

FAIRR INITIATIVE: A FOCUS ON SUSTAINABLE FOOD SYSTEMS

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FAIRR is the fastest growing ESG network with over \$38 trillion of assets



Best Sustainable Investment Research



Short-listed, ESG Research of the Year



Most Outstanding Initiative



How we work with investors and companies in the food sector

Define material risks
for investors in the
sector

Produce research &
facilitate
engagements on
material issues

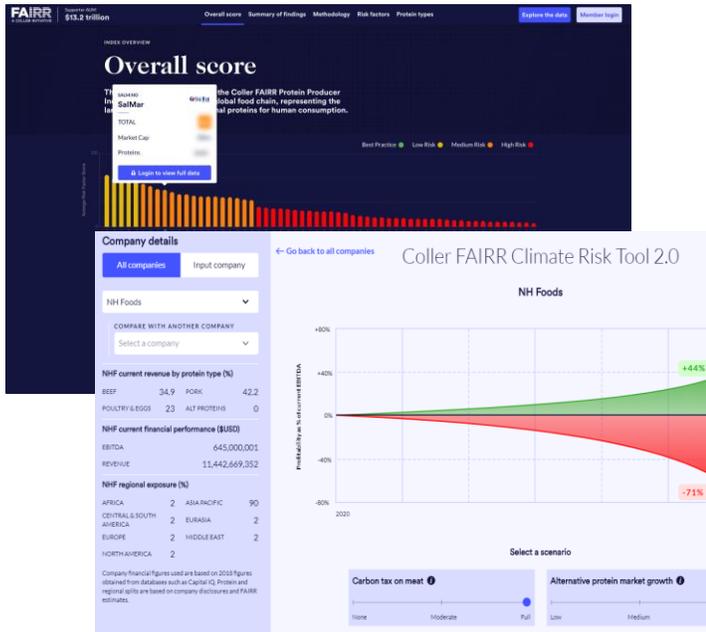
Encourage
companies to report
on established
metrics so investors
can assess risks

Derive standardised
metrics where there
are gaps
(eliminate
information
asymmetry)

Help investors
assess company
performance on
risks &
opportunities

FAIRR produces research, practical tools & facilitates engagements

BENCHMARK TOOLS & ANALYSIS



SECTORAL & THEMATIC REPORTS



ENGAGEMENTS



Sustainable Protein in the Supply Chains



Working Conditions in Meat Processing



Sustainable Meat Sourcing



Animal Pharma & Antibiotics

Contents

1. Industry risks

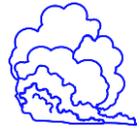
2. Deep dives

3. Tools

Future of Food: Assessing risks in the global livestock sector

Intensive livestock farming is a driver of major ESG risks

Sector is exposed to a wide array of ESG risks but remains under-regulated.



GHG EMISSIONS

14.5% OF GLOBAL GREENHOUSE GAS EMISSIONS



FRESHWATER

USES MORE FRESHWATER THAN ANY OTHER INDUSTRY



DEFORESTATION

CATTLE/SOY PRODUCTION IS THE #1 CAUSE OF DEFORESTATION



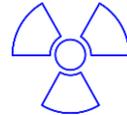
WASTE

MANURE & FERTILIZER RUNOFFS CAUSE WIDESPREAD POLLUTION



ANTIBIOTICS

#1 USER OF ANTIBIOTICS, INCL. SHARED-CLASS



FOOD SAFETY

HIGH RISK OF NON-COMMUNICABLE & FOOD-BORNE DISEASES.



LABOUR

INADEQUATE SAFETY & POOR VISIBILITY OF SUPPLY CHAINS ISSUES



WELFARE

CLOSE CONFINEMENT AND ROUTINE MUTILATIONS



GOVERNANCE

MATERIAL FAILINGS IN SUSTAINABILITY GOVERNANCE

Physical and transition risks are not priced into today's markets.

Increasingly forceful policy and market responses and more extreme events likely over the next decade.

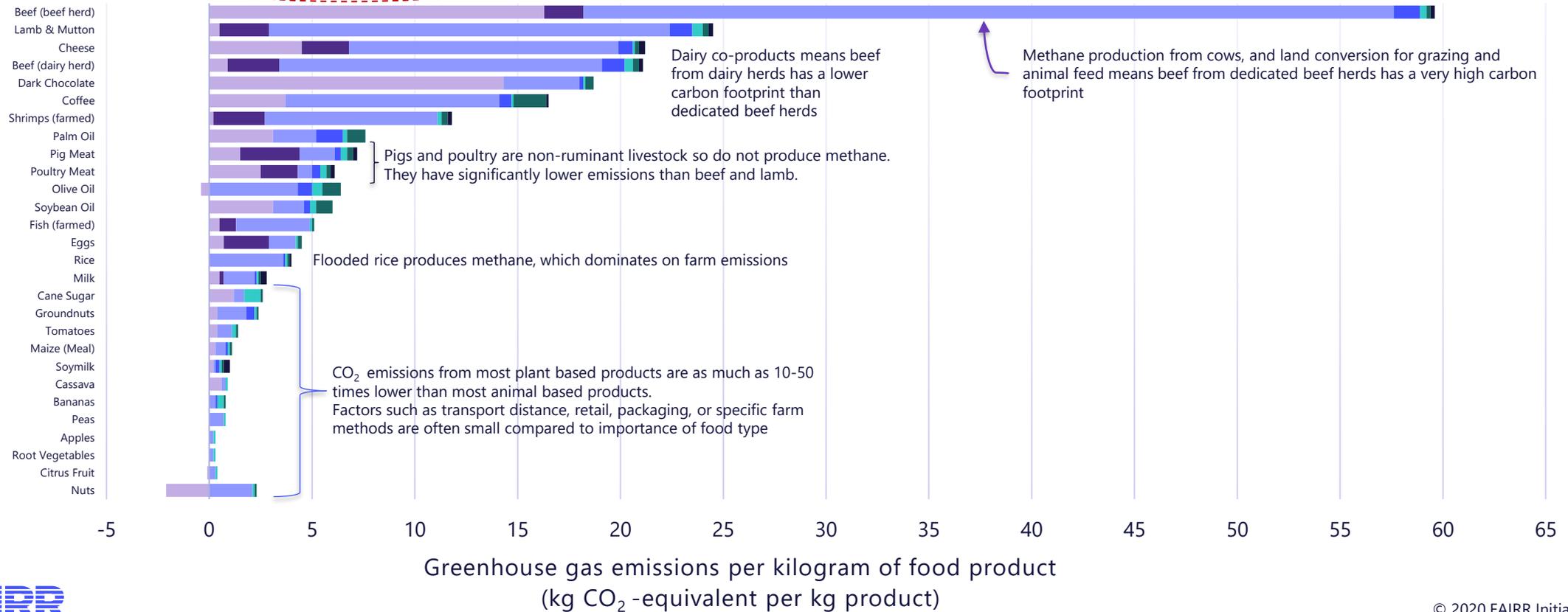
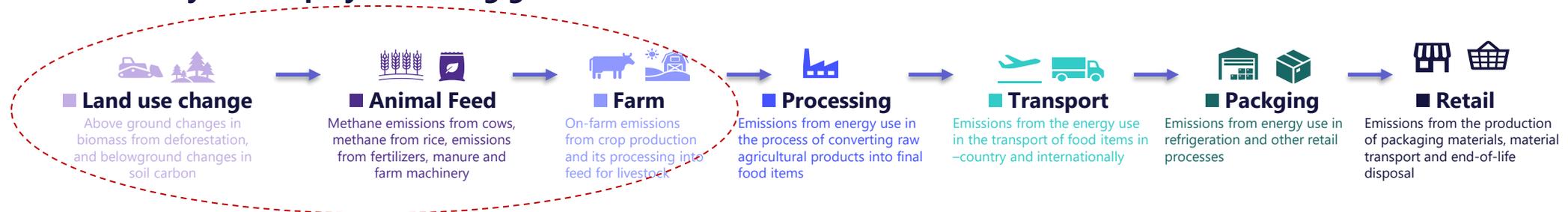
TRANSITION RISK ¹			PHYSICAL RISK ¹	
MARKET	REGULATION, POLICY, LEGAL	TECHNOLOGY	CHRONIC	ACUTE
Shifting diets and consumer preferences	Carbon pricing	Alternative proteins grab market share	Declining water supply	Losses due to hurricanes or flooding
Downstream buyers imposing sustainability requirements on suppliers, limiting market access	Litigation	Growing costs linked to sustainability interventions, e.g., feed additives and methane reducing technologies	Increased feed costs, as well as lower availability and quality due to changing temperature and precipitation patterns	Input supplier shortages resulting from extreme weather
Shareholders adopted net zero targets, limiting capital access	Growing local and national regulations on welfare, antibiotics use, enforcement of pollution measures, increased enforcement of land zoning		Higher livestock mortality and lower growth rates due to temperature increase ²	Spread of pests and diseases

