

Cheating the Senses

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ABSTRACT: The history of spice adulteration is both a history of deceit and falsification and a history of detection and the fight for food safety. It is a tale of ingenuity and perseverance on both sides. Spice adulteration has been one of the more common forms of food fraud since the global spice trade began and is still today a major problem. Spices are especially vulnerable to adulteration and fraud. Spices travels through many countries and through many hands before they arrive in the kitchen, and spices are often in powder form which makes adulteration very hard to determine. This paper explores the theme of spice fraud and its different incarnations in the nineteenth century, during the Second World War, and looks at the situation in today's global food market.

For many people spices are an intrinsic part of their culinary identity. So when it is brought to light that some of the spices on sale at the market or in the shops have been tampered with and are not the pure and safe spices that we know and love, but instead adulterated with compounds that may either be inferior to the real spice, harmful to ingest or both, it affects more than just the food on our plates.

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Any kind of food fraud no matter what food it involves have enormous impact on society and the way we think about food. Food scandals takes away our trust in the food we eat and in the safety measures installed to counter fraud, and because of this diminishing of trust in our food supply and in our society's ability to keep us safe from fraud, no food scam is truly innocent and without consequences.

This is not a new issue. In 1820 the famous chemist Friedrich Accum (1769-1838) stated that 'of all nefarious traffic and deception, practised by mercenary dealers, that of adulterating the articles intended for human food with ingredients deleterious to health, is the most criminal, and, in the mind of every honest man, must excite feelings of regret and disgust.'¹

There is the kind of spice adulteration that cheats the senses and will leave most of us blissfully unaware that someone might have been tampering with the content of our spice racks. This is exacerbated by the fact that a lot of people do not know too much about spices beyond how to cook with them. How many of us are completely sure how they are supposed to look, smell and taste at their best, especially when looking down into a jar full of aromatic powders. It is tempting to choose the ones with the brightest colours, but beware the spices may have been touched up with synthetic dyes and short of scientific analysis it is impossible

to be sure that what you're looking at is pure spice. The uncertainty rises when there are multiple spices at play and with the popularity of ready made spice mixes and seasonings from garam marsala to pumpkin pie mix, the potential for fraud is high.

Spices travels through many countries and through many hands before they arrive in the kitchen, and adulteration can happen at every stage. Some swindlers look to swindle the next link in the long chain, and some are not overly concerned with hiding the fraud. The adulteration can be quite crude, and sometimes the adulterants used are poisonous or harmful to human health or the environment in other ways. In this type of spice fraud there is also a lot of bulking and padding going on as to increase the weight of wares. In fact, the most common type of food fraud across all food stuff is the use of water to increase the weight of the product. But while it is possible and not too much hassle to soak fresh herbs in water before weighing them, or even pump water into chicken breasts, spices and water do not go well together. Instead, swindlers have looked to other powdery substances to add to their lot. Through history these materials have included flour, ground rice, arrowroot powder, ground coconut shells, gypsum, sand, brick dust, seed husks and many other things.

Dried herbs are not safe from adulteration either. According to the European Spice Association and the American Spice Trade Association only two species of the genus *Origanum* may be sold as oregano: *Origanum vulgare hirtum* and *Origanum onites*, but this doesn't stop further adulteration with dried leaves from plants like rockroses, myrtle and European hazelnut.²

44 When the swindling is targeting the consumer directly, the swindlers are often banking on the feeling of shame felt by the swindled person is big enough to forestall any backlash against them and their business. Like the fake saffron bought from a market stall that a hapless customer bought and is now too embarrassed to return and make a fuss about. Tourists on holiday browsing spice markets are obvious targets for this type of fraud. Very often the adulteration will be discovered too late when the buyer is back in his or her own country and opens the package and starts cooking with the spices and realize something is wrong.

To further muddy the waters, some spices are not only adulterated they are used as adulterants themselves. An example of this is the use of turmeric instead of saffron to give dishes the rich yellow colour associated with the spice but not the taste of saffron. This, of course, is only fraud if the product claim to use saffron in its recipe and not turmeric. The Spanish dish *paella* has a long history of being made with saffron, but now it is more less accepted to use turmeric instead, and many will not even know that it is supposed to contain saffron. This form of ingredient displacement is not fraud, but it deprives the paella of a part of history and cultural significance.

