

Future of Meat:

How should New Zealand's Red Meat Sector Respond to Alternative Protein Advancements?

FULL REPORT OF LEARNING



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Re-cap of project purpose

This project is about understanding the *potential* disruption that *could* occur in future *if* demand for red meat were to decline over to time or shift to alternative proteins.

We have three key objectives:

- Better understanding the shifts in food and food production technology that's occurring today
- Identifying threats and opportunities for New Zealand's red meat sector (scenario planning)
- Identifying the types of shifts and activities required to address these threats and opportunities



Contextual learning

The Context: 3 key elements

The Big Picture

- 1) Population growth
- 2) Shifting economic power
- 3) Environmental concerns



The Market

- 1) Growth in white meat
- 2) New markets changing the landscape
- 3) Increased premium sales
- 4) Evolution of alternative protein

The Consumer

- 1) Increase in desire to eat plant based diets
- 2) Red meat negativity
- 3) Red meat becoming more specialised
- 4) Varying acceptance of alternative protein

The Context: The Big Picture

The Big Picture

- 1) Population growth
- 2) Shifting economic power
- 3) Environmental concerns



The Big Picture: The world population is growing at an unprecedented rate, with shifting balances of power

1) Population growth

The world population is predicted to increase by a billion by 2030, leading to big questions around how the world will feed itself. Population growth in sub-Saharan Africa, Asia and India are all expected to cause issues for world food stocks.

The U.N., governments and the private sector are looking for solutions, searching for the next innovation that could help create scalable food production and avoid food and health crises across the globe.

2) Shifting economic power

While the developing markets are predicted to grow substantially in population (primarily in India and Africa), many developed markets' populations are predicted to remain static.

As growth declines in developed markets, the emerging markets will gain more and more economic and political power and influence, along with a new generation of consumers, the Millennials.

In 2009 the FAO from the UN predicted that food production would need to increase by **70%** to feed the world population in 2050*

*How to feed the world in 2050, Food and Agriculture Organisation of the United Nations

According to WHO, chronic disease is expected to rise by **57%** by 2020

*<https://www.pwc.com/gx/en/industries/healthcare/emerging-trends-pwc-healthcare/chronic-diseases.html>

Millennials account for **27%** of the global population, **58%** of which live in Asia

*Where are the Global Millennials, AT Kearney

India's population is expected to increase by **16.5%** by 2030, while Germany is predicted to decrease by **-1.4%***

*World Population Prospects, United Nations

The Big Picture: With this growth comes an increasing focus on environmental issues

3) Environmental concerns

Governments are under pressure to reduce their environmental impact, both from worldwide organizations such as the U.N., as well as from consumers.

Farming has come under considerable scrutiny, with both scientific bodies and celebrities singling out animal production as damaging the environment.

A recent 2017 study into methane claims previous estimates underestimated the methane production of livestock by

11%* suggesting a bigger impact on greenhouse gases from farming than was previously believed

*Revised methane emissions factors and spatially distributed annual carbon fluxes for global livestock, Journal of Carbon Balance and Management, Sept 2017

190
countries

have signed up to the Paris agreement, which requires the reduction and mitigation of greenhouse gases

The Context: The Market

The Market

- 1) Growth in white meat
- 2) New markets changing the landscape
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- 4) Evolution of alternative protein



The Market: A variety of factors are changing the meat industry

1) Growth in white meat

USDA figures show a growth in chicken consumption in the U.S., while pork has recently returned to growth.

A variety of factors lie behind this trend, including cost reductions through vertical integration, low fat (in chicken) and preferences for these meats in developing markets (e.g. Chinese preference for chicken and pork).

Pork increased in trade by **9%** between 2015-2016,
while chicken increased by **5%**
and bovine by **3%***

*OECD/FAO (2017), "Meat", in OECD-FAO Agricultural Outlook 2017-2026, OECD Publishing, Paris

2) New markets changing the landscape

China's increasingly affluent population have driven a significant amount of meat growth, although their low population growth points to this trend slowing.

The Middle East has increased imports of chilled Australian beef, with an increasing appetite for prime cuts, thanks to its affluent middle class.

China's imports of beef are responsible for **69%** of all beef growth over the last 26 years

*Beef Trends, David Widmar, Agricultural Economic Insights

Egypt **doubled** its imports of Australian beef between 2013-2014, while Saudi Arabia increased its imports from **2% to 7%** between 2010 - 2015

*Australian Arab Chamber of Commerce and Industry

3) Increased premium sales

New markets such as the Middle East's consumption of premium meats and a gradual increase in Chinese adoption of Western cuts has led to increased premium imports.

U.S. markets also show a marked rise in purchases of grass-fed beef, with some predicting the organic beef market will double in value by 2027**.

U.S. grass fed sales have **doubled*** year on year although it remains an infrequent purchase (approx. 1-4% of sales)

*Nielsen data, Back To Grass report, Stone Barns Center for Food and Agriculture
** Organic Beef Market segmentation, Future Market Insights

The Market: Alternative protein is rapidly evolving



4) Evolution of alternative protein

The alternative protein market is not a new entrant, having existed in some markets for thousands of years, however recent advances in food technology have created new products. We can define alternative proteins as the following:

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Alternative proteins, such as plant-based protein, cultured meats and edible insects, provide a substantial amount of protein but require less natural resources to produce than the most common protein sources, meat and fish.

These are composed of different sequences of amino acids than conventional meat.

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Alternative Proteins: Key notes

Technology

There are 3 different core approaches to alternative protein:

- Using alternative sources to create products that are indistinguishable from animal products – mixing known ingredients together (e.g. Beyond Burger) or extracting protein at a molecular level and reconstructing a product (e.g. Impossible Burger)
- Culturing meat products using stem cell technology
- Sourcing or farming novel alternatives and using a process to create a protein rich ingredient

Regulation/impact

Products that are made from known ingredients have been quickly and easily approved for safety by the FDA or equivalent. Whereas products that involve heavy processing or a scientific approach are still under evaluation.

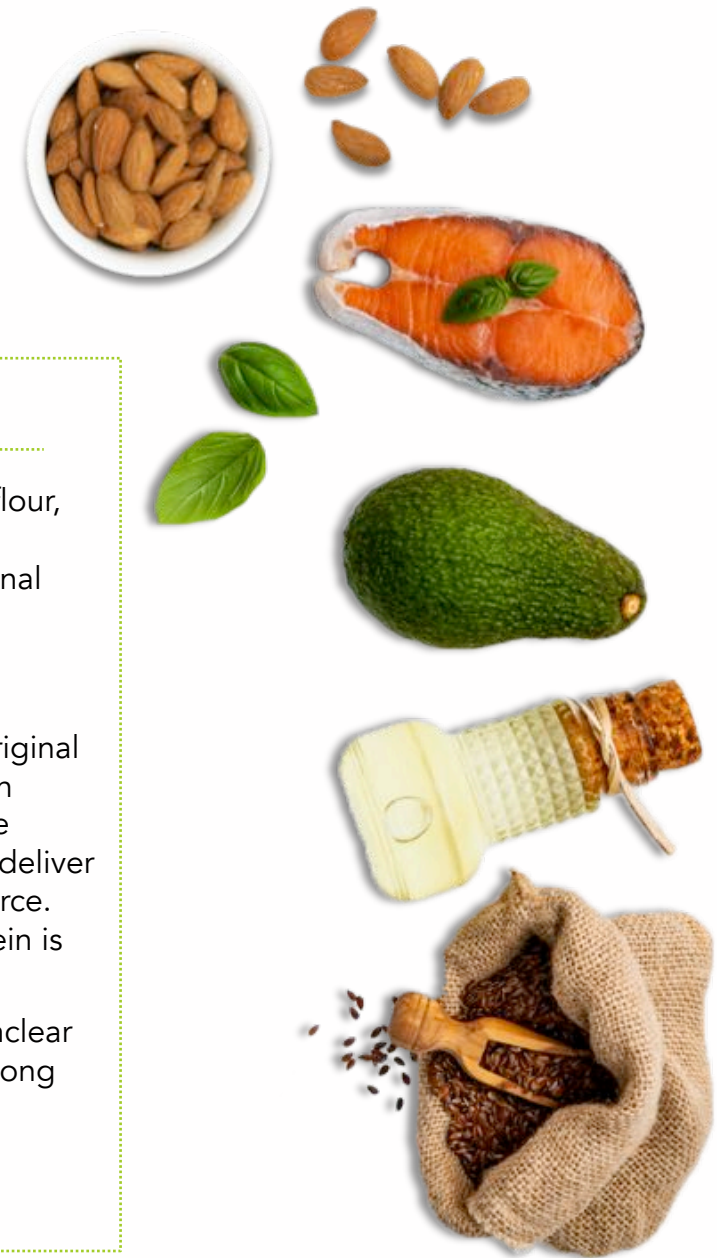
The primary goal of all alternative proteins is to reduce the environmental / climate impact of producing traditional proteins, offering alternative ways to feed the ever growing population.

Nutrition

With the exception of insect flour, the alternative proteins are comparable in overall nutritional value to their animal protein equivalent (insect protein is nutritionally superior).

Nutritionists agree that the original source is the preferred protein source, as they do not believe nature can be synthesized to deliver the same optimal protein source. All also agree that plant protein is a good source to add to diet.

The nutrition community is unclear at this stage of the potential long term effects of consuming alternative protein sources.



Alternative Proteins: Key notes

Scale/cost

All alternative proteins are faced with production scale challenges in order to achieve mass production and distribution. These include operational and product development hurdles as well as availability of ingredients.

Currently all products are premium priced, although all are aggressively seeking ways to reduce the cost of production, with all achieving significant reductions in cost year on year.

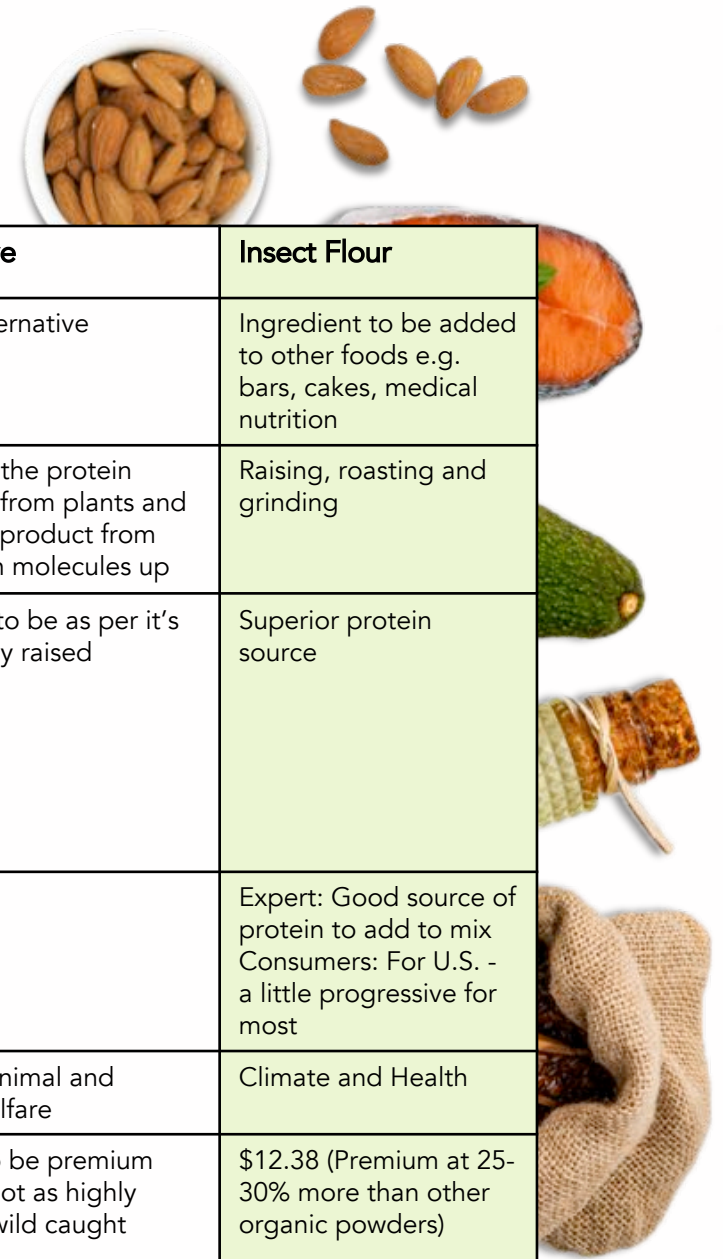
Industry response

The food industry, including grocery and dining, all believe these alternative proteins are in demand and it is only a matter of time before they achieve mass production to facilitate wider distribution and more competitive pricing.

In addition, the casual dining and fast food industry have indicated that once the production is there and when consumer demand hits critical mass, it will not take a lot for them to shift their menus and widely offer these products as alternatives on their menu.



The Market: Current alternative proteins



Brand/Company:	Beyond Burger	Impossible Burger	Memphis Meat	New Wave	Insect Flour
Product Type:	Plant Based Burger (competes with beef burger)	Plant Based Burger (competes with beef burger)	Exploring range of meats, initial focus chicken	Shrimp alternative	Ingredient to be added to other foods e.g. bars, cakes, medical nutrition
Technology:	Mixing known plant based ingredients together to create a beef patty form	Extracting the protein molecules from plants and building a product from the protein molecules up	Cellular based	Extracting the protein molecules from plants and building a product from the protein molecules up	Raising, roasting and grinding
Nutritional Profile:	(4-oz. patty) Calories: 290 Total fat (g): 22 Saturated fat (g): 5 Cholesterol (mg): 0 Sodium (mg): 450 Protein (g): 20 Iron (Daily Value %): 25%	(3-oz. patty) Calories: 220 Total fat (g): 13 Saturated fat (g): 11 Cholesterol (mg): 0 Sodium (mg): 470 Protein (g): 21 Iron (Daily Value %): 10%	Proposed to be as per it's traditionally raised equivalent	Proposed to be as per it's traditionally raised equivalent	Superior protein source
What experts and consumers say about nutrition:	Expert: Good source of protein although not a direct substitute. Consumers: Better than animal protein	Expert: Not as good as real thing due to processing Consumers: Better than animal protein	Expert: Not as good as real thing due to processing Consumers: Full of chemicals or too far out	N/A	Expert: Good source of protein to add to mix Consumers: For U.S. - a little progressive for most
Claimed Benefits:	Climate, Animal Welfare and General Health	Climate	Climate, Animal Welfare	Climate, Animal and Human welfare	Climate and Health
Price:	\$5.99 2 x 4-oz patty	Premium circa \$4 above regular burger price	Not commercially available. Have significantly reduced cost of production at proof of concept stage	Planned to be premium although not as highly priced as wild caught shrimp	\$12.38 (Premium at 25-30% more than other organic powders)

The Context: The Consumer



The Consumer

- 1) Increase in desire to eat plant based diets
- 2) Red meat negativity
- 3) Red meat becoming more specialised
- 4) Varying acceptance of alternative protein

The Consumer: Consumers are changing their eating patterns

1) Increase in desire to eat plant based diets

With plant based diets in-vogue and social media spreading positive messages around plant based foods (plant-based food was named a top trend of 2016), many consumers are considering a shift in eating habits.

Plant based diets are expected to create health benefits, increased energy and are seen as a better ideological fit in terms of sustainability and lower consumption of resources.

Vegan/vegetarian are talked about **more than Coca Cola** in social media, with 4.6 million mentions (vegan/vegetarian) to 4.1 million mentions (Coca Cola)

*Kantar, Exploring Global Meat Trends 2016

As part of this shift, particularly amongst Millennials, there is a growing trend towards 'mindful eating', a more conscious engagement with food.

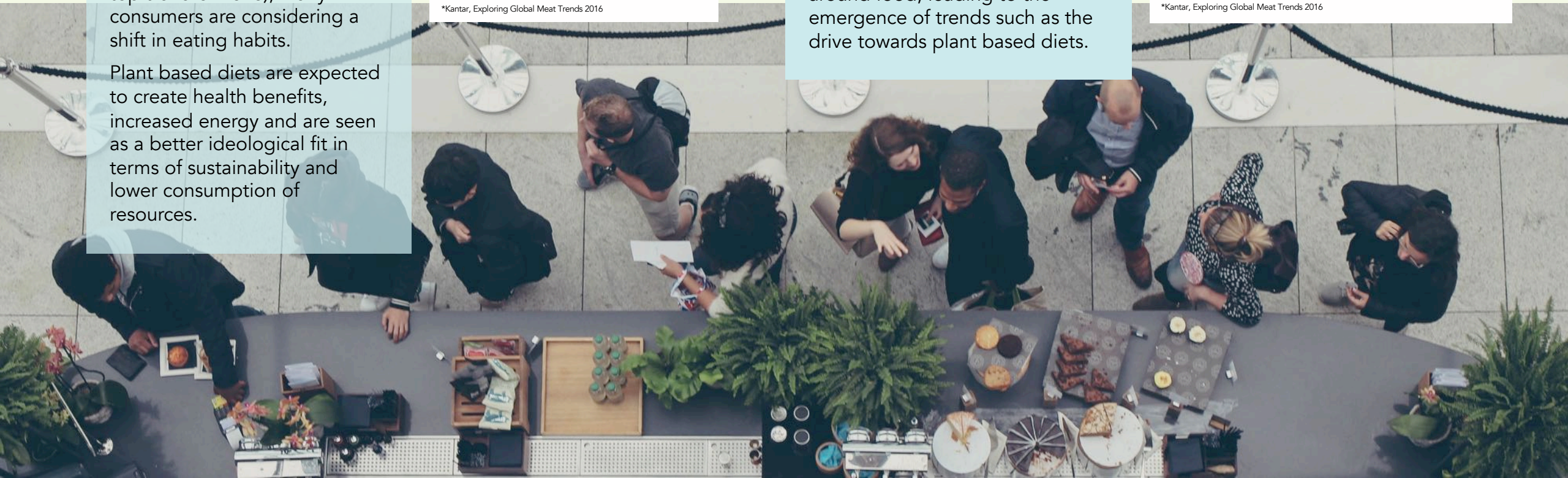
This leads to a greater engagement with messages around food, leading to the emergence of trends such as the drive towards plant based diets.

7.3 million* Americans are vegetarian, an additional 22.8 million are flexitarian

*https://www.washingtonpost.com/lifestyle/wellness/cant-do-vegetarian-how-about-flexitarian/2016/07/07/9d2610aa-3d57-11e6-80bc-d06711fd2125_story.html

55% of U.S. residents plan to eat more plant-based foods this year



*Kantar, Exploring Global Meat Trends 2016



The Consumer: attitudes towards red meat reveal a number of negative perceptions

2) Red meat negativity

From our consumer research across the U.S.A and China we identified a number of emerging views on red meat, with a surprising level of consistency:

THEME	HEALTH	WELFARE	ENVIRONMENT
	<ul style="list-style-type: none"> • Believe it to be a medical fact that red meat is bad for you, carcinogenic and bad for the heart, due to widely shared stats/infographics • Digested slowly leading to lethargy • Full of antibiotics and steroids 	<ul style="list-style-type: none"> • Images and videos have created a view of the red meat industry as dirty and cruel • Low welfare can clash with personal and social values • Concern that poor treatment = unhealthy meat 	<ul style="list-style-type: none"> • A more academic concern, with most aware of the effect on greenhouse gases and a smaller number aware of water and land statistics • Awareness increases as environmental impacts are felt, e.g. the fires in California
	<ul style="list-style-type: none"> • According to Traditional Chinese Medicine, red meat has to be limited • Aware of Western views on red meat's medical risks (carcinogen etc.) • Often eaten for specific health issues 	<ul style="list-style-type: none"> • Lesser concern compared to Western views, although still present • Increasing awareness of welfare via celebrities 	<ul style="list-style-type: none"> • Very conscious of air pollution • However, lower concern compared to the West • Celebrities could increase awareness

58% of British consumers who have reduced red meat consumption cited health concerns as a reason, compared to **20%** for welfare and **11%** for the environment*

*Natcen Survey of British Social Attitudes 2016

The Consumer: various forces are pushing red meat into specialised niches

3) Red meat becoming specialised

In both Eastern and Western markets, the negative views towards red meat are mixing with cultural factors to push red meat into narrower niches. However this comes with benefits, namely clear positions for red meat to own.



- Due to health credential issues, meat is increasingly either seen as a comfort food or an indulgence
- As an indulgence, it is reserved for special occasions, with quality and premium meat a way to ensure the best experience
- As a comfort, it is an integral part of social occasions and heritage, from barbecues to stews








- Due to Traditional Chinese Medicine (TCM), red meat is used for specific purposes, such as for pregnancy, cold physical dispositions or enhancing strength
- These put a natural cap on red meat consumption, as it needs to be limited in other occasions and only used for specific situations
- Beyond TCM, red meat becomes an indulgence in a similar way to the West, saved for special occasions and as part of exploring food experiences

The Consumer: synthesized meat is currently the most positively viewed protein

4) Varying acceptance of alternative proteins

From our consumer research across the U.S.A and China we saw that synthesised meat created universal interest, while other protein sources varied in terms of the consumer response:

SOURCE	SYNTHESISED MEAT 	CULTURED MEAT 	NOVEL PROTEIN 
	<ul style="list-style-type: none"> • See it as a healthier, more sustainable alternative to red meat • Appears to be successful as a substitute for home cooked comfort meals with strong flavours • Less common as an indulgence or for special occasions 	<ul style="list-style-type: none"> • Seen as related to GMO, which creates health concerns • Worried about additives such as steroids, hormones and antibiotics 	<ul style="list-style-type: none"> • See this as more of a curiosity than a genuine alternative to red meat • Aware of consumption outside of the U.S.A but few have experienced it
	<ul style="list-style-type: none"> • Seen to be the most natural alternative to red meat • Intrigued and excited about the possibility • Some concerns around the product experience delivering a meat like experience 	<ul style="list-style-type: none"> • Dislike the idea of something created in a laboratory • Worry about the chemicals involved • Concerns around the long term effects of consumption 	<ul style="list-style-type: none"> • More accepting of the idea of eating insects as a way to get protein, although tend to be specific about varieties (dislike crickets) • Algae is already part of the diet so eating it is not a concern

Forces of disruption

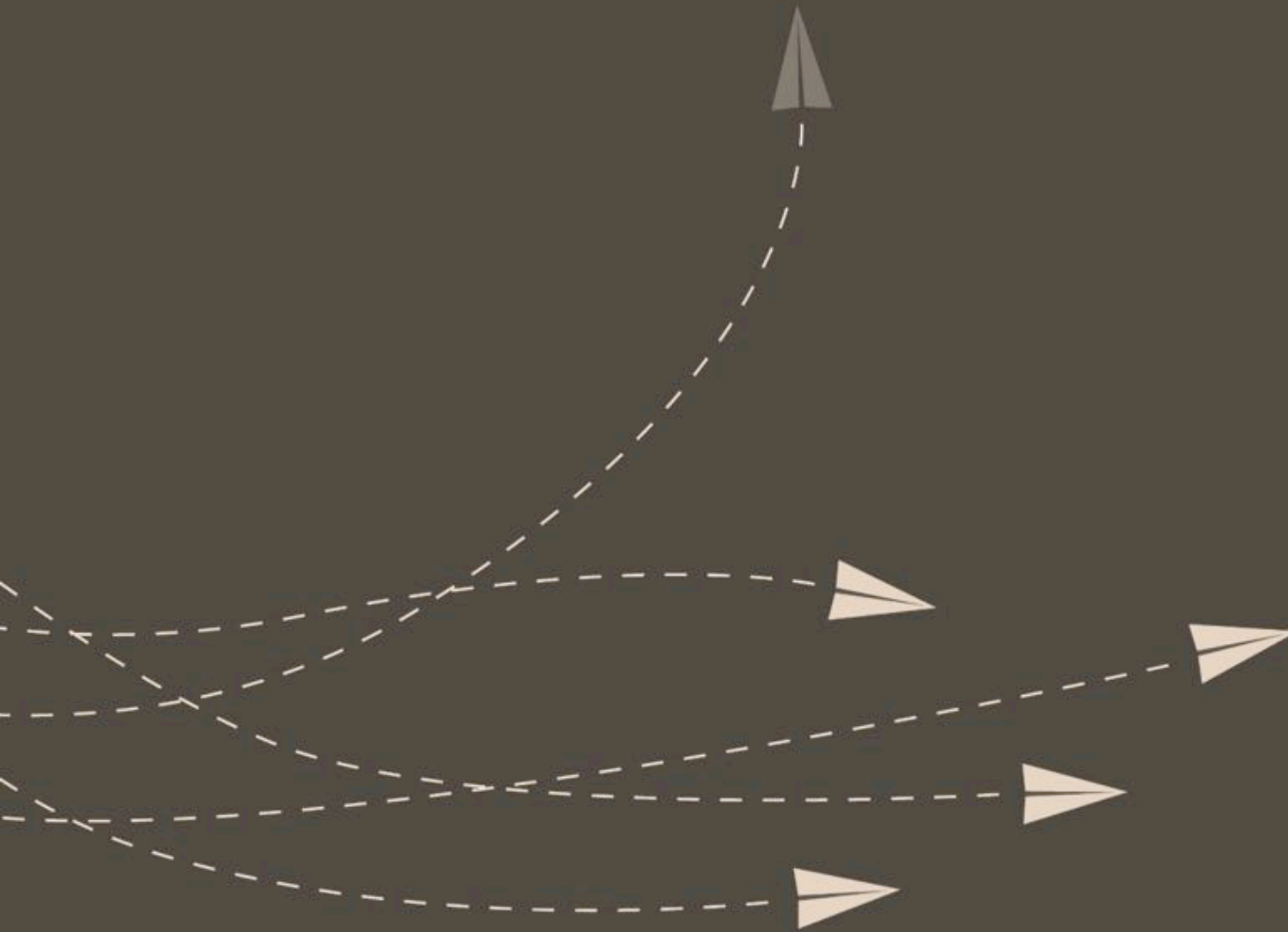


Whenever disruption occurs it is preceded by a series of signals or forces.

These can be quite weak or might even feel like they pass in a flash - so it can be hard to determine if they are really happening or if it is just media hype.

Disruption happens when these signals gain traction, get stronger and all converge at the same time.

At present, we are seeing these weak signals gaining traction and momentum, suggesting they are at the point of converging at the same time - making disruption a possibility.



