

Shifts in transitional protein solutions

Millennials are the drivers of change in many areas of food production - Part II

Growing numbers of transformative changes, with increasing meat and dairy consumption, as well as rising demand for food and nutritional quality, will put additional pressure on the agricultural ecosystems. To meet world needs by 2030, it is estimated that about 40% more food must be produced from less land and fewer inputs such as chemical pest control, less water, and less fertiliser. On top of that, the inequities between developing and affluent societies must be solved in order to improve economic and societal imbalances.

By Henk Hoogenkamp

Agricultural productivity rates have failed to keep up with global population growth. Overuse of priceless fresh water poses not only serious environmental hazard, but also a risk to social and political stability. It is inevitable that water scarcity could cause certain food shortages in the next decennia. In 2015 and beyond, water withdrawals will in certain world regions be in excess of sustainable supply and this discrepancy will only widen.

The world of soy transition

Soybean cultivation can serve as an example of how difficult it will be to navigate the world of future requirements and its environmental impact. The average EU citizen consumes 61 kg of soy

yearly, 93% (57 kg) of which is embedded as animal feed in the animal-derived foods that most consumers eat daily. By far the highest amount of embedded soy (109 g per 100 g) is present in chicken breast meat (Fig. 1), closely followed by eggs (55 g of soy per 100 g), pork chops (51 g of soy per 100 g of meat), hamburgers (46 g of soy per 100 g of meat) and cheese (25 g of soy per 100 g of product).

Although soy is an essential part of the global food supply, these high-protein crops have negative ecological and environmental impact if grown irrespon-

sible. There is no doubt that the explosive growth of the soy crop has come at the expense of millions of hectares of grassland, forest, savannah and wilderness taken away and converted to agriculture harvest land around the world. In particular South America has been affected, destroying most valuable eco-systems such as the Amazon. In addition, in 2015 about 95% of all soybeans harvested in the US will be of GMO origin.

When it comes to protein, consumers have a lot to choose from. Plant protein ingredients like derived from legumes, cereals, vegetables, and fruits are rapidly transforming into a valuable functional and nutritional cost-effective ingredient in various food formulations (Box). A good protein has a handful of components: stellar nutrition, great flavour, process adaptability, versatility and performance in more ways than one. Plant proteins – or vegetable proteins – are widely regarded as functional and versatile. There is no question that the harvest needs to transform plants into premium and sustainable

protein foods to nourish the world. It is clear that modern consumers want more lean protein in their diet, and many are looking to lower the cost of protein sources. In theory, plant proteins should be less expensive, although in reality this is not always true, especially when it concerns so-called high moisture extruded meat analog foods. More consumers are willing to look beyond animal-based proteins to satisfy their need for protein. While generally the interest in protein is growing, plant-based meat-alternatives are emerging as a viable option. The number of grocery shoppers that seek out protein-enriched foods is increasing, and many are willing to pay a premium for these foods, especially when formulated from natural wholesome components.

Sustainable as well as renewable food production is a fundamental human need. There are basically two options to feed the world: to get more food out of the land currently farmed, or increase the hectares or acreage to farm on. Nevertheless, sustainability will still depend on whether farm-



Fig. 1: Very high amounts of soy are transformed to chicken breast meat via soy-based poultry feed.

Vegetable protein = Plant protein

The collective term "vegetable protein" was coined (1992) by the soy industry to diffuse negative consumer bias against the word "soy". "Vegetable protein" is misleading and a more accurate catch-all name is "plant protein". As a category, plant protein includes some of the following protein types:

Soy = legume protein
 Pea = pulse protein
 Lupin = pulse protein
 Wheat = cereal protein
 Oat = cereal protein
 Rice = cereal protein
 Potato = root protein
 Alfalfa = legume protein
 Corn = cereal protein (zein)
 Fruit seed = fruit protein

