CLINICAL SALMONELLOSIS IN A FINISHING HERD, A CASE REPORT

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Abstract In a finishing herd of 1020 head clinical salmonellosis was a problem in market age pigs during 2002. During two years, intervention and prevention was done using organic acids through drinking water and feed. Progress of the *Salmonella*-status was monitored by detecting antibodies against *Salmonella*. From this case it can be concluded that clinical salmonellosis disappeared and dead loss decreased rapidly after application of the acids. The mean OD% dropped strongly from 40 to below 10. The herd never became entirely *Salmonella*-free, defined as no samples with OD%>10. The sickbay was a problem location because it was not operated on an all-in/all-out basis. Infection levels differed strongly between stables and compartments. The outbreak in the third quarter of 2002 cost on average 4.60 per pig delivered to the abattoir in that period. The majority of the costs of clinical salmonellosis are due to a reduction of technical results.

Introduction Sub-clinical *Salmonella* infections are common in swine in The Netherlands. Clinical salmonellosis however is rare. In the herd in this study watery yellowish diarrhea was seen in pigs at market age, followed by death in about 2% of the pigs. Regular antibiotic therapy, on an individual and group level, was necessary to control the situation. Organic acids were used additionally on an ad hoc basis. In December 2002 it was decided that organic acids should be used continuously with the aim to reach a definite solution to this problem. The aim of this study was to see how effectively *Salmonella* could be controlled.

Materials and Methods The farm consisted of one barn with 10 compartments of which compartment 2 through 9 contained 60 pigs each operated at an all-in/all-out basis. Compartment one is the sickbay which is not operated on an all-in/all-out basis. Pigs were bought from one supplier at about 25 kg LW. Cross bred Pietrain finishers were raised until the end of 2002 after which the "body"-cross was used. Delivery to market was at about 115 kg LW. In September 2002 a second new barn was filled, consisting of four compartments with 120 pigs each. The second barn was connected to the first by the central hallway. All compartments were artificially ventilated separately. Floors were half slatted, half convex closed floor in all compartments. Each pen contained 10 pigs and one wet-feeder (Stalko). Compound feed was fed to all pigs. Mixtures of organic acids for drinking water were Selko pH 0.2% continuously from start to finish and for feed Selacid-balance 4 kg per 1000 kg of feed in all feeds. Blood samples were collected at regular intervals where samples were taken from all compartments with pigs to a total of 40 samples. Sera were tested for antibodies against *Salmonella* using the IDEXX-*Salmonella* Elisa. The herd owner uses a management program called Vlevis (Siva software B.V.) to collect and store performance data of his herd. The manufacturer of this program also provides reference values by collecting data from many herds that use this program. Financial and technical results can be compared to these reference values.

Stalko wet-feeder

Results Chronologically the following events came to pass:

Sep 2002	New stable is used
End of 2002	New type of finisher is introduced: change from Pietrain to "Body".
Dec 12 2002	Herd visit by practitioner, representatives of Selko, AHS and feed manufacturer.
Jul 7 2003	Faecal samples: compartment 13 is positive
Aug/Sep 2003	High ambient temperatures, many flies, dirty pens.
Nov/Dec 2003	Coating applied on floors in the new stable.

Mar 18 2004	Selacid balance replaced by Selacid green growth dry (containing Medium Chain Fatty Acids)
May-Jul 2004	Six or seven compartments were not cleaned and disinfected because the high pressure cleaner broke down.
Jul 3 2004	Growers from a different supplier were bought to fill empty compartments 9 and 10. Five out of eight tested growers were sero-positive for *Salmonella* of which four above OD%>40.
Aug 18 2004	Selacid balance was reintroduced into the feed.
3rd Q 2004	Meningitis as a result of *Streptococcus suis* infection resulting in deaths.
Nov 15 2004	Changed to a in-house mixture of organic acids from the feed manufacturer.
Feb 22 2005	End of trial.

In figure 1 the serological results are presented. January 16th 2003 is the baseline sampling before structured intervention. Samplings were not evenly spaced in time. For each sampling there are three bars representing percentages of samples (N=40): first bar is the samples with OD% below 10, second bar is samples with OD% between 10 and 40 and the third bar is samples with OD% above 40. The line is the mean OD-value. The result of the sampling at February 7th 2005 is strongly influenced by the positive samples from compartment 8. Four out of a total of six samples with an OD%>40 come from this compartment and had a mean OD% of 109. Compartment 8 is next to compartments 9 and 10 in which the positive growers were introduced.

In figure 2 the financial results are displayed per quarter in Euros in comparison to the reference values for each period. Overall, figure 2 shows that the herd financially performs above average. The third quarter of 2002 however was below average because of the salmonellosis outbreak. The difference between the average of the second and fourth quarter (2,27) and the third quarter (-2.33) is 4.60 per finished pig. For approximately 450 marketed pigs in the third quarter this means a loss of over 2000—as a result of dead pigs, higher feed conversion and a lower percentage lean meat. This does not include the costs for medical treatment.

Discussion From the serological monitoring as presented in figure 1 it can be conclude that application of the acids in drinking water and feed were quite successful in reducing the *Salmonella* prevalence effectively. Clinical signs disappeared quickly soon after application of the acids. However, there was no single sampling occasion when there were no samples with an OD%>40. This means that *Salmonella* was always present in some animals. This was due to several factors such as the sickbay which was highly infected at most occasions (data not shown). Furthermore there were periods with high temperatures and many flies and where no cleaning and infection was done due to broken machinery. Finally growers from an infected source were brought into the herd (July 2004) resulting in an increase in the infection. This leads to the observation that acids can not prevent infection if these violations of hygiene standards are not corrected or prevented.

