

# Petits Propos Culinaires 107

Essays and notes on food, cookery and cookery books



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## ACCURACY AND PRECISION IN FOOD WRITING

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With a less than stellar grade-point average and having been expelled from high school just before graduation, my college options were slender. I opted to go to New Mexico State University in Las Cruces. In the 1960s, the town had a population of about a thousand inhabitants when school was not in session and six times that when it was. The closest major city, El Paso, was an hour away by interstate highway.

I chose civil engineering as my major, not because I knew anything about the field, but because two of my high school friends chose the subject for themselves. The first class I was exposed to in the subject was surveying. We started with a rod, chain, compass, and notebook, slightly modernized versions of the same equipment that George Washington used. Before we were sent out in the field, there were a couple of classroom lectures. I only remember part of one.

The instructor chalked a square on the blackboard. He told us the square represented a plot of land. He instructed a student in the front row to take the chalk and divide the plot into two equal plots, each of half the size of the original. The student drew a vertical line through the centre of the square that the instructor had drawn. The next student was given the same instructions, and one right-most plot was vertically subdivided. The process continued until it was no longer possible to subdivide the diminishing plot with the chalk. The chalk lacked any further precision. The lesson that day was my first exposure to the parallel concepts of accuracy and precision.

Depending upon the field of interest, accuracy and precision will have a different definition. In the world of cooking, accuracy is a measure of how close the cook is able to quantize

an ingredient, a temperature, or time to its true value. If I go to my tap and measure out a cup of water, how close to a true, or accurate, cup will my measured amount be? Precision is a measure of how consistently I can use my measuring device, in this case a plastic measuring cup with one ounce increments marked on its side. Since the markings are sufficiently spaced, I can visually estimate quarter-ounce amounts. The precision of my one-cup measurement is one-quarter ounce.<sup>1</sup> If I line-up five examples of the same measuring cup, will the markings on the side be in the same place across all the cups? If I use a known standard, will my plastic measuring cup indicate the same absolute amount? When we purchase a piece of measuring equipment, we assume that the manufacturer has been competent in their design and production of the item. With my measuring cup, I can measure a cup of water to a known precision of one-quarter ounce, but I can only assume that the accuracy of the measuring cup is close to being true.

#### RECIPES BY NUMBERS

In my experience, when referring to cookery, most people only consider accuracy and precision in the numerical realm. They measure the suggested amount of flour or set their oven to a prescribed temperature. Within these narrow boundaries, they seek an assumed degree of accuracy and consider precision, if at all, only in the abstract.

My teachers have always told me that modern recipes use more precise prescriptions of ingredients than older recipes, but that has not been my experience. Writers for the first five-hundred years of cookbooks mostly used non-prescriptive descriptions of the ingredients in recipes, but there were times where the opposite was true. The Vatican manuscript of *Le Viandier de Guillaume Tirel dit Taillevent* from the first half of the fifteenth century contains a recipe titled: ‘*Blanc mengier d’un chappon pour ung malade*’.<sup>2</sup> From the title we learn that the recipe requires precisely one capon. The recipe also calls for ‘*demie douzainne d’amendes pelées*’, or precisely six peeled almonds. Whole number specifications, as in

this case, are very precise. Even though the weight of the capon and the size of the almonds were not specified, the whole number specifications are quite accurate. Count measurements will always be precise and accurate if the cook knows how to count.

By the eighteenth century, highly precise ingredient quantities were common in recipes. A random peek in Eliza Smith's *The Compleat Housewife*, chosen because it was published in many editions in both Britain and America, provides many examples: 'a lemon', 'candied orange and citron cut in pieces, of each three ounces', 'yolks of two hard eggs', 'half a pound of the finest sugar', and 'two pounds of beef-suet'.<sup>3</sup> All of the above measurements are either by weight or count. Smith rarely uses volumetric measurements, such as spoons or cups, and only then in cases where the ingredient is a liquid or accuracy is unimportant.