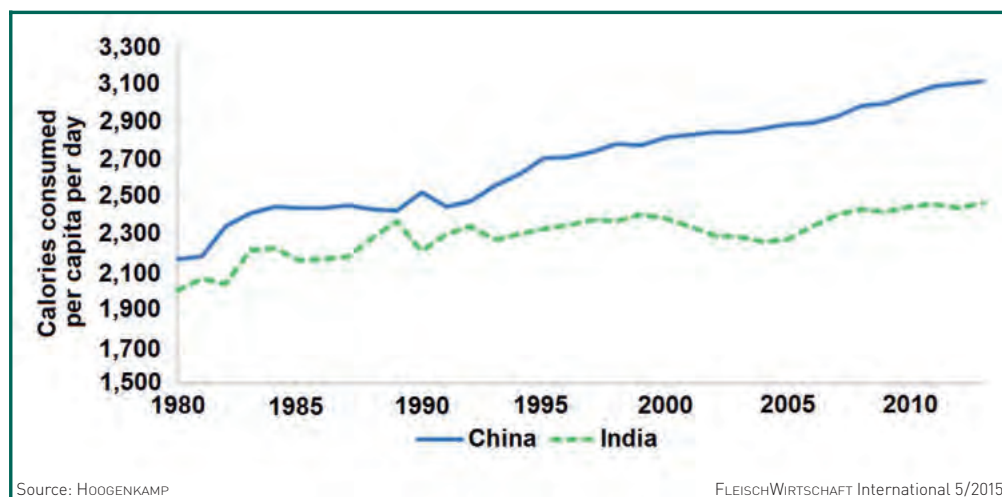


Fig. 2: Consumers in developing countries show a raising calorie intake.

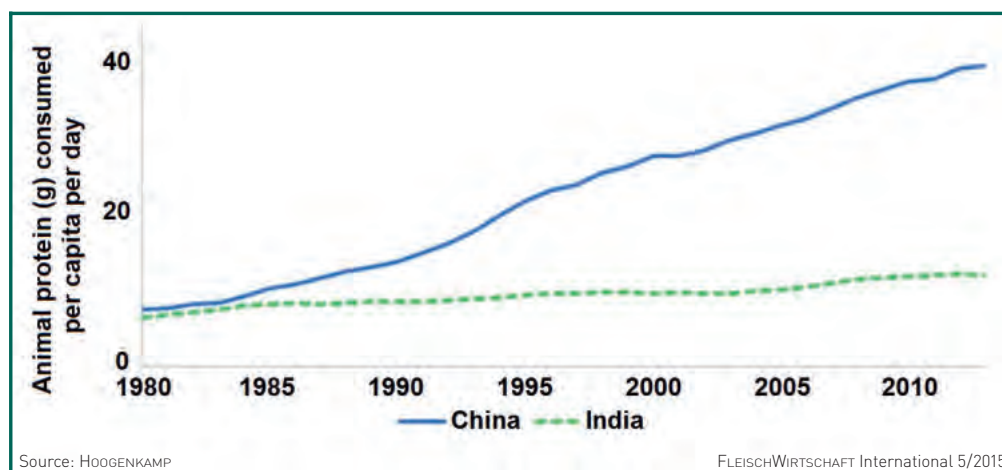


Fig. 3: Parallel to their rising income people prefer meat and dairy as sources of protein.

ing can successfully continue to produce food over the long term with little or no damage to environment including deforestation, depleting groundwater, and inefficient use of nitrogen and phosphorus fertilisers. Take note that phosphorous fertiliser is a finite resource. In addition, global warming and carbon dioxide emissions could ultimately be the deathblow to sustainability.

Whichever choice is made, it will need to be coupled on concerted efforts to feed fewer crops to raise animals as well to significantly reduce food waste. To secure sufficient food for the fast growing world population, the answer might well be that mega-farms are the most appropriate way to move forward. Hence, the environmental impact of large-scale meat and dairy production, with livestock estimated to produce over half of the world's greenhouse gases.

Too fat and too skinny

Never before has food been such a global issue. Both sides of the spectrum show overweight and obese people sharing the planet with chronically malnourished and hungry populations. All things considered, the bottom line is how to produce more food from less land, reduce waste, and improve equal access to wholesome food at less price volatility.

