

Abstract

Evaluation of oyster freshness using near infrared spectroscopy

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Introduction

The spoilage of oysters is complex. It occurs via metabolic activities of microbial organisms and also through biochemical reactions such as oxidation and enzyme activity. Traditional methods to evaluate spoilage include microbial, biochemical and sensory evaluation techniques. However, these techniques are either time consuming or require specialist sensory panels. The potential of near infrared reflectance (NIR) spectroscopy as a tool to evaluate oyster freshness has been explored.

Materials and Methods

Pacific oysters were harvested, shipped overnight by road transport and processed the following day as per standard industry practice. Shucked, half shell oysters were stored in plastic oyster trays. Trays were placed within unsealed plastic vacuum pouches with the end of the bag folded to prevent dehydration. Oysters were stored at 4°C and were sampled on Days 0, 3, 5 and 7 and freshness was assessed by a sensory evaluation method and by microbial enumeration. The microbial analyses undertaken included counts of total viable organisms, *Shewanella* like organisms and *Pseudomonas* spp. The concentration of trimethylamine was also estimated (AOAC 971.14). NIR spectra were collected from 20 individual oysters on each analysis Day using an Antaris FT-NIR spectrophotometer. Data was collected from both whole and homogenised oysters. Principal component analysis (PCA) and partial least squares discriminant analysis (PLS-DA) were used as methods to interpret and classify oysters according to freshness.

Results and Discussion

PLS-DA and PCA developed using NIR spectra, discriminate oyster samples according to their freshness. A classification rate for fresh oysters of 67% was achieved on Days 2 and 3. For off oysters a classification rate of 70% was achieved on Days 5 and 7.

Conclusions

These results suggest that NIR spectroscopy, combined with multivariate data analysis methods, is useful for determining the freshness of oysters. Potentially, future uses could also include classification of other quality traits and product identification and authentication. The work reported here constitutes a preliminary study and requires further development.