

# Getting the facts straight with accurate fat analysis

**Terry Woolford**, general manager of US-based Eagle Product Inspection, discusses developments in fat analysis methods for faster and more accurate results.

**SINCE THE BEGINNING** of this year, meat and poultry sold in the US has had to include on-pack nutritional labelling and this presents an opportunity for the industry to showcase the wide availability of lean meats, according to Mark Dopp of the American Meat Institute. This, of course, has an inevitable effect on methods of testing for chemical lean (CL), which represents crude fat content in meat products and is a key indicator of product quality.

With widespread consumer concern regarding obesity, heart disease and diabetes, levels of fats and trans-isomer fatty acids in meat products are of particular importance. Manufacturers must be able to ensure that their fat analyses are accurate in order to reassure both meat processors and consumers – the days when six per cent variance in CL percentages was deemed acceptable have now gone.

With supermarket price pressure another key market trend, meat manufacturers are looking for more innovative ways to reduce their manufacturing costs. The lingering effects of the worldwide recession mean that while consumers demand healthier and more convenient meat products, they also want them at a lower price.



The need to reduce costs is inevitably passed on to manufacturers.

Fat claims and lean meat giveaway are avoidable sources of cost in meat manufacturing that arise from outdated methods of CL testing. After purchasing a consignment of meat at a stated CL value, a processing company will perform its own sample analysis for comparison. Should the CL value be found to be lower (greater fat content) than that stated, the processor will issue a 'fat claim', which requires the manufacturer to pay compensation. Equally, there are no refunds in the case of a higher CL value being found, resulting in lean meat giveaway. Whichever way the inaccuracy swings, manufacturers lose out.

In looking at current needs for CL testing – namely high accuracy and speed – a number of inadequacies have appeared in the industry standard reference model the Soxhlet method, which has been in use for over one hundred years. The Soxhlet method can take up to a day for just a small sample of product to be extracted for analysis to obtain the CL value. Additionally, it is typically applied to samples extracted from just a tiny portion of the overall consignment, of which two grams are tested. This means that the inspection rate is a mere 0.00001 per cent.

Owing to the greatly limited size of the samples used, the Soxhlet method gives results with a high margin of error that is not ideal for today's demands. Such a tiny amount of meat cannot be compositionally representative of consignments up to tens of kilograms in size, and therefore the CL value calculated cannot be accurate either.

## THE FUTURE

Two of the most common current methods of CL testing in the US meat industry are Anyl-Ray and Near Infrared Reflectance/Transmission (NIR/NIT) techniques. The former is an offline measurement that works only in a predetermined range of fat percentage and is known to have up to a six per cent variance, while the latter is inline but analyses just five to 10 per cent of product. Both only work on ground products according to an independent study by the Institute of Food, Nutrition and Human Health at Massey University, New Zealand.

Meat manufacturers require more accurate and efficient methods of fat analysis. Non-invasive, precise and repeatable techniques of fat analysis significantly reduce the losses incurred through inaccurate measurements, while ease-of-use, manufacturing line versatility and machine reliability help to bring down total cost of ownership.

Looking at solutions on the market today, one option has several advantages to meet current demands – this technique is DEXA, or dual energy x-ray absorptiometry. DEXA is already well known in the medical field and is now used as a non-invasive, inline method to determine CL content for meat and meat products.

In order to determine fat levels, the system uses two energy spectrums to discriminate between high and low channel x-rays. Essentially, DEXA machines measure the amount of x-rays that are absorbed by fat in the meat as it passes through the system. It is the most precise method of fat analysis, accurately producing CL values within +/- 1CL and the most repeatable, as verified by the independent study from Massey University. This method therefore satisfies current market demands for greater

Eagle's fat analysis system not only uses the DEXA technology but also checks weights and performs product inspection for contaminants.



## Bringing gluten testing in-house

accuracy, and helps manufacturers avoid fat claims and giveaway. Furthermore, real-time scanning Dexa fat-analysis systems allow manufacturers to quickly verify that incoming and outgoing meat are within specification – entailing no disruption to output levels, and allowing total control.

The most innovative Dexa machines are not only accurate and repeatable – they function dually as management tools and process control tools, providing company heads with the information they need to make informed decisions and guarantee compliance. Intuitive management software, barcode readers and trace servers, which allow quality personnel to remotely access real time data and reports for production, rejection, weight and trending, can greatly improve manufacturing processes, cutting costs and meeting regulatory standards.

This is especially important in the US considering the need for regulatory compliance and traceability through every stage of a product's life cycle. Increasingly strict industry standards, such as the US Food and Drug Administration (FDA) Act, which President Barack Obama signed on 4 January 2011, have sought to tighten track-and-trace standards across the food industry. Meat products now need to be effectively catalogued and product tracking information simple and easy to access. In fact, the meat industry focus on traceability does not only stem from tightened regulations, but also from a requirement for greater efficiency – a database of all CL tested products allows the manufacturer to build shipments to a specific CL value.

Fat analysis has come a long way. As well as carrying out their primary function on CL testing to a far higher degree of accuracy, modern solutions offer previously unachievable levels of traceability, multi-functionally in the form of simultaneous contaminant inspection and checkweighing, and peerless reliability.

To meet current trends in healthy eating, price-competitiveness and tightened regulations, and to stay one step ahead of future developments, meat manufacturers can turn to Dexa to meet CL testing needs. 

Australasian Medical & Scientific (AMSL) has introduced two new test kits for gluten to the Australian market that offer reliable testing of processed foods such as biscuits or baby food.

Developed by Missouri-based Romer Labs, the AgraStrip Gluten G12 is a lateral-flow device for on-site factory testing and the AgraQuant Gluten G12 is an enzyme-linked immunosorbent assay (ELISA) for quantitative testing in the laboratory.

The test kits use Romer Labs' proprietary gluten-detection technology, which employs a next generation antibody called G12 and can be used to test processed foods, such as biscuits or baby food.

Andrew Odd, manager of AMSL's scientific division explains that during food processing the target antigen may be modified, by heat or hydrolysis for example, and therefore it will not be detected by certain methods of gluten testing. The G12 antibody, however, still reacts positively to pathogenic samples as it specifically targets the toxic portion of the gluten peptide sequence.


The AgraStrip Gluten G12 kit has an adjustable cut-off level for qualitative screening at either 5ppm, 10ppm or 20ppm gluten, while the AgraQuant Gluten G12 ELISA quantitates levels of gluten between 4ppm and 200 ppm.

"Kits based on ELISA and lateral flow (LF) can be as accurate and sensitive [as standard testing methods], however [they] are faster [offering results in minutes], easier and cheaper [to use], and tests can be done onsite by anyone," says Odd. "Technical staff are not required to perform the tests.

"...The G12 kits should be of interest to those currently testing using another method or sending [samples] out to a lab and thinking about bringing their testing in-house."



Romer Labs showcased the new test kits at the 2012 Food Safety Summit in Washington DC last month. The showcase included a presentation by world renowned gluten-expert Dr Alessio Fasano in which he discussed celiac disease and gluten sensitivity, and the importance of testing for gluten in food products.

In Australia, health experts estimate that one in 100 people suffer from celiac disease, however, a far larger proportion of the population follows a gluten-free diet to deal with gluten intolerance, irritable bowel syndrome and other issues. 

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