

## **Documentation of animal health in organic pig herds: A case study**

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### **Abstract**

The health of weaned pigs should be described using several information sources to get an overall assessment of the health state in the herd. In this case study four organic pig herds each fattening between 800 and 3500 pigs per year provided data from clinical examination of a sample of animals, pathological findings at slaughter, post weaning mortality and medicine usage in the herd. Clinical symptoms were present in 8 – 18 % of the pigs, and 2 – 6 % of the pigs showed more serious symptoms of disease. At slaughter 10 – 17 % of the pigs got remarks for pathological lesions, primarily liver spots, abscesses and chronic pericarditis. The post weaning mortality varied between herds, while the usage of medicine was rather low in the herds. The herd health status can be aggregated in many ways. A suggestion is made for the four herds. According to this the good health state is achieved in herds combining a modest medicine usage with a low level of disease, measured by low prevalence of clinical symptoms, low number of remarks at slaughter and low mortality.

### **Introduction**

Organic pig production is a small-scale production compared to organic milk production and knowledge on animal health and welfare in existing systems is scarce. Due to high production costs the economic viability of organic pig production is depending on the producers obtaining a high payment compared to conventionally produced pork. Further, good animal health is a prerequisite for a satisfactory economy in organic pig production.

Organic pig production differs from the conventional production in e.g. feeding, access to outdoor areas, weaning age and use of preventive medication, and the animals benefit from a low animal density, and good possibilities for expressing normal behaviour such as locomotion, foraging, exploration and nest building. Therefore it is likely that the occurrence of health and welfare problems may be different in organic herds compared to conventional production systems.

Endoparasites must be considered one of the major constraints for welfare as well as economy in organic swine production (Nansen & Roepstorff, 1999). Two Danish survey studies have both shown high prevalences of helminth infestations in organic outdoor pig production (Roepstorff et al., 1992; Carstensen et al., 2002). Also, Leeb and Baumgartner (2000) reported that endo- and ectoparasites was the main problem, while Vermeer et al. (2000) found that endoparasites as well as post weaning problems were health problems of concern.

In a case study on four organic farms, Vaarst et al. (2000) concluded that lameness was a common clinical finding in sows, and respiratory diseases and parasites were problems in some fattening pig herds. Hansson et al. (1999) found significantly less chronic pleuritis and more leg problems in organic pigs than in non-organic pigs.

Roderick and Hovi (1999) found a low level of diseases in organic pig production in a postal questionnaire. Parasites were seen as the biggest problem, whereas diarrhoea and respiratory diseases were seen as minor problems.

Health and welfare problems in organic sow herds also have been the focus of a questionnaire study by Bonde & Sørensen (2003). Veterinarians and production advisers with experience in organic pig production reported that poor body condition and reproduction problems were frequently occurring in the sows. Crushing or trauma inflicted by the dam often caused injuries to suckling piglets, whereas insufficient supervision, care and disease treatment, disturbances and trauma from predators, and unsuccessful nursing were perceived as other causes of welfare problems. Diarrhoea was perceived as a major health problem in weaned pigs.

It is necessary to use several information sources to get an overall picture of the health state in a pig herd (Baadsgaard, 2001). A description of the health state should contain information on clinical health, mortality, pathological findings at slaughter and medicine usage in the herd.

Clinical examinations cannot reveal all diseases in the pigs. The examination provides an instantaneous assessment of any acute and chronic clinical disorders present in the herd. Additionally, the extent of disease and the effect on the general condition may be assessed through a clinical examination. However, pigs may have substantial pathological lesions in joints or lung tissue not visible clinically. Therefore, the clinical examination has to be combined with data from the pathological examination at slaughter.

The meat control data may be biased by large variation in recording intensity between different abattoirs (Willeberg et al, 1997). The abattoir records acute and chronic lesions present at the time of slaughter as a matter of standard procedure, whereas healed lesions from earlier infections of course wont be recorded. Further, the clinical effect of the pathological lesions is not recognised. The extent of pathological lesions at time of slaughter depends on the course of the disease in the individual animal. Time of disease onset and changes in disease character from acute to chronic or healing processes have great influence on the findings at the abattoir.

