Eggs are one of the most beneficial foods you can eat, and it's a shame they've been vilified for so long in the United States. In the U. S., roughly 280 million birds give us about 75 billion eggs per year, which is about 10 percent of the world supply.

But not all eggs are created equal.

Eggs from truly organic, free-range chickens are FAR less likely to contain dangerous bacteria such as salmonella, and their nutrient content is also much higher than commercially raised eggs.

The dramatically superior nutrient levels are most likely the result of the differences in diet between free ranging, pastured hens and commercially farmed hens.

If you are eating organically, then you have learned how important the diet and care of an animal is to the quality of its meat, and in this case, their eggs. But have you ever thought about what happens to these eggs AFTER they are collected?

You would think that organic eggs would be your best choice when picking them up at the grocery store. However, most states have laws that make them illegal unless all the eggs that are sold commercially are processed in a way that could damage them.

Some states require that all eggs receive a chlorine bath and mineral oil coating before they are nestled into their cartons.

There are vast differences in how eggs are processed and handled, even under the "certified organic" label.

As it turns out, what happens outside the shell is as important as what happens inside the shell, and that is the focus of this report.

Your Egg's Journey from Hen to Market

Ideally, eggs should be processed the day after they are laid. The USDA requires processing within 30 days of lay. High quality eggs are processed within seven days of lay.
Egg processing involves the following six steps:

1. Egg collecting
2. Cooling
3. Cleaning/Disinfecting
4. Candling (a measure for assessing the interior quality of the eggs whereby eggs are held up in front of a high-intensity light and visually examined; among other problems, cracks can be identified that necessitate disposal of the egg)
5. Grading
6. Packing/Labeling

It is the cleaning process that you as a consumer should be aware of, because in this step, chemicals and contaminants may be introduced that compromise your eggs' quality.

**Why Eggshells are Like Your Skin**

Did you know that, like your skin, eggshells are actually a porous membrane rather than an impermeable barrier?

*An eggshell contains approximately 7,500 pores or openings.* The outer surface is covered with a waxy cuticle (called the bloom when on a chicken egg), sealing the egg and helping prevent bacteria from entering.

Gases are transferred and moisture is lost through these pores.

When moisture is lost, carbon dioxide is also lost, speeding up the breakdown of the egg.[i] Loss of carbon dioxide causes the egg's pH to increase, which results in thinning of the albumen.

Why is this important?

Because commercial processing regularly destroys this protective cuticle.

As it turns out, it is standard industry practice to wash chicken eggs. Depending on the method of washing, the cuticle can be easily damaged, which leaves your eggs vulnerable to contamination and faster spoilage. The egg industry knows this, so to replace what Mother Nature put there for good reason, they must coat the egg with something—often mineral oil. It's akin to adding preservatives to processed foods.

Not only is mineral oil a non-natural agent, but it's a petroleum product that was never intended for you to eat.
Some egg producers use vegetable oil as a more natural alternative.

If you are a culinary talent, you might be surprised to hear that using eggs whose shells were oiled will prevent those "stiff peaks" from happening, because some percentage of the oil seeps into the egg white.

Not all eggs undergo oiling, but many larger producers do, particularly if they are preparing their eggs for long-distance shipment and/or storage.

According to the "incredible edible egg[ii]" website, about 10 percent of all eggs are oiled. I could find no statistic about what percentage of eggs are cleaned in a way that their cuticle has been wiped out, but I suspect it is much higher than 10 percent.

Like your skin, what's put ON your egg goes INTO your egg. Meaning, whatever the eggshell comes into contact with can cross over this semi-permeable membrane and end up in your scrambled eggs, from chlorine to mineral oil to dish soap -- to salmonella.

**Your Organic Eggs May Be Chlorinated or Rinsed in Lye**

According to *A Guide to On-Farm Processing for Organic Producers: Table Eggs[iii]*, detergents and other chemicals used for "wet cleaning" eggs must either be non-synthetic or among the allowed synthetics on the National List of allowed non-agricultural substances (205.603 of the National Organic Standard).

These synthetics include:

- **Chlorine** (sodium hypochlorate)
- Potassium hydroxide or sodium hydroxide (lye)
- Sodium carbonate
- Ozone
- Hydrogen peroxide
- **Peracetic acid (peroxyacetic acid) -- a mixture of vinegar and hydrogen peroxide**

These agents serve mostly as sanitizers, rather than washing agents.

