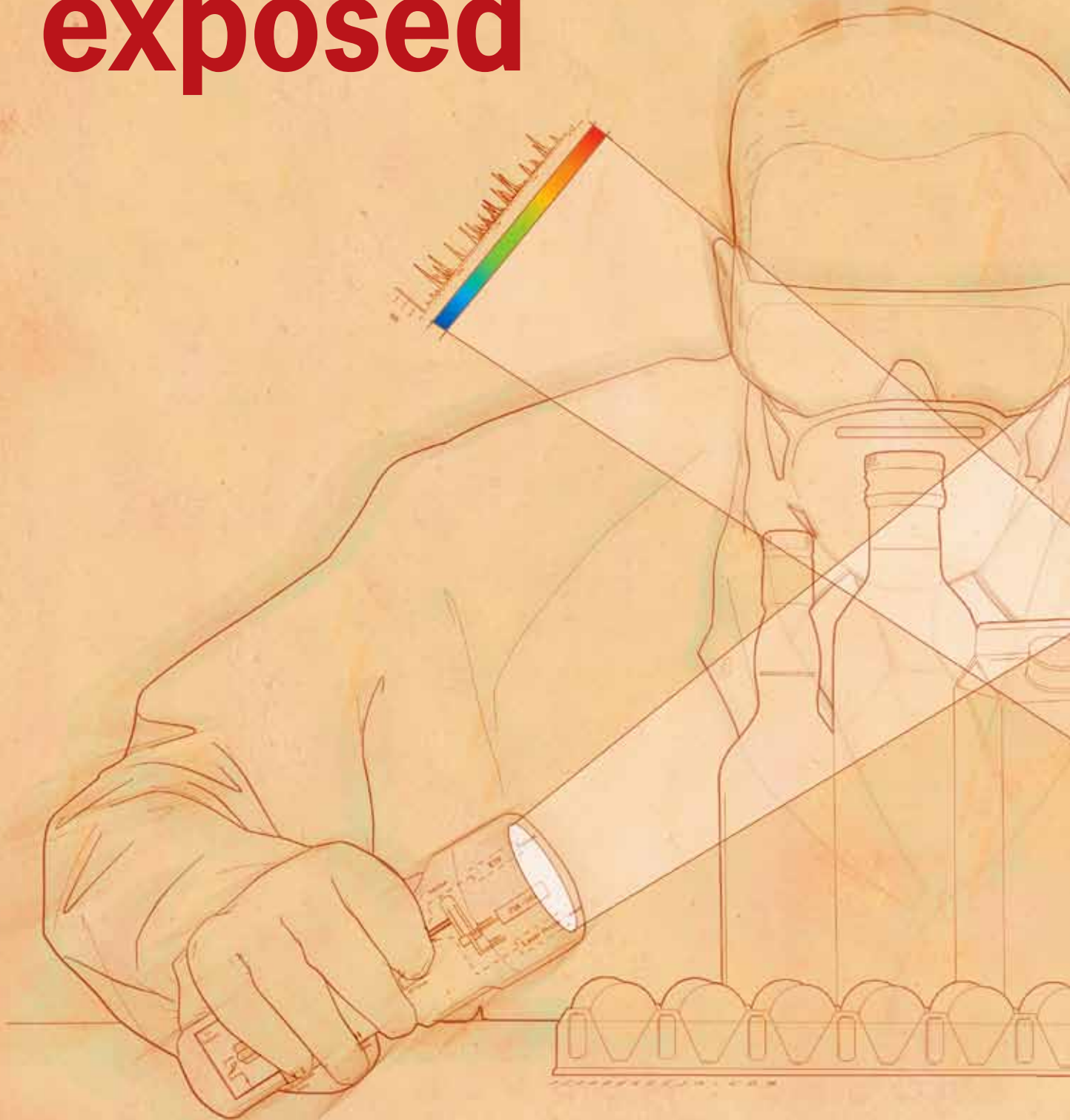


Food fraud exposed



Producers who lie about the origin of foodstuffs can be brought to book more often nowadays. RIKILT Wageningen UR is developing more and more tests which reveal where the ingredients come from as well as whether they really were grown organically. Coffee and eggs have proven to be surprisingly traceable. TEXT ASTRID SMIT ILLUSTRATION RHONALD BLOMMESTIJN

Consumers are willing to pay a few cents extra for certain foods. For extra virgin olive oil, for instance, because they believe it is healthier and tastier, and for organic food, because the producers do not use any pesticides and the animals enjoy more space. This puts temptation in the path of producers who are out to make a fast buck. Passing off a force-fed chicken as an organic one earns you a couple of extra euros per kilo. And indeed, companies have been known to be economical with the truth. Last year in the Netherlands, horse-meat was sold as beef on a large scale, while German poultry farmers marketed standard eggs as organic ones.

