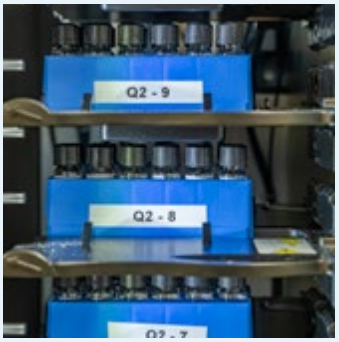
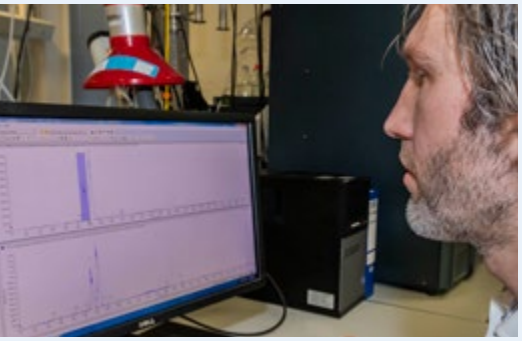
Testing shellfish without lab animals



A method developed by the Wageningen institute RIKILT for identifying toxins in shellfish has prevented the use of hundreds of thousands of lab animals in recent years. What is more, the method is more reliable than the test on animals.

TEXT AND PHOTOGRAPHY HANS WOLKERS

‘The new method soon proved much more precise’



Food poisoning from eating shellfish is often caused by toxins produced by algae that can accumulate in shellfish. Within a few hours, the consumer gets stomach cramps, severe diarrhoea and fever: diarrhetic shellfish poisoning (DSP). Since 1970, a test using lab animals has been used to check for infected shellfish in production areas. Mice were given injections of a shellfish extract into their stomachs. If the mouse died, the production area was closed down. Hundreds of thousands of lab animals per year were needed for this testing.

MORE PRECISE

In 2005, RIKILT researcher Arjen Gerssen and his colleagues started developing a new method using chemical analysis and no lab animals. Gerssen’s aim was to quantify the toxin in shellfish using liquid chromatography followed by mass spectrometry (LC-MS). ‘The break-through came when we decided to conduct the experiment with a slightly different LC-MS method than the usual one,’ explains Gerssen. ‘Instead of the standard acid mobile phase, we used an alkaline mobile phase. That new method soon proved to be much more sensitive and accurate.’

At first, only two of the 13 regulated toxins that cause DSP were available in their pure form. These kinds of reference substances are essential for establishing new analytical methods. So at first, Gerssen could only develop the method for those two substances. But over the years, others gradually became available. Gerssen: ‘By now we can measure them all accurately.’

REFERENCE TEST

From 1 January 2011, the new method became part of the EU reference test for safeguarding the food safety of shellfish, and many laboratories adopted it. A major advantage of the new test is that it saves a lot on animals, as well as on related costs. ‘The LC-MS apparatus might be expensive – it costs about 300,000 euros – but so are lab animal facilities,’ says Gerssen. ‘The apparatus lasts 10 years, which makes the cost about 30,000 per year. If you have to do a lot of analyses, it works out cheaper than the mice test.’ What’s more, the analytical chemical method is more reliable. The test on mice sometimes gave false-positive results. Gerssen: ‘Mice died during the test, but that was not always due to the toxins produced by algae; it could be caused by something else, like too many fatty acids. So a production area might be closed mistakenly. That had massive financial consequences for the sector. That is a thing of the past now. ■

www.wur.eu/phycotoxins