If chlorine is used at levels over 4 ppm, it must be followed with a clean water rinse at no more than 4 ppm residual levels. Chlorine itself is relatively benign and breaks down to chloride in your body -- which is not much different from the chloride ion in table salt.

However, chlorine can interact with organic materials to form highly toxic compounds called **DBPs**.
(Disinfection Byproducts), which can be carcinogenic and mutagenic. And eggs are an "organic material," which bears the question of what chemical interactions are occurring in a chlorinated egg that have yet to be discovered?

Instead of harsh chemicals, the guide cited above recommends cleaning eggs with plain vinegar (mixed with 3 parts water) because it is non-synthetic and quite effective at removing both bacteria and stains on the eggshells (which some people find objectionable).

Some farmers report rinsing eggs very quickly in water, just to dislodge any debris, and believe this is adequate. Others use a dry brushing process -- no liquids at all -- just a brush, sandpaper, or a loofah sponge.

This dry brushing technique is highly recommended for small producers.

If eggs are rinsed in water, it is very important that the wash water be about 20 degrees warmer than the eggs, and at least 90 degrees F, but not more than 40 degrees above the eggs' temperature because of the risk of thermal cracking. This proper temperature gradient encourages the contents of the egg to swell and push the dirt out of the pores.

If the water is too cold relative to the egg, the egg can literally "suck in" the washing solution -- along with the bacteria in it. Water exposure should be as brief as possible to minimize the potential for contamination, and the eggs dried immediately.

Mineral oil is not listed in the National List of allowed substances.

I think it is unlikely that an organic farmer would choose to use mineral oil, but the regulations are so variable from state to state, and the national guidelines so nebulous, that there is lots of wiggle room.

Scrambled Federal and State Regulations on Eggs

There are different federal and state regulations for egg farmers, depending on what the eggs are intended for.

Eggs that are going to be used in egg products (i.e., those that will be cracked and emptied) are subjected to one set of regulations, and eggs that are sold as "table eggs" or "shell eggs," which are sold fresh and whole "in the shell," are subject to another set of regulations.

And then there are state regulations, in addition to federal regulations.

In 1970, Congress passed the Egg Products Inspection Act (administered by the USDA) to ensure that eggs and egg products are safe for consumption. This act imposes specific inspection requirements for both shell eggs and egg products for anyone who sells eggs to retailers (grocery stores, restaurants, hotels, etc.).

In 1972, on-site inspections of all shell egg producers became required quarterly. However, any producer with a flock of less than 3,000 birds is EXEMPT from this act.
Every state has its own specific egg laws, which makes it more complicated to figure out what process your eggs have gone through. Although the USDA does not allow immersion washing (allowing eggs to soak in water), most small producers are not subject to those restrictions.

And most state egg laws do not specify washing methods. For an extensive list of egg regulatory agencies, you can refer to this USDA Food Safety and Inspection Service "fact sheet."

**Egg Cleaners and Sanitizers**

According to the USDA's publication "Guidance for Shell Egg Cleaners and Sanitizers"[iv]:

"Compounds used to wash and destain shell eggs are potential food additives. Therefore, they are regulated by the Food and Drug Administration (FDA). Unfortunately, FDA does not have any published regulations dealing with shell egg cleaning and destaining compounds."

Leaves it wide open, doesn't it?

The publication goes on to give some guidelines for egg cleaning chemicals, basically instructing farmers to use substances that are "GRAS" (Generally Recognized as Safe), but these substances are not limited in any way.

Since organic egg producers are interested in producing high-quality eggs, many of them—especially small, local farming operations—have implemented gentle washing methods that don't compromise the cuticle.

Interestingly, in Europe, Grade A eggs are not washed. According to the National Sustainable Agriculture Information Service[v]:

"This practice is a result of research done in the early 1900s that indicated washing eggs before storage resulted in unpredictable and sometimes deleterious results. However, the length of wash time, cleanliness and temperature of the water and the proper use of sanitizers varied widely in these studies. Older egg production books do not recommend washing eggs at all. In the past, it was important to protect the cuticle because refrigeration was not always possible."

