# Process Flavors: Building Savory Solutions

Ingredient restrictions and tight cost targets present a technical gauntlet for the formulation of quality, cost-effective process flavors


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Any successful flavor creation project requires the satisfaction of three broad parameters—flavor target profile, health/regulatory/dietary guidelines and cost (whether in-use or otherwise). And in no other category are these parameters pulling in such disparate directions as process flavors. Consumers are looking for healthier foods that do not sacrifice taste at a price point that is at or below that of conventional offerings. Customers have a range of solutions available to them when developing products in the savory category. As a result, says Rebecca Wagner, business unit manager of emerging markets at FONA International, "the savory flavor itself has to fix a need to really be more cost-effective than [simply] adding more MSG or a yeast extract. It has to fit that need or add an accent. Typically, for our customers, we are working on a very focused need that they have, and we understand all of their product parameters and are able to put it all together to create a solution that fits [that requirement]—as well as their consumers' needs."

"It all puts pressure on the flavor creator," says Yogi Desai, senior flavorist at FONA International. "What do you do? How do you start? If you go project to project, each customer's needs are different. As you customize the flavor for [them], you can always find the winning solution."

## Complex Consumer Demands

Consumers, taking cues from media regarding ingredient statements, are making process flavor suppliers' jobs more complicated, notes Wagner. "If they weren't turning the label around," she says, "they definitely are now." As a result, says Wagner, flavor suppliers are pursuing formulations that reduce or eliminate sodium, monosodium glutamate (MSG), hydrolyzed vegetable proteins (HVP), genetically modified organisms (GMO), trans fats, allergens, and more. "Consumers want to be able to read the ingredient statement and know what they're consuming," Wagner continues. "They want to be able to feel good about lower sodium, or that [the product] doesn't have the MSG." And, she notes, as concerns over childhood obesity grow, parents are increasingly asking, "'What am I feeding my kids?' There are a lot of [parameters] that we get from our customers immediately." Meanwhile, says Wagner, media outlets such as The Food Network have turned consumers into foodies that seek out increasingly sophisticated, novel foods and flavors. Paradoxically, she adds, consumers want those foods to be cost-effective without sacrificing taste. This tension between consumer cost and flavor quality expectations and restrictions on ingredients that efficiently deliver flavor fidelity and/or potentiation, says Wagner, is a true challenge. Meeting the right cost-in-use target begins with customer education on all cost and performance parameters affecting the final price point of the flavor solution. This includes explanations of the impact some key materials will have on cost and just how concentrated the flavor will be. "That becomes an important factor for all of our customers to be thinking about: How much is this going to hit [their] actual bottom line? In their pound per product, how much is the flavor going to impact the finished product? We really spend a lot of time making sure they're thinking of cost-in-use." This process, she concludes, extends from the formulation stage to the application, ensuring the right fit for the customer.

## Ingredients and Formulation: Limitations and New Opportunities

FONA's customers in the United States and beyond range from regional to international to global, necessitating an increasing amount of ingredient restriction considerations on the part of the formulation team. For example, says Desai, "If it is a global company, then GMO is a bigger issue. If you make the flavor for a global company, they want to make sure they meet all their global compliance [requirements]." Yet, says Wagner, while HVP, MSG and general clean label requests are fairly universal, GMO is still emerging in the United States. In the case of process flavors, GMO issues can crop up in relation to HVP root materials such as soy and corn, or yeast extracts grown on

a base of corn syrup. "The US market is not as concerned with GMO—yet," concludes Wagner. "However, it's just a matter of time." Similarly, Desai says that while HVP and MSG are generally frowned upon by US consumers, this is not necessarily the case in a number of developing markets. "When we get a project we have to make sure we get all the information up front," he says. "Especially when you're [aiming] for natural, non-GMO, halal or those kinds of regulatory requirements. We have to make sure we know the customer is asking for the right thing—and that we're asking the right questions so we start with the right information."

