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# Don’t Ask What It Costs, Ask What It Saves

By bioscentric | Biology

We are now witnessing the beginnings of a fundamental shift in how ingredients are made by engineering biology. While petrochemical supply chains still dominate chemical manufacturing, renewable supply chains are springing ingredients into the market that deliver on the specifications customers and consumers desire. These “no compromise” bio-based ingredients also offer advantages over everyday ingredients from both petrochemical and agricultural sources. Leveraging the power and complexity of biology by turning microbial cells into microscopic chemical factories can create cultured ingredients that cost less to produce, using fewer and more sustainable resources.

Take for instance the cosmetic ingredient market, estimated to be about $20 billion dollars globally. Despite the potential benefits of bio-based ingredients for both personal care brands and consumers, obstacles remain. Brand owners and manufacturers clearly benefit from next generation ingredients, but how do they pay for it? These players may hesitate to foot the bill or feel unable to pass the costs onto

consumers for research and innovation that leads to “no compromise” cultured ingredients.

### Intelligent ingredients

What exactly do cultured ingredients need to deliver on? Ali Witwit, Vice President of Technology at specialty ingredient leader Ross Organic, outlines seven criteria for market success in the following video. The company refers to these as “intelligent ingredients”:

- **Sustainable**: is the ingredient sourced and produced through sustainable practices?
- **Significant value-add**: does the ingredient possess multiple function and performance benefits?
- **Solutions-based**: does the ingredient solve a problem that currently exists in consumer product formulas?
- **Earth friendly**: does the ingredient have little to no impact on the environment? Is it biodegradable?
- **Perceived consumer benefit**: can consumers tell the ingredient is in the formula through seeing or feeling a difference?
- **Data**: are claims made about the ingredient’s value backed up with real-world results that demonstrate efficacy?

The parameters above help Ross Organic and other similar companies find ingredients that can meet current and future market needs. These might include biodegradable cellulose microbeads that can replace polyethylene, or production processes that use enzymes to reduce energy consumption and waste generation, and active plant stem cells generated from a single precursor line for better activity and quality control. It’s important to note that innovative ingredients must “stick the landing” by meeting *all* of the above criteria, not just a majority. Failing to deliver an enhanced consumer experience could limit your market success whether an ingredient adds significant economic value or not.

It’s also important to note the distinction between the two types of ingredients within personal care formulations that biology-based manufacturers are targeting: bulk and actives. Each faces unique obstacles to achieving market success. Bulk ingredients, such as bio based surfactants, are high volume, commodity products accompanied by relatively lower margins with production costs, scale, and capacity serving as the major competitor drivers. Think hundreds of thousands of tons at a few dollars per kilo at the most, requiring years of bioengineering as well as a specially built facility. At the other end of the price curve are expensive “active ingredients”, which are sold in much smaller

quantity–tens of tons maximum–and have higher margins, and usually don't need a dedicated production plant. For actives, efficacy on skin and marketing story serve as the primary factors to consider, not cost.

### Who pays, who saves?

Many cultured ingredients from biotech have initially focused on lower volume, higher margin actives to increase their chances of achieving success, although bulk ingredients are receiving attention in specific instances. While the two types of ingredients are defined by unique obstacles, they face one identical challenge: who in the supply chain will pay for the research to develop new bio based versions of these ingredients? Let's look at each player in the chain:

- **Biotech or cultured ingredient firm ("innovator")** — they have the basic technology and are usually working with a supplier, but early-stage innovators have a relatively high cost of capital because they are usually funding development to some degree by selling equity rather than through retained earnings. At the least they are severely limited in the innovation they can afford to provide relative to what they could provide with a "normal" cost structure.
- **Ingredient supplier** — they are usually funding some portion of the development costs of the innovator and are selling onward to brand owners, but they may not feel comfortable investing in "black box" technologies such as biotech. They have a basic information asymmetry relative to the biotech company regarding chance of success, which suppresses investment.
- **Manufacturer or brand owner** — these players need innovation for keeping consumers excited and engaged by brands, but may not have the incentives to invest in long-term ingredient development when competing for retail customers. Traditionally they are purchasers of R&D, as very few manufacturers and brands are involved any more in ingredient innovation, and focus more on formulating. But they also aim to keep overall ingredient spend static, so as new ingredients come in, they generally do not accept them loaded with more supplier margin.
- **Consumer** — despite some belief in the idea that consumers will pay a premium for sustainable or natural products, this is tending to flatten, and it's generally assumed that passing on costs to consumers won't work (also breaks promise of "no compromise").

"Who pays?" is a question with no easy answers. Each part of the value chain wants its share of the potential benefits provided by innovative cultured ingredients, but hesitates

to kick in the funding needed to bring them to market. In this kind of dynamic, something has to give for cultured ingredients to break through.

Ingredient suppliers want reassurance that manufacturers and brand owners will embrace innovative ingredients before they invest in research, but manufacturers aren't willing to embrace ingredients until they can be validated and produced at scale. Meanwhile, suppliers are usually expected to meet or beat the price of the conventional ingredient being replaced, which can be difficult to do when they are also trying to recover the R&D expense. That places a significant burden on innovators to deliver novel ingredients that also provide cost savings –a difficult task given high-cost of capital, which can limit the upside for technology owners.

## A different approach to calculating value

In the absence of easy answers, one thing is clear: "no compromise" cultured ingredients could benefit from more long-term thinking and risk-taking within the value chain. Perhaps biotech innovators should get creative with their approach to de-risking "blackbox" projects, and drive manufacturing and scale-up success to increase confidence in their ability to deliver success cases long term. Perhaps suppliers should flex their relatively low R&D cost basis, or augment it with a good position on low cost feedstock access, to further leverage gains from biomanufacturing. And brand owners can differentiate by grabbing ingredients early and pushing on the coming wave of biology driven innovation trends — microbiomes, beneficial microbes, novel ingredients — to earn consumer mindshare and premiums. Focusing on additional forms of value that can be captured from innovative bio-based ingredients is the best way to accelerate into the next phase.