Mortality data are relevant to include in an assessment of herd health state. Some diseases manifest themselves as sudden deaths without former clinical symptoms, and their prevalence cannot be assessed based on clinical examination or medicine usage. Further, euthanasia of chronically disabled animals depend of management in the individual herd, thus the mortality has to be related to the prevalence of animals with chronic diseases within the herd.

The on-farm medicine usage per se is not a valid measure for the herd health state as the threshold for medical therapy varies between herds (Baadsgaard, 2004). However, it provides valuable information on the health state if combined with systematic clinical examinations in the herd. A good health state would generally be characterized by a low prevalence of clinical or pathological symptoms and a modest medicine usage in the herd.

An analysis of the health state in organic pig production is needed. The purpose of this paper is to carry out a preliminary description of the health state in organic fattening pigs based on four cases. This preliminary investigation will be followed up by a comparative study of animal health in organic and conventional herds of fattening pigs.

## Materials and methods

Data were collected in four organic pig herds, which are described as regards herd size, production system and health management in Table 1.

The four herds were visited three times in July, October and December 2003. During these visits systematic clinical examinations of all weaned pigs present in the herds were carried out. The clinical protocol included body condition of the pig, skin lesions, lameness, CNS symptoms, gastro-intestinal as well as respiratory problems. All pigs were examined visually in the pens and clinical symptoms were recorded at pig level. The total number of pigs in the

age groups from weaning until 30 kg live weight and heavier than 30 kg was recorded, respectively. The herd prevalence of clinical disease has been calculated based on this.

Table 1. System description for the 4 case herds

Herd	1	2	3	4
Herd size	80 sows reduced to 60 sows in the period.	200 sows	80 sows	110 sows
Produced slaughter pigs per year	800 pigs – the rest is sold	3500 pigs	1450 pigs	1300 pigs
Declared health state	Mycopl +	PRRS+ Mycopl +, AP+	Mycopl + AP 2+6	Not declared
Vaccination after weaning	No	Mycopl and AP at wean. + 3 weeks after wean	No	Mycopl at wean. Coli-serum at weaning
Production system weaned pigs	Deep litter pens (25 pigs) with outdoor run	Deep litter pens (50 pigs) with partly covered outdoor run	Pens with deep litter and slatted floor (80-90 pigs).	Pasture with huts (100 pigs)

The medicine usage in the herds has been estimated from data reported to the Danish central database Vetstat by veterinarians and pharmacies. We have focused on the amount of antibiotics and chemotherapeutics prescribed to the herds in 2003, while other drugs such as vaccines or anthelmintics were excluded from this analysis. The corresponding number of therapeutic doses has been calculated, i.e. the kg pig that could be treated with the amount of medicine prescribed when following the standard dosage recommended by Vetstat. The medicine usage is subsequently related to the herd size, which have been estimated as the average number of weaned pigs (until 30 kg) and fattening pigs (heavier than 30 kg) present in each of the four herds at the three visits.

Pathological findings on slaughtered animals have been assessed through the abattoir statements to the four farmers including all fattening pigs supplied to the abattoir in the period February 12th – December

31st 2003 for herd 1 (731 pigs), July 4th – December 31<sup>st</sup> for herd 2 (1500 pigs) and January 1st – December 31st for herd 3 (1289 pigs) and herd 4 (785 pigs), respectively.

Herd 1, 2 and 3 have recorded the number of dead and euthanised pigs in a 19-week period in August to December 2003. The farmers were asked to categorise the dead pigs into three weight groups:

1. Weaning - 30 kg
2. 30-50 kg
3. Heavier than 50 kg

In herd 4 the number of dead pigs (heavier than 30 kg) has been estimated through the bills received from the incinerating plant for collecting individual carcasses on-farm in a 22-week period August – December 2003. It was not possible to estimate the number of dead pigs lighter than 30 kg in this herd.

