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A register-based study on associations between vaccination, antimicrobial use and productivity in conventional Danish finisher pig herds during 2011 to 2014

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Highlights

- Vaccination against PRRS was associated with high lean meat percentage.
- Vaccination against PCV2, MYC, APP or LAW was not associated with productivity.

- Vaccination against PCV2, PRRS and APP was associated with antimicrobial use.
- No association was found between vaccination against MYC and AMU.
- Vaccination against LAW was associated with more parental antimicrobial treatments.

Abstract

Reduction of antimicrobial use (AMU) in pigs is a priority to counteract development of antimicrobial resistance in animal and human pathogens. However, there is concern that Danish pig producers complying with official AMU restrictions might experience reduced herd health and productivity in the future, if alternative strategies are not available. Vaccination has been suggested as a strategy to prevent disease and minimise the need for antimicrobial treatments. The aim of this register-based study was to assess the associations between data on vaccination, productivity and AMU in Danish finisher herds over a 4-year period following initiation of the Yellow Card, which is a restrictive AMU control scheme. For each of the years 2011 to 2014, sow herds were grouped according to purchase patterns regarding Porcine Circovirus Type 2 (PCV2) (use/no use). For the sow herds (N = 179–433), additional information of purchases of vaccines against *Mycoplasma hyopneumoniae* (MYC), *Actinobacillus pleuropneumoniae* (APP), Porcine Reproductive and Respiratory Syndrome virus (PRRS) and *Lawsonia intracellularis* (LAW) was included. By use of movement data, finisher herds receiving pigs from the sow herds were tracked and included in the analyses. Finisher herds (N = 40–62) with register data on productivity (i.e. average daily weight gain, feed conversion rate, mortality and lean meat percentage) and data on prescriptions of antimicrobials measured in Animal Daily Doses/100 finishers/day as well as the proportion of parenteral AMU treatments out of all treatments (AMU-ratio) were included. Univariable combinations were tested for statistically significant associations ($P < 0.05$) and included in multivariable linear mixed-effects model for each of the six outcome variables representing productivity (N=4) or AMU (N=2). Herd number was included as a random effect to account for the herds appearing more than once. The variables representing PCV2, enrolment in the Danish Specific Pathogen Free (SPF) system, year, herd type and herd size were included as potential confounders. Vaccination against PRRS and higher AMU for finishers were associated with increased lean meat percentage, potentially due to disease outbreaks resulting in reduced growth of the pigs and lower carcass weight at slaughter in herds with PRRS. None of the other

types of vaccines was associated with any of the productivity outcomes. Vaccination against PCV2, PRRS and APP were associated with higher levels of AMU, and vaccination against LAW with a higher AMU-ratio. This may be explained as some farmers preferring to take action soon after observing disease problems. No association was found between vaccination against MYC and AMU. Herds enrolled in SPF had significantly higher average daily weight gain than non-SPF herds.

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Keywords

Pig production; Register data; Antimicrobial use; Productivity; Vaccination; Porcine Circovirus Type II; *Mycoplasma hyopneumoniae*; *Actinobacillus pleuropneumoniae*; Porcine reproductive and respiratory syndrome; *Lawsonia intracellularis*

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