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Evolution of antimicrobial use in French pig farms from 2010 to 2016 through the INAPORC panels

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The French Ecoantibio plan was a success : the exposure of pigs to antibiotics decreased by 41% from 2012 to 2016, while the initial target was -25%. But beyond this overall assessment of antibiotic sales by pharmaceutical companies, farm surveys are important to describe more precisely how antibiotics are used. The three INAPORC panels, implemented in 2010, 2013 and 2016, meet this objective to produce detailed references on antibiotics usage, based on representative sample of farms.

Material and methods

- The three INAPORC panels were conducted with a similar method (Hémonic et al., 2018, Porcine Health Management, 4:8).
- In 2016: 143 voluntary farms, randomly selected from the national BDPORC database, and representative of the French pig production.
- Lists of purchased antibiotics by farmers were got from veterinarians and medicated feed manufacturers.
- A telephone survey with farmers made it possible to split the amount of each drug into age groups and reasons for treatment.
- Two indicators were used to present the variation of antibiotic usage:
  1. The **ALEA** (Animal Level of Exposure to Antibiotics) was used for an overall estimation of the sample exposure to antimicrobials.
     = {[(quantities of active substance in mg)/(dose in mg/kg/d x duration in d)]/biomass in kg}.
     Biomass = number of sows*300 kg + number of slaughtered finishers*105 kg + number of culled sows*350 kg.
  2. The **number of daily dose per animal (nDD/a)** was used to describe the mean usage in each age group :
     = {[(quantities of active substance in mg)/(dose in mg/kg/d x weight group in kg)]/number of animals}.
     Weight group = 250 kg for a sow, 2 kg for a suckling piglet, 15 kg for a weaner and 50 kg for a fattener.

Results and discussion

- From 2010 to 2016, the decrease in ALEA estimated by Anses (-47%, based on national antibiotic sales) and by the INAPORC panels (-52%) was similar. However, the ALEA estimated by the panels in 2010, 2013 and 2016 were always lower than those of Anses, suggesting overestimation of the volume allocated to pigs during the stratification of sales by species.
- Over the six years, the nDD/a significantly decreased for all age groups **(Figure 1)**. But for sows the decrease was less marked (-7%) than for suckling piglets (-28%), weaned piglets (-70%) and fatteners (-71%).
- For sows, the main indications for treatment are urogenital and systemic disorders. The increase in the usage of tetracyclines in sows from 2010 to 2016 might partly reflect an increase in leptospirosis control strategies, maybe in association with loose-housing of sows.
- Other major results included a huge decrease in the use of:
  1. Critically important antibiotics (CIA) **(Table 1)**. It was the result of a voluntary moratorium on the use of cephalosporins in 2011, completed in 2016 by a compulsory reduction, including also fluoroquinolones.
  2. Premixes **(Table 2)**.
  3. Colistin: for weaned piglets, usage of colistin dropped by 75 % from 2010 to 2016. This did not result in increased use of other digestive antibiotics or in a massive use of zinc oxide (16% of farms using zinc oxide in 2016). But antibiotic treatments for digestive disorder still concerned 70% of farms in 2016.
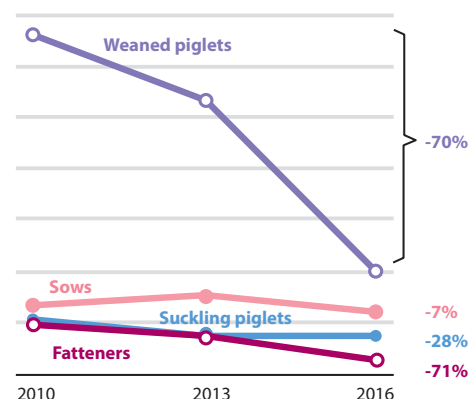

Figure 1: Variation (%) of nDD/a for each age group

Table 1: Variation (%) of CIA usage

CIA	Evolution (%) of nDD/a 2010-2016	Concerned farms (%) 2010 - 2013 - 2016
Sows		
Fluoroquinolones	-80*	53[a] - 57[a] - 29[b]
Cephalosporins	-100*	11[a] - 1[b] - 4[b]
Suckling piglets		
Fluoroquinolones	-83*	44[a] - 4[a] - 19[b]
Cephalosporins	-98*	18[a] - 4[b] - 4[b]

*Different letters and * = significant difference (p<0,05)*

Table 2: Variation (%) of premixes usage

Age group	Evolution (%) of nDD/a 2010-2016	Concerned farms (%) 2010 - 2013 - 2016
Sows	-22	24 - 18 - 21
Suckling piglets	-100*	14[a] - 6[a] - 0[b]
Weaned piglets	-83*	84[a] - 73[b] - 32[c]
Fatteners	-81*	29[a] - 16[b] - 14[b]

*Different letters and * = significant difference (p<0,05)*

Conclusion

The methodology of random sampling of farms appears as a precise and robust tool to monitor antimicrobial use within a production animal species, able to fulfil industry and national authorities' objectives and requirements to assess the outcome of concerted efforts on antimicrobial use reduction. The INAPORC panels contribute to providing detailed references on antibiotic use in the French pig production and demonstrate the continued commitment to improving current practices.