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Do you know where your food came from? It's all in the genes

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DNA bar coding is increasingly being used to determine where food - and sometimes food contaminants - come from

Is that grouper you ordered actually low-cost catfish? Are those "all-beef" hot dogs you purchased really all beef? And where exactly did those cucumbers come from?

Food wholesalers, retailers and consumer interest groups are increasingly relying on genetic tracing to find out.

As the technology becomes more affordable and accessible, DNA bar coding, or the analysis of genetic sequences to identify a specimen, is being used to help determine where food - and in some cases, food contaminants - come from. It may eventually even be used in cases like the E. coli outbreak that has killed at least 14 people and seriously sickened hundreds in Europe. Although Spanish cucumbers have been singled out in the outbreak, food-safety officials have yet to ascertain the exact source.

Dr. Paul Hebert, scientific director of the International Barcode of Life project at the University of Guelph, has used DNA bar coding to solve all kinds of food mysteries. It allowed him, for example, to find out how the head of a mouse wound up in a TV dinner, which was discovered on the production line of a Canadian manufacturer. (The mouse's genetic material allowed him to identify it as a Southeast Asian rodent, and therefore, to deduce that it had come from the factory in Thailand where the chicken was processed.) In early 2010, he was able to identify how the carcass of a bird turned up in the salad of a chain restaurant in Regina, Sask. (The bird was revealed to be a yellow warbler native to California, where the lettuce for the salad was harvested.)

"[Using] these little forensic applications in cases like this, or if someone were to find a fly in a drink or an ant or anything like that, we could put a name on it and from whence it came," Dr. Hebert says.

While pinpointing the source of contaminants allows manufacturers and retailers to determine who's liable, the applications of genetic tracing for busting food fraud and alleviating consumer fears are possibly even greater. Last week, for instance, U.S. distributor Performance Food Group announcedit was using DNA-tracing technology to ensure the weekly 180,000 pounds (81,646 kilograms) of beef it supplies to 11,000 U.S. restaurants is in fact premium Angus beef.

"There is a lot of marketing noise out there. DNA technology cuts through that noise and provides the ultimate proof of product integrity," Ronan Loftus, chief executive of IdentiGEN North America, the company that provides Performance Food Group with the DNA-tracing technology, said in a press release.

The European Commission also issued a report last week on how DNA analysis can help authorities and industry stakeholders crack down on the woefully common practice of labelling fish with a false species name or declaring false origins to mask illegal catches or pass cheap fish off as expensive ones. Separately, the Oceana sea-life conservation group reported that DNA testing is providing evidence of the extent of seafood fraud. The figures it

offered are staggering. Over a nine-year period, U.S. government testing discovered up to 37 per cent of fish and 13 per cent of shellfish were mislabelled.

Dr. Hebert, who once discovered an endangered species of shark sold in Vancouver during a random market survey, says seafood fraud in Canada is little better.

"Just about anywhere we go in North America ... 25 to 30 per cent of the products that you're buying aren't what they're labelled as," he says, although in most cases, it's simply a matter of a low-value product being passed off as a high-end one.

While Dr. Hebert suggests DNA bar coding could be ideal for government food inspections, the biggest users of the technology so far have been wholesalers and retailers, consumer interest groups and journalists, he says. The cost of conducting genetic testing has decreased dramatically over the past decade. Although it's still prohibitive for average consumers to test the food they buy, it could cost as little as $1 per specimen for government inspection agencies to test hundreds of thousands of samples at a time. According to The New York Times, the U.S. Food and Drug Administration recently purchased gene sequencing equipment for several of its field laboratories and expects to use it routinely by the end of this year.

The Canadian Food Inspection Agency was unable to answer whether it plans to use DNA tracing for regular inspections as of press time.