Biosecurity in small scale pig farms in three Balkan countries: a pilot study

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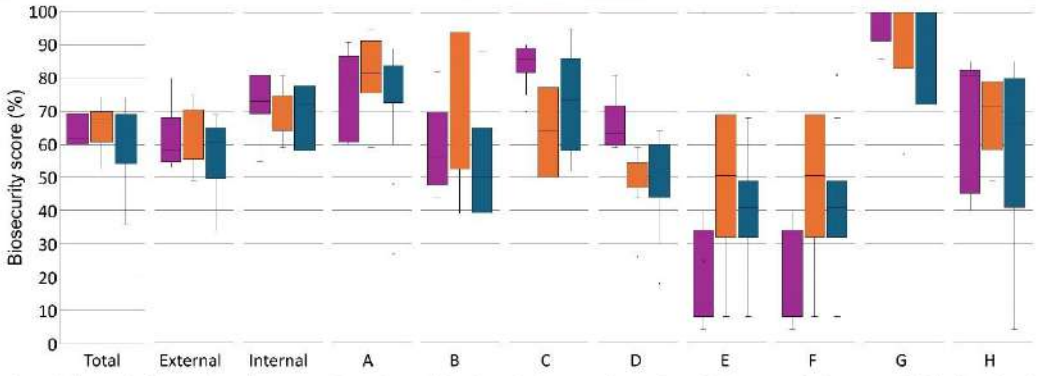
Background

- Small scale pig farms contribute to disease transmission
- Improving biosecurity on small scale pig farms enhances animal and farmer health
- To highlight areas for improvement, the biosecurity on small scale pig farms should be assessed

Materials & Methods

- Newly developed Biocheck.UGent survey
  - Backyard / small scale pig farm-specific
  - Risk-based scoring system
  - Biosecurity score on 100 (total & subcategories)
  - Freely available online
- Pilot tested on 40 small scale pig farms in Slovenia (n=10), North-Macedonia (n=10) and Serbia (n=20)

Results & Discussion



Letter indicates the biosecurity subcategory. A: Location and housing – B: Entrance of new pigs – C: Transport of pigs, removal of deadstock and manure – D: Feed, water, equipment supply and pest control – E: Visitors and worker – F: Disease management – G: Animal handling – H: Cleaning and disinfection Slovenia North-Macedonia Serbia

- Pigs were mainly kept for self-consumption (n=22)
- On average 30.2 (min. 1 – max. 460) pigs were housed on the farms
- Twenty farms only housing fattening pigs resulted in high scores on category G; fattening pigs were housed separately on 17 farms
- The total average biosecurity scores were low (<70) meaning significant improvements are needed
- Internal biosecurity scored on average higher than external biosecurity. Measures related to visitors and workers can be improved
  - Non-professional visitors could have contact with pigs on 29 farms
  - On 18 farms, farm-specific clothes and footwear were not available
- New pigs entered the farm in the last two years on 27 farms but only on one farm pigs were quarantined (30 days)
- Limiting the contact with wild pigs is crucial on small scale pig farms
  - On 23 farms, pigs were always kept indoors
  - On 8 farms where pigs had outdoor access (n=17), wild-pig-proof fences were present

Practical use

- Assessing the biosecurity helps to identify the gaps on small scale pig farms
- The report can serve as a communication tool, objectively showing the farmer where improvements can be made to better protect their pigs

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BETTER

TRACE MINERALS AS A STRATEGY FOR ADVANCING LIVESTOCK BIOSECURITY

CENTRE OF BIOSCIENCES SLOVAK ACADEMY OF SCIENCES

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INSTITUTE OF ANIMAL PHYSIOLOGY

1 Abstract

Biosecurity is a complex of strategies and practices designed to protect farm animals from pathogens and diseases, ensuring their overall health and preventing the spread of infections between and within farms. Our research aims to explore how trace mineral supplementation in livestock farming can influence the transmission of pathogens between animals, with a focus on its role within biosecurity. As well known that trace elements (TEs) are crucial for animal immunity, health, and overall performance; therefore, supplementing animal feed with TEs is a common husbandry practice. In addition to adhering to biosecurity protocols, mineral additives in feed can promote intestinal health and support the diversity of the gut microbiome, helping manage animal diseases and disorders more effectively. Although the recommended dietary levels for zinc (Zn) and copper (Cu) in pigs range from 50 to 110 ppm and 5 to 10 ppm, respectively, higher concentrations of the minerals (2000-3000 ppm for Zn and 125-250 ppm for Cu) was often used in nursery diets in the past. These pharmacological levels can help reduce post-weaning diarrhoea and boost growth in both nursery and grow-finish pigs. The beneficial effects of increased Zn and Cu concentrations in pig feed are primarily by their antimicrobial properties, their role in promoting gut development, and their contribution to maintain gut integrity. However, the use of pharmacological doses of these trace elements in pig production led to increased antimicrobial resistance and environmental contamination by heavy metals. As a result, the European Union has prohibited the use of pharmacological levels of Zn as a growth promoter in piglet diets since 2022. Despite these concerns, providing appropriate mineral supplementation-particularly through organic sources of TEs-remains a critical component of livestock health programs. This approach does not only support animal health but also forms the foundation for effective biosecurity practices and broader health management strategies.