Besides the availability of sufficient cropland, food waste, spoilage, politics and economics are increasingly infringing upon the basic human right of access to food for a great many of the underprivileged of the world citizens. According to the Joint UN report (September 2014) slightly more than 800 mill. people are still chronically undernourished. Asia – the world's most populous region – is the home of the majority of the hungry, 525 mill. people and most

of the balance is in sub-Saharan Africa. Hunger kills more people than malaria, tuberculosis and aids combined. Actually, hunger kills about 1.3 mill. more people than cancer. Hunger reduction requires sustained political commitment and an integrated approach that needs to include public and private collaboration. This is especially true for the vulnerable, particularly to address the micronutrient deficiencies in mothers and children under five years of age.

Almost every country in the world, affluent and poor, faces a serious public health risk due to malnutrition, either from undernutrition, obesity or micronutrient deficiencies. The cost of poor nutrition is huge: stressed health systems, premature death and a severe drag on economic progress. (UN FAO/WHO, Nov. 2014). Food fortification is needed to combat undernutrition and malnutrition.

Governments are presently shelving possible solutions for the looming food shortages because of the current financial crisis. Currently, so many political and financial issues are hounding governments that they no longer have the stomach to tackle issues causing future food uncertainties and possible shortages. For now, it seems that food security has moved to the back burner.

There is little doubt that providing enough food, particularly sufficient protein, for the rapidly increasing world population is a challenging task. The fact is that more than 500 mill. people are suffering from protein deficiency, while emerging research also pinpoints that the aging population will require extra protein supplementation in their diet to prevent sarcopenia.

Undoubtedly, the sustainable agricultural production of food of animal origin represents the biggest environmental challenge. The love of consumers for meat might well be on a collision course with the need to rebalance the consumption of more resource-efficient plant proteins. In other words, it is time to actively move to a more environmentally balanced diet to reduce the consumption of foods with a higher environmental impact such as meat and dairy.

Health and environmental agendas are not always aligned with the current dietary recommendations. For example, in affluent countries, the recommended amount of meat consumption is significantly less than the current levels. People are encouraged to eat more vegetables, fruits, whole grains, low-fat dairy products, and omega-rich seafood. Instead they consume more processed foods containing hidden levels of sugar, sodium, trans-fat, and refined grains. The price differences between healthy and unhealthy foods are widening and may contribute towards food insecurity and increasing health inequalities. The latter could further exacerbate social inequalities in health.

Americans are at the top of the global carnivores. US consumption of beef per person is 38 kg in 2014, while chicken consumption is at 45 kg per person. The overall

meat consumption stands at 122 kg a year, which is considerable more than the average body weight of an adult. When these numbers are extrapolated on the world population, the question of sustainability is an easy answer.

Especially consumers in developing countries such as China, India, Indonesia are gobbling up more meat and dairy products (Fig. 2). It is mainly increased purchasing power that is intensifying appetite for protein. This is especially true for consumers in emerging economies. To “feed and meat”, livestock farmers expand their production and heavily rely on sharply increased harvests of the main crops soy, corn, wheat and rice.

China in transition

In developing and poorer countries, protein deficiency remains a problem for at least one billion people – or some 15% of the world population. Yet, as income rises, meat and dairy are foremost sources of protein that people prefer (Fig. 3). Despite the fact that international organisations would like to reduce meat intake, the opposite will happen. For example, in 2015 worldwide meat consumption will rise 2.0% a year over the next decade (USDA). The United Nations FAO has projected that the average person will consume about 45 kg of meat, versus 40 kg in 2007, and 35 kg in 1991.

