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## **Non-Destructive Measuring Systems for the Evaluation of High Oxygen Stored Poultry: Development of Headspace Gas Composition, Sensory and Microbiological Spoilage**

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### **Abstract:**

As poultry is known to be a perishable food, the use-by date is set in such a way that food safety is guaranteed even with a higher initial bacterial count. This means, however, that some products are wasted, even if they are still safe to eat. Therefore, non-destructive measurement devices might be a good opportunity for individual shelf-life prediction, e.g., in retail. The aim of this study was therefore to use non-destructive measurement devices based on fluorescence quenching (oxygen detection) and mid-infrared laser spectroscopy (carbon dioxide detection) for the monitoring of high-oxygen-packed poultry in different storage conditions. During 15 days of storage, the gas composition of the headspace was assessed (non-destructively and destructively), while total plate count was monitored and a comprehensive sensory evaluation was performed by a trained panel. We were able to demonstrate that in most cases, non-destructive devices have comparable precision to destructive devices. For both storage conditions, the sensory attribute slime was correlated with reaching the critical microbiological value of  $10^7$  CFU/g; the attribute buttery was also useful for the prediction of regularly stored poultry. The change in the gas atmosphere as a sign of premature spoilage, however, was only possible for samples stored in irregular conditions.

Keywords: modified atmosphere packaging, non-destructive, shelf-life prediction, sensory evaluation, fluorescence quenching, infrared spectroscopy, meat quality