I INTEGRATIVE INTERNACIONAL CONGRESS
ON ANIMAL AND ENVIRONMENTAL HEALTH

THE USE OF AI IN PREDICTING CONDEMNATIONS IN CHICKEN CARCASS INSPECTION: AN APPROACH TO ONE HEALTH.

I Integrative International Congress on Animal and Environmental Health, 1ª edição, de 25/06/2024 a 28/06/2024
ISBN dos Anais: 978-65-5465-100-4

CARVALHO; Flávio Eduardo da Silva de [1], SALLE; Carlos Tadeu Pippi [2]

RESUMO

The meat inspection service plays a fundamental role in ensuring food safety and preventing diseases transmitted through them. Additionally, animal health is intrinsically linked to human health, as the quality of animal-derived products directly impacts consumer health. Furthermore, environmental care also has an important role related to agricultural and animal production practices that may affect both animal and human health. In this context, One Health seeks to ensure balance in this triad. This study presents an investigation into the use of Artificial Neural Networks (ANNs) on findings from poultry carcass inspection in slaughterhouses, with a focus on promoting One Health principles. Our aim was to assess the ability of ANNs to estimate parameters related to conditions identified by federal inspection services, including total and partial condemnations, total and partial contaminations, repugnant appearance, dermatosis, and airsacculitis. The dataset used in the study comprises a historical series of the entire commercial poultry chain, consisting of 3,370 batches of poultry from a single source, with 70% (2,359 batches) allocated for model training and 30% (1,011 batches) reserved for testing. Each batch is described by 89 variables, representing a robust basis for analysis. Among the attributes are various zootechnical production data. The construction of the target attribute was based on criteria established by the partner poultry company and aligned with sector requirements, choosing 7 dependent variables related to conditions identified and segregated by inspection services (total and partial contamination, airsacculitis, repugnant appearance, dermatosis, and total and partial condemnation) as output models. The Neuroshell Predictor® computational program was used to develop the ANN models. The model results were evaluated based on statistics generated by the program, as well as comparison of generated linear regression graphs, providing information on the performance and effectiveness of artificial neural networks in predicting identified conditions. The training results of the ANNs demonstrated high performance, with coefficients of determination (R^2) above 0.80 and a correlation coefficient (R) of 0.90. Validation (test) values of R^2 and R ranged between 0.70 and 0.90, indicating a consistent predictive capacity of ANNs relative to real data. The application of Artificial Neural Networks (ANNs) in poultry carcass inspection not only improves the early detection of conditions but also promotes a holistic approach to One Health. By integrating data on breeding conditions, animal welfare, and slaughter practices, ANNs offer a comprehensive analysis that goes beyond traditional food inspection boundaries.

PALAVRAS-CHAVE: Federal Inspection Service, Carcass condemnation, Artificial Neural Networks, Deep Learning, Food safety

[1] Universidade Federal do Rio Grande do Sul, carvalhofes@hotmail.com
[2] Universidade Federal do Rio Grande do Sul, tadsalle@gmail.com

[1] Universidade Federal do Rio Grande do Sul, carvalhofes@hotmail.com
[2] Universidade Federal do Rio Grande do Sul, tadsalle@gmail.com