

# Least cost formulation – knowing your fat from your lean

Meat processors – firms that convert meat from trimming into finished products such as sausages and hamburgers – are under increasing pressure to extract value from a process which offers notoriously slim margins. Changing availability and prices are a constant challenge, therefore the ability to react quickly is paramount and processors must work intelligently in order to do so.

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One of the methods commonly employed by modern processors is that of Least Cost Formulation (LCF), a mathematical optimisation technique that enables them to put together a formula or recipe at the least cost or expense – specifically where it needs to meet certain technical parameters and constraints and where there is flexibility in ingredient use.

Take a sausage as an example. If you are making sausages and the specifications state that product must consist of 40% protein, but must also contain a minimum of 70% pork, there are a number of ingredients you could combine in order to achieve this goal.

Besides the necessary pork, which may be high-fat pork, one or more other animal or vegetable proteins may be selected to achieve recipe targets.

This combination of recipe components and amounts provides flexibility in meeting targets, where that flexibility can be exploited to enable use of inherently lower cost components. With agile purchasing, this flexibility allows additional cost reduction via low cost spot buys of commodity products whose prices vary daily.

LCF, in a complementary role, also allows processors to make best use of existing inventory. Using LCF calculations, processors can manufacture sausages, for example, that best optimise yield value from existing stock.

Meat processors constantly look for ways to optimise production, and since the largest portion of the manufactured product for meat processors is the meat itself, it stands to reason that this is where the attention should be focused. Fat is a primary determinant of the cost of meat and the ability to measure fat content accurately is crucial to effective LCF.

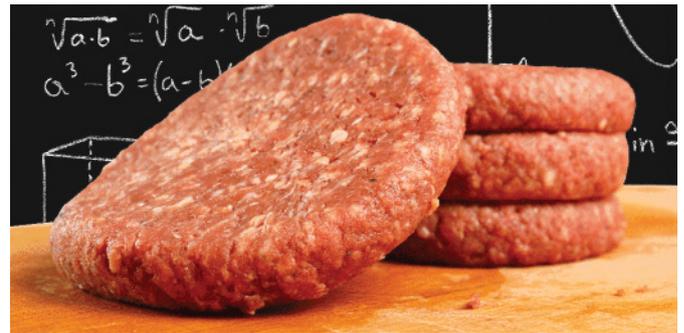
As the saying goes “you can’t manage what you can’t measure.” Accurate fat measurement enables LCF, and this is where advanced x-ray technology comes into play. Modern in-line fat analysis (FA) systems using Dual X-ray Absorptiometry or ‘DEXA’ technology, enables fat measurement of 100% of the meat based on the differential absorbance of fat and lean meat content using two x-ray energy spectra. The combination of measuring all of the meat, and at accuracies better than  $\pm 1$  CL (chemical lean), enables LCF control schemes to precisely meet blending targets at maximum yield.

## Myriad of benefits

The meat processing industry, in order to comply with stringent regulatory requirements, must make hygiene a priority. Food borne pathogens have been responsible for countless hospitalisations, even deaths, and the damage to a processor’s brand reputation and financial health can be severe if they are identified as the source.

FA systems available on the market today are engineered to NAMI/EHEDG sanitary design guidelines. This makes them ideal to withstand harsh washdown and sanitation protocols typically required within processing facilities to ensure sanitisation to a microbiological level. With Eagle FA systems, breakdown for sanitation is quick: just five minutes to prepare for sanitising. So processors spend less time cleaning the machine, and more time processing meat, without compromising on hygiene standards.

FA systems are also capable of simultaneously detecting physical contaminants, such as glass shards,



metal fragments and calcified bone, and measuring weight. The former is critical to ensure dangerous foreign objects do not make it through to the retail supply chain (or damage downstream equipment). The latter provides processors accumulated weight and weighted CL measurements in real time – giving them the ability to control a total batch to target CL at a given batch weight.

The FA system’s ability to perform a wide range of tasks simultaneously, coupled with low ongoing costs to extend the lifetime value of the equipment, are key drivers to achieving a fast return on investment (ROI) – a major consideration when looking to purchase capital equipment.

## The world before inline FA

Before inline FA became available, measurement techniques could be very accurate but at the same time almost irrelevant to the process of LCF. To expand a little, methods such as the Soxhlet reference method would use the only choice available at the time – to take batch samples. If you take a 1,000kg batch of meat, Soxhlet will require just 10g for a single measurement, meaning that if you took that one sample and called it a true representation of that batch, you are basing your calculations on just 0.001% of the meat. The 10g measurement you took may be incredibly accurate, but as a representation it cannot be said to amount to anything close to true.

To take things further, let us say

that two separate entities take 10 measurements each from the same 1,000kg batch of meat, take them away and compute the averages. The results will still not match unless the batch of meat was perfectly homogenised – which is all but impossible.

This kind of disagreement lies at the heart of fat claims and is a problem that is completely blown away by the introduction of FA. Since FA looks at 100% of the meat, there can be no sampling errors as they are no longer necessary and, as an added benefit, there is no time spent in the laboratory and no wasted product that cannot be returned to the production line.

Past measurement methods were simply too crude to support robust LCF. With FA, what we have is a technology that enables LCF that can have a real impact on both productivity and profitability.

## Conclusion

Meat processors who fail to take LCF seriously are likely to encounter commercial problems, as without it their ability to achieve the highest yield from their activities is compromised.

In line FA systems – through accurate fat measurement – enable meat processors to extract every ounce of process yield, and thus operating margin, from the product they process. This puts those that employ FA at a competitive advantage over those that choose not to, as the latter’s LCF will not be as efficient as it could be. ■