

Fake Eggs

If you've lived in China, chances are you've heard about fake eggs. This should surprise few, as almost everything is counterfeited in China. Is it an old wives' tale, or is it for real?

Before I get to that, let's start with a story.

I have lived in Dongguan since 2002. Having heard the fake egg story countless times, I had gleefully retold it to my friends. I also made the observation that it probably originated as a dare or challenge, since a lot of ingenuity is required to make a fake egg. Obviously, Carly Fiorina was wrong when she said that the Chinese are not innovative¹.

As a skeptic and a long time listener of the award-winning podcast Skeptic's Guide to the Universe², I was surprised when the host Dr. Novella mentioned a fake chicken egg industry in China. Not long after that, Rebecca Watson, one of the co-hosts of the podcast, was invited to speak at a "Skeptics in the Pub" event, right here in Dongguan³. I decided to get some fake eggs and bring them to the event, as a surprise show-and-tell. After all, as the manufacturing capital of the world, where else would it be made but here?

I asked several people to get fake eggs at the local wet markets. Knowing that these are supposedly sold alongside or mixed in with real eggs, and not expecting truthful labeling, I asked them to buy the cheapest eggs possible, if all attempts fail.

In the end, I got a bag of eggs that were very cheap, and was told that they were "questionable" and "probably fake". Upon careful examination, I could not immediately tell which ones were fake. When I Googled it (actually in China, Baidu), lots of results

¹ <https://thenanfeng.com/china-reacts-us-presidential-candidate-criticizing-chinese-not-innovative-imaginative/>

² <http://www.theskepticsguide.org/>

³ <http://www.onefortheroadg.com/event/skeptics-in-the-pub/>

came up on “how to distinguish fake eggs from real ones”. They were all roughly the same⁴:

1. The fake shell is shinier, but not by much.
2. The fake shell is slightly rougher.
3. Noticeable sounds when shaken due to water seeping from the coagulant.
4. A real egg will have a faint smell/stink.
5. A fake egg will have a duller sound when tapped lightly.
6. The white and yolk of a fake egg will quickly mix together once cracked open, since they are made of the same material.
7. When pan-frying a fake egg, the yolk will break by itself because the artificial sac membrane can't withstand the heat.
8. A real egg will have crack-like patterns when opened which disappear when cooked.
9. A real egg's yolk will be powdery when cooked, a fake egg's will be rubbery
10. A real egg will start to coagulate around 45 degrees Celsius, a fake egg will not when steamed.

Putting the eggs to the test without cooking them, nothing was obviously wrong except for a few that had a noticeable sound when shaken. The shells did not feel, smell, or sound any different when tapped.

Perplexed, I decided to look at how fake eggs were made. Perhaps that would offer me some insight on how to tell them apart⁵. To my delight, I found underground schools that teach people how to make fake eggs, and even YouTube videos. The yolk and white were made of the same material, and the yolk was dyed orange. Strangely enough, no one demonstrated how to make a seamless shell, which to me, seemed like the most difficult part of the process. I deal with molds on a daily basis, and making a shell without a parting line is not only difficult but expensive. As an engineer, I have always wondered how it was made, and this was disappointing.

After looking closely at the process, it simply didn't make sense. Why would the white and yolk have different properties when cooked, if they are made of the same material? Why would the yolk and white mix only when cracked opened, but not in the shell? Why would nobody show how the shell is made?

⁴ http://wenku.baidu.com/link?url=Ca4a-YVduNmoDhofq6CKnQWIBJQfJEv-TvTy9q19e2Oyb9aXaQKyT9starqmuXxtOp5we3INmqOCaYykt0TejeEQ0Q8_FuWlkjH4rWDSOQS

⁵ <http://bbs.meizhou.com/thread-311212-1-1.html>
<http://baike.baidu.com/view/1188496.htm?fr=aladdin#2>
http://www.zhanjiang.cc/news/news_info.asp?Tid=37429

That's when it dawned on me. I had been searching for "how to tell a fake egg from a real one" and "how to make a fake egg". Is it possible, that I had been begging the question all along, without first establishing that a "fake egg" exists?