2 Biosecurity in animal health program

Primary biosecurity- the prevention of pathogen spread between farms
Secondary biosecurity- the prevention of pathogen spread within a farm
Tertiary biosecurity- the increase of the resistance (e.g. antimicrobials) or the immunity of the animals against pathogens (e.g. diet, vaccination)

Feed supplementation = adequate nutrient balance diet
reduce the level of exposure to pathogens (through adequate biosecurity) = generate protective immunity

3 Trace minerals in animal nutrition

- ✓ Essential for growth and development
- ✓ Metabolism and enzyme functions
- ✓ Antioxidance defense
- ✓ Immune system supp
- ✓ Reproductive hea
- ✓ Tissue health

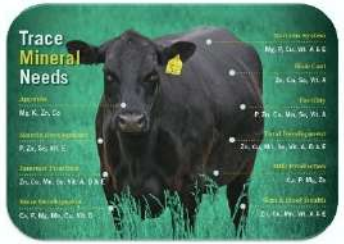
Pharmacological doses of Zn, Cu vs. Animal's trace mineral requirements

- ✓ **reduced post-weaning diarrhea**
- ✓ **improve growth performance in piglets by**
  - ✓ antimicrobial activity
  - ✓ development of gut morphology
  - ✓ maintenance of gut integrity

Pharmacological doses of Zn and Cu in pig diet:
ZnO = 2000 - 3000 mg Zn/kg of complete feed
$CuSO_4$ = 125 - 50 mg Cu/kg of complete feed

Trace minerals requirements depend on:
- ✓ animal species (poultry, swine, cattle etc.)
- ✓ life stage/ animal status (pregnancy, lactation, growing etc.)
- ✓ environmental and physiological conditions (temperature, nutrition, physical activity, stress etc.)

Zn and Cu requirements for different animal species:
Zn = 50 - 110 mg/kg of complete diet
Cu = 5 - 10 mg/kg of complete diet



4 Negative effect of pharmacological doses

5 Nutrition strategies for gut health and immune function

Feed supplementation with

organic trace minerals

bacteriocins/postbiotics
(natural antimicrobials produced by some bacterial strains)

- ✓ improving gastrointestinal functionality, the gut health
- ✓ enhancing the immune system through gut health
- ✓ increasing the diversity of gut microb
- ✓ increasing nutrient bioavailability
- ✓ reducing antimicrobial resistance
- ✓ reducing environemental pollution

6 Preliminary results

ce minerals on the GIT

- ✓ improved intestinal morphology (efficient nutrient absorption)
- ✓ reduced intestinal permeability (upregulated protein expression of the tight junction proteins)
- ✓ increased the abundance of beneficial microbiota
- ✓ enhanced antioxidant capacity by increasing antioxidant enzymes
- ✓ increased production of short-chain fatty acids in the cecum of pigs and the rumen of small ruminants (better uptake by rumen bacteria)

The effect of postbiotics (bacteriocins)

- ✓ proven antimicrobial potential as alternatives to antibiotics
- ✓ improved non-specific and mucosal immunity, intestinal resorption
- ✓ proven immunological and antiparasitic potential
- ✓ increased antioxidant status of animals

KEY COMPETENCIES OF VETERINARIANS TO COMMUNICATE BIOSECURITY ON SMALL-CAPACITY ANIMAL FARMS

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Drawing on insights from 30 peer-reviewed studies, the poster highlights six core competency domains essential for veterinarians to effectively convey biosecurity information to farmers:

