Biosecurity practices in Mexican poultry farms: an insight to face disease challenges

#SVEPM2020

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1. Background

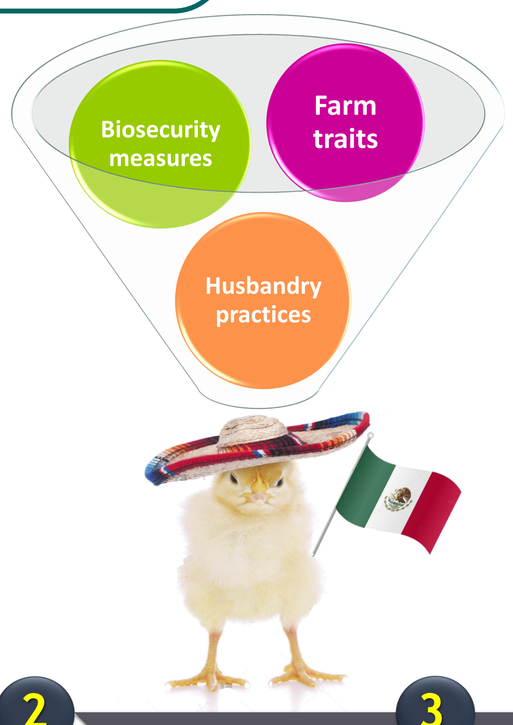
- Mexico is the 4th egg and the 6th chicken-meat producing country worldwide
- Repeated outbreaks of the newly detected subtype H7N3 Highly Pathogenic Avian Influenza virus (HPAI) have been occurred ever since its first detection in 2012
- New regulations have been issued by the Mexican government regarding antimicrobial usage on livestock (2018) and best poultry husbandry practices (2016)

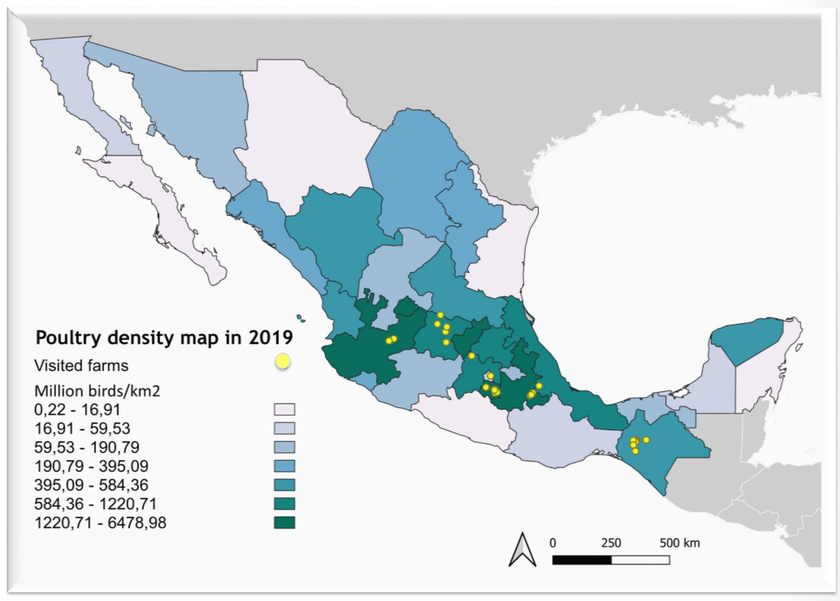
2. Questions

- Which are the biosecurity measures practiced across the different types of poultry farms in Mexico?
- Is there a pattern of antimicrobial usage in Mexican poultry farming?

3. Methodology

1. 43 farms were visited
2. On-farm interviews were conducted using a 48-question survey
3. A multivariate data analysis was performed:
   a) A Multiple Correspondence Analysis (MCA) to explore the individuals and the categorical variables
   b) Farms were grouped using an agglomerative Hierarchical Cluster Analysis (HCA) according to their pattern of husbandry practices and biosecurity measures



