

Early disease detection for weaned piglet based on live weight, feeding and drinking behaviour



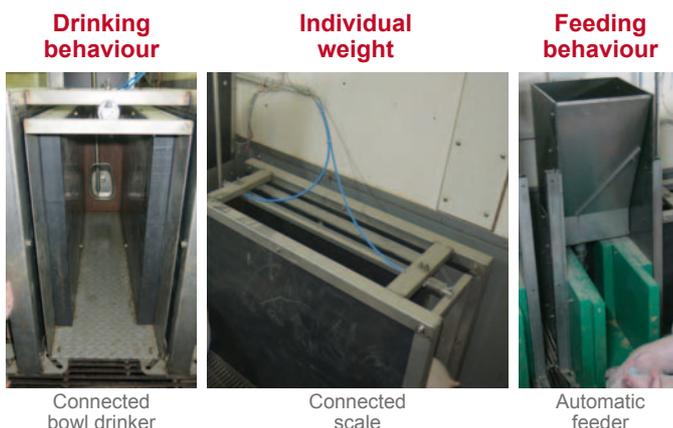
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Reduce antibiotic use is a major issue for pigs production because of World Health Organization recommendations and meat consumers concerns. In order to reduce the needs of medication, one way is the early individual disease detection for isolate and treat only the sick animal. The subclinical symptoms with the feeding and drinking behaviour can have a diagnostic value. A first automatic warning system has been built based on a statistic model who use data from automatic feeders, connected bowl drinker and connected scale.

Housing conditions

- Two batches of 102 piglets from 28 to 63 days old
- 6 pens of 17 animals
8 ♀ and 7 castrated ♂
- 3 groups of weight:
 - Light (7.69 kg ± 0.4)
 - Mediums (8.80 kg ± 0,4)
 - Heavy (9.80 kg ± 0,4)
- Two feeds:
 - 1st → 15th day
 - 5th → 35th day
- Temperature from 28°C to 24°C

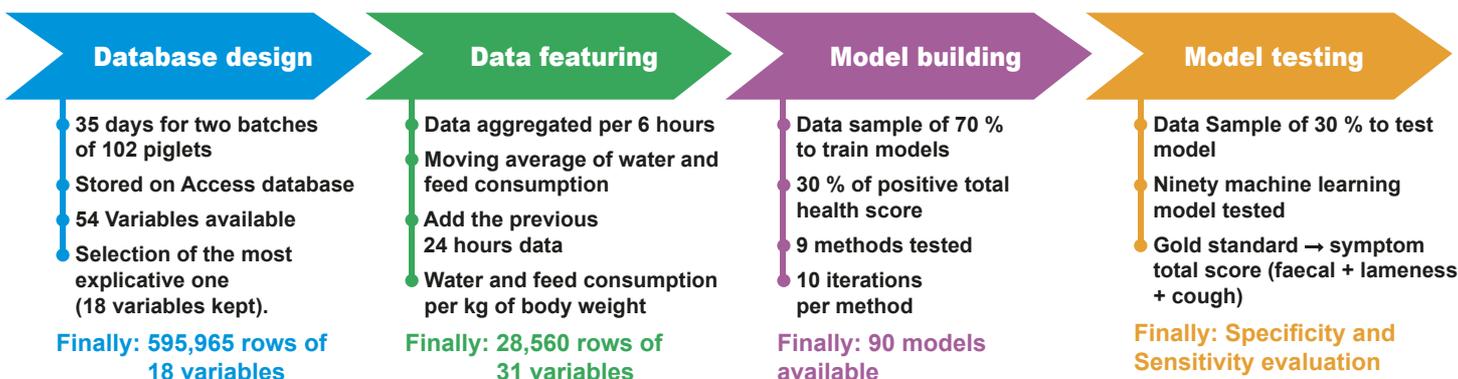
Equipment



Health status

- Observations by a skilled operator 20 minutes per pen 5 days per week
- Focus on Digestive / Respiratory / Locomotor disorders
- Piglet forced to defecate 3 time per week
- Rating grid based on Welfare Quality
- Standardized on Excel file

Results



Method used	Classification and Regression Trees (CART)	Gradient Boosted Machine	Bagging*	k-Nearest Neighbours			Logistic Regression	Naive Bayes	Random Forest
				3	5	8			
Sensitivity	19 %	14 %	83 %	88 %	86 %	83 %	29 %	61 %	69 %
Specificity	97 %	99 %	92 %	81 %	80 %	78 %	85 %	56 %	93 %

* The best score for specificity and sensitivity is 100%. The best model is when both sensitivity and specificity are close to 100%.

Discussion

- Perform model validation in commercial farms
- Improve the robustness of the model through:
 - Increasing the number of batches
 - Adding new traits such as activity level

Conclusion

The global accuracy of the bagging model to perform early disease detection appears to be good enough to build a first decision support tool. The results showed that the sensitivity of the model was higher than 83 % and the specificity higher than 92 %. However, it is difficult to determine whether the model would be robust in another context, with another breed of piglets or within another farm. Further validation of the model is ongoing. New trials with new batches of piglets are being undertaken to see if the accuracy of the decision support tool with new piglets (different from the one used to build the model). Further investigations are planned within the Healthy-Livestock project, such as trying to add new traits to find the best predictor of disease or trying to make the model able to determine which kind of disorder the piglets are suffering from.

