

**“Optāsne Frixā cum eā?”;  
Creating a Model of the Big Mac in Ancient Rome.**

“A Big Mac – the communion wafer of consumption”  
John Ralston Saul<sup>1</sup>

The Big Mac, to many people, serves as a symbol of the widespread influence and impact of American consumerism and capitalism. It has made its impact felt across the world, becoming available around most of the globe, and spreading to become part of a modern empire of fast food, representing McDonalds, and its country of origin, the United States of America. This can be especially seen in the creation of the Big Mac Index, a measurement of purchasing power parity which is dependent on the identical nature of the Big Mac around the world, and the differing prices, even when accounting for the differing values of currency. But how does this sandwich stack up in one of the greatest empires of the ancient world, the Roman Empire? Most everything required in a Big Mac burger, the bread, cheese, lettuce, onions, pickles, the special sauce, and the burger itself is either widely available or easily substituted in the setting of later Imperial Rome, which allows for the creation of a Big Mac. Furthermore, because of Diocletian’s Edict on Maximum Prices, and other sources on the pricing of goods, this allows for the pricing of the Big Mac, and then a comparison to the modern cost of the Big Mac with the Big Mac Index. Through creating this model, one can get a new analysis<sup>2</sup> on the relative prosperity and worth of Rome, presented in a very modern sense.

If the model of the Big Mac has any hope of panning out, it must begin with the bread. The bun of the Big Mac consists of three parts, the crown, the club, and the heel.<sup>3</sup> These buns weigh altogether an average of about 82 grams, and serve as an integral part of the sandwich.<sup>4</sup> However, the composition of these buns is bleached white flour<sup>5</sup>, which presents an issue in its translation to the ancient world. While there were similar variants of bleached wheat flours in the ancient world, they would have been uncommonly used, as other grains were preferred. Other types of grains and flours were available and would be more widely commonly consumed than the monoculture of bleached wheat flour in contemporary North American culture<sup>6</sup>. Taste wise, it would be right to assume the use of spelt flour or similar grains, as is done with individuals who try to reenact the cuisine of Ancient Rome.<sup>7</sup> Robert Allen, a prominent economic historian of Rome, has placed the price of bread in ancient Rome at about .394 grams of silver per kilogram of bread, during the reign of Emperor Diocletian. Diocletian issued a Price Edict in 301, which while relatively ineffectual at acting as a stabilizing economic measure, gives one of the most complete models of Roman prices available. This Edict, as a consequence serves as the background to the costs discussed, and by extrapolating from it we can find the costs for the Roman Big

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<sup>1</sup> Saul, *The Doubter’s Companion A Dictionary of Aggressive Common Sense*, 10.

<sup>2</sup> The print edition, *The Big Mac Index Fast Food for Thought*.

<sup>3</sup> Daily Mail Reporter, *Make a big mac at home! McDonald’s top chef explains the secret to the chain’s burger (but why doesn’t it look quite like what you get at the counter?)*.

<sup>4</sup> See Figure 1. Measurements of a Contemporary Big Mac.

<sup>5</sup> “Big Mac Nutrition.”

<sup>6</sup> Margaritis and Jones, “Greek and Roman Agriculture”, 165169.

<sup>7</sup> “Neill”, post on *Pass the Garum*, Cato’s Roman Bread. Giacosa, Ilaria Gozzini, *A Taste of Ancient Rome*, 16.

Mac, both in terms of Denarii Communes, the notational currency used by the Edict, and United States Dollars. These values can be seen in Figure 2., a table which prices the components of a Big Mac out, and converts them to modern prices. This table presents us with a value of .0264 dollars for the 82 grams of bread which can be found in a Big Mac burger.<sup>8</sup>

