

# Rapid detection of early spoilage odours

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<http://www.agresearch.co.nz>

<http://www.mirin.z.co.nz>



Farming, Food and Health. **First**

*Te Ahuwhenua, Te Kai me te Whai Ora. Tuatahi*

# Overview



Rapid detection of early spoilage odours

- What it is?
- How can it help you? - Applications
- How does it work?



## Rapid detection – what is it?

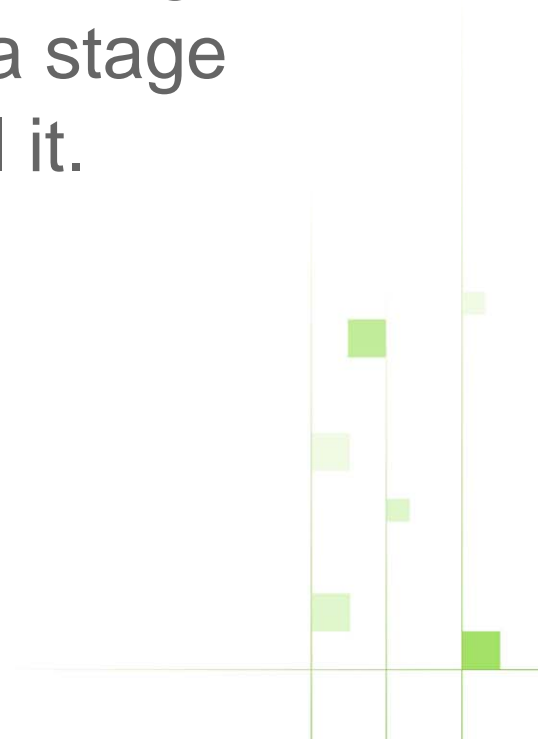


A means for detecting the spoilage state of meat, from the “odours” produced during micro-organism growth – ideally at a stage before a human nose can smell it.

If a human can / better

Picture a machine

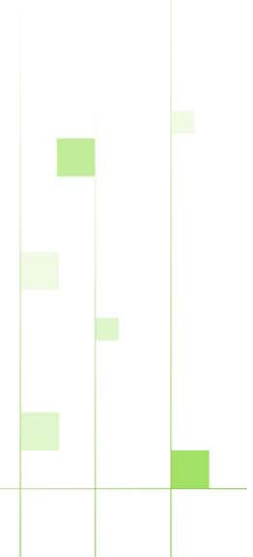
Fast, cheap, high chemical  
compound ID



## How can it help you? - Applications



- Prediction of shelf life
- Odour profile differences due to season, region and feed
- Spoilage/contamination QA for customer
- Spoilage/contamination QA at distribution centre
- Accelerated test and hold
- Improved traceability



# Prediction of shelf life

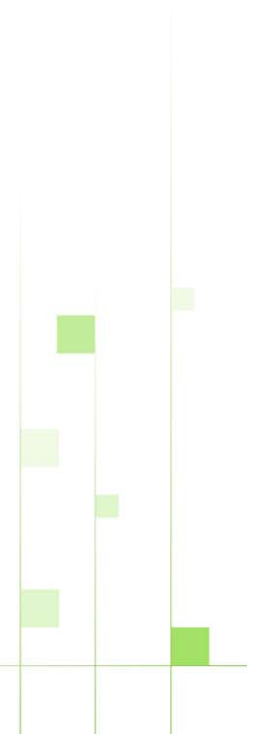


**Problem:** Current methods for quickly determining shelf life ignore variations in past storage conditions and microbial growth associated with individual cuts. Therefore most cuts are labelled with shelf lives that are too conservative.

**Solution:** Early detection of developing odours predicting shelf life could result in more accurate dates, customised for individual cuts or packages.



