

Knowing Your Meat is Worth Millions



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Even for an experienced butcher it is not always an easy task to say whether a given piece of beef will be tender or not. A new generation of advanced X-ray techniques promises to be able to give the answer right away.

“This type of knowledge is worth millions to the industry. If the beef is highly tender, you can expect a high price per volume, while if not you may as well turn it into minced beef right away,” says Lars Bager Christensen, senior consultant at the Danish Meat Research Institute, DMRI, Danish Technological Institute.

However, a fair amount of research is required before the slaughterhouse industry can start X-ray scanning its meat for tenderness. This is where advanced facilities such as the ESS and the MAX IV are relevant.

“In order to introduce a novel measuring technique, firstly you need to demonstrate that the claimed correlation is real. To that end we send samples to advanced research facilities such as synchrotrons and neutron sources.”

Data Processing as important as X-rays

If, as the scientists hope, the desired documentation is achieved, the next step will be to develop a simpler method.

“Basically, we need a method which does the same job as the investigations at the advanced facilities but using X-ray equipment which

is economically and practically available to the industry,” Lars Bager Christensen explains.

The experiments are part of the NEXIM research project (NEw X-ray Imaging Modalities for safe and high quality food) funded by the Danish Council for Strategic Research. Besides DMRI both University of Copenhagen and DTU are NEXIM partners.

“Currently we are shipping samples for facilities in France and Switzerland. Obviously, the coming facilities in Lund will expand our possibilities. The location of the ESS data processing centre in Copenhagen is a further advantage. We have seen from our experiments so far that data processing is no less important in getting high quality results than is the X-ray equipment itself,” the senior consultant comments.

CT scans to optimise pork production

Several factors besides meat tenderness are included. A number of slaughterhouses already have advanced automated cutting equipment for pork. The equipment operates on the basis of a standard model for the distribution of meat, fat and bones in the pig.

“In real life you will never see two animals being exactly alike. Our idea is to scan the bodies just before they reach the cutting equipment in order to obtain the optimal result every time,” says Lars Bager Christensen.



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More specifically the researchers want to use the X-ray absorption technique CT scanning (Computed Tomography). The method is optimized for distinguishing between flesh, fat tissue and bones in human patients.

“However, when a hospital may need to scan, say, four patients an hour, the slaughterhouses need much higher throughput. In relation to the NEXIM project we are developing CT equipment capable of scanning as much as 750 samples an hour. This is a dramatic increase in speed and approaching a level relevant to the industry. Still, quite some research needs to be done before we get there.”

Unique results on salt in meat

The results will not only benefit the industry, according to Lars Bager Christensen:

“We are confident that the research will benefit consumers as it will help developing healthier and safer food. For instance, the

issue of excessive salt content in food remains in high focus. Traditionally salt is added as a powder. Results from the NEXIM project have disclosed that a large portion of the salt remains bound in the product as crystals. In other words, this salt has not been dissolved and therefore it does not contribute to preserving the product against bacteria. If you can apply your salt in a smarter way so the full amount is dissolved you will be able to get the same anti-bacterial effect using less salt. This will clearly be subject to further research.”

Similarly, meat products with low-fat content or other favourable health features are certain to form an ever larger part of the research agenda, the senior consultant predicts:

“NEXIM takes interest in a wide range of possible future applications. It remains to be seen which of these will become relevant to the industry first. Still, we can say with confidence that advanced X-ray techniques are likely to provide valuable insight into meat.”

New Horizons Are Opening to the Food Sector

World leading facilities within neutron and X-ray scattering, the ESS and MAX IV, will open in the Oresund region over the next few years. However, there is no need to wait for these facilities to open. Scientists at Technical University of Denmark and University of Copenhagen are already in gear for X-ray and neutron scattering projects. These could either be full research projects in their own right or preliminary projects leading up to projects at existing or the coming large scale facilities. Contact the universities to learn more about what they can offer you.

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