Similarly, the cheese would also have been very different in the ancient world, especially from the cheese found in the Big Mac. This “American” cheese is soft, rubbery, and often with a peculiar colour, the result of modern preservatives, additives, and refrigeration techniques. In reading the works of the ancient gentleman farmers, Cato, Varro, and Columella, we find they all paint for us a very different image of cheese production, largely one which was not as standardized to the degree that it was today.<sup>9</sup> Instead of adding chemicals or ingredients to the cheese, the preservation of the cheese would have been obtained by drying, or more infrequently salting, the cheese making it similar to a Pecorino Romano<sup>10</sup> Another aspect to consider is the consistent production of cheese and the consistency found in all aspects of the dairy industry these days, both for reasons of economies of scale and to ensure that a standard cheese can be shipped everywhere as part of a standard Big Mac worldwide. While manufactories were used for many agricultural products, such as olive oil and wine, cheese would have been different from region to region, as the local processes and climate changed.<sup>11</sup> While cheese was a common enough product, its use in cooking seems to have been as a spread or topping, or in baking.<sup>12</sup> There is not much evidence that cheese was cooked into or onto meat, which is unfortunate for recreating the Big Mac in Rome. This said, we can now begin to explore specifics of the cheese within the Roman Big Mac. A Big Mac contains on average two slices of cheese, which weigh in at 14 grams.<sup>13</sup> When used with Diocletian's Price Edict, the cheese within the burger would cost 0.34 Denarii Communes, or 0.0264 United States Dollars (USD) today.

Moving ahead, the lettuce within the Big Mac today could be viewed as ostensibly healthy by some, insofar as the Big Mac as a whole could be considered healthy. This tradition is mirrored in the literary evidence which we have from Roman times, especially within the works of Pliny's Natural History, an encyclopedia of the Roman understanding of the natural world. Within this text, Pliny goes on to describe a variety of uses for the greenery;

“Indeed [the various species of lettuce] all have a cooling quality, and consequently are acceptable in summer. They relieve the stomach of distaste for food and promote appetite. At all events it is stated that the late lamented Augustus in an illness, thanks to the sagacity of his doctor, Musa, was cured by lettuce, which had been refused him by the excessive scruples of his previous doctor, Gaius Aemilius; this was such a good advertisement for lettuces that the method was then discovered of keeping them into the months when they are out of season, pickled in honey-vinegar. It is also believed that lettuces increase the blood-supply.”<sup>14</sup>

Lettuce as a whole is not tremendously interesting, in modern times or in ancient times, and does not appear much out of the culinary tradition. In the culinary tradition

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<sup>8</sup> See Figure 2. Component and Big Mac Prices in Denarii Communes, United States Dollars.

<sup>9</sup> Lucius Junius Moderatus Columella, *Res rustica* *VIX*, 284289.

<sup>10</sup> Dalby and Grainger, *The Classical Cookbook*, 2526.

<sup>11</sup> Curtis, “Food Processing and Preparation”, 384385.

<sup>12</sup> Edwards, *The Roman Cookery of Apicius*, 176177. Dalby and Grainger, *The Classical Cookbook*, 9296.

<sup>13</sup> See Figure 2. Component and Big Mac Prices in Denarii Communes, United States Dollars.

<sup>14</sup> Pliny the Elder, *Libri XVII XIX*, 502505.

recorded, lettuce would present itself by the leaf, or in a pureed state combined with other substances.<sup>15</sup> As such, the shredded lettuce to be found in the 15 Big Mac, while not impossible, would have been more likely to have been the individual leaves which can be found in the more gourmet burgers. The measurements taken with the Big Mac indicates lettuce to average at 14 grams, meaning that for Ancient Rome, the lettuce would have cost .015 Denarii Communes, or 0.0132 USD.

With the previous items addressed, the next presents itself as a real pickle. Cucumbers were widely regarded and popular in Ancient Rome, seeming to have been a real favorite of Emperor Tiberius, as Columella tells us of the immense investment and resources which this emperor would spend on the plant to be supplied with the treat throughout the year. At the same time it seems that pickling of vegetables was a common practice, seen as an attractive way to preserve the vegetables for the less fertile seasons, done with parsnips and houseleeks among other vegetables.<sup>16</sup> But for cucumbers, we are presented with another, alternative process which seems to have been applied to these gourds. According to Pliny the Elder, “Cucumber seed should be soaked for two days in milk mixed with honey before it is sown, in order to make the cucumber sweeter.”<sup>17</sup> The modern understanding of this is as a process which influences the amount of Cucurbitacin in the cucumber, the chemical responsible for making the cucumber and similar vegetables bitter.<sup>18</sup> By soaking the seeds, this would allow for them to be less stressed as they grew, and would result in a less bitter, sweeter cucumber. As such, and with no direct evidence of any production of pickled cucumbers, these sweet cucumbers will act in proxy for the cucumbers of the modern Big Mac even if they are not a perfect replica. The cucumbers in the Big Mac measure out to be about 7 grams, meaning that it would cost 0.044 Denarii Communes for them in ancient Rome, and 0.0176 USD.<sup>19</sup>

