Antimicrobial drug use in Austrian pig farms: plausibility check of electronic on-farm records and estimation of consumption

M. Trauffler, A. Griesbacher, K. Fuchs, J. Köfer

Context
Antimicrobial resistance represents a global problem for both human and animal health. The monitoring of antimicrobial consumption in veterinary medicine is crucial to develop strategies to reduce the spread of resistance. Understanding the species and diagnoses for which antimicrobial substances are prescribed is of particular importance, and such data could be provided by the end-user, such as the farmer. However, sources of information from end-users are rarely standardised and the quality of data collected in this way can be inaccurate. The aims of this study were to collect on-farm drug application data in Austria, to obtain a plausibility estimate for such data, and to quantify the total amount of antimicrobial consumption in the pig population included in the study using four different measures.

Main conclusion
The results of the study clearly underline the need for on-farm data for the measurement of antimicrobial consumption in veterinary medicine. However, the plausibility check of data revealed that further measures are necessary in order to improve data quality. The antimicrobial consumption in the studied pig population was relatively low, showing a high amount of underdosage especially in relation to oral treatments. Metaphylactic and prophylactic measures represented the most important indications for antimicrobial use in farrow-to-finish and fattening pig farms.

Approach
Data collection was performed in collaboration with an Austrian meat production company. Farmers were required to electronically record each drug application via an online platform in the context of a quality assurance system. Data from 75 conventional pig farms (49 farrow-to-finish, 21 fattening and five breeding farms) from 2008 until 2011 were first reviewed and checked for quality and plausibility. The recorded antimicrobial drug amounts were checked for accuracy by comparing them with the dispensary records of veterinarians. Antimicrobial consumption was expressed as weight of active substance(s) in mg, number of Used Daily Doses (nUDD), number of Animal Daily Doses (nADD) and number of Product-related Daily Doses (nPDD). All results were presented on a per kg of bodyweight per year basis. Antimicrobial use was evaluated separately for several variables such as route of administration (oral or parenteral), active substance (ATCvet Code), type of treatment (group level or individual) and therapy indication (diagnosis made by the veterinarian). UDD/kg ADD/kg ratios were calculated in order to assess dosage accuracy. For the identification of farms with high antimicrobial use compared with other farms of the same farm type, a threshold value was fixed according to the definition of outliers: threshold value = q75 + (1.5 × interquartile range).

Results
The data plausibility proof revealed that approximately 14 per cent of entries were unrealistic, mainly due to false information about drug amounts. Annual antimicrobial consumption was 33.9 mg/kg/year; 4.9 UDD/kg/year; 1.9 ADD/kg/year; 2.5 PrDD/kg/year (annual average 75 farms). Most of the antimicrobials were applied orally (86 per cent) and at a group level. Main therapy indications were metaphylactic/prophylactic measures (farrow-to-finish and fattening farms) or digestive tract diseases (breeding farms). The proportion of ‘highest priority critically important antimicrobials’ was low (12 per cent of nADD/kg/year). Orally administered antimicrobials were mostly underdosed, whereas parenterally administered antimicrobials tended to be overdosed. After calculating the ratio of antimicrobial use per farm:threshold value, farms with higher antimicrobial use than the threshold value could be visualised graphically. Statistical analysis showed that the veterinarian had an influence on the dosage and the therapy indication.

Interpretation
The results of this study are not representative of the whole of Austria, as the sampling frame (75 pig farms, representing around 3 per cent of the Austrian pig population) is too small. The plausibility control of the data showed that the collection of drug application data by farmers is feasible, but is associated with some limitations. Inaccurate information was frequently observed despite automatic plausibility checks. The antimicrobial consumption of 1.9 ADD/kg/year is relatively low. However, the treatment frequency expressed in nUDD showed an antimicrobial consumption of 4.9 UDD/kg/year. UDD is based on real consumption and is independent of farmer non-compliance; it may therefore describe the actual consumption more accurately than daily doses based on theoretical dosage recommendations. PrDD, which takes into account differences in dosage recommendations even if the active substance is the same, has been defined as a potential alternative to ADD. Finally, it is important to state that daily doses are developed at the national level based on summary of product characteristics dosage recommendations. As a consequence, a comparison of antimicrobial consumption between countries is not possible using these indicators.

Significance of findings
The infinite evaluations that can be performed using on-farm data must be emphasised. Well-established and technically mature quality assurance systems should be officially accredited in future. In particular, the labelling of each single drug package or vial with a serial number was very useful for plausibility checks of the recorded drug amounts. The unit of measurement is crucial in the interpretation of antimicrobial consumption. UDDs, ADDs and PrDDs could be used in parallel, representing real or standardised consumption, respectively.
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