7 Forces of disruption – an overview

1

Global and Govt. institutions have put the impact of meat consumption on the agenda

2

There is growing support for a plant protein based diet from the medical industry

3

The flow of capital into alternative protein isn't slowing down

4

The technology to produce a consumer ready alternative protein burger is here and is pushing for commercial scale

5

A new set of influencers are creating a new cultural narrative around meat

6

Millennials eating patterns are reshaping the food industry

7

The market is responding to consumer demand for new products and services

1

Global and Government institutions have put the impact of meat consumption on the agenda

As always progress will be slow, however, the conversation has started and they are beginning to take action to reduce the consumption of meat and address economic concerns.



Governments have started to respond to the data showcasing the impact of meat consumption on the climate

Last month, *FoodIngredientsFirst* reported a political stir in Germany after environment ministers went ahead with their decision to ban meat and fish from official functions, due to its potential environmental impact. Germany's infamous sausages and traditionally meat-heavy food options were nowhere to be seen at a recent buffet as part of the German government's "exporting green technology" symposium.

A whopping 30% of Earth's landmass goes to meat, dairy, and egg production, according to the United Nations. As the UN also reports, livestock production causes "an even larger contribution" to climate change "than the transportation sector worldwide".

As the global population surges towards a predicted 9.1 billion people by 2050, western tastes for diets rich in meat and dairy products are unsustainable, says the report from United Nations Environment Programme's (UNEP) international panel of sustainable resource management.

"UN urges global move to meat and dairy-free diet"

<https://www.theguardian.com/environment/2010/jun/02/un-report-meat-free-diet>

"Meat Tax. Denmark considers a tax on red meat to fight climate change"

<https://www.theguardian.com/world/2016/jun/20/chinas-meat-consumption-climate-change>

"China's plan to cut meat consumption by 50% cheered by climate campaigners"

<https://www.riseofthevegan.com/blog/denmark-considers-a-tax-on-red-meat-to-fight-climate-change>

Governments also have an economic case

Veggie-based diets could save 8 million lives by 2050 and cut global warming

A global switch to diets that rely less on meat and more on fruit and vegetables could save up to 8 million lives by 2050, reduce greenhouse gas emissions by two thirds, and lead to healthcare-related savings. It could also avoid climate-related damages of \$1.5 trillion (U.S.), Oxford Martin School researchers have found.

In a study published last week in the *Proceedings of the National Academy of Sciences*, Marco Springmann and his colleagues at the University of Oxford conservatively estimate that if people continue to follow current trends of meat consumption, rather than shifting to a more balanced or plant-based diet, it could cost the U.S. between \$197 billion and \$289 billion each year—and the global economy up to \$1.6 trillion—by 2050.

“The economic case for worldwide vegetarianism”
Not curbing its taste for meat could cost the U.S almost \$200 billion each year – and the global economy up to \$1.6 trillion.

<https://www.theatlantic.com/business/archive/2016/03/the-economic-case-for-worldwide-vegetarianism/475524/>

“France ploughs billions into ‘intelligent’ proteins – seeks global leadership by 2030”

<https://www.foodnavigator.com/Article/2016/10/17/France-ploughs-billions-into-intelligent-proteins-seeks-global-leadership-by-2030#>

Governments are reviewing dietary guidelines and questioning new evidence about the benefits of meat

The most recent dietary guidelines in the U.S. did not suggest reducing red meat. Instead, the guidelines emphasize a "shift towards other protein foods" — including more nuts and seeds and about 8 ounces of seafood per week, based on a 2,000-calorie-a-day diet.

The suggestion to limit meat intake comes in a more subtle form. For instance, the guidelines point out that many teen boys and adult men consume more than the recommended 26 ounces a week of protein from animal sources, so they should "reduce overall intake of protein foods by decreasing intakes of meat, poultry, and eggs."

Dariush Mozaffarian, dean of Tufts University's Friedman School of Nutrition Science and Policy, points out that although different studies of meat show different results, the range of those results is actually quite narrow. "If you look at every possible study with every population around the world, you see that meat-eating is neutral or is associated with slight harm," he says. "I've never seen a benefit."

The Netherlands Nutrition Centre says it is recommending people eat just two servings of meat a week, setting an explicit limit on meat consumption for the first time.



"New dietary guidelines crack down on sugar. But red meat gets a pass"

<https://www.npr.org/templates/transcript/transcript.php?storyId=462160303>

"The Netherlands' new dietary guidelines take meat off the menu"

<https://thinkprogress.org/the-netherlands-new-dietary-guidelines-take-meat-off-the-menu-a97c40f05d84/>

"Government advisers to recommended lower meat consumption"

Britons will be told this week to limit their red meat consumption to the equivalent of a large pack of mince a week for the sake of their health..

<http://www.telegraph.co.uk/news/health/news/8336628/Government-advisers-to-recommended-lower-meat-consumption.html>

Key takeaways and why we should care

As always progress will be slow, however, the conversation has started and governments are beginning to take action to reduce the consumption of meat and address economic concerns.

- ✓ Global meat consumption is being questioned and challenged
- ✓ Governments around the world are beginning to take action to protect their economic interests
- ✓ Regulatory measures are likely to be the core source of leverage by governments around the globe



The actions of these individual countries will eventually impact global imports and meat consumption

“ The FDA and USDA will approve these new proteins, we will have to. We have a responsibility to provide food for the American people, to make sure it is available - plus we have a job to create a market for agribusiness both here and abroad.

-Expert Interview, Gov't

2

There is growing support for a plant protein based diet from the medical industry

The medical community is starting to pit red meat against plant protein in new studies, the health care industry is suggesting patients eat less meat, and the mainstream health & wellness industry is starting to recommend plant-based diets.



The international medical community are currently building a case against red meat and for plant protein



BMJ
British Medical Journal

People who ate the most red meat were **26 percent more likely to die** of nine diseases than those who consume the least. An increased risk of mortality and death due to nine different causes associated with red meat intake was observed. (Cancer, heart disease, stroke, diabetes, respiratory infections)

MGH Massachusetts General Hospital
JAMA The Journal of the American Medical Association

Where protein comes from is as important as how much protein people get. The largest study of its kind to examine the effects of different sources of dietary protein found that a high intake of protein from animal sources, particularly processed and unprocessed red meats, was associated with a higher death rate. This was compared with a high intake of vegetarian protein from plant sources, which was associated with a lower risk of mortality.

JGIM
Journal of General Internal Medicine

Plant protein may help you live longer. High animal protein intake was positively associated with cardiovascular mortality and high plant protein intake was inversely associated with all-cause and cardiovascular mortality.

ACC American College of Cardiology
MC Mayo Clinic

Plant based diets better for heart health. Epidemiological studies and Randomised Control Studies indicate that plant-based diets are associated with improvement in atherosclerotic cardiovascular disease (ASCVD) risk factors and a decreased risk of ASCVD.

The science against Meat: A look at 5 key studies about cancer risk

<https://www.washingtonpost.com/news/to-your-health/wp/2015/10/27/the-science-against-meat-a-look-at-5-key-studies-about-cancer-risk/>

Limit Animal Products from Diet. Physicians should encourage patients to limit animal products when possible, and substitute red meat and processed red meat with plant-based foods. Patients may supplement a plant-based diet with moderate amounts of fish, poultry, eggs, and dairy if desired.

The healthcare industry is recommending less meat to patients



KP

Kaiser Permanente

Doctors, nurses, and other staff are learning about plant-powered eating so they can pass along the information to their patients. Some of the medical staff are even adopting plant-powered diets long-term.

In 2013, Kaiser Permanente published a nutritional update for physicians, which advised doctors to **recommend plant-based diets, "to all their patients,** especially those with high blood pressure, diabetes, cardiovascular disease, or obesity." *Kaiser Permanente, the largest healthcare organization in the U.S.*

ACS

American Cancer Society

A number of mainstream medical groups now endorse vegetarian diets (or vegetarian-ish), including the American Cancer Society, the American Institute for Cancer Research, the Academy of Nutrition and Dietetics. In 2014, the American College of Cardiology elected its first ever vegan president, Dr. Kim A. Williams.

AICR

American Institute for Cancer Research

AMA

American Medical Association

AMA recommends hospitals shift to plant-based meals. The American Medical Association (AMA) said in a statement last month that the nation's hospitals and physicians [should] take their patients' best interests to heart by **shifting hospital food menus to focus on plant-based meals,** as well as the elimination of processed meats, foods with added sugars and excess sodium and fat.

Morrison Healthcare at Mayo Clinic Phoenix Brings Meatless Monday to their cafeteria

<http://www.meatlessmonday.com/articles/morrison-healthcare-mayo-clinic-phoenix/>

In August 2017 Morrison Healthcare implemented Meatless Monday in their three cafeterias.



Dr. James Loomis, an internist who directs the Barnard Medical Center in Washington, D.C., says that over the past few years he has noticed a **growing willingness among his colleagues to prescribe vegan and vegetarian diets to patients** "I am being invited to speak about this at mainstream medical conferences about diabetes and heart diseases," he said. "That never would have happened five years ago." He said that when he attended the first International Plant Based Healthcare Nutrition Conference five years ago, about 250 people showed up. This year, the group expects attendance to exceed 1,000.

The mainstream health and wellness industry is pushing a narrative on the benefits of plant based diets

Doctors are starting to talk about having too much protein in our diets.



Dr Oz: The Vegan Diet is "The single biggest movement of 2017"

<https://www.plantbasednews.org/post/dr-oz-the-vegan-diet-is-the-single-biggest-movement-of-2017>

Science-based mainstream experts like Bill Nye are confirming the benefits of plant-based.

Plant-based diets are the future. I look forward to food preparations that are not "derivative bits," as we say in comedy writing. I look forward to the emergence of new plant-based dishes.

- VIA Ask me Anything on Reddit



A new documentary called "Eating You Alive" claims you could reverse chronic health problems such as heart disease, diabetes and obesity by eating plant-based, whole foods.



Eating You Alive' trumpets a plant-based solution to America's Health crisis

https://www.reporter-times.com/news/schools/eating-you-alive-documentary-advocates-for-plant-based-diet/image_2b4b3939-d229-5504-951f-a31874c1018c.html

The Texas firefighter's 28-day save-your-life plan that lowers cholesterol and burns away the pounds is a plant-based diet.



Whole Foods carries an entire line of plant-based products based on the diet.

Tech is advancing and providing individual healthcare data putting the patient in control



Researchers are developing new tools to help track nutrients in meat

We need to know how much energy and nutrients are being provided by our food. To help do this, we developed myfood24, an online dietary assessment tool that can support accurate, detailed recording of food and nutrient intake by researchers.



The Pittsburgh Health Data Alliance is one of many new partnerships to use big data to provide personalized healthcare and nutrition plans

PHDA aims to take data from various sources (such as medical and insurance records, wearable sensors, genetic data and even social media use) to draw a comprehensive picture of the patient as an individual, in order to offer a tailored healthcare package.



Wearable Tech is allowing people to send real-time data to their doctors for personalized nutrition plans

Wearable blood pressure monitors send data to a smartphone app, then off to the doctor.



Key takeaways and why we should care



The medical community is starting to pit red meat against plant protein in new studies, the health care industry is suggesting patients eat less meat, and the mainstream health & wellness industry is starting to recommend plant-based diets.

- ✓ Data from the international medical community is highlighting the risks of red meat, while promoting the benefits of plant based protein
- ✓ The healthcare industry is promoting less red meat through their nutritional guidelines
- ✓ Personalised data collecting is increasing and getting more sophisticated
- ✓ The mainstream health and wellness industry is actively promoting plant based diets



Plant based diets are gaining momentum and going mainstream as reputable sources of medical information and health data are promoting a diet of less meat and more plant protein.

“ *There is a pretty good percentage of the population, and by all accounts that appears to be growing, of people who would rather not eat meat if they can help it. It's a consumer we don't want to lose, even for a burger chain.*

-Expert Interview, QSR industry



3

There is a steady flow of investment capital

Big Foods, VC's and Investors are increasing both the size and speed of their investment in alternative protein - helping ensure it will only be a matter of time before further technical breakthroughs along mass production and scale is achieved.



Investors are pouring money into food tech and increasing their investment in alternative protein



The US food tech scene shows no sign of slowing down as food startups raise over \$750M year-to-date.

<https://www.thegrocer.co.uk/people/entrepreneurs/startup-boom-in-food-and-grocery-shows-no-sign-of-slowng-down/559404.article>

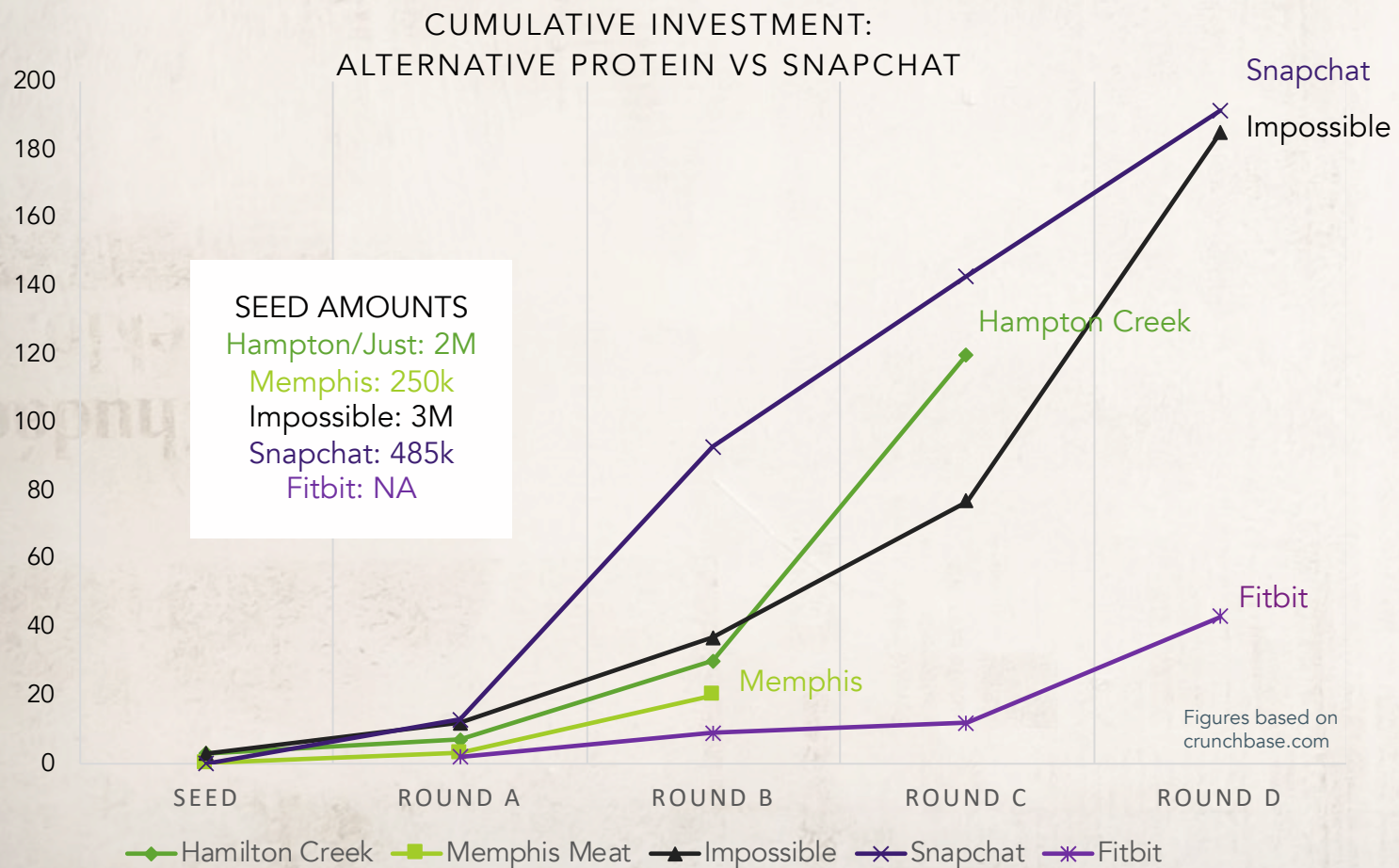
In a recent speech on 'moonshot' technologies, Google's Eric Schmidt cited cultured meat as 2017's no. 1 tech trend, ahead of 3D printing and self-driving cars. [and Bill Gates supports it too]

Startups in seafood and aquaculture technology raised \$193 million in 2016, a 271% increase on the \$52 million raised across both 2014 and 2015, according to AgFunder research.

Startups in this space fed on \$4.6 billion in funding in 2015, almost double the \$2.4 billion that poured in the year before, according to a report by AgFunder.

Over the past two years (2016-2017), Crunchbase has identified about \$250 million in disclosed investments in what we call the alternative protein space.

The trend in alternative protein start-ups is to "keep investing" - suggesting key milestones are being hit & investor confidence is growing



Investment in alternative protein closely follows the trajectory of major successful innovations such as Snapchat and exceeds some, for example Fitbit.

Investors include: Google Ventures, Khosla Ventures, Viking Global Investors, UBS,[28] Hong Kong billionaire Li Ka-shing's Horizons Ventures, Bill Gates and most recently Richard Branson.

BEYOND MEAT

Raised \$17M at seed with all funding rounds undisclosed amounts

EXO

Raised nearly \$6M in seed and series A financing in under 2 years

Big foods are investing in food start-ups and alternative protein as they strive to stay relevant, reduce M&A costs and respond to investor pressures



Danone

Danone's \$10.4 billion purchase of plant-based dairy producer WhiteWave Foods earlier this year [2017].

Tyson

As well as owning a 5% stake in the plant-based protein start-up Beyond Meat, the food-giant also launched a venture capital fund worth \$150 million to invest in startups, with a stated goal to target startups that are developing alternative proteins or innovative food manufacturing processes.

Campbells

Campbell Soup announced that it is launching a \$125 million venture capital fund to invest in food startups.

General Mills

A relationship with General Mills' 301 could help expand distribution, most notably to traditional grocery stores. 301 also thinks that the brand could expand into other food categories beyond protein bars and nut butter.

Farm Animal Investment Risk & Return

A coalition of 40 investment companies behind 16 of the world's largest food companies is pushing for them to switch from meat to plant-based proteins, citing environmental and health concerns over factory farming.

"Cargill invests in startup that grows 'Clean Meat' from cells"

<https://www.wsj.com/articles/cargill-backs-cell-culture-meat-1503486002>

"Investors worth trillions are putting pressure on food companies to serve more fake meat"

<http://www.businessinsider.com/fairr-jeremy-coller-animal-welfare-2017-5>

Current indicators suggest growth in alternative protein will continue



“Investors are actually lining up spontaneously so that we don’t have to go out and ask for funding — people are actually offering it.” (Mosa Meats CEO)

“The first shipment of Beyond Meat burger—packages of two quarter-pounder plant-based patties—was put on display alongside fresh meat products at the Boulder Whole Foods store on a Thursday in May 2016. By 6pm every package was sold. ” [Whole Foods CO]

“The whole non-meat industry, I think it’s going to continue to grow,” [Rich (VP) of Whole Foods]

IMPOSSIBLE

Is this the beginning of the end of meat?

https://www.washingtonpost.com/news/wonk/wp/2017/03/17/is-this-the-beginning-of-the-end-of-meat/?utm_term=.3461cd3aefbd

The impossible burger factory is open for business

<https://newfoodeconomy.org/the-impossible-burger-factory-is-open-for-business/>

Oakland: ‘Impossible’ meatless burgers ramp up production at new facility

<https://www.eastbaytimes.com/2017/03/23/oakland-impossible-meatless-burgers-ramp-up-production-at-new-facility/>

Impossible foods scale up production to supply 1 million vegan burgers every week!!

<https://www.livekindly.co/impossible-burger-vegan-factory/>

BEYOND BURGER

Beyond Burger Expands to Nearly 500 TGI Fridays

<http://vegnews.com/articles/page.do?pagelId=10441&catId=1>

Beyond Meat expands to new El Segundo lab, where it hopes to concoct plant-based bacon and steak

<http://www.latimes.com/business/technology/la-fi-tn-beyond-meat-20180131-story.html>

The Beyond Burger Is Coming to the UK in 2018!

<http://www.onegreenplanet.org/news/beyond-burger-expands-to-uk/>

Beyond Burger gains popularity and expands to 280 Safeway stores

<https://abasto.com/en/news/beyond-burger-expands-to-safeway/>

Where’s the beef?The market for alternative-protein products

Plant-based “meat” products have made it onto menus and supermarket shelves

<https://www.economist.com/news/business/21716076-plant-based-meat-products-have-made-it-menus-and-supermarket-shelves-market>

Key takeaways and why we should care



Big Foods, VC's and Investors are increasing the size and speed of their investment in alternative protein, while pushing for further technical breakthroughs and mass production scale.

- ✓ Investment dollars are present and on the increase
- ✓ The investors are powerful and influential
- ✓ Big foods have a vested interest and bring their infrastructure and expertise in building brands and getting products to market



The convergence of all these investors means the potential upside has become too valuable to ignore

“ At some point in the near future, filet mignon as a cylinder of beef can be grown in that shape, it could be 3D printed in that shape or a combination.

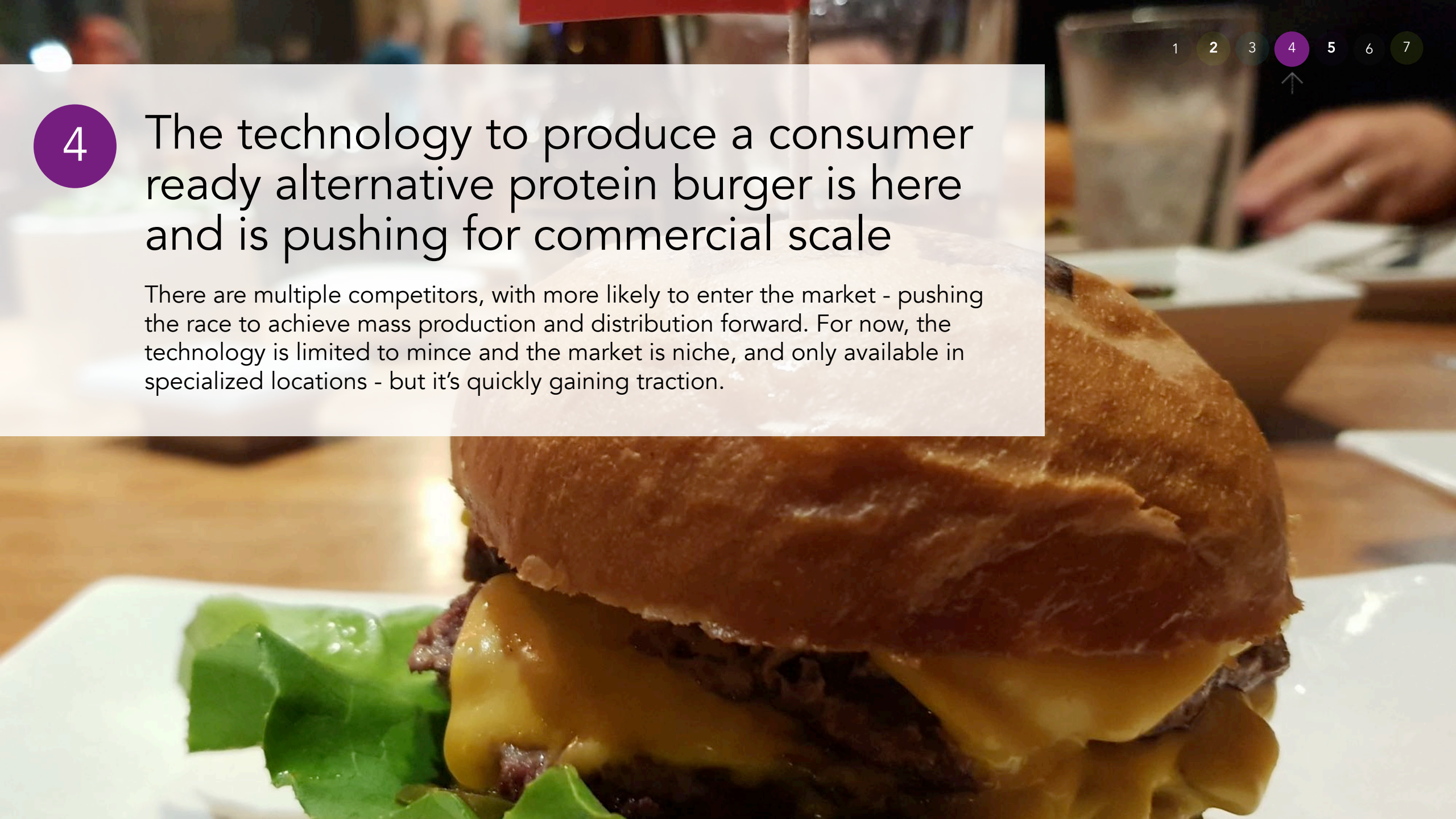
-Expert Interview,
Alternative Proteins



4

The technology to produce a consumer ready alternative protein burger is here and is pushing for commercial scale

There are multiple competitors, with more likely to enter the market - pushing the race to achieve mass production and distribution forward. For now, the technology is limited to mince and the market is niche, and only available in specialized locations - but it's quickly gaining traction.



There are currently three core approaches driving development in alternative proteins...



SYNTHESISED MEAT

Using alternative sources to create products that are indistinguishable from animal products. Within this there are two core approaches - mixing plants together to create a product or extracting the protein molecules from plants and then building a product from the protein molecules up.

Uses a molecule called heme that's found in plants and animals and carries oxygen through the bloodstream (and in plants, through the mechanisms that produce energy). Heme makes your blood red, turns meat pink, and gives the traditional burger its slightly metallic flavor and delicious aroma.



CULTURED MEAT

Culturing meat products using stem cell technology.

The process of developing a lab burger starts with extracting stem cells from cow muscle tissue, which are then cultured with nutrients and growth-inducing chemicals for them to multiply.



NOVEL ALTERNATIVES

Sourcing or farming novel alternatives and using a process to create a protein rich ingredient.

Crickets are farmed, roasted and ground into a fine powder.

Alternatively a standard industrial fermentation process is used to grow algae, and after fermentation the ingredients are washed, dried and milled into a soft, fine powder.

