

Nutrition: A personalised future



In the future, the concept of a stock-keeping-unit won't be relevant in the food-and-beverage world. How could a single product or brand reach every target consumer in a way that delivers significant, real benefits specific to that person?



It's clear that consumers are increasingly expecting products to be more adaptable and tailored to their individual needs. Putting aside science fiction fantasies of replicators and food fabricators, technologies are being developed now which can allow for mass personalisation of ingredient profiles in order to help consumers feel better and achieve new lifestyle goals.

What are the aims of personalised nutrition?

When we look at personalisation in the nutrition space, we must look beyond the traditional multi-vitamin approach in order to deliver genuine benefits for the consumer. Looking across the next five years it's almost certain that a pre-made product from a limited range in a health store will not satisfy the end user.

Across categories, customers are demanding products that are actively adapted to their hyper-specific needs and not simply a broad demographic defined by a marketing team. This is true in nutrition, perhaps more so than any other product category. It is clear that an active, nutritionally aware 30-year-old has different needs to a sedentary, 30-year-old knowledge worker who primarily eats food on-the-go. Our lifestyles are so unique and complexly varied that our nutritional products should celebrate and react to this diversity.

Level of personalisation / # product variants



Figure 1: Over the next 10 years, brands will need to move further and further to the right of the personalisation complexity spectrum

The level of ambition that brands have regarding producing customised or personalised products will determine the level of complexity of the product they wish to develop. Of course, it won't be a gradual migration from left to right on the complexity spectrum; the different personalisation paradigms of “For people like me” and “My personal blend” imply different product formats, technologies

for product manufacturing and create wholly different value propositions. Given the up-front cost of developing new technologies, a holistic view of the technical challenges and the key consumer drivers is needed prior to beginning a new project.

What benefits are people targeting?

Already, in newcomers and start-ups, there is a trend to advertise or define products by their specific benefits, rather than simply offer broad spectrum supplements. In the past, personalisation in the nutrition industry meant additional folic acid for pregnancy, and updated ranges of supplements for the aging population. However, a new era of

products is breaking down the divides between diet, health, wellness and functional consumer benefits; enabling a range of new products which make claims on a whole host of related attributes:



Health related benefits range from the traditional scope of vitamin supplementation through to more aspirational products which market towards specific consumer hot topics such as immune-boosting. The natural extension of this trend is the growing number of companies who aim to treat chronic conditions through “food as medicine” interventions. Personalised diet plans and supplements help consumers with diabetes, gut-related challenges or the complications of radio and chemo-therapies. All of these plans aim to deliver nutrients that are deficient in someone's diet, or need to be boosted to fight disease.



Fitness and nutrition are intimately linked, as any aspiring athlete knows. As sports scientists and nutritionists learn more about the way our bodies work, we are presented with new opportunities to improve base performance. Fitness related benefits could include requirements for energy intake ahead of, and during periods of intense exercise, or delivering nutrients after exercise to aid in recovery and assist in building long term performance. There is a wealth of sport science data to be drawn on for developing a personalised nutrition plan.



Energy, mental alertness and perceived acuity is a key target for many consumers, who look for active ingredients which promote both acute and directly noticeable benefits (say, a morning cup of coffee) and long-term preventative measures which might keep our brains healthier into the distant future. Consumers seem more likely to target the immediate acute benefits, as shown by the ubiquity of drinks infused with B vitamins, sources of caffeine and “energising” flavours like ginger. However, navigating the legislative minefield of bringing new stimulating ingredients to market may be a tricky proposition for brands looking to capitalise on this trend.



Beauty ingredients are beginning to see some traction with consumers, and the link between diet, nutrition and personal appearance is becoming clear. Skin tone, visible blemishes, hair lustrousness and other beauty parameters can be affected by delivering the right functional ingredients. This is likely to need further personalisation based on demographics and specific activities, for example an individual's level of sun exposure.

Of course, not all of these ingredient profiles need to change on a daily basis for each consumer. Consideration of how and when to deliver a personalised nutrition product will be key across the different markets.