Determining liquid quantity with a volumetric measure can be quite precise if the cook is consistent in how the measuring tool is used. Liquid measures are always level. The measure may not be accurate to modern standards, but it still can be precise.

By the middle of the nineteenth century, prominent authors like Isabella Beeton were using volumetric measurements for dry ingredients without specifying whether the tablespoon, dessertspoon, or teaspoon was measured scant, level, rounded, or heaping. Mrs Beeton does specify that the volume of a tablespoon is one-half fluid ounce, a dessertspoon is one-quarter of a fluid ounce, and a teaspoon is one-eighth of a fluid ounce.<sup>4</sup> She doesn't address the salt spoon used in recipes later in the century. Mrs Beeton was not the first cookbook author to stipulate the volumetric measurement of dry ingredients but was possibly the most prominent of her time.

Mrs Lincoln attempted to provide some standardization, even though it was a bit misguided, to the use of measuring spoons.<sup>5</sup> She provides a table of weights and measures that inexplicably differentiates between liquid and dry measures such that it takes about one-third more of a dry ingredient to equal the same volume of a liquid ingredient.<sup>6</sup> In her hands, in the area of accuracy, dry ingredients take one on the chin.

Mrs Lincoln differentiates between heaping, rounded, level, and scant measurements and describes how each is achieved. Although not specifically stated, she implies that if a qualifier is not included, a measurement should be assumed to be level. Mrs Lincoln's successor at the Boston Cooking School, Fannie Farmer, explicitly stated, 'A tablespoonful is measured level. A teaspoonful is measured level'.<sup>7</sup> These two statements earned her the title 'mother of level measurements', even though she wasn't the first to call for them.<sup>8</sup>

Measurements performed with measuring spoons are inherently imprecise because of many variables, starting with whether the cook uses them properly. The average home cook will choose a set of measuring spoons based on marketing factors other than accuracy. They simply assume their spoons to be accurate. When used for liquid measurement, most will judge the fill level from above rather than at eye level. A spoon with shiny interior may appear full, when observed from above, even though it is less than three-quarters full. Another issue is when different sources of the same dry ingredients are measured with the same spoon to a level fill, the resulting weight can differ greatly due to the difference in coarseness and packing of the dry ingredients. (See the later discussion regarding kosher salt.)

By the time the world was gripped by economic depression and *The Joy of Cooking* was published, volumetric measurements had superseded weight measurements. They were now the standard.<sup>9</sup> Thirty years before, a measuring cup was about one-twentieth the price of a kitchen scale, and the scale only had a precision of an ounce.<sup>10</sup> I assume the price difference was even more by the 1930s. By the time I purchased my first electronic scale in the 1980s, the price ratio was up to forty-to-one. Since the turn of the twenty-first century, electronic scales have dropped impressively in price, and the price ratio of scale to measuring cup is now closer to two-to-one. Some enlightened cookbook authors are beginning to favour weight over volumetric measurements even though the market still seeks the latter. The transition will probably require the current generation that is just starting to cook, men

and women who were schooled in the metric system, to become dominant.

For the most part, the precision of nineteenth-century measurements was appropriate and adequate. People learned how to adjust their recipes and work within the limitations of their equipment to produce a wide range of cooked dishes. It didn't matter if the teacup they used for measuring, or even the tin-plated iron measuring cup, was different to their neighbours'. Cooks learned how to adjust their recipes to the circumstances and how to judge when their oven was at the proper temperature.<sup>11</sup> Since the Second World War, we have specified ingredient lists with an increasing amount of precision, but as cooks we are less able to adjust for the remaining, often uncontrollable, differences in the dishes we are preparing.