... it is likely that more will follow as the technology fragments, additional novel sources are discovered and hybrids are created

Sprouted brown rice

Seaweed

Algae

Pea Plant



Moringa Plant

Duckweed

Sachi Inchi

Shitake Mushrooms



Alternative protein landscape expected to diversify in coming decades, with consumption expected to rise to 300 million tonnes by 2054

- Lux Research

To see how Impossible mix Heme and plant protein, go to <https://www.impossiblefoods.com/burger/>

Each approach has made substantial leaps in technical development as well as commercial and consumer acceptance



The product sensory has dramatically improved, is being accepted by consumers, and is predicted to continue to improve.



Bloody and red, and it cooks and tastes like an actual beef patty

Synthesised meat foods are **currently** available with limited distribution in both mainstream and high-end restaurants and grocery stores in the US.



The cost of producing cellular meat has fallen dramatically making the possibility of a commercially viable product more likely. Lab grown meat prices have dropped 30,000 times in less than four years.



“A pound of meat for less than \$2,400, down from \$18,000 last year”
Uma Valeti CEO Memphis Meat

Cost of Lab-Grown Burger Patty Drops From \$325,000 to \$11.36

And while each approach has hurdles to jump, they are actively and aggressively addressing barriers to growth and consumer acceptance



For the second year, the James Beard Foundation partnered with the Mushroom Council in the US on the Blended Burger Project, challenging chefs to come up with burgers made of 25% mushroom content.



"You'll eat bugs. These investors are betting millions on it"

<https://www.wired.com/2016/03/investors-bet-millions-wont-balk-eating-bugs/>

You Tube videos using analogs to make the science appear more natural
<https://www.youtube.com/watch?v=DgdFjy1DTjA>

"Why Pepsi's CEO believes that bugs are the protein of the future"

<https://www.forbes.com/forbes/welcome/?toURL=https://www.forbes.com/sites/christinatroitino/2016/10/31/why-pepsis-ceo-believes-that-bugs-are-the-protein-of-the-future/&refURL=https://www.google.com/&referrer=https://www.google.com/>

"Lab-grown meat is in your future, and it may be healthier than the real stuff"

https://www.washingtonpost.com/national/health-science/lab-grown-meat-is-in-your-future-and-it-may-be-healthier-than-the-real-stuff/2016/05/02/aa893f34-e630-11e5-a6f3-21ccdbc5f74e_story.html?utm_term=.7568fd61eb7c

"Edible insects have a huge culinary potential that we are only beginning to explore in the West"

<https://www.eater.com/2015/12/17/10236112/eating-insects-cricket-flour>

While the technology is advancing, it won't reach scale in the immediate future



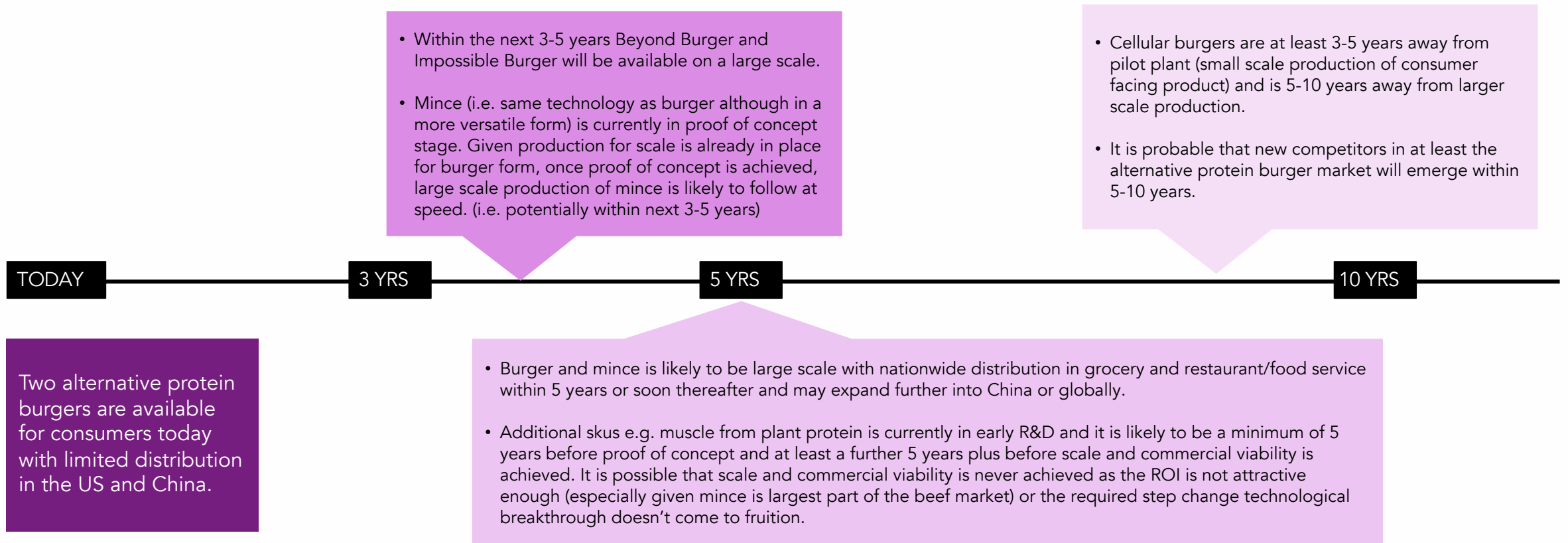
The following is an estimated timeline for the potential evolution of **beef** alternative protein technologies. Changes in financial investment, regulations or technology advancements (or setbacks) will effect estimates.

	TODAY	3 YRS	5 YRS	10 YRS	20 + YRS
BEYOND MEAT	<p>Small scale production with limited distribution in Grocery and regional distribution in Casual Dining</p> <p>Limited availability in China (HK)</p>	<p>Full scale production with greater regional distribution grocery & casual dining</p> <p>Increased availability in China</p>	<p>Increase in production facilities with potential for national distribution in grocery & casual dining</p> <p>Potential for next generation skus</p> <p>Potential for further global expansion and non U.S. production facilities</p>		<p>Potential for next generation production</p>
IMPOSSIBLE	<p>Pilot plant production with limited distribution in casual & showcase dining</p>	<p>Full scale production with extended distribution casual dining & food services</p> <p>Potentially grocery (dependent on R&D sensory development of behaviour in fridge)</p>	<p>Multiple production facilities with potential for national distribution in grocery & casual dining</p> <p>Potential for next generation skus</p>		<p>Potential for next generation production</p>
CELLULAR	<p>Proof of concept</p>		<p>Pilot plant</p>		<p>Commercial potential</p>

When we put these advances together, we see a rapidly changing future



The following is an estimated timeline for the potential evolution of **beef** alternative protein technologies. Changes in financial investment, regulations or technology advancements (or setbacks) will effect estimates.



Key takeaways and why we should care



The technology to produce a consumer ready alternative protein burger is here and is pushing for commercial scale

There are multiple competitors, with more likely to enter the market, pushing the race to achieve mass production and distribution forward. For now, the technology is limited to mince and the market is niche, available only in specialized locations, but it's quickly gaining traction.

- ✓ An alternative protein beef burger with consumer accepted sensory experience is here and will get better
- ✓ Mass commercial scale for the alternative protein burgers is still to be achieved
- ✓ Technology fragmentation has started and will continue
- ✓ The tech has not moved beyond mince, but there is a strong effort to innovate the product quickly



Alternative protein technologies are likely to further disrupt the protein category and encroach on the red meat market

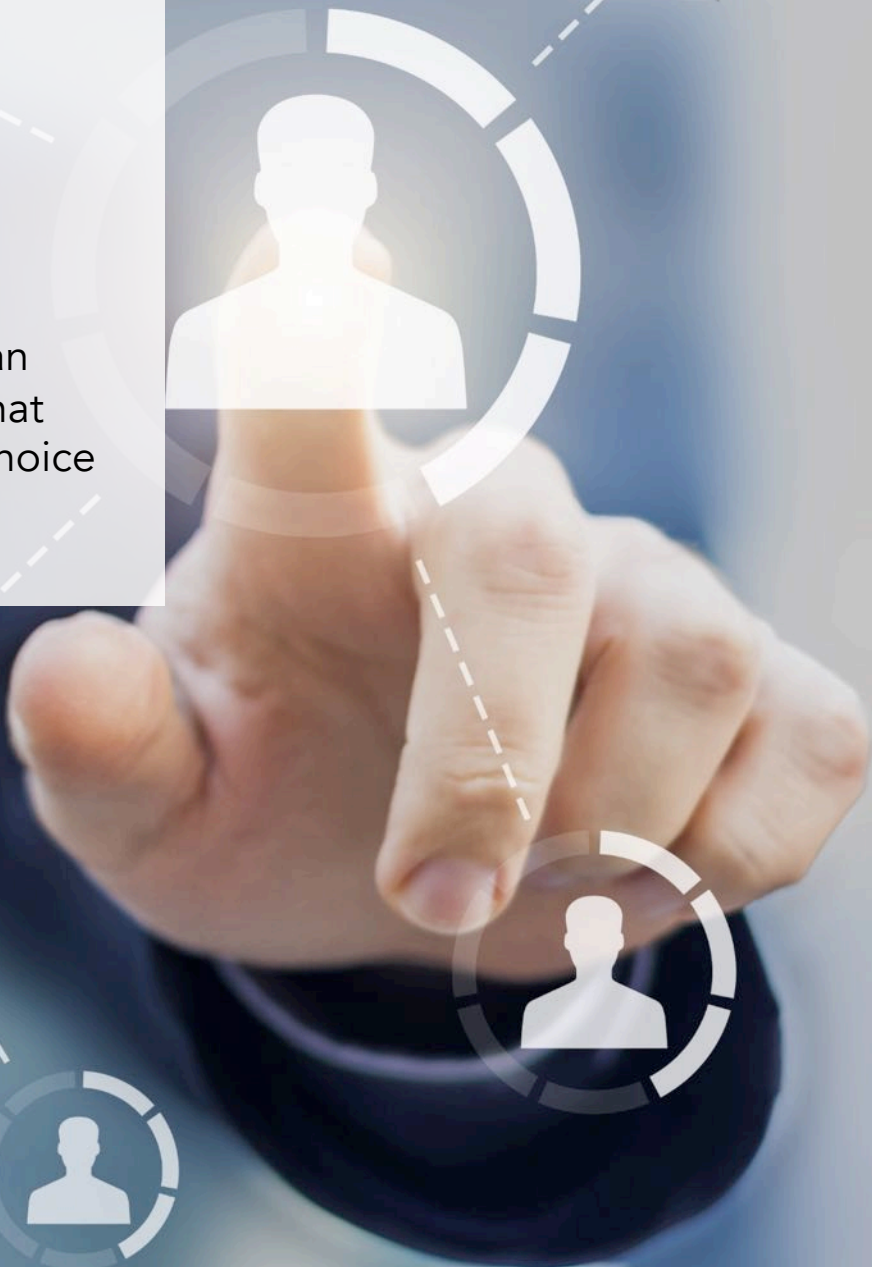
“As a scientific challenge [making muscle] this is very appealing, very challenging, something we want to figure out how to do, the other [making mince] is the kids pool. Anyone with a mixing bowl could've made mince, whereas this other piece - we definitely want to solve it!

-Expert Interview, Alternative Proteins

5

A new set of influencers are creating a new cultural narrative around meat

What used to be a small, niche movement to abandon meat (based on an ethics) has become a cultural narrative lead by mainstream influencers that pushes the reduction of red meat as a mindful, health-forward lifestyle choice rooted in building energy, power and performance benefits.



Professional athletes have started advocating for the performance and health benefits of a plant based diet



Forest Green Rovers, the first vegan British football team



Vegan athletes dominated the 2017 Naturally Fit games, vegan athletes won 32 medals across a range of sports including bodybuilding, crossfit, olympic weightlifting, kettlebell and powerlifting



David Haye, professional boxer, has moved to a plant based diet



New Zealand body builder and former Mr New Zealand Dusan Dudas has a community dedicated to building muscle and being fit via a vegan lifestyle



The Williams sisters combine a raw diet with veganism while in training, to boost performance



David Carter NFL defensive lineman went vegan after learning that animal protein caused inflammation in his joints. He adopted the mentality that food was his medication and went completely plant protein



Carl Lewis, olympic runner, has moved to vegetarianism and now is vegan



Rich roll is a vegan ultra-athlete

Pop culture is driving awareness, reshaping the conversation and highlighting health and sustainability issues



James Cameron's new documentary will introduce "elite athletes, special ops soldiers, visionary scientists...We're trying to dispel the myth that you need protein from animals to become a real man."



Netflix documentary What The Health pushes the conversation about meat into health



BBC Film, Carnage uses irony to present a new way to think about veganism



Plant-based bloggers like Delicious Ella promotes healthy living through plant-based recipes



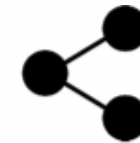
In 2016, Animal Equality launched their **iAnimal virtual reality films** showing the horrors of animal farming



Veganuary encouraged people to go vegan for the month of January



Celebrity Chef Jaime Oliver is vocal about promoting meat-free week's to promote better health



Social Media is allowing amateurs to have influence
The video "Dairy is Scary" by Erin Janus has amassed over 1.6 million views, showing how the dairy industry operates

Aspirational influencers are making the conversation cool and creating followers



"Pigs in tiny crates suffer beyond anything most of us can imagine... these extremely social and intelligent animals lose their minds from being denied any social or psychological stimulation at all."

Ryan Gosling

<https://www.theglobeandmail.com/opinion/a-tiny-cage-is-not-a-life/article13117337/>

"When a child kills an animal for fun, we fear mental illness. When an adult with the capacity to reason does it, we call it "sport"."

Seth MacFarlane

Seth MacFarlane -
<https://twitter.com/sethmacfarlane/status/627269286873034752?lang=en>

"I feel great. I have a lot more energy than I used to have. I sleep better. I like the way I look in my clothes better. I don't cramp as much. I exercise better. I think my circulation has gotten better."

Samuel L Jackson

- <http://www.ecorazzi.com/2014/04/14/exclusive-samuel-l-jackson-touts-benefits-of-eating-vegan/>

"I don't see why someone should lose their life just so you can have a snack"

Russell Brand

<http://inourishgently.com/watch-why-im-vegan-and-how-you-can-be-too/>

"The future of meat is vegan"

Bill gates

<http://www.animalequality.net/news/485/bill-gates-future-meat-vegan>

Russell Simmons has a new book

The Happy Vegan

Russell Simmons

"(For my) own health, and after all the information I gathered about the mistreatment of animals, I couldn't continue to eat meat."

Liam Hemsworth

<https://www.mensfitness.com/life/entertainment/liam-hemsworth-force-nature>

Key takeaways and why we should care



A new set of influencers are creating a new cultural narrative around meat

What used to be a small, niche movement to abandon meat (based on an ethic) has become a cultural narrative lead by mainstream influencers that pushes the reduction of red meat as a mindful, health-forward lifestyle choice rooted in building energy, power and performance.

- ✓ A range of influencers are making plant-based diets aspirational
- ✓ Athletes are pushing the performance benefits of plant protein diets
- ✓ Cultural influencers are moving the conversation from being about animal ethnics alone into a mainstream dialogue about health benefits and sustainability
- ✓ Aspirational influencers are making this conversation cool and creating followers



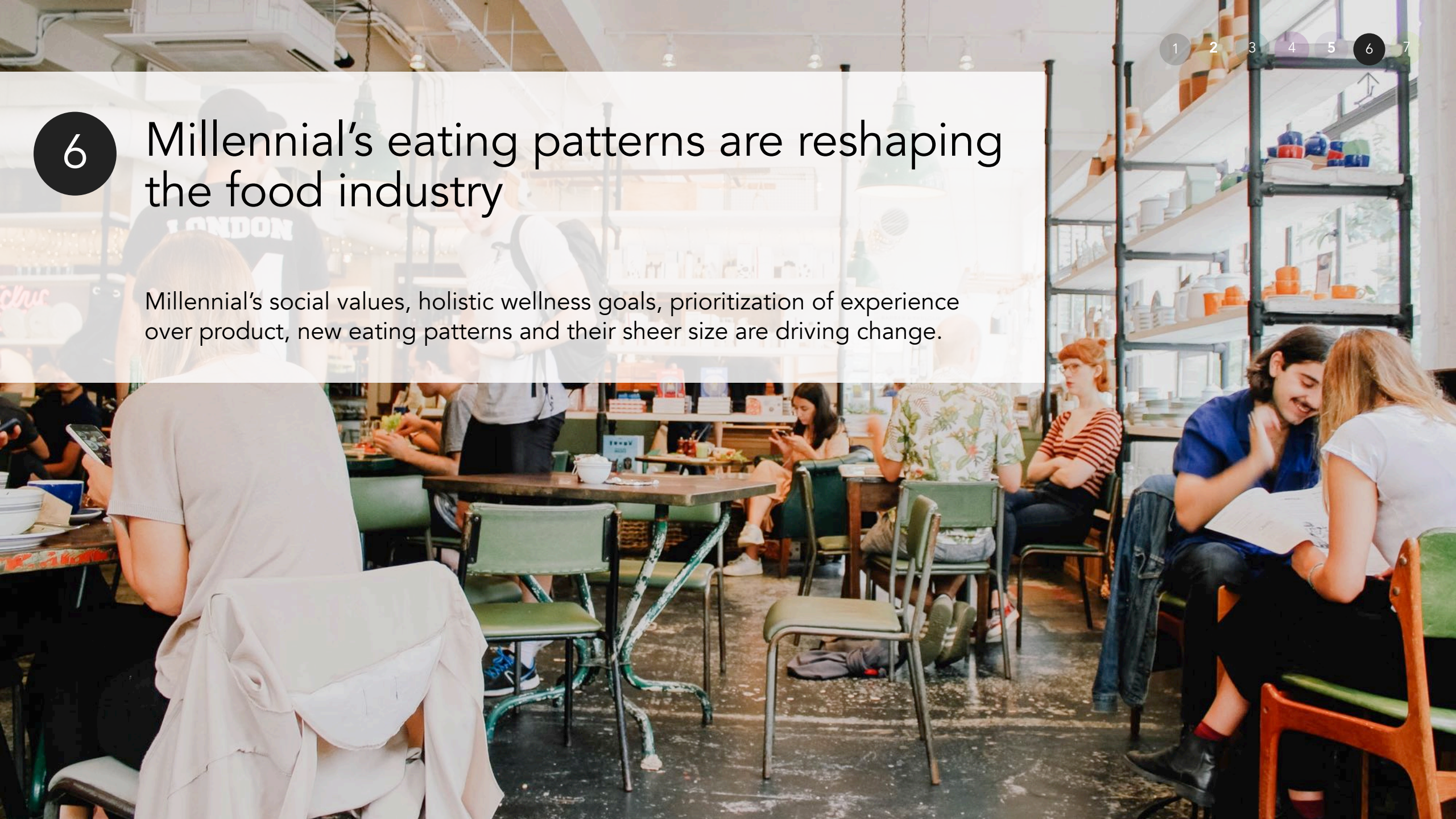
The alternative protein conversation is gaining momentum and becoming mass market

“ *I think we're going to be growing vegetarian and loyal non-animal protein eating eaters...I think we're not even up the hill yet to the tipping point. We're still on the ride.*
- Expert Interview, Grocery

6

Millennial's eating patterns are reshaping the food industry

Millennial's social values, holistic wellness goals, prioritization of experience over product, new eating patterns and their sheer size are driving change.



Millennials are powerful in numbers and in spending power globally



#1

Global Millennials are located in the worlds' largest countries with the greatest concentration in Asia

#2

Their volume dramatically outweighs that of U.S. Baby Boomers and Gen X, with Chinese millennials at 1/3 of the population of China

#3

Their spending power is also significant, particularly in China the younger consumers have the highest spending share

92 Million U.S. Millennials

61 Million U.S. Gen X

77 Million U.S. Boomers

400 Million Millennials in China (1/3 of the population)

- U.S. Census Bureau

Millennials have the power to reshape the food industry around their holistic values and desire for new experiences



Millennials have a more holistic view of health

They define health as a daily commitment to eating right and exercising.

Millennials value new experiences over possessions

They are driving the experience economy and shifting where money is being spent, from possessions to experiences.

Sustainability matters to millennials and affects what they buy

Sustainability is increasingly an important factor in purchasing decisions, rather than an after thought.

Definition of healthy:	Millennial	Gen X
Eating right	24%	14%
Exercising	22%	14%

Source: What's Your Healthy Survey, Aetna 2013

65% of the 18-34 year olds surveyed were driving the "Experience Economy" through buying real life experiences versus possessions.

That equates to **£419,556,233** each month.

Eventbrite Study 2014, UK

Sustainability is one of the top 4 reasons to pay more, **51%** of those who highlighted sustainability as a reason to pay more were Millennials.

Source: The Nielsen Global Survey of Corporate Social Responsibility and Sustainability, 2015, Credit Suisse.

Food is an area where the next generation's beliefs will have a significant impact

“ As their spending power increases so will their spending on food by \$50 billion per year through 2020, making this a crucial time for food brands to adapt.” *Forbes* ”

The most **health-centric** are Generation Z - consumers under age 20 - with **41%** saying they would willingly pay a premium for "healthier" products.

That compares with **32%** of Millennials (ages 21 to 34) and about **21%** of Baby Boomers (about 50 to mid-60s).

Global, Nielsen Global Health and Wellness Survey

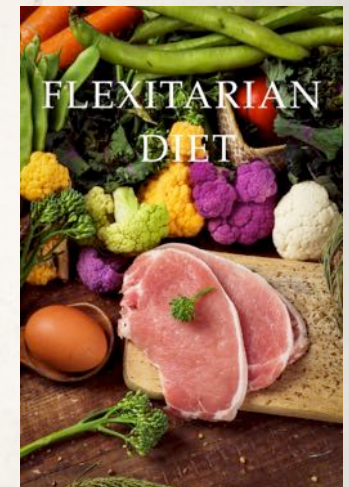
Globally, younger consumers are much more interested in - and willing to pay premium prices for - food products they perceive as for **healthier** than older consumers.

Nielsen's Global Health and Wellness Survey, 30,000 consumers in 60 countries

Mintel (2016, U.S.) cites a significant increase in sales of **meat alternatives**, particularly among consumers in the 18 to 24 age bracket

According to The New York Times, "an estimated **12%** of millennials say they are **"faithful vegetarians"**, as compared to **4%** of Gen-X'ers and about **1%** of baby boomers."

While 7.3 million Americans are vegetarian, an additional 22.8 million are **flexitarian**, reflecting a desire for a healthier, lower meat lifestyle, while retaining some level of meat in their diet



“How China is becoming the world's largest market for healthy eating”

“Food brands must embrace new value equation to win with millenials”

Millennials shifting eating patterns are pushing meat off the centre of the plate



Millennials are less focused on major meals, and more focused on small meals and grazing (U.S.)

Nearly half say they average at least four meals or snacks a day, with 7% snacking or grazing. Another 7% say they do not follow a routine for meals.

Millennials crave interesting experiences and adventure in all aspects of their lives – food included.

Millennials are more apt than any other generation to explore cuisines. According to the National Restaurant Association's ethnic foods survey, 29% of all participants said they have tried a new ethnic food within the past year. Specifically, that rate increased to 37% for respondents aged 25-34, and to nearly 50% for those aged 18-24.

Their eating patterns are different from previous generations Millennials draw sharp contrasts with their parents with respect to eating habits. Thinking back to when they were growing up, half say they now eat more often during the day than their parents did; 38% say they eat less regularly; 37% eat fewer meals at home; 50% tend to snack more often than their parents did; 39% eat less processed foods; 31% eat more fresh, whole and freshly made foods.
-plma (U.S.A)

Ordering and delivering apps mean they have to think less about food, but get to enjoy it more

26% of U.S. Millennials use an app to order food from a restaurant and 20% to order food from their supermarket.

– plma, 2016 (U.S.A)



Use new services to expand their tastes/palates/experience

Some 31% always or frequently order takeout food and 19% get meals that often from food box delivery services such as Blue Apron or Graze.

-plma, 2016 (U.S.A)

Average number of meals or snacks daily

47% - (4 or more)

27% - (3 a day)

18% - (2 or less)

7% - (no routine)

Key takeaways and why we should care



Millennials eating patterns are reshaping the food industry

Millennial's social values, holistic wellness goals, prioritization of experience over product, new eating patterns and their sheer size are driving change.

- ✓ Millennials are a large and powerful group, with more holistic values than previous generations.
- ✓ Values are being expressed through food and eating styles
- ✓ Lifestyle patterns are pushing meat off the centre of the plate



The sheer size of the Millennial generation of consumers will bring about change

“ Our guests are better educated on food and sourcing, they are proactively and intentionally incorporating more veggies, fruits, wholegrains and nuts into their diet.
- Expert Interview, QSR

“ The consumer market for these alternative proteins is not in any way as limited as what a gluten-free market was originally. It's broader. It's a complete food movement.
- Expert Interview, Grocery



7

The market is responding to consumer demand for new products that meet evolving needs and desires

There has been a dramatic increase in the mainstream availability of alternative products, in the grocery aisle, at quick service restaurants and via niche business models.



The food industry is fragmenting in response to shifting consumer demand and desire for niche food benefits

Increase in products related to special diets

Between 2013 and 2015 approximately 70,000 new products were introduced at one of the Natural Products Expos. About 10,000 of those products made a claim about special diets, such as gluten-free, vegetarian or paleo.

Eric Peirce Head of data and Insight, New Hope Natural Media, Health Trade Show. U.S

Increase in vegan products

Market research firm Technavio, predicted that new vegan product launches will grow by 11 percent annually from 2016 until 2020. (U.S.)

According to a recent study by Wakefield Research, 55 percent of U.S.A residents plan to eat more plant-based foods this year. Of the 55 percent, 36 percent say they're going to eat somewhat more; and 19 percent, much more.

"U.S. Organic food sales hit record \$43 billion in 2016"

<http://www.foodinsiderjournal.com/blogs/clean-label-insights/2017/06/us-organic-food-sales-hit-record-43-billion-in-2016.aspx>

Increase in meat substitutes or plant-based

Meat substitute product launches accounted for almost 14% of all new "meat" launches tracked in West Europe by Innova Market Insights in Q3 2015, compared to 6.3% tracked in Q3 2011. "This trend represents a growing opportunity for high-quality meat alternatives, which is also being reflected in the 24% average annual growth in global meat substitute launches recorded between 2011 and 2015," explains Lu Ann Williams, Director of Innovation at Innova Market Insights.