- **Technical and clinical competencies: understanding infectious disease epidemiology, conducting risk assessments, and designing cost-effective biosecurity interventions**
- **Effective communication and educational skills are essential for increasing farmers' awareness, fostering compliance, and cultivating a culture centred on biosecurity**
- **Problem-solving and decision-making abilities enable veterinarians to prioritize interventions and address the unique challenges faced by small-scale farms**
- **Leadership and advocacy are critical for mobilizing resources, influencing policy, and promoting sustainable practices**
- **Familiarity with local and international regulations ensures compliance and alignment with public health goals**
- **Digital literacy prepares veterinarians to leverage modern tools for effective communication and data management. Digital literacy combines both technical and cognitive abilities; it consists of using information and communication technologies to create, evaluate, and share information**

Veterinarians have a critical role in enhancing biosecurity on small-capacity animal farms, requiring diverse competencies to address technical, social, and economic challenges

“Preliminary Assessment of Biosecurity Levels in STEC-Positive Sheep Farms Using Biocheck.ugent: Insights from a Case Study in Albania”

BETTER COST Meeting 4-5 February, 2025 – Skopje, Macedonia

Xhelil Koleci

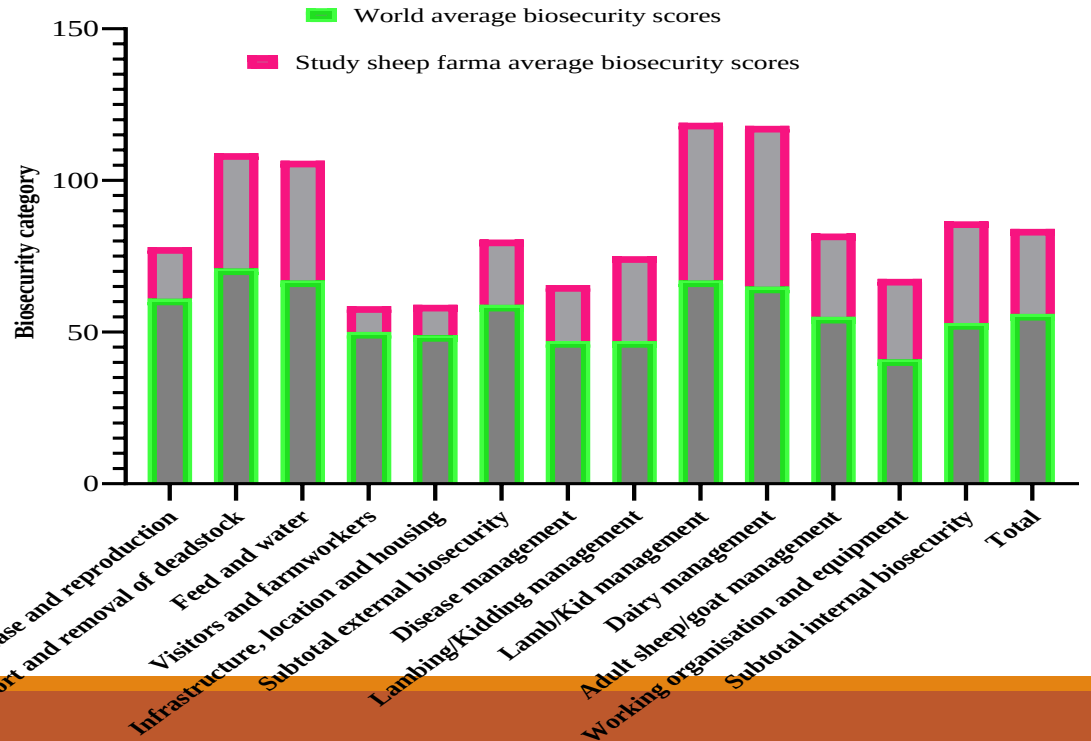
Përllumb Zalla, Majlind Sulçe, Gerald Muça, Egon Andoni, Rezart Postoli