Mean  
individual



# Odour profile differences due to season, region and feed



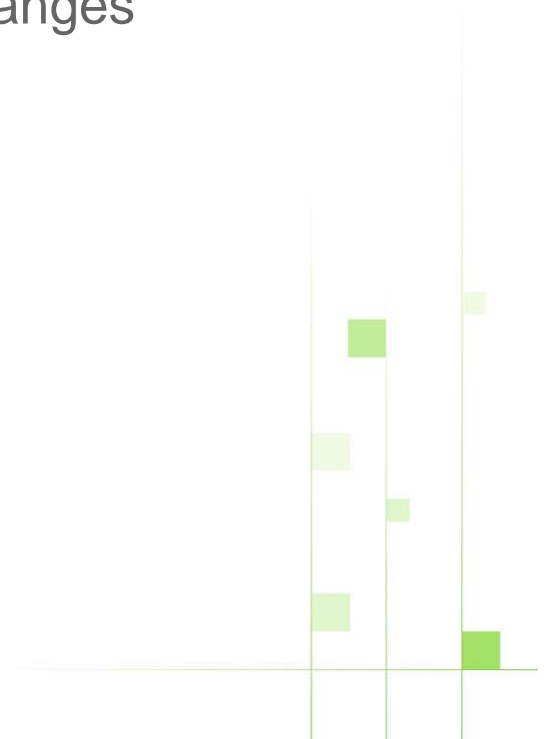
**Problem:** Season, region of supplier and feed differences all affect odour profile.

**Solution:** Could augment the odour panel. An on-line system would check whether samples remained within the ranges specified by the panel.

Virtual odour panel

Within limits

Product channelling



# Spoilage/contamination QA for customer

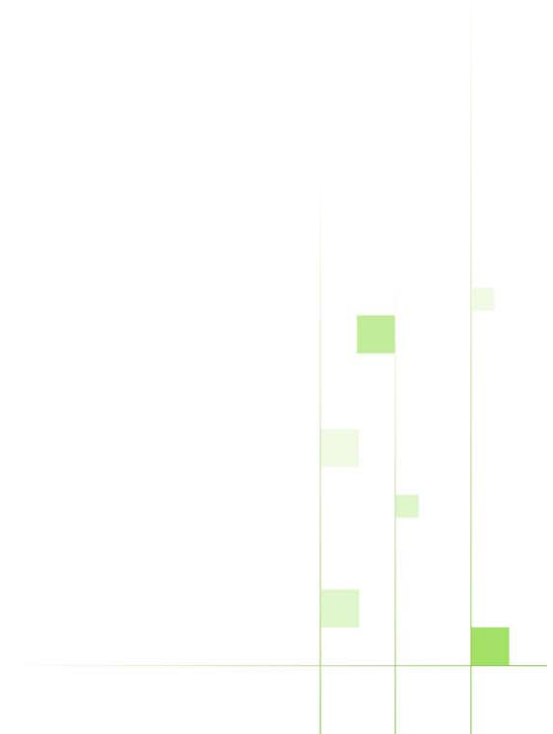


**Problem:** The customer receives meat with a suspicious odour, colour, texture or taste. What went wrong and who's to blame?

**Solution:** The customer exposes a passive sampling device to the pork odour and courier it away for analysis.



Captures state  
Tamperproof logger



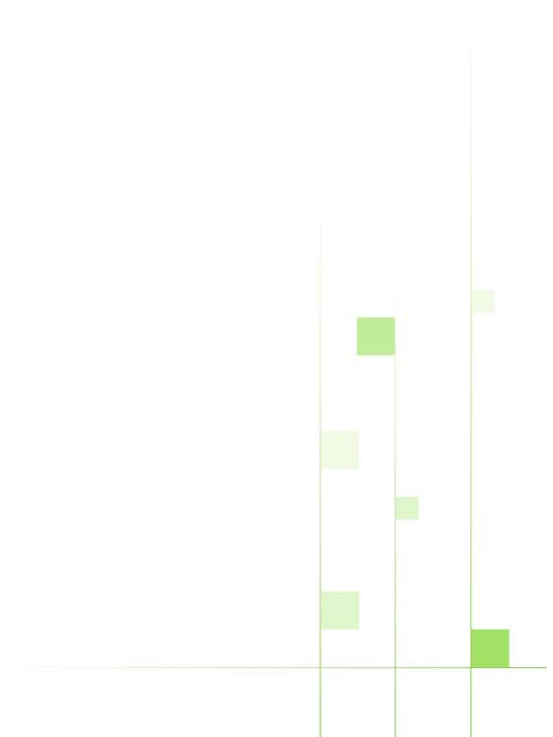
# Spoilage/contamination QA at distribution centre



**Problem:** The reputation of a brand can suffer significantly in the rare event when contaminated or spoiled meat leaves the processor.