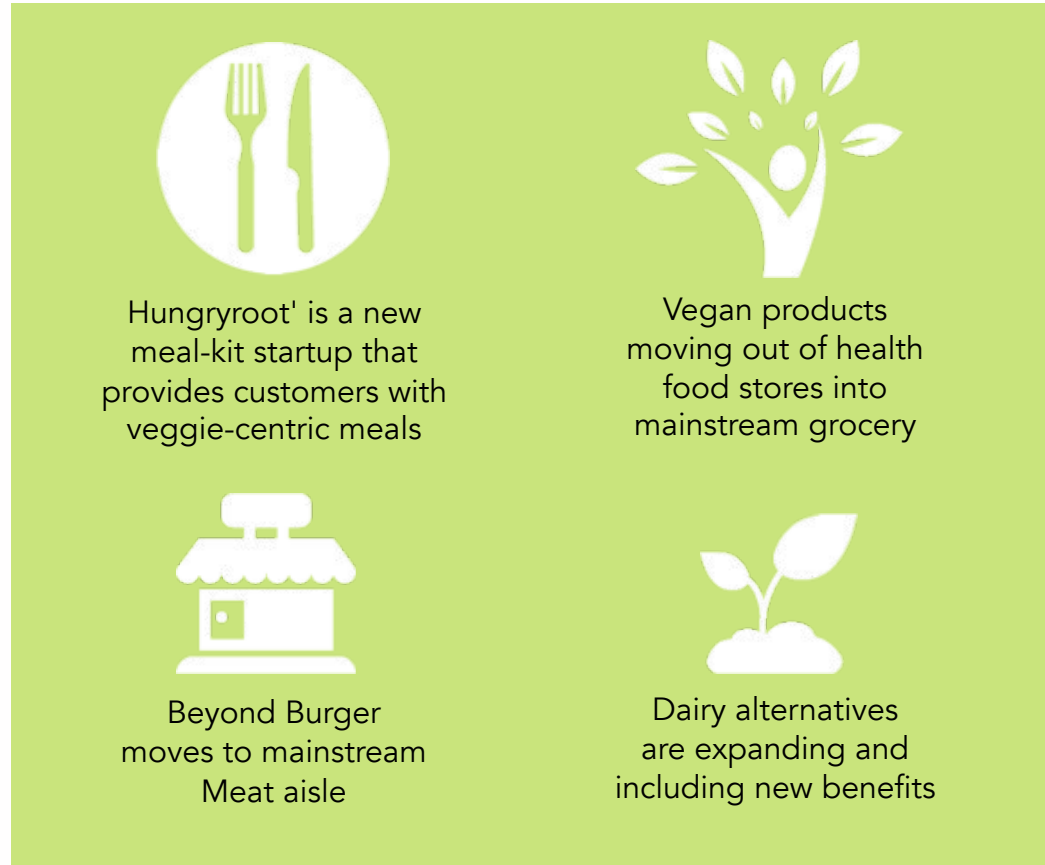
Increase in natural claims


Panera Bread (U.S) just announced that "100 percent of (its) food is 100 percent clean," meaning no flavors, colors, sweeteners or preservatives that are artificial. .


Alternatives to traditional meat and dairy products continue to be launched and are pursuing wider distribution


A report from global market research firm Mintel identified meat and dairy alternatives as one of the 12 key trends set to impact the **global** food and drink market in 2016.


The plant-based food sector specifically has reached **\$3.5 billion with an 8.7% growth rate** in the past two years. The growth in this space is being driven by two key factors: an accelerated shift in consumer behavior and rapid product innovation.




Hungryroot' is a new meal-kit startup that provides customers with veggie-centric meals


Vegan products moving out of health food stores into mainstream grocery


Beyond Burger moves to mainstream Meat aisle


Dairy alternatives are expanding and including new benefits

60%

Rise in global food and beverage new product launches bearing a vegetarian claim in the last five years.

<http://www.nutritionaloutlook.com/trends-business/vegetarian-launches-surged-60-over-past-five-years>

<https://www.foodnavigator-usa.com/Article/2016/07/11/Innova-Market-Insights-at-IFT-New-data-on-the-flexitarian-trend>

Quick service restaurants are responding to the demand for more meat-free options

Veggie Pret Store experiment hailed as a massive success

Veggie Grill - Will double in size in 3 years (from end of 2016) after raising \$22M in funding. U.S.

First vegan drive thru has opened in Canada

leCupboard plan to roll out 30 plant based vending machines in California over the next 3 months, followed by another 200 across the country

IKEA creates a veggie Swedish Meatball

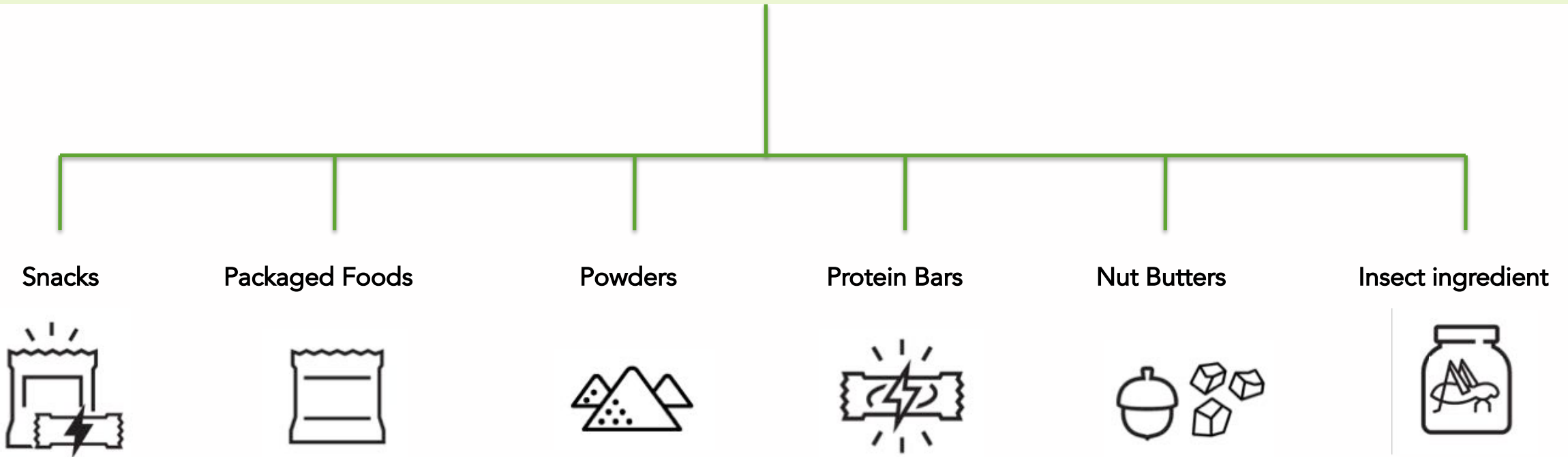
White Castle has added a veggie slider

Chipotle add braised Tofu and Wendy's adds black bean burger

Taco Bell teaches customers how to eat vegan at their stores

With protein becoming more important to consumers, new players are entering and expanding ways to access protein

PROTEIN



Key takeaways and why we should care

The market is responding to consumer demand for new products that meet evolving needs and desires

There has been a dramatic increase in the mainstream availability of alternative products, in the grocery aisle, at quick service restaurants and via niche business models.

- ✓ The market is already responding to consumer demand by creating new products and services that deliver on fragmented needs including the desire for more protein
- ✓ Niche products are available in the mainstream grocery store
- ✓ In select locations, alternative protein is starting to sit beside real meat in the grocery aisle
- ✓ While distribution is niche, the key players are pushing hard to expand distribution



Mainstream adoption proves there is consumer demand for reducing meat, getting protein from other sources and changing the way we eat.

“It’s not big (10-20% of its conventional analog) but the growth is 30-40%, quadrupling and even 10 times what is conventional growth. When the dollar growth matches that, it will become meaningful.

-Expert Interview, Grocery

“The growth has been monumental. When I say that, obviously a small base but the percentage movements are huge and with big CPG getting behind it, like Beyond Meat, we are seeing more sophisticated marketing.

-Expert Interview, Grocery

Summary of key takeaways from 7 forces of disruption

- ✓ Global meat consumption is on the agenda.
 - ✓ Governments around the world are beginning to take action to protect their economic interests.
 - ✓ Regulatory measures are likely to be the core source of leverage by governments around the globe.
 - ✓ Data from the international medical community is highlighting the risks of red meat, while promoting the benefits of plant based protein.
 - ✓ The healthcare industry is promoting less red meat through their nutritional guidelines.
 - ✓ Personalised data collection is increasing and getting more sophisticated.
 - ✓ The mainstream health and wellness industry is actively selling plant based diets.
- ✓ Investment dollars are present and on the increase.
 - ✓ The investors are powerful and influential.
 - ✓ Big Foods have a vested interest and bring their infrastructure and expertise in building brands and getting products to market.
 - ✓ A commercially viable alternative protein product with consumer accepted sensory experience is here and will get better.
 - ✓ Technology fragmentation has started and will continue.
 - ✓ Influential and powerful investors are protecting their technology and establishing the social discourse.
 - ✓ Athletes are pushing the performance benefits of plant protein diets.
 - ✓ Cultural influencers are moving the conversation from being about niche animal ethnics into a mainstream dialogue about sustainability and health benefits.
- ✓ Aspirational influencers are making this conversation cool and creating followers.
 - ✓ Millennials are a large and powerful group, with more holistic values than previous generations.
 - ✓ Values are being expressed through food and eating styles.
 - ✓ Lifestyle patterns are pushing meat off the centre of the plate.
 - ✓ The market is already responding to consumer demand by creating new products and services that deliver on fragmented needs including the desire for more protein.
 - ✓ Niche products are available in the mainstream grocery store.
 - ✓ Alternative protein is sitting beside real meat in the grocery aisle.



7 Forces of disruption

1

Global and Govt. Institutions have put the impact of meat consumption on the agenda

2

There is growing support for a plant protein based diet from the medical industry

3

The flow of capital into alternative protein isn't slowing down

4

The technology to produce consumer ready alternative protein burger is here and is pushing for commercial scale

5

A new set of influencers are creating a new cultural narrative around meat

6

Millennials eating patterns are reshaping the food industry

7

The market is responding to consumer demand for new products and services

Summary of why we should care

1 >

The actions of these individual countries will eventually impact global imports

2 >

Reputable sources of medical information and health data are promoting a diet of less meat and more plant protein

3 >

The convergence of all these investors means the potential upside has become too valuable to ignore

4 >

Alternative protein technologies are likely to further disrupt the protein category and encroach on the red meat market

5 >

The alternative protein conversation is gaining momentum and becoming mass market

6 >

The sheer size of the Millennial generation of consumers will bring about change

7 >

Mainstream adoption proves there is consumer demand for reducing meat, getting protein from other sources and changing the way we eat

Potential Consumer Headwinds:

What could happen to turn consumers against protein alternatives?

"Target yanked Hampton Creek products after mysterious allegations"

<http://www.latimes.com/business/la-fi-target-hamptoncreek-20170628-htlstory.html>

Health scare/scandal turning consumers off new 'fake' meats?

A health scare can stop the progress of any new innovation as it takes years to build back consumer trust.

"The unhealthy truth about almond milk"

Almond milk is in fashion, but that doesn't mean it is good for you, or for the environment

<http://www.smh.com.au/lifestyle/diet-and-fitness/the-unhealthy-truth-about-almond-milk-20151109-gkupts.html>

"14 things that happen to your body when you eat soy"

<http://www.eatthis.com/soy-side-effects/>

New medical info showing negative effects of plant/cellular meat?

As Almond has gained traction, it's also started coming under pressure as the health industry examines it's nutritional content and environmental impact.

"Too much margarine could kill you"

– quite literally Dr. Stephen Sinatra

<https://www.drsinatra.com/too-much-margarine-could-kill-youquite-literally>

Alternative proteins have unintended side effects?

There was a time when Margarine was considered the healthy option, until it was uncovered that the trans-fats within margarine can cause death.

"Eating meat has known health benefits"

<https://thepaleodiet.com/who-eating-meat-health-benefits/>

New medical studies prove health benefits of meat creating new diet trend?

Diet fads such as Paleo and Atkins have constantly pushed the value of meat. There are currently a range of studies taking place to evaluate the health benefits of meat.

Potential Economic Headwinds:

What could happen in the market to slow growth and development of alternatives?

"Here's what would happen if U.S. faces another recession"

<https://www.forbes.com/sites/kenrapoza/2017/06/29/heres-what-would-happen-if-u-s-faces-another-recession/#4a5c21727a79>

Economic recession that changes how consumers are willing to spend?
Most economists believe the U.S.A economy will experience a market correction in the near future. Depending on how a recession hits consumers it may cause them to cut back on spending right when alternatives are gaining traction.

"The Silicon Valley funding craze is deflating"

<http://www.businessinsider.com/silicon-valley-startup-funding-2017-4>

Investment freezes/slow before sensory and distribution is achieved?
Most of the investment in alternatives is coming out of Silicon Valley, which is known to be fickle with investment dollars. They could slow investment if better/newer investment opportunities emerge elsewhere.

"China's economy set to slow to 6.5 percent in 2018"

<https://www.reuters.com/article/us-china-economy-gdp/chinas-economy-set-to-slow-to-6-5-percent-in-2018-as-government-turns-off-cheap-money-reuters-poll-idUSKBN1F50E1>

Global economic growth slows?
If economic growth slows, especially in emerging markets, consumers may not reach the levels of disposable income required to consume premium meat or premium alternatives.

"COMMODITIES: Grain prices skyrocket in response to drought report"

http://articles.latimes.com/1988-07-14/business/fi-8706_1_grain-prices

Supply chain shortages that drive prices up?
Most of the alternatives are heavily reliant on plants that are not at scale in terms of availability. Any impact on the supply chain of plants would significantly effect the price of alternatives.

Potential Product Headwinds:

What could happen if alternative protein products fail to deliver?

"World's first lab-grown burger eaten by humans, tastes like despair"

<https://www.extremetech.com/extreme/163107-worlds-first-lab-grown-burger-eaten-by-humans-tastes-like-despair>

Product sensory never improved to meet expectations?

Even if consumers want to eat alternatives, they won't adopt them at scale until the taste and sensory experience meets their needs and expectations. The taste of alternatives has to appeal to a broad, mainstream audience.

"As meat-free burgers move mainstream, Impossible Foods scales up"

<https://www.triplepundit.com/2017/03/impossible-foods-oakland-burger/>

Alternatives remain niche, never gaining enough scale to become accessible?

Currently all alternatives are far away from scaling to a level that would be necessary to keep prices affordable and accessibility wide spread. If they don't reach scale quickly, consumers could move onto something else.

"Beef prices buoyed by cutthroat competition in meat market"

<https://azcapitoltimes.com/news/2017/06/19/beef-prices-buoyed-by-cutthroat-competition-in-meat-market/>

New competitors enter the market, driving down prices and reducing quality of the product?

Currently, there aren't many real players in alternative proteins, but the investment dollars flowing into the market suggests many more competitors will come. This could cause price wars that drive down quality of the product.

"The problem with fake meat"

<https://www.technologyreview.com/s/536296/the-problem-with-fake-meat/>

Product remains as mince (only) limiting the needs it meets for consumers?

Even though R&D teams are working to create products beyond mince, they are a long way off. If alternatives stay as mince, consumers will likely have to continue eating meat to meet other needs.

Potential Government Headwinds:

What could happen within government bodies to shape the adoption of alternatives?

"Meat industry wins round in war over federal nutrition advice"

<https://www.politico.com/story/2016/01/2015-dietary-guidelines-217438>

How will new lobbying groups play a role in protecting meat industries?

A range of groups have started to protect the meat industries. These groups have had success and have more and more funding. Governments' have an incentive to work with these groups to protect jobs and economic revenue.

"Meat industry wins in dietary guidelines for Americans"

<https://www.ecowatch.com/meat-industry-wins-in-dietary-guidelines-for-americans-1882145198.html>

What if government's continue to change dietary guidelines in favor of alternatives?

Governments' have been giving more space to protein alternatives but they haven't changed the role of meat. They could easily remove plant-protein from the guidelines and replace it with meat if studies supported it.

"California's almonds suck as much water annually as Los Angeles uses in three years"

<https://www.motherjones.com/environment/2015/01/almonds-nuts-crazy-stats-charts/>

What if growing plants ends up causing new environmental problems?

With the growth of plant proteins, no one knows how supply will be created to meet the new demand. It's possible that growing different types of plants could cause a new type of environmental crisis that would cause governments to crack down on expansion of plant farm land.

"FDA casts doubt on safety of Impossible Burger's key GMO ingredient"

https://www.huffingtonpost.com/entry/fda-casts-doubt-on-safety-of-impossible-burgers-key_us_598de8b7e4b063e2ae057f4a

What if government bodies refuse to endorse new alternatives?

The long-term health and safety effects of the impossible burger (and cellular meat) are unknown, therefore gov't bodies might be very slow to approve them without years of additional testing. Currently, there is no agreement on how to test them (as the food is changed on a molecular level).

Scenario Planning



How can we expect the forces of change to play out?

We can't know what will happen as the forces converge, but we know which core factors will shape the industry going forward. We can use these factors to create 'plausible' future scenarios.



Market

What will happen to the availability of red meat?



Consumer

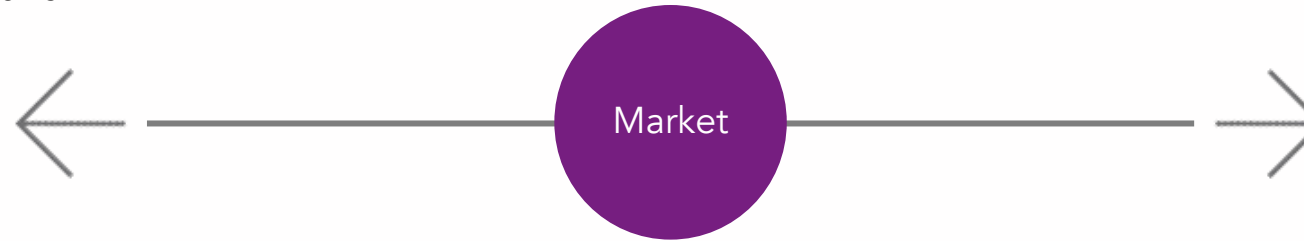
How will consumers respond?

Will the red meat market expand or contract?

Will supply of red meat expand and remain unconstrained?

Will supply of red meat become constrained and restricted?

ABUNDANT SUPPLY



SCARCE SUPPLY

What are the factors that will push us one direction vs the other?

Focus blame for climate change/carbon emissions **on other factors** (such as oil, waste), **push for red meat** to help address **feeding** growing population



Global Institutions
(i.e. U.N.)



Focus blame for climate change/carbon **on red meat** consumption, **push for alternative ways to feed** growing population outside red meat

Agri-business successfully **protects red meat** industry from regulation and loss of subsidies etc. while gov't **regulates alternative proteins**



Gov't Regulation



Gov't's **regulate red meat** via shift in dietary guidelines and shift their **support/subsidies to alternative proteins**

Investment dries up and **technology never advances enough** to create a viable alternative protein product (i.e. range, sensory)



Competitive Product
(technology)



Investment continues and **technology improves** alternative product (i.e. sensory, range) and consequently product meets consumer needs/desires

Investment dries up and **technology fails to scale** (commercially viable) and be widely accessible (via range of SKU's on shelf/menu)



Competitive Product
(scale)



Investment continues and **technology scales** and become more commercially viable and widely available (via range of SKU's)

Will consumers increase or decrease consumption?

Will consumers reduce red meat consumption?

DECREASING DEMAND



Will consumers maintain and increase consumption?

INCREASING DEMAND

What are the factors that will push us one direction vs the other?

Influencers **demonize meat** and celebrate new eating styles rooted in ways to reduce red meat



Influencers **celebrate meat** and promote new ways to continue consuming red meat

Consumers **prioritize ideology** rooted in support for climate change and animal ethics over desire to eat meat



Consumers **prioritize desire to eat** meat over ideology, rooted in support for climate change and animal ethics

Health trends and medical studies **influence consumers to adopt** alternate proteins and reduced animal protein diets



Health trends and medical studies **influence consumers to continue** eating more meat and seeking nutrients only found in meat

Eating patterns continue to **fragment and focus less** on the prominence of meat within meals



Eating patterns **maintain meat as the hero ingredient** and find new ways for meat to play a prominent role in meals

Overview of Scenarios

Four plausible future scenarios result from crossing the market and consumer factors. Understanding these scenarios helps us consider actions to address the forces of change.

Scenario 1: Red meat is pushed to the side of the table



Decreasing demand



Scenario 3: Red meat is the reluctant choice

Scarce supply



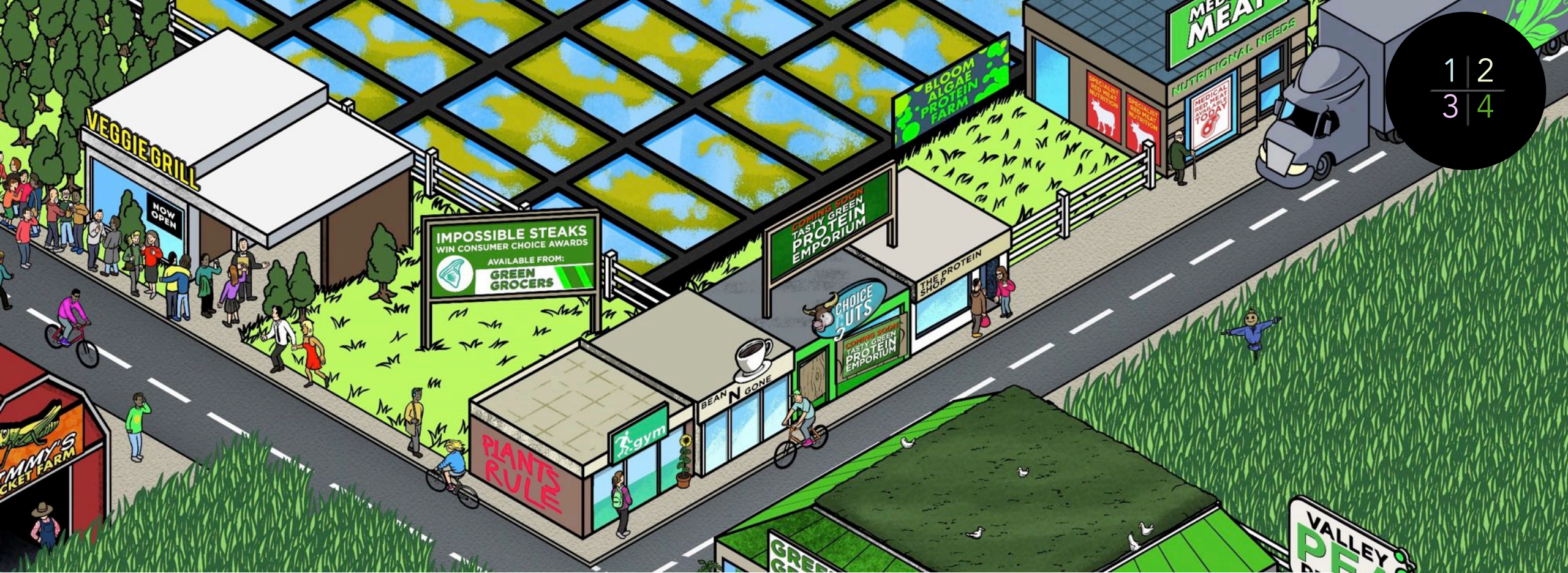
Scenario 2: Red meat is the speciality choice

Increasing demand



Scenario 4: Red meat is the everyday choice

Abundant supply



Scenario 1: Red Meat is pushed to the side of the plate



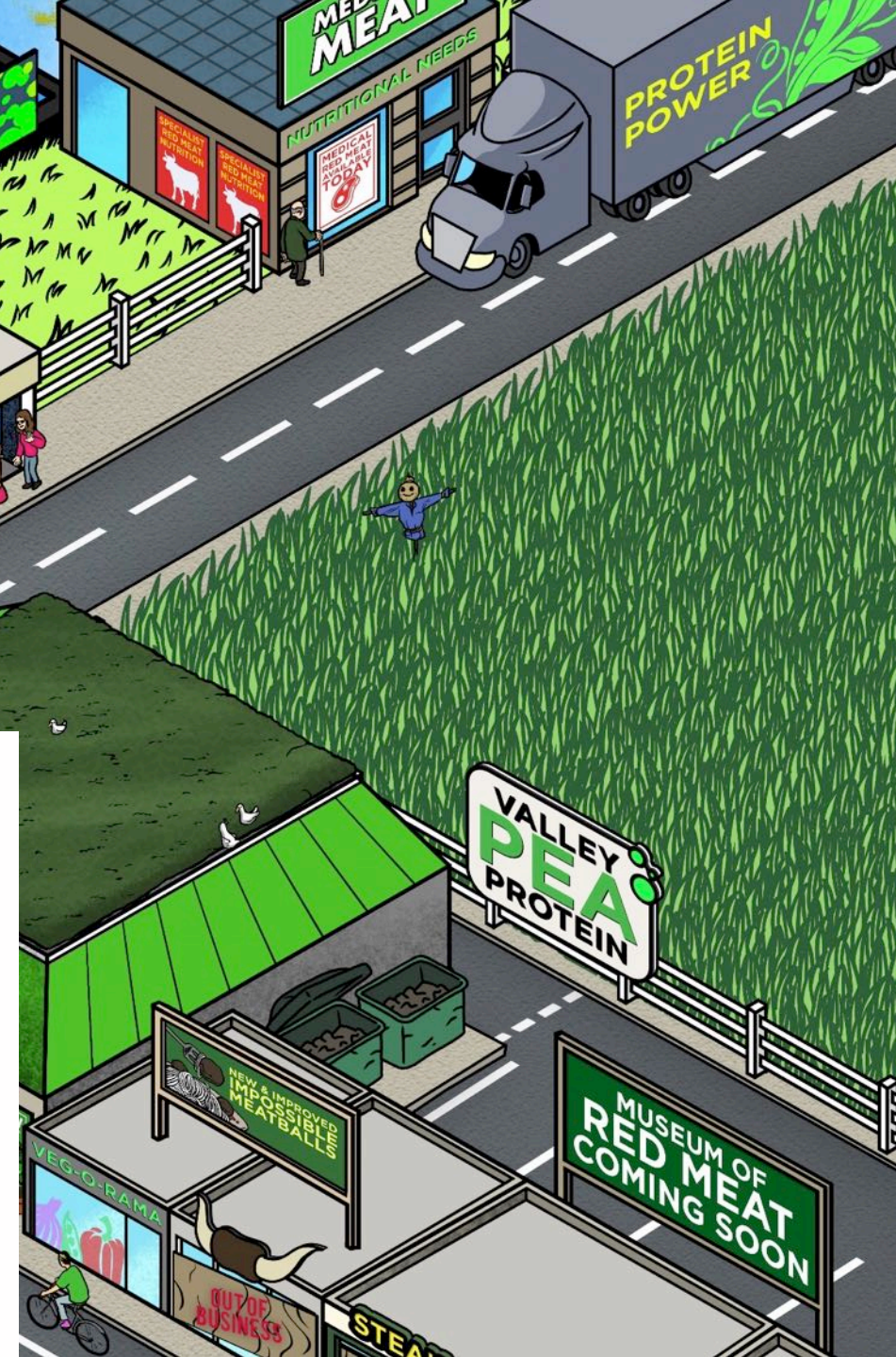


In this world...

