

Antimicrobial use indicators and their effect on relative ranking of grower-finisher herds

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Introduction

- *Antimicrobial use (AMU) indicators* are units of measurement adjusted by a denominator that represents the population at risk¹
- Examples include:
 - › Milligrams per population correction unit² (mg/PCU)
 - › Defined daily dose for animals³ per population correction unit (DDDvet/PCU)
 - › Defined daily dose for animals³ per animal-time (e.g., DDDvet/1000 animal-days)
- Population correction unit (PCU)² = the biomass of animals at risk of treatment with antimicrobials
- Defined daily doses for animals (DDDvet)³ are based on the average labelled daily dose per kg of animal, by species and route of administration
- Canadian defined daily doses for animals (DDDvetCA) are based on Canadian labelled antimicrobial doses⁴
- Antimicrobial use indicators were applied to grower-finisher AMU surveillance data from the Public Health Agency of Canada's Canadian Integrated Program for Antimicrobial Resistance Surveillance⁴, and the relative ranking of each herd was compared

Methods

- Farm level antimicrobial use data collected during one production cycle from 23 sentinel grower-finisher herds in Ontario (May 2017 – April 2018) was analyzed²
- Eight herds with no use were excluded
- Three antimicrobial use indicators were applied (Table 1) using R (version 3.5.3, packages: dplyr, openxlsx, tidyverse); herds were ranked from lowest to highest in terms of use

Table 1. Equations used to determine the mg/PCU, DDDvet/PCU, and DDDvetCA/1000 pigs-days for each herd

Population correction unit	$\# \text{ pigs} \times \text{weight (kg)}$
Total number of DDDvetCA	$\sum \frac{\text{mg used}}{\text{DDDvetCA} \left(\frac{\text{mg}}{\text{kg}}\right)}$
Mg/PCU	$\frac{\text{Total mg used}}{\text{PCU}}$
DDDvetCA/PCU	$\frac{\text{Total number of DDDvetCA}}{\text{PCU}}$
DDDvetCA/1000 pig-days	$\frac{\text{Total number of DDDvetCA}}{(\# \text{ pigs} \times \text{weightkg} \times \text{days}_{\text{at risk}})/1000}$

Results

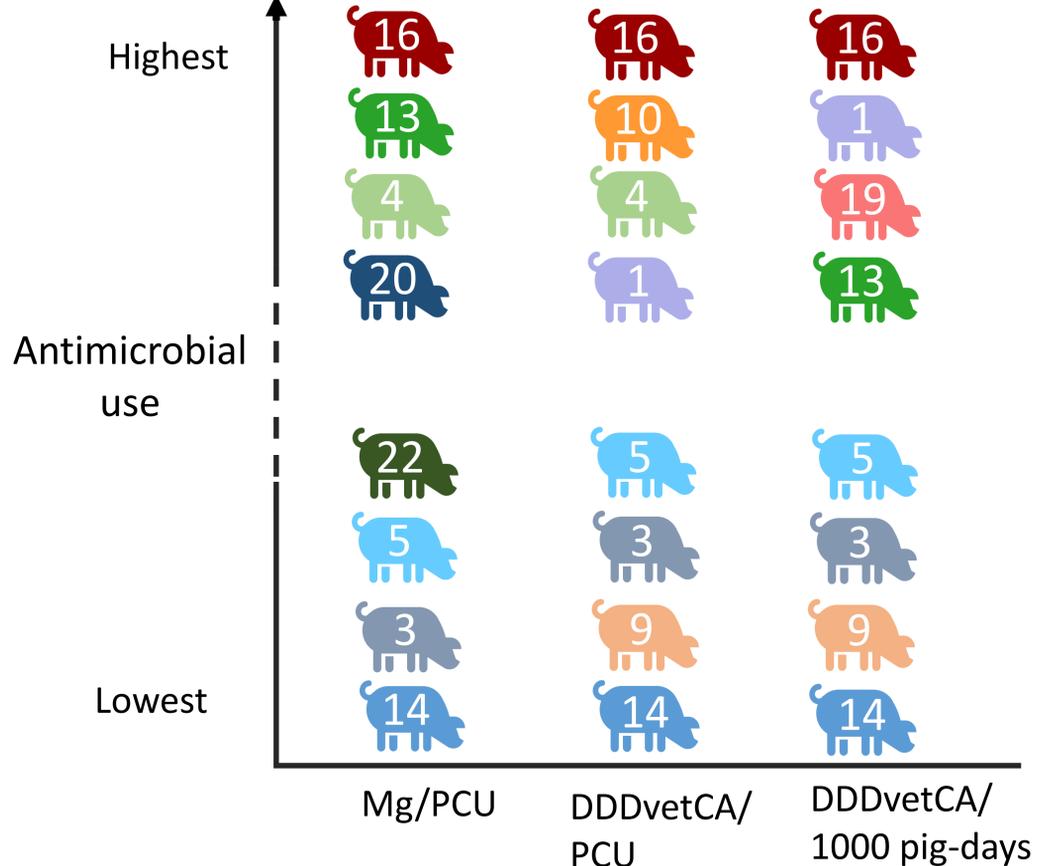


Figure 1. The relative ranking of 23 sentinel grower-finisher herds in Ontario by antimicrobial use during one production cycle. Antimicrobial use is measured using three indicators: milligrams per population correction unit (PCU), Canadian defined daily doses (DDDvetCA) per PCU, and DDDvetCA per 1000 pig-days. The four highest and lowest using herds are displayed; eight herds with no use were excluded. Each herd is identified by a unique number and colour.

- 22 of the 23 herds were conventional; one herd was RWA (raised without antibiotics)

- 8 herds did not use antimicrobials during the production cycle of interest

Conclusions

- Quantitative comparisons of AMU among herds was affected by the choice of AMU indicator
- Ranking of herds on either end of the spectrum of use may not be affected by the choice of indicator, while other herds may change in relative AMU or may fall above or below a particular level depending on the indicator used.
- When interpreting comparative AMU data, the choice of indicator is an important consideration

- Herds 14 and 16 were the lowest and highest users respectively, regardless of indicator
- There were changes in the relative ranking of other herds, depending on the indicator used
- The total kgs used by herds 14 and 16, and the number of pigs at risk of treatment in these two herds fell within the range of other herds (Table 2)

Table 2. The mean and range of the number of pigs at risk of treatment and total kg used compared to the highest and lowest herds.

	Pigs at risk (#)	Total Kg used
Herd 14	993	1.4
Herd 16	223	13.5
Mean	845	12.1
Range	143 - 1537	0.5 – 59.2

Literature cited

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Acknowledgments

The authors would like to thank the participating veterinarians and swine producers and the Canadian swine industry

Funding sources: Ontario Ministry of Agriculture, Food & Rural Affairs – New Directions; Ontario Veterinary College; Public Health Agency of Canada (in-kind)



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