The mortality of weaned pigs (until 30 kg) and fattening pigs (heavier than 30 kg) is calculated as the number of dead pigs in the weight group related to the number of produced pigs in the period:

- Mortality < 30 kg: Dead animals lighter than 30 kg / (30 kg pigs sold (herd 1) + dead pigs heavier than 30 kg + slaughtered pigs)
- Mortality > 30 kg: Dead animals heavier than 30 kg / slaughtered pigs

## Results

The total number of pigs examined clinically during three visits per herd was 584, 3016, 1516 and 1416 pigs in herd 1-4, respectively.

The examination showed that 8-18 % of the pigs in the four herds were displaying clinical symptoms as illustrated in Figure 1. 2-6 % of the pigs had more serious clinical symptoms defined as poor body condition and/or affected general condition combined with other clinical symptoms or alternatively the presence of extensive clinical symptoms even if not (yet) affecting the condition of the animal. The serious clinical symptoms normally should elicit some sort of action from the farmer such as medical intervention, isolation of the pig or euthanasia owing to incurable disease.

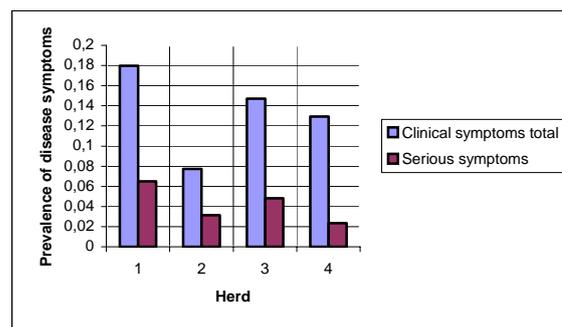


Fig. 1. Disease prevalence based on pooled results from 3 visits in 4 organic pig herds with clinical examination of pigs. The total prevalence of all clinical symptoms as well as serious symptoms is presented.

The prevalence of clinical findings classified according to main symptom is illustrated in Figure 2. The symptoms include poor body condition (thin pigs), affected general condition (depressed), skin lesions, lameness, diarrhoea and respiratory symptoms such as sneezing, coughing or dyspnoea. None of the disease symptoms occurred in more than 10 % of the pigs but the variation between herds was pronounced. The total disease prevalence was higher in herd 1, especially as regards thin or depressed pigs or pigs with diarrhoea. Skin lesions were more common in herd 3, caused by problems with ear lesions in one of the visits, while symptoms of lameness and respiratory symptoms occurred in all herds.

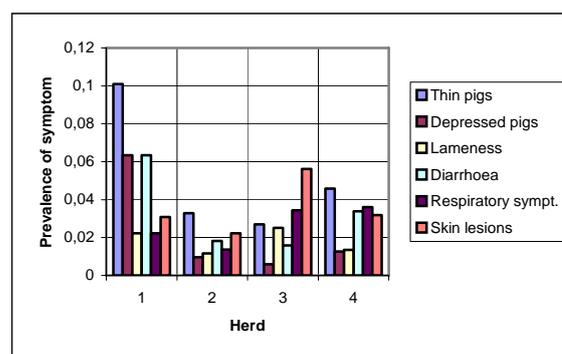


Fig. 2. Clinical symptoms based on pooled results from 3 visits in 4 organic pig herds with clinical examination of pigs. The symptoms are classified into poor body condition (thin pigs), affected general condition (depressed), lameness, diarrhoea, respiratory symptoms and skin lesions.

The prevalence of disease symptoms for each visit is illustrated in Figure 3, for weaned pigs (<30 kg) and fattening pigs (>30 kg), respectively. The variation in disease prevalence between visits was pronounced,

especially for weaned pigs in herd 1 and 3. Generally, the disease prevalence was higher for weaned pigs than fattening pigs. It should be noted that only one weaned pig (< 30 kg) was present in herd 1 at the visit in October.

