THE WORLD IN TRANSITION: CLEANER CONSUMPTION

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People, plants, animals, soil, water, sunshine, and eco-systems are all connected to food. New thinking will be necessary to allow the global food industry to transform and revolutionize the way food is produced by creating an environment-friendly supply chain that takes no more than what planet Earth can give.

Around 33 percent of all the CO2 released is absorbed by forests. By removing valuable forests, one of the world's most effective "carbon sinks" are lost. Despite all good intentions of the major agri-companies, their commitment of pledging to net-zero has little or no chance of meeting the objectives by 2025.

Around 60 percent of the global deforestation is caused by agricultural commodities production. So far, most agri-companies that have committed to net-zero carbon emissions are at risk of missing their climate targets. The primary drivers of deforestation are beef, soy, and palm oil with coffee, rubber, cacao, and sugar not far behind.

Transformative pathways of behavioral and structural changes will be needed to embark on a diversified agroecological production system which aims to increase access to healthy and sustainable diets. Increasingly, younger affluent consumers prefer food products that care about sustainable agricultural practices and are minimally processed while maintaining a natural status. Decoding these preferences translate in health, convenience, and TASTE. In other words, if the taste does not meet the expectations, consumers tend to think less about the health of the planet.

Whatever transformative pathway is chosen; it is important to remember that the most crucial factor influencing the enjoyment of consumers is still their sensory appeal in spite of all the green messaging. In affluent societies, 1 in 3 consumers will not consider buying 100 percent plant-based foods because of poor taste and texture. The technological reasons are clear: besides the lack of flavor and color of most plant ingredients, the proteins neither perform in the same way nor provide the same favorable organoleptics like taste and texture.

Democratization

The plant-forward movement has clearly captured mainstream and continues expanding in new territories and applications in multiple product offerings. Driven by a combination of more health, environmental, and ethical awareness, consumer demand for plant protein formulated foods continues to grow, albeit not as fast as projected. The looks of plant-based meat, bakery, snacks, and dairy-like products are set to become an enduring part of the food landscape. In most developed countries, the market for plant-based proteins as well as alternative meat and milk continues to grow. For both milk- and meat alternatives, it is important to place these in the same supermarket aisles as the traditional products. This branding and positioning strategy significantly increases the likelihood that consumers are tempted to choose these foods.

Many Angles to Consider

Even though industrial livestock continues to influence the environmental footprint, alternative meat and dairy will not be the complete answer. Instead of just focusing on a protein transition, there must be a democracy to hear what small-scale farmers and food-insecure populations have to say. Reason being that the multinational companies -including their acquisition activities of successful startups- tend to reinforce the reliance of plant protein and over-processed food choices that dominate and polarize public debate about traditional consumption of meat and dairy. The key element in making a global sustainable food transition will be support for farmers in developing regions to move away from industrialized animal-harvest farming toward sustainable and ecologically sound livestock farming and plant-based alternatives.

Harvest Variables, Globalization & Climate Change

Globalization is partly responsible for the increase in the volume of

grain and pulse crops traded. There is often a correlation between export demand and countries reducing their stockpiles to the point of possibly reducing food security. Weather conditions such as dry spells or heavy rainfall can cause a string of poor production years, as well as provide above-average high-volume harvest numbers.

Although plant protein can play a key role in reducing the ecological and environmental footprints of global food production, there is still a risk that the over-reliance

on a few crops can lead to further reduction of biodiversity. Therefore, care should be taken so that the drive for more plant protein consumption does not cause harm or issues like deforestation and loss of wildlife and biodiversity.

The global ecosystems need a reimagining of food systems to operate within nature's boundaries. Conventional agriculture is strained to a point that it is unsustainable, especially that the world might possibly run out of farmable land to feed the fast-rising population by 2050. To be compliant, food companies need to develop a vision of an economic system that prioritizes the biodiversity of nature's assets. Preferably, these objectives need to be accomplished in such a manner that capital, health, and affordability are harmonized on a platform of corporate sustainable environmentalism.