Red meat is very rarely consumed (only when absolutely necessary) and mainstream consumers have less and less interest in it, because they believe reducing consumption helps address any ideological need (e.g. climate issue - they are doing their part) and consumers believe they can get essential nutrients from alternative protein sources (making the shift from red meat being a win win for them).

Governments' support and investment for alternative proteins means that the technology has advanced - product sensory has improved enough to meet consumers needs (don't feel there is a trade off or has exceeded expectations), it is also affordable and widely available, so everyone can access it.

Red meat only has niche roles for specific audiences e.g. babies, elderly or the infirmed or is produced for non food purposes e.g. medical application.



Scenario 1: More detail on this world

1 | 2
3 | 4

Market

- **Global Institutions** – Have built a collective argument against red meat with supporting evidence and are putting pressure on governments to act
- **Govt Regulation** – Government's have shifted support (in the form of subsidies etc.) to alternative proteins and away from agri-business and are using taxation and nutritional guidelines to regulate red meat
- **Competitive Product (Tech)** - Tech has made significant improvements and product sensory is consumed by mainstream consumers
- **Competitive Product (Scale)** – Products are affordable and more widely available
- **Beyond** – Standard everyday affordable choice & additional formats
- **Impossible** – Expanded from menu's to shelf & additional formats
- **Cellular** – Viable production and scale (being pushed/supported by gov't/global bodies as a necessary alternative)

Consumer

- **Cultural Influence** - Cultural conversation has taken root among mainstream audiences and moved beyond niche athletes
- **Ideology** – Climate, feeding population and ethics debate connected to animal protein, is clear and proven. Consumers feel social/cultural pressure to align around a new ideology that doesn't promote red meat consumption
- **Health/Medical Trends** – Evidence around the benefits of alternative proteins over animal protein is deep and extensive. Consumers can't ignore the mounting case against red meat
- **Eating Patterns** – Red meat is no longer the hero of the plate or primary source of protein, consumers have replaced it with plants and other protein sources as much as possible (in the absence of alternative proteins being widely available)



Case Study: Dairy Industry offers a cautionary tale

How has this happened before?

In the dairy industry, the introduction and adoption of dairy-free alternatives has reduced demand for traditional dairy products, forcing the dairy industry to respond.

What Happened?

Milk was a stable and growing commodity

In the 1970's, milk and dairy were a core staple of American families. Dairy farmers were protected and supported by government regulations and subsidies, and the industry was growing. It's hard for anyone to imagine milk could be replaced (it was considered as common and necessary as water or oxygen).



A series of forces collided to shift the market

- A new generation emerged with new needs (replacing milk with soft drinks)
- Activists and health advocates built a case against dairy that eventually became adopted
- Governments started reducing subsidies and other forms of support and eventually started changing dietary guidelines



It started slow, niche and seemed unlikely, and then became exponential

- First, there was only one alternative (Almond Milk) which was niche, only used by those with lactose issues
- As the alternatives became better and demand shifted, alternatives expanded to other nuts and the product met more needs
- Eventually, moves beyond milk to dairy-free yogurt and cheese
- Even with headwinds (like health scare in soy) demand shaped the market

Case Study: The Dairy Industry offers a cautionary tale

1|2
3|4

What can we learn?

The dairy industry missed huge revenue opportunities, and were so slow to respond, they now have to play defense rather than offense

- The dairy industry ignored the weak signals and continued on, business as usual
- Outside players captured share dairy should have captured (i.e. General Mills captured share in Greek yogurt, pharma developed muscle milk)
- Now they are on the defensive and have to try to reduce appeal of Almond Milk through attack campaigns rather than find new ways to appeal to consumers
- Dairy industry is made up of multiple P&L's and didn't collaborate

Almond milk is now America's favorite milk substitute, boasting sales growth of 250 percent over the past five years (2016). During almond milk's rise, the total milk market shrunk by more than \$1 billion.

- Nielsen Consumer Insights Report, Nut Milk

The dairy industry's plight is a cautionary tale for other industries whose core product falls out of favor or is under attack by activists. It illustrates the dangers of focusing on just one highly commoditized product, ignoring market trends, and trying valiantly to sell what you make rather than to make what people want. The industry has nobody to blame but itself. It's in trouble because it has focused on cows instead of consumers.

- Hank Cardello, Forbes

Scenario 1: What does this mean?

Role for animal protein (red meat) for food consumption will only become less relevant, demand and investment/government support creates a multiplier effect in favour of alternative proteins, shifting meat or cows/sheep to other purposes. There are fewer traditional meat producers and competitors as they shift to other revenue streams.

KEY CHARACTERISTICS: Disruptive Innovation, High Risk/High Reward, Alternative Proteins Dominate

Scenario Upsides

- ✓ New emerging market is like a gold rush (e.g. nut milks, first-in take biggest prize)
- ✓ Expanding demand for protein with room to offer portfolio of options

Scenario Downsides

- x New and unexpected competition from unexpected places (nature of break through innovation)
- x Lack of action (i.e. players who take no action become irrelevant - not incremental or staged)
- x High risk as most unknown

Ways In

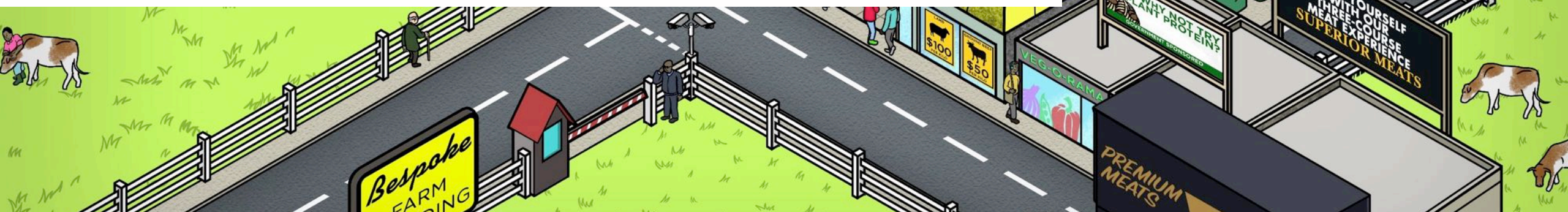
- Invest in disruptive innovation
- Explore different business models and revenue opportunities (including new purposes/uses for live stock/farmland)
- Partner with those (or invest in) first to market in new alternative proteins
- Build out expertise in new areas

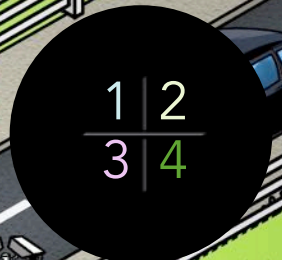
What To Watch

- Investment into alternative proteins
- Expansion of alternative proteins footprint in meat market
- Performance of alternative proteins
- Shift in social pressure and adoption of conversation
- Governments and meat industry investing or supporting alternative proteins to the detriment of traditional meat
- New and unexpected players/entrants trying to capture market (i.e. think Apple or Google entering the protein market)



Scenario 2: Red Meat is the specialty choice





In this world...

As a result of regulation in the form of taxation and lack of subsidies/support, red meat is not widely consumed because it's expensive. In addition there are also cheaper alternatives in the form of less desired plant proteins or cellular meat.

Desire for red meat amongst mainstream consumers hasn't changed as they aren't worried about the impact of red meat on the environment and they believe they can't have red meat as much as they'd like. Since red meat is expensive and somewhat scarce, they save it for special occasions.

With additional government support alternative proteins are getting better and more available which is forcing consumers away from red meat and towards other options.



Scenario 2: More detail on this world

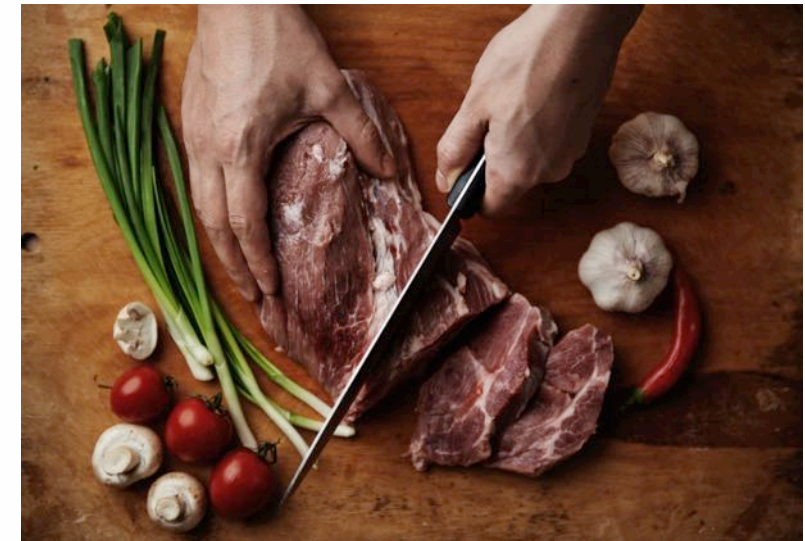
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Market

- **Global Institutions** – Have build a collective argument against red meat with supporting evidence and are putting pressure on governments to act
- **Govt Regulation** – Government's have shifted support (in the form of subsidies etc.) to alternative proteins and away from agri-business and are using taxation and nutritional guidelines to regulate red meat
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Consumer

- **Cultural Influence** - Cultural conversation surrounding alternative proteins is niche and focused on athletes and performance (hasn't crossed into mainstream space)
- **Ideology** – Climate and ethics debate is not yet strong/clear enough to shift choice away from real red meat. Consumers give red meat the benefit of the doubt.
- **Health/Medical Trends** – Evidence is emerging but hasn't become ubiquitous and proven, therefore consumers remain skeptical at worst and unclear at best
- **Eating Patterns** – Red meat is still the hero of the plate and primary source of protein, either as an ingredient or core part of the meal

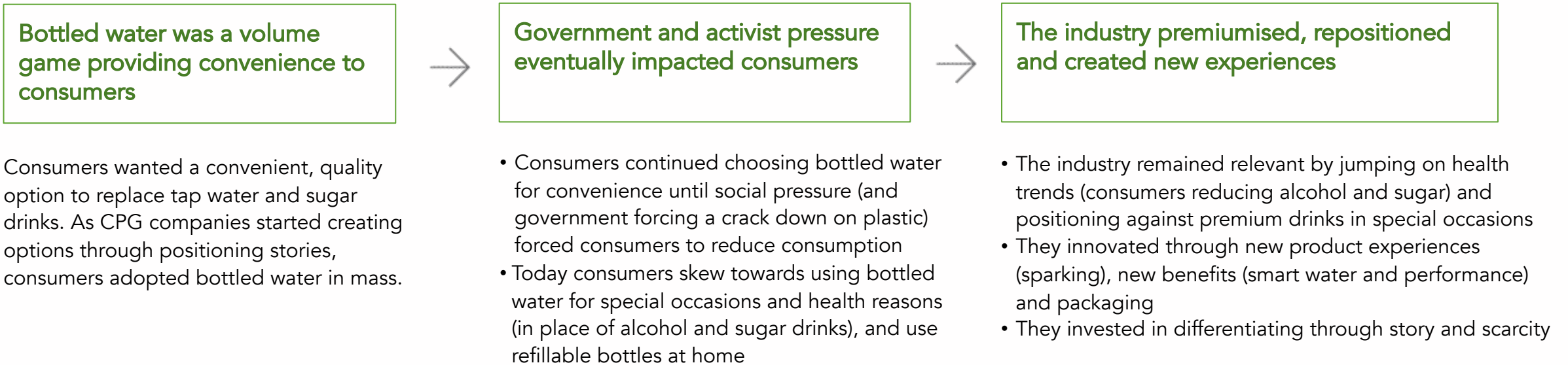


Case Study: Bottled Water premiumises to respond to government regulations and consumer pressure

How has this happened before?

The bottled water industry had to premiumise to grow, as government regulation and social pressure forced consumers to reduce plastic bottles. With less volume, the industry created new occasions and repositioned itself against alcohol to increase margins.

What Happened?



Case Study: Bottled Water premiumises to respond to government regulations and consumer pressure

What can we learn?

Bottled water didn't panic about losing volume, instead they focused investment and created new reasons for consumers to pay even more for water

- The industry let low margin opportunities go (let consumers shift to tap water in home vs defending against it)
- Gave consumers a new reason to choose bottled water that they felt good about and helped them feel like they were getting premium benefits or new benefits they couldn't get from tap water
- The strategy was very focused and they had to reposition themselves against new competitors (i.e. alcohol)

The market is small but lucrative: sales of flavored water amount to only 4% of the volume of plain water sold, but bring in 15% of the total revenue.

- Zenith Consulting, Beverages Market

It could be a fine vodka, on sale for £80 (\$99) in Harrods, an upmarket department store in London, it has a price tag to match. In fact, it is a bottle of water. Harvested directly from Norwegian icebergs that are up to 4,000 years old, Svalbardi is one of hundreds of water brands that are sourced from exotic places and marketed as luxury products. At the luxury end of the market, water has become more like wine, argues Michael Mascha, the author of a guide to fine water. In expensive restaurants the precise origin of water is what matters; many eateries offer water lists along with the wine selection.

- The Economist

Scenario 2: What does this mean?

The red meat market doesn't expand and it gets more and more specialised and uber premium. Margins are higher, customers and markets get ever more specific and segmented, creating value tiers. With ultra specialisation the number of competitors reduces yet differentiation and ability to compete gets harder.

KEY CHARACTERISTICS: Ultra specialised, Uber premium, Value tiers, Highly targeted, Rare, Real red meat is prized

Scenario Upsides

- ✓ Potential to exploit very high margin potential
- ✓ Ability to build on existing strengths in premium
- ✓ Potential to create tiers of value and feeding pipeline of growth via trading consumers up

Scenario Downsides

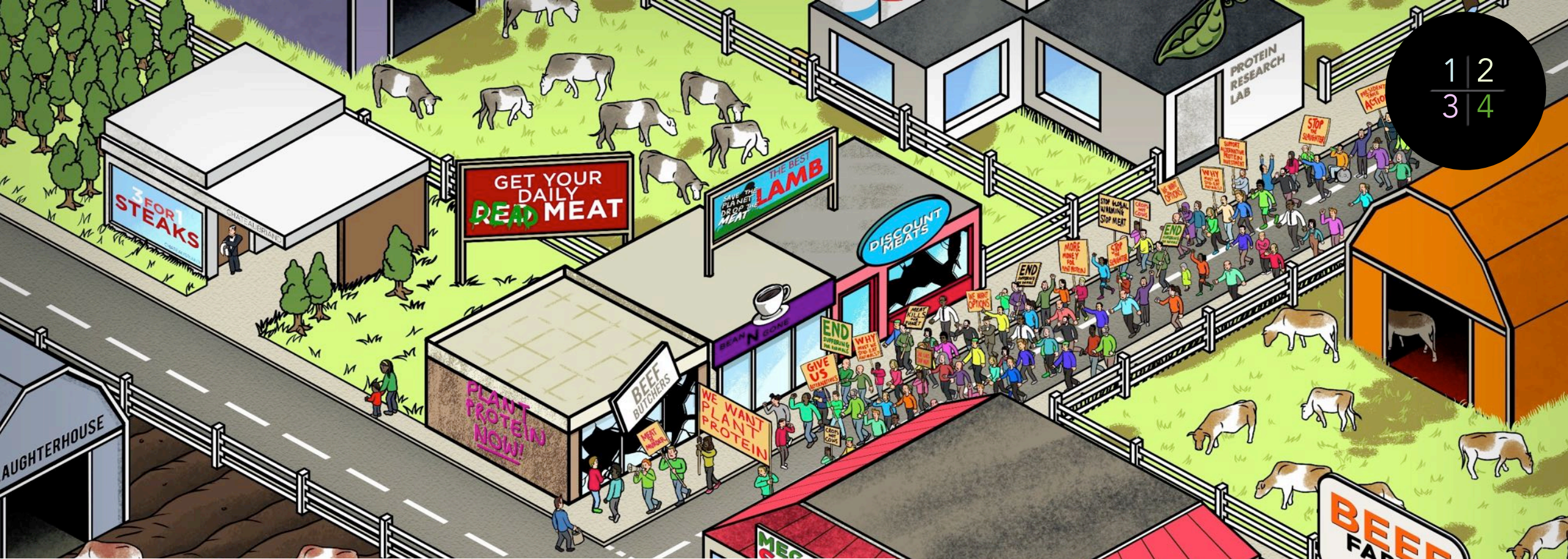
- x Very hard to maintain premium offer (cost of maintaining scarcity)
- x No volume means margin has to continue increasing
- x Need to continue to create new consumer benefits
- x Limited audience is harder to cater to and tends to skew, need to focus on loyalty without volume

Ways In

- Shift positioning to be ultra-premium
- Invest in creating a high margin premium product (super scarce benefits, value tiers, supporting story)
- Explore different business models/distribution (i.e. specialty or direct to consumer)
- Shift to selling an experience versus a product and establish ownable emotional benefits

What To Watch

- Increase in current premium offers and claims (e.g. next generation of grass fed, wagyu or even more local production processes or claims e.g. graze on glaciers, cattle exposed to freshest air on planet)
- Government bodies messaging pushing/moral debate and the conversation gaining momentum



In this world...

For consumers, red meat has fallen out of favour as they accept and adopt mounting evidence suggesting red meat is hurting the environment and it is not good for the population, as there are other ways to get protein. Consumers are increasingly critical of red meat and are searching for new ways to incorporate alternative proteins into their diets, as they reduce red meat consumption as much as possible. They are also frustrated that red meat is still a necessary source of protein, because none of the protein alternatives are widely available.

Governments are being pressured by consumers to support and invest in alternatives proteins. Governments are however still protecting meat industries (and global bodies aren't being taken seriously/ their case hasn't gained traction).



Scenario 3: More detail on this world

1 | 2
3 | 4

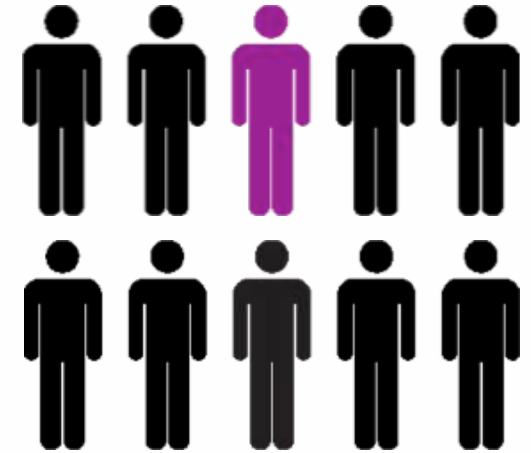
Market

- **Global Institutions** – Haven't gained influence globally (only adopted by a few gov'ts) and haven't created momentum to put pressure on red meat
- **Govt Regulation** – Agri-business has forced governments to protect industry via dietary guidelines and via new studies into the benefits of red meat
- **Competitive Product (Tech)** – Alternative proteins remain in the headlines yet stay niche
- **Competitive Product (Scale)** – Alternative proteins aren't affordable or available enough to drive choice
- Beyond – Veggie burger alternative for niche audience
- Impossible – Expensive, limited, not close enough to meat
- Cellular – Not a viable option (sensory or viability)

Consumer

- **Cultural Influence** – Cultural conversation has taken root among mainstream audiences and moved beyond niche athletes
- **Ideology** – Climate, feeding population and ethics debate connected to animal protein, is clear and proven. Consumers feel social/cultural pressure to align around a new ideology that doesn't promote red meat consumption
- **Health/Medical Trends** – Evidence around the benefits of alternative proteins over animal protein is deep and extensive. Consumers can't ignore the mounting case against red meat
- **Eating Patterns** – Red meat is no longer the hero of the plate or primary source of protein, consumers have replaced it with plants and other protein sources as much as possible (in the absence of alternative proteins being widely available)

1 in 10
Millennials
are vegetarian
or vegan



Source: Nutrition Business Journal



Meat substitute company Quorn Foods says it has seen "unprecedented" global growth in the first half of 2017, with sales up 19% worldwide. The firm says it is benefiting from the rise of the "flexitarian" diet.

Case Study: Coke responds to decline in sales

How has this happened before?

The soft drink industry diversified to respond to the decline in consumption of sugar based drinks. Though it is still widely available and consumers drink it sometimes, most make a concerted effort to reduce.

What Happened?

Coke had a very streamlined portfolio, with minimal diversity

Up until 2000, 90% of Coca-Cola's volume was from traditional soft drink/soda. They focused on volume and expanding into new markets including owning the entire supply/distribution chain. At first, the company only expanded through new soft drink skus (Sprite etc.) and maintained a streamlined portfolio.



They were forced to respond to shifting demand

- As consumers started adopting a strong health focused cultural narrative they naturally started reducing soda/soft drink, originally they avoided it entirely, as there were not many alternative drinks
- Government's turned the other way and allowed consumers to make their own choices for close to 15 years (until very recently [2016/7] they started taxing the industry)



Coke ultimately had to replace their own products with a new sugar free option

- Coke was forced to diversify further as consumers' demanded change, first they bought up a range new drinks (e.g. innocent, smart water)
- Then created an incubator to support development of healthier drinks (e.g. coconut water etc.)
- And eventually (in 2017) finally created a whole new sugar-free drink to replace soda

Case Study: Coke responds to a decline in sales

1 | 2
3 | 4

What can we learn?

Coke diversified in incremental stages and through a variety of revenue streams. They allowed their core product to fund their move into new opportunities

- Diversification didn't happen over night, they took the shift in demand seriously and plotted a range of strategic moves
- They used short-term plays (acquisitions) to fund longer term investments (5 years of research to develop sugar-free Coke)
- They slowed change and regulation down rather than avoiding it (bought time to make a shift)
- Multiple P&L, markets conflicting agendas

In America the consumption of soda per person peaked in the late 1990s, at nearly 53 gallons per person, and has since declined to about 75% of that level. Last year volumes of Diet Coke, once seen as a fix for more health-conscious consumers, dropped by 4.3%.

- Beverage Digest

As for the firm's traditional products, Coca-Cola is seeking higher volumes in young markets and higher profits in old ones. To propel growth in India, for example, it has developed a new bottle to keep its soda fizzy despite long and bumpy journeys. And in developed markets, where volumes are stable at best, Coca-Cola is making bubbly drinks more profitable through a mixture of higher prices and smaller packages.

- The Economist, 2017

Scenario 3: What does this mean?

This is a heightened version of what we are beginning to see today - i.e. incremental change in red meat consumption. The market is fragmenting and being shaped/pushed by consumer demand, and although red meat doesn't disappear, it does become more niche or just one of many protein source options available to consumers.

KEY CHARACTERISTICS: Fragmentation, Incremental, Consumer Frustration, Pressuring Governments Portfolio solutions, Acquisitions, Diversify

Scenario Upsides

- ✓ Diversifying possibilities to meet and capture new consumer demand
- ✓ Potential to build portfolio around fragmented needs to get into consideration set
- ✓ Option to defend the share of red meat market that remains - focus positioning on niche meat needs

Scenario Downsides

- x Lack of portfolio strategy as try to be everything to everyone
- x Dilute need for meat by introducing too many alternatives
- x Focus too much on defending existing market and miss long-term opportunity for incremental innovation

Ways In

- Compliment vs compete with plant protein – create a different need for animal protein alongside plant protein
- Continue to push health story around nutrients in red meat as compliments to plant protein.
- Invest in acquisitions or incremental innovation
- Build portfolio positioning strategy

What To Watch

- Consumer generated solutions (what are consumers creating to solve their own problem)
- Investment in alternatives from meat industry



Scenario 4: Red Meat is the every day choice



In this world...

Red meat is still widely consumed and mainstream consumers aren't asking hard questions about its impact on the environment. The belief is that essential nutrients can come from real red meat and can therefore justify their decision to maintain and/or increase consumption.

Governments are protecting red meat industries and global bodies haven't taken collective action to build a case connecting red meat consumption to the climate crisis, nor are they actively supporting alternative proteins as the preferred choice to feed the growing population.

Meanwhile, tech hasn't advanced enough to put alternative proteins on the consideration set for consumers who desire and prefer real red meat.

Scenario 4: More detail on this world

1 | 2
3 | 4

Market

- **Global Institutions** – Haven't gained influence globally (only adopted by a few gov'ts) and haven't created momentum to put pressure on red meat
- **Govt Regulation** – Agri-business has forced governments to protect industry via dietary guidelines and via new studies into the benefits of red meat
- **Competitive Product (Tech)** - Alternative proteins remain in the headlines yet stay niche
- **Competitive Product (Scale)** – Alternative proteins aren't affordable or available enough to drive choice
- **Beyond** – Veggie burger alternative for niche audience
- **Impossible** – Expensive, limited, not close enough to meat
- **Cellular** – Not a viable option (sensory or viability)

Consumer

- **Cultural Influence** – Cultural conversation surrounding alternative proteins is niche and focused on athletes and performance (hasn't crossed into mainstream space)
- **Ideology** – Climate and ethics debate is not yet strong/clear enough to shift choice away from real red meat, consumers give red meat the benefit of the doubt
- **Health/Medical Trends** – Evidence is emerging but hasn't become ubiquitous and proven, therefore consumers remain skeptical at worst and unclear at best
- **Eating Patterns** – Red meat is still the hero of the plate and primary source of protein, either as an ingredient or core part of the meal



"Restaurant sales gain ground in Second quarter with big boost in burgers"

<https://www.cnn.com/2017/06/05/restaurant-sales-gain-ground-in-second-quarter-big-boost-in-burgers.html>



Case Study: Wine expands despite health evidence

How has this happened before?