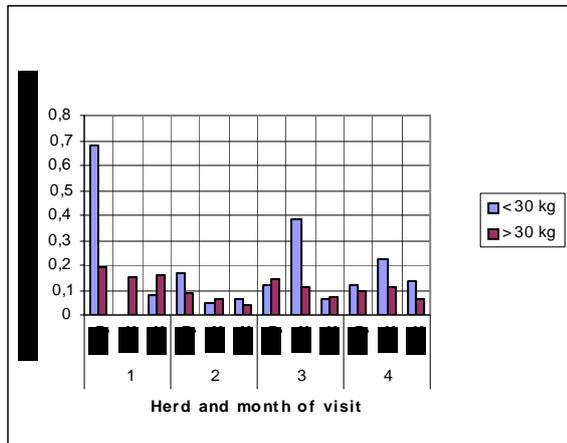


Fig. 3. The total prevalence of clinical symptoms at 3 visits in 4 organic pig herds, grouped for weaned pigs (< 30 kg) and fattening pigs (> 30 kg), respectively.

The ordination of antibiotics and chemotherapeutics in 2003 ranged from 5000 therapeutic doses (medicine for treatment of 1 kg pig) in herd 4 to 150000 doses in herd 2. The medicine usage in relation to herd size is illustrated in Figure 4. Herd 4 used a very small amount of medicine, predominantly to sows and suckling piglets. Herd 1, 2 and 3 treated 0,7- 0,9 kg fattening pig per pig in the herd per day. Additionally, herd 1 treated 0,8 kg weaned pig per pig in the herd per day.

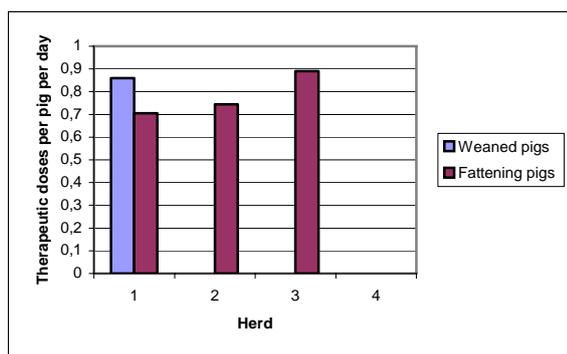


Fig. 4. Therapeutic doses of antibiotics and chemotherapeutics prescribed per pig per day in 4 organic pig herds in 2003. The medicine usage is grouped into weaned pigs and fattening pigs. Therapeutic doses correspond to kg animal treated with the standard dosage of the drug. The number of pigs is estimated as average herd size for 3 visits in each herd.

Pathological lesions at time of slaughter were observed in 10 – 17 % of the pigs slaughtered in 2003 from the four herds as illustrated in Figure 5. Skin lesions such as hernia, scars, abscesses, eczema, old fractures and tail wounds were the most frequent pathological diagnoses occurring in 4 – 8 % of the animals, liver spots were recorded in 3 – 8 % of the pigs while chronic arthritis was observed in less than 1 % of the pigs. Respiratory diseases, either chronic pneumonia or chronic pericarditis were recorded in 2 – 8 % of the pigs. Herd 2 did supply more pigs with chronic pneumonia than the other herds (4 % of the pigs compared to less than 1,5 %). No pigs from any of the four herds got a remark for chronic pleuritis.