Saucing it up a little, we can see one of the most Roman aspects of the Big Mac, the Big Mac Sauce. While the paprika present within it would not be something found in the Roman world, the concept of sauce pervades Roman cuisine. Sauce was slathered on almost everything, used to create a sense of sweetness or saltiness which could be considered sickening from a modern point of view. Patronius, with his “Satyricon” provides quite the example of this during Trimalchio's Feast, during which Habinnas describes a prior dinner in minute detail;

“For the first course we had a pig crowned with sausages and served with bloodpuddings and very nicely done giblets, and of course beetroot and pure wholemeal bread which I prefer to white myself: it’s very strengthening and I don’t regret it when I do my business. The next course was cold tart and a concoction of first class Spanish wine poured over hot honey. I didn’t eat anything at all of the actual tart, but I got stuck in the honey. Scattered round was chickpeas, lupines, a choice of nuts and an apple apiece though I took two.”<sup>20</sup>

This love of sauces can be seen further in the Apician cooking tradition, which gives us an entire book of sauces, “De Condituris” (On Condiments), a useful reference when trying to find an analogue to replace the Big Mac sauce.<sup>21</sup> By listening to the description of McDonalds Executive Chef Dan Coudreaut, who describes the Big Mac sauce as one filled

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<sup>15</sup> Edwards, *The Roman Cookery of Apicius*, 5052.

<sup>16</sup> Lucius Junius Moderatus Columella, *Res rustica XXII*, 158163.

<sup>17</sup> Pliny the Elder, *Libri XVII XIX*, 463.

<sup>18</sup> 18 University of Nebraska-Lincoln, *Bitterness in Cucumbers and Zucchini*. 5.

<sup>19</sup> See Figure 2. Component and Big Mac Prices in Denarii Communes, United States Dollars.

<sup>20</sup> Petronius, *The Satyricon*, 53.

<sup>21</sup> Giacosa, Ilaria Gozzini, *A Taste of Ancient Rome*, 26.

with “contrasting flavour”, the qualities desired within the sauce become visible.<sup>22</sup> The recipe that makes the most sense would be “Ius in Venationibus Elixis et Assis” (Sauce for all boiled and roasted game).<sup>23</sup> This sauce contains a mixture of pepper, rue, lovage, celery seeds, thyme, mint, and pennyroyal, alongside juniper berries, honey, and Oxygarum, a vinegar based fish sauce. Such a sauce seems to have been inexpensive and widely available in the ancient world, and while Diocletian’s Price Edict does not go to a level of detail which allows us to really find the cost of the materials in the sauce itself, with most minor spices simply listed as “Condiments”, it does let us approximate the cost of the sauce as a whole with a simple “Liquamen” sauce. As such, the price of the sauce would have been estimated at .044 Denarii Communes, or 0.03872 USD for the 18 grams of Big Mac sauce to be found in a Big Mac.<sup>24</sup>

As we quickly approach the final layers of the Roman Big Mac, it feels only right to stop a moment and shed a tear for our good friend, the Onion. But the onion, besides acting in the medicinal usages which Pliny the Elder gives, was also known for other, more mystical connotations.<sup>25</sup> An example of this can be found in Plutarch in his “De Iside et Osiride” (On the Worship of Isis and Osiris), a part of his “Moralia”, one of the best records we have to this day on Roman Egyptology. While as a whole the Ancient Egyptian tradition would not have been widespread throughout the empire, it would be tolerated amidst the diverse array of religious customs and practices in the empire. In this work, Plutarch describes how “Dictys, the nursing of Isis” died when he fell into a river, grasping for a clump of onions.<sup>26</sup> As such, within this faith, “... the priests keep themselves clear of the onion and detest it and are careful to avoid it.” He further casts it into an inauspicious light, noting that it thrives in the waning moon, and that “It is suitable for neither tasting nor festival because in the one case it causes thirst and in the other tears for those who partake in it.” Interestingly, another prominent Roman writer, Ovid, would cast the onion in a much different light. In Ovid’s “Ars Amatoria” (The Art of Love) and his “Remedia Amoris” (The Cure for Love), he identifies the onion as an aphrodisiac to assist in the courtship process of a young Roman male.<sup>27</sup> In *Ars Amatoria* interestingly, the onion is presented as one of the better tasting aphrodisiacs;

“Some counsel the taking of savoury, noxious herb; it is poison, in my judgement; or they mingle pepper with the seed of biting nettle, and yellow camomile ground up in old wine; but the goddess whom lofty Eryx holds upon his shady hill will not thus be driven to her joys. Let white onions sent from the Pelasgian city of Alcahous, be eaten, and the salacious plant which comes from the garden, eggs too and Hymettian honey, and the nuts that the sharpleaved pine tree bears.”