**To Refrigerate or Not to Refrigerate**

Despite what you've heard, eggs that are fresh and have an intact cuticle do not need to be refrigerated, as long as you are going to consume them within a relatively short period of time.

In other countries, including most of Europe, eggs are frequently not refrigerated.

In the U.S., refrigeration of eggs became the cultural norm when mass production caused eggs to travel long distances and sit in storage for weeks to months before arriving at your superstore. The general lack of cleanliness of factory farms has increased the likelihood that your eggs have come into contact with pathogens, amplifying the need for disinfection and refrigeration.
Not only that, but as a culture, we are rather "germ phobic" here in the U.S., compared to other countries.

So, IF your eggs are very fresh, and IF their cuticle is intact, you do not have to refrigerate them.

According to Hilary Thesmar, director of the American Egg Board’s Egg Safety Center[vi]:

"The bottom line is shelf life. The shelf life for an unrefrigerated egg is 7 to 10 days and for refrigerated, it's 30 to 45 days. A good rule of thumb is one day at room temperature is equal to one week under refrigeration."

Eggs purchased from grocery stores are typically already three weeks old, or older. USDA certified eggs must have a pack date on the carton, and a sell-by date. Realize that the eggs were often laid many days prior to the pack date.

For cracking the egg carton dates code, click here.

For more information about how to maximize the health benefits of your eggs, please review my earlier article.

Hello, Big Farma

About 95 percent of the eggs produced in the U.S. come from gigantic egg factories housing millions of hens under one roof.

According to the American Egg Board:
• Prior to World War II, most egg production came from farm flocks of less than 400 hens. By the early 1960s, technological innovations caused a shift from small farms to huge commercial operations.

• There are currently about 245 egg companies with flocks of 75,000 or more.

• Of these 245 companies, 60 have at least one million laying hens, and 12 have more than 5 million hens.

You can only imagine how difficult -- if not impossible -- it is to keep 5 million hens healthy and happy, under one roof... a clucking nightmare!

This is just another reason you should buy from your local organic farmer.

According to Robert Plamondon's Poultry Pages[vii], the most common sources of dirty eggs are the following:
• Hens who sleep and poop in the nest boxes
• Hens who enter the nests with muddy feet
• Broken eggs (from insufficient nest litter, or too many hens jammed together)

• Traffic (too many hens coming and going in a small area)

It is much easier to produce clean eggs than to clean dirty eggs.

Preventing dirty eggs is best done through better management of the hens and their nesting spaces, which greatly reduces the need for egg cleaning in the first place.

As the guide states, "Disease prevention in organic systems starts with clean birds." Your egg farmer should be paying attention to proper nutrition, clean water, adequate housing space, and good ventilation to reduce stress on the hens and support their immunity.

Crowded conditions in factory farms are a major reason why so many commercial eggs have to be bathed in caustic chemicals in order to be "safe" for you to eat!

**How Can You Guarantee Clean, Fresh Eggs?**

So, how can you tell if your eggs have been washed in chlorine or lye, or in some other chemical, or coated with mineral oil?

You certainly can't tell by looking at them.

*The only way to know if your eggs have been washed or oiled (and using what agents) is to ask the producer -- and the only way to do that is to buy from small local farmers you have direct contact with.*

It is important to know where your food comes from. And if you don't ask, they won't tell you.

The key here is to buy your eggs locally. About the only time I purchase eggs from the store is when I am travelling or for some reason I miss my local egg pickup.

But finding high quality organic eggs locally is FAR easier than finding raw milk as virtually every rural area has individuals with chickens. If you live in an urban area visiting the local health food stores is typically the quickest route to finding the high quality local egg sources.

**Farmers markets** are another great way to meet the people who produce your food. With face-to-face contact, you can get your questions answered and know exactly what you're buying. Better yet, visit the farm -- ask for a tour. If they have nothing to hide, they should be eager to show you their operation.

Remember, clean and happy chickens lead to healthy eggs.

[i] "Fresh Farm Eggs—Marketing and Regulations" (Agricultural and Natural Resources Fact Sheet #511), Washington State University Cooperative Extension for King County
[vi] "Storing eggs differs in Europe, America" (May 6, 2009)
[vii] Plamondon R. "Egg quality/egg washing"