

Risks of engineering the microbial community in yogurt include interactions with naturally-occurring bacteria in both yogurt and the human body. Yogurt is a probiotic and many people eat it to improve their health. To reference Darwin, will the engineered bacteria be “more fit” than the desired bacteria in yogurt and/or in the human gut microbiome, making the yogurt less effective as a probiotic? Could the engineered bacteria mutate and create additional toxins as a byproduct? Additionally, the creators must think about the effectiveness of the color change. If a sample of yogurt is contaminated, will the green color show up throughout the sample, or just in the localized area where the toxin is found? What is the threshold of toxin concentration that induces the color change compared to the amount of toxin that affects humans? How long does it take for the bacteria to change color after a sample has been contaminated and could consumers have eaten the contaminated yogurt before the color change has occurred? How obvious is the color change in different colors of yogurt (i.e. can the green be seen in a flavor of yogurt that may already be green such as key lime pie or will color-blind people be able to tell the difference in pink yogurt?)? They should also think about how children perceive the color, which may make them want to eat it more than regular yogurt. Finally, the creators should address how this will affect different consumer populations by increasing the price, making it unaffordable for low-income people.

These risks and more will be brought up by various stakeholders. The scientists will care a lot about the safety of the product for humans as well as how effective it is in creating the warning for consumers through its color saturation, speed of color production, and toxin threshold. Investors will worry about the plans releasing the technology to the public as they will want to make their money back by keeping the technology private. Additionally, they will wonder about whether the public will respond positively to this, whether this product is applicable to other foods and toxins, how much it will affect and increase the cost of the production of yogurt, and how common the chemical is in yogurt before wanting to spend money on this project. Human health groups will want to know more about the safety of this technology and ensure that the technology is approved regulated by the government before it is introduced to the market. The government will have concerns about access to the technology, especially because the creators want to make their technology public. Finally, consumers will have concerns about the product’s safety, effectiveness, and how much the price of yogurt will increase with the addition of this process to the production of yogurt.

In order to mitigate the questions of safety, the scientists should consider making the fitness of the bacteria dependent upon the presence of the toxin. As such, if the bacteria are added to non-contaminated products, they die. This would mean that the bacteria would never be consumed alive, as theoretically the consumers would not eat the products that had turned green.