**Solution:** On-line sensing of unusual volatiles sends product on conveyer belt to “more inspection required line”.

Anything different  
Machine oil





## Accelerated test and hold

Meatingplace.com reader survey, Oct 2007

**Problem:** 63% of survey participants said they support the method of testing ground beef samples and holding shipments to retailers until sample test results are confirmed. However, the overhead in inventory control and storage is expensive, and ironically decreases shelf life.

**Solution:** Reducing the testing time to a matter of minutes effectively eliminates the waiting period.



# Improved traceability

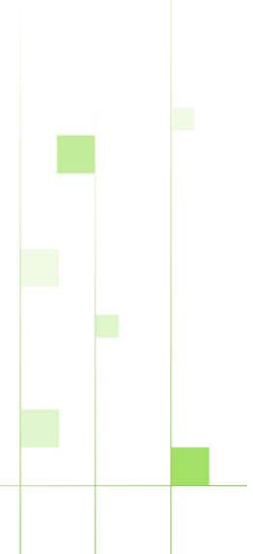


**Problem:** Traceability back to individual sources is very difficult after product from different suppliers is mixed together.

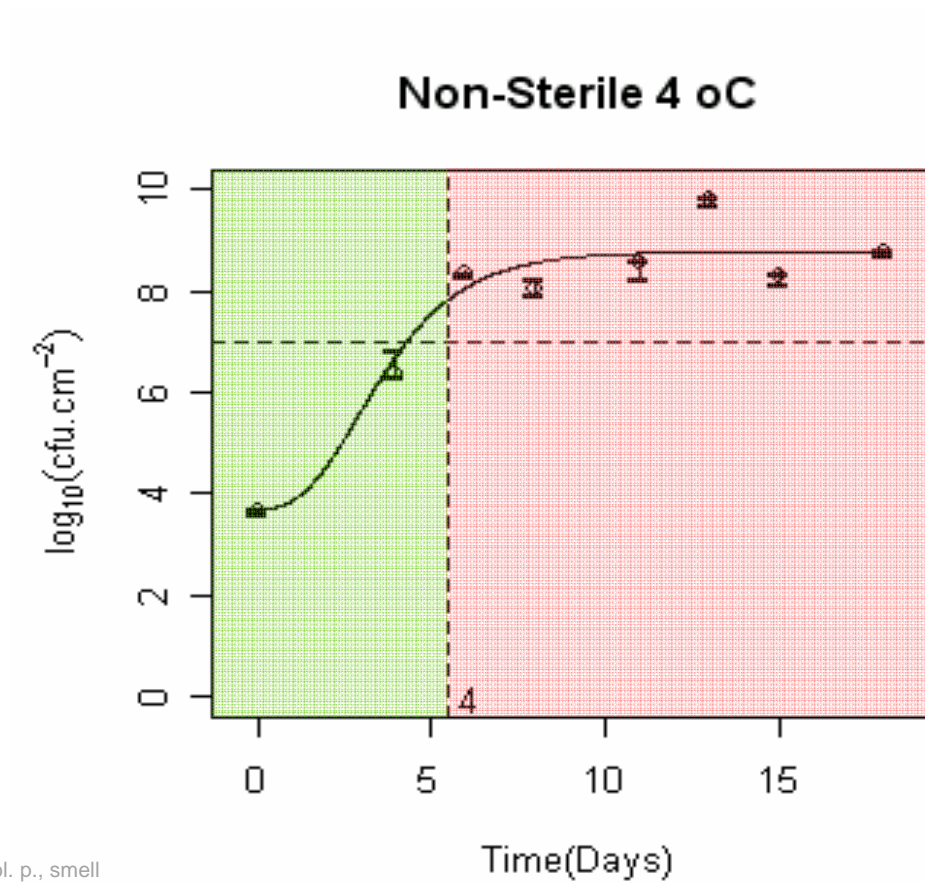
**Solution:** Any method that reduces the testing time makes traceability more feasible. Traceability from retailer back to processor ensures initial results are already to hand from individual sources.