Inversely, in his *Remedia Amoris*, Ovid records this last advice to help a young man through the emotional difficulties of break up:

“And then there is diet too; that I may perform all a physician’s task, I will tell you what to take and what to shun. Onions, be they Daunian or sent from Libyan shores or come from Megara all are harmful. Nor less should you avoid salacious rocket, and whatever sets our bodies in trim for Venus. More usefully may you rue that sharpens the eyesight, and whatever sets our bodies out of trim for Venus.”

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<sup>22</sup> Daily Mail Reporter, Make a big mac at home! McDonald's top chef explains the secret to the chain's burger (but why doesn't it look quite like what you get at the counter?).

<sup>23</sup> Edwards, *The Roman Cookery of Apicius*, 202.

<sup>24</sup> See Figure 2. Component and Big Mac Prices in Denarii Communes, United States Dollars.

<sup>25</sup> Pliny the Elder, *Libri XX XXIII*, 2427.

<sup>26</sup> Plutarch, *Libri V*, 21.

<sup>27</sup> Ovid, *The Art of Love and Other Poems*, 95, 233.

Overall, the onion seems to have taken on a wide and varied role within Roman society, but one which shows its widespread usage and acceptance in Roman cuisine. With this said, the price of onions in Rome was 0.09 Denarii Communes for the 15 grams needed, for a USD price of 0.0792.<sup>28</sup>

At this point the meat of the problem in creating a model of the Roman Big Mac, the Beef Patty, remains. Described as a “100% Pure USDA Inspected Beef; No Fillers, No Extenders.”, the modern Big Mac has used this as a major selling point, with the all too familiar jingle “*Two allbeef patties, special sauce, lettuce, cheese, pickles, onions – all on a sesame seed bun.*”<sup>29</sup> This said though, Beef was not an especially popular meat in Ancient Rome, and had nowhere the same level of popular acceptance or widespread consumption which we find today. This can be explained in a few ways. Part of this can be attributable to the climate of the Mediterranean, which is very much defined in the terms of a dry summer and a wet winter. This varies from the environments of Northern Europe and the United States, where a temperate and more consistent rainfall allows for cattle to be raised more easily. This is also seen with the technology employed by the Romans for farming, namely basic plows.<sup>30</sup> These ploughs, harnessed to work cattle without significant mechanical advantage, stressed the cow and made their meat stringy and tough. Such a meat would be undesirable, and only eaten at the end of the cow’s natural life. To find a meat as ubiquitous as beef in the ancient world, we must go the whole hog and embrace the pig. Pig was the go to meat in ancient Rome, used for both oblations and consumption. Archaeological evidence provides us with traces of manufactories devoted to raising swine, something which evokes images of the factory farming of the present era.<sup>31</sup> The role of the pig in Roman society was seen as so central that it would become used a symbol of Roman rule in the polemic between Romans and Jews in Roman Palestine, where each side would define itself and the other by their consumption of pork.<sup>32</sup> For these reasons and more, it would be entirely reasonable for the role of beef in the Big Mac to be substituted by pork, as Robert Allen does in his writings on Roman economic history.<sup>33</sup> But even with the meat replaced, a burger made up of only ground meat with black pepper and salt would likely have been found to be bland in Rome. In Apicius, we are provided with the dish “*Esicia omentata.*”<sup>34</sup> In this recipe, the meat would have been ground with winesoaked bread, grain, myrtle berries and pine nuts, resulting in a flavourful meatloaf of sorts. While it seems that patties could have been made out of a variety of meats, Apicius states “The ground meat patties of peacock have first place if they are fried ... and those of suckling pig, fifth”, reinforcing the decision to use pork in the model of a Roman Big Mac.<sup>35</sup> All this said, the sauce which was made earlier should render *Esicia Omentata* unnecessary, and allow one to simply use the ground meat. According to the Price Edict, the 66 grams of beef would have cost 0.03 Denarii Communes, making the whole add

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<sup>28</sup> See Figure 2. Component and Big Mac Prices in Denarii Communes, United States Dollars

<sup>29</sup> Gallagher, “Beefedup old jingle pays off for big mac.”

