE EUROPEAN COMMISSION

Mandate 1: Request for a scientific opinion concerning animal health and welfare aspects of different housing and husbandry systems for adult breeding boars, farrowing and pregnant sows

The opinion should consider, inter alia, the following specific issues:

- The effects of stocking density, including the group size and methods of grouping the animals, in different farming systems on the health and welfare of adult breeding boars, farrowing and pregnant sows.
- The animal health and welfare implications of space requirements; including the service area for individually housed adult breeding boars.
- The impact of stall design and different flooring types on the health and welfare of breeding boars, pregnant and farrowing sows with piglets through weaning taking into account different climatic conditions.
- The latest developments of group housing systems for pregnant and farrowing sows with piglets through weaning, taking account both of pathological, zootechnical, physiological and ethological aspects of the various inside/outside -systems and of their health and environmental impact and of different climatic conditions.

³ E.C.O.J. n° L316 of 1/12/2001. p. 1.

⁴ E.C.O.J. n° L340 of 11/12/1991. p. 33.

- The latest developments of loose-house systems for sows in the service area and for farrowing sows with piglets through weaning, which meet the needs of the sow without compromising piglet survival.

Mandate 2: Request for a scientific opinion concerning animal health and welfare aspects of different housing and husbandry systems for farmed fattening pigs

The opinion should consider, inter alia, the following specific issues:

- The effects of stocking density, including the group size and methods of grouping the animals, in different farming systems on the health and welfare.
- The animal health and welfare implications of space requirements.
- The impact of stall design and different flooring types on the health and welfare of fattening pigs taking into account different climatic conditions.

Mandate 3: Request for a scientific opinion concerning the risks associated with pig tail biting and possible means to reduce the need for tail docking considering the different housing and husbandry systems

This report will refer only to mandate 3 as referenced above.

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The scientific co-ordination for this Scientific Report has been undertaken by the EFSA AHAW Panel Scientific Officers Elisa Aiassa, Sara Barbieri and Oriol Ribó.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

- Tail biting is considered as an abnormal behaviour. The need to perform exploration and foraging behaviour is considered to be a major underlying motivation. The occurrence of tail biting has a multi-factorial origin and there is evidence in the report that some causal factors have more weight, such as the absence of straw, the presence of slatted floors and a barren environment.
- Evidence indicates that tail-biting pigs are likely to be frustrated and hence experiencing reduced welfare. Pigs receiving gentle chewing of their tails appear not to be adversely affected by this, but those whose tails have been injured or who are subject to vigorous biting are likely to be in pain and distress. The affective experiences of pigs in pens where tail-biting is occurring but who have not themselves been bitten is unclear.
- Tail biting is associated with a variety of pathological changes ranging from spinal abscesses to pyaemia in different parts of the body. Such changes may be associated with reduced growth rate or in more severe cases, total carcase condemnation.
- While the whole procedure (of being picked up by the farmer and being tail docked) is probably highly aversive to the young piglet (given the strong behavioural and vocal responses it elicits), it seems likely that tail-docking of day-old piglets does not induce a major physiological stress response, although these animals may be capable of showing such a response.
- Pain induced by tail docking seems moderate on a short-term (hours) basis but animals may suffer from pain due to neuroma formation on a long-term (days and weeks) basis.
- It can be concluded that there is little evidence that provision of toys such as chains, chewing sticks and balls can reduce the risk of tail biting.
- Heritability of tail-biting has been evaluated and its value found to be high enough for selection. Moreover, a phenotypic correlation between tail-biting behaviour and higher lean tissue growth rate has been reported.
- There is a consistent suggestion from a range of abattoir-based studies that males may be more at risk of incurring tail-biting damage than females. However, experimental studies looking at the effects of sex composition are not conclusive.
- In general, tail-in-mouth is seen early in life in pigs kept under farming conditions, soon after weaning, and appears to decline as pigs grow older, while tail-biting usually starts to occur later. It is possible that these behaviours are not directly related, they have different time courses and there is a suggestion from one or two studies that tail-in-mouth may be lower in pens where there is tail-biting, and vice versa.
- Although tail-in-mouth behaviour and tail-biting outbreaks show some relationship to pig age, it is difficult to disentangle maturational effects, due to biological and behavioural development, from environmental effects, such as alterations to husbandry and housing, that are associated with different stages of the pig rearing cycle.
- There is no clear evidence that lowering weaning age has a strong effect on the propensity to show tail-in-mouth type behaviours or enhances levels of tail biting.
- Historical studies and field studies as well as industry experience indicate that increased stocking density may lead to a greater risk of tail-biting, but more recent studies are not as clear cut.