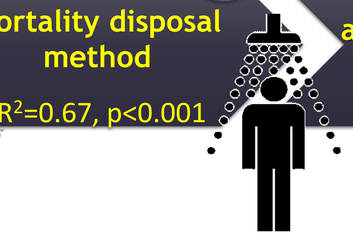


4. Results

4.1

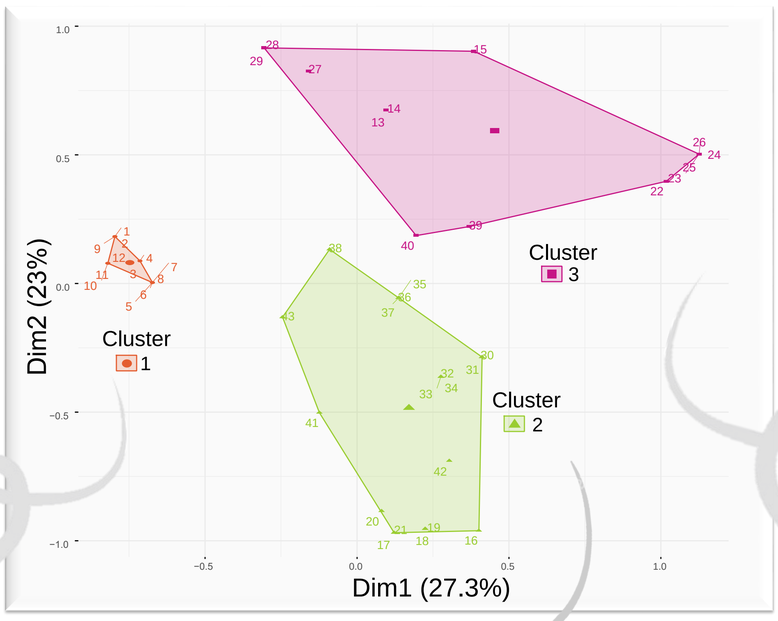
Top 5 biosecurity measures whose practice differentiates the farms according to the MCA

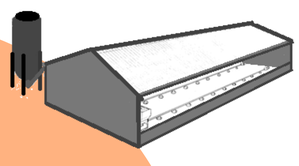
1. Usage of self-protective equipment — R^2=0.82, p<0.001
2. Mortality disposal method — R^2=0.67, p<0.001
3. Hygiene before and after entering the farm — R^2=0.53, p<0.001
4. Compulsory use of exclusive farm clothes — R^2=0.52, p<0.001
5. Footbath at barn entrance — R^2=0.38, p<0.001

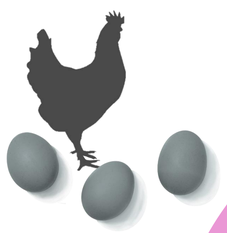


4.2

3 clusters were identified by the HC analysis







Cluster 1 (n=12)

Broilers in open-sided barns in small farms were overrepresented

- Vacancy period <1week
- Not compulsory usage of exclusive farm clothes
- Occasional wear of self-protective equipment

100% (12/12) of farms used 2 antibiotics, 3 farms mixed both

Phosphonic acid derivatives (n=12/12) *

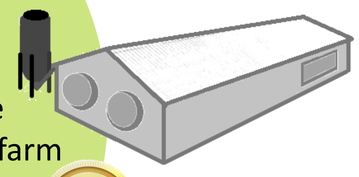
* p<0.001

Macrolides (n=3/12)

Cluster 2 (n=18)

Broilers in controlled-environment barns in large farms were overrepresented

- Footbath at each barn entrance
- Compulsory usage of exclusive farm clothes
- Mandatory use of self-protective equipment



44.4% (8/18) of farms used 3 antibiotics, 6 farms mixed them all

Quinolones (n=8/8) *
Macrolides (n=6/8)
Tetracyclines (n=6/8)

* p<0.01

Cluster 3 (n=13)

Egg-laying hens in open-sided barns were overrepresented

- Optional or inexistent hygiene protocol before and after entering the farm
- No footbath at each barn entrance
- No usage of self-protective equipment

84.6% (11/13) of farms used 4 antibiotics, 1 farm mixed Tetra + Quino + Phospho

Phosphonic acid derivatives (n=3/11)

Quinolones (n=1/11)
Macrolides (n=2/11)
Tetracyclines (n=7/11)*

* p<0.05

4.3

-Antibiotics were used in 72% of the farms (31/43)
-Some antibiotics were significantly associated with the cluster construction (p-value)

*Antibiotics are colored in a traffic light color key considering risk for publich health:
Avoid · Restrict · Caution · Prudence

5. Conclusions

1. The **top 5 biosecurity measures** identified in this study are those whose **compliance should be enforced**.

2. Egg-laying hen farms were more prone to **breach biosecurity** measures. **Last HPAI outbreak in Mexico in 2012 started in this type of farms.**

3. In **farms where biosecurity measures were less stringent**, **antibiotic treatment was more likely to be used**.

4. Farms with **more biosecurity breaches** used **critically important antibiotics for public health** according to the *"Categorization of antibiotics in the European Union"*

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