

## Key Benefits

Instant analysis of all volatile freshness markers

Minimal sample preparation

Simple operation

Easily configured for multiple products

Industry-proven robust technology



## Simple, Instant Evaluation of Beef Freshness

Beef freshness is evaluated easily and objectively by applying SIFT-MS for instant, direct analysis of evolved volatile freshness marker compounds.

Consumer acceptance and food safety are important concerns for suppliers of beef and other red meats. Although consumers provide the ultimate feedback on product quality, application of suitable instrumentation can provide rapid analysis, objectivity, and low costs per sample, which are not always possible using human subjects.

Selected Ion Flow Tube Mass Spectrometry (SIFT-MS) is a very rapid, sensitive technique for assuring freshness of beef and other red meats. With detection limits equivalent to those of the human olfactory system, minimal sample preparation, and direct analysis, SIFT-MS is a very effective technique for detecting spoiling of red meats, enabling wide-scale freshness screening.

Figures 1 and 2 show the results obtained for ground (minced) and sirloin steak cuts of New Zealand beef, respectively. Ground beef has a higher surface area per unit mass than steak, so is more susceptible to spoilage. Inorganic preservative is added to minced

beef to prolong its shelf life.

This appears to keep the dimethyl sulfide concentration constant for the duration of the reported study and also serves to moderate production of ethyl acetate. Ammonia and trimethylamine continue to be produced, however.

This study demonstrates that SIFT-MS is ideally suited to early detection of beef degradation via the volatile compounds emitted by spoilage organisms - even for steak, which has a much lower exposure to environmental microbes. The Syft Voice200ultra SIFT-MS instrument provides a robust, simple solution for sensitive, quantitative screening of large numbers of samples per day, both manually and automatically (via autosampler integration).

### Experimental Method

Samples of fresh New Zealand beef (sirloin steak and ground (minced)) were purchased from retailers in Christchurch, New Zealand.

Triplicate samples of each product (25 grams) were placed in 250-mL Schott bottles and capped. They were allowed to warm to room temperature prior to the initial analysis (defined as "time zero" due to uncertainty in the actual age and history of samples). The bottles were then incubated at 37°C (Sanyo MIR-262 incubator) for the duration of the experiment, apart from the brief period of time that they were removed for analysis.

### SIFT-MS Analysis

Instrument	Voice200
Inlet type	High performance
Sample flow	25 sccm
Software	Voice200 & LabSyft
Analysis type	Selected Ion Mode
Reagent ions	H <sub>3</sub> O <sup>+</sup> , NO <sup>+</sup> , O <sub>2</sub> <sup>+</sup>
Compounds	Ammonia, dimethyl amine, trimethylamine, hydrogen sulfide, methyl mercaptan, dimethyl sulfide, dimethyl disulfide, formaldehyde, acetaldehyde, ethyl acetate, ethyl propanoate, acetic acid, ethanol
Analysis time	30 seconds
Typical LOD	50 pptv

Figure 1. SIFT-MS headspace concentrations of various compounds above New Zealand ground (minced) beef at 37°C.

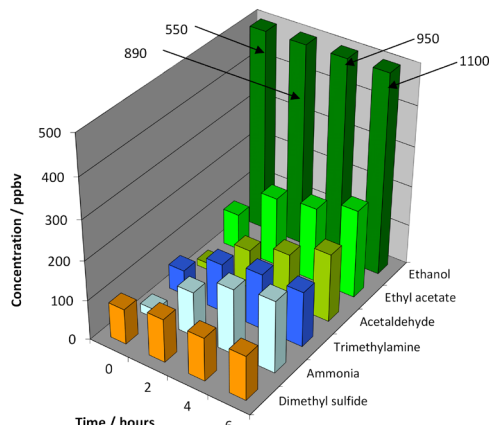
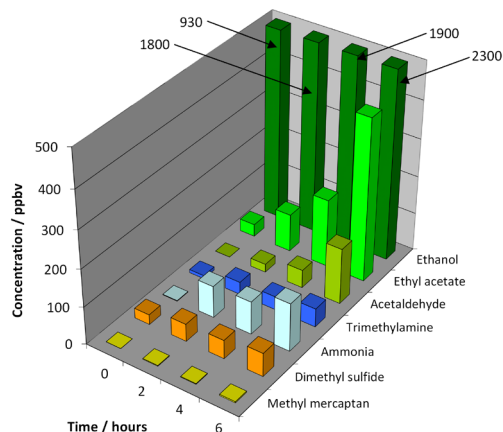


Figure 2. SIFT-MS headspace concentrations of various compounds above New Zealand sirloin steak at 37°C.



### Further Reading

Syft Brochure *SIFT-MS Technology Overview*

Syft Brochure *Food, Flavor & Fragrance Solutions*

Syft Application Note *Rapid Classification of Beef Aroma Quality*

Syft Brochure *Labsyft: Laboratory Software for SIFT-MS*

B.J. Prince, et al. (2010), "Application of [SIFT-MS] to real-time atmospheric monitoring", *Rapid Commun. Mass Spectrom.* **24**, 1763.