

How do food manufacturers pick those dates on their product packaging – and what do they mean?

June 27 2016, by Londa Nwadike, Kansas State University



When does it all become dangerous to eat? Credit: Rich Johnstone, CC BY-NC-ND

No one wants to serve spoiled food to their families. Conversely, consumers don't want to throw food away unnecessarily – but we certainly do. The United States Department of Agriculture estimates Americans toss out the equivalent of [US\\$162 billion in food every year](#), at the retail and consumer levels. Plenty of that food is discarded while

still safe to eat.

Part of these losses are due to consumers being confused about the "use-by" and "best before" dates on food packaging. [Most U.S. consumers report checking the date](#) before purchasing or consuming a product, even though we don't seem to have a very good sense of what the dates are telling us. "Sell by," "best if used by," "use by" – they [all mean different things](#). Contrary to popular impression, the current system of food product dating isn't really designed to help us figure out when something from the fridge has passed the line from edible to inedible.

For now, food companies are not required to use a uniform system to determine which type of date to list on their food product, how to determine the date to list or even if they need to list a date on their product at all. The [Food Date Labeling Act of 2016](#), now before Congress, aims to improve the situation by clearly distinguishing between foods that may be past their peak but still ok to eat and foods that are unsafe to consume.

Aside from the labeling issues, how are these dates even generated? Food producers, particularly small-scale companies just entering the food business, often have a difficult time knowing what dates to put on their items. But manufacturers have a few ways – both art and science – to figure out how long their foods will be safe to eat.

Consumer confusion

One study estimated 20 percent of food wasted in U.K. households is due to misinterpretation of date labels. Extending the same estimate to the U.S., the average household of four is [losing \\$275-455 per year on needlessly trashed food](#).

Out of a mistaken concern for food safety, 91 percent of consumers

occasionally throw food away based on the "sell by" date – which isn't really about product safety at all. "Sell by" dates are actually meant to let stores know how to rotate their stock.

A survey conducted by the Food Marketing Institute in 2011 found that among their actions to keep food safe, 37 percent of consumers reported discarding food "every time" it's past the "use by" date – even though the date only denotes "peak quality" as determined by the manufacturer.

The most we can get from the dates currently listed on food products is a general idea of how long that particular item has been in the marketplace. They don't tell consumers [when the product shifts from being safe to not safe](#).



Dates can be about rotating product, not necessarily when it's safe to eat the food. Credit: MdAgDept, CC BY

Here's how producers come up with those dates in the first place.

Figuring out when food's gone foul

A lot of factors determine the usable life of a food product, both in terms of safety and quality. What generally helps foods last longer? Lower moisture content, higher acidity, higher sugar or salt content. Producers can also heat-treat or [irradiate foods](#), use other processing methods or add preservatives such as benzoates to help products maintain their safety and freshness longer.

But no matter the ingredients, additives or treatments, no food lasts forever. Companies need to determine the safe shelf life of a product.

Larger food companies may conduct [microbial challenge studies](#) on food products. Researchers add a pathogenic (one that could make people sick) microorganism that's a concern for that specific product. For example, they could add *Listeria monocytogenes* to refrigerated packaged deli meats. This bacterium causes [listeriosis](#), a serious infection of particular concern for pregnant women, older adults and young children.