The financial loss of 4.60 is the gross amount compared to the mean of the previous and following quarter. This amount might contain losses as a result of other reasons. However, the previous and following quarter are also relatively low compared to other quarters which might under estimate the 4.60. One can argue that salmonellosis must have been present already in the

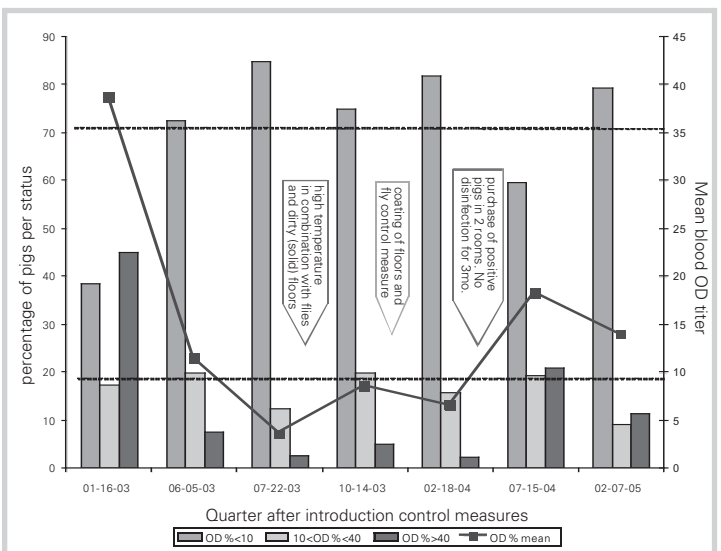

Figure 1. Results of the serological monitoring.

second quarter and was not eradicated in the fourth quarter. If the first quarter of 2002 is incorporated in the equation (6.47 above average, which is exceptionally good), then the loss increases to 6.00 per pig soled in the third quarter. Furthermore, costs for medications and extra labor are not incorporated in this amount. Real costs were therefore most likely higher then 4,60. This amount should however be used with caution because many factors that were not included in this evaluation determine a financial result. Medical treatment of groups of pigs usually cost less than 0,50 per pig which leads to the conclusion that the majority of costs from a salmonellosis outbreak are due to a reduction of technical results like daily gain, feed conversion (feed/gain), dead loss and lean meat.

Conclusions

1. Application of acids has a direct effect on the appearance of clinical salmonellosis and results in a strong reduction of the number of serologically positive pigs and the mean OD%-value in subsequent batches of pigs (figure 1).
2. Despite the strong reduction in the number of positive pigs, the Salmonella-free status is not reached (all samples OD%<10).
3. The sickbay turns out to be a critical point of continuous infection and re-infection, probably because it is operated on a continuous basis and is therefore never cleaned and disinfected.
4. This case study shows that application of acids is a powerful tool to reduce Salmonella but that it will not lead to a Salmonella-free status if high hygiene standards are not meet as well.
5. Infection levels between compartments can differ considerably, from not at all infected to majority serological positive (data not shown).
6. The relative financial loss as a result of the outbreak of salmonellosis is estimated at 4.60, which is probably an under estimation. This amount should however be used with caution because many factors that were not included in this evaluation determine a financial result.
7. The majority of financial losses due to an outbreak of salmonellosis are due to a reduction in technical results like daily gain, feed conversion, dead loss and lean meat.

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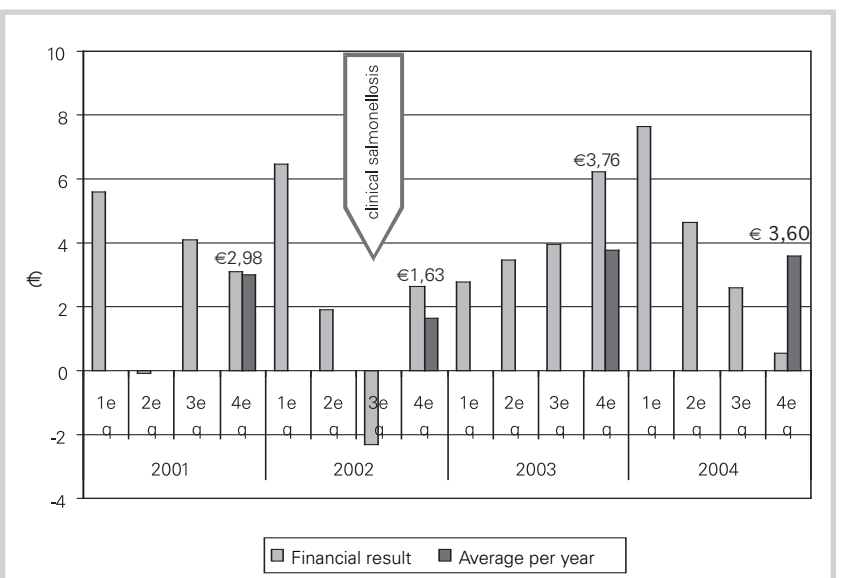

Figure 2. Relative financial results per quarter for the years 2001 – 2004 (light bars) and average per year (dark bars).