



Meat Grown from Stem Cells

Beef for dinner—without killing animals or the environment

By G. Owen Schaefer

IMAGINE BITING INTO A JUICY BURGER THAT WAS PRODUCED without killing animals. Meat grown in a laboratory from cultured cells is turning that vision into a reality. Several start-ups are developing lab-grown beef, pork, poultry and seafood—among them Mosa Meat, Memphis Meats, SuperMeat and Finless Foods. And the field is attracting millions in funding. In 2017, for instance, Memphis Meats took in \$17 million from sources that included Bill Gates and agricultural company Cargill.

If widely adopted, lab-grown meat, also called clean meat, could eliminate much of the cruel, unethical treatment of animals raised for food. It could also reduce the considerable environmental costs of meat production; resources would be needed only to generate and sustain cultured cells, not an entire organism from birth.

The meat is made by first taking a muscle sample from an animal. Technicians collect stem cells from the tissue, multiply them dramatically and allow them to differentiate into primitive fibers that then bulk up to form muscle tissue. Mosa Meat says that one tissue sample from a cow can yield enough muscle tissue to make 80,000 quarter-pounders.

A number of the start-ups say they expect to have products for sale within the next few years. But clean meat will have to overcome a number of barriers if it is to be commercially viable.

Two are cost and taste. In 2013, when a burger made from lab-grown meat was presented to journalists, the patty cost more than \$300,000 to produce and was overly dry (from too little fat). Expenses have since fallen. Memphis Meats reported this year that a quarter-pound of its ground beef costs about \$600. Given

this trend, clean meat could become competitive with traditional meat within several years. Careful attention to texture and judicious supplementing with other ingredients could address taste concerns.

To receive market approval, clean meat will have to be proved safe to eat. Although there is no reason to think that lab-produced meat would pose a health hazard, the FDA is only now beginning to consider how it should be regulated. Meanwhile traditional meat producers are pushing back, arguing that the lab-generated products are not meat at all and should not be labeled as such, and surveys show that the public has only tepid interest in eating meat from labs. Despite these challenges, the clean meat companies are forging ahead. If they can succeed in creating authentic-tasting products that are also affordable, clean meat could make our daily eating habits more ethical and environmentally sustainable. ■

G. Owen Schaefer is a research assistant professor in the Center for Biomedical Ethics at the Yong Loo Lin School of Medicine at the National University of Singapore. He studies the ethics of developing novel biotechnologies and has written on the ethics of human enhancement, genetics, big data, assisted reproduction and in vitro meat.