I found a report of a government employee (Zhu, Bao Li) who wrote to then Premier Wen in 2008 about the fake eggs. He received an official reply 5 months later, stating that an extensive investigation in Hunan, Shandong, and Guangdong provinces uncovered no fake eggs on the market⁶. He subsequently posted an open reward of 1000 RMB for a verifiable fake egg in the local newspaper, which has gone unclaimed since April 2009. However, no primary reference links were provided despite the specific claims, and I was unable to find archived material. Anecdotally, I have not found anyone in China, expat or local, who has rigorously examined a fake egg.

After some further digging, it turns out that truth is stranger than fiction. Fake eggs are not the real scam. The real scam, ironically, is that scam schools are scamming prospective scammers, by promising to teach them how to make something that can't be done⁷. The schools show how the yolk and white can be formed into an egg shaped gelatin, but claim the shell forming process happens overnight - giving them plenty of time to replace them with real eggs before the students return. It is a perfect crime with no recourse, and poetic justice for the scammers. As I realized that, my eyes rolled back so far I saw the back of my skull.

Some have pointed to abnormal/malformed eggs as proof of fake eggs. In fact, I had personally bitten into a rubbery yolk, a disgusting and powerful experience that had only strengthened my erroneous conviction. In reality, egg abnormalities happen naturally and are quite common⁸.

From a different perspective, would it make sense to counterfeit a low value, generic item that is fragile, tricky to make, and difficult to transport? Let's perform a quick reality check.

The counterfeit/adulteration industry typically targets:

1. Branded items with high brand premium, such as luxury watches, designer bags, and footwear.
2. Unbranded items with high market value, such as gold plated lead ingots, shark fin, bird's nest (swiftlet spit), and *O. sinensis* (fungus on mummified larva).

⁶ <http://baike.baidu.com/view/1188496.htm?fr=aladdin#11>

⁷ <http://www.chinanews.com/life/2010/12-27/2747149.shtml>

⁸ <http://www.guokr.com/article/91623/#id18>

3. Items that can be adulterated easily, such as adding melamine to diluted milk, injecting meat with water, mixing waste oil into cooking oil.
4. Intellectual property, such as music, software, books.

All of the above have very large profit margins, which is essential for an illegal activity. Eggs do not fall into any of these categories. At around 5 RMB/500g⁹, it is virtually impossible to make a meaningful profit with the production method described¹⁰ (cost analysis on my blog). Counterfeiters are rarely deterred by law; however, they are rather demotivated by a lack of profit.

The entire fake egg story seems to be a “Keyser Söze”, a myth sold on fear, a meme that fits the narrative. It exists right on the edge of plausibility, seemingly tangible but just out of reach. The existence of scam schools further embellishes the story, even if they were simply exploiting the situation opportunistically.

A quick look at the cost could have easily brought down the house of cards, without even considering the engineering challenges. However, I had blindly accepted it as fact without examination, since it seemed to fit the narrative perfectly. I had *wanted* it to be true, and that alone was enough to obscure the warning flags. It is an example of how powerful our own biases can be, and despite being a skeptic, a humbling reminder of my own credulity.

Perhaps there is an innovative entrepreneur out there, determined to make fake eggs. However, I believe that the motive will be curiosity rather than profit. So when it comes to eggs, my advice is, eat away. Don't worry about eggs being fake; worry about salmonella instead.

