ASSOCIATIONS BETWEEN BIOSECURITY AND ANIMAL WELFARE IN INDOOR PIG FARMS

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BIO SEC URE

Good animal welfare is associated with good animal health. An optimal biosecurity is expected to improve animal health and welfare.

In this study we analyse biosecurity and animal welfare data from pig farms in Ireland to explore associations between biosecurity and animal welfare in intensive pig production.

Materials and Methods

Two assessment systems were used in this study.

BIOCHECK PIGS
Pigs

Assessment and Management of Risk Factors in Tail-biting in Pig Production

Total Models: 15 LMMs
- One for each biosecurity subcategory (6 external subcategories + 6 internal subcategories)
+
- One each for Overall, External and Internal biosecurity.

Linear mixed models (LMM) were used to analyse relationships between biosecurity subcategory (scores 0 to 100)

Predictors variables: welfare risks, farm type, year and other variables

Random Effects: Veterinarian (assessors) and the Farm (herd)

Records per farm and year were matched.

Number of Farms	2020	2021	2022	2023
Biosecurity	148	173	303	268
Welfare	160	203	299	268
Statistical analysis	141	160	245	237

Results

For most of the models:

- Biosecurity scores increased over the years
- Fattening farms had a higher score of overall and internal biosecurity, while birth to bacon farms had a higher score for external biosecurity.

The herd effect had **a higher variance** than the assessor effect.

Associations between biosecurity sections and animal welfare risk were found for some models.

Regression coefficients of the LMMs with statistically significant results (p-values <0.05).

Models (biosecurity scores as outcomes)	Presence of risks for different animal welfare categories:				
	Environmental enrichment	Animal Health	Competition issues	Feeding processes	Thermal Comfort
External biosecurity sections:					
Purchase of animals and semen		3.60	-4.66		
Transport of animals, removal of manure/dead animals	-2.53				
Feed, water and equipment supply	-3.41				
Personnel and visitors	-4.75				
Vermin/bird control	-9.30			-3.52	
Internal biosecurity sections:					
Farrowing and suckling period	-9.21				
Nursery unit management				4.01	-3.31
Fattening unit management			4.77		

Legend: **Blue cells when estimate is negative** (meaning that the **biosecurity score decreases with the fixed effect** – e.g. the biosecurity score for the management of the nursery unit is 3.31 on average lower on farms where there are risk for thermal comfort compared to farms where such risks are not present) and **peach cells when estimate is positive** (meaning that the **biosecurity score increases with the fixed effect** – e.g. the biosecurity score for management of the nursery unit is 4.01 on average higher on farms where there are risk for feeding processes compared to farms where such risks are not present).

Summary

We found some statistical associations between biosecurity and animal welfare. Mostly a decrease in biosecurity was associated with presence of risks factors for animal welfare, albeit that was not always the case.

The results reflect the difficulty in assessing animal welfare when relying exclusively in one method. A combination of several methods using animal-based measures, taking into account resources available and incorporating animal behaviour should be explored in the future.