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**Biosecurity in Italian pig farms - monitoring as a basis for targeted improvements**

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**Introduction**

Monitoring biosecurity of pig farms is pivotal for farmers and veterinary authorities; particularly, when considering emerging and re-emerging diseases such as porcine epidemic diarrhoea (PED) and African swine fever (ASF). Both PED and ASF outbreaks may have severe consequences on pig production (Niederwerder and Hesse 2018; Sánchez-Cordón et al., 2018) and, in case of ASF, also result in bans on export. Improving biosecurity may also be essential to reduce antimicrobial use (AMU) without compromising production (Postma et al., 2017). In line, reducing AMU in livestock is part of the Italian national plan against antimicrobial resistance (Anon., 2017).

The aims of this study were to investigate biosecurity levels in Italian pig farms and identify potential areas for improvement as this has not been done before.

**Material and Methods**

Between Jan. 2017 and Jan. 2018, two researchers visited 124 pig farms during trial studies for the development of a monitoring system, called ClassyFarm, by the Italian Ministry of Health. All farms included were involved in the ClassyFarm trial on a voluntary base. Biosecurity was measured using Biocheck.UGent 2.1 (available at <https://www.biocheck.ugent.be/>), a risk-based survey which quantifies in percentages the on-farm biosecurity and provides a score for external biosecurity (all measures to prevent introduction of infection) and internal biosecurity (all measures to prevent spread of infection in the herd). Total biosecurity is calculated as the average of external and internal biosecurity. The survey encompasses six subcategories for external biosecurity and six for internal biosecurity (Fig.1). The relationships between farm size and biosecurity

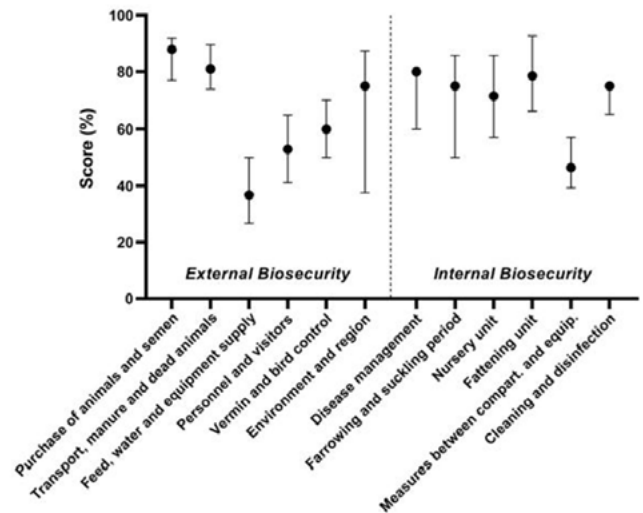


Figure 1: Median and interquartile ranges of 124 Italian pig farms of Biocheck.UGent 2.1 subcategories

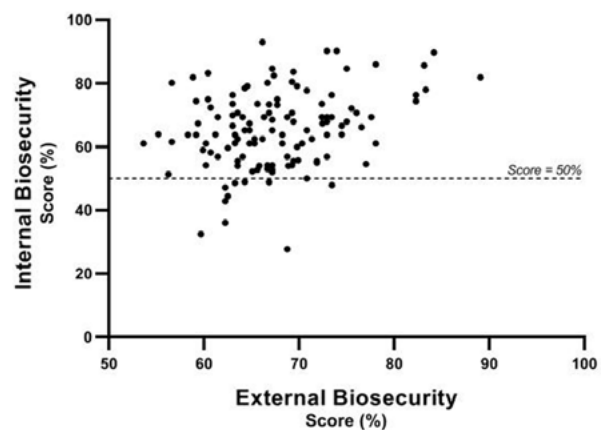


Figure 2: External and internal biosecurity of 124 Italian pig farms (Biocheck.UGent 2.1)

(total, internal and external) were investigated using Spearman’s rank-order correlation.

**Results**

The median yearly number of reared pigs in fattening farms was 7562 (range 1091-77349) while the median number of sows in the other farms was 490 (range 180-2600). The median total biosecurity was 66.3% (range 47.0%-86.1%), external biosecurity 67.2% (range 53.6-89.1%), and internal 65.3% (range 27.8-93.0%). Median scores below 50% were found in two subcategories, one for external biosecurity: “Feed, water and equipment supply” (36.7%; range 10.0-100%); and one for internal biosecurity: “Measures between compartments and use of equipment” (46.4%; range 17.8-92.9%). Figure 1 illustrates the median score and interquartile ranges of each subcategory.

The correlation between external and internal biosecurity (Fig. 2) was weak ( $\rho = 0.25$ ) but significant ( $P = 0.006$ ). A weak negative correlation ( $\rho = -0.25$ ,  $P = 0.02$ ) was found between size of fattening farms and internal biosecurity.

### Discussion and Conclusion

Since the sample size was limited, results of this study should be interpreted with caution. Furthermore, the farms involved in this study were part of a convenience sample which may not be entirely representative of the Italian pig production.

External biosecurity was, on average, lower than what has been reported in countries such as Belgium, Denmark, Germany, Sweden, and the Netherlands (Filippitzi et al., 2017). This warrants attention due to the re-emerging of ASF in Europe (Sánchez-Cordón et al., 2018). Biosecurity levels of feed, water and equipment supplies were particularly poor, and this may lead to introduction of different pathogens which may increase AMU. These results highlight the importance of promoting good practices such as keeping trucks and transporters outside the clean areas, buying feed with proper hygienic standards, and monitoring the quality of drinking water.

Internal biosecurity was generally higher than in other countries (Filippitzi et al., 2018); nevertheless, biosecurity between compartments and equipment management were generally poor which may facilitate spread of highly contagious agents once introduced into a herd (e.g. PED virus). Hence, target measures should be promoted such as keeping proper disinfection baths between compartments and using compartment-specific equipment.

A detailed knowledge of biosecurity areas of improvement may guide policies of veterinary authorities and allow for targeted education of farmers and vets. Finally, an important step towards better identification of areas of improvement could be applying a risk-based scoring system, such as Biocheck.UGent, to a sample of farms which is believed to be representative of the national pig production.

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