The wine industry has continued to expand even with negative health evidence against it (and alcohol in general), governments are continuing to support and build the industry, while consumers ignore health narratives. It's become a ubiquitous and crowded category.

What Happened?

Wine was small and not easily accessible for most consumers

With the exception of markets where wine was central to way of life e.g. France, wine was historically inaccessible due to price and lack of availability. In these markets it was a little snooty and was focused on special occasions. Options were limited and consumers didn't understand how to navigate the category.



Local gov't supported the industry to grow it extensively

- As wine expanded out of France into new markets it became more accessible for consumers
- After years of health and ethics campaigns against alcohol (and sugar) consumers continue to consume wine in volume
- Governments allow it to be more accessible by reducing regulation (licensing) and supporting agribusiness



As wine gained popularity, every wine region in the world entered the game

- The volume game for wine has become very competitive forcing major players to premiumise via brand positioning or to expand into emerging markets
- India and China have become the newest wine markets after formally being low/no volume markets
- Consolidation is taking over the industry, leaving small players vulnerable

Case Study: Wine expands despite health evidence

What can we learn?

The success and growth of the wine market is attractive on the surface, but many producers are struggling to compete with consolidation and lower margins:

- As competition has increased it's become harder to for the wine industry to generate margin (many have to sell/consolidate)
- They are entering new markets, but growth is slow (they have to train people in India how to drink wine and wait for a new generation to emerge)
- Many are vulnerable to a shift in the market (i.e. if younger consumers continue shifting to beer they don't have diversified portfolios)

2017 will see steady growth at around 1 to 3% volume and 2 to 4% in value. Total US wine sales approached \$60 billion in 2016, a 5% increase from 2015. 2016 is the 24th consecutive year of growth for US wine sales.

- Wines & Vines (2017)

*Over 90% of alcohol sales in India in 2012 were of spirits, mostly whiskey. **But the wine market in India is growing at 13% annually**, faster than that for any other alcoholic beverage. To keep up with the demand, we are adding a million liters of capacity every year. Today we have a capacity to produce eight million liters.*

- Sula Vineyards India, via Wall Street Journal

Scenario 4: What does this mean?

This is an expanded version of the market today. As the global population increases and correlation between red meat and GDP continues, the volume of red meat consumed increases overall. In response, a wide range of competitors will try to enter the market to capture share of volume increase.

KEY CHARACTERISTICS: Volume, Growth, Emerging Markets, Incremental, Competition

Scenario Upsides

- ✓ Potential to exploit growth/capture volume - capture share in increasing populations and growing incomes
- ✓ Speed to market - Exploit current expertise to beat out new competitors (i.e. China)
- ✓ Potential to differentiate within existing markets and defend existing share

Scenario Downsides

- x More players keep meat inexpensive (hard to premiumise and increase margins) and make market more competitive (higher volume)
- x Local governments getting into the game/reducing exports
- x Focusing too much on existing market opportunities may result in missing long-term innovation

Ways In

- Build brand story to differentiate in existing markets
- Strengthen relationships to protect your share of meat market
- Create momentum and support health story around nutritional benefits of real red meat
- Establish/Strengthen relationships in growth markets (i.e. China) and new markets

What To Watch

- Population increase
- Meat consumption in emerging markets - Indonesia, Sub Saharan Africa
- Meat consumption in growing markets - China, India
- Medical studies on the benefits of red meat

Scenarios summary



Overview of Scenarios

#1 Red Meat is pushed to the side of the plate

Consumers adopt a cultural narrative demonizing meat and shift choices away from meat to alternative sources of protein, the red meat market has contracted as regulations on meat have increased and competitive products have become widely available (affordable) and accepted.

Decreasing demand

#3 Red Meat is a reluctant choice

Consumers adopt a cultural narrative demonizing red meat and want to shift choices away from red meat to alternative sources of protein (or want to reduce), but alternative protein products aren't a viable option as the product sensory doesn't meet needs or they aren't commercially viable (expensive, niche). Meanwhile, red meat is widely available as gov't's have not regulated it.

Scarce supply

#2 Red Meat is the specialty choice

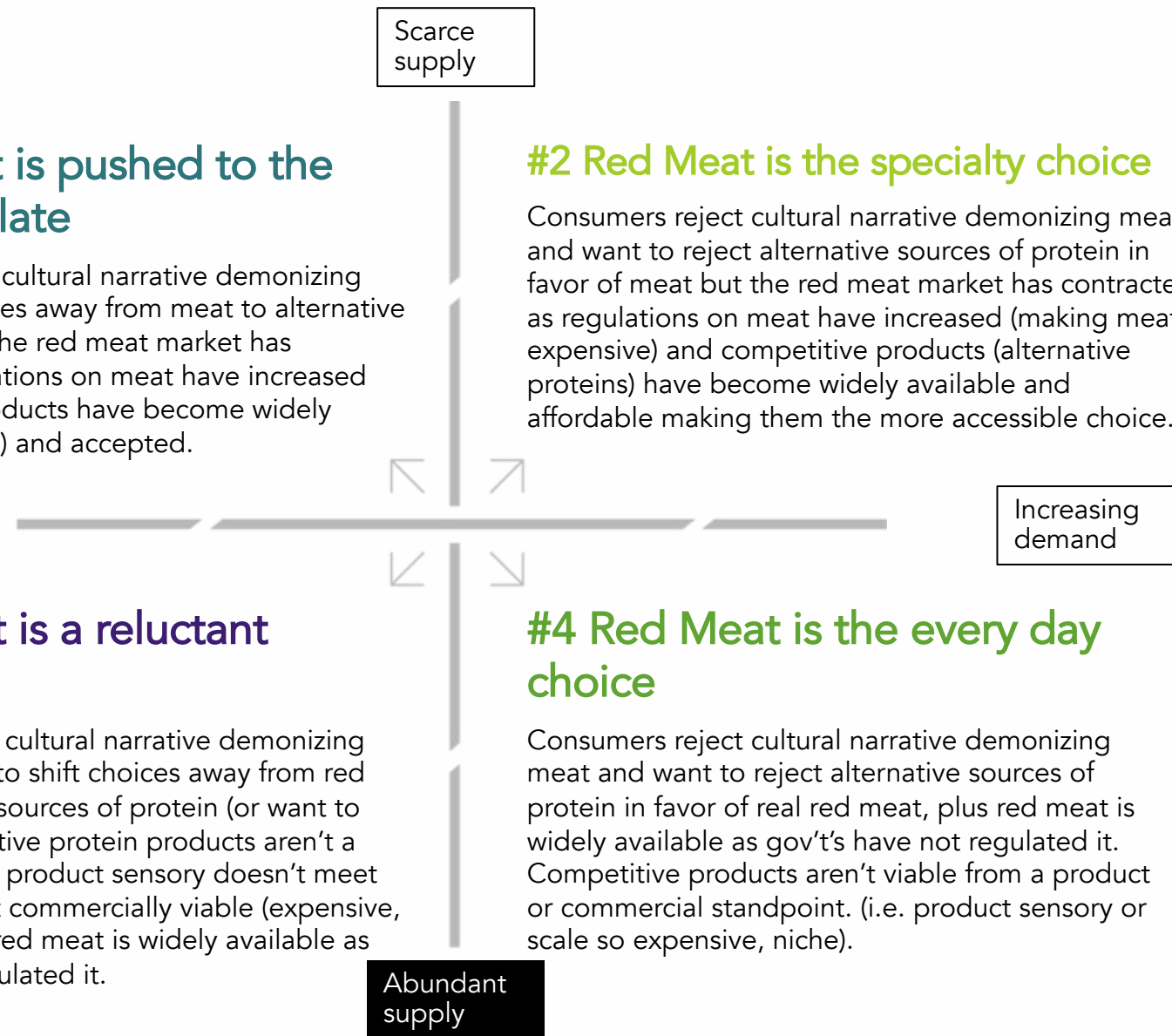
Consumers reject cultural narrative demonizing meat and want to reject alternative sources of protein in favor of meat but the red meat market has contracted as regulations on meat have increased (making meat expensive) and competitive products (alternative proteins) have become widely available and affordable making them the more accessible choice.

Increasing demand

#4 Red Meat is the every day choice

Consumers reject cultural narrative demonizing meat and want to reject alternative sources of protein in favor of real red meat, plus red meat is widely available as gov't's have not regulated it. Competitive products aren't viable from a product or commercial standpoint. (i.e. product sensory or scale so expensive, niche).

Abundant supply



#1 Red Meat is pushed to the side of the plate

1 | 2
3 | 4

Description of this world: Red meat is very rarely consumed (only when absolutely necessary) and mainstream consumers have less and less interest in it, because they believe reducing consumption helps address any ideological needs (e.g. climate issue - they are doing their part) and consumers believe they can get essential nutrients from alternative protein sources (making the shift from red meat being a win win for them).



Governments support and investment for alternative proteins means that the technology has advanced - product sensory has improved enough to meet consumers needs (don't feel there is a trade off or has exceeded expectations), it is also affordable and widely available so everyone can access it. Red meat only has a niche role for specific audiences e.g. babies, elderly or the infirmed or is produced for non food purposes e.g. medical applications.

BOTTOMLINE

Role for animal protein (red meat) for food consumption will only become less and less relevant, demand and investment/government support creates a multiplier effect in favour of alternative proteins, and in shifting meat or cows/sheep to being used for other purposes. There are fewer traditional meat producers and competitors as they shift to other revenue streams.

KEY CHARACTERISTICS

- Disruptive innovation
- High risk/high reward
- Alternative proteins dominate

#2 Red meat is the specialty choice

Description of this world:

As a result of regulation in the form of taxation and lack of subsidies/support, red meat is not widely consumed because it's expensive.

In addition there are also cheaper alternatives in the form of less desired plant proteins or cellular meat.

Desire for red meat amongst mainstream consumers hasn't changed as they aren't worried about the impact of red meat on the environment and they believe they can only get essential nutrients from real red meat. Therefore, they are frustrated they can't have red meat as much as they'd like. Since red meat is expensive and somewhat scarce, they save it for special occasions.

With additional government support alternative proteins are getting better and more available which is forcing consumers away from red meat and towards other options.



BOTTOMLINE

The red meat market doesn't expand and it gets more and more specialised and uber premium. Margins are higher, customers and markets get ever more specific and segmented, creating value tiers. With ultra specialisation the number of competitors reduces yet differentiation and ability to compete gets harder.

KEY CHARACTERISTICS:

- Ultra specialised
- Uber premium
- Value tiers
- Highly targeted
- Rare
- Real red meat is prized

#3 Red Meat is a reluctant choice

Description of this world: For consumers, red meat has fallen out of favor as they accept and adopt mounting evidence suggesting red meat is hurting the environment, and it is not good for the population as there are other ways to get protein.

Consumers are increasingly critical of red meat and are searching for new ways to incorporate alternative proteins into their diets, as they reduce red meat consumption as much as possible. They are also frustrated that red meat is still a necessary source of protein, because none of the protein alternatives are widely available. Governments are being pressured by consumers to support and invest in alternative proteins. Governments are however still protecting meat industries (and global bodies aren't being taken seriously/ their case hasn't gained traction).



BOTTOMLINE

This is a heightened version of what we are beginning to see today - i.e. incremental change in red meat consumption. In this scenario, the market is fragmenting and being shaped/pushed by consumer demand, and although red meat doesn't disappear, it does become more niche or just one of many protein source options available to consumers.

KEY CHARACTERISTICS

- Fragmentation
- Incremental
- Consumer frustration
- Pressuring governments
- Portfolio solutions
- Acquisitions, diversify

#4 Red Meat is the every day choice

Description of this world:

Red meat is still widely consumed and mainstream consumers aren't asking hard questions about its impact on the environment. The belief is that essential nutrients can only come from real red meat and can therefore justify their decision to maintain and/or increase consumption.

Governments are protecting red meat industries and global bodies haven't taken collective action to build a case connecting red meat consumption to the climate crisis, nor are they actively supporting alternative proteins as the preferred choice to feed the growing population. Meanwhile, tech hasn't advanced enough to put alternative proteins on the consideration set for consumers, who desire and prefer real red meat.



BOTTOMLINE

This is an expanded version of the market today. As the global population increases and correlation between red meat and GDP continues, the volume of red meat consumed increases overall. In response, a wide range of competitors will try to enter the market to capture share of volume increase.

KEY CHARACTERISTICS

- Volume
- Growth
- Emerging markets
- Incremental
- Competition

Strategic Responses



How do we use these scenarios?

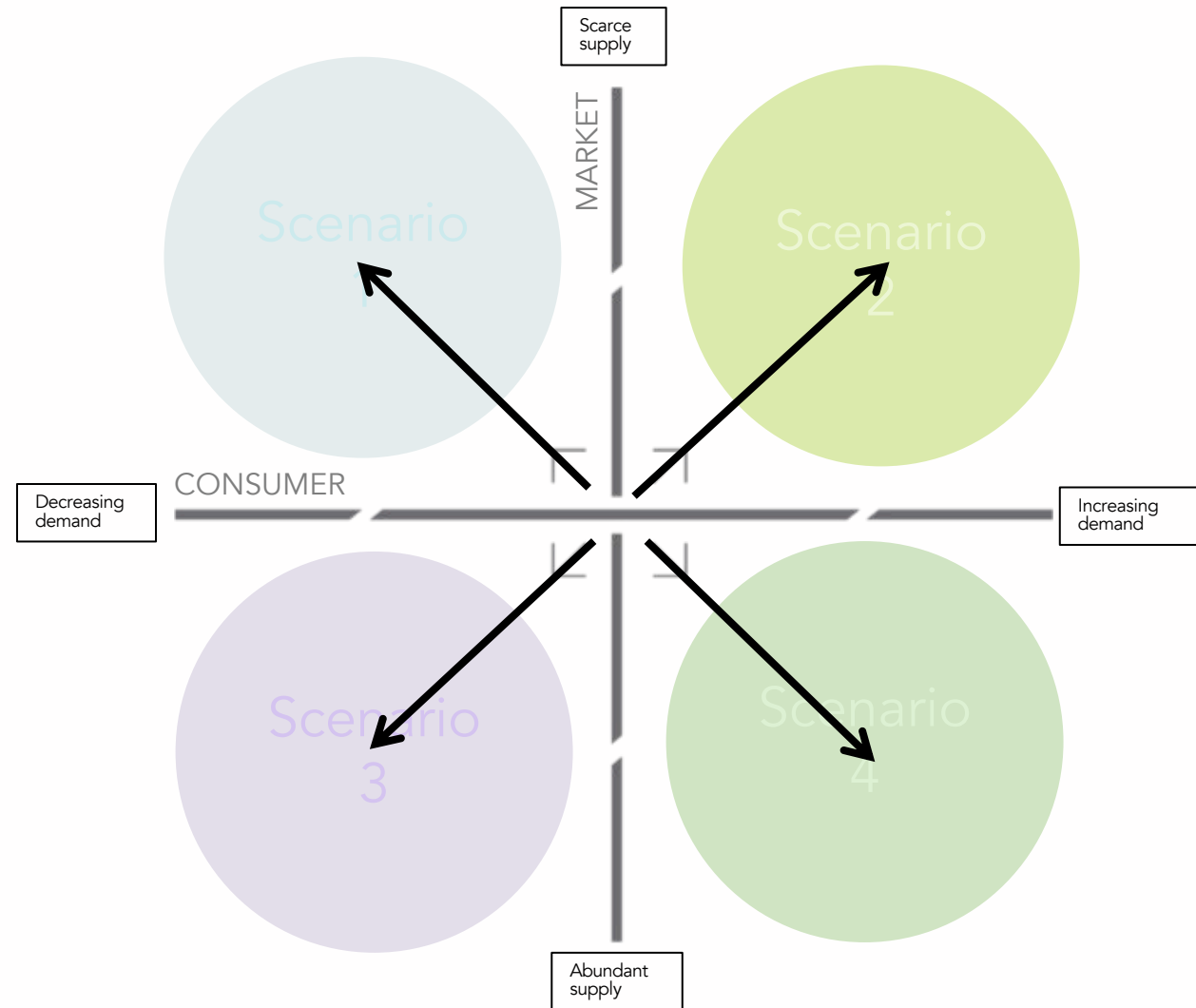
The purpose of the scenarios is to push our thinking

- ✓ Push us to the extremes of what's possible
- ✓ Propose big "what if's" to overcome blind spots
- ✓ Push back to get generate broad perspective
- ✓ Create provocations to inspire ideas
- ✓ Set foundation of understanding to plot response



The next step is to plot series of plausible strategic responses

- ✓ The reality will be closer to the center
- ✓ What matters isn't what "might" happen, what matters is what we do about it
- ✓ The scenarios won't play out in isolation, we need a multi-layered and dynamic response
- ✓ Our response will be based on our objectives and capabilities
- ✓ Not everyone will have the same response (there will be actions which require collaboration, and some that don't)
- ✓ This map is not static or linear, it requires a dynamic and nuanced response that is constantly updated



Initially it feels safest and attractive to cover all the quadrants

However, it's important to focus investment and energy in a particular direction

- ✓ Need to achieve economies of scale by working in a similar direction
- ✓ Each move requires investment, it's better to invest more in one direction vs less in each (i.e. play to win)
- ✓ The quadrants are in conflict with each other (therefore if you cover them all you dilute them all)
- ✓ We don't have permission to play in all of them, our strengths and current assets determine where/how we are best suited to play
- ✓ It's much easier to compete if we know specifically who we are competing against vs everyone

Will consumers reduce red meat consumption?

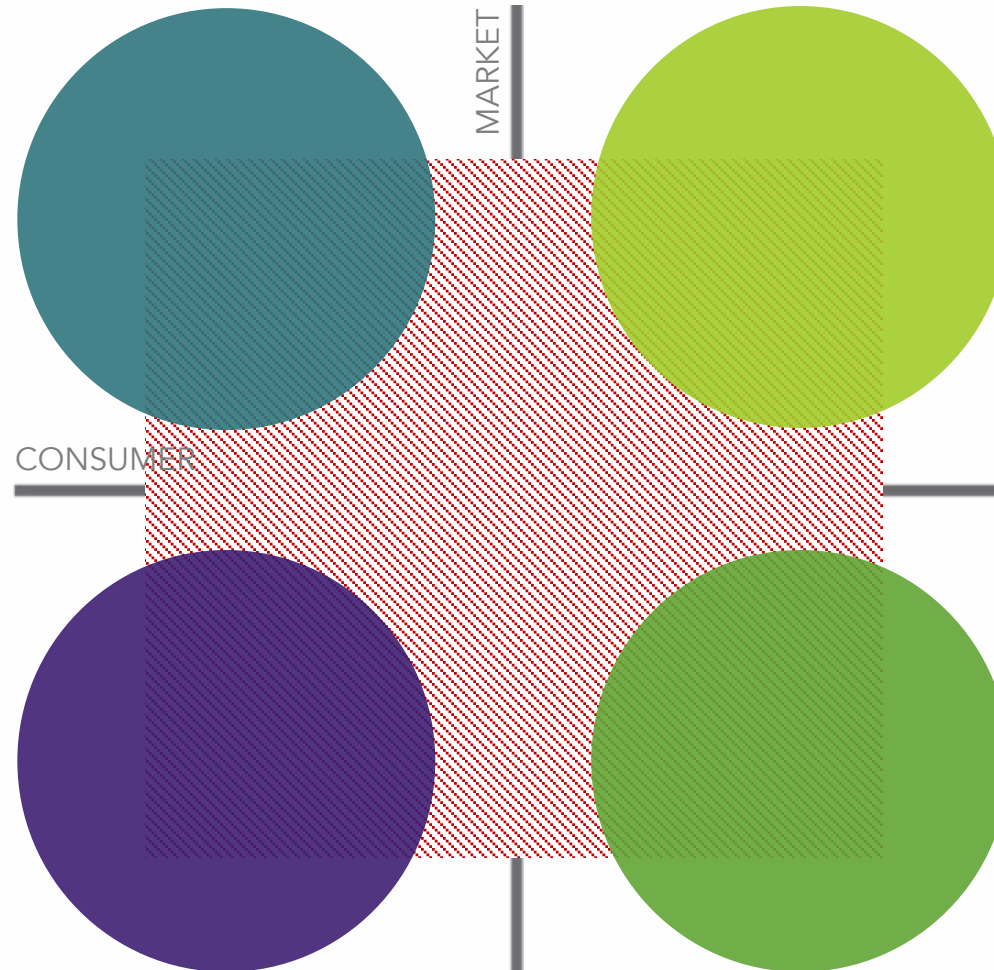
CONSUMER

Will supply of red meat become constrained and restricted?

MARKET

Will consumers maintain and increase red meat consumption?

Will supply of red meat expand and remain unconstrained?



Summary of four primary strategic responses

1. **DIVERSIFY** portfolio beyond red meat and protect current volume (share)
2. **INNOVATE** beyond red meat using funding from short-term revenue growth
3. **PREMIUMISE** by building tiers of value and investing in product development
4. **EXPAND** and grow share in red meat via differentiation and speed to market

Secondary, less attractive responses

5. Make a few **BIG LEAPS** outside of meat
6. Varied and **SPECIALISED** response
7. **WAIT** to make a more educated decision

How to think about the strategic responses

How to think about these:

- ✓ None are absolute and singular – remember they can move and our actions can move them
- ✓ Think of them as a 'center of gravity'
- ✓ The solution won't be the same for everyone
- ✓ These are made up of a series of decisions/actions vs one size fits all
- ✓ Each has short-term + long-term actions,
- ✓ Decisions need to be made immediately, but actions can follow in a series of steps vs all at once

Each response is slightly different:

Each has a range of opportunities

Each has upsides and downsides

Short-term Focus

Attractive

Long-term Investment

Unattractive

Long Bets – To Hedge

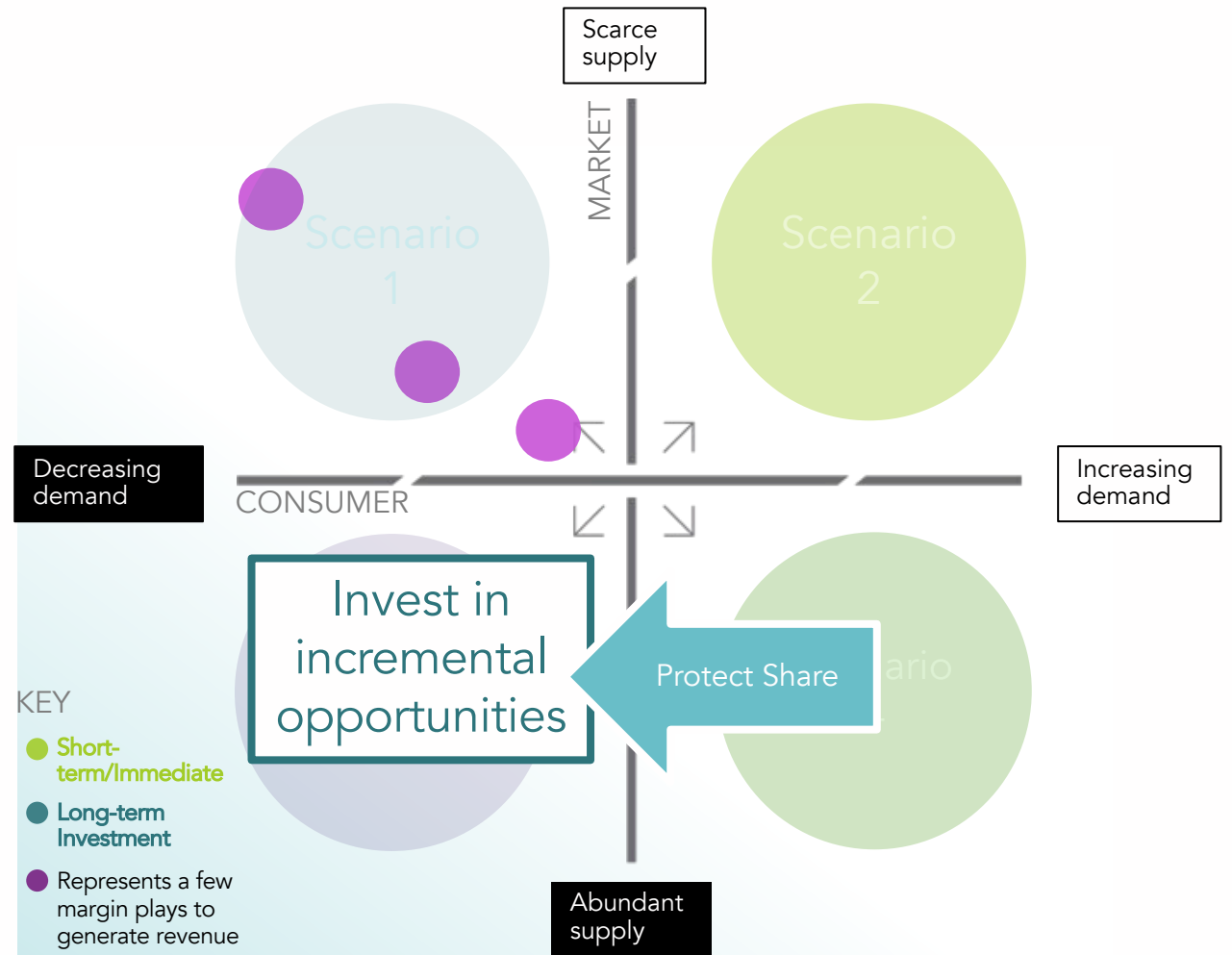
Strategic Response: **DIVERSIFY** portfolio beyond red meat and protect current volume (share)

Key insight underpinning this strategic response:

Consumers have a strong desire to eat alternative proteins, however due to a combination of existing alternative protein providers failing to offer a tasty enough product, and regulations not restricting the supply of traditional red meat; consumers are either eating alternative proteins and wishing there was a better one available and/or continuing to eat some red meat. There is an opportunity to respond to this consumer need by offering a better alternative protein option.

