

Is organic agriculture leading to an increase in antibiotic resistance?

One of the mostly aggressively promoted attributes of organic agriculture—it uses ‘natural’ fertilizer, better known as manure—may be linked to animal health problems. It turns out that cows fed antibiotics to cure diseases can excrete them back into the environment and that could be one reason for increased antibiotic resistance in the soil.

We can't be too hard on cows and chickens, people do the same thing and those traces of antibiotics have to be processed in sewage systems. We use a lot of antibiotics because people get sick—but a lot fewer die due to streptococcus and diphtheria than before man-made antibiotics entered the scene, and a lot fewer animals die also. Medical science has clearly saved hundreds of millions of human lives and tens of billions of animals, but how much difference is it making in modern antibacterial resistance?

Organic company marketing departments and their environmental corporation allies have capitalized on the use of antibiotics in livestock and, in many cases, misrepresented it when it comes to resistance. The National Resources Defense Council filed a lawsuit over antibiotic use for growth in 2011 but when California recently tried to pass a law mandating no antibiotics for growth and letting farmers revert to FDA guidelines for medical use, [the NRDC lobbied against the bill and admitted that antibiotics for growth is actually a tiny percentage of outlier farmers](#).

Some claims about antibiotic resistance are even sillier. A blaring headline in Tuesday's *Daily Mail* (UK) [asked](#): “Can GM food cause immunity to antibiotics?”

A British study has revealed that volunteers who ate one meal containing genetically modified soya had traces of the modified DNA in bacteria in their small intestines. Scientists now fear that GM foods, which are often modified to be resistant to antibiotics, will leave Britons vulnerable to untreatable illnesses.

That's the scare viewpoint promoted by many anti-GMO activists; there is just no support for in the empirical data. While [a few scholars have tried to contend genetically modified foods can somehow be causing](#) antibiotic resistance in humans, the speculation has been soundly debunked. In this outlier study, this gene transfer, a 1 in 10^{26} event, just happened to be found in a study of 7 people fed GM food to try and find that GM foods cause antibiotic resistance, is not being taken seriously by mainstream scientists.

Activists want magic buttons they can raise money to lobby for pushing, and they may be confused by science recently, but to microbiologists the origins of antibiotic resistance, and how much of it is man-made, has always been unclear.

It got less unclear [in a recent paper in *Proceedings of the National Academy of Sciences*](#) by microbiologist Professor Jo Handelsman and colleagues. Instead of implicating corporation farms and overuse of antibiotics, they found that *organic manure* was letting more resistant bacteria gain a foothold in the environment than synthetic fertilizers do.

What gives? Science has long known that antibacterial resistance has never been as simple as ‘get rid of X and the environment is saved’ because bacteria in the environment have naturally developed antibiotic-resistance genes. Soil has always carried antibiotics, due to the influence of fungi, molds and bacteria in the ecosystem. Alexander Fleming discovered penicillin in 1928 because he found that mold inhibited bacterial growth naturally. So authoritatively blaming modern medicine for the antibiotic resistance being spread in soil was environmental marketing, but not science.

The authors of the new study wanted to find out if manure itself was really the problem. So they did a study treating soil samples with manure from cows that never had antibiotics and samples that had nitrogen-based fertilizer. Then they examined the soil samples for the enzymes produced by bacteria that are responsible for resistance to antibiotics like penicillin – [called beta-lactamases](#).

After two weeks, the results were clear – [the organic manure was causing more antibiotic resistance](#) than synthetic fertilizer, by producing more β -lactamases in the soil and that was causing resistant bacteria to flourish more than in soil that would be present on a conventional farm. Environmentalists shouldn’t be too disheartened by the results. Even if organic manure causes more antibiotic resistance in the environment, there could still be other issues they could blame on humanity, like heavy metals.

What they cannot do is dismiss Handelsman as a shill for Big Ag – since 2013, she has been on leave of absence from Yale so she could serve as the Obama administration associate director for science at the White House Office of Science and Technology Policy, led by Obama Science Czar Dr. John Holdren.

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