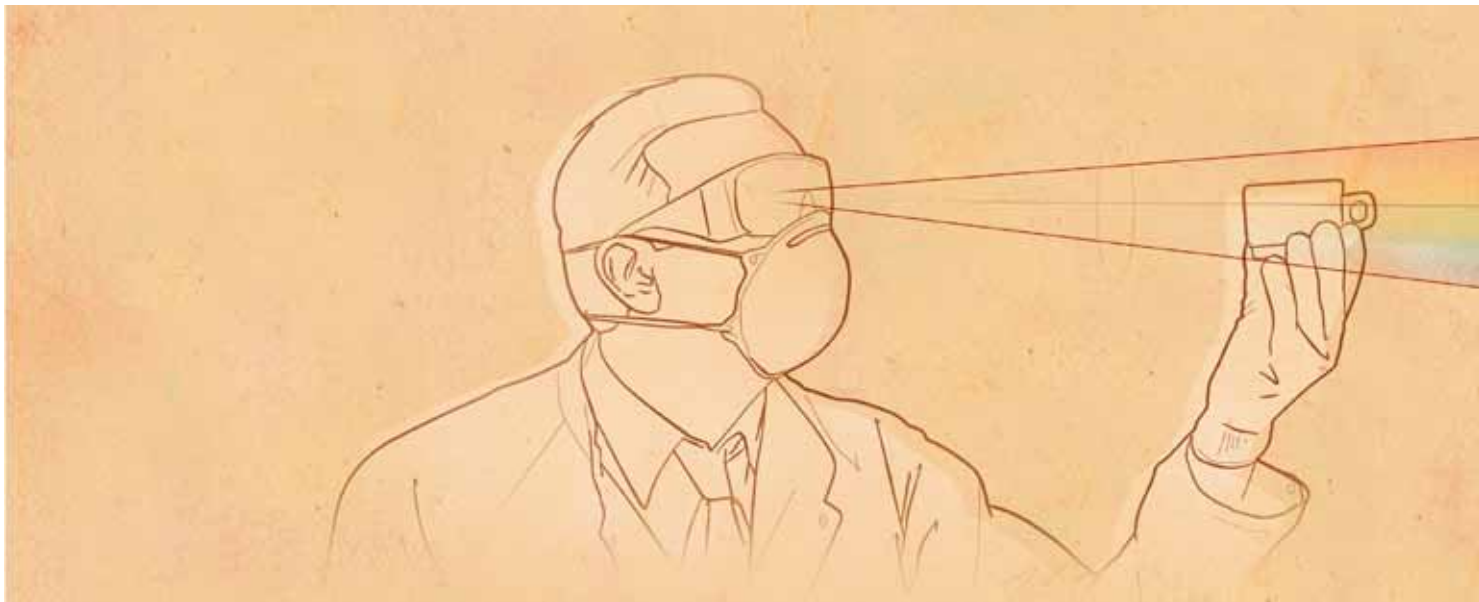
But how do you establish whether you are getting what you think you are getting? An organic egg looks no different to a free-range one, and the milk of pastured cows tastes the same as any other milk. Until recently there was no easy way of verifying whether products were bona fide.

Controllers can try to trace the route the product has travelled to the supermarket shelf. They can visit the suppliers and check the paperwork, but what if that has been falsified?

GENUINE OR FAKE

In order to support this monitoring, better methods are being developed for distinguishing the genuine from the fake – partly thanks to the research of RIKILT Wageningen UR, one of the frontrunners in this field in Europe. ‘Ten years ago the possibilities were still limited. Thanks to the combination of statistics and better analytical tools, we can do a lot more now,’ says Saskia van Ruth, professor (by special appointment) of Authenticity and Novel Foods at Wageningen University, part of Wageningen UR. Her research group is >





able to evaluate the authenticity of more and more foods: olive oil, palm oil, animal fats, coffee, eggs and soon perhaps milk and cocoa.

Van Ruth's research group tries to identify the substances in foods that betray their origins. 'By identifying proteins, pigments or volatile substances such as aromas, you hope to be able to say: Hey, that profile is typical of, say, organic cocoa, and that one is typical of standard cocoa,' explains Van Ruth. In the lab, analyst Rita Boerrigter-Eenling demonstrates how this works. We are standing by a PTRMRS. This mass spectrometer measures the levels of volatile substances such as aromas in the air above a food. Her colleague Michiel Wijten has attached a pot of whisky malt to it. 'First we heat up the malt. The substances which are released go through a tube to the mass spectrometer, which registers how much of a particular molecule with a particular weight is present.' On the computer screen of the PTRMRS, a graph appears with bars at varying heights. 'This is in fact a fingerprint of this whisky malt. We compare that with a large database which contains the fingerprints of all sorts of whisky malts, and we try to isolate their characteristics. There are a lot of statistics involved. We cannot tell which malt this is just by looking at it,' says Boerrigter.