The history of food adulteration shows that, with few exceptions, the methods of swindling have changed from rather crude and often dangerous methods, like the boiling of sour wine in lead vessels to sweeten it or using heavy metal compounds to colour sweets, to

very sophisticated methods today. That adulterated food, while being almost undetectable in some cases, is most often not as dangerous to consume as earlier.

However, poisonings caused by adulterants can still occur today, as the scandals like the discovery in the early 2000s of the carcinogenic azo dye Sudan 1 (or Sudan Red) in food products, among others, in chili powders across Europe.

Counterfeit Pepper and Food Scares

In the nineteenth century there were cases of adulterations that had fatal consequences for hapless consumers, while other food scams merely cheated people into paying more money than a product was worth. The industrial Revolution changed the world's foodways fundamentally and widened the gap between producer and consumer considerable. As Professor Jeffrey Pilcher argues:

...the meaning of 'wholesome' changed fundamentally as foods began arriving by railroad and steamship from around the world. The freshness of meat was no longer determined by how recently it had been slaughtered but rather by its packaging and refrigeration. Shoppers, who formerly judged the quality of foods for themselves by smell and touch, increasingly had to trust the label on a can.³

With more links in the supply chain, the swindlers had ample opportunity to swindle. However, this century also saw scientists, chiefly chemists and doctors, emerge as food detectives and battling adulteration. Through scientific methods and meticulous examination of commodities they sought to expose the widespread adulteration and educate consumers on how to avoid getting swindled.

Scientists in London was at the forefront of this development and the reason for this may be more than Britain being a centre for science and industrialisation. When looking through the lenses of adulteration and food safety the state of English food in the nineteenth century was appalling. The French chemist Alphonse Normandy (1809-1865), living in London, lamented in 1850:

If one of the principal characteristics of our epoch, in a commercial point of view, is the immense progress which every department of productive industry has achieved, it must be admitted that the arts of adulteration and sophistication have more than kept pace with that progress. ... all that can be mixed, hackled, twisted, ground, pulverized, woven, pressed – all articles of consumption in trade, in manufactures, in the arts, in a word, all that can be made matter of commerce and be sold, is adulterated, falsified, disguised, or drugged.⁴

It was in response to this mire of adulteration and fraud that chemist Friederich Accum took it upon himself in 1820 to expose the swindlers and educate the public about the dangers lurking in the shops and kitchens. With his treatise he intended to 'exhibit easy

methods of detecting the fraudulent adulterations of food, and other articles, classed either among the necessaries or luxuries of the table; and to put the unwary on their guard against the use of such commodities as are contaminated with substances deleterious to health'.⁵ Accum's treatise not only detailed chemical tests for exposing adulteration, but also listed the names and business which had been charged and prosecuted for adulteration, so as to serve as a warning to both swindlers and consumers. The book became a bestseller and sold one thousand copies within the first month.

It is almost impossible to overstate the importance of Accum's work not just for Britain but for the entire Western World. 'In the history of Adulteration,' writes Historian Bee Wilson, 'there are two stages: before 1820 and after 1820: before Accum and after Accum.'⁶ With Accum, the topics of adulteration and food safety gained attention both in the international scientific community and among the public.

The adulteration of spices in the nineteenth century was most of the time rather crude and unsophisticated but the swindlers showed a surprising ingenuity and creativity when it came to adulterants. Anything that could be pulverised and, perhaps with the help of colorants such as red lead or naphthol yellow, achieve the look of ground spices, could be used.

46 The simplest way to adulterate spices was to substitute a good part of the spice with another substance similar in looks but not necessarily in taste. While many would not be able to distinguish between pure cinnamon and cinnamon mixed with cassia, cumin seeds adulterated with grass seeds coloured with charcoal dust,⁷ would make most people suspicious.

At the other end of the spectrum, there was the manufacturing of counterfeit peppercorns. Through the centuries pepper have been adulterated with everything remotely pepper-like. In the nineteenth century pepper grocers were making artificial peppercorns using linseed oil cakes, clay and a bit of cayenne pepper, for flavouring. To make the counterfeit pepper look like real peppercorns the mixture was pressed through a sieve and the rolled in a cask to form little spheres. Fortunately, this fraud could be detected quite easily. 'It is only necessary to throw a sample of the suspected pepper into a bowl of water,' wrote Accum, 'the artificial pepper-corns fall to powder, whilst the true pepper remains whole.'⁸

Ground pepper was another story. It could be adulterated with anything from cayenne and rape seeds to burned potato scraps and gypsum. Often times these unsavoury mixtures were bolstered with the floor sweepings from pepper warehouses and came to be known as 'pepper dust'.⁹ All over Europe pepper was being adulterated with whatever was locally available. In France, for instance, the use of ground olive stones was widespread.¹⁰

Adulteration did not end with Accum, but his work spurred other scientists to take up the cause. One of them was the physician and chemist Arthur Hill Hassall (1817-1894) and he too would revolutionize the way adulteration was detected. With the use of a microscope, Hassall could reveal the components of even the most finely ground spices.