<sup>30</sup> Margaritis and Jones, “Greek and Roman Agriculture”, 165 169.

<sup>31</sup> Kron, “Animal Husbandry, Hunting, Fishing, and Fish Production”, 183.

<sup>32</sup> Rosenblum, “Why Do You Refuse to Eat Pork? Jews, Food, and Identity in Roman Palestine.”

<sup>33</sup> Allen, “How Prosperous were the Romans? Evidence from Diocletian's Price Edict (301 AD)”, 45.

<sup>34</sup> Giacosa, Ilaria Gozzini, *A Taste of Ancient Rome*, 8990.

<sup>35</sup> The Economist online, *Daily Chart the Big Mac Index*. A similar decision was made in relation to the Maharaja Mac, a Big Mac proxy made out of chicken produced in India, done for mostly religious reasons. The Economist recognizes that this good is not strictly equivalent, but chooses to compare it for the purposes of the Big Mac Index anyways.

up to 1.408 USD.<sup>36</sup>

With laborious effort a model of the Roman Big Mac has been constructed, allowing for the product to be sold. But the issue remains of the nonfood costs associated, mainly that of the workforce. Within the Roman world, slave labour was widely employed as a cheap, reliable means to get tasks done. This applied for both those slaves who were skilled labourers, acting as assistants to freedmen or working with fragile crops like grapes, and to the unskilled labour force which would be those employed at a McDonalds, both in the past and the present. The Diocletian Price Reforms give us the cost of a day's worth of labour from such an individual at about 3.625 Denarii Communes.<sup>37</sup> When split among an estimated 940 burgers a day, this would make it so that each burger cost about .001 Denarii worth of labour, which is about 0.00088 USD.<sup>38</sup> With these final costs, the value of the Big Mac in Roman times can now be established. Assuming that the a ten percent markup for profit is in effect, this would make the retail value of the Roman Burger 2.16 Denarii Communes or 1.8832 USD.<sup>39</sup> This price, while very low, is not completely unthinkable. With more specific details and costs factored in, it would make sense that this price would become similar to that of the Ukraine or Hong Kong.<sup>40</sup> With this, we can now compare the price to that of a modern Big Mac in the US.

When this value is then subsequently placed onto the Big Mac Index, we get a Big Mac Index Value of 44.838, indicating a 44% undervaluation of the product compared to the US Dollar. This could be for any number of reasons, from the relative cheapness of goods and especially meat in the modern period, to simply many of any parts which are part of the modern McDonalds operation, such as the Franchise system and the use of centrally grown and distributed ingredients, or most basically to a misvaluation of the Roman denarius in itself. Another interesting question which can be explored with this concept is the affordability of the Big Mac to the average citizen. We can see that for the average unskilled labourer it would have made 36.1 nummi a day, which means that it would take 1.48 days worth of labour to afford a Big Mac, a huge amount of time and labour.<sup>41</sup> While this value needs to be taken with a grain of salt, it makes sense with the highly disparate wages and salaries which Romans earned.<sup>42</sup> All of these remain areas of potential future research, alongside some very basic questions which could very well open up new interest in this topic, such as "Would the Romans have a concept of a sandwich?". This question remains troubling to us in the modern day, as we still have issues in defining the sandwich itself in the modern period, with some choosing to define it as a "protein encased in bread product", a definition which applies to many ancient foods, such as the "Patina Apiciana".<sup>43</sup> Others reject this proposal, and choose to define the sandwich in relation to sliced bread, and the products wrapped within it.<sup>44</sup> This subject is at present the source of much discourse, both academically, and in an informal, public sense.<sup>45</sup> Despite these disputes, by analyzing the

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<sup>36</sup> See Figure 2. Component and Big Mac Prices in Denarii Communes, United States Dollars.

<sup>37</sup> Allen, "How Prosperous were the Romans? Evidence from Diocletian's Price Edict (301 AD)", 3.

<sup>38</sup> Gibbers, comment on "Rachel", "How many burgers on average does a McDonald's restaurant sell each day?"