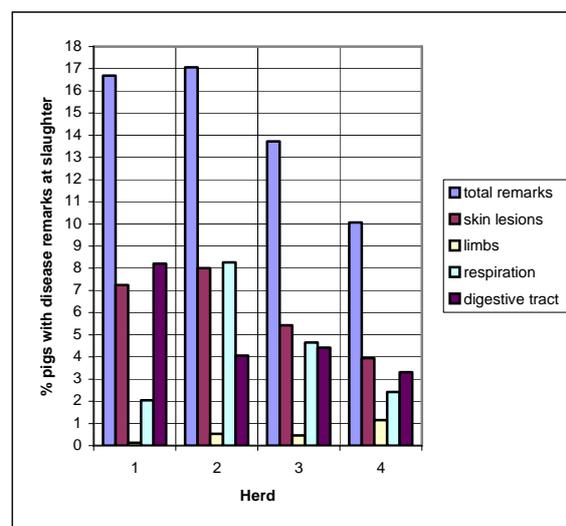


Fig. 5. Pathological findings at slaughter assessed from the abattoir statements to 4 organic pig herds in 2003. The total occurrence of remarks as well as remarks grouped into skin lesions (hernia, scars, abscesses, eczema, old fractures and tail wounds), limbs (chronic arthritis), respiration (chronic pleuritis, pericarditis and pneumonia) and digestive tract (liver spots, chronic peritonitis and enteritis).

A specification of the observed skin lesions shown in Figure 6 emphasizes the abscess as the main skin disorder encountered at slaughter, ranging from 1,4 % of the pigs in herd 4 to 4,3 % in herd 2. The primary locations of abscesses were neck and chest (35 % of the abscesses) and hindquarters (32 % of the abscesses). Old fractures were observed in 0,8 % of the pigs in all four herds, while tail wounds appeared in 0,1- 0,5 % of the animals.

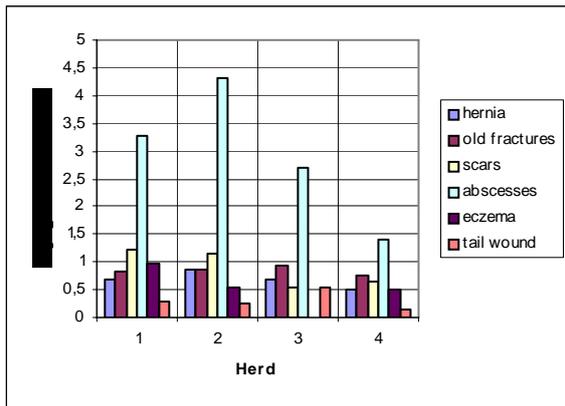


Fig. 6. Pathological findings at slaughter assessed from the abattoir statements to 4 organic pig herds in 2003. The prevalence of hernia, scars, abscesses, eczema, old fractures and tail wounds.

The mortality of weaned pigs and fattening pigs in the four herds is illustrated in Figure 7, showing variation in the mortality between herds. Herd 1 experienced a high mortality in fattening pigs, while herd 3 lost most pigs at an early stage after weaning. Herd 4 did not record the mortality among weaned piglets. The mortality of fattening pigs in herd 4 was low compared to the other herds, but the difference in recording method may lead to an underestimation of mortality in herd 4. A certain caution must therefore be exercised when comparing the mortality in herd 4 with herd 1-3.

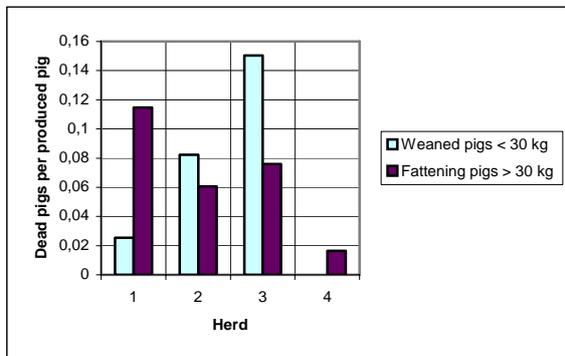


Fig. 7. Post weaning mortality in 4 organic pig herds in August - December 2003. The mortality is reported separately for weaned pigs and fattening pigs. Herd 4 used another recording strategy of dead pigs and did not record death of weaned pigs.