假鸡蛋

只要您在中国待过，就应该听过假鸡蛋这回事。很少人会觉得惊讶，毕竟假货在中国比比皆是。那么，假鸡蛋究竟是确有其事，还是空穴来风呢？

先来讲个故事吧。

⁹ <http://www.84ny.com/view/617275.html>

¹⁰ <http://danielliang.com/randomness/fake-eggs/>

我从 2002 年开始就长住东莞。期间不知听过多少假鸡蛋的故事，自己也兴高采烈地复述给国外的朋友听。我也指出，因为需要很独特的创造力才作得出来，当初假鸡蛋很可能是源于打赌或挑战。很显然地，菲奥莉娜（前惠普执行长）最近说中国人缺乏创造力是错误的¹¹。

身为“怀疑论者的宇宙指南”播客的长期听众与怀疑论者，当播客主持人在节目中提到中国有一个假鸡蛋工业时，我不禁有些惊讶。节目播出后不久，其中一位主持人华特森小姐被邀请到东莞来主持一个“怀疑论者的酒吧聚会”活动。我当下决定买一些假鸡蛋并带去这个活动，给她一个惊喜。东莞毕竟是世界的工厂，除了这里还会在哪里做？

我拜托许多人到传统市场去买假鸡蛋。由于假鸡蛋是参杂在真鸡蛋里面，或直接当成真货销售的，而且也无法奢望商家会摆明卖假，我只好交代他们，最差的情况下，就买最便宜的鸡蛋回来。

最后，我拿到一包非常便宜的鸡蛋，并被告知鸡蛋“有问题”及“很可能是假的”。我仔细地观察，但还是看不出那些是假的。上谷歌，不，百度搜索，“如何分辨假鸡蛋”，马上有许多结果。他们的辨别方式大致相同¹²：

1. 假鸡蛋的壳颜色比较亮，但差别不是很大。
2. 假鸡蛋的壳比较粗糙。
3. 晃动假鸡蛋时会有声响，这是因为水分从凝固剂中溢出的缘故。
4. 真鸡蛋会有隐隐的腥味。
5. 轻敲假鸡蛋，声音会比较闷。
6. 假鸡蛋打开后不久，蛋白与蛋黄就会混在一起，因为他们是同样材质做的。
7. 煎假鸡蛋时，因为蛋黄薄膜受不起热，蛋黄会自动散开。
8. 真鸡蛋打开后蛋壳膜会有裂缝般的纹路，煮熟便会消失。
9. 真鸡蛋的蛋黄煮熟了会呈粉状，假的会有弹性。
10. 真鸡蛋 45 度开始凝固，假鸡蛋则不会。

在不烹煮的情况下测试时，除了一些摇起来有些声响外，我并没有发现闻起来、摸起来、敲打起来有任何明显的差异。

¹¹ <https://thenanfang.com/china-reacts-us-presidential-candidate-criticizing-chinese-not-innovative-imaginative/>

¹² http://wenku.baidu.com/link?url=Ca4a-YVduNmoDhofq6CKnQWIBJQfJEv-TvTy9q19e2Oyb9aXaKqYt9starqmuXxtOp5we3INmqOCaYykt0TejeEQ0Q8_FuWIkjH4rWDSOQS

困惑之余，我决定看看假鸡蛋是怎么做的。也许透过生产方式可以了解到辨别的技巧¹³。很庆幸地，我找到许多教人怎么做假鸡蛋的视频，甚至有专业的地下学校。我发现蛋黄与蛋白是同一种材料做的，唯一的差别是蛋黄有染色。很奇怪地，所有的视频都没有教人怎么做蛋壳，一个我个人认为是最困难的一步。在工作上，我每天和模具接触；要做出一个没有合模线的外壳不仅困难，而且昂贵。身为一个工程师，我一直很好奇蛋壳是如何做出来的，而这个结局令我失望。

我仔细地看了生产过程，越想越觉得不合常理。为什么一样的材质做的，蛋黄与蛋白煮出来会有不同的效果？为什么蛋白与蛋黄在打开鸡蛋后会混在一起，但包在蛋壳内就不会？为什么没有人演示蛋壳的生产过程？