So quick easy it lowers  
the barrier



# Experimental results during spoilage

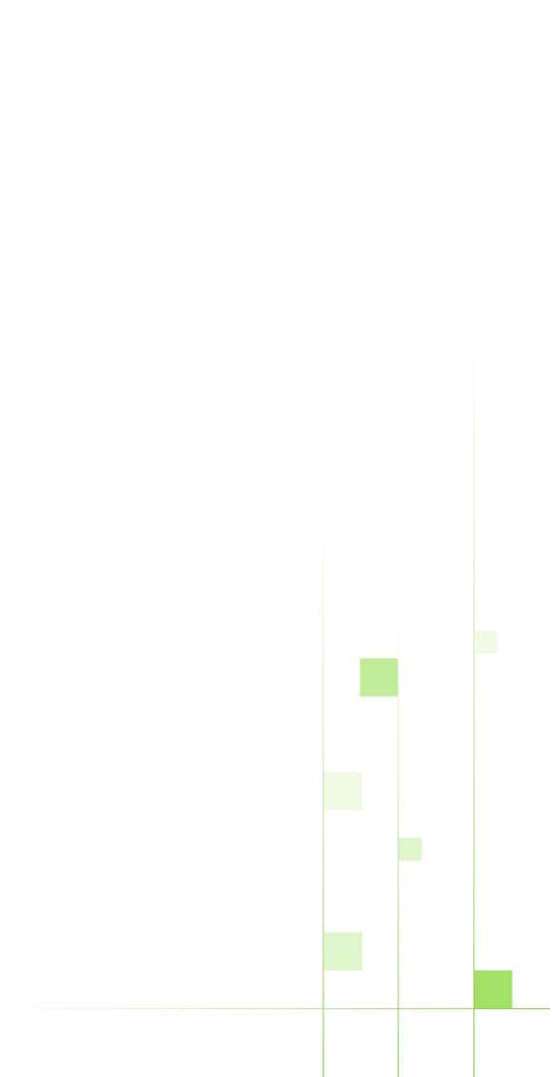


Explain exp.

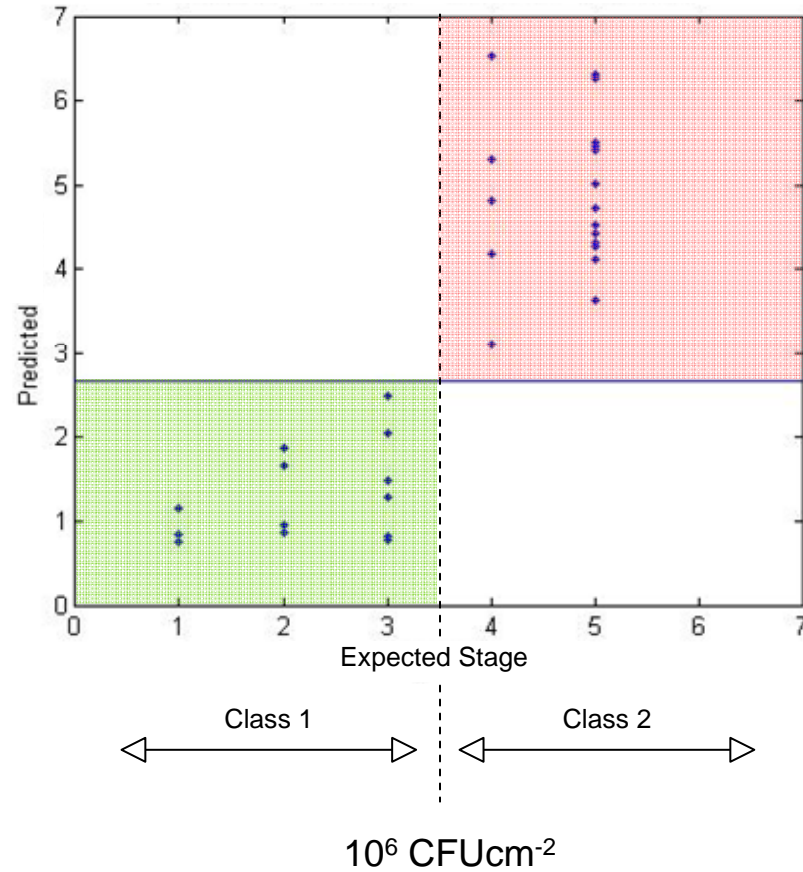
Simple sugars, then a.a. and sol. p., smell