'Transition': Risks related to the transition to a lower-carbon economy

'Physical': Risks related to the physical impacts of climate change

One third of global greenhouse gas emissions come from food systems

Livestock has a key role to play in curbing global emissions



There will be an inevitable policy response to tackle food sector emissions

Net Zero targets will threaten the commercial viability of emissions-intensive meat and dairy companies

New Zealand Zero Carbon Bill¹ ...



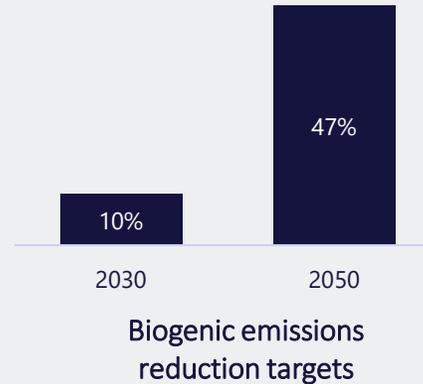
Climate Change Response (Zero Carbon) Amendment Act 2019

Public Act 2019 No 61
Date of assent 13 November 2019
Commencement see section 2

Bill introduced to deliver commitment to making country carbon net-zero by 2050

... which has different regulations for methane emissions

Aims to cut **10%** of biological methane by 2030 and up to **47%** by 2050



Primary livestock emissions



Emissions from fertilizers

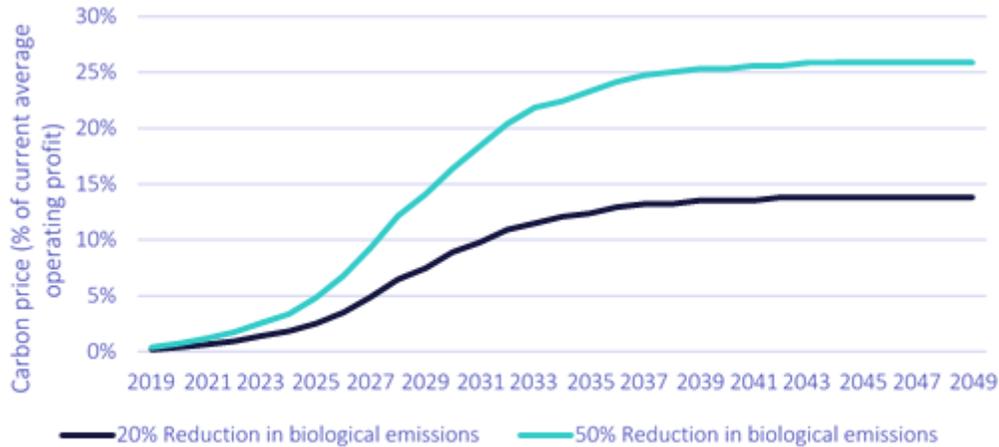


The primary mechanism is a proposed agricultural emissions pricing scheme, which will be introduced in 2025, though the design of the pricing mechanism remains unclear as it is still being developed. The government will conduct a review of progress made on the pricing scheme. If no progress is made, sector emissions will be subject to the NZ ETS scheme.

A carbon price on livestock farmers will result in cost increases, higher debt, and potential curbs on production

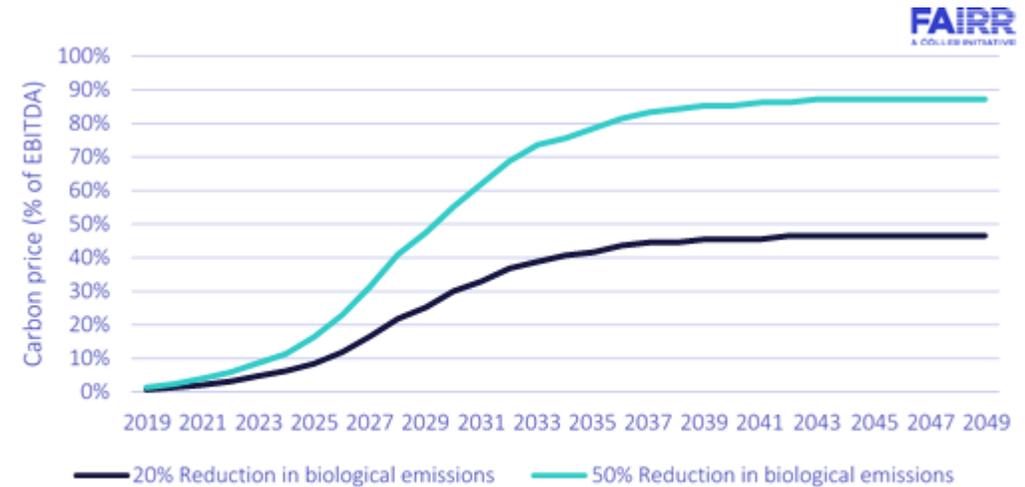
Carbon pricing will drive up costs and exacerbate debt for dairy farmers in New Zealand

Carbon prices could be up to 14% - 26% of the current average operating profit of owner-operator dairy farms by 2050



Data sources: *Farms, forests and fossil fuels: the next great landscape transformation*, Parliamentary Commissioner for the Environment; *Economic Survey 2018-19*, DairyNZ; *New Zealand's Greenhouse Gas Inventory 1990-2018 vol 1*, Ministry for the Environment

Carbon costs for Fonterra – which has 80% market share of New Zealand's dairy industry – could amount to 47% - 87% of current EBITDA by 2050