- Although no clear and consistent picture emerges from the research conducted so far, anecdotal evidence and industry opinion suggests that mixing may act to trigger tail-biting under commercial conditions.
- Absence of straw is an important hazard for tail biting. However, both the amount of straw (full bedding better than limited provision from a rack) and its form (long straw better than chopped) are also of importance.
- Maintaining pigs in systems on floors without straw bedding is a major hazard for tail biting. In unbedded systems, a higher proportion of slatted flooring is an additional hazard.
- Absence of a particulate, rootable substrate is a significant hazard for tail biting.
- A hazard for tail biting is competition for feed and/or inadequate feed intake.
- There is no convincing evidence for a consistent hazard associated with feed form (e.g. dry, wet, pelleted or meal feed).
- A hazard for tail biting is inadequate dietary sodium (salt).
- A hazard for tail biting is deficiency of dietary essential amino acids.
- There is insufficient evidence that excessive or insufficient level of dietary fibre is a consistent hazard for tail biting.
- There is insufficient evidence that any specific dietary raw material is a hazard for tail biting.
- There is limited evidence that presence or absence of specific feed additives is a hazard for tail biting, although the absence of specific feed additives may become a hazard for tail biting in the case of sub-clinical disease.
- A hazard for tail biting may be a sudden change in diet composition, especially to a lower nutrient density.
- There is limited evidence for a hazard associated with water provision, although impaired quality of drinking water or a cut in water provision can become a hazard for tail biting during summer.
- Circumstantial data, anecdotal reports and practical experience strongly suggest poor health status to be a hazard for tail biting.
- Tail biting risk seems to be increased in autumn season.
- Hazards for tail biting are (1) heat stress, (2) cold stress and (3) high airspeed.
- Despite strong commercial opinion, there is insufficient experimental evidence that poor air quality is a hazard for tail biting.
- The evidence of artificial ventilation being a hazard for tail biting is limited and probably confounded.
- The evidence of the absence of natural light being a hazard for tail biting is limited and probably confounded.
- Under common intensive farming conditions, tail docking reduces the frequency of tail biting, but does not completely eliminate the problem when unfavourable conditions persist.
- The efficacy of tail docking to reduce the frequency of tail biting is very difficult to estimate since it depends on the level of tail biting in control undocked pigs. Indeed, tail docking is all the more efficient in current intensive housing systems for pigs since environmental and possibly also genetic hazards for tail biting are prevalent.

- The existence of tail lesions is probably a stimulating factor for further biting.
- With few hard experimental data available on therapeutic effects of treatments in case of tail biting cases, at present the most rational intervention appears to be to counteract known risk factors as much as possible, including the removal of biters and victims and hygienic measures to limit secondary infections where necessary. It is evident that good stockmanship, given adequate working time and not too high pig:stockperson ratio, is essential to detect and address the presence of risk factors and to act before severe outbreaks become established.

CONCLUSIONS FROM THE RISK ASSESSMENT

Due to the limited amount of quantitative data related to effects of potential hazards on pig welfare, the risk assessment was mainly based on expert opinion. The methodology used does not give a precise estimate of the risk attributed to certain hazards; however the output can be used to designate areas of concern, as well as, guidance for future research.

At present, most of the pigs in Europe belong to the docked population. Therefore, more information is available from this population compared with the undocked. On the undocked population, the RA was mainly focused on being tail bitten because there are no available quantitative data on the prevalence of being a tail biter.

It should be noted that because we are dealing with a single 'outcome' (i.e. being tail bitten) the RA calculations are most heavily influenced by the exposure assessment. Therefore, hazards that have a high prevalence in the EU population come out as high risk factors in the RA.

According to the results of the RA and the graphs in the Annex, the following potential hazards show the major risks:

Docked Population:

- Lack of straw and absence of adequate enrichment. No particulate rooting substrate, no destructible toy,
- Lack of long straw,
- Lack of straws and 100% slatted floor;

Undocked population:

- Lack of long straw,
 - Castration in males,
 - Absence of bedding having previously had bedding since weaning,
 - Genotype with high lean tissue growth rate (low fatness),
 - Presence (no removal) of tail bitten and tail biting animals.
- Within the current pig population (docked and undocked), the largest risk for being tail bitten is the lack of appropriate enrichment. This is a compound risk where many factors (material properties) are often involved for example lack of adequate substrate (particle rooted substrate or destructible toy) and fully slatted floor.
 - Stocking density, associated with lack of enrichment and fully slatted floors, is a significant risk for tail biting.
 - A high lean tissue growth, influenced by genetic selection which is commonly practised in Europe, was indicated in the Risk Assessment as a major risk factor to being tail bitten.

