

Mystery Meat: What Other Animals Are in that Hot Dog?



By Alex Berezow, PhD — August 23, 2016

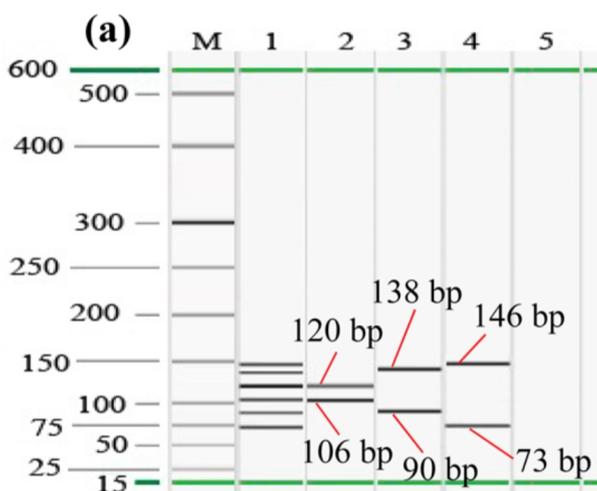


[1] *What's in your hot dog?* (Credit: Shutterstock)

Food fraud is outrageously common. In 2013, the United Kingdom was rocked by a [scandal](#) [2] in which products thought to contain only beef were adulterated with horse meat. Some products, instead of being 100% beef, were [100% horse meat](#) [3]. That same year, it was revealed that lamb sold in Chinese restaurants might actually be [rat meat mixed with some gelatin and food coloring](#) [4]. From [cheese to fish](#) [5], it now seems as if there is little reason to believe that the food you purchase actually matches what is printed on the label.

Now, Malaysian researchers have added yet another food to the potential fraud list: frankfurters, known more commonly in the U.S. as hot dogs or sausages.

To conduct their analysis, the team first identified DNA "fingerprints" that were unique to cows, pigs, and buffaloes. These fingerprints were based on two genes present in the mitochondrial DNA of all three animals. The scientists designed primers (short segments of matching DNA), which are used in a common process called PCR to amplify small DNA segments from these genes. Crucially, each DNA segment was a different size (based on basepairs or "bp"), allowing them to be easily separated and identified. Thus, meat samples from each animal yielded a unique fingerprint based solely on the sizes of these DNA segments*. (See figure.)



Credit: M. A. Motalib Hossain et al., J.

Agric. Food Chem. 2016. DOI:

10.1021/acs.jafc.6b02224

Each lane represents a particular meat sample:

Lane 1: A mixture of beef, buffalo, and pork

Lane 2: Beef only

Lane 3: Buffalo only

Lane 4: Pork only

Furthermore, the authors demonstrated that their DNA test was highly sensitive; it could detect merely 0.1% adulteration of a meat sample.

With their handy new tool, the team turned its attention to 30 commercial frankfurters they purchased from Malaysian markets. Twenty of them were labeled "beef," but the authors found that all 20 also contained buffalo. Ten of the frankfurters were labeled "pork," and all ten only contained pork.

In an email to ACSH, one of the authors, Dr. Eaqub Ali, explained that buffalo meat is cheaper than beef in Malaysia, which probably explains why food suppliers adulterate beef with buffalo meat.

Interestingly, no pork was detected in the adulterated beef frankfurters. Malaysia is majority Muslim, and food suppliers are apparently careful not to offend their customers' religious sensibilities. But they will, however, commit fraud.

Source [6]: M. A. Motalib Hossain et al. "Double Gene Targeting Multiplex Polymerase Chain Reaction–Restriction Fragment Length Polymorphism Assay Discriminates Beef, Buffalo, and Pork Substitution in Frankfurter Products." *J. Agric. Food Chem.* 64 (32): 6343–6354. Published: 18-July-2016. DOI: 10.1021/acs.jafc.6b02224

**The authors also showed that these DNA segments could be cut into smaller fragments using special enzymes that identify particular DNA sequences. This technique, known as [RFLP](#) [7] analysis, served to authenticate their method.*

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Links

- [1] <http://www.shutterstock.com/pic-59158459/stock-photo-portrait-of-a-water-buffalo-on-the-rice-fields-of-guilin.html>
- [2] https://en.wikipedia.org/wiki/2013_horse_meat_scandal
- [3] <http://www.bbc.com/news/uk-21375594>
- [4] <http://www.theatlantic.com/china/archive/2013/05/rat-its-whats-for-dinner/275573/>
- [5] <http://acsh.org/news/2016/05/22/cheese-chemistry-is-your-parmesan-legit/>
- [6] <http://pubs.acs.org/doi/abs/10.1021/acs.jafc.6b02224>
- [7] https://en.wikipedia.org/wiki/Restriction_fragment_length_polymorphism