These highly specific flavor parameters, says Desai, require close collaboration between the flavor house and the customer to ensure that all parties are aware of how certain ingredient restrictions will contribute to the complexity of the process flavor development. For example, he says, it is important to explain that while there may be a trans-fat-free solution, it will come with certain technical challenges and will require customer collaboration to find a winning flavor solution. "The biggest challenge is that there are very limited ingredients to process from," says Desai. "Process flavors are fundamentally based on commodity ingredients like sugars (ex: ribose, xylose or less reactive sugars) and proteins (ex: HVP and yeast extracts). Some of the sugars are cost-effective; some of the five-carbon sugars are very expensive. There are a lot of complexities when you are making the reaction." This reaction, which typically involves an amino acid, reducing sugar and heat (Maillard reaction), is a sophisticated system.[a] "There is not one single defining compound that is responsible for a given flavor," Desai says. "A meat flavor reaction can probably generate 300–400 chemical compounds by the end of the reaction. There's a complexity that can make it difficult to track the optimization and efficiency of the reaction." And thus, every ingredient substitution or elimination has a significant impact; those substitutions have to be implemented very carefully so that the flavor profile remains constant.

Desai explains that natural, HVP, yeast extracts, MSG, GMO and other global considerations dominate today's process flavor challenges. "MSG, from the labeling standpoint, is going to continue to have an issue," he notes. Customers simply do not wish to see the ingredient listed on the label statement. Meanwhile, in recent years HVP has declined in popularity, in part due to its associated MSG content and GMO concerns related to its root materials, corn and soy. More recently, the US Food and Drug Administration initiated a recall action related to a US-based HVP supplier due to potential salmonella bacteria contamination (no illnesses reported as of a March 24, 2010 bulletin). This disruption, in addition to the exit of some suppliers from the market, has contributed to some temporary tightness in the HVP market, which in turn puts new pressures on the yeast extract industry. "HVP is a very effective flavor enhancer," says Desai, but adds, "It's a good enhancer. [It] not only gives you the flavor, but it also gives you the enhancement, just like MSG. You cannot buy anything [else] in the same price range as HVP that you can potentially use straight as a flavor." And so, he explains, recent calls for HVP-free formulations force flavorists to turn to more costly and perhaps less efficient ingredients such as yeast extracts and animal products. Such changes can throw a formulation out of the target cost range, Desai explains, not to mention the fact that HVP alternatives come with their own complications.

As previously noted, yeast extracts are costlier than HVP and represent a GMO concern when grown on a base such as corn syrup. On the other hand, animal extracts, while providing some flavor fidelity to the overall profile, are even more expensive than yeast extracts. "With meat ingredients," says Desai, "the challenge is you need to have the US Department of Agriculture inspection at your site for the processing of the meat ingredients." In addition, he says, "You're not going to get as good of a flavor impact using only meat ingredients as you would using HVPs or yeast extracts. They're not [efficient] enhancers."

The arena of natural aroma compounds and taste modifiers, says Desai, does offer some alternative opportunities, particularly moving forward. "If you are making a strawberry flavor or a banana flavor you can have a natural isoamyl acetate," he says. "There are [currently] very few natural aroma compounds available for the savory [segment]. Whatever is out there is expensive, so it's very hard." However, he says, "There is a lot of innovation going on in flavor compounds. [The manufacturers] are trying to come out with more and more new compounds and are focusing more on the natural [materials]. That should open up soon."

Of course a key component of process flavors is the taste component—salt and umami—which is challenged by concerns over elements such as sodium and HVP. "I think taste modifiers like salt replacers are going to play a key role as we move forward," says Desai. "The taste factor plays a key role in how the flavor is perceived and the taste modifying technology has to work along with flavor development. Innovation in taste modifying agents along with flavors should help find good solutions."

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[a]Anything that undergoes heating treatment spurring thermal degradation can be classified as a process flavor.