CIVET CAT EXCRETA

Last year, RIKILT Wageningen UR succeeded in distinguishing between standard and

organic coffee, using this mass spectrometer. The institute screened 110 kinds of coffee, including 43 organic coffees and 67 standard ones. As many as 900 different volatile substances are released from ground coffee, which means there is a fair chance of one coffee having a different aroma profile to another one. One of the coffees was instantly identifiable: kopi luwak, which at a couple of hundred euros a kilo is the world's most expensive coffee. The beans of this coffee are first eaten by civet cats and then excreted. No too surprising that this coffee should have its own unique aroma profile. Yet Van Ruth and her colleagues were pleasantly surprised when they found that organic coffee, too, had a really different profile to standard coffee. Using the test they were able to identify 98 percent of the organic coffees and 95 percent of the standard ones. What is not yet known is which elements in the organic crop cause this. The fact is that organic coffee is grown using natural manure and without pesticides. 'Apparently that has an effect on the aroma, but how exactly we are still researching,' says Van Ruth. Her group had further success last year in their research on the difference between organic and standard eggs. In this case it is the type of pigment – certain carotenoids in the egg yolk – that is a suitable indicator. The colour of the egg yolk is heavily dependent on the type of feed, and on cultural preferences. Northern Europeans prefer yellow egg yolks, while southern Europeans prefer orange ones. Poultry farmers bear this in

mind in putting together their feed mixes. An organic farmer does this by giving the chickens pigment-rich crops such as maize, alfalfa and grass, while the regular poultry farmer adds artificial yellow pigments. The yellow pigments in the egg yolks are easily identified using high-pressure liquid chromatography (HPLC). 'This way we can easily see the difference. It is not so much the kind of pigment that matters as the proportion of it present in the egg yolk,' says Van Ruth. Her research group first investigated this for Dutch eggs and then for eggs from the whole of the European Union, Canada, Israel, Norway and Turkey. 'In most of the countries studied, we could tell with almost 95 percent certainty whether eggs were organic or not. Except for Turkey. We don't know why that is; that needs further investigation.'

ORGANIC MILK

It is not always so easy to differentiate organic products from standard ones. A study of the difference between pasture milk, standard milk and organic milk drew a blank in the first instance. Standard milk comes from cows that do not go outdoors, pasture milk from cows that are put out to graze, and organic milk from cows that are both put out to graze and fed on organic fodder. 'We looked first at specific fatty acids, such as phytanic acid, which get into the milk when the cow eats fresh grass. We hoped that you could see from the amounts of these fatty acids whether the milk is



‘Organic farming methods affect the coffee’s aroma’

standard, organic or pasture.’ But it was not possible to differentiate between the three types of milk just by using these markers. Next, amounts of triglycerides and cholesterol in the milk were measured. The difference between standard milk and milk from cows that are put out to graze (whether pasture milk or organic milk) can be fairly reliably measured using these substances, but the difference between pasture milk and organic milk cannot. So the search goes on. And there are other foods being studied.

PhD student Valentina Acierno is trying to identify the origins of cocoa. Queen Maxima was given a sneak preview after the opening of the academic year last September. RIKILT had had a chocolate model of the new education building Orion made, and used an aroma profile to demonstrate to the queen that the chocolate almost certainly came from Africa. ‘The PhD researcher has only just started but she can already say this on the basis of her research,’ says Van Ruth. ‘She will be publishing on it soon.’

The lab sometimes also used isotopes to discover the origin of a product. Isotopes are variants of chemical elements. Hydrogen, for example, exists in a light and in a heavy form, as does carbon. Both forms are often found in a product but in proportions that vary per region or continent. Van Ruth points to a sugar sample that her lab has analysed. ‘The question was: does it come from cane or beets. There is no point in using DNA analysis or a fingerprint to find that out because both sorts of sugar are

pure sucrose. But with isotope research you can look at the proportions of carbon 12 and carbon 13. They are different in cane and beet sugar.’ Isotope research offers good prospects for pinpointing the origin of fish and of palm oil too. Isotope ratios in palm oil indicate whether the oil was produced in South America, Africa or Asia. It is only a rough indication, but even that can be useful, given that sustainable production methods are unlikely in some parts of the world.

MORE CHECKS

The list of products whose authenticity can be verified is getting longer. But are all the tests being used regularly? Van Ruth: ‘Up to now, the government left the responsibility for checking products with the companies themselves. It is important that they take their responsibilities seriously and that they pick up on these new testing possibilities. That is happening, but it could certainly happen more often.’ Van Ruth expects that the government will do more checking itself in future, partly in response to the recent food frauds involving horse-meat and organic eggs in Germany. Hans Beuger, coordinator and specialist safety inspector at the Dutch Food and Water Authority, confirms that his organization has put the authenticity of food back on the agenda. ‘Up to now, we concentrated on food safety and monitoring was up to the companies. But we are going back on that, partly due to recent developments.



PHOTO FRED VAN WELDE

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Last year we and the industry formed an Action Plan Taskforce on confidence in food, and we are going to devote more energy and attention to the authenticity of food. How we are going to go about it, we are not quite sure yet. That partly depends on the amount of money allocated to this work.’ Van Ruth: ‘We will just carry on developing the methods. We have just received another European grant for research on food authenticity and olive oil. Our main task is to develop new, scientifically sound methods and to give advice. And we are certainly doing that.’ ■

www.wageningenur.nl/foodauthenticity