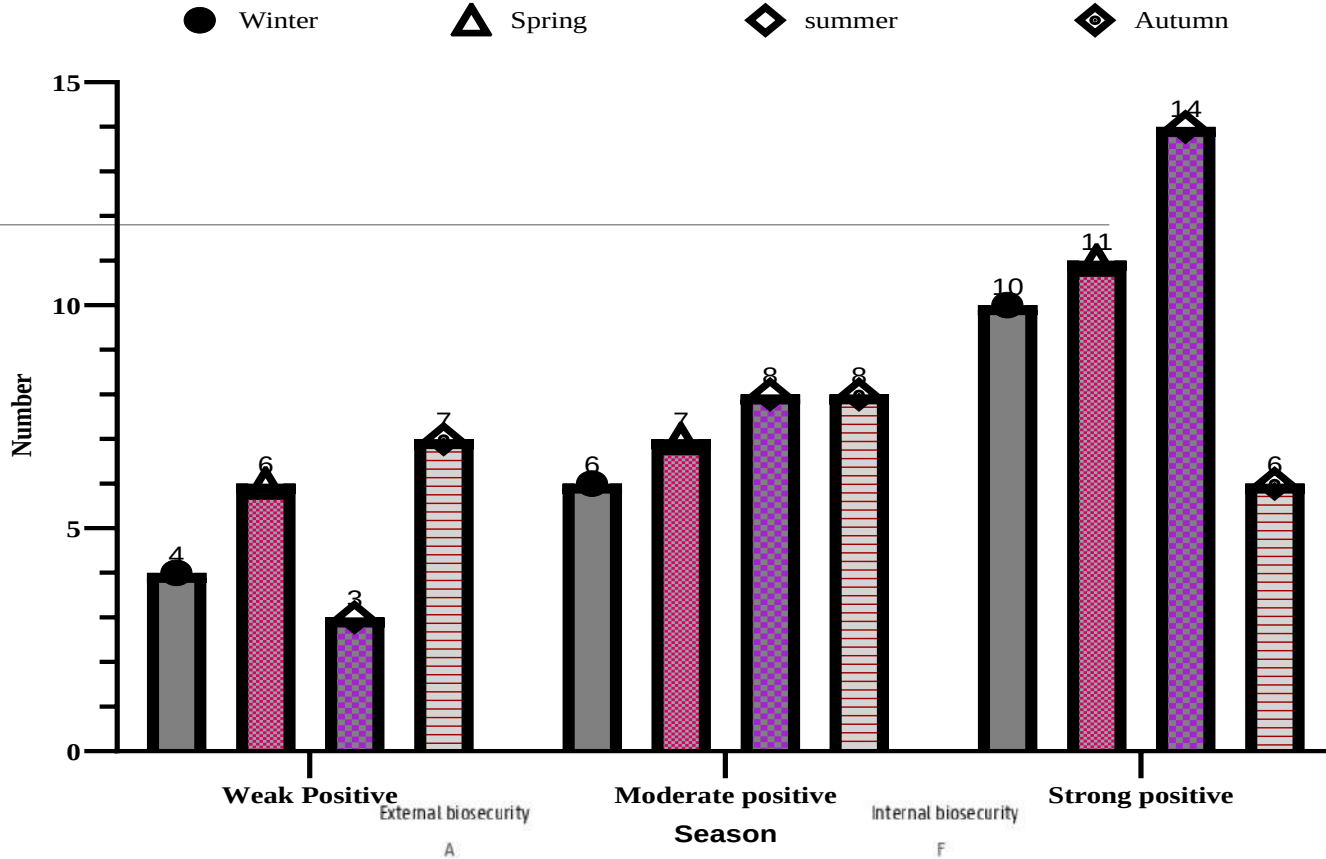
Sheep importance in Albania; STEC, Biosecurity in 7 sheep farms

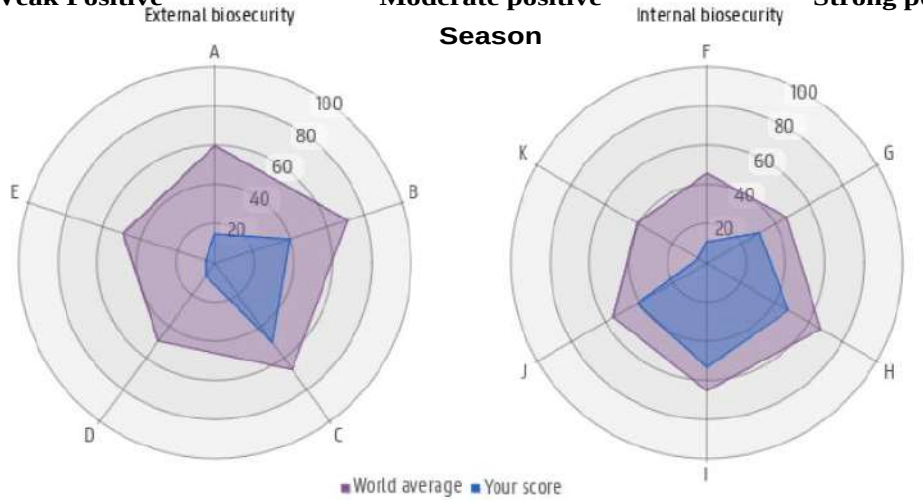
STEC prevalence 64.3% (71.4%) in summer and 51.4%) autumn

The investigation found serious biosecurity weaknesses.