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Before he turned to the subject of food adulteration, Hassall had made headlines with his examinations of the London water supply, that helped bring on water reforms.

The focus of Hassall was on the scope of adulteration. In collaboration with founding editor of *The Lancet*, Thomas Wakley (1795-1862), he went and purchased samples of product from shops all around London and then used his trusty microscope to examine them. He then reported on how many samples were pure and how many adulterated, and the nature of the adulterants. According to Hassall's analyses the extent of spice adulteration in London was great, but maybe not as dire as the citizens feared. It was possible to find pure spices among the falsified. Hassall showed that among 19 samples of ground cinnamon, three turned out to be cassia, ten were padded with materials such as flour and arrowroot, and six were pure cinnamon. However, while mace seemed to be only rarely adulterated, it was impossible for Hassall to find pure mustard anywhere.¹¹

As Accum had done before him, Hassall also strove to publicise the shops and manufactures involved in the adulteration of food. 'Experience has shown, that any merely general exposure of the nature of the adulterations practiced on the public through their food is not sufficient to deter from a repetition of them, and that the only way in which it can be hoped that such fraudulent practices can be stayed, and the public protected, is by such proceedings as will entail personal discredit and probable loss.'¹²

Hassall became known far and wide and his analyses became a guarantee for the quality of products. A Danish producer of chocolate, *Elisabethsminde*, proudly stated in their announcements in 1889 that 'The famous English analysts Arthur Hill Hassall and Edwyn Godwin Clayton says about Elisabethsminde's cocoa powder: it is evident from the analysis, that this preparation is pure cocoa, finely pulverised, ... Elisabethsminde's cocoa powder is in this regard very favourable, compared to the other countless preparations we have examined'.¹³

The purity of spices was not just a problem in Europe. When the American chemist Harvey Washington Wiley (1844-1930), who would later be known as the 'Father of the Pure Food and Drugs Act', in the 1880's was testing spices and other foods in his laboratories he and his team were horrified to find how much adulteration was going on. They found that the most common spices to be adulterated were pepper, mustard, cloves, cinnamon, cassia, allspice, nutmeg, mace, and ginger.¹⁴ Some American spice sellers developed sophisticated recipes for imitating their chosen spices, while others found one type of adulterant and stuck with it. A story goes, that a New York purveyor of pepper, mustard, cloves, cinnamon, cassia, allspice, nutmeg, and mace – adulterated them all with ground coconut shells, of which the firm purchased five thousand pounds a year.¹⁵

As in Europe spice adulteration showed a great creativity and contempt for food safety. Chemist Clifford Richardson (1856-1932) stated, in a chapter on pepper producers in America, that 'Specimens from Baltimore mills of very low-quality goods were found to contain but little pepper, and that of the worst quality, being made up of cracker dust,

yellow corn, cayenne, and charcoal in so disgraceful a way as to be visible to the unassisted eye on close examination'.¹⁶ It was no wonder that consumers treated spices with trepidation when such findings were made public.

The fear of adulteration and fraud persists even when food safety measures are put in place and shows an improvement to food quality. As Bee Wilson has shown, there were fewer scandals of adulterated food in Britain in the 1880s as opposed to earlier in the century, but the fear of adulteration remained at an all-time high.¹⁷ Food scandals can easily lead to scaremongering and the demonization of an entire industry and even though it can be proved that not everyone is adulterating their products the fear of adulteration takes on a life of its own. This fear can in some cases lead to people becoming distrustful of food in general and demands for pure and untainted food free of any adulterants and additives can reach the extreme. In the United States, Ella Eaton Kellogg (1853-1920), wife of John Harvey Kellogg of the famous Battle Creek Sanatorium, rallied the Women's Christian Temperance Union to fight for abstinence in a broader sense than mere liquor, and to only eat pure and unadulterated food. However, according to her, 'stimulating' condiments as pepper and mustard were equally contaminated and should be avoided at all cost.¹⁸

Substitutes and Sawdust in Denmark

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During the Second World War adulteration became almost normalized in the form of ersatz products. With rationing and all the other restraints on daily cooking brought on by the war, ersatz products became an important part in keeping the meals as close to peacetime recipes as possible. But, at the same time, the war gave rise to new forms of adulteration that played on the fact that it became harder to differentiate between illegally adulterated products and the legal ersatz products. The term *authenticity* came to have many different meanings during this period.

