

FARMING PRACTICES THAT IMPACT THE USE OF ANTIMICROBIALS IN SWINE DURING THE NURSERY, GROWING, AND FINISHING PHASES

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1 BACKGROUND

The growing demand for animal protein poses a challenge for pig farming to balance efficiency, sustainability, and economic viability. In intensive systems, the increased exposure of pigs to infectious agents raises health risks, making the use of antimicrobials a common practice for prevention and treatment in order to maintain zootechnical performance (Botelho, 2017). However, intensive and often inappropriate use compromises the effectiveness of these drugs, favoring bacterial resistance in animals and humans (WOAH, 2023).

In Brazil, pig farming faces structural challenges such as mixing piglets from different origins, different levels of biosecurity, and early weaning, factors that favor the systematic and preventive use of antimicrobials. The lack of consolidated data limits the development of control policies. Thus, this study aimed to quantify the use of antimicrobials in the nursery, growth, and finishing phases and to identify management practices associated with their consumption.

2 MATERIALS AND METHODS

The study was conducted in three operational units of a large Brazilian agribusiness, located in different pig-producing regions, covering the geographical and sanitary diversity of intensive pig farming in Brazil. Integrated farms with all-in-all-out management were included, selected according to weaning age (<24 or ≥24 days), number of piglet origins (single or multiple UPDs), and biosecurity level (<85% or ≥85%).

Structured questionnaires that were given to the responsible technicians in person were used to collect data. The questionnaires, which addressed management, biosecurity, cleaning, medication regimens, environment, nutrition, and health history, were tailored to the nursery and growth/finishing sectors. Antimicrobial use was recorded until weaning and until slaughter, including oral (feed and water) and parenteral (intramuscular injections) routes, expressed in mg/kg of weight gain. The volume administered per batch was calculated based on the dose, average weight, and duration of treatment, and the data were analyzed by ANOVA and multiple regression (stepwise), keeping only significant variables ($p \leq 0.05$) in the final model.

3 RESULTS

The use of antimicrobials in the nursery, growth, and finishing phases was measured at 154.3 mg of active ingredient per kg of body weight gain, varying according to the production segment. In the nursery phase, the average consumption was 263.4 mg/kg (range 46.4–468.1 mg/kg), while in the finishing phase, the average was 131.1 mg/kg (range 75.5–391.2 mg/kg).

Regarding the questionnaire applied to the 102 farms participating in the study, multiple regression analysis identified variables associated with the use of antimicrobials. In the nursery phase, the following stood out: a higher number of animals per pen (each additional pig increased consumption by 4.59 mg/kg), the quality of the isolation fence (adequate fencing reduced consumption

by 98.04 mg/kg compared to those in need of repair), and the use of cistern water (associated with an increase of 55.31 mg/kg).

In the growth and finishing phase, the most relevant factors were: age at housing (each additional day reduced consumption by 4.14 mg/kg), downtime (periods <4 days increased consumption by 30.24 mg/kg), and animal density (each additional 0.1 m² per pig reduced consumption by 7.14 mg/kg).

DISCUSSION and CONCLUSION

This study quantified the use of antimicrobials in intensive pig production systems in Brazil, revealing an average of 154.3 mg/kg of body weight gain, which is lower than the global estimate for the species, 172 mg/kg (Van Boeckel et al., 2015). However, consumption was lower than in national studies such as Dutra (2017) on independent farms (358 mg/kg) and Galvani (2023) in agro-industries in Rio Grande do Sul (367.2 mg/kg in nurseries and 238.4 mg/kg in finishing).

High animal density and limited available space were major risk factors for higher antimicrobial consumption, increasing the need for treatment. On the other hand, each additional day of age at housing in the finishing phase reduced consumption, confirming the relationship between densification, physiological immaturity, and increased susceptibility to disease. (Van Cuong et al., 2016). In contrast, biosecurity measures had a protective effect: farms with adequate isolation fences reduced use by 98 mg/kg, while reduced sanitary breaks and the use of cistern water were associated with a greater need for treatment, showing that good cleaning practices, disinfection, adequate sanitary break periods, and the supply of quality water reduce the pathogen load and, consequently, the consumption of antimicrobials (Alarcón; Allepuz; Mateu, 2021).

In summary, the results of this study show that the use of antimicrobials in Brazilian pig farming is influenced by management factors, production structure, and biosecurity. These findings reinforce the need for practices that reduce drug consumption and contribute to addressing the challenge of antimicrobial resistance, preserving animal health, food safety, and therapeutic efficacy.

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