No single marker

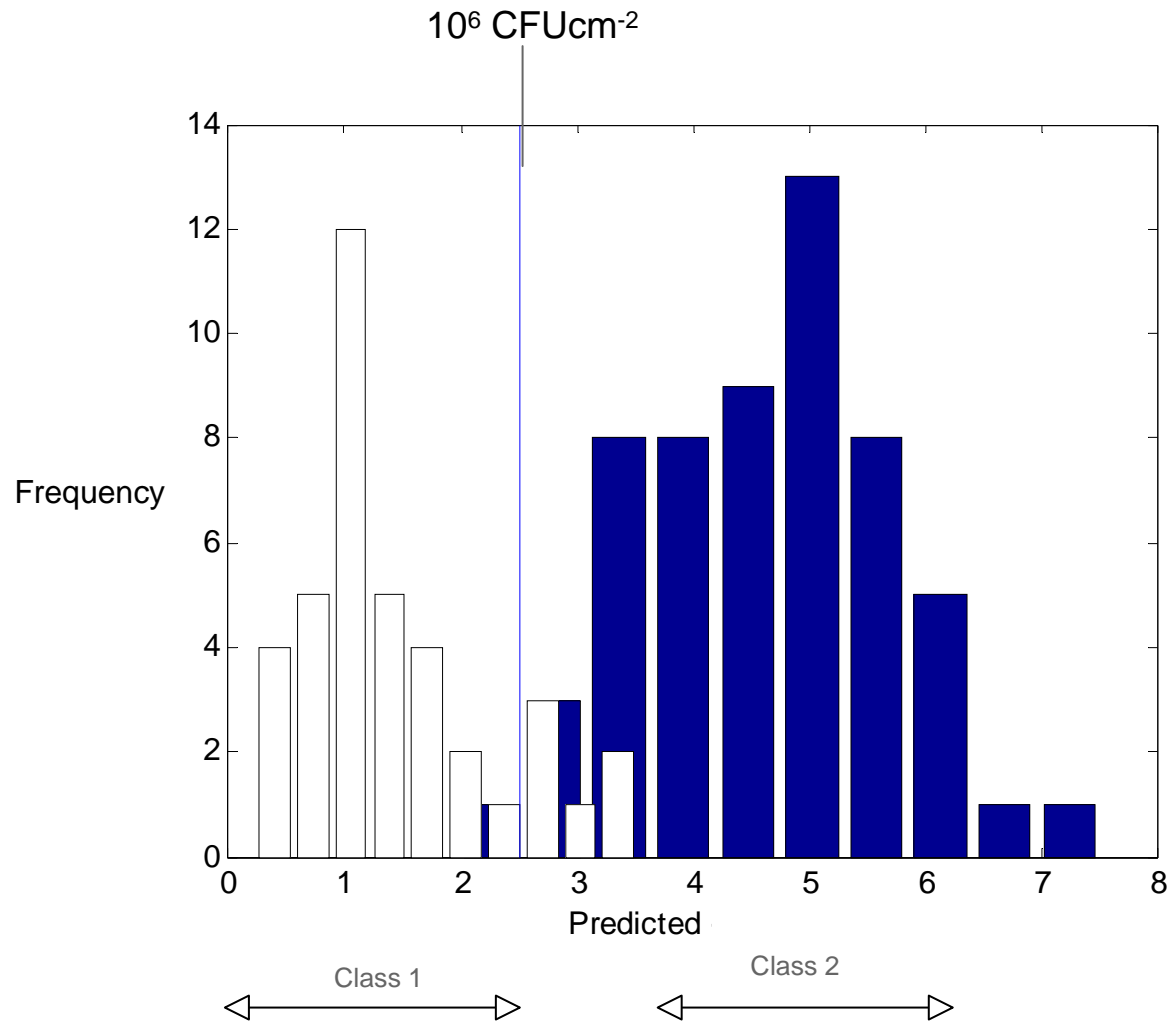
Classes of volatiles – variability in samples and states of growth



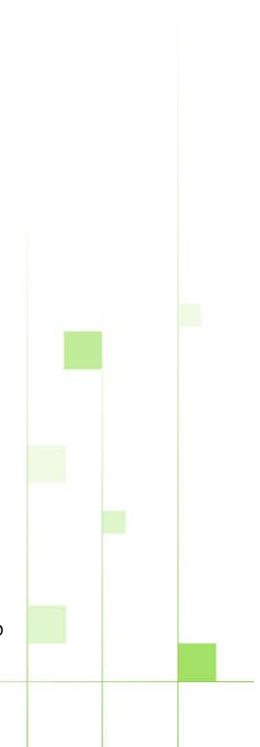
# How does it work?



# Results



Decision point = mean of Class 2 - 2SD



## Question time



Our research...  
Your applications.

Tell me about them!