The overall amount of protein available for human consumption may decline with rising atmospheric carbon dioxide (CO_2) levels. Elevated levels of carbon dioxide can block plants' absorption (=assimilation) of nitrates, resulting to foods and crops with reduced nutritional quality. Studies have indicated that protein and nitrogen concentrations in plants decline under elevated levels of carbon dioxide –indicating that the nutritional quality of food crops is at risk as climate change intensifies.

Clean Disruption?

There is real change when a levy or tax will be enforced on foods such as beef and dairy or shutting down active farms to forcefully achieve deep cuts in emissions by adopting circular economy strategies that reduce demand or limit export. Much to the chagrin of farmers, these government strategies are already being implemented in the Netherlands and even creating social unrest, as well as major political parliament voting upsets.

To be fair, it should be noted that the shift to higher levels of ultra-processed foods in the last decennia also significantly contributed to greenhouse gas emissions as well as destruction of wildlife habitat and monoculture, causing a debilitating ecological footprint. These ultra-processed foods are, for example, heavy additive-loaded ready-to-eat meals, margarine, and sodas.

When all these variables are implemented, only time will tell if the doom-say assumptions of the climate experts are correct in their assumptions that increased plant-based "cleaner food" consumption will indeed meet the target of limiting global warming to 1.5C.

Zero Deforestation Global Economy

It is estimated that the demand for crops like soybean is expected to increase by 80 percent in 2050. Most of the soybean is widely used as animal feed. For instance, some 60 percent of soy grown across the world is shipped to China and mainly used for animal feed that ultimately ends up as slaughtered meat.

Soy agriculture requires large amounts of water and is increasingly associated with driving deforestation leading to catastrophic environmental

damage, including eradication of wildlife habitat. With demand for soy protein and soy oil increasing as well as land and water issues of the crop becoming unsustainable, the global population needs finding alternative protein sources. These alternatives are now being developed using sources like micro algae and cellular agriculture, including molecular farming.

Due to agricultural expansion, deforestation and forest degradation continue to take place at alarming rates. Hence, it is imperative that new agricultural production methods are implemented without destroying valuable forest and wildlife areas. Ideally, whenever possible, reforestation should be made within the framework of the transformative solutions for climate change, biodiversity, and the much-needed food security.

Legacy and startup companies should both accomplish their mission to end deforestation within the forest reserve and restore degraded forest and wildlife. Companies like these and the premier global plant protein companies should work together to accomplish these lofty goals by promoting regenerative agriculture and strive to become resource-positive companies by sourcing only sustainable crops like soybeans to accelerate the transition to a net-zero global economy.

Furthermore, it is expected that effective diligence across supply chains will ultimately be introduced and that all food sold will be mandated as guaranteed deforestation-free. Supermarkets that are in the first line of consumer-defense will likely drive these transitional changes needed to ensure that food systems deliver affordable, healthy, and ecologically sustainable foods.

Challenging Times Prompt New Solutions

A fundamental shift in how food is produced is needed. This includes the practices of over 500 million smallholder farms and the consumption patterns of the global population, with special emphasis on the developed countries and the huge waste of valuable food. To minimize environmental degradation while still feeding some 10 billion people by 2050, a drastic cut in consumption of meat, dairy, and eggs will be needed. However, will these goals be attainable knowing that the world production of both dairy and meat is still upward trending?

The meat eaten today in record consumed quantities overwhelmingly comes from genetically uniform, immunocompromised, and pharmaceutically treated animals, often stacked in confined spaces. Unfortunately for most consumers, the present and future of animal farming is low on the list of priorities, mainly due to the lack of public understanding. However, the continuation of factory-farmed animals should be top priority on the agenda to determine the limits of this huge industrially powered supply chain.

Consumer Demands

An increasing number of consumers living in affluent societies believe that vegetarian or vegan food choices are more sustainable than slaughtered food options such as beef, pork, and chicken. To keep up with the plant-based phenomenon and the shifting consumer attitudes from trend

to food (r)evolution status, the legacy brands are now forced to closely monitor market changes. This is especially the case as more consumers adapt to increased plant-based eating, though for diverse reasons, with more plant protein or fiber in their diets and eating more healthfully while feeling good about their proactive attitude for helping the environment.