Continued Chinese growth in meat demand and a willingness of consumers to spend more will further drive consumption including the creation for value-added meat products. As a matter of fact, premium priced beef is the fastest growing meat choice in China, ahead of poultry and pork. The Chinese beef market has grown by almost 5.0% from 1995 to 2015, compared to pork growth 3.5% and poultry 3.4% over the same time frame. To put these numbers in a different perspective: per capita consumption pork 40 kg, poultry 13 kg and beef 6 kg (2015). The total Chinese per capita meat consumption of 59 kg in 2015 will increase significantly in the years ahead with beef prices outpacing those of pork and poultry.

A country in rapid transition such as China usually is confront-

ed with opposite medical observations. Improved nutrition has made Chinese markedly taller on average since 2000, with women grown more than men. The average height of fully-grown men increased 4 mm to reach 167.1 cm and women grew by an average of 7 mm to 155.8 cm. These are significant growth numbers and mostly the result of increased animal protein intake such as meat and dairy. However, with more prosperity also come signs that China is shifting to typical western chronic diseases. Smoking, excessive alcohol use, insufficient physical exercise and high sodium and increased fat consumption are the main causes. About 30% of Chinese adults are overweight and more than one in ten are obese, a number that is quickly reaching Western “standards”.

Chinese citizens have more disposable income, which allows buying more meat and processed foods. Unfortunately, there is lack of nutritional education and subsequently very few Chinese know about the importance of a balanced diet and the importance of regular physical activity.

Sustainable livestock farming

Needless to say that the sharp increase in demand for dairy and meat products has raised environmental and ecological concerns. The UN estimates that livestock production is responsible for about 15% of global greenhouse emissions. It is clear that it can be argued that meat especially is a relatively ineffective source of protein, and that it would be smarter to convert agricultural crops directly into food, instead of feeding and raising animals first. However, animals should be part of a sustainable and ecologically balanced agricultural infrastructure, and its products contribute to a nutritionally sound and good-tasting healthy diet.

There is no question that the sustainable production and consumption of animal-origin foods is the biggest environmental challenge. The Western world, spoiled with high levels of meat availability at relatively low prices, cannot point fingers at developing countries considering that they also in-

crease consumption of these premium high-impact animal protein based foods and meat products. After all, many developing countries have been deprived of eating quality meat and enjoying dairy foods. With the increasing economic standard in developing countries, it is very likely that the consumption of animal origin foods will rise exponentially through at least 2050. In fact, it is projected that the world meat and dairy consumption to increase by at least 50% as compared to the 2015 numbers.

Although food production accounts for about 8% of the greenhouse gas emissions, in general terms, animal-based foods are responsible for more greenhouse gas emissions than plant-based foods. For example, while beef accounts for only 4% by weight of the food available, it contributes 36% of the associated greenhouse gases. Cattle – which have a long outgrow cycle – don’t efficiently convert plant-based feed into muscle meat and/or milk. Growing feed often involves the use of fertilisers and other substances through energy-intensive processing methods. In addition, cows release lots of methane and their manure also releases this potent greenhouse gas.

Cows in particular are not very efficient at converting feed to muscle protein for human con-

sumption. Compared to other farmed and harvested animals such as hogs and poultry, beef produces 5 times more heat-trapping gases per calorie, takes 11 times more water for irrigation and uses 28 times the land. In addition, cows burp major amounts of methane, a greenhouse gas that is significantly more potent than carbon dioxide (Journal Proceedings of the National Academy of Sciences, July 21, 2014).

Actually, pork, poultry, dairy and eggs all have comparable environmental footprints. US government data calculate air and water emissions and how much water and land are used in the lifetime production of the harvested animals: beef, pork, poultry, dairy and eggs. This calculation gives a rather accurate environmental cost profile of different meats and other types of animal proteins.

The finite amount of agricultural land, the availability of clean water combined with resource depletion will force policy makers to rebalance diets towards more plant-based foods. In other words, they will accept the need to reduce the consumption of foods with a higher environmental impact such as meat and dairy, and increase lower-impact foods such as quality plant proteins derived from cereal grains, legumes, potato, vegetables and fruits.