Diversify and Protect

- Incremental growth strategically planned (staged)
- New revenue streams outside of traditional red meat sources
- Partnerships, acquisitions, new product development
- Strategic collaboration with common goal: different roles for different players
- Minimal, focused long-bet innovation (as it is staged longer term innovation likely to follow off the back of initial innovations, as this response assumes no-one has cracked alternative protein product sensory yet)
- Shift away from farming livestock and selling animal proteins



Strategic Response: DIVERSIFY

This response is focused on **diversification**, which could include partnerships, mergers and acquisitions or new product development.

It requires a **common strategic goal across the sector** to plan a strategic staged expansion into opportunities outside red meat and a shift to secondary industry (manufacturing behaviours). In the short-term it's important to protect share, while in the long-term its important to build a repertoire of products that meet a range of consumer needs.

A few key players may want to hedge against quick markets changes by investing in a few big long-shot bets (this should be determined by capabilities).

Attractiveness

- ✓ Staged over time
- ✓ Diverse opportunities
- ✓ Pragmatic/Less Risky
- × Vulnerable to disruptive innovation
- × Not one dimensional
- × Shift away from livestock farming

Strategic Response DIVERSIFY: Score card

STRENGTHS

- Range of companies and capabilities across the sector
- Established presence in red meat market is strong foundation for protecting share and potentially applying value chain to new alternative products
- Early innovation already happening/in place in some P/L's
- Small country, know each other and can create united force & pragmatic approach

OPPORTUNITIES

- Consumer needs are shifting somewhat predictably
- More and more partners/ acquisitions available
- Red meat is still in the consumer repertoire
- Multiple ways to optimize short term share e.g. animal feed, gluten etc.

WEAKNESSES

- Diverse P&L's and competing interests
- Cooperating as a single sector has been an historical challenge
- Range of companies and capabilities across the sector

THREATS

- Consumers adopt more and more protein alternatives
- Disruptive innovation we can't currently predict takes over
- Tech players are nimble enough to react quickly to shifts/change

> REQUIRED ACTION

Short term	Focused plan around how to protect current share
	Determine best opportunities for diversification + plan for capturing
	Agree to common goal/objective and assign roles/responsibilities including timing
	Identify steps in pragmatic approach and timing of each party
Long term	Invest in new opportunities that meet shifting consumer needs
	Develop a diverse portfolio of revenue streams
	Figure out who is best suited to make a few long shot bets
	Focused plan around how to protect current share

Strategic Response DIVERSIFY: implications for the NZ red meat sector and each individual sector

NZ Red Meat Sector Implication:

This response doesn't work unless the entire sector pools their strengths and gets behind one core goal/objective. It's still possible to have separate P&L's, but actions must be coordinated in the same direction.

Government



- Provide investment and subsidies to help farmers shift business models
- Invest in incubators and other research and development facilities to build product development capabilities e.g. fund cellular meat research, fund start ups exploring the next generation alternative protein products that NZ can have proprietary patents on
- Create trade agreements and build relationships outside of red meat in other countries to pool resources e.g. Canada provides pea crops and NZ provides manufacturing
- Provide business management consulting and other marketing and sales support
- Provide business environment to support the shift and diversification of the sector's product portfolio

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- Set and manage core strategic objectives for the sector and guide implementation
- Provide leadership to create scale
- Provide market intel of how shifts are occurring and where opportunities are emerging
- Facilitate collaboration between different companies as an objective third party
- Invest in consumer research and competitive intelligence to better understand consumer behaviour, emerging trends and emerging behaviours
- Provide business management consulting and other marketing and sales support
- Invest in outside creative and consulting partners to help build a cohesive brand portfolio (protein category strategy)

Strategic Response DIVERSIFY: continued

Farmers



- Continue producing red meat while assessing assets that can be used towards developing future revenue streams (i.e. land, equipment, relationships, and other resources)
- Explore opportunities to collaborate with other farmers and big meat
- Continue to support the quality of product story (big red meat story and associated claims)
- Explore direct to end user opportunities
- Mindset shift away from farming animals to for example crops, insect farms

Meat Companies



- Build new relationships with relevant exporters and distributors e.g. from red meat importers to alternative protein importers or retailers
- Explore direct to consumer or retailer opportunities
- Invest in consumer marketing capabilities
- Develop working relationships (collaborative but not necessarily uncompetitive) with each other to achieve greater efficiencies and share distribution channels and relationships. E.g. Meat company X specialises in one product/segment/market and meat company Y specialises in a different one, then together they manage the relationship with exporters and achieve success for New Zealand

Strategic Response DIVERSIFY: What might this look like?

In 2012, Global dairy giant **Danone** was growing but had become vulnerable to market shifts (40% of sales were concentrated in Western Europe and consumer tastes were shifting – per capita consumption of milk has dropped 13% in the US over the past five years). They spent five years repositioning their portfolio to be completely focused on health and wellness.

STEP 1

Acquired Dairy-Free Brands by purchasing WhiteWave foods

WhiteWave increased sales 19 per cent over the past four years, making it the fastest-growing company in the US food and beverage industry.

STEP 2

Built a more sustainable supply chain for remaining dairy portfolio

Danone created a partnership with farmers to pay for certifications if farmers started using non-GMO feed.

STEP 3

Invested in future opportunities for dairy hybrids

Investing in R&D to create a dairy/plant-based combination product.

WHAT WE CAN LEARN

- ✓ This was rooted in an overarching objective to reposition the company to meet shifting consumer needs
- ✓ It took place in stages over a five year period and it still continues today
- ✓ They had to look at shifting all areas of their business from product to supply chain to a lot of investment in R&D

This is really about resilience, over all, and therefore the long-term adaptation of models of agriculture and eating and drinking practices” - Global CEO, Danone, Emmanuel Faber

Another example:

Unilever’s recently diversified by taking their most famous Ice Cream brand Ben and Jerry’s into the non-dairy space. (Sales of non-dairy ice cream in the US leapt by 44% in 2016, while dairy ice cream rose only 3% – Nielsen) “The focus of plant-based alternatives is no longer reduced to functionality,” according to Mintel. “The new wave of products focuses strongly on taste and indulgence rather than on health.”

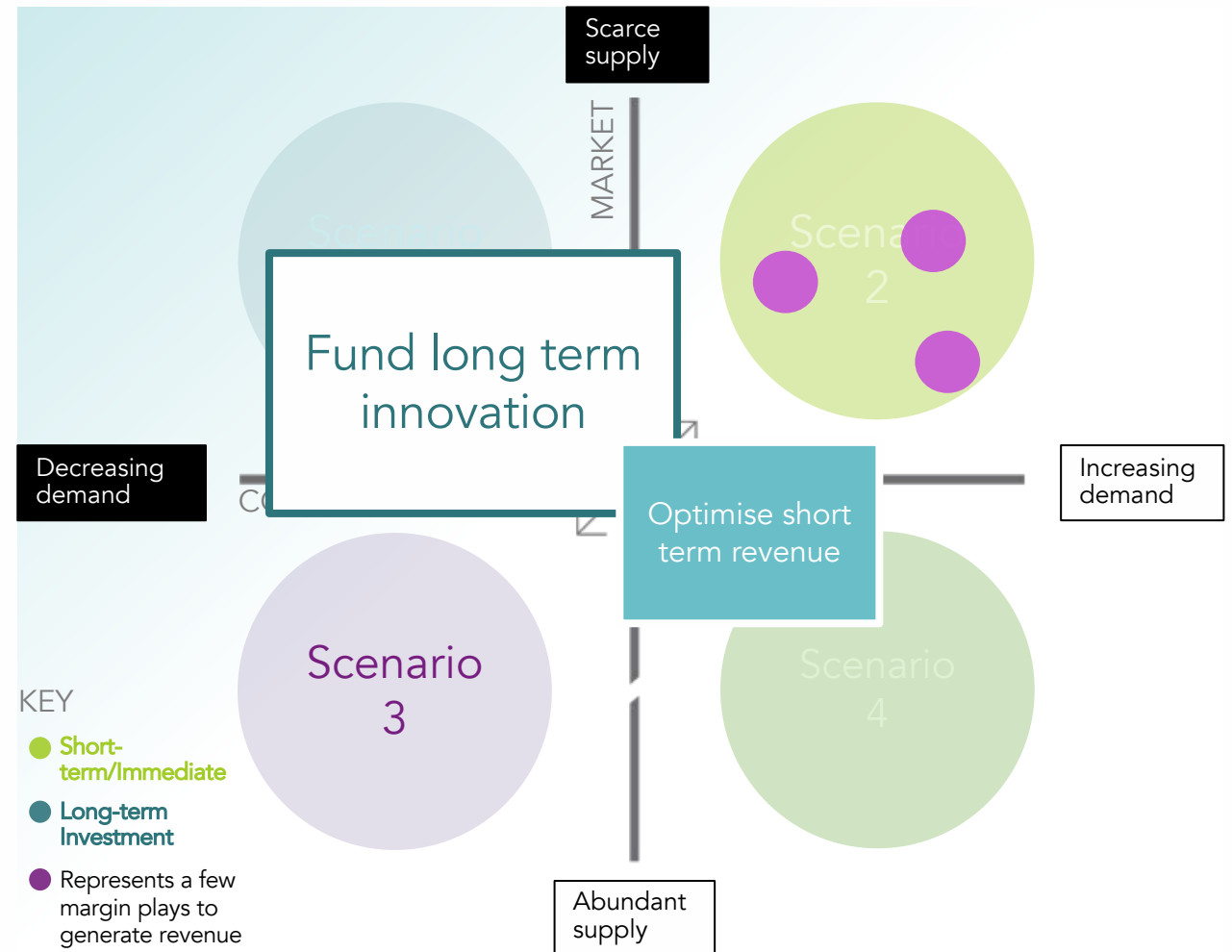
Strategic Response : INNOVATE beyond red meat using funding from short-term revenue growth

Key insight underpinning this strategic response:

The alternative protein market is established and competitive, consumers have widely adopted these products and they are now mainstream. Livestock production has been highly regulated and any livestock still being raised is used for other purposes e.g. medical use or medical nutrition. There is an opportunity to invest in ways to apply existing resources to new categories e.g. tourism and medicine.

Innovate outside of meat consumption

- Long-term future innovation – think big and well beyond meat category
- Optimize short-term revenue to fund long-term gain (assumes you leave red meat consumption market)
- Expand view of market (i.e. outside of traditional red meat consumption, think about use of farm land, medical, by products or tourism)
- Paradigm shift – Imagine new business models
- Expand capabilities and skills
- Timing dependent (slow growth now, but will accelerate fast) can't decide to do this later



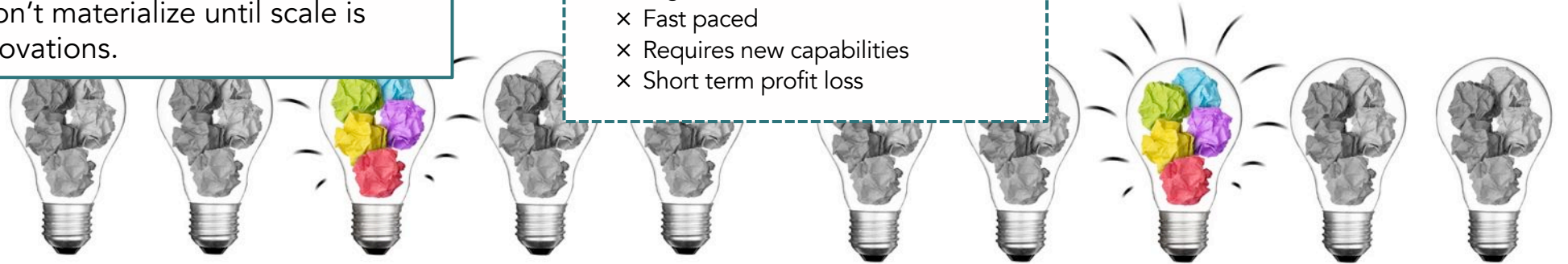
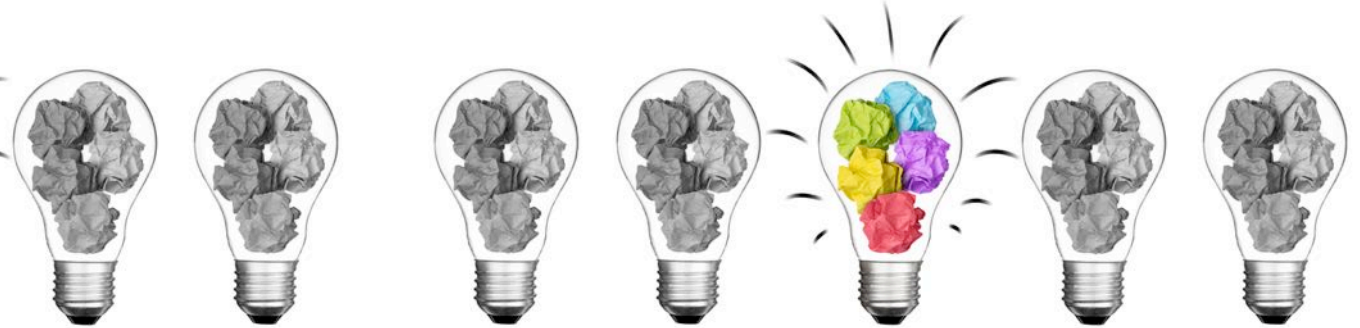
Strategic Response: INNOVATE

This response is focused on long-term **innovation**, which includes investing in and creating new opportunities, outside of red meat consumption, potentially beyond food, which could include products, services, or new business models.

It requires a very focused objective on **where and how to invest (how to shift our business) as well as building new capabilities**. In the short-term it is important to generate revenue to fund investment into the long-term. It should be expected that in the short-term potential losses could be incurred, as returns won't materialize until scale is reached with the new innovations.

Attractiveness

- ✓ Potential for high return
- ✓ Very focused
- ✓ Still raise animals
- × Higher risk
- × Fast paced
- × Requires new capabilities
- × Short term profit loss



Strategic Response INNOVATE: Score card

STRENGTHS

- Some new tech already exists, as well as a range of assets (farm land etc.)
- Gov't's and other bodies are incentivized to help/play role
- Have pulled this off before e.g. wine and wool
- Early innovation already happening/in place in some P/L's

OPPORTUNITIES

- Still the wild west, room for big winners (winner takes all)
- Lots of players that could benefit from partnerships (i.e. need for cow tissue)
- Market is still undefined (consumer needs are also open for influence)
- Multiple ways to optimize short term share e.g. animal fed, gluten etc.

WEAKNESSES

- Difficult for a coalition to take big risks
- Competing P&L's make it harder to channel investment
- Have to move beyond current capabilities including even more partners
- May need to share IP with each other (competition is now offshore and not within NZ companies)
- As a sector you have historically focused on the short term gains (< 12 months)

THREATS

- No way to know how the tech timeline plays out (could invest in wrong stuff)
- Big players with big money could monopolize new opportunities
- Flood of new competitors (well outside meat category)
- Note: you could go into alternative proteins here, however competition is high as alternative proteins have already been widely adopted

> REQUIRED ACTION

	> REQUIRED ACTION
Short term	Agree and focus on revenue streams that are the most profitable in short-term
	Find partners within to start building R&D capabilities (including in gov't, universities)
	Agree to a focused approach and the trade-offs, losses you are willing to take
Long term	Agree and focus on revenue streams that are the most profitable in short-term
	Invest in a range of diversified streams (don't bet on only one horse)
	Think big and take some risks on opportunities to reimagine business
	Initiate research into new opportunities (i.e. tourism) to begin moving toward capturing

Strategic Response INNOVATE: implications for the NZ red meat sector and each individual sector

NZ Red Meat Sector Implication:

This response requires a clear vision and strong leadership. It involves accepting risk and a willingness to manage the potential of short term loss. It's still possible to have separate P&L's, however the degree of collaboration required can feel like there is a joint P&L.

Government



- Provide necessary support to sector during the transition from traditional red meat
- Invest in infrastructure and human intelligence development to enable innovations and success
- Establish partnerships and develop relationships with other countries to collaborate and share resources
- Invest in incubators and other research and development facilities to build product development capabilities e.g. next generation agribusiness or application of livestock to other uses e.g. medical
- Create trade agreements and build relationships outside of red meat in other countries
- Provide necessary business management consulting and support services for the new industries

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- Provide leadership and support for new business models
- Diversify capabilities and services to support the different innovation opportunities and emerging business
- Set and manage the new vision for the sector and guide implementation
- Provide market intel of how shifts are occurring and where opportunities are emerging
- Facilitate collaboration between different companies as an objective third party
- Invest in consumer research and competitive intelligence to better understand consumer behaviour, emerging trends and emerging behaviours
- Provide business management consulting and other marketing and sales support
- Invest in outside innovation and product development partners to help facilitate the transition
- Provide investment to identify opportunities for each region

Strategic Response INNOVATE: continued

Farmers



- Explore opportunities to collaborate with other farmers and big meat to create new products
- Assess assets for other uses and applications (i.e. land, equipment, relationships, and other resources)
- Explore other beef and sheep breeds to better deliver on new innovation needs
- Assess business and identify optimal opportunities for your individual business
- Educate and upskill to become an expert in a new innovation opportunity
- Create a coalition to pool resources and identify opportunities suitable for your region
- Explore cash out revenue opportunities and exit strategy

Meat Companies



- Assess and identify new opportunities for investment e.g. start up investment, M&A
- Explore ways to apply operations and capabilities to other innovations
- Upskill and become experts in the new innovation areas
- Create a coalition to pool resources and identify opportunities suitable for your region
- Assess business and identify optimal opportunities for your individual business
- Develop working relationships (collaborative but not necessarily uncompetitive) with each other to pool resources and achieve economies of scale or conversely, agree who invests in what to help facilitate focus and achieve success for New Zealand as a whole

Strategic Response INNOVATE: What might this look like?

In 2016, after years of financial losses and a continuing decline in the consumption of regular milk, **Elmhurst Dairy** closed its milk producing plants. One year later, it re-opened and had completely shifted its positioning and business model to focus on vegan nut milks.

STEP 1

Partnered with an outside expert to create product expertise

Henry Schwartz convinced plant-based food expert Dr. Cheryl Mitchell to bring her methods for making non-dairy Milked Plants to Elmhurst. "Elmhurst is bring the packaging and distribution expertise, and Dr. Mitchell is bringing the power of milked plants."

STEP 2

Created a new product called MILKED and invented a proprietary process for creating nut milks

It calls its proprietary process "milking." Cold milling machines extract all of the protein, fat, and micronutrients from the nuts, which means Elmhurst doesn't need to fortify the milks with additional vitamins.

STEP 3

Built new distribution channels in premium stores and direct to consumer

It's about transforming with the times. As awareness and demand for vegan products continues to grow, we're seeing plant-based options become mainstream.

- Henry Schwartz, CEO Elmhurst.

WHAT WE CAN LEARN

- ✓ It is possible to shift your entire business, Elmhurst re-opened after only about a year away from the business
- ✓ Outside experts are necessary to help move into a new industry
- ✓ You can't just change your product, you have to adopt a whole new mindset about your business

Another example:

In 2011, Facebook diverted its entire engineering staff from building out their web-based platform (core product) to building a new messaging app. For two years, the company took on financial losses as there were not updates to its core product.

CEO Mark Zuckerberg had bet the future of the company on the adoption of mobile as the primary way people would consume online content. Facebook had to retrain almost 70% of their staff in order to build the messenger app for mobile.

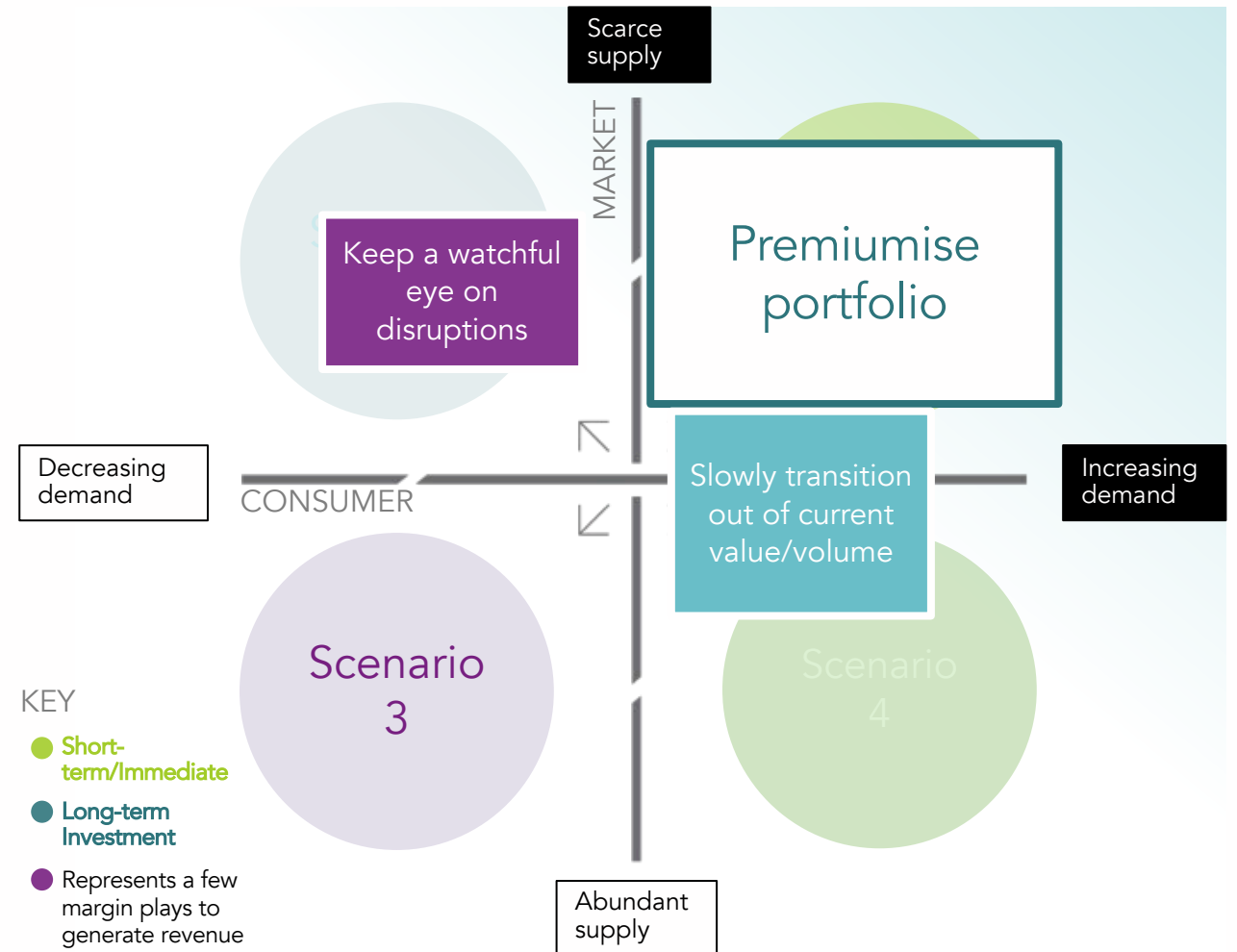
Strategic Response : **PREMIUMIZE** by building tiers of value and investing in product development

Key insight underpinning this strategic response:

Consumer desire for red meat as food is high and scarcity of supply as a result of regulation has made red meat all the more coveted. Furthermore, competition in red meat is fierce, as players try to hold on to their margin by reinventing premium and the tiers of value. There is an opportunity to leverage existing capabilities and create a NZ version of ultra premium with your own clearly defined tiers of value.

Premiumise through tiers of value

- Transition away from volume, shift focus to margin
- Over time, build tiers of value (can keep a value play)
- Invest in building product and credentials
- Requires focused coordination
 - everyone must follow same guidelines
- Ongoing investment in product to protect premium position
- Watch tech innovations and disruptions to protect margin



Strategic Response : PREMIUMIZE

This response is focused on **super premiumisation** which requires building out our existing strong position in red meat to include tiers of value (low to super premium).

It requires a very focused and coordinated response (everyone has to be in playing by the same rules) and requires giving up some volume opportunities in the short-term to invest in premiumisation in the long-term. It also requires building a brand and established new premium cues (i.e. bigger than grass-fed and a heightened version of the red meat story).

To hedge against disruptive innovation, it requires watching how different technologies play out to see if it's necessary to invest in opportunities outside meat.



Attractiveness

- ✓ Very focused
- ✓ Strong capabilities
- × Exposed to market shifts
- × Harder to win
- × High investment required
- × Impact on P&L for dairy

Strategic Response PREMIUMIZE: Score card

STRENGTHS

- Strong red meat credentials and momentum in this direction
- Strong infrastructure/relationships in the industry
- Strong geography, origins, claims potential
- Have some direct to consumer infrastructure e.g. Coast Spring Lamb

OPPORTUNITIES

- Margin play will exist for a long-time while alternatives stay in mince
- If meat is scarce, margin can actually become very large
- Alternative protein may stay out of muscle

WEAKNESSES

- Current red meat story may need additional product investment
- Existing volume players can tarnish reputation here
- Livestock from dairy industry needs a new home
- Sales team vs brand/marketing team

THREATS

- Alternative protein tech gets so much better it reduces margins
- Other competitors are also positioned to build the same credentials e.g. Ireland
- Consumer demand can shift in a moment (i.e. new health study etc.)

> REQUIRED ACTION

Short term

Create guidelines for premium based on capabilities (what does it look like)

Plan how to coordinate efforts and where/how to invest in building product

Decide which levels of volume/value to keep and build on

Long term

Invest in product credentials, continue to increase margin

Invest in strong brand story and in creating scarcity

Assess other margin opps like providing tissue for cellular etc. (watch it)

Strategic Response PREMIUMIZE: implications for the NZ red meat sector and each individual sector

NZ Red Meat Sector Implication:

This response requires a significant investment in the premiumisation of product and the regulation of agreed premium guidelines. It involves commitment from all parties to adhere to guidelines or accept exclusion from claiming New Zealand sourced meat.