One consequence of the move away from volumetric measurements is the current trend to provide both English and metric values for each ingredient specification.<sup>12</sup> If the metric units are exact multiples of five, ten, or twenty-five of the labelled unit and the English equivalent is an approximation of the same precision, then it is likely that the recipe was originally developed in metric units. An example of a unit specification with a metric-unit predominance would be 1 fl oz (30 ml), 1 oz (30 g), or 1 fl oz (3 cl). These units all display similar precision. A recipe developed in English units and displayed with an English-unit predominance is often shown as 1 fl oz (29.57 ml) or 1 oz (28.35 g). These equivalencies imply a precision for the metric units of 0.01 units, or about one-hundred times the precision of the English units. Rather than just mathematically converting the English units to the metric units, rounding the result to the same number of significant figures as the original English units will apply a similar level of precision to the result.<sup>13</sup>

Errors in accuracy are introduced by recipe writers when they believe the numbers on a dial or display. Both my large, built-in conventional oven and my small, countertop convection oven have digital displays that allow me to set either to a precision of ten degrees Fahrenheit or five degrees Celsius. Just because a

temperature is displayed on the outside of the box, I know better than to think that the temperature inside the box matches. The temperature inside an oven can vary due to position, loading, internal-air movement, and control system. Modern ovens use a proportional-integral-derivative controller that reduces the cycling of the heating element to an insignificant amount. Older ovens used simple on-off thermostats that caused the temperature to cycle up-and-down over a range defined by the oven's hysteresis. The knobs used to set older ovens also indicated temperatures only to twenty-five degree intervals on the Fahrenheit scale or even relative settings like Gas Mark, which represents the same interval. For most oven users, a precision of twenty-five degrees is adequate, especially once the user becomes familiar with their oven's idiosyncrasies, including relative accuracy. Problems in precision arise when cookbook authors test recipes in a 350 °F oven but blindly convert the temperature setting to 176.7 °C. The implied increase in precision between the two numbers is one-hundred-to-one. The Celsius temperature should be stated as 180 °C to maintain the same precision. The cooking process won't mind the five degree Fahrenheit difference in actual temperature.

Problems in both precision and accuracy can arise when the cook believes a display that gives the temperature to four significant digits. This is the case with modern cooking devices such as immersion circulators. These typically display temperatures to a tenth of degree. There is an implication with such precision that these devices are also very accurate. Unfortunately, the thermocouples that many of these devices use are only accurate to about plus or minus two degrees Celsius.<sup>14</sup> Since circulators are used for low-temperature cooking, where in selected cases a difference of one degree Celsius can make a difference, it is reasonable for cookbook authors to express the desired temperature to a whole degree Celsius, not a tenth of a degree as some are doing.<sup>15</sup> When the temperature specification is converted to Fahrenheit or Celsius, whichever is appropriate, the results should also be to a whole degree of precision.

## RECIPES BY WORDS

The above examples illustrate various aspects of numerical accuracy and precision with respect to cooking. How close is that cup of flour you just measured to a true cup of flour? Or how accurate was your measurement? Are you able to determine your measurement to within a tablespoon or maybe a teaspoon? Or how precise was your measurement? For numeric measurements, the process is fairly simple. What about verbal accuracy and precision?

Modern recipes are flush with imprecise adjectives. The adjectives are commonly used to guide the cook in some way, but in my experience, confuse novice cooks and only produce a false degree of precision. Some examples are:

Size: large, medium, small;

Temperature: hot, warm, cool, cold;

Temperature setting: high, medium, low;

Grind: coarse, medium, fine;

Position: top, middle, bottom;

Colour: brown, golden, bright green, etc.;

Stirring: beat, whip, whisk;

Time: about ... seconds, minutes, hours.

The heavy use of these imprecise adjectives seems to have started some time after mid-century. When I suggested to a group of recipe writers that their use didn't add anything to the finished recipe other than confusion, I was firmly rebuked. According to these writers, cooks would be unable to follow 'Place the ingredients in a bowl, and beat them vigorously...' if some ambiguous, imprecise adjective relating to bowl size wasn't included in the instruction.<sup>16</sup> Adding imprecise words like 'small', 'medium', or 'large' add nothing to the instruction. How big is 'medium'? My experience with entry-level students is that imprecision of this type leads to confusion.