## Discussion

We had expected lameness to be a problem in organic pig herds but only 1 – 2,5 % of the pigs from the four case herds were visibly lame in the clinical

examination and chronic arthritis were observed in less than 1 % of the pigs at slaughter.

In 2003 an investigation of the prevalence of clinical diseases in fattening pigs was carried out in 100 herds (Landsudvalget, 2003). The most frequent diagnosis was ear wounds observed in 4,26% of the pigs. Coughing was recorded in 2.14 %, and lameness in 2,05% of the pigs. Thus, the results from the four organic herds in the present study do not indicate any substantial differences in clinical health between organic and conventional pig herds.

It is remarkable that no pigs at all were diagnosed with chronic pleuritis at slaughter, whereas a number of pigs got remarks for chronic pericarditis. It is likely that some of these pigs have suffered from chronic pleuritis as well.

This study estimates the medicine usage at herd level applying one out of several possible methods. We have chosen therapeutic dose per pig in the herd per day to relate the medicine consumption to herd size as well as observation period. Other accounts may report the number of standard pigs treated or the medicine usage per produced slaughter pig. The lack of a common calculation method makes it impossible to compare the medicine usage in the present study to current reports of the medicine usage in alternative production systems.

We have stressed the importance of including several information sources in the evaluation of herd health as an alternative to focusing solely on e.g. abattoir remarks recorded routinely at the veterinary meat control at slaughter.

For some purposes it would be informative to aggregate the information to get an overall documentation of animal health in the individual herd in a simple form. A way to do this is suggested in Table 2. This requires the definition of benchmarks for good and poor health described by the different measures such as clinical examination, medicine usage, pathology at slaughter and mortality, respectively. As an example the clinical health might be defined as good if the prevalence of serious clinical symptoms is below 3 % and likewise health at slaughter might be good if total remarks are less than 10 %. Further a mortality of less than 3 % might indicate good health and medicine usage below 1 kg therapeutic dose per pig per day also could indicate good health.

Table 2. Suggestion for an aggregated health state description illustrated by 4 organic pig herds. As a preliminary guideline the healthy herd is defined as having low prevalence of clinical symptoms (< 3%), low medicine usage (< 1 kg dose per pig per day), low number of remarks at slaughter (< 10% of the pigs) and low mortality (< 3%).

	Herd 1	Herd 2	Herd 3	Herd 4
Clinical symptoms	High	Low	High	Low
Medicine usage	Low	Low	Low	Low
Abattoir observations	High	High	High	Low
Mortality N "High"	High 3	High 2	High 3	Low 0

Overall, the evaluation ranks herd 4 as having the best herd health in this investigation, followed by herd 2, herd 1 and herd 3. Herd 4 kept the fattening pigs on pasture, while herd 3 was granted an exemption from the rule requiring outdoor area for weaned pigs. Further the high group size and continuous management system may constitute possible risk factors for the health problems observed in this herd.

The clinical examination provides an instantaneous view of the herd health. However, some clinical symptoms may be difficult to notice at a visual examination of groups of pigs. Respiratory diseases are difficult to diagnose based solely on a clinical examination, and it is also difficult to estimate the exact number of pigs having diarrhoea. Compared to this poor body condition and lameness are easier to assess.

The amount of veterinary medicine used in the herd is an important part of the characterisation of herd health. The effect of veterinary treatment will be reflected in a reduced mortality, or reduced prevalence of clinical disease and remarks at slaughter. A healthy herd is characterised by simultaneously having low medicine usage, low disease prevalence and low mortality. Herds with high medicine usage and low disease prevalence and mortality are successfully controlling diseases by means of medicine. High medicine usage combined with high disease prevalence and mortality indicates no treatment effect of the medicine used to treat disease problems, and the combination of low medicine usage and high disease prevalence and mortality is characteristic of a herd experiencing health problems without even attempting to treat the problem.

## Acknowledgement

This study received financial support from Fonden for Økologisk Landbrug.

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