The data does not account for the cost pass through of the carbon price

Data Sources: *Farms, forests and fossil fuels: the next great landscape transformation*; Parliamentary Commissioner for the Environment, *Fonterra CDP Climate 2020*; *Fonterra Annual Report 2020*

There will be an inevitable policy response to tackle food sector emissions

Net Zero targets will threaten the commercial viability of emissions-intensive meat and dairy companies

Northern Ireland Draft Agri-Food Strategy¹

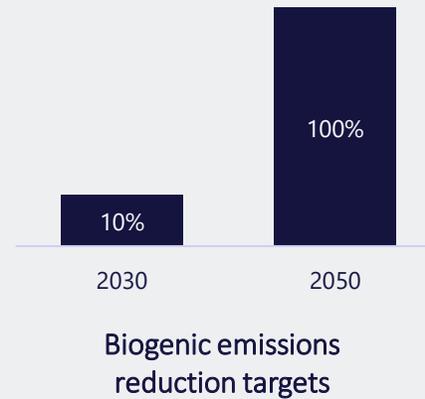
Draft Agri-Food Strategy 2030 – Executive Summary

Draft for Public Consultation
April 2021

Strategy introduced to deliver commitment to making country carbon net-zero by 2050

A Climate-neutral food system by 2050

Aims to cut **10%** of biological methane by 2030 and become **climate neutral** by 2050



Livestock emissions



Emissions from fertilizers



The current AgClimatise strategy “makes clear **an increase in the national cattle herd above current levels will jeopardise the achievement of the sector** attaining climate neutrality by 2050”.

There will be an inevitable policy response to tackle food sector emissions

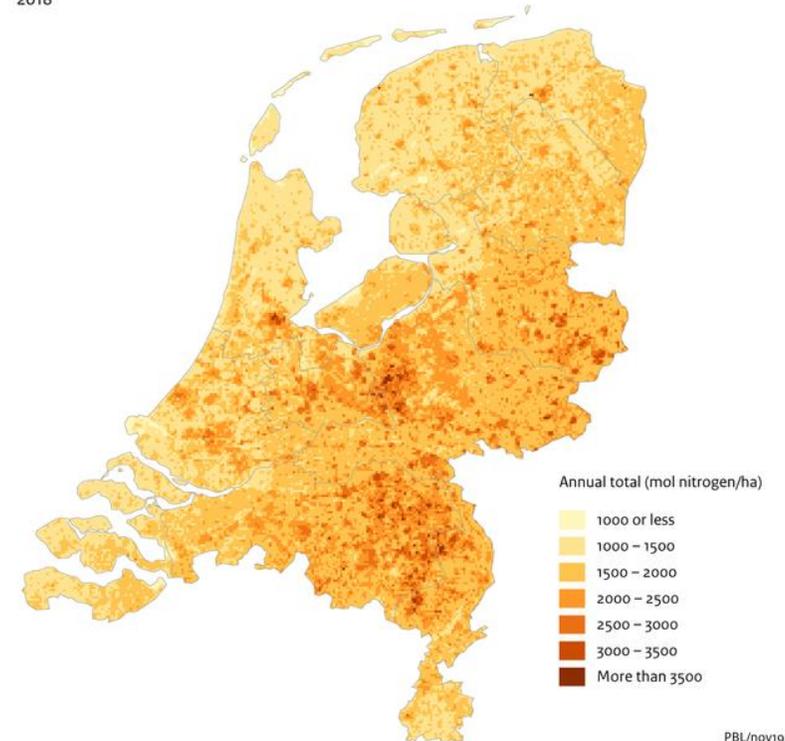
Stringent environmental regulation will threaten the commercial viability of emissions-intensive meat and dairy companies

New Dutch Law To Curb Nitrogen Emissions

- Dutch farms contain four times more animal biomass per hectare than the EU average (pork & dairy)¹
- Agriculture is responsible for nearly half of nitrogen pollution that falls in the country.
- New law to limit nitrogen emissions by half by 2035.²
- According to estimates, the Netherlands will reduce its production by 1.8 million piglets and by 1 million finisher pigs.³

Nitrogen deposition

2018



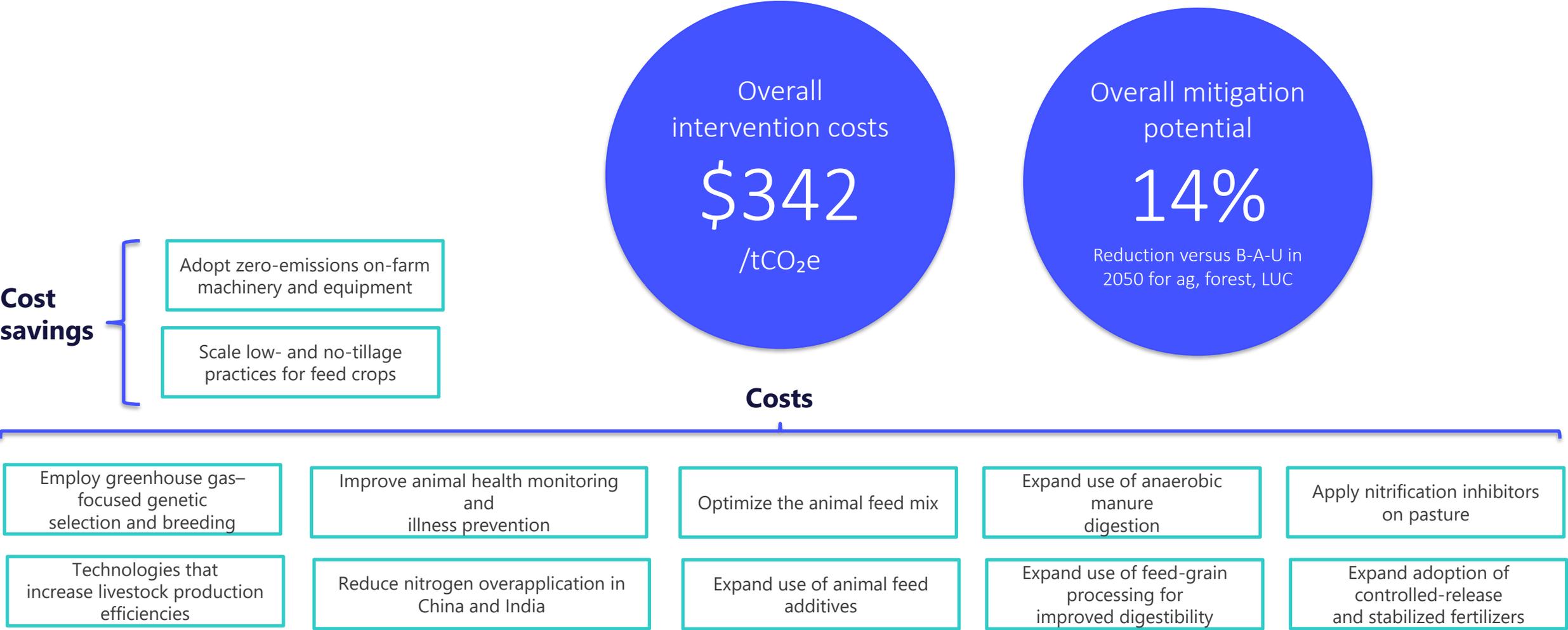
Source: RIVM, 2019

53%
Global N₂O
emissions

264x
GWP

Mitigation of impacts will impact CAPEX and/or operating expenses¹

Stringent environmental regulation will threaten the commercial viability of emissions-intensive meat and dairy companies