Another common source of recipe confusion is the use of imprecise ingredient names. My biggest complaint is when a



*Gerrit Dou (1613–75):  
Girl Chopping Onions,  
Royal Collection,  
London.*



recipe calls for ‘kosher salt’ as a generic term.<sup>17</sup> In the United States, there are two principal brands of salt with the word ‘kosher’ in their names. Equal volumes, the measurement method usually specified, of the two salts produce results whose weights differ by forty per cent, a significant variation.

Many processed or fermented products called for in recipes are imprecise. Soy sauces differ by country or culture, and within one group, an array of variations exist. Even ketchup can vary greatly by brand and country. By not specifying an exact brand, the outcome of the recipe may be a dish that tastes much different than intended.

Even generic ingredients like eggs need to be clearly specified. I’ve seen too many recipes online that are careful to use adjectives like ‘organic’, ‘pasture-raised’, and ‘brown’ but forget to provide the egg size and country of origin. A European large egg is closest in size to an extra-large egg in North America and Australia. Egg size can be very important in baking.

A term that used to have a specific meaning that now is imprecise is the verb ‘chop’. When Mrs Lincoln wrote her cooking

school instructional book in 1884, she was very specific when food was to be chopped, about 150 times in this edition, and diced, about 40 times.<sup>18</sup> She also specified a chopping knife, but not a cook's knife, as part of her required-equipment list.<sup>19</sup> When I've questioned modern cookbook authors as to whether there is a difference between chopping and dicing vegetables, I've been told 'no' more often than I been told 'yes'.<sup>20</sup> A number have told me that when they use chopped in a recipe, they intend for the reader to dice. When I give a recipe to my entry-level students that calls for the onions to be chopped, that is what they do. If the recipe says dice, they dice. The terms are not synonymous. It is imprecise, and wrong, to claim that they are.

#### SOCIAL MEDIA

Outside of recipe writing, there is both formal and informal food writing. Formal writing is produced by commercial sources and usually ends up in print or on an edited website. Informal writing is the purview of social media, a rampant source of both inaccurate and imprecise essays and comments on food.

On 3 May, 2016, a highly respected and well-known American food historian and author with expertise in international culinary history and foodways posted the following statement on the Facebook page of the Oxford Symposium of Food and Cookery: 'Another British influence on American cuisine: haslet, essentially meatloaf, no?'<sup>21</sup> The statement was followed by a link to an online dictionary.<sup>22</sup> There, haslet was defined as 'A cold meat preparation consisting of chopped or minced pork offal compressed into a loaf before being cooked.' Although the original statement is in the form of a question, it is clearly rhetorical. If the reader assumes that the writer is referring to modern haslet, then the first part of the statement is neither accurate or precise and the second part is accurate but not precise. If the reader doesn't bother to follow the link to the modern definition and instead relies on the *Oxford English Dictionary*, then the definition becomes 'A piece of meat to be roasted, esp. part of the entrails of a hog; pig's fry; also, the "pluck" or "gather" (heart, liver, etc.) of other animals, as the

sheep, calf, etc.’, and both phrases of the original statement are inaccurate.<sup>23</sup> In both situations, by not clarifying the timeframe, the whole statement become inaccurate. Additionally, the writer is assuming that all the readers understand what American meatloaf is.<sup>24</sup> From a comment posted later in the day from the original poster, ‘Early English settlement set a lot of food preferences and habits in America.’ So now we know that the original statement was referring to the traditional definition of haslet and not the modern definition that was provided in the post. With this new knowledge, the entire original statement becomes inaccurate.<sup>25</sup>

Many posters on social media assume that every reader cooks the same way, has the same food background, uses the same inaccurate terminology, has access to the same cooking equipment, and lives the same lifestyle before posting what are often imprecise, and sometimes inaccurate, statements. They assume that the reader will find precision in their statements because the reader is the same as they are. The reader will know precisely what the poster is saying. There will be no breakdown in communication. The reality, of course, is the opposite.

