

Use of NIR Spectroscopy from identification of chicken breast defects

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Why is this important?

Growth-related breast myopathies such as White Striping (WS), Wooden Breast (WB) and Spaghetti Meat (SM) are major quality defects in modern broiler production. These conditions reduce meat quality, affect processing performance and generate economic losses due to downgrading and product rejection. Reliable methods for early detection are needed to support quality control and improve processing decisions. Near-infrared (NIR) spectroscopy offers a rapid, non-destructive and portable solution that can be applied directly in processing facilities.

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What was done?

The INTAQT project evaluated a pocket-sized near-infrared (NIR) spectrometer combined with machine-learning models as a rapid screening tool for detecting breast myopathies in broiler meat. A total of 4,500 breast fillets from commercial broiler flocks were scanned non-destructively using a handheld device.

Spectral information was used to develop prediction models capable of distinguishing normal fillets from those affected by WS, WB and SM. The study also investigated the biochemical changes associated with these defects.

Main results of the Detection of breast myopathies

- Portable NIR spectroscopy successfully differentiated normal fillets from those affected by White Striping and Wooden Breast.
- The best prediction models achieved a balanced accuracy of 77–78%.
- Detection was most effective when multiple myopathies occurred simultaneously, reflecting common commercial conditions.
- Spectral information captured biochemical changes associated with the defects, including alterations in water distribution, fat deposition and collagen content.
- The results demonstrate the potential of handheld NIR devices as practical tools for rapid quality screening in poultry processing plants.

Practical recommendations

Poultry processors can implement portable NIR devices as a first-pass screening tool on processing lines to rapidly identify fillets that may require further inspection or alternative product allocation. The technology can support objective quality assessment and improve consistency in sorting operations.

Limitations and future opportunities

Although the models achieved promising accuracy, further improvements are possible through larger datasets and additional machine-learning developments. Future work could expand the approach to different broiler populations and processing environments, improving model robustness and facilitating wider industrial adoption.

Benefits for practitioners - Implementation of NIR technology can:

- Improve quality-control efficiency.
- Reduce reliance on manual inspection and visual scoring.
- Identify defective fillets before packaging.
- Reduce downgrading and associated economic losses.
- Improve product segmentation and allocation.
- Increase processing efficiency and consistency.
- Provide rapid, non-destructive and portable analysis without laboratory reagents.
- Support monitoring of myopathy prevalence over time.

Key message

Portable NIR spectroscopy provides a rapid, non-destructive and cost-effective method for detecting broiler breast myopathies. Its implementation in poultry processing plants can improve quality control, reduce economic losses and support more objective decision-making throughout the production chain.