

From Fish to Fowl: How AI is Saving a Commercial Broiler Farm

Resume:

Livability in broilers refers to the percentage of chicks that remained alive and healthy from their placement to marketing weigh. It serves as a critical indicator of both animal welfare and farm performance. Benchmark livability values for commercial broilers typically range from 91% to 99%. Low livability carries significant economic consequences, as each lost bird represents wasted feed, labor, housing, and veterinary inputs, while also reducing overall flock uniformity and profitability. From a sustainability perspective, high mortality translates into inefficient resource use and a larger environmental footprint per kilogram of meat produced.

The major drivers of low livability include infectious diseases (linked to management flaws like poor ventilation, inadequate nutrition, and excessive stocking density), environmental stressors (e.g., temperature fluctuations or poor litter quality), and genetic predispositions associated with rapid growth. Ensuring high livability is therefore essential not only for economic returns but also for the ethical and sustainable production of poultry meat.

In this study, we aimed to predict broiler livability using environmental, health, and production data. We primarily analyzed data from 97 antibiotic-free and conventional broiler production cycles across eight farms in Quebec. To address the data scarcity, a common challenge when training and testing machine learning models in animal agriculture, we supplemented our dataset with three types of salmon production data. These complemeLivability in broilers refers to the percentage of chicks that remained alive and healthy from their placement to marketing weigh. It serves as a critical indicator of both animal welfare and farm performance. Benchmark livability values for commercial broilers typically range from 91% to 99%. Low livability carries significant economic consequences, as each lost bird represents wasted feed, labor, housing, and veterinary inputs, while also reducing overall flock uniformity and profitability. From a sustainability perspective, high mortality translates into inefficient resource use and a larger environmental footprint per kilogram of meat produced.

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transfer learning by predicting liveability in salmon data and then using models weights to train a predictive model for broiler livability. LLM model performance was evaluated using root mean squared error (RMSE) to access the relationship between predictors (temperature, production features) and broiler livability. Our preliminary results show that broiler livability can be predicted with an average error between 1.5% and 1.6% per production cycle.

This study highlights the use of novel AI approaches and external data to tackle data scarcity. We also highlight the importance of controlling environmental parameters to mitigate production losses and promote sustainable broiler production in Canada. Providing farmers with recommendations on optimizing environmental conditions can help prevent financial losses and improve farm profitability.