#### COMMERCIAL MEDIA

On 26 October 2016, the World Health Organization’s International Agency for Research on Cancer (IARC) issued a press release that contained the statement, ‘Processed meat was classified as carcinogenic to humans (Group 1), based on sufficient evidence in humans that the consumption of processed meat causes colorectal cancer.’<sup>26</sup> Typical questions relating to the announcement and classification were answered in supplemental information linked to by the press release.<sup>27</sup> A number of newspapers reported on the contents of the press release later in the day. *The Guardian* headlined, ‘Processed meats rank alongside smoking as cancer causes – WHO’ and sub-headlined ‘UN health body says bacon, sausages and ham among most carcinogenic substances along with cigarettes, alcohol, asbestos and arsenic’.<sup>28</sup> *The Telegraph* headlined, ‘Processed meat ranks alongside smoking as major cause of cancer, World Health Organisation says,’ and sub-headlined,

‘WHO publishes report listing processed meat as “carcinogenic to humans” – the highest ranking, shared with alcohol, asbestos, arsenic and cigarettes’.<sup>29</sup> The *Daily Mail* headlined, ‘Just two rashers of bacon a day raises your risk of cancer: Health chiefs put processed meat at same level as cigarettes,’ and sub-headlined, ‘Damning new report from the World Health Organisation released today/Rulings will send shock waves through farming and fast food industries/Experts said no need to cut out eating red and processed meat totally/But people who eat a lot should think about cutting down, they added’.<sup>30</sup> All three papers provided sensational headlines that were essentially accurate but nonetheless imprecise and, each in their own way, went on to modify the impression made by the headline by explaining details of the IARC report. None of the articles explained the idiosyncrasies of the IARC classification system which produce much of the imprecision.<sup>31</sup> None of the articles clarified what an eighteen per cent increase in risk meant.<sup>32</sup> Over the next thirty days, numerous websites brought clarity to the original IARC pronouncement, but these articles didn’t produce a media response comparable to the original press release.

#### AXIOMS

The world of food and cooking is rife with inaccurate axioms repeated by teachers and other experts like ‘searing a steak seals in the juices’, ‘always keep the tip of your knife in contact with your board when slicing’, ‘gas cooks better than electricity’. No matter how many times experts attempt to debunk statements like these, other ‘experts’ continue to repeat them.<sup>33</sup> These axioms sound so good and are just too easy to say. When the statement is imprecise as well as inaccurate, such as the third one, debunking becomes even more difficult. Supporters of the statement will find a single instance where they believe the statement is factual and attempt to justify its general use on that one aspect. Axioms such as these become deep-seated beliefs among those that repeat them. Rationality and clear thinking are seen as an attack. Statements such as those presented here are just a few examples of where

being accurate and precise in the world of food and cooking is less important than sounding knowledgeable.

## CONCLUSION

In the fifty years since I first learned about accuracy and precision, I have seen many examples of both being misunderstood or simply ignored when it came to food writing. Sometimes the reason was cultural. Sometimes the reason was traditional. Sometimes the reason was lethargy. Statements that lack accuracy may simply be wrong, but accurate statements that are imprecise hinder the writer's facility to clearly communicate. While readers may balk at inaccurate statements, they readily accept imprecise statements that allow the reader to add their own personal interpretation.