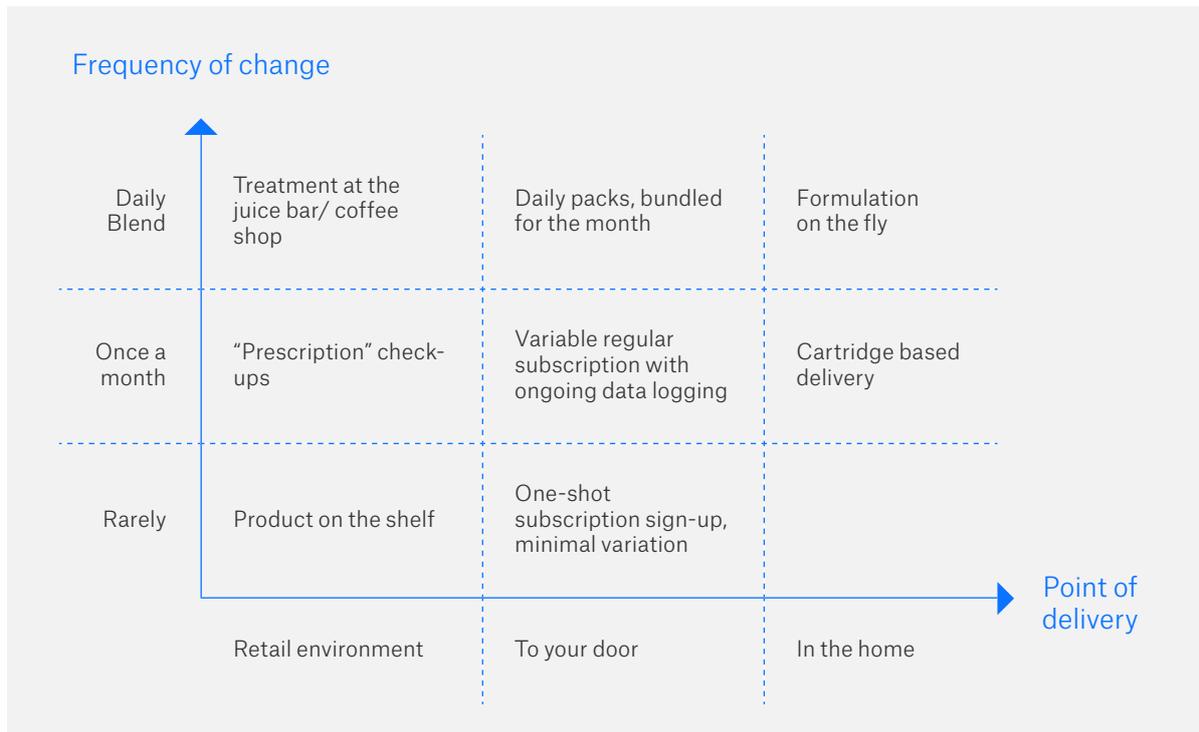
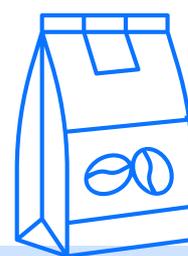


Figure 2: New product developments need to consider where the product will be created, and how often the personalised formula will be changed; these decisions drive technology selection for product, process and packaging

As product developers go about designing a system for personalised nutrition, a number of decisions must be made about the consumer experience, which ultimately will lead the technology development. The two most significant decisions for the consumer experience are likely to be determining the location and the frequency of interaction between the customer and the brand. Narrowing down the scope in this way immediately identifies the major technology challenges that the product development team will encounter. Is it more about reducing the COGs for a mass customisation system

which will sit in every health food store in the country, or making high throughput formulation possible in a factory?



How long will the shelf life need to be for the product, and will that require novel packaging solutions?

If we plot out a matrix based on our two key axes of personalisation (point of delivery and frequency of change - see Figure 2), we identify a number of different business

models and ways of delivering the key consumer benefits in perhaps non-intuitive ways.



In the **retail environment**, we can consider a simple spectrum of product variation frequency. The current retail paradigm rarely changes, but the introduction of simple methods for brand engagement “check-ups” – e.g. in store questionnaires, sales assistants, biometric scanners – can move consumers up the ladder of engagement and lead to higher frequency sales. In other retail environments, such as cafes and health food bars, there is the opportunity for daily engagement with a personalised nutrition system and rapid feedback on changes to personal circumstances.