Good reasons for the iPad-App of FleischWirtschaft International



For the future of food security, most especially in developing countries where people do not get enough protein, it is essential not to rely on farmed animals as the primary source. By relying less on an inefficient meat protein-delivery system, people should instead utilise the nutritive value of the world's five major commodity crops – rice, corn, wheat, soy and potatoes. Moreover, the many other plant proteins in the world can be further explored for the production of meat alternatives that could fundamentally reshape our food supply.

Protein quality

Most plant proteins show a conversion factor of 30% to animal-derived protein sources such as those present in meat, dairy, and eggs. In order to match the animal protein sources, the way forward is to blend different types of plant proteins in order to optimise and harmonise nutritive values and obtain advantageous amino acids content. For example, wheat and rice protein typically have low lysine levels, and blending other

plant protein sources like pea, soy, algae, and canola can boost these lower levels.

For now, soy plant protein is the world's main source to deliver functionality, immunological characteristics, and nutritive values. However, pea protein and rice protein is rapidly making advancements in formulated food products, especially in specific categories such as “all-natural” allergen-free and gluten-free.

The plant protein industry was surprised about the new measuring protein quality by the Food and Agriculture Organization of the United Nations (FAO/2013) recommending using the Digestible Indispensable Amino Acid Score (DIAAS) as the new preferred method, as opposed to the Protein Digestibility Corrected Amino Acid Score (PDCAAS), which favoured plant protein and especially soy protein.

The new DIAAS method clearly demonstrates the superiority of dairy protein over plant proteins. Rice protein may be the exception because of its high levels of arginine and leucine – the highest levels in all cereals and grains. This

feature will make rice protein ideally suitable not only as a stand-alone protein for hypoallergenic foods but also as a partner for dairy protein with special relevance to the nutrition in general and to special food segments such as clinical nutrition, sports performance, weight management and sarcopenia.

Protein and, to a lesser extent, fibre are parts of a larger trend of consumer concerns about the benefits of foods. This trend can be clearly seen on labels where protein is increasingly given a more prominent position. Protein enrichment is the new buzz in affluent societies. Protein and fibre have a very positive consumer perception and increased awareness, although these ingredients mean differently to various people.

Protein definitely has the widest range of consumer acceptance, ranging from muscle building to weight loss. For most consumers, quality protein equates strength, endurance and prolonged energy including mental and cognitive alertness. The truth is, in relation to consumer appeal and perception; plant protein ingredients still have a long way to go. There is little doubt the dairy protein – especially whey protein – is seen as the golden standard to which every other protein comes second. The plant protein ingredient manufacturers, specifically soy protein companies, need to learn to be more modest in their claim to fame. Soy proteins are indeed unique but, when it comes to nutrition, they often perform nutritionally better when blended with other sources of protein, especially whey protein, meat protein and egg albumen.

Protein continues to go from strength to strength, even without specific accompanying health claims. Everyday food products, like breakfast cereals, nutri-bars, beverages, hybrid meat including meat-free, and plant protein-enhanced dairy foods are ideal platforms to deliver these dietary protein solutions. Fruit smoothies including protein beverages appeal to consumers throughout the day, gaining popularity as a breakfast cereal replacement in the hurried morning hours.

In a sense, protein is often seen as a “health halo effect” that goes

beyond basic nutritive delivery. Food labels usually have a limited lifespan and only go as long as the latest fad lasts. Protein might be an exception to this rule. In the Greek language, “protein” means “first in life”, and this has never faded from people's minds throughout history. Protein has always been a component for well-being and survival.

Plant protein is primed to deliver ingredient innovations that can provide consumers with more comprehensive food security as well as advanced food diagnostics monitoring. Food diagnostic ingredient services offer formulation know-how, improve texture and taste, as well as extend shelf life. These plant protein solutions can assist in providing customers with a unique range of effective and cost-efficient formulas as well as nutritive contributions to global food security and ecological sustainability.