In Denmark food adulteration had not had the same attention as in Britain but Accum's treatise and Hassall's examinations had not gone unnoticed. Denmark had had a general food safety legislation dating back to 1701, where the police were tasked with controlling that no harmful or spoiled wares or harmful substances were sold as food. In 1836 came the first positive list of colourants in cakes. This was after a series of cakes coloured with heavy metal-based paints were discovered by the police in Copenhagen.¹⁹ Spices do not seem to have been focus as especially vulnerable to adulteration in nineteenth century Denmark, but this changed during the twentieth century.

Throughout the Second World War many Danish ersatz spices were found to consist of little genuine spice and a great deal of sawdust. The use of sawdust was not a new thing, it had been used as an adulterant in ground spices for hundreds of years and the means of detecting it was with the microscope. Clifford Richardson had noted in 1887 that 'sawdust

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of various woods may be recognized by the fragments of various spiral and dotted vessels and fibrous materials which are not found in the spices or other adulterants.²⁰

The Danish authorities had in 1937 expressed concern over the many cases of ground cinnamon adulterated with a high percentage of ‘crushed cigar boxes’ (Spanish cedar, *cedrela odorata*).²¹

With the Nazi occupation of Denmark in April 1940, the country had suddenly been cut off from a lot of the countries it normally traded with. Half of all Denmark’s import stopped abruptly, and the other half was controlled by the German Wehrmacht. This meant that many spices abruptly became unavailable. The Danes had a love of spices, especially cinnamon and pepper. Before the war Denmark imported about half a million kilos of spice each year.²² This meant that people were hungering for spices and were ready to accept substitutions of a quality what today would be viewed as dodgy and unacceptable.

The idea behind using sawdust or ‘tree flour’, as it was officially named to make it seem more palatable, in ersatz spices was to have a cheap and available receptor for flavour and aroma. Essential oils extracted from real spices or artificial flavourings would be added to very finely ground sawdust, primarily from beech trees, but oak was also used. Through this process the sawdust would absorb and contain the flavour and aroma of the original spice. However, spice flavours proved to be quite volatile for 1940s techniques, and many ersatz spices lost their taste when heated during cooking. As chef Richard Oest-Larsen lamented, ‘We do not have pepper and all the other glorious flavours, and ten cents worth of sawdust in the meatballs, will not make them taste better.’²³

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Ersatz cinnamon could be made by adding cinnamaldehyde to sawdust and then colouring it at the end to make look more like real cinnamon. ‘Many will perhaps find this distasteful to use sawdust for this purpose’, wrote one newspaper, ‘but fairly considered, it may well be the same whether one uses bark from the cinnamon tree or another tree.’²⁴

But even in ersatz products the sawdust content could be found to be too high to be anything other than a counterfeit spice. In 1942 *Steins Laboratorium*, which handled food testing for the state, publicised the test results of 4400 samples of all kinds of food including spices, and the results were not good. Several samples of cardamom proved to be made of ‘a waste product, which was completely worthless as a spice’²⁵, while especially cinnamon seemed to be made up of the ever-present sawdust mixed with starch, cocoa shells, and ochre. One pepper sample was made almost entirely of crushed dried peas and two samples of cloves had so much sawdust that they were stamped as falsifications. All in all, 310 samples of the 4400 was found so badly adulterated or spoiled that it led to official reprimands and large fines.²⁶

The demand for spices also revived an older method of swindling. This fraud involved the selling spent spices as fresh. Spices such as cinnamon could be boiled to remove its essential oils and the re-dried and sold while the essential oils could be used to flavour

sawdust for ersatz spices. Back in the 1850s Hassall had illustrated how spent spices could be detected, through looking at the starch granules that change shape after being boiled.²⁷

