

# BRACE FOR VEGAN MEAT

APRIL 2018 TECH BRIEF FOR THE FOOD INDUSTRY TALENT NETWORK



## Food without Slaughtering => Biofabrication

In his Ted Talk, [\*This computer will grow your food in the future\*](#), [Caleb Harper](#) does a brilliant job of making biofabrication seem simple. Cells are small, so they can be stored onsite, like the materials of a 3D printer with refrigeration. We know how to speed-grow cells/seeds and help them differentiate. A machine analogous to a 3D printer can be programmed to both grow and assemble. Voilà. Food.

Too futuristic? Consider [Modern Meadow](#), now in Nutley NJ. A few years ago, when they were being incubated at the Brooklyn Navy Yard, Modern Meadow focused on beef, because of its carbon footprint. They produced hors d'oeuvres and invited vegetarians (and investors) to partake. Since the concept fits with the philosophy of most vegans, some were open to embracing non-cow-sourced beef.

In a world where [Grant Achatz](#) is celebrated as a leader in [molecular gastronomy](#), one cannot dismiss the possibility of vegan meat. NJ can be the right place to make it happen and the labor force will be a factor.

## Labor Force Takeaway

While any sort of large-scale production of biofabricated foods is (perhaps) a decade away, the development of the technology is here and now. Modern Meadow is actively recruiting [food scientists](#). As the industry grows though, they and others will need staff trained to run processes around the clock. Just as not every chef will go into molecular gastronomy, the [Culinary Institute of America](#) would be crazy not to include it in their curriculum. Similarly, biofabrication should be incorporated into labor force development.

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# Biofabrication – coming to a table near you

The Information Age has unlocked life itself: DNA. Scientists have been able to tap into nature’s tool kit to engineer plants and animals for long enough that the technology is moving into the commercialization phase. Quietly, biofabrication is developing manufacturing facilities and processes.

Companies like NJ’s **Modern Meadow** will be scaling up production lines and selling. Some of the products will be **food**, engineered to taste fabulous. Engineered to taste “historical.” Engineered to taste “craveable.”

As food industry professionals, you won’t be dismissive of the money that will be spent or the lengths to which foodies will go to experience a novel taste sensation. Wineries, craft breweries, artisanal cheese producers and local honey sellers all have tasting sessions. Why not biofabricated foods?

While it is true that industrial scale animal-free meat culturing systems still need much research, farm production of meat isn’t stagnant either. Meat leaves an environmental footprint with greenhouse gas emissions. Therefore we must consider supply chain and production parameters to minimize the overall impact.

The **carbon footprint of various meats** has long been the subject of public discussion. In summary the production emission of meat ranked from largest per pound to smallest per pound are:

Lamb > Beef > Pork > Farmed Salmon > Turkey > Chicken > Eggs

Cheese is also high in emissions because it is so concentrated. Nuts, beans and vegetables are much lower.

**Which is preferable: poultry raised on algae + insects or meat grown in a factory?**

One example of increasing quality while decreasing cost: **the inclusion of algae and grown insect meal**. Adding up to 50 percent of soy protein in feed has been shown to improve the quality of broiler-chickens. Quality was checked through the slaughtering and use of state-of-the-art packaging for shipment.

Consider meat analogs. Tofu, seitan, tempeh and textured vegetable protein all have viable markets. In vitro meat production using **tissue engineering techniques** will develop markets too.

Large-scale production of biofabricated foods, likely to be driven by scarcity issues, will change economic equations to the point where growing nutrient-dense foods indoors becomes an attractive option. Only one extended shortage in the supply chain may cause a major ripple effect on: water, land, transportation fuels, population density, war zone encroachment, etc.

The food industry in New Jersey has an opportunity to track this emerging area. Biofabrication is more than a single technology. It’s more than a new fab-facility. It’s also much more than **academic study** these days. It is poised to grow in NJ, and it will need an educated workforce from tip to tail. Incorporating biomaterials science into training in mechanical and process engineering could be well worth the effort. An attuned workforce could be the key to growth of this new industry in NJ.