<sup>39</sup> "McDonald's Corp. Profitability Analysis."

<sup>40</sup> The Economist online, Daily Chart the Big Mac Index.

<sup>41</sup> Allen, "How Prosperous were the Romans? Evidence from Diocletian's Price Edict (301 AD)", 3.

<sup>42</sup> Mitchell, "Rome on a denarius a day"

<sup>43</sup> Chillag, post on *Wait Wait... Don't Tell Me* blog, Sandwich Monday: 'Defining Sandwich'. Dalby and Grainger, *The Classical Cookbook*, 136137.

<sup>44</sup> *White City Shopping Center v. PR Restaurants*.

<sup>45</sup> Florestal, "Is a Burrito a Sandwich? Exploring Race, Class and Culture in Contracts", 159.

nature and value of a Big Mac in the Roman era, a new and unique perspective emerges on the times of the Romans in comparison to the present.

Figure 1. Measurements

Component	Big Mac 1 – Mass (Grams)	Big Mac 2 – Mass (Grams)	Big Mac 3 – Mass (Grams)	Big Mac – Avg Mass (Grams)
Buns	86	80	81	82
Lettuce	16	13	14	14
Beef	66	66	66	66
Sauce	18	18	18	18
Onions	13	17	14	15
Cheese	14	13	14	14
Pickles	6	7	7	7
Total	219	214	214	216

Figure 2. Component and Big Mac Prices in Denarii Communes, United States Dollars

Component <sup>46</sup>	Amount (Grams) <sup>47</sup>	Amount (Number of Units) <sup>48</sup>	Price in Denarii Communes <sup>49</sup>	Price in Nummus in 301 CE <sup>50</sup>	Value in Silver (Grams) <sup>51</sup>	Price in USD <sup>52</sup>
Bread	82	--	.03	.75	.024	.0264
Cheese	14	--	.34	8.5	.272	.2992
Lettuce	14	.03 heads (out of a 524g head of lettuce)	.015	.375	.012	.0132
Pickles (Cucumber)	7	.05 Pickles (out of a 150g Pickle)	.02	.5	.016	.0176
Sauce (lus in Venationibus Elixis et Assis)	18	1.5 Tbsp (with a weight approx. that of	.044	1.1	.0352	.03872

Higgins, post on *parker higgins dot net*, on burritos, sandwiches, and the law.

<sup>46</sup> Components change from the contemporary Big Mac to the Roman model, but quantity stays the same.

<sup>47</sup> Data taken from Figure 1. – Measurements of a Contemporary Big Mac.

<sup>48</sup> Allen, “How Prosperous were the Romans? Evidence from Diocletian’s Price Edict (301 AD).” Some values, Bread Cheese, and Beef (Pork) are based of values generated by Allen. Others are based of contemporary vegetable sizes.

<sup>49</sup> Jack Mitchell, e-mail message to author, November 24, 2012. Allen, “How Prosperous were the Romans? Evidence from Diocletian’s Price Edict (301 AD).” Scheidel, “Real wages in Early Economies: Evidence for Living Standards from 1800 BCE to 1300 CE.”

<sup>50</sup> Jack Mitchell, e-mail message to author, November 24, 2012

<sup>51</sup> Allen, “How Prosperous were the Romans? Evidence from Diocletian’s Price Edict (301 AD).” Approximately .032 grams of silver per Nummus

<sup>52</sup> “24hgold” Based off the price of Silver in US Dollars, \$1.10 USD per gram on November 29<sup>th</sup> 2012

		mayonnaise)				
Onions	15	.15 Onions (our of a 100g onion)	.09	2.25	.072	.0792
Beef (Pork)	66	--	1.6	40	1.28	1.408
Labour	--	.001 burgers worth of labour (out of 940 burgurs)	.001	.025	.0008	.00088
Total	216	--	2.16	53.5	1.712	1.8832

Results were measured from local, contemporary Big Macs procured at the Quinpool Road McDonald's of Halifax on November 27th 2012. These are assumed to be representative of Big Mac Burgers from the United States and elsewhere.<sup>53</sup> I would like to acknowledge James Kho and Graham Jolliffe of Dalhousie University for assisting me in the measurement and disposal of these burgers.

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<sup>53</sup> The print edition, *The Big Mac Index Fast Food for Thought*.