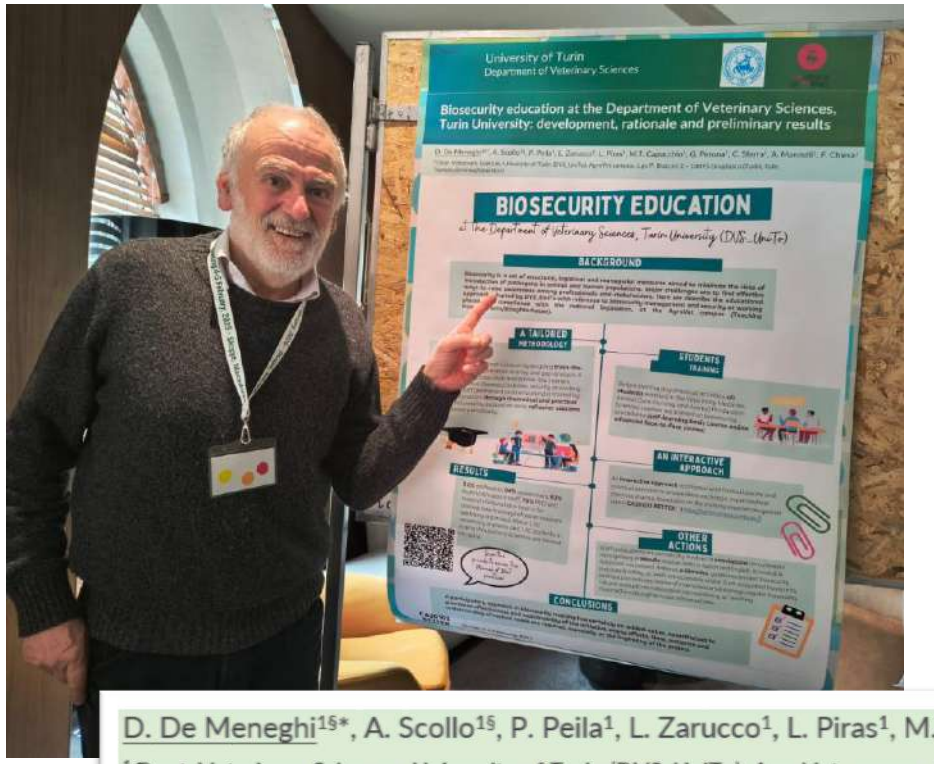
Important biosecurity measures are required to lower STEC prevalence







Discussion time



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→ **DVS_UniTo educational approach with reference to biosecurity management and safety at working places at AgroVet campus: i. teaching hospital; ii. diagnostic & research labs; iii. (multi-species) farm; iii. wildlife center; iv. slaughterhouse; iv. "butcher shop"**

- **two Depts** involved; **different stakeholders**; agriculture land + residential area; outskirt of the city;
- **challenge to harmonise training** → i. **safety-at-work** (risks for all workers + specific risks at vet school) & ii. **biosecurity training** (wide range of employees, different tasks, temporary & permanent staff, students, etc.)

A TAILORED METHODOLOGY

The educational approach relies on synergizing **train-the-trainers** method, information sharing and gap-analysis. A Biosecurity Committee implements train-the-trainers courses (infectious diseases/zoonoses, security at working places). All staff (permanent and temporary) is trained by qualified instructors **through theoretical and practical courses**, followed by evaluation tests; **refresher sessions** are organised periodically.

STUDENTS TRAINING

Before starting any practical activities, **all students** enrolled in the Veterinary Medicine, Animal Care-Nursing, and Animal Production-Sciences courses are trained on biosecurity procedures (**self-learning basic course online**, **advanced face-to-face course**)

AN INTERACTIVE APPROACH

An **interactive approach** is adopted with frontal lessons and practical exercises to ensure ideas exchange, expertise/best practices sharing, based also on the training experiences gained within **CA20103 BETTER**[§]. (https://better-biosecurity.eu/)

OTHER ACTIONS

Staff and students are periodically involved in **simulations** on outbreaks management. A **Moodle** module, both in Italian and English, is available. Additional educational material, **e-libraries**, guidelines on best biosecurity practices & safety at work are accessible online. Such integrated biosecurity package also includes: review of internal/external signage; regular biosecurity risk gap-analysis; microbiological risk monitoring at Teaching Hospital/Farm/Slaughterhouse infrastructures.

