Smartphone screens cows for doping

RIKILT Wageningen UR has developed a method of detecting banned hormones in cows. A small measuring instrument combined with a smartphone can be used on the farm to check whether a farmer is giving his animals the prohibited hormone rBST.

TEXT KORNÉ VERSLUIS **PHOTOGRAPHY** GUY ACKERMANS

In August this year, Susann Ludwig and fellow researchers at RIKILT published an article in the journal *PLoS ONE* in which they describe a test that gives a strong indication of whether cows have been given the banned hormone rbST. Ludwig, who received her doctorate for this subject in Wageningen, was aiming to create a test that could give a result on the farm. 'Mobile phones are an incredibly interesting option. Everyone knows how to use them and the data link lets you share the results immediately,' she explains. She is now at the Eindhoven University of Technology and working on the further development of mobile tests for banned substances.

Recombinant bovine somatotropin (rbST) enhances milk production in cows. A cow that has been injected with the hormone will produce roughly ten per cent more milk. Using rbST is legal in many states in the USA, but the EU banned it in 2000. The main reason for the ban is that cows treated with the hormone are more likely to get udder infections and other health problems.

Ludwig's test does not measure the presence of the hormone itself, it detects the antibodies that cows make when they are injected with the hormone, which is a foreign substance. These antibodies are detected using a small device that Ludwig developed in collaboration with an American start-up. In the device, LEDs illuminate a milk sample with UV light and sensors measure the fluorescence. The device sends the measurement results to the smartphone, which performs calculations to see whether a sample is suspect or not.

Ludwig's test is not yet ready for use on farms. Anyone who wanted to market such a test would need to develop it further. That is why RIKILT is concentrating on

UV-lights illuminate the sample. Suspect samples show up red.

a test that can be carried out in the laboratory for the time being. Saskia Sterk, the cluster manager for Growth Promoting Substances at RIKILT, is working with colleagues on the final touches to another rbST test. Like Ludwig's test, rather than detecting the actual hormone it detects antibodies that the cow makes as a reaction to the exogenous hormone.

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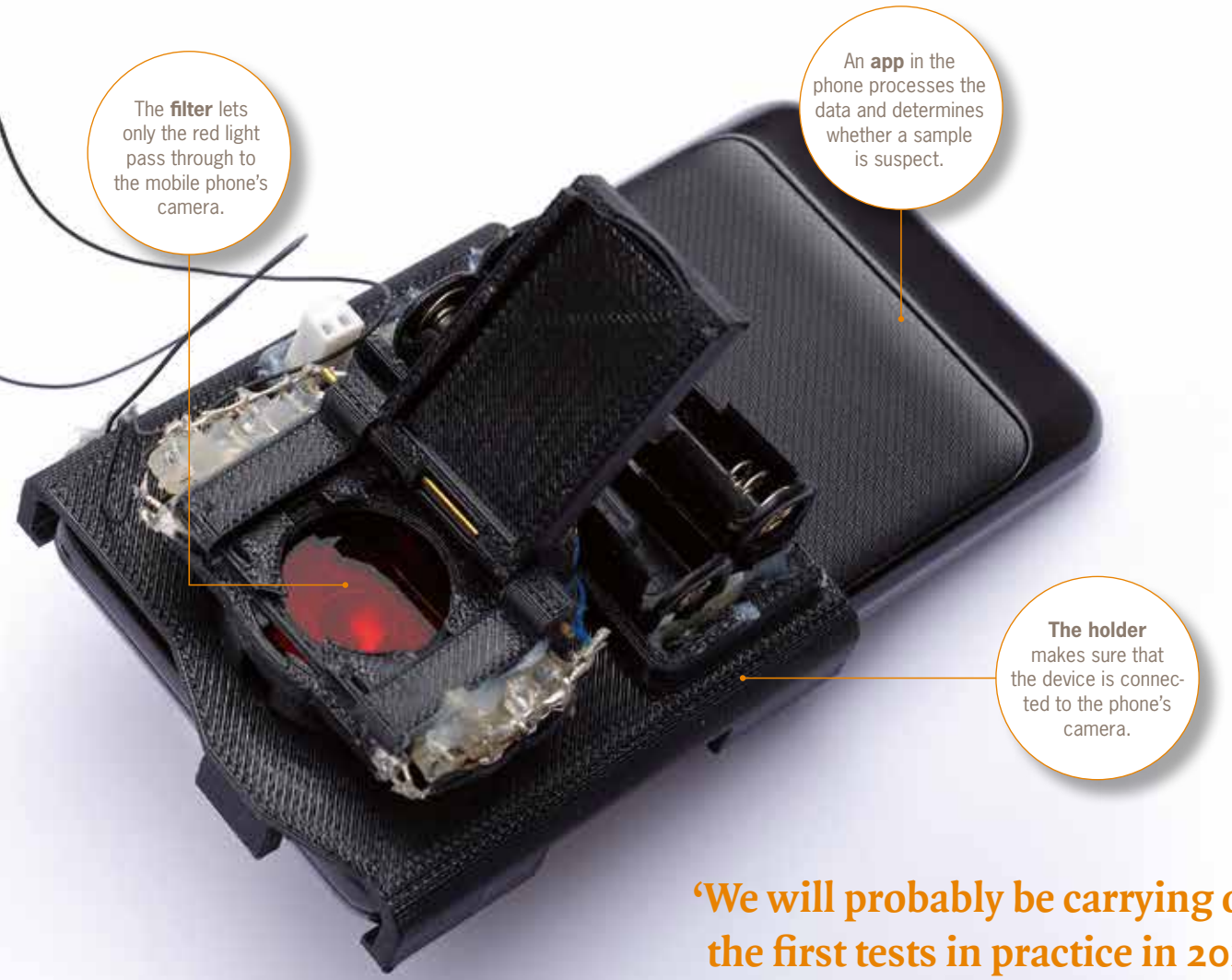
Sterk says that it is highly likely that rbST is being used in Europe despite the ban. Ampoules of the illegal hormone have been seized, for example. But it is unclear how widespread use of the hormone is because there are no cheap tests for detecting its use. 'The new test will solve that problem and we will be able to see whether Dutch farmers are using rbST. We will probably be carrying out the first tests in practice in 2016.'

The fast test does not provide enough proof for legal purposes, explains Sterk. 'Evidence of the banned substance itself is required for a fine or conviction. Our cheap screening test is based on substances that cows produce in response to the hormone. Additional measurements with a mass spectrometer are needed to provide proof of the hormone itself.' That examination is relatively expensive. The combination of cheap screening and additional measurements makes it possible to test large quantities of milk.

Sterk thinks the development of fast mobile tests linked to a smartphone is a promising option, including tests for banned substances. 'If inspectors can decide in the field whether or not a sample is suspect, that will save on a lot of expensive lab investigations.' ■



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