- High prevalence of endemic and occasional epidemic diseases makes poor health status a high risk factor for tail biting.
- Competition for feed is the most prevalent and therefore constitutes one of the major risks for tail biting.
- The acute aspects of welfare risks from tail docking may seem to be less than the welfare risks from tail biting related to the factors discussed above. However the balance between the welfare effects of tail biting and tail docking heavily depends on the tentative assumption discussed above, i.e. of linearity of the intensity score (see chapter 9 of the Scientific Report). It also depends on the extent (severity and duration) of chronic pain arising from tail docking and other aspects of uncertainty inherent in this qualitative risk assessment.
- The prevalence of undocked pigs in the EU is currently very low (5-10 %). The systems in which undocked pigs are kept are not equivalent to the systems of the wider population (of docked pigs) in the EU since undocked pigs generally live in systems where hazards for tail biting are less prevalent (e.g. more often having access to enrichment materials such as straw and additional space).
- The risks of tail biting for a given hazard are higher in the population of undocked pigs than in docked pigs.
- The highest risks for poor welfare from tail biting in both populations encompass the same hazards.
- Lack of adequate enrichment is a higher risk for poor welfare from tail biting in the docked pig population than in the undocked pig population because of the large difference in the exposure to this circumstance.

RECOMMENDATIONS

- Accurate data on the entire range of deleterious effects on pig health associated with tail biting should be collated.
- It is important to monitor the pigs closely at times of life when husbandry is changing in order to possibly prevent tail-biting outbreaks.
- Those housing and management procedures that are found to prevent tail biting should be applied and if tail biting occurs, such management interventions that prevent an escalation of the problem and the negative consequences of poor welfare in victim pigs should be applied. The importance of good stockmanship is emphasized.
- Since tail-biting can cause very poor welfare and tail-docking is likely to be painful, both in the short term and as a result of possible long-term pain from neuroma formation, measures other than tail-docking should be implemented to control tail-biting and its adverse effects for welfare.
- To minimise the risk of tail-biting, it is recommended to address the following major risk factors: (i) provision of straw, preferably as bedding, and (ii) proportion of slatted floors in housing systems for fattening pigs. Due to the severe adverse effects for pigs of tail biting inducing poor welfare, when tail biting incidence increases in a farm, other factors which have also effect on the likelihood of tail biting (e.g. air speed, health status, high temperatures) should be considered.
- Monitoring at slaughter of lesions related to tail biting is suggested as a mean to identify herds with such problems as guidance for the implementation of preventive actions.

- The methodology and the results (Conclusions and Recommendations) of this opinion as well as the previous opinions on Pig Welfare, should be further analysed identifying welfare indicators (in particular animal-based) suitable for the development of an animal welfare monitoring system.

RECOMMENDATIONS FOR FUTURE RESEARCH

- In order to be able to assess properly the severity of docking tails in pigs research is needed that addresses the severity and duration of chronic pain.
- Objective assessment of the prevalence and extent of chronic pain resulting from tail docking should be investigated.
- There is a need for more quantitative data on the difference in prevalence of tail biting between populations of docked and undocked pigs in the different housing systems prevalent in the EU.
- There is a need to understand the fundamental mechanistic level of what causes an individual pig to bite tails.
- Developing a (ethically acceptable) model that generates tail-biting with a known probability, to allow study of influential factors.
- More knowledge is required to fully understand the role of the selection for fatter animals as means to reduce tail biting.
- Differences in susceptibility to being tail bitten between castrated and entire males should be further investigated.
- The deleterious effects of poor health in pigs on tail biting should be studied.
- Further research is required to elucidate the causes of the apparent higher levels of tail damage in males and to provide more information on whether there are any sex differences in performance of tail-biting behaviour.
- Experiments to disentangle the effect of age and the environment need to be done, because it remains a possibility that environmental factors are as important in determining the occurrence of tail-biting as age-related maturational or developmental processes per se.
- Studies should be carried out regarding long-term effects of early weaning on tail-in-mouth and tail-biting, especially for non-docked pigs.
- Studies on the effect of increasing group size on tail biting are recommended.
- Further studies of the effects of mixing, particularly on commercial farms are recommended.
- Research is needed to determine effective and feasible enrichment strategies which can be used to reduce tail biting risk in prevalent (part/fully slatted) housing and without compromising slurry management.
- Effective substitutes for straw, allowing appropriate foraging and exploration, should be investigated.
- Further research is required on the role of dietary fiber on tail biting risk.
- An objective assessment of the effect of tail docking on tail biting under different housing and management systems is recommended.
- The cues involved in the stimulating effect of the presence of tail lesions are not known and require new research to be elucidated.

- The inclusion of known risk factors as described in this report and elsewhere into the methodology sections of research studies on tail biting is recommended.
- A detailed checklist, or more sophisticated computer-based decision support system (such as a Bayesian network or relational database), should be developed further for use in counselling in case of tail biting outbreaks/problems on farms.
- As an adequate management would benefit from improved early detection of tail biting outbreaks, research on the better understanding of the causal factors leading to tail biting and tools for detecting causal factors on farms should be encouraged.