# Leveraging data integration to improve broiler health management: a Polish case study

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## Introduction

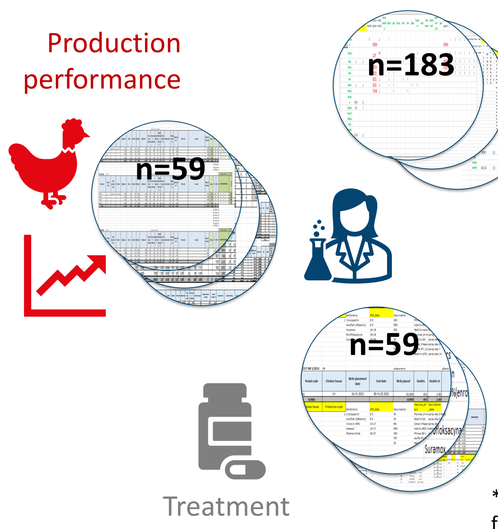
**Using real-world data** in research is advocated as an **efficient solution** to improve **animal health management** by providing **relevant** and **timely** information for **decision-making**.

We propose to examine the **process** required to transform real-world data into information for decision-making, using data from **Polish broiler** farms as an **example**.

## From real world data to decision making

### Input:

Example: data from 59 Polish broiler farms between 2018 and 2022




*n is the number of flat files received

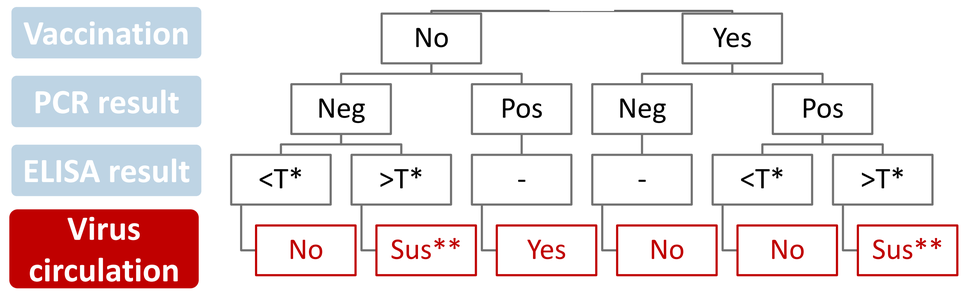
### 1. Extract Transform Load (ETL)

### 2. Cleaning, standardisation, integration

### 3. Enrichment

**Adding value to the data using external sources (GIS information, domain knowledge, etc.).**

Example: decision trees were defined using expert knowledge to estimate if field viruses circulated in the flock




T* - Geometric mean threshold defined based on virus and ELISA test type
Sus** - Suspected circulation, further testing required before confirmation

### Iterative process

### Output:

**Data-driven decision-making**

### 4. Data description

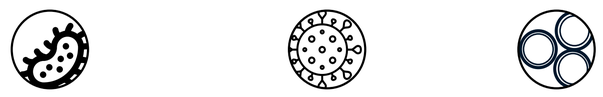
**Essential to understand the context and limits of the data.**

Example 1: Description of production performance indicators revealed that our data is made of high performing flocks

| Screened flocks ( 114) | Mean | SD[a] |
|---|---|---|
| Condemnation (%) | 0.57 | 0.44 |
| Dead on arrival (%) | 0.004 | 0.003 |
| European performance efficiency factor (EPEF) | 391.25 | 46.82 |
| Feed conversion rate (FCR) | 1.58 | 0.11 |
| Mean age at slaughter (days) | 38.89 | 1.39 |
| Mean weight at slaughter (Kg) | 2.53 | 0.18 |
| Mortality (%) | 5.71 | 4.36 |

[a]SD: Standard deviation; flock mean performance are better or worse than the one described in Europe by Van Limbergen *et al*. (2020).