Considering a **subscription** or **postal delivery** model, there is the opportunity to deliver nutritional products which vary as often as the pack size allows for. There is an inherent delay with a postal service of at least 1 or 2 days for delivery, so a truly reactive daily blend might not be possible, but matching products to a monthly/weekly cycle of needs could be achieved.



For products which are formulated or compounded **in the home**, there is a scale issue to consider. It seems likely that products could be compounded from functional ingredients delivered as cartridges or pods, but how often will those be changed, and how many pods/cartridges can we include in a countertop formulating device before it is too large for consumer preference?

Of course, it’s likely even more complex business models will abound. For example, consider a base product formulation (say a beverage powder) which is delivered on subscription each month and then compounded on a daily basis with functional additives, which are delivered in cartridges every 3 months. The bulk formulation can be created in a central factory, benefiting from economies of scale, but individual consumers could still feel ownership of their personal nutrition plan, seeing it created and tailored before their eyes.

Creative solutions to reduce cost or complexity of the supply chain will be key to unlocking the potential of personalised nutrition concepts.



We must also consider how the formulation is actively tied back to the customer and their precise needs. If we are looking to genuinely personalise the formulation in accordance with customer needs, we must truly understand those needs – whether they be emotional, biophysical or otherwise. Finding a simple and non-invasive way to gather initial biometric data, and then monitor any changes is a significant challenge. We take it as a given that drawing blood for biomarker quantification is neither practical in scale nor likely to be accepted by the customer.

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Understanding and defining personalisation

Some of this personalisation might come from questionnaires or surveys driving a “recommendation engine”; but this approach is limiting with regard to the true level of personalisation achieved, and has a simple multiplicative number of variants. Furthermore, consumers are unlikely to tolerate daily requests for survey information if you are looking to update formulation parameters regularly. A better alternative may lie in consumer electronics and wearable technologies, which could seamlessly feed useful data into a recommendation engine. This engine could then be acted on by any number of connected dispensing systems – from smart water bottles or in-home 3D printers to centrally manufactured tableted products.

Currently, the many forms of personalised nutrition services are delivered using online questionnaires. These questionnaires are used by companies such as Ritual, NOURISH3D, Care/of, Vitamin Buddy and Kencko, to name a few. The daily bundles are ordered via their website, personalised based on a short lifestyle questionnaire and delivered in the post monthly. Ritual provides personalised essential vitamins for women that are an all-in-one capsule, so consumers take one tablet for all their vitamins rather than multiple. Similar services are NOURISH3D, which provide made-to-order, 3D printed edible vitamin “stacks” (all vitamins in one tablet), and Multiply lab, who use 3D printing to make a single, personalised capsule containing a consumer’s whole prescription.

A small number of personalised nutrition services provide a one-off test to give a greater insight into the consumer’s health. For example, Nutrilite offers a DNA test in combination with an online questionnaire and this data is then used to create a customised weight loss programme. DNA sequencing is still a relatively expensive technique, but it will only drop in cost over the next 5 years, driven by new technologies enabling the clinical medicine industry. As nutritional scientists learn more about the genetic

variation in how our bodies treat the food we eat, we might expect more tests along these lines. As research unveils more about the role our different genetics play in the progression of disease states or susceptibility to chronic illnesses, we are likely to see further examples of “food as medicine” interventions based on genetic markers.

Interestingly, the use of continuous monitoring technology remains fairly unexplored and only a handful of providers (DSM, Nestle and The Clear Health Programme) offer such a system. ‘The Clear Health programme’ provides a wearable sensor which is worn on the arm and continuously monitors blood glucose levels. In addition to automatic blood glucose monitoring, the consumer tracks their food intake through a smartphone app. This data is then combined to inform the consumer when they are making food choices, helping the customer maintain a healthier diet without moving into the mass-personalisation of supplements or other nutritional additives.