Nutrient-dense vegetables, beans, fruits and nuts – specifically walnuts and almonds – make a significant part of a healthy diet, not only to keep the heart healthy but also to manage body weight and avoid long-term degenerative diseases. Such diseases as prostate cancer, colon cancer, heart disease, and macular degeneration can be slowed down or prevented by a healthy and moderate diet. The medical and social costs associated with degenerative diseases will eventually rise to astronomical levels and choices will have to be made as to which patients deserve to receive treatment as well as life extension.

Plant protein-formulated food including hybrid-meat products meet all modern nutritive and organoleptic requirements, and its “all-natural” status provides consumers with multiple positive health benefits (Fig. 4). Most of these are not only environment-friendly and ecologically sound, but are also keen in addressing certain looming issues that are presently still under the radar screen: slowing of aging, healthy immune systems, strong energy levels, healthy skin, strong bones, alertness, cancer, and a healthy heart. Just for cancer alone, worldwide trends indicate a rising number of cancers linked to hormones, diet, and reproduction in



Fig. 4: Consumers often provide plant protein-formulated food with multiple positive health benefits.

less developed countries going through rapid economic and societal change, including a shift towards Western dietary habits. Tumors are not detected and diagnosed in developing countries as frequently as in affluent countries. These inequalities between rich and poor countries explain the rapid growing cancer-related deaths.

Capital venture push

More lifestyle choices (vegetarianism/flexitarianism) and livestock welfare are fueling increased demands for meat-free or meat-hybrid foods. New generations of the food-tech ventures aims to change the way people eat. Venture capital firms as well as social media billionaires such as Google co-founder Sergei Brin, and Microsoft's Bill Gates fund start-up food related companies that try to find plant-based alternatives to meat, poultry, and eggs. This trend is now widening and has attracted other major name "investors" including the Twitter founders Biz Stone and Evan Williams as well as venture capitalist Li Ka-Shing. These people look at meat-free with a somewhat different perspective: coupling the ecological wellbeing of the world to strong opportunities for building great financial returns.

"Global health is the cornerstone of global prosperity. With billions of people adding more animal protein to their diets - meat consumption is expected to double by 2050. It seems clear that arable land for raising livestock won't be able to keep up" (Bill Gates, March 2013 - www.gatesnotes.com).

Replacing these animal-based protein sources can significantly reduce land, water, and crops needed to feed animals, while at the same time benefit people's health and reduce outbreaks of diseases. For the next generation, sustainability of food security will be a major challenge. Besides the fundamental economic and technology challenges, the biggest hurdle is how to convince consumers to try the plant-based equivalent of the "real or original" food.

Erratic weather patterns can quickly cause havoc in harvest

yields. It does not take much to create an imbalance when projected crop yields of wheat, corn, soy, rice and potatoes do not meet the needs of the world population. The pressure on resources is intensifying, not only due to soaring populations but also because of desertification, droughts, floods, land grabbing, and lack of GM progress.

Prolonged spells of drought - like happening in California 2010 to 2015 - ultimately require mandatory regulation to draw down water use. Being denied irrigation water, forces farmers to leave agricultural land unplanted. Farmers who don't have access to surface water may decide to increase the amount of water pumped from limited groundwater supplies, though this option can only go so far until dead zones start to occur. Limited fresh water supply is a wake-up call and may require drastic action to curb water use ranging from landscaping, lush lawns including golf courses, shower-time, car washing, industry and food production.

The Organisation for Economic Cooperation and Development (OECD) predicts that almost half

the world population will be living in areas with high sea water stress by 2030. Based on 2015 estimates, agriculture is responsible for about 70% of fresh water consumption globally, while the industry requires another 22%. Both the food and meat industries are especially heavy users because water is a key component for nearly every single part of the production process: from outgrowth to final point of food consumption. The pressure on food security is further compounded by the availability of suitable agricultural farmland, biofuels, climate change, clean energy and manpower.

Population surge

The world population in 1950 was about 2.5 bn., less than the anticipated 3 bn. increases expected by 2050 reaching a total of 9.4 bn. people. While developed countries accounted for close to one-third of the world's population in 1950, they will have only 15% of the total by 2050 since the expected population growth will primarily be in the developing world.