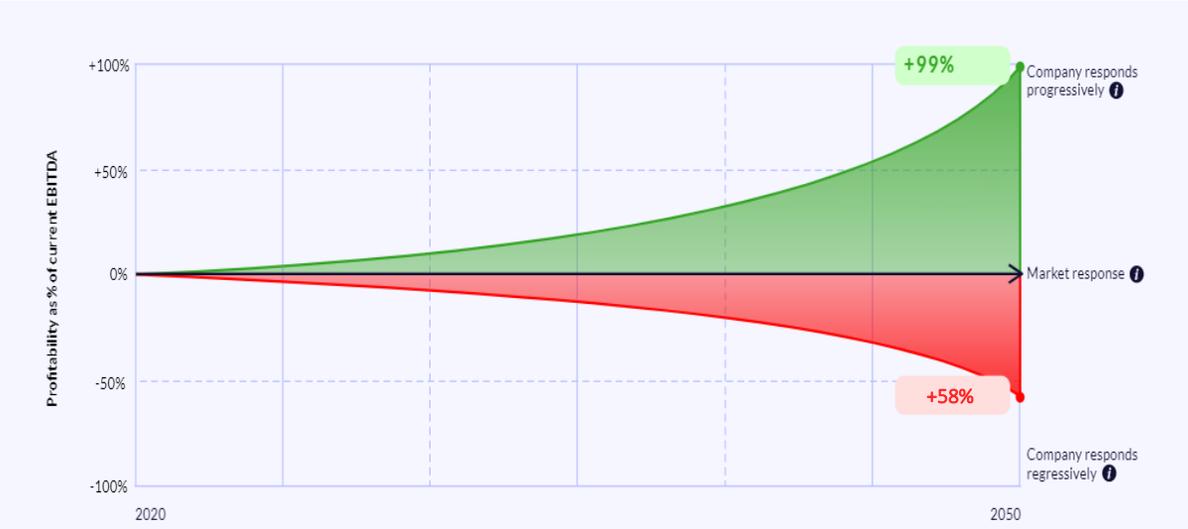
1. McKinsey Agriculture and Climate Change
<https://www.mckinsey.com/~media/mckinsey/industries/agriculture/our%20insights/reducing%20agriculture%20emissions%20through%20improved%20farming%20practices/agriculture-and-climate-change.ashx>

Coller FAIRR Climate Risk Tool: climate scenario analysis tool for the protein sector

Stringent environmental regulation will threaten the commercial viability of emissions-intensive meat and dairy companies

2°C scenario analysis developed with the best available climate science to assess 38 of the largest animal protein producers

Addressing both transition and physical climate impacts and climate mitigation opportunities



Our model shows that on average, companies' risk between 54% to 102% of their current EBITDA in response to transition and physical linked climate costs in 2050, even after accounting for sustainability interventions.



Carbon tax on meat



Increased energy costs for poultry



Increased animal feed costs



Increased cost of cattle mortality



Increased veterinary costs

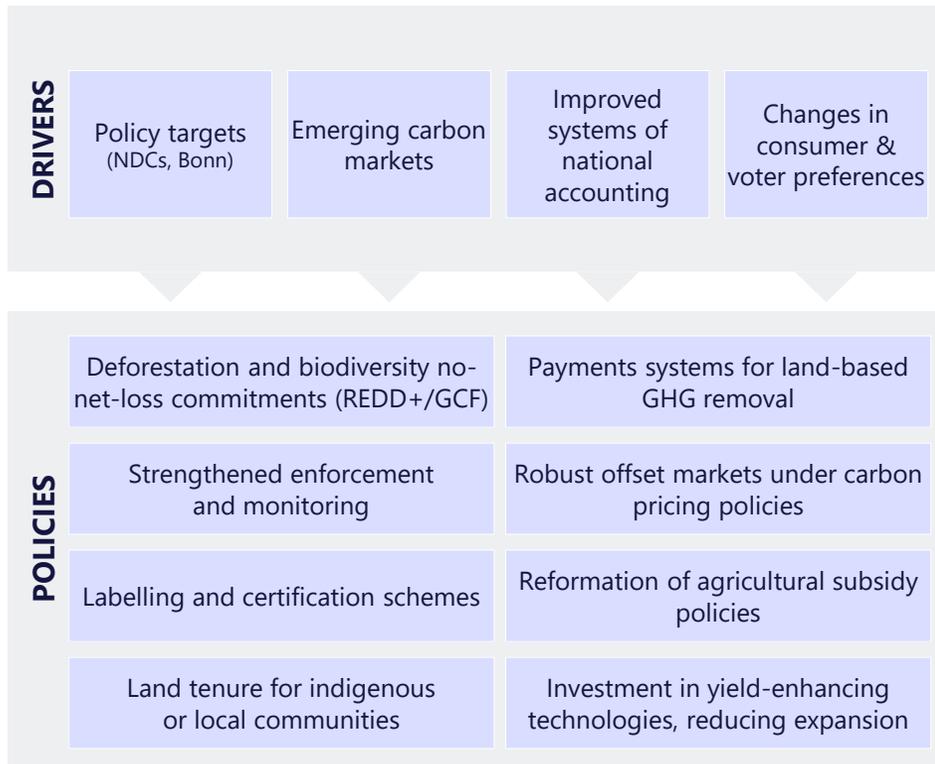


Plant-based proteins: A significant strategic opportunity for both climate mitigation and revenue generation

Forest loss and associated activity is expected to cease by 2030

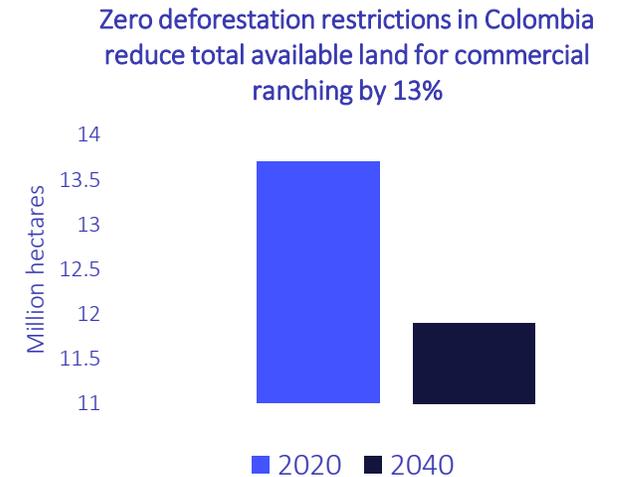
A strong policy response is expected to drive rapid shifts in current agricultural practices, requiring changes in business models and supply chains.

Agriculture accounted for **51% of global deforestation**,¹ with the dominant contributors being **beef** cattle and **soy** for animal feed.



