

SCIENTIST IN THE FIELD

## Peeling Away Microbes

Can feeding orange rind to cows help rid beef of *Salmonella* and *E. coli*?

A cow's rumen has an incredibly thick population of microbes, somewhere between 10 billion and 100 billion microbes per milliliter of its fluid. *Escherichia coli* and *Salmonella* are two, but they are found in relatively low levels, maybe one out of 10 million cells. For years we have been trying to

reduce the amount of these pathogens after the cows are killed, and those efforts do really well. But at some point, you reach diminishing returns. So we're trying to move to the preharvest site, before the cows are killed.

In southeastern Florida and in California, where they produce orange juice, orange peels are a waste product. Instead of throwing them away, the juice company used to sell the peels to local dairies. Cows can eat pretty much anything, so farmers have been feeding cows these waste products because it's cheap and the cows like it.

We knew orange peels had antimicrobial properties, so we asked whether maybe they were having an effect on the cows. They set up an experiment, and, sure enough, it worked in some studies in the live animals and reduced the microbes a little over 10-fold. It's not a home run, but it has a role that it can play.

We'll combine the orange peels with all the other things we do. You would immunize cows when they are born and then, as they're growing up, start feeding them some probiotic and orange peel every day. Then, in the plant, they have acid washes and other methods. So everything working together should be able to reduce the pathogen load.

### PROFILE

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Imagine you see people running a race in the Olympics where they are jumping hurdle after hurdle, and eventually they start tripping because they get tired. A pathogen is the same way—we're trying to introduce multiple hurdles of various heights. No one has found that magic

solution yet because pathogens have evolved to live in animals over time. There is no such thing as that magic bullet in biology.

—As told to Rose Eveleth



COURTESY CARLA B. POSSAMAÍ Federal University of Espírito Santo (monkeys); ROSEMARY CALVERT Getty Images (orange peel)