Example 2: Pathogens observed in the flocks showed a high diversity



*Escherichia coli** present in 60.5% of the flocks

*Enterococcus faecalis* in 29.8%

*Staphylococcus spp.* in 28.1%

Infectious bronchitis virus (IBV) circulating in 42.1% of the flocks

Avian metapneumovirus (aMPV) in 20.2%

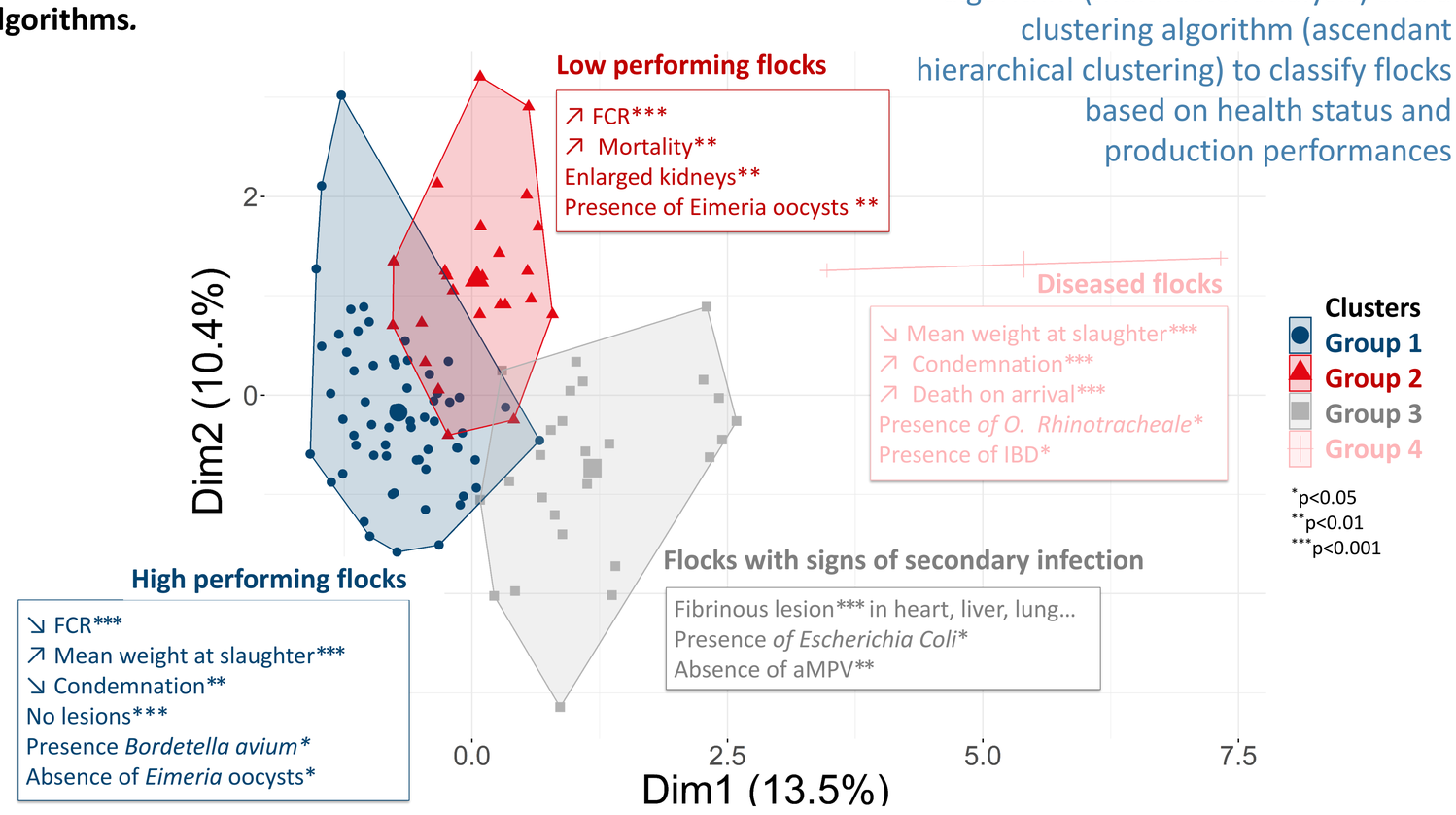
Infectious bursal disease virus in 18%

Eimeria oocyst observed in 35.1% of the flocks

### 5. Data analysis

**Transforming data into information by using simple to complex machine learning algorithms.**

Example: using dimension reduction algorithm (multifactor analysis) and a clustering algorithm (ascendant hierarchical clustering) to classify flocks based on health status and production performances




## Discussion and conclusion

The described process allowed the **identification of patterns** in the flocks that stakeholders can use to identify issues in current health management and associated **solutions** or **hypotheses for further investigation**. However, in the example, the **value of the information** is **limited** by the amount and quality of **available data.**

Describing this process supports the development of decision-support tools for animal health management**.** It demonstrates **to stakeholders** that **reusing their real-world data** can produce **relevant decision-making information,** but also highlights the **current obstacles**, such as data accessibility and quality.

**Reference**
Van Limbergen, *et al*., on behalf of the PROHEALTH consortium, 2020. Risk factors for poor health and performance in European broiler production systems. BMC Vet. Res. 16, 287. doi: 10.1186/s12917-020-02484-3

## DECIDE Consortium

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