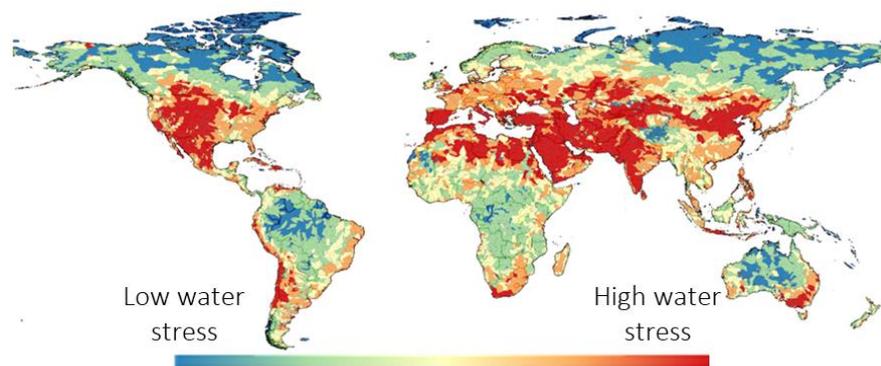
Companies relying on expansion into forested lands face significant asset and economic stranding.

“We project total global net agricultural land losses ranging from **4 to 15% of current area--286 to 604 million hectares--**by 2050 under our transition scenarios, relative to the baseline scenario. Tropical agricultural commodity producing regions like South America, Southeast Asia, Africa, and China see the largest drops in agricultural land.”²



Increasing water stress comes with risks for the private sector that require forward planning and ongoing management

Expected to drive rapid shifts in current agricultural practices, requiring changes in business models and supply chains.



Increased frequency of flood and droughts increase the likelihood and scale of catastrophic events that can cause a variety of business disruptions

Estimated agricultural **losses** were near **US\$3 billion in Brazil** due to a severe drought that affected many parts of South America in 2020. ¹

To reduce its dependency on town-supplied water, Australian poultry company, **Inghams Group**, is investing in an on-site bore water treatment plant in its Te Aroha processing plant in New Zealand to reuse water.

South African poultry giant Astral spent **US\$3.5 million** on a reverse osmosis plant at its Standerton processing plant to secure sufficient quantity of water, after years of continuous water cuts. In addition, the Group incurred expenses of **US\$4.35 million** (2019: \$8.8 million) for water and electricity supply interruptions.

Extreme weather events are having an impact on the livestock sector

Companies will require an increasingly resilient supply chain & agile operations management to hedge against water & other acute physical risks

CAUSE	SHORT TERM	LONG TERM	EXAMPLES
Drought	<ul style="list-style-type: none"> • Reductions in rangeland quality • Increased vulnerability to wildfire • Reduced milk production and reproduction capacity • Increased susceptibility to ticks and worms 	<ul style="list-style-type: none"> • Soil erosion, regrowth of nutrient-poor grasses • Higher livestock mortality 	<ul style="list-style-type: none"> • <u>Tyson cited</u> an \$89 million increase in feed costs due to drought in 2018 • Nearly 38% of Texas, which accounts for 15% US beef, is <u>currently under drought</u>, causing shortages of grass, hay and water
Floods	<ul style="list-style-type: none"> • Increased cost of production • Overgrazing • Decreased feed and hay availability 	<ul style="list-style-type: none"> • Imported feed • Lower quality hay 	<ul style="list-style-type: none"> • <u>Cal-Maine feed costs</u> increased in 2020 due to historic rainfall and flooding • 2019 floods in <u>Nebraska</u> cost cattle industry \$400 million • <u>Australian Agricultural Company</u>, the country's largest cattle and beef producer, suffered losses of up to 43,000 heads of cattle. Losses equivalent to US\$30 million
Fires	<ul style="list-style-type: none"> • Loss of livestock and productivity • Business disruption • High price volatility 	<ul style="list-style-type: none"> • Rebuilding costs • Increase in cost of labor and unemployment within rural regions 	<ul style="list-style-type: none"> • <u>Australian bushfires in 2019</u> resulted in the loss of 100,000 sheep, beef and dairy cattle, account for 12% of the national flock and 9% of the national herd, respectively

The amount of animal waste produced by livestock farms is almost 13 times more than that produced by the entire US population

Manure can devastate local ecosystems and surrounding communities, and is becoming a license to operate risk



In the US, lagoons are a common way to store waste from industrial farms.

Air Pollution

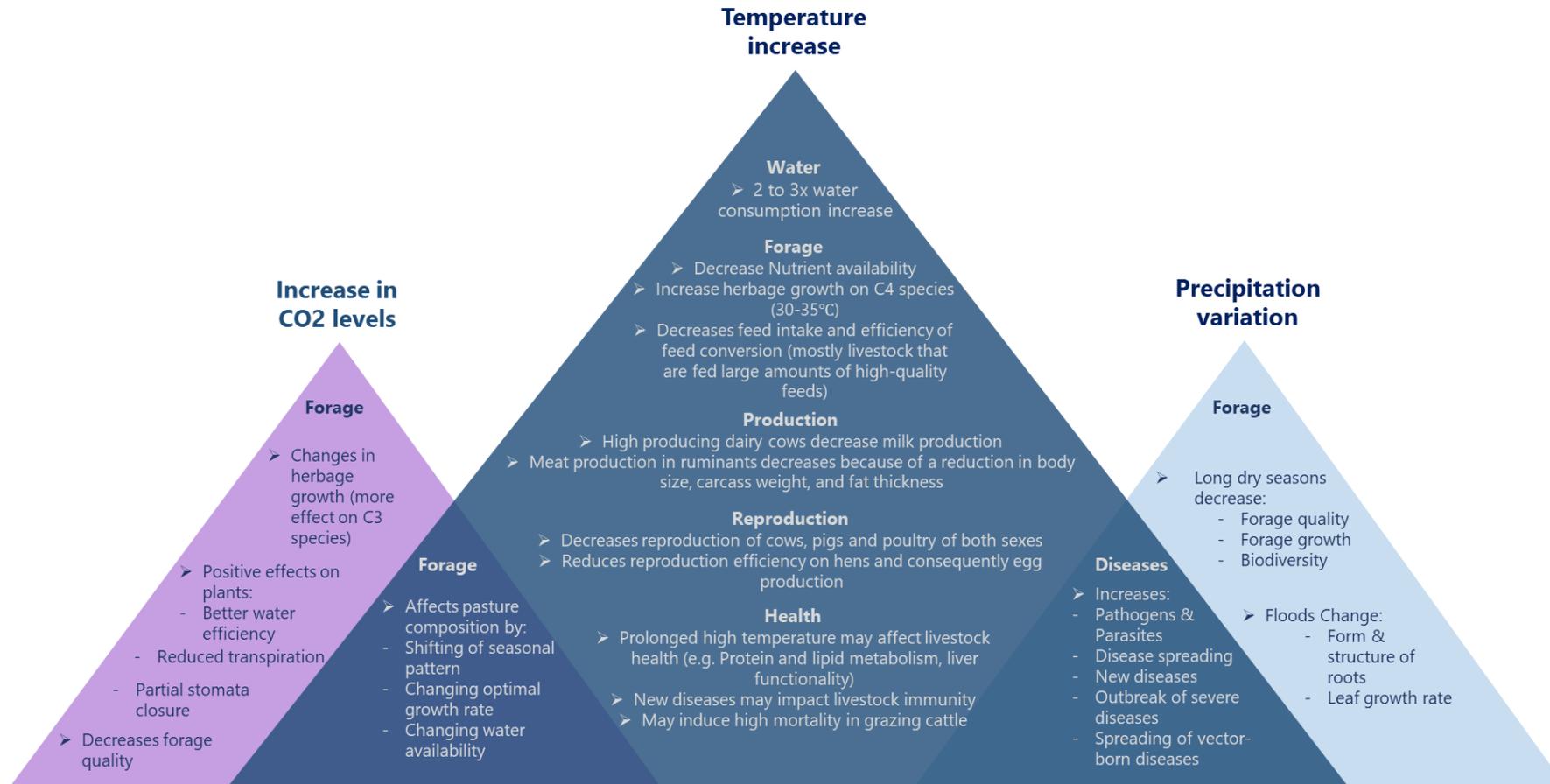
- Manure emits different harmful gases, like ammonia
- Air pollution from farms leads to 17,900 US deaths per year

