A meta-analysis on field experiences with vaccination against ileitis showing a reduction on antibiotics use.

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Abstract
Nowadays the meat industry and its customers demand for a reduction in antibiotic use in animals. They ask for further efforts from the production level to reduce the risk of antibiotics resistance. In that matter the EU commission since 2007 has presented its guideline named “prevention is better than cure”; Japan defined new standards for export trade regulations; Carrefour developed special codes of production. Following this requirement of reduction of antibiotic use, pig production should stay technically and economically attractive. The following survey analyses the differences between farms in which oral vaccination against ileitis was introduced and corollary the antibiotic regime reduced (group A), in comparison with farms that implemented vaccination against ileitis without a subsequent change in the antibiotic protocol (group B). The database comprises 64 farms in 9 European countries (from mid-2005 to mid-2007) and their production parameters as average daily gain (ADG), feed conversion ratio (FCR), mortality rate and antibiotics usage. It represents 330,756 pigs. All farms are positive for ileitis and used Enterisol® Ileitis as a control tool. On average 40 farms (group A) achieved a cost reduction for antibiotics treatment of € 1.49 per pig. 24 farms did not change their antibiotic protocol (group B). Farms in group A achieve performance improvements on ADG, FCR and mortality rate of +33 g/day, -0.08 kg/kg and -1.29 % respectively. Group B achieved improvements on ADG, FCR and mortality rate of +37 g/day, -0.07 kg/kg, and -2.24 %, respectively. Financially, the gross margin per pig is identical within both groups of farms: + € 4.30 (group A), + € 4 43 (group B). Oral vaccination is a technical and economic attractive alternative to reduce antibiotics usage in ileitis infected herds. It allows new opportunity to produce pig meat in line with consumer demand.

Introduction
Nowadays the scientists, the meat industry and the consumers demand a reduction of antibiotic use in animal production: In 2007 the EU commission has presented its guideline named “prevention is better than cure”; The Dutch government asks for further efforts from the production level to reduce the risk of antibiotics resistance by reduction of antibiotic consumption within its MARAN report, 2007; The French department store group Carrefour as well developed similar codes of production. Despite these requests for reduction of antibiotic use, pig production needs to stay technically and economically attractive. In this paper it is demonstrated, how the change from cure to prophylaxis against a ubiquitous and infectious disease with strong economical impact can address these needs. The proactive tool of vaccination for the control of Ileitis was presented by Scholz.

The following survey analyses the differences between production herds in which oral vaccination against ileitis was introduced and corollary the antibiotic regime reduced, in comparison with farms that implemented vaccination against ileitis without a subsequent change in the antibiotic protocol. This paper describes the methods of data collection, selection criteria and methods of analysis, presents the findings and discusses their relevance to pig production.
Materials and Methods
From mid-2005 to mid-2007 64 herds in 9 European countries were able to return complete data. Representing 330,756 pigs, these herds were able to give reliable information on their antibiotic usage. The findings were collected either at a batch level (a group of pigs followed from weaning to slaughter) or over a defined period (weekly, monthly or quarterly average based on inventory). The design of the studies is therefore dual: herds with side-by-side trials protocols and herds with longitudinal field data. In the latter case the statistical process control methodology was used (SPC). SPC is well described by Wheeler. This monitoring method standardises field data evaluation and detects changes in performance using before-and-after comparison. SPC is a recognised statistical tool used to monitor and evaluate continuous processes in an existing situation, and is well established in pig production.
The database comprises production parameters as average daily gain (ADG), feed conversion ratio (FCR), mortality rate and antibiotics usage. All farms are positive for Lawsonia intracellularis infection and used the vaccine Enterisol® ileitis as a control tool. A gross margin was calculated for each herd. The gross margin is the average carcass value minus the cost for piglets, feed and mortality within a group. The cost factors varied with changes in the group means for the technical parameters, ADG, mortality and FCR. Reduction of the cost for antibiotics was taken into account.
2 groups of herds can be described: herds in which oral vaccination against ileitis was introduced and corollary the antibiotic regime reduced (group A); herds that implemented vaccination against ileitis without a subsequent change in the antibiotic protocol (group B). Price references are averages for the period from July 2006 to June 2007.

Results
On average 40 farms (group A) achieved a cost reduction for antibiotics treatment of € 1.49 per pig. 24 farms did not reduce their antibiotic use (group B). Farms in group A achieved performance improvements on ADG, FCR and mortality rate of +33 g/day, -0.08 kg/kg and -1.29 % respectively. Group B achieved improvements on ADG, FCR and mortality rate of +37 g/day, -0.07 kg/kg, and -2.24 %, respectively (table I). Financially, the gross margin per pig is identical within both groups of farms: + € 4.30 (group A), + € 4.43 (group B).

Table 1: Performance changes in farms with reduced or not reduced antibiotic treatments.

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
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<tbody>
<tr>
<td>Antibiotic reduction (€/pig)</td>
<td>-1.49</td>
<td></td>
</tr>
<tr>
<td>ADG change (g/day)</td>
<td>+33</td>
<td>+37</td>
</tr>
<tr>
<td>Final ADG (g/day)</td>
<td>789</td>
<td>767</td>
</tr>
<tr>
<td>FCR change (kg/kg)</td>
<td>-0.08</td>
<td>-0.07</td>
</tr>
<tr>
<td>Final FCR (kg/kg)</td>
<td>2.84</td>
<td>2.89</td>
</tr>
<tr>
<td>Mortality change (%)</td>
<td>-1.29</td>
<td>-2.24</td>
</tr>
<tr>
<td>Final mortality (%)</td>
<td>3.36</td>
<td>4.10</td>
</tr>
<tr>
<td>Gross margin (€/pig)</td>
<td>4.30</td>
<td>4.43</td>
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Discussion
Successful animal health management is rarely based on a single practice; age-segregation, all-in all-out management, biosecurity, vaccination, etc. Examples and confirmation of such practices from the field help in the decision making process to prevent and control infectious diseases. It is the application of these tools on a routine basis via sound education and training that sets many farms apart from others, allowing increased productivity. Recently, Lapierre showed circovirus vaccines might reinforce this prevention tendency and allow veterinary care to be more and more successful. Nevertheless none of these measures are sufficient to completely eliminate the need for antibiotics and their prudent use should remain a valid option in animals. In that respect the most critical areas of attention would be use of in-feed antibiotics and use of antibiotics of critical importance to human health. The American Association of Avian Pathologist provides a clear guideline to judicious therapeutic use of antimicrobials in poultry. It lists specific important bacterial infections of poultry and provides recommendations for each. One further step could be to recommend a first, second and even third line drugs for specific infections, with preference given to older over newer compounds or narrow-spectrum over broad-spectrum, etc.

Conclusion
This survey presents vaccination as a technically and, economically attractive tool to reduce antibiotic use in ileitis infected herds. It provides a solution for the production of pig meat in addressing producers as well as consumer needs.

References
http://www.carrefour.fr/plus-carrefour/les-engagements-carrefour/engagement-qualite-carrefour
Accessed June 10, 2009