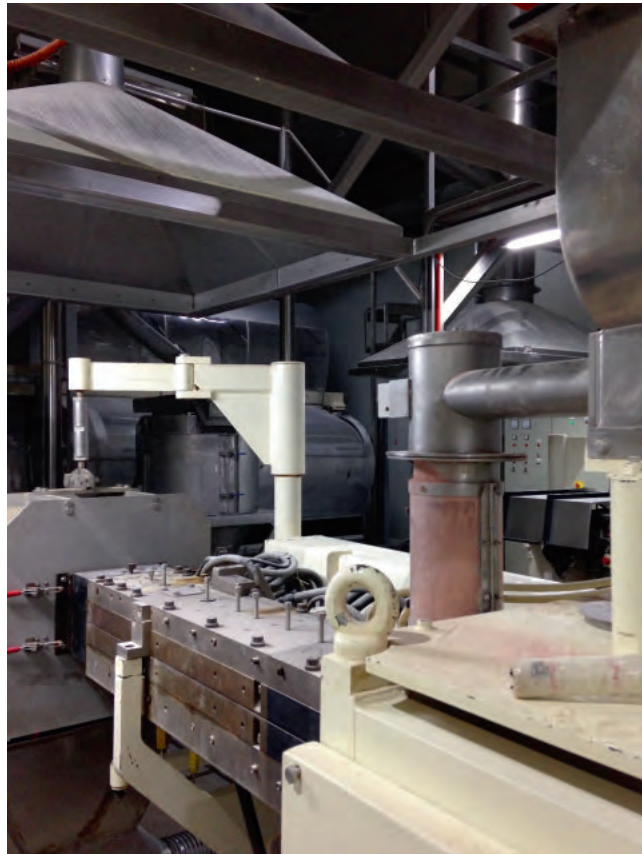


Fig. 5: Extrusion technology allows plant protein ingredients simulating meat texture and appearance.

The combined populations of China with 1.36 bn. people and India with 1.1 bn. will reach about 2.5 bn. people in 2015.

While China's population will rise slightly, India's population is expected to increase by almost 50%. Together, the two countries will have well over 3 bn. people by 2050 and will account for about one-third of all the people on Earth. If indeed China will relax the "one-child policy" all projections are out of the window and will likely surge well beyond the current estimates.

Contrary to earlier projections, the world's population is likely to soar through the end of 2100. This is largely due to sub-Saharan Africa's higher than expected birth rates. According new statistical models, there is an 80% likelihood that the number of people on the planet will increase to between 9.6 and 12.3 bn. by 2100. In this model, the Africa's population will rise to between 3.5 and 5.1 bn. by 2100 from about 1 bn. today. Big populations and high fertility levels are expected to drive this growth. (Journal of Science, September 2014). Of course, model projections do not take natural disasters into considerations such as a medical catastrophe that potentially could dwindle calculated or projected populations, not to mention mass immigration or geographically driven asylum migration.

Food inflation

The dynamic change of increased basic food prices is not only stressing economies all over the world but also exacerbating hunger and sparking political unrest in poorer countries. Food costs need to be seen in perspective: The cost of growing food accounts for only 15% of the final consumer price. The balance goes to processing, packaging, marketing, transportation and profit. The forces behind the cost of food and functional ingredients as well as rising energy prices will likely increase the cost of everything else, and the strong demand for meat and dairy in developing countries like China, India, and Southeast Asia (Fig. 3). The cost of livestock feed, togeth-

er with competing demand from agricultural biomass to manufacture biofuels, can play havoc on both the pricing of staple commodities and specialty crops.

Fortunately, some governments are backpedalling on mandated use of biofuels. Taking food from the mouth and putting it into a car is not something that is sustainable. It's more sensible to limit the use of crop-based biofuels such as corn ethanol and try to make the economics work to produce biofuel harvested from inedible waste. Mandated use of subsidised biofuels not only drives up fuel prices but also reduces fuel efficiency. As such, it is highly questionable if food-to-fuel conversion is sustainable.