Water pollution

- Manure has high level of nitrogen, bacteria, antibiotics, and heavy metals, which leads to waterways contamination
- Raccoon river in Iowa has been classified as one of the top 10 US endangered rivers due to pollution from intensive farms

Climate change will lead to reductions in livestock productivity and increase mortality

Higher temperatures will alter the physiology of livestock, making animals more susceptible to disease and stress.



Innovation in food technology increases substitution

Alternative meats are becoming more cost competitive.

Disruption in dairy sector foreshadowing disruption to meat sector

NOV
2019



“Dean Foods’ business has struggled as more **consumers turn to non-dairy** milk or buy private label products. Consumption of milk has fallen **26 percent** in the last two decades (USDA data)¹

JAN
2020



“As **consumers** increasingly turn to **milk alternatives** and thousands of dairy farms are collapsing, milk producers are now faltering, too, putting thousands of jobs at risk and threatening their brands.²

3 types of disruptive technologies³

Plant-based proteins

Products that **replicate** animal proteins in **texture, flavour and aroma** through use of **plant sources** that can mimic the structure of animal proteins on a molecular level (e.g. mung bean, lupin, algae, mycoprotein) and/or through novel processing methods (e.g. extrusion).

Example



Fermentation technology

Specific **animal proteins** such as caseins found in milk and ovalbumin in egg can be **produced without the animal through a fermentation** or brewing process where yeast organisms or another host are programmed to produce the proteins.

Example



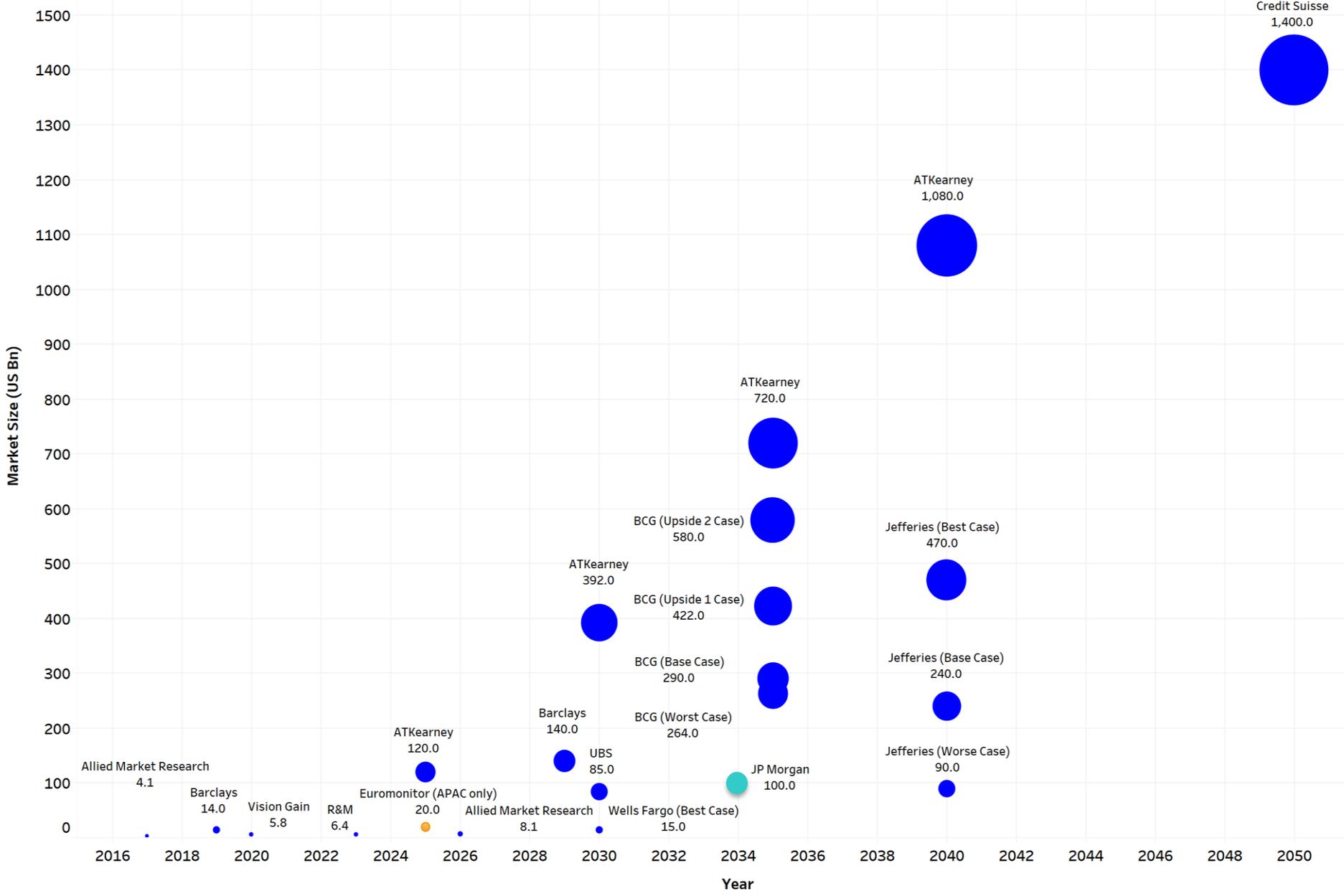
Cell culture technology

The **growing of meat cells** in a **nutrient-rich culture** medium to create whole pieces of meat instead of harvesting meat from animals. The process involves many of the same tissue engineering techniques that were developed for regenerative medicine.

