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ISSUE BRIEF

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BiomElix One: The Approved Commercial Animal Feed That Generates Genetically Modified Bacteria Inside the Farm Animals Eating It

A self-replicating chromosome cutting system, approved by one exporting country, potentially deciding exposure for citizens in importing countries.

- ***BiomElix One* is a living, self-replicating product.** It's a chicken feed additive made of live, genetically engineered bacteria, fed to chickens (approved for use only in Brazil) to reduce Salmonella contamination.
- **It works by transferring engineered DNA far beyond its target *Salmonella* species.** The transfer isn't targeted to a single bacterial species - it happens through direct contact and passes into any susceptible bacteria, not just its intended target species.
- **Creating new genetically modified bacteria in the gut is the mechanism, not a side effect.** Every transfer creates, by definition, a new genetically modified organism. Unlike a single, controlled event in a laboratory, this happens millions of times, in an uncontrolled manner, inside animal guts.
- ***BiomElix One* generates living modified bacteria inside animal guts** - and those organisms could potentially remain in chicken meat for sale. Because genetically modified bacteria are living, self-replicating organisms, any importing country that chooses not to carry out its own regulatory risk assessment can end up exposing its own citizens - quietly bypassing any relevant regulations it may have.

What is the issue?

Salmonella is a bacteria well known for causing food poisoning in humans, but it also slows the growth of birds in commercial chicken farms. In response to the growth issue, two approaches to *Salmonella* control have emerged: the first improves the conditions in which chickens are raised and has been the successful basis of EU policy since 2003[1]. The second uses anti-Salmonella feed supplements and is particularly prevalent in the highly intensive farming systems of the Americas. *BiomElix One* is a first-of-its-kind feed additive that is an example of the latter approach. It works by loading into bacteria CRISPR gene-cutting instructions **that are located on circular bits of replicating DNA called plasmids**. These plasmids are then actively spread through the bacterial communities naturally living in chicken's guts - passing them from bacterial cell to cell, across the many different bacterial species living there[3]. Where these engineered plasmids enter *Salmonella* bacteria, they cut their chromosomal DNA and kill it. In every other species the plasmid transfers to, the same introduced DNA cutting mechanism remains active, but it is not expected to be effective in actually cutting chromosomes - however, each plasmid transfer itself still creates a new, living genetically modified organism.

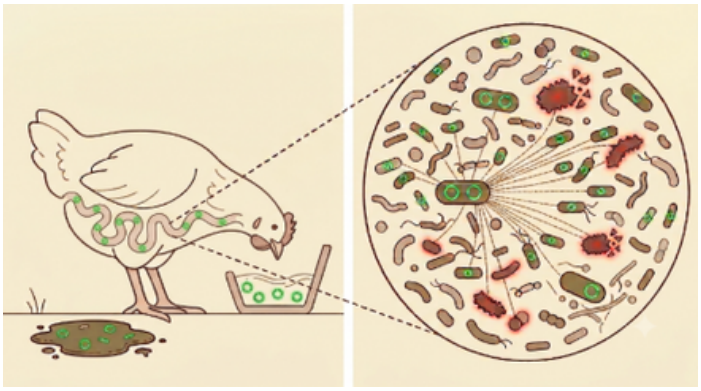

Figure. How BiomElix One generates new, living, genetically modified bacteria in chicken guts. *Chickens drink water with the delivery bacteria that contain the engineered plasmids (green circles). Inside the gut, the delivery bacteria continue to make copies and transfer the plasmid to many bacterial species [3] - most simply retain the plasmid (non-target species) - while a small proportion are killed (the target Salmonella species, shown bursting). Bacteria carrying engineered plasmids become dispersed into the environment through the chicken's droppings, and other routes.*

Cross-species spread as an intended design feature

This spread across species isn't a side effect. It's how the product is designed to work: to reach *Salmonella*, the instructions must pass into many, or even most, of the bacterial species in the gut. So, producing large numbers of different genetically modified bacteria, across many species, is core to the mechanism by which this product is intended to work. *BiomElix One* is built from genetic elements known to work between bacteria that are separated by many hundreds of millions of years of evolutionary distance.

Key safety data not made public

Once the engineered plasmid is established in the gut bacterial community, it will not remain inside the bird, but will disperse into environment through droppings and potentially slaughter waste (see **Figure**). Furthermore, raw poultry meat is documented to carry live bacteria through to the point of sale [4] - though remarkably, nobody appears to have publicly tested whether any of those bacteria would carry the plasmid released by *BiomElix One*. It should be noted that most key safety properties of *BiomElix One* are not public due to regulatory documents being treated as confidential business information, this is despite its commercial approval. [5]

Why does this matter?

A double standard: approved for the environment, barred from the clinic

Scientists have had a name for what *BiomElix* One does long before it existed as a commercial product: *broad-spectrum horizontal gene transfer* [6]. In 2018, the National Academies of Sciences, Engineering, and Medicine - in an assessment commissioned by the U.S. Department of Defense - rated the difficulty of detecting or stopping this kind of intervention, once released, as medium-high risk: one of the most serious ratings the report gives to any potential hazard it assessed. [7] Yet within six years, this same category of technique had been approved for commercial use in animals raised for human food in one major meat-exporting country - while, at the same time, no country on Earth has approved it even for use in controlled clinical trials in humans, despite obvious potential applications (see Box). [8]

Box. Obvious vertebrate concerns left unaddressed. Gut bacteria generally live freely in vertebrate digestive systems, but some also have the ability to invade inside the cells of vertebrates **[10]**. Medical students learn the acronym **LISTEN** to remember bacteria that can invade and live inside human cells - ***L****isteria*, **I**ntracellular (not a genus - just a placeholder reminder word), ***S****almonella*, ***T****uberculosis* (for genus *Mycobacterium*), **E**nterocolitica (for genus *Yersinia enterocolitica*), ***N****eisseria*. Every one of these is named in the patent describing *BiomElix One* as targetable by the plasmid transfer, [11] **and four of the five are also reported in chicken guts.** [12] The 2008 paper that first described the *broad-spectrum horizontal gene transfer* technique *BiomElix One* is based upon noted it was "especially suitable for use inside eukaryotic cells" - and all human cells are eukaryotic. [13] If eating meat from a treated bird may mean consuming bacteria carrying active, engineered gene-cutting molecules, [14] some of these bacteria are capable of entering human cells - bringing synthetic chromosome-cutting molecules into close proximity to the human genome - closer than they would normally come outside a controlled medical laboratory. [15]

What might the consequences be?

When one country's approval decides risk for others

Countries usually protect their own citizens by setting their own rules - inspecting imports and if necessary declining products *.

This kind of oversight, in theory, can work well for chemicals or parts of crop plants, but works less well for living, self-replicating organisms (or self-replicating modified plasmids) that can potentially persist in traded products or in the wider environment. With microbes, exporting countries with the highest tolerance for risk or the weakest oversight can decide for all those countries that import potentially contaminated products. This is a concerning and largely new kind of loophole, specific to living genetically modified microbes - because an approval in one country can ultimately put such products on the plates of people in another country if their government chooses not to properly apply its own regulations.

* From September 3, 2026, Brazilian meat - including chicken - has been barred from entering the EU, under a measure targeting compliance with EU rules restricting antimicrobial (antibiotic) use in food-producing animals. [9] Antibiotic-resistance genes are commonly carried on the same broad-host-range plasmids exploited in *BiomElix One*.

Where can I get more information?

For sources cited in this text and additional notes go to:

www.saveourseeds.org/briefings/biomelix-one/