RESULTS

91% professors, **94%** researchers, **92%** technical/support staff, **78%** PhD and research fellows have been o far trained; new training/refresher sessions are being organised. About 130 veterinary students and 140 students in Animal Production/ Sciences are trained annually.

Scan the qr-code to access the Manual of Best practices!

Vi blagodaram
Thank you

Considerations / Comments / What we have learnt so far:

☺

- **integrated approach for training on biosecurity+safety at working places & collaborative learning → added value**

☹

- **efforts, time, patience and understanding of mutual needs to guarantee effectiveness and sustainability of the initiative … especially at the beginning of the project**
- **evaluation (qualitative and/or semi-quantitative) of the training yet to be done → NEOH evaluation framework and/or BETTER tool, ref. M. de Nardi and coll. (!?)**

Quantification of antimicrobial use on commercial broiler farms in Pakistan

Qamer Mahmood, Ilias Chantziaras, Jeroen Dewulf | *Faculty of Veterinary Medicine, Ghent University, Belgium*

1 Background

Pakistan has a large, intensive broiler production industry, where antimicrobials are extensively used for both therapeutic and prophylactic purposes. Monitoring antimicrobial use (AMU) at the farm level is crucial to guide interventions for antimicrobial stewardship. This study quantified AMU on 100 commercial broiler farms in Pakistan using different metrics. Defined daily dose (DDD_{vetPK}) and defined course dose (DCD_{vetPK}) used in this study were recently developed by Mahmood et al, 2024.

2 Methodology

Calculation of AMU

$$TIDDD_{vetPK} = \frac{\text{Total amount of active substance administered (mg)}}{DDDvetPK\left(\frac{mg}{kg}_{day}\right) \times \text{No. of days at risk} \times \text{kg AAR}} \times 100 \text{ AAR}^*$$

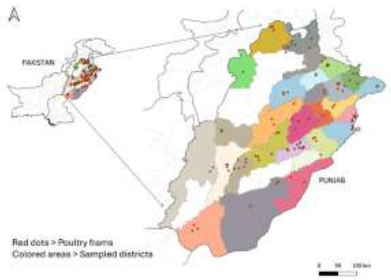
$$TIDCD_{vetPK} = \frac{\text{Total amount of active substance administered (mg)}}{DCDvetPK\left(\frac{mg}{kg}_{day}\right) \times \text{No. of days at risk} \times \text{kg AAR}} \times 100 \text{ AAR}$$

$$TIUDD_{vetPK} = \frac{\text{Number of days with antimicrobial treatment}}{\text{Total number of days at risk}} \times 100 \text{ AAR}$$

$$\text{mg/kg biomass} = \frac{\text{Total amount of active substance administered (mg)}}{\text{Actual body weight per bird at treament} \times \text{No. of broilers at treatment}}$$

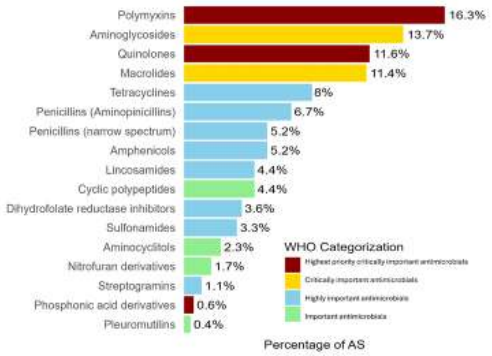
*Animals at risk

Data collection

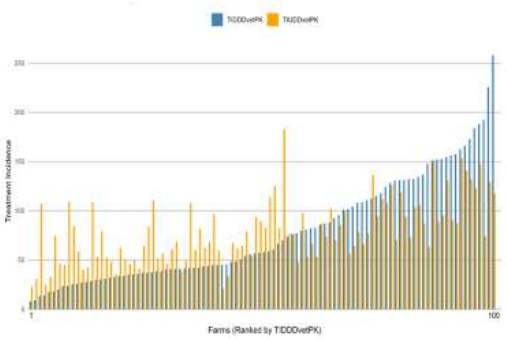


3 Results

Choice of Antimicrobials used



$TIDDD_{vetPK}$ and $TIUDD_{vetPK}$ per farm



4 Conclusion

AMU in Pakistani broiler production is alarmingly high, requiring urgent reductions, especially in CIAs. Strengthening farm management (especially through biosecurity improvement plans) and regulatory oversight can ensure prudent use, reducing antimicrobial resistance (AMR) risk.

Full article

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