Example



Estimated global market size for alternative meats

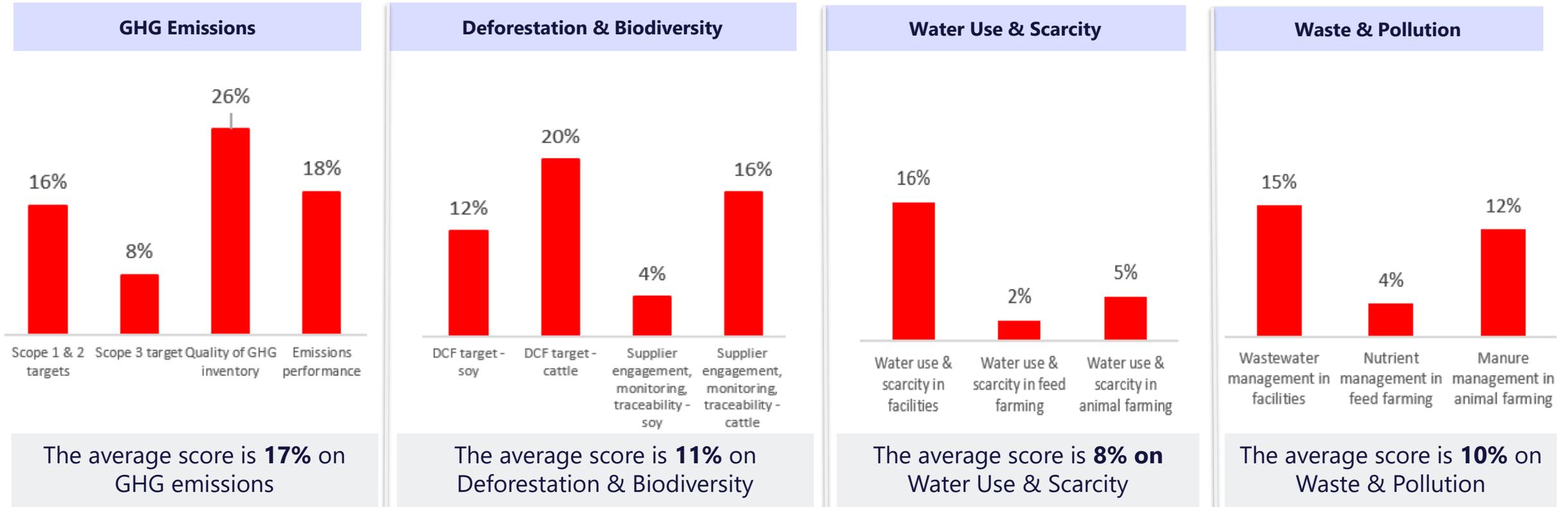


- Key:**
- = Plant-based protein only
 - = Include cell-based protein
 - = APAC only (Euromonitor)

Sources: Jefferies, "The Great Protein Shake-up?", September 2019; <https://www.atkearney.com/retail/article/?a/how-will-cultured-meat-and-meat-alternatives-disrupt-the-agricultural-and-food-industry>; <https://www.investmentbank.barclays.com/our-insights/carving-up-the-alternative-meat-market.html>; <https://www.alliedmarketresearch.com/press-release/global-meat-substitute-market.html>; <https://www.thegrocer.co.uk/consumer-trends/global-meat-alternatives-market-worth-58bn-by-2020/565289.article>; <https://www.businesswire.com/news/home/20180702005609/en/Meat-Substitutes---Worldwide-Market-Outlook-2023>; <https://www.marketwatch.com/story/beyond-meat-is-a-disruptor-as-plant-based-meat-industry-sales-poised-to-reach-100-billion-2019-05-28>; <https://www.fooddiver.com/news/plant-based-meat-market-forecast-to-reach-85b-by-2030-report-says/559170/>; <https://www.bcg.com/en-gb/publications/2021/the-benefits-of-plant-based-meats>; <https://ir.tyson.com/news/news-details/2021/Tyson-Foods-Debuts-New-Plant-Based-Products-First-Pride-Brand-in-Asia-Pacific/default.aspx>; <https://www.credit-suisse.com/about-us-news/en/articles/news-and-expertise/sustainable-food-as-an-investment-opportunity-202106.html>

Risks are additive, suggesting a coming transition in the protein sector. Yet disclosure levels remain low

Companies should act now to lead in the sector shift



1. Collier FAIRR Protein Producer Index 2020

FAIRR Tools for investors

Coller FAIRR Protein Producer Index: 33 KPIs that assess ESG managements in the animal protein sector

60 largest global animal protein producers

9 RISK FACTORS



GHG Emissions

- GHG inventory
- Scope 1 + 2 target
- Scope 3 target
- Climate risk/scenario
- Emissions performance



Working Conditions

- Human rights
- Fair working conditions
- Safety & turnover data
- Freedom of association



Animal Welfare

- Welfare policy
- Assurance & certification
- Performance on key metrics
- Aquatic animal welfare



Waste & Pollution

- Wastewater mgmt. (facilities)
- Nutrient mgmt. (feed farming)
- Manure mgmt. (animal farming)



Deforestation & Biodiversity

- DCF target
- Supplier engagement
- Certification
- Ecosystem impacts
- Disease management
- Feed ingredients
- Sea lice management*
- Feed innovation*

**NEW TO INDEX 2021*



Food Safety

- Food safety systems
- Product recalls & bans



Antibiotics

- Policy antibiotics
- Disclosure antibiotics



Water Scarcity

- Water use (facilities)
- Water use (feed farming)
- Water use (animal farming)



