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Patterns of antimicrobial use in heavy pig production

Scali F.[1], Giudici F.[1], Alban L.[2], Dewulf J.[3], Maisano A.M.[1], Santucci G.[1], Lazzaro M.[1], Giacomini E.[1], Amicabile A.[1], Borrello S.[4], Candela L.[4], Ianieri A.[5], Ghidini S.[5], Belluzzi G.[5], Pasquali P.[6], Alborali G.L.[1]

[1]Istituto Zooprofilattico Sperimentale Lombardia Emilia Romagna, Brescia, Italy, [2]Danish Agriculture and Food Council, Copenhagen, Denmark, [3]Ghent University - Faculty of Veterinary Medicine, Department of Obstetrics, reproduction and herd health, Ghent, Belgium, [4]Ministero della Salute, Rome, Italy, [5]University of Parma, Dipartimento di Scienze degli Alimenti e del Farmaco, Parma, Italy, [6]Istituto Superiore di Sanità, Rome, Italy

Introduction

Pig farming is a concerning source of antimicrobial resistance (AMR) and reducing antimicrobial use (AMU) at farm-level represents an essential action against AMR spread. Furthermore, information on AMU at farm-level is crucial to develop tailored antimicrobial stewardship (AACTING, 2018). Several studies on AMU in pig farms are available worldwide; however, data on heavy pig production are scarce. Italy is both a major producer of heavy pigs and one of the highest consumers of antimicrobials in Europe (EMA, 2018).
The aim of this study was to investigate AMU patterns in Italian heavy pigs starting with the fattening farms.

Material and Methods

Data from 143 farms were collected retrospectively, covering the 2015 pig population (reared pigs and mortality) and AMU. Information on pig population was provided by the farmers. Data on AMU came from paper prescriptions and health logs. The sampled farms were located in the north of Italy, where most of the Italian pig production takes place. The farms were fattening farms, rearing heavy pigs from 20–30 kg to slaughter. All farms included were involved in the ClassyFarm system trials, a monitoring system under development by the Italian Ministry of Health. AMU was expressed as number of treatment days per 100 days (treatment incidence 100 (TI100)) (AACTING, 2018) using Defined Daily Dose Animal for Italy (DDDAit) as metric. Standard weight at treatment and days at risk were set, respectively, at 100 kg and 180 days. DDDAit were based on Italian summaries of product characteristics.
Associations between AMU, herd size, and mortality were examined using Spearman´s rank correlation, principal component analysis (PCA) and factor analysis (FA)

Results

On the sampled farms, a median of 4,362 fattening pigs were reared (range 1,014–43,159) yielding a total of 916,276 pigs. Median weight at slaughter was 169 kg (range 137–182 kg). Median TI100 was 10.7 (range 0.2–49.5). Tetracyclines was the most commonly administered class (27%), followed by lincosamides (22%), penicillins (13%), pleuromutilins (9%), and macrolides (9%). According to WHO's 2017 list, classes considered as highest priority critically important antimicrobials (HPCIAs) for human medicine represented 17% of the overall AMU. Figure 1 illustrates the distribution of HPCIAs by class.

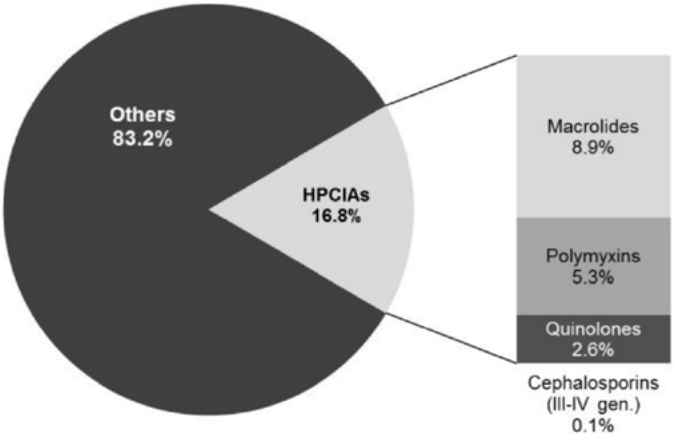

Figure 1: distribution of 2015 antimicrobial use in 143 Italian

In larger farms, AMU (ρ = -0.29, P< 0.001) and mortality (ρ = -0.23, P = 0.01) tended to be lower than in smaller farms. AMU was negatively correlated with use of injectables (ρ = -0.46, P< 0.001) and positively with use of oral products (ρ = 0.21, P = 0.01) and premixes (ρ = 0.26, P= 0.002). Correlation between AMU and mortality was low, but statistically significant (ρ = 0.18; P = 0.03). PCA and FA suggested four dimensions to explain the variance.

Discussion and Conclusion

Wide differences among farms in terms of AMU were found, similar to those described by several studies on pigs slaughtered at lower weights. Macrolides were frequently used which was expected considering how largely they are sold in Italy (EMA, 2018). Although macrolides consumption should be reduced, their prioritisation is still debated (EMA, 2019). The relatively high use of colistin may be explained by the low farmer awareness in 2015. Promoting the administration of injectable antimicrobials, whenever is feasible, could reduce overall AMU.
The negative relations between herd size and both AMU and mortality may suggest that larger farms are more

careful on management and biosecurity. The impact of AMU on mortality was low. To better understand AMU in heavy pig production, potential preventive factors (e.g., biosecurity, vaccinations), AMU in other age groups (i.e., sows, sucking piglets, weaners), and production indicators shall be investigated among others using results of the PCA and FA. Hereby, positive examples for farmers can be developed and guiding policies for veterinary authorities can be set, providing a valid tool for rational management and AMU reduction. Nationwide monitoring systems are already successful implemented in several countries. However, developing such a system for a large nation is challenging. Therefore, starting with a sample of farms is a first step towards a nationwide system.

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