

# 3-D Printed Milk Now Taking Shape



By Ruth Kava — April 20, 2016



*Milking a Cow* courtesy of [Shutterstock](#) [1]

Consumers are very particular about their milk, it would seem — added growth hormones are shunned, and happy cows are priorities in many people's minds. So would they be likely to drink milk that didn't involve cows directly, either because the milk comes from yeast or from a 3-D printer? We're looking forward to that answer, since both appear to be the horizon.

First, let's take a look at milk made by [yeast](#) [2]. The genes from cows that make milk proteins are cloned and transferred to yeast. This is not a particularly new technology — that's how genetically-engineered human insulin is made. Then, as the yeast grow they produce the proteins normally found in cows' milk. To these proteins must be added the other constituents of milk — the water, fats, minerals and vitamins, and lactose. (Or maybe leave the lactose out — for those with intolerance.) What you end up with is milk that some would call vegan — no animals involved in its production — apart from the initial DNA transfer to yeast. And of course, such milk could then be used to make cheese. Some would argue that such yeast milk is more environmentally friendly, because it reduces the need for methane-producing cattle. But that still remains to be proven.

Even more far out than milk produced by yeast is printed milk — yes, printed. There are trials afoot to determine if milk can be produced by [3-D printers](#) [3].

One impetus is that such production might be useful for astronauts on long journeys (Mars, anyone?), and NASA is actually looking into it. Basically, the process involves "printing" sodium caseinate — a main protein found in milk, and then adding the required other ingredients to form what most of us would call milk. And not only is printed milk on the menu — astronauts might also be able to print themselves a [pizza](#) [4] — as long as the printers work in zero-gravity conditions!

However astronauts are fed it remains to be seen how the average consumer views these new production techniques. According to a recent [survey](#) [5] from the Pew Research Center, more than half of American adults believe genetically-modified foods aren't safe. So it seems likely that it would be an uphill struggle to get people to feed their babies either printed milk or milk produced by yeast.

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**Links**

[1] <http://www.shutterstock.com>

[2] <http://www.takepart.com/article/2014/11/18/biohacking-meat-dairy>

[3] <http://www.takepart.com/article/2016/04/18/3d-printed-milk?source=acsh.org>

[4] <http://www.takepart.com/article/2013/05/21/nasa-3d-pizza-printer>

[5] <http://www.pewinternet.org/2015/07/01/chapter-6-public-opinion-about-food/>