Governance

- Sustainability governance

1 OPPORTUNITY FACTOR

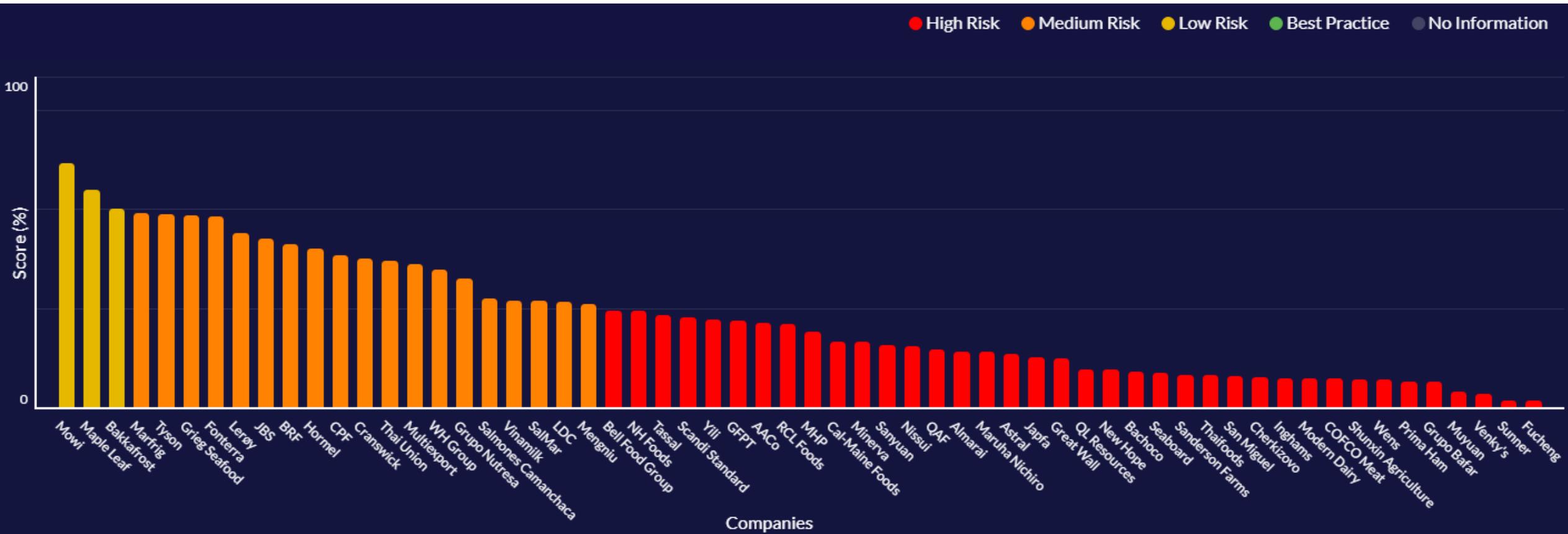


Sustainable Proteins

- Diversification to alternatives

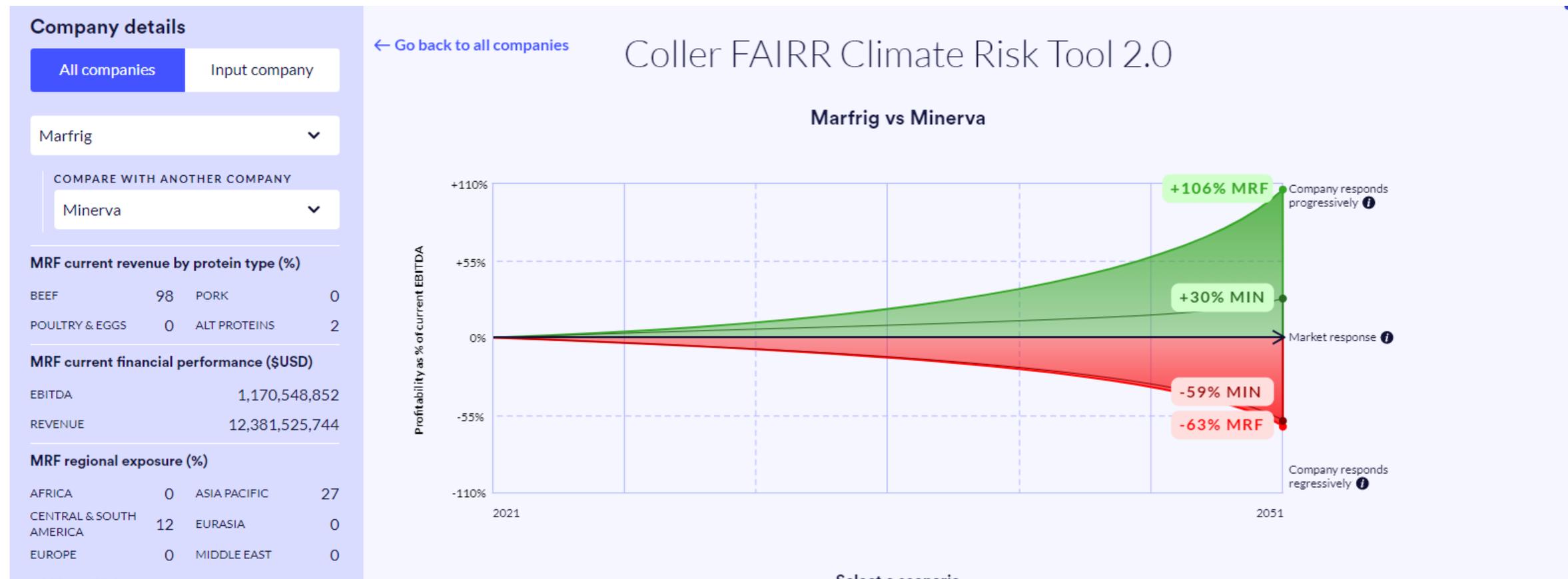
Coller FAIRR Protein Producer Index: 33 KPIs that assess ESG managements in the animal protein sector

60 largest global animal protein producers, 63% are categorised as High Risk



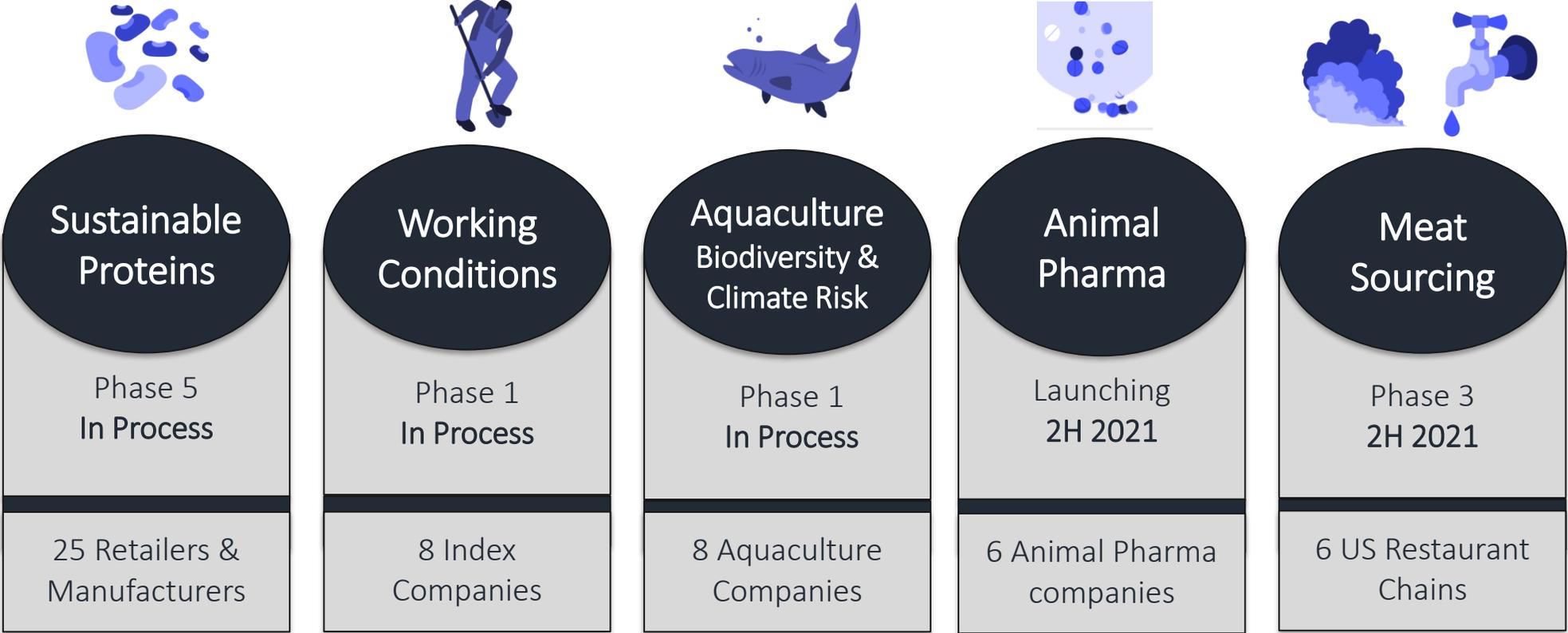
Coller FAIRR Climate Risk Tool: Investors can use the tool online to explore climate impacts on meat companies

Companies' relative response is determined against the market



Engagements: FAIRR runs multiple engagements on market-leading areas of ESG risk

Our engagements are supported by over \$40 trillion in collective AUM



Deepening our policy engagement to help accelerate a sector transition

Scale up sustainable protein production through innovation funds, tax credits and government procurement contracts



Rethinking Protein

Conference exploring policy roadmap for food system transitions

Good Food Finance

Coordinating partner to GFF – a coalition dedicated to shifting food system policies

Where's the Beef?

Investor statement urging G20 nations to enact policies & disclose GHG emissions targets in agriculture

Investor Working Group

Investor statement calling for CAP reform to enable net zero targets to be met by 2050

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