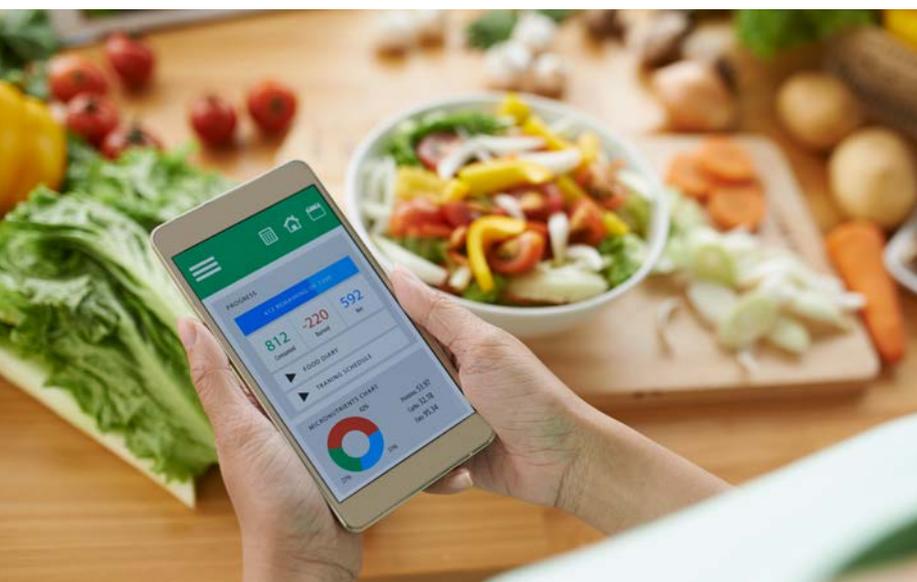
In a similar fashion, DSM and Nestlé also monitor consumers using a smartphone app. DSM provides a non-invasive, at-home urine test that measures eight biomarkers. This pairs up with a smartphone app, which continuously tracks metrics associated with factors such as diet, exercise, sleep and hydration, to give a highly personalised picture of the consumer's health. This data is used to create personalised beverages containing a custom mix of vitamin and mineral blends, as well as nutritional recommendations and live coaching. Nestlé's personalised nutrition service involves a DNA test, online questionnaire and constant monitoring through a smartphone app. However, in the Nestlé app the consumer's calorie and nutritional intake is tracked by the consumer uploading photos of their meals which may raise some questions relating to accuracy and reliability of the data generated. This data then informs the customised "Nespresso"-like capsules, which are used to make a variety of

products from teas to smoothies, based on their personal nutritional needs and what the consumer tends to lack in their diet.

The challenges of delivering against the promise

Shelf life concerns dominate a number of product developments – NPD scientists targeting 6 or 12 month shelf lives for ambient products have to make continual compromises to ensure formulations remain efficacious. Moving to a personalised, "formulation on the fly" approach could provide significant advantages, especially in cases where active components of a formula will react poorly with each other. It might not be a problem for a compounded nutritional product to have only 30 minutes of stability if it is consumed 2 minutes after the components have been mixed from their individual, shelf stable cartridges.

On the other hand, mass personalisation poses an interesting development challenge for regulatory, packaging and label developers. For products which are created in a central factory and shipped to customers, the burden of individually labelling the packages and ensuring compliance with regulations may be significant. Again, this might be an advantage of completing product personalisation closer to the end customer – a system with a limited number of component cartridges blended for a personalised product potentially only requires regulatory and labelling checks for the cartridge SKUs. Therefore, performing the final compounding as late as possible could make mass customisation achievable with a minimal regulatory burden.



One further final challenge for those considering mass-manufactured personalisation in a central production facility (or in a retail environment) – how often and how easy will that equipment be to clean and sterilise? Mass personalisation potentially introduces challenges around allergens, contamination or more simply, flavour crossover. Robust self-cleaning approaches will need to be implemented, likely on a customer-by-customer basis, which has the potential to slow operations to a crawl.

Picking the right development path through the different technology elements and potential use cases may seem like a daunting task, but it is crucial that these choices are made with a consumer-centric mindset. Brands should ask what benefits they wish to enable for their customers, and how each option for technology, distribution and business model helps to

deliver those benefits. In some cases, the right approach for personalisation will be clear – the more often you want to be able to change the formulation, the closer to the consumer you need to create your product.

It's clear, however, that there is no one-size-fits-all solution; and this needs to be approached on a case-by-case basis. Implemented correctly, personalised nutrition formulation will be a powerful tool for future products.



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