How much longer can political inaction continue if even highly affluent countries like the US and UK have increasing numbers of people living off food stamps and receiving emergency food supplies from food banks? Yet, another 2 bn.+ people will join planet Earth by 2050. 210.000 more mouths need to be fed every single day. The challenges ahead to manage food security are very complex and totally immense. Even affluent countries like the US will have a total of approximately 50 mill. people in 2015 living on government-issued food stamps and food donations, now renamed SNAP (Supplement Nutrition Assistance Program).

Food and land waste

A new approach is definitely needed to determine how food is grown and shared while securing affordability and ecological sustainability. Of course, one can still argue that the world is capable of growing sufficient food for future generations and that inequality is not a matter of sufficient food but rather of shameful waste.

It is indeed true that a very large amount of food is wasted between harvest and mouth. Ill-harvest, poor storage, hoarding, political maneuverings, processing, point of sale inefficiencies and, last but not least, waste by consumers are all guilty parameters that food does not reach actual consumption. It can therefore be stated that the greater the affluence of society, the higher the food waste. On a worldwide basis, it is estimated that nearly 25% of bread and cereal products waste occur in high-income countries.

US Government data estimate that nearly a third of food available for consumption in the US goes uneaten. Probably similar numbers are true for many EU countries. Consumers don't understand the impact of food waste and most underestimate how much food is thrown away. Although consumers are now more attuned than ever to the purity of ingredients, organic, natural and locally grown, most consumers don't really care

about the environmental impacts of food waste. It is estimated that food waste makes up more than 20% of what's in landfills and it is a significant source of methane gas as it rots. (US Environmental Protection Agency/2015). Methane is a potent greenhouse gas that contributes to global warming. The wasted food accounts for about 2% of greenhouse gas emissions, not to mention huge freshwater losses, cropland and fertiliser inefficiencies. (John Hopkins - Public Health, PLOS Journal).

Feeding valuable plant protein to animals with the objective of converting into animal protein - meat, milk and eggs - can be considered as waste to a certain extent. In order to sustain healthy diets for current and future generations, it is essential to capture the abundant nutritional value of plant protein ingredients - such as for example rice bran - that still remains largely wasted.

All these variables make it imperative to put more emphasis on the use of plant protein ingredient solutions, including the use of these proteins to formulate sustainable and healthy foods like meat analogs and formulated meat products. The world can ill-afford to continue business as usual, knowing that about 80 mill. more people will live on planet earth every single year with no decline in sight.

To sum: plant-based nutrition is more sustainable with less

greenhouse gas emissions, less use of clean water, and less ever-expanding land utilisation. Slowly but surely, plant-based foods like meat-free products, will achieve considerable consumer popularity and wellness status (Fig. 5). Hopefully the protein paradigm will shift to increased plant protein formulated foods. Yet, don't make the mistake to rule out meat. Meat is not only a valuable source of high-quality protein but also a universal favorite across most societal cultures and will continue to dominate meal solutions for many years to come.

Although meat and dairy consumption in developing countries will skyrocket, plant protein is the new normal. For the sake of health and eco-sustainability, the developed and affluent world has no other choice.



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China

Seminar attracts 108 participants from 43 companies

More than 100 guests came to GEA's Wuqing factory in China for the Slice & Pack and Homestyle & Bone-in Poultry applications seminar this summer. GEA's seminars have a strong reputation worldwide as an ideal way to gain hands-on experience. This one addressed two distinct groups of customers: processed poultry products producers and producers of sliced and packaged products. To cover this diverse group, two parallel sessions were held. With the product and applications experts from European sites of the company providing



The reactions from attendees were positive and they were already asking for a date for the next seminar.

the applications and equipment expertise, and local personnel providing simultaneous translations, language barriers were easily overcome. As Chinese con-

sumers look beyond their established culinary traditions for ways of preparing food, there is a growing demand for know-how. One such trend is homestyle chicken,

a crispy breaded poultry product that in the past has been difficult to reproduce authentically on an industrial scale.

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