## NOTES

1. To describe the precision of a measurement in a statistical sense, the measurement would need to be completed multiple times. Precision would then be the distribution of the measurements.
2. Terence Scully, *The Viandier of Taillevent: An Edition of All Extant Manuscripts* (Ottawa: University of Ottawa Press, 1988) p. 241.
3. Eliza Smith, *The Compleat Housewife: or, the Accomplish'd Gentlewoman's Companion* (London: J. and J. Pemberton, 1739) p. 125.
4. Isabella Beeton, *The Book of Household Management* (London: S.O. Beeton, 1863) p. 40.
5. Mary Johnson Bailey Lincoln, *Mrs. Lincoln's Boston Cook Book* (Boston: Roberts Brothers, 1884) p. 28.
6. Lincoln, p. 31; For example, Mrs Lincoln writes that 16 tablespoons of a liquid, measured volumetrically, is equal to one volumetric cup, which is true. Then she writes that 12 tablespoons of a dry material, measured volumetrically, is equal to one volumetric cup, which is not true. A volumetric tablespoon of a liquid requires the same volume as a tablespoon of a dry material.
7. Fannie Merritt Farmer, *The Boston Cooking-School Cook Book* (Boston: Little, Brown and Company, 1896) p. 28.
8. KeriLynn Engel, 'Fannie Farmer, the mother of level measurements', *Amazing Women In History*, 23 July 2013 <<http://www.amazingwomeninhistory.com/fannie-farmer-mother-of-level-measurements/>> [accessed 10 May 2016]
9. Irma S. Rombauer, *The Joy of Cooking* (St Louis: the author, 1931; facsim. New York: Scribner, 1998).
10. *Catalogue No. 114* (San Francisco: Holbrook, Merrill & Stetson, 1903) pp. 144A, 760-1.
11. Catherine Beecher, *Miss Beecher's Domestic Receipt Book* (New York: Harper & Brothers, 1846) pp. 83-4.
12. The term 'English' is being used in this instance because it is more commonly

- used than the correct term of ‘U.S. Customary’, which is the American system of measurements derived from English units after the American Revolution; Wikipedia contributors, ‘Imperial and US customary measurement systems’, *Wikipedia*, 19 April 2016 <[http://en.wikipedia.org/w/index.php?title=Imperial\\_and\\_US\\_customary\\_measurement\\_systems&oldid=716068203](http://en.wikipedia.org/w/index.php?title=Imperial_and_US_customary_measurement_systems&oldid=716068203)> [accessed 11 May 2016].
13. For an explanation of significant figures see Wikipedia contributors, ‘Significant figures’, *Wikipedia*, 3 May 2016 <[http://en.wikipedia.org/w/index.php?title=Significant\\_figures&oldid=718438310](http://en.wikipedia.org/w/index.php?title=Significant_figures&oldid=718438310)> [accessed 11 May 2016].
  14. ‘Thermocouples—What is a thermocouple—Types of thermocouples’ <<http://www.thermocoupleinfo.com>> [accessed 8 May 2016].
  15. Thomas Keller, et al., *Under Pressure: Sous Vide Cooking* (New York: Artisan, 2008) p. 106.
  16. Rombauer, p. 233.
  17. The term ‘kosher salt’ is a shortening of what formerly was sold as koshering salt. The most popular American brand dates back to 1886. It features a crystal shape designed so the salt doesn’t fall off of poultry going through the koshering process. The second, major American brand was created in 1999 to compete with the first. Its shape is produced by running larger crystals between rollers. A number of smaller brands are also produced. All the brands have paid a certification company to be labelled as being kosher. Salt is a mineral and is always kosher by definition.
  18. Lincoln.
  19. Lincoln, p. 509; Chopping knives are rare today, but were common in kitchens up to the middle of the twentieth century. Going back in time, a painting attributed to Joachim Beuckelaer (1533–74) clearly shows a chopping knife identical to one shown in a painting called *Girl Chopping Onions* by Geritt Dou (1613–75) in the Royal Collection, London (see illustration). The earliest image or description (I’ve found) of a modern cook’s knife is in *The American Home Cook Book ... by an American Lady* (New York: Dick & Fitzgerald, 1854) p. 16. The *santoku*, the other knife designed to be used for slicing fully against a cutting board, was designed and introduced into the American market in 1982 by Ed. Wüsthof Dreizackwerk.
  20. It is rare that I find a cookbook author who has even seen a nineteenth-century chopping knife, which is different to a modern mezzaluna.
  21. ‘Oxford Symposium on Food and Cookery’ <<http://www.facebook.com/groups/oxfordsymposium/953604828071849/>> [accessed 9 May 2016].
  22. ‘haslet: definition of haslet in Oxford dictionary (American English) (US)’ <[http://www.oxforddictionaries.com/us/definition/american\\_english/haslet](http://www.oxforddictionaries.com/us/definition/american_english/haslet)> [accessed 9 May 2016].
  23. ‘haslet | harslet, n.’ (Oxford: Oxford University Press, 2004) <<http://www.oed.com/view/Entry/84461?redirectedFrom=haslet>> [accessed 9 May 2016]; the entry is accompanied by the note: ‘This entry has not yet been fully updated (first published 1898).’
  24. Many of the commenters to the posting demonstrated a lack of knowledge regarding ‘American meatloaf’, generally describing it as specific preparation and not allowing for variations in content or shape, of which there are many.
  25. American cuisine was strongly influenced by English cuisine up until the middle