Clearly, consumers in affluent countries are giving more support to the plant-based dietary choices that not only help manage weight but also address underlying conditions like wellbeing and reduce the risk of degenerative diseases such as cancer, diabetes type 2, and cardiovascular disease.

It is evident that the younger consumers under the age of 30 are the early adopters of a vegetarian dietary preference. In contrast, the consumers under the age of 50 are most likely to adopt a flexitarian-style diet as a meaningful compromise. These trends do seem to transcend both demographic and generational groups. For these groups of consumers, clean label and transparency is not a passing trend but movement that is here to stay.

There are also subtle protein-consumption differences between men and women: women are mostly interested in protein for lifestyle, satiety, and body-weight control, whereas men see protein nutrition in relation to their increased muscle strength, physical (sport) performance, and energy level.

Plant Equivalency

There is a clear relationship between the willingness of consumers to purchase plant-milk and plant-meat alternatives or the animal-based equivalents. Most consumers believe that plant milk and plant meat are too expensive, and they would prefer to see similar pricing, suggesting that price is a key barrier to plant protein food consumption.

The latter is especially true to capture or win over the flexitarian consumer, particularly during times when the cost of living goes up. Perhaps the answer lies in the fact that margins on animal meat and dairy milk are historically low at around 10 percent, whereas margins on plant-based protein foods are typically at 30 percent to as much as 50 percent. Besides these differences, there is growing evidence that the increase in living costs does indeed challenge the ethical and ecologically-driven buying decisions.

Environmental & Human Health Degradation

The overriding question is if plant-based meat and plant-milk beverages lead to sustained change in purchasing behaviors. For now, the answer is a resounding yes! However, it is appropriate to ask if a vegetarian-based diet loaded with wheat, corn, soy, and rice is sustainable for long-lasting human preferences. After all, wrong were the nutritional (pseudo) scientists and self-appointed gurus some 30 years ago when they were pushing the ultimate healthy diet high in carbohydrates and low in fat! A skyrocketing global obesity and diabetes type 2 epidemic is presently affecting both affluent and developing countries alike. It only shows how incredibly hard it is to make dietary changes last.

A more balanced approach on the ideal human nutrition guidelines will be needed. Perhaps it is now safe to conclude that optimal human health, in fact, clashes with the "health" of the planet Earth.

It is a fact that it takes more than just calories to nourish humans. Over the last 50 years, legacy food companies have continuously removed essential natural components from crops –especially roughage and fiber- to make food taste better. Most of these companies spend lots of energy in finding the bliss point –the stage of continually eating food. Quite a bit of compulsive eating resulted, and many people are on autopilot when eating these "great-tasting, empty-calorie" foods. This is good for marketing and sales, but bad for the nutritive status of a human body.

In the developing world, diets high in dairy and meat are expected to rise exponentially due to the growing number of people who have the means to afford these much-beloved foods as their primary source of nutrition, even though the increase in animal protein consumption will mean a real setback in reducing greenhouse gas emissions.

As a side note: consumption of fluid milk in North America declined by 25 percent between 2006 to 2022, along with a triple-digit increase in dairy alternatives within the same time frame. However, to put it into perspective, this decline in cow's milk consumption is more than compensated by the sharp increase of dairy sales in developing countries. Subsequently, the net greenhouse gas savings do not always reflect what special interest groups make the consumer believe.

Transformative Changes

The growing number of transformative changes with increasing meat and dairy consumption, as well as the rising demand for food and nutritional quality, will put additional pressure on the agricultural ecosystems. To meet world needs by 2050, an estimated 70 percent more food must be produced from less land and fewer inputs like chemical pest control, less water and fertilizer, as well as less or no antibiotics for raising slaughter animals. In addition, the inequities between developing and affluent societies must be solved to improve the economic and societal imbalances.