With all the dubious ersatz products and falsified exotic spices on the market it is no wonder that many Danish housewives instead turned to other means of flavouring and spicing up their meals. A very popular book in Denmark during the Second World War was Herluf Petersen's *Spisekammeret paa Grøftenkanten* (*The Larder on the Edge of the Ditch*). It described in detail several edible wild plants growing in Denmark, how cook with them and their flavour profile. Gråbynke (mugwort, *Artemisia vulgaris*), for instance, could be used as a seasoning for roasts.²⁸

The Danish newspapers were also quick to offer advice on foraging and gardening, and one local newspaper stated that 'such home-grown spices, as we ourselves grow, dry and grind, are without any danger of being falsified'.²⁹

Spice Adulteration Today

50 Before the 1970s a lot of food legislation around the world was concerned with labelling to prevent false branding like the marketing of margarine as butter. It was not the labelling of ingredients as we see today. For many products, the ingredients were shrouded in trade secrets and not disclosed to the public, so consumers could easily be misled in the jungle of colourants, additives and artificial flavourings that had come into use the post-war decades. Developments in food science had made it possible to create nature-identical substances and food adulteration had thereby entered a new era. Legitimate spice brands could now be 'natural', 'nature-identical' and 'artificial'.

One of the best-known cases is the different vanilla flavourings. It is the second most expensive spice on the market, so adulteration happens frequently. The chemical compound which is mostly responsible for giving the vanilla bean its vanilla flavour is vanillin. The chemical structure of vanillin had been known since the late 1850s, and vanillin had been synthesized and manufactured as a flavouring on a large scale from the 1870s. The use of synthetic vanillin can be characterized as nature-identical, since vanillin also occurs in nature, while another vanilla-substitute ethyl-vanillin does not and is therefore an artificial flavouring.

The 1970s became a ground-breaking decade for food safety legislation with several new food safety measures being introduced and older food laws updated around the world.

In 1973, the first comprehensive Danish positivliste (positive liste) of food additives saw the light of day. It was a list of approved food additives making use of the European Union's E-number system, introduced in 1962. It laid the groundwork for a better regulation of food production and promoted openness and transparency within the food industry. During the preceding research for the list, food producers were interviewed about their use of additives, and their answers were codified into the list. Thus, it gave an almost complete view of the food production in Denmark and the use of additives.³⁰ However, as the history

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of adulteration shows both scientific and legislative breakthroughs in food safety and production gives rise to new forms of swindling.

Food adulteration has evolved with the times and there is big money involved in an ever-growing international market, so more and more resources and manpower are needed to combat food fraud which is now more than ever a global issue.

When the Danish Food Authorities established a flying squad in 2006 it was a six people team, today there are thirty-one employees. 'With icebergs you know that you have to multiply by ten. When it comes to food fraud, I do not know whether to multiply by two or ten.'³¹, stated Michael Rosenmark, leader of the team, in an interview in October 2019, when asked about the scope of adulteration and fraud.

Food scandals still happen frequently, and they shock and outrage us, just as they did in Accum's time. And, while today's adulteration compared to the fraud in the nineteenth century is overall less harmful to human health, poisonous substances can still find its way into our food.

In the early 2000s the growing use of azo dyes, especially Sudan Red, to adulterate chilli powder, came under scrutiny by food authorities in Europe and in 2003 the EU issued a directive requiring all dried and ground chilli entering the EU to be certified free of Sudan Red. At first it was thought that the adulteration only occurred amongst producer in India, but the list rapidly grew to include other chilli producing countries such as China, Pakistan, South Africa, and Turkey.

Sudan dyes are usually used to colour waxes, solvents, polishes and certain fabrics, and they have not been legal for food use in the EU since 1997, because of their potential carcinogenic properties. Swindling chilli producers had used Sudan Red to colour chilli powder adulterated with stems, seeds, and other bulking material, so that the characteristic bright red nuance could be achieved. This scandal culminated in 2005 with the recall of more than 350 products in the UK because contaminated chillies had been used as ingredients in a variety of products like Worcestershire sauce, which had in turn been used as ingredients in processed foods.³²

Today we no longer see counterfeit peppercorns made from floor sweepings and linseed oil cakes, but that does not mean that fraud with pepper has disappeared. Today's preferred pepper adulterant is dried papaya seeds. The seeds are only a little bit smaller than real pepper corns and are readily available. Spices are still one of the most vulnerable foods when it comes to fraud, and, as it is integral to food cultures all around the globe, spices will continue to play a part in the future story of adulteration.

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