Government



- Push back on global regulations and lobby individual governments to help establish superiority of New Zealand product
- Provide support and subsidies for farmers as they transition to the ultra premium product ranges
- Manage local environment groups and temper the climate change story
- Lobby international markets to get maximum share of beef and sheep market i.e. if 1000 cows and sheep allowed on the planet - New Zealand gets maximum allocation

New Zealand Beef + Lamb



- Establish and manage the premium beef and lamb guidelines
- Provide leadership and support for evolved business models
- Help invest in premium brand specialists to help build high quality story and supporting products while creating scarcity in the story
- Facilitate collaboration between different companies as an objective third party
- Invest in consumer research and competitive intelligence to better understand new consumer audiences' behaviour and needs to ensure New Zealand is always delivering what is considered to be super premium
- Provide business management consulting and other marketing and sales support
- Invest in outside innovation and product development partners to help facilitate the transition to super premium and creation of value tiers
- Provide investment to identify opportunities for each region
- Watch tech innovations and disruptions to protect margin

Strategic Response PREMIUMIZE: continued

Farmers



- Create a product strategy to optimise value products and shift to producing premium products
- Explore opportunities to collaborate with other farmers and big meat to create new products
- Explore other beef and sheep breeds to better deliver on what is considered to be premium
- Assess business and identify optimal opportunities for your individual business
- Educate and upskill to become an expert on the new consumer audience's needs
- Create a coalition to pool resources and identify opportunities suitable for your region
- Explore direct to customer strategies
- Ensure super premium guidelines are adhered to

Meat Companies



- Create new relationships and up the game in terms of story telling and sales
- Strengthen relationships with farmers to ensure super premium cues are being delivered in product
- Ensure super premium guidelines are adhered to
- Explore direct to customer strategies
- Develop working relationships (collaborative but not necessarily uncompetitive) and agree how to divide up global markets and achieve success for New Zealand as a whole.
- Become experts in the new consumer audience

Strategic Response PREMIUMIZE: What might this look like?

1871 Dairy is an ultra premium micro-dairy in Chicago, that produces small batch and artisanal dairy products. They don't sell to commercial processors, instead they bottle their own milk, yogurt and ice cream and sell it directly to consumers. The owner describes his operation as a microdairy because it's like a microbrewery. He hopes to eventually have a tasting bar in downtown Chicago.

STEP 1

Returning to older artisanal methods of dairy processing

The dairy pasteurizes the raw milk at 145 degrees, a lower temperature than at many commercial processors, which helps retain its healthful enzymes.

A half gallon of 1871 Milk is \$7, more the double the cost of standard milk

STEP 2

Created innovative specialty products

Flavored milks and yogurts such as Raspberry basil

In this day and age, with the milk market so volatile, farmers have three options: You get a niche and process your own milk, you get bigger, or you get out of dairy farming

- Owner of Micro Dairy Trinity Valley In New York

STEP 3

Sells to specialty retailers and directly to consumers

Supplies grass-fed cow's milk to Michelin Star restaurants

WHAT WE CAN LEARN

- ✓ This concept isn't mainstream, but the margins are almost double that of normal milk producers at \$7 for a half gallon
- ✓ There is an exceptional amount of focus given to the product and proprietary methods
- ✓ There is an entire experience created around the product

Another example:

Fairlife Milk created an ultra-premium offer in dairy milk (which directly competes with nut milks) by offering a super premium benefit. They produce ultra-filtered milk which creates concentrated nutrients.

The founders left the traditional dairy farming business to create a cooperative of 99 family owned farms, who all share the same standards and processes. As a collective they entered into an agreement with Coke to distribute their product.

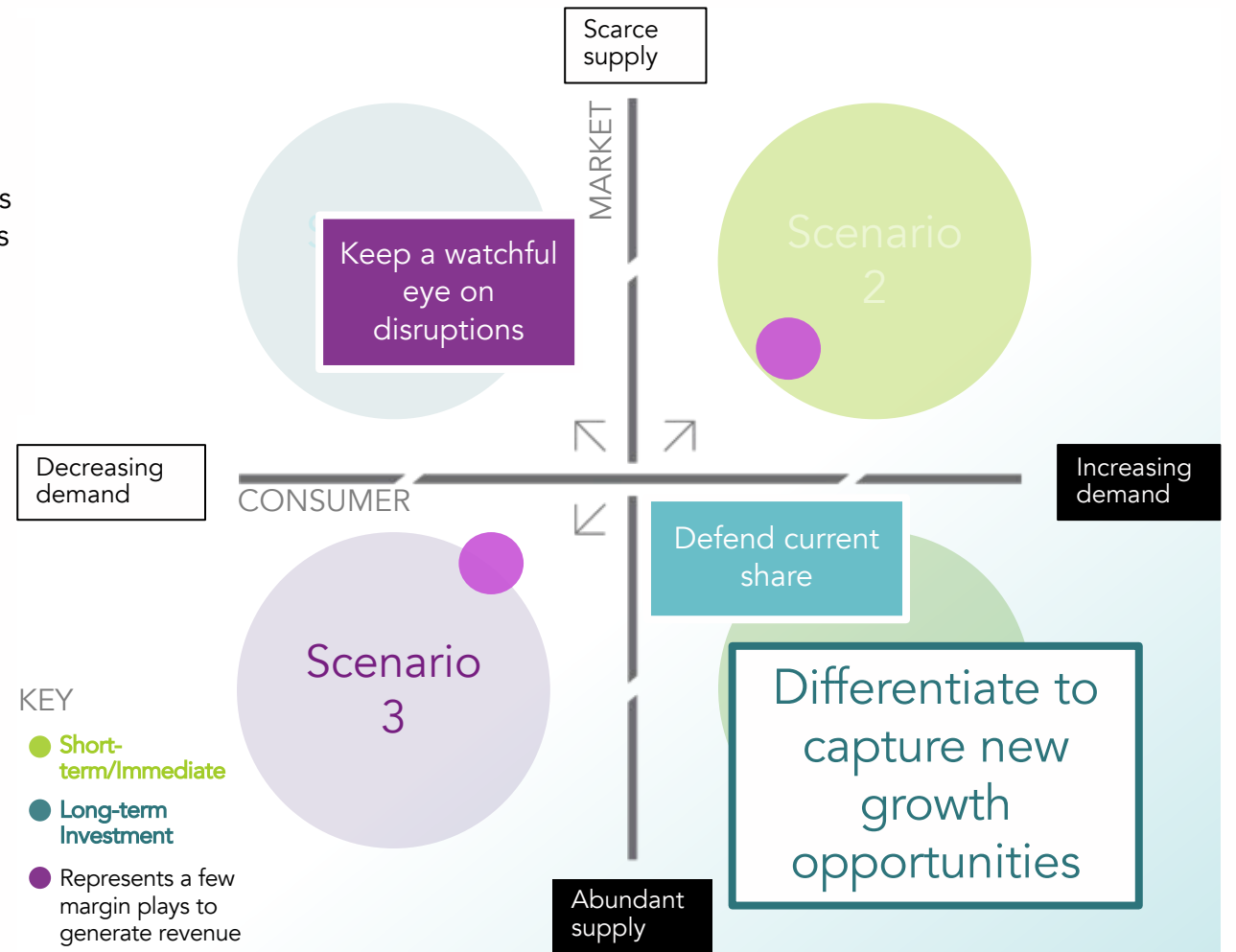
Strategic Response: **EXPAND** and grow share in red meat via differentiation and speed to market

Key insight underpinning this strategic response:

Consumers continue to eat red meat and as the population grows the consumption of red meat has increased in line with this population growth. With new consumers entering the category (e.g. China and India), the needs of this group is changing the product requirements. In addition, new players are entering the market to try and capitalize on the growth, making the market more competitive than ever. There is an opportunity to capture new share through differentiation, specifically by delivering on the needs of the new consumers better and faster than anyone else.

Targeted expansion to grow share

- Worldwide increase in volume of red meat consumed, driven by new markets
- New markets bring new needs and consumer behaviours
- Speed to market is key as others attracted to growth opportunity
- Dominate growth in emerging market, requires economic power and strength
- Defend current share by optimizing all value products
- Collaborate to remain competitive (not cannibalise each other)
- Monitor how market moves/fragments to manage long-term risk



Strategic Response: EXPAND

This response is focused on **targeted expansion** and growth in red meat, which means capturing new consumers, increase volume with existing consumers and moving quickly into emerging markets.

It requires working collectively in a co-opetition way and becoming even more competitive, entering emerging markets with economic force (must build strength in numbers). In the short-term it's important to build brand positioning stories to differentiate and defend share. In the longer term its important to invest in capturing growth (speed to market) before new competitors emerge. (i.e. in India/China or a region within those large markets).

This response is completely focused on the red meat market and is therefore very exposed, so it requires watching how innovations emerge and it allows for some to move outside of red meat if capabilities allow.



Attractiveness

- ✓ Immediate
- ✓ Strong capabilities
- ✓ Still raising animals
- × Exposed to market shifts
- × Erosion of margin
- × Risk of diluting brand

Strategic Response EXPAND: Score card

STRENGTHS

- Strong relationships and supply chain
- Quality product and distribution plus strong value products (from dairy)
- Production and scaling capabilities for more volume and use of entire animal
- Learning from Blue Apron experience - volume + spec proof of 2+ suppliers required

OPPORTUNITIES

- Growing population and meat consumption
- Consumers could reject health claims for plant-based
- Medical studies could prove need for meat
- New and emerging consumer needs and product spec requirements

WEAKNESSES

- Relationships in new markets
- Potential for cannibalization/competition among each other
- Potential size as an economic force to dominate in emerging markets

THREATS

- Disruptive innovation we can't foresee (beyond what currently exists)
- Competitors we can't foresee with lower margins (i.e. China)
- Local competitors and forces coordinate against importers

> REQUIRED ACTION

Short term

Move quickly to defend current share through brand positioning

Build more external relationships to grow into new markets

Create coordinated effort based on strengths to ensure all opps. covered

Engage in consumer research to understand the wants and needs of the new markets (med. term)

Long term

Expand offer to next generation of meat eaters (young ppl in China/India)

Invest in generating volume through new partnerships (i.e. the next McDonalds)

Watch how innovation/regulation is playing out to cover self

Strategic Response EXPAND: implications for the NZ red meat sector and each individual business

NZ Red Meat Sector Implication:

This response requires becoming very competitive and moving very quickly to capture emerging markets. All collaboration is focused on speed to market.

Government



- Provide inroads to emerging markets - knock on doors, establish trade agreements
- Establish infrastructure in relevant markets
- Provide expertise in business management consulting and other marketing and sales support for the specific markets
- Provide investment support to accelerate speed to market
- Invest in health studies to encourage volume of red meat consumption or adoption of red meat consumption

New Zealand Beef + Lamb



- Provide expertise in the consumer behaviour and needs of the emerging markets
- Become experts in core international markets
- Invest in understanding the consumer in the new growth markets
- Monitor how market moves/fragments to manage long-term risk
- Provide leadership and support as the sector transitions to an aggressive volume play
- Define and sell the revised New Zealand meat story
- Facilitate collaboration between different companies as an objective third party
- Engage in a strategy to create demand i.e. encourage new emerging markets to eat red meat

Strategic Response EXPAND: continued

Farmers



- Explore ways to increase efficiency and speed of product to market e.g. faster fattening of livestock
- Create a product strategy to optimise speed to market
- Explore other beef and sheep breeds to better deliver on speed to market strategy
- Explore consolidation opportunities to enable tackling large volume markets e.g. China
- Educate and upskill to become an expert on the consumer needs in key markets
- Create a coalition to pool resources and identify opportunities suitable for your region
- Invest in product development to ensure delivery of new needs e.g. nutrition spec, breeds, production process

Meat Companies



- Expand into or deepen relationships in key markets and regions
- Establish infrastructure to facilitate speed to market
- Identify the “new McDonalds” in these markets and develop strong relationships
- Develop working relationships to ensure all opportunities are covered so New Zealand achieves success as a whole.
- Become experts in the new consumer audience
- Invest in needs for new markets e.g. processes, cuts etc.

Strategic Response EXPAND: What might this look like?

The dairy industry in the U.S. is hitting back at declining sales by coming together with a coordinated response.

STEP 1

Developed a coordinated comms campaign

For the last 20 years, they have promoted the consumption of milk through their Got Milk? Campaign. Their newest campaigns instead focus on dairy overall to promote milk, cheese and yogurt. They've gone through a complete re-branding/positioning to make the tone of the campaign more modern and inclusive.

STEP 2

Focusing on expansion

Working with the U.S. trade representative Robert Lighthizer to focus on markets such as Mexico.

Looking at new markets

Expanding its market reach to Asia remains a key priority for the U.S. dairy Sector. Exports to Southeast Asia rose 16% and sales to China were up 74% for the first quarter of 2017.

We will continue to urge Lighthizer to focus on protecting Mexico, our number 1 market, and pursue additional export opportunities around the world."

- Tom Vilsak, CEO US Dairy Sector

WHAT WE CAN LEARN

- ✓ This required a significant amount of investment in communication and brand positioning to try to influence consumer demand and push a new narrative around Dairy
- ✓ Global expansion is essential to draw new consumers (and requires strong partnerships with gov't officials in both domestic and foreign gov'ts)

Another example:

In 2011, after 20 years of promoting itself as "the other white meat," the National Pork Board launched a new advertising campaign to increase consumption among existing consumers. The new line "Pork. Be Inspired" is designed to inspire pork lovers to consume Pork in new and varied ways. They said, "Our best opportunity for growth was our biggest fans, they are heavy protein users [but] there was a lot more headroom that they could eat more pork."

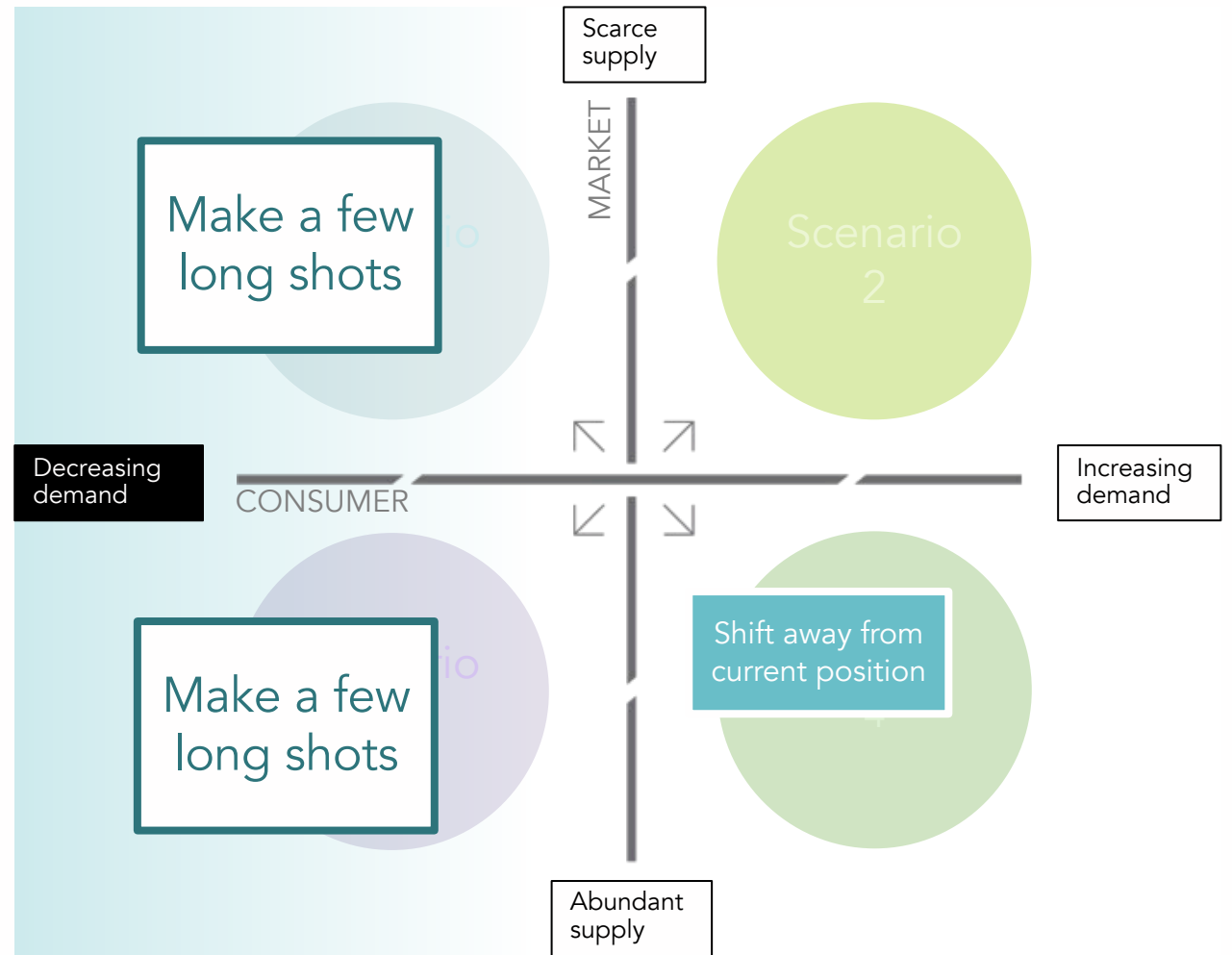
Strategic Response:

Shift focus away from red meat, take a big risks outside of red meat

Why we didn't build this out

- There are too many diverse capabilities within our sector to choose only a few big bets
- We are too established and have too much existing value to walk away from
- The forces of change are still too volatile to take huge leaps, the headwinds could shift their direction at any moment leaving us exposed
- A staged approach is more likely to reflect how consumers shift, they won't all become vegan over night, so our strategy should reflect this

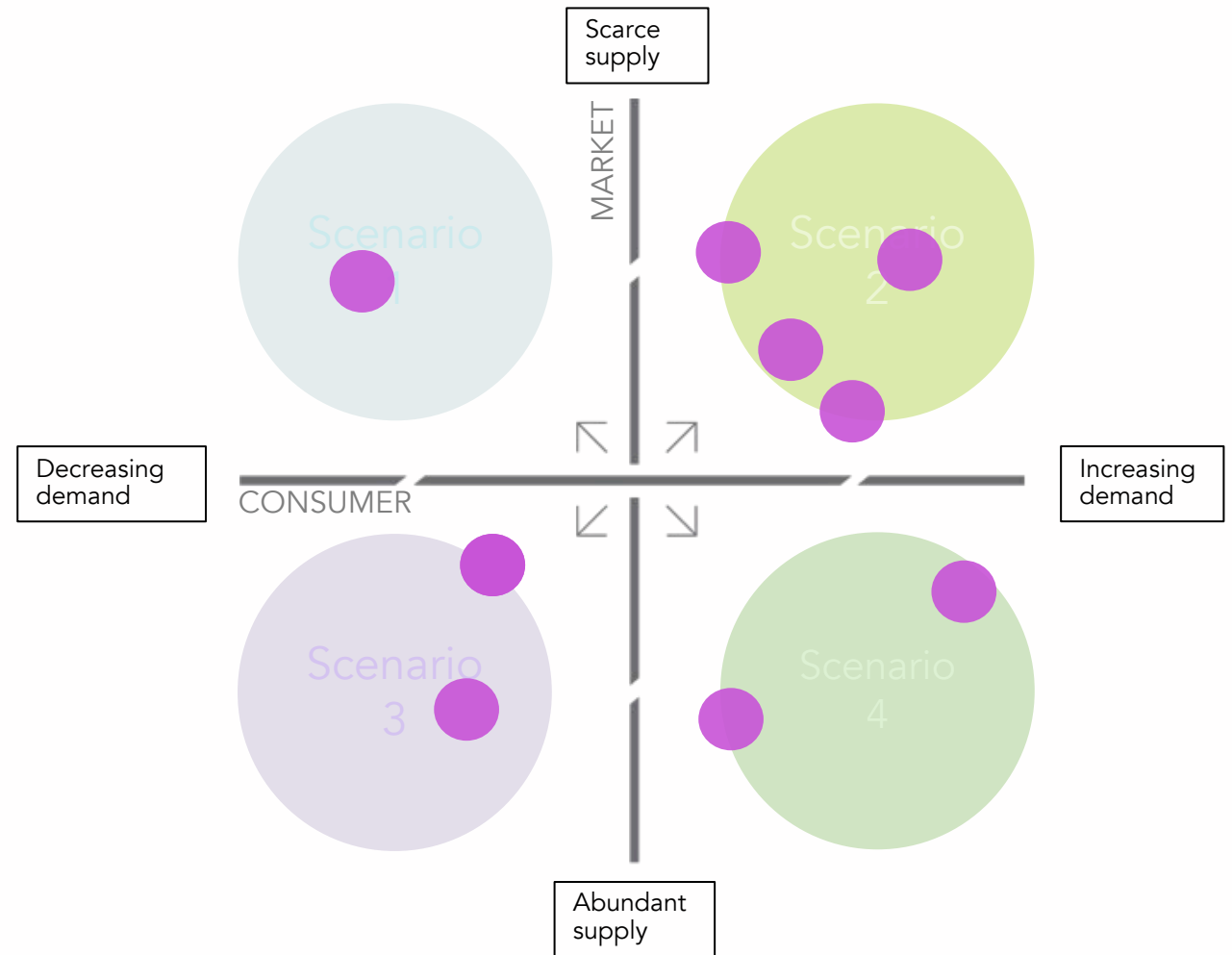
- KEY
- Short-term/Immediate
 - Long-term Investment
 - Represents a few margin plays to generate revenue



Strategic Response: Individualised response, everyone focuses on their own speciality

Why we didn't build this out

- The quadrants are in conflict with one another, therefore if everyone has their own agenda, everyone's actions will be diluted/cannibalised
- Specialisation will happen in the coordinated responses anyway (it will simply exist with an agreed overall objective)
- This will set us up to have some big winners and big losers depending on how things play out

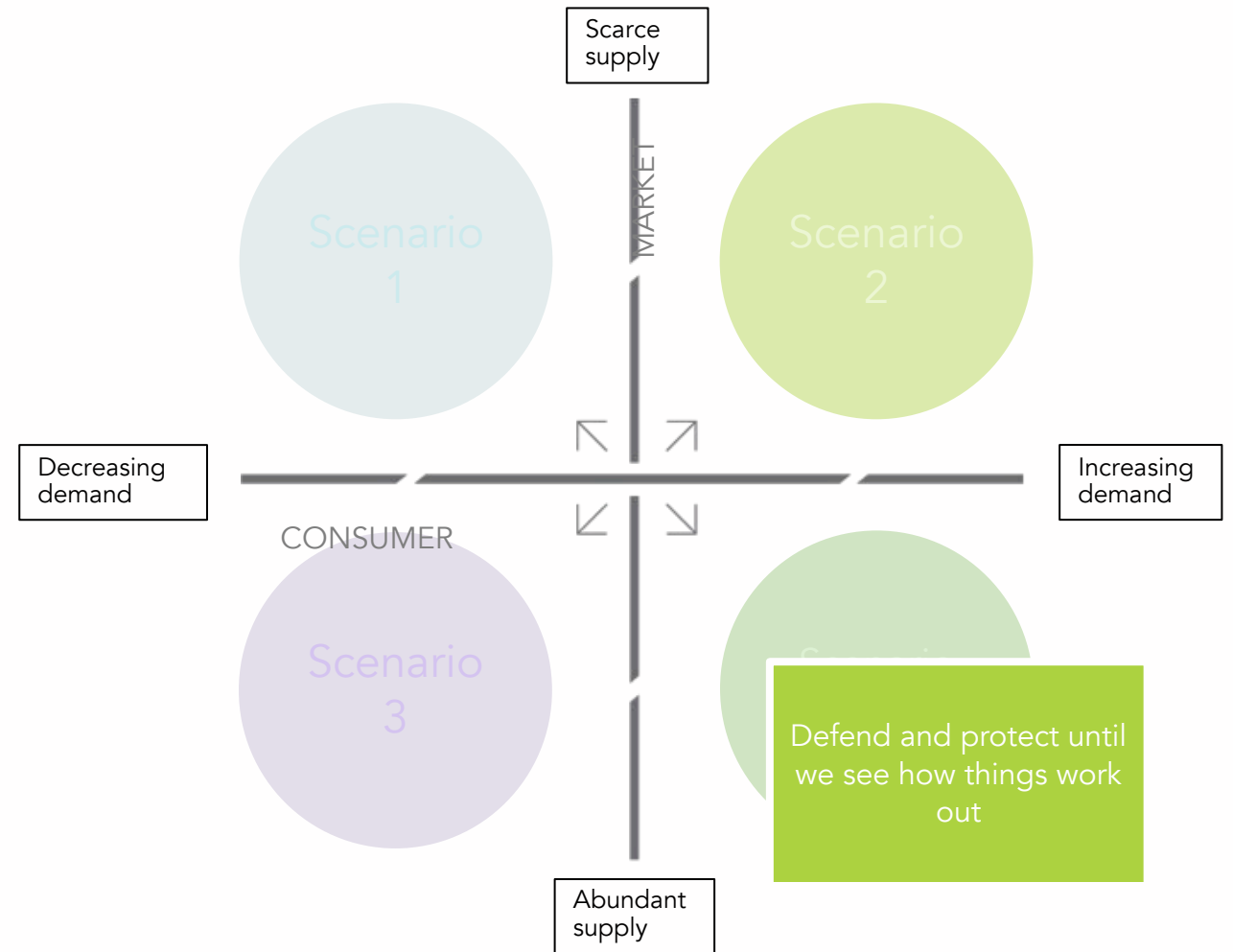


Strategic Response: No response, wait until the headwinds become more clear

Why we didn't build this out

- While change is happening slowly now, that doesn't mean we can wait to make a decision
- Decisions have to be made well before acceleration occurs to create momentum in one direction
- There is some time to see how some of the forces shape out, but its better to create momentum and then pivot vs waiting with the expectation that it will be easy to go from 0-60

- KEY
- Short-term/Immediate
 - Long-term Investment
 - Represents a few margin plays to generate revenue



A reminder of the strategic responses

1. **DIVERSIFY** portfolio beyond red meat and protect current volume (share)
2. **INNOVATE** beyond red meat using funding from short-term revenue growth
3. **PREMIUMISE** by building tiers of value and investing in product development
4. **EXPAND** and grow share in red meat via differentiation and speed to market

Secondary, less attractive responses

5. Make a few **BIG LEAPS** outside of meat
6. Varied and **SPECIALISED** response
7. **WAIT** to make a more educated decision

Want to know more

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