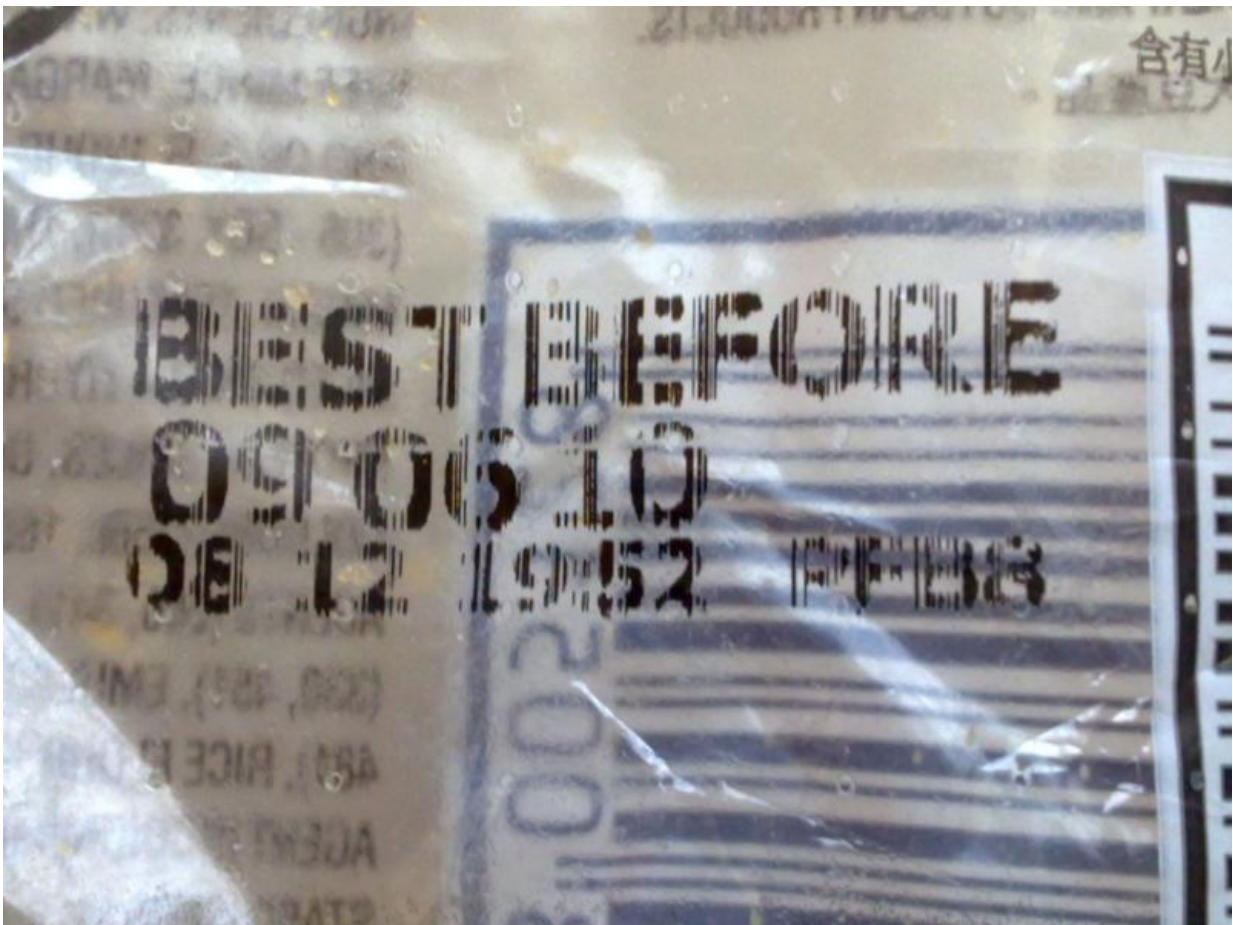
The researchers then store the contaminated food in conditions it's likely to experience in transportation, in storage, at the store, and in consumers' homes. They're thinking about temperature, rough handling and so on.

Every harmful microorganism has a different infective dose, or amount of that organism that would make people sick. After various lengths of storage time, the researchers test the product to determine at what point the level of microorganisms present would likely be too high for safety.

Based on the shelf life determined in a challenge study, the company can then label the product with a "use by" date that would ensure people would consume the product long before it's no longer safe. Companies

usually set the date at least several days earlier than product testing indicated the product will no longer be safe. But there's no standard for the length of this "safety margin", it's set at the manufacturer's discretion.

Another option for food companies is to use [mathematical modeling tools](#) that have been developed based on the results of numerous earlier challenge studies. The company can enter information such as the specific type of product, moisture content and acidity level, and expected storage temperatures into a "calculator." Out comes an estimate of the length of time the product should still be safe under those conditions.



Do you even know what the manufacturer meant by this date? Credit: Sascha Grant, CC BY-NC-ND

Companies may also perform what's called a static test. They store their product for an extended period of time under typical conditions the product may face in transport, in storage, at the store, and in consumer homes. This time they don't add any additional microorganisms.

They just sample the product periodically to check it for safety and quality, including physical, chemical, microbiological, and sensory (taste and smell) changes. When the company has established the longest possible time the product could be stored for safety and quality, they will label the product with a date that is quite a bit earlier to be sure it's consumed long before it is no longer safe or of the best quality.

Companies may also store the product in special storage chambers which control the temperature, oxygen concentration, and other factors to speed up its deterioration so the estimated shelf life can be determined more quickly (called accelerated testing). Based on the conditions used for testing, the company would then [calculate the actual shelf life](#) based on formulas using the estimated shelf life from the rapid testing.

Smaller companies may list a date on their product based on the length of [shelf life](#) they have estimated their competitors are using, or they may use reference materials or ask food safety experts for advice on the date to list on their product.

Even the best dates are only guidelines

Consumers themselves hold a big part of food safety in their own hands.

They need to handle food safely after they purchase it, including storing foods under sanitary conditions and at the proper temperature. For instance, don't allow [food](#) that should be refrigerated to be above 40°F for more than two hours.

If a product has a use-by date on the package, consumers should follow that date to determine when to use or freeze it. If it has a "sell-by" or no date on the package, consumers should follow storage time recommendations for foods kept in the [refrigerator or freezer](#) and [cupboard](#).

And use your common sense. If something has visible mold, off odors, the can is bulging or other similar signs, this spoilage could indicate the presence of dangerous microorganisms. In such cases, use the "If in doubt, throw it out" rule. Even something that looks and smells normal can potentially be unsafe to eat, no matter what the label says.

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