突然间，我有如大梦初醒。我搜寻的是“如何辨别假鸡蛋”与“如何制作假鸡蛋”。我是否在确认假鸡蛋真的存在之前，就已经预设立场，视为理所当然了呢？

我找到了一篇报告，是一位政府官员朱保利在 2008 年上书温总理恳请调查假鸡蛋事件。五个月后他收到了一份正式文件，说明在湖南、山东、广东省内进行深度调查后，并未发现市面上有假鸡蛋的存在。他随后在报纸上刊登 1000 元人民币的悬赏启事，寻求可验证的假鸡蛋，然而从 2009 年刊登至今无人问津。虽然资料出处明确，但我没有找到最原始的佐证资料。我个人至今还没有遇见过任何用科学严谨的方式查看过假鸡蛋的中国人或外国人。

继续探查之后，我发现事实比虚幻更加不可思议。假鸡蛋并不是真正的骗局。真正的骗局，是地下学校用假的制作方法骗取这些准骗子的学费¹⁴。这些学校演示如何把蛋黄及蛋白做成一个蛋形的凝胶，然后声称蛋壳要过夜才能成型。这样他们就有充足的时间狸猫换太子，换成真的鸡蛋。这是准骗子无法报警的完美犯罪，标准的恶有恶报。当我了解真相，不自主地翻白眼翻到看到自己的后脑勺。

有些人把不正常与变形的鸡蛋当成假鸡蛋存在的证据。我自己也曾经吃到一颗橡皮蛋黄。当时这个恶心的经验强烈地加深我对假鸡蛋存在的错误信念。事实上，诸如此类的不正常鸡蛋会自然并且经常发生¹⁵。

¹³ <http://bbs.meizhou.com/thread-311212-1-1.html>
<http://baike.baidu.com/view/1188496.htm?fr=aladdin#2>
http://www.zhanjiang.cc/news/news_info.asp?Tid=37429

¹⁴ <http://www.chinanews.com/life/2010/12-27/2747149.shtml>

¹⁵ <http://www.guokr.com/article/91623/#id18>

从一个不同的角度来看，做一个低价值、无品牌、易碎、难制作、难运输的假货，会有经济效益吗？我们来看一看。

造假的行业一般来说会针对：

1. 有高品牌价值的产品，如名牌手表、手袋、鞋子等。
2. 高价值的无品牌产品，如冒充金条的镀金铅条、鱼翅、燕窝、冬虫夏草等。
3. 可以稀释变造的产品，如三聚氰胺奶粉、注水肉、地沟油等。
4. 知识产权品，如音乐、软件、书等。

以上产品都有高利润，是违法造假行业不可或缺的要素。鸡蛋并不在以上任何类别。鸡蛋的价格极低，大约人民币 5 元/斤¹⁶，根本无法用所描述的生产方式获得应有的利润（具体成本分析详见我的博客¹⁷）。造假业者很少会因为法律而却步，但毋庸置疑地会对低利润打退堂鼓。

假鸡蛋像是一个编造的谎言，一个利用恐惧销售的神话，一个符合剧情的童话故事。它存在于可信与不可信的边缘，似乎够得着却又摸不到。假鸡蛋学校更是为这个故事锦上添花，即便只是见机行骗的衍生产物。

原本一个很简单的成本分析就能让这个谎言堆砌而成的高塔崩落下来，根本用不着分析制作流程的困难度及挑战性。然而，因为这个神话太动人，太符合剧情，让我未经仔细思考就盲目地接受。我下意识地希望故事是真实的，而这已经足够让我放下心防，对诸多警讯视而不见。这个例子让我们看到自己的认知偏差的影响力，对自诩为怀疑论者的我，更是一个容易轻信的生猛的提醒案例。

也许有那么一位有创意的企业家，正埋头研究如何做假鸡蛋。但是我相信他的驱动力是好奇心，而不是利润。我个人觉得，就鸡蛋而言，放心去吃吧。别担心吃到假鸡蛋，要担心也是担心沙门氏菌。

¹⁶ <http://www.84ny.com/view/617275.html>

¹⁷ <http://danielliang.com/randomness/fake-eggs/>