- of the nineteenth century. Traditional haslet did not become part of American cuisine and is not the same as meatloaf, which is made primarily from ground meat not offal.
26. 'IARC Monographs evaluate consumption of red meat and processed meat; press release no. 240', (Lyon: International Agency for Research on Cancer, 26 October 2015) <[http://www.iarc.fr/en/media-centre/pr/2015/pdfs/pr240\\_E.pdf](http://www.iarc.fr/en/media-centre/pr/2015/pdfs/pr240_E.pdf)> [accessed 9 May 2016].
  27. 'Q&A on the carcinogenicity of the consumption of red meat and processed meat', (Lyon: International Agency for Research on Cancer, 26 October 2015) <[http://www.iarc.fr/en/media-centre/iarcnews/pdf/Monographs-Q&A\\_Vol114.pdf](http://www.iarc.fr/en/media-centre/iarcnews/pdf/Monographs-Q&A_Vol114.pdf)> [accessed 9 May 2016].
  28. Sarah Boseley, 'Processed meats rank alongside smoking as cancer causes – WHO', *The Guardian*, 26 October 2015 <<http://www.theguardian.com/society/2015/oct/26/bacon-ham-sausages-processed-meats-cancer-risk-smoking-says-who>> [accessed 9 May 2016]; this page generated 4,456 comments and 237,055 shares.
  29. Laura Donnelly, 'Processed meat ranks alongside smoking as major cause of cancer, World Health Organisation says', *The Telegraph*, 26 October 2015 <<http://www.telegraph.co.uk/news/health/news/11954640/World-Health-Organisation-report-processed-meats.html>> [accessed 9 May 2016]; this page generated 32,000 shares.
  30. Sophie Borland, 'Bacon, burgers and sausages "are as big a cancer threat as cigarettes," Who declares', *Daily Mail*, 26 October 2015 <<http://www.dailymail.co.uk/health/article-3289821/Bacon-burgers-sausages-big-cancer-threat-cigarettes-global-health-chiefs-declare.html>> [accessed 9 May 2016]; this page generated 2,700 comments and 24,000 shares.
  31. The IARC Group 1 Classification only means that there is 'sufficient evidence of carcinogenicity'. The term 'sufficient' is highly subjective, and is debated, even among members of the various IARC committees.
  32. The current rate of occurrence of colorectal cancer in the average Briton or American is slightly below five per cent. If the rate increases by the IARC-predicted rate of eighteen per cent, the rate of occurrence will increase to less than six per cent. The death rate is significantly less.
  33. Chowhound, 'Harold McGee Debunks the "Sealing in the Juices" Meat Myth', *You Tube*, 4 November 2011 <<http://youtu.be/GjfdW-kcX5E>> [accessed 10 May 2016].