# Stranded in a vicious cycle?

The case for transformation in animal agriculture

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# Executive summary

Research commissioned by the Changing Markets Foundation surveying 201 respondents from the investment community shows that 82% agreed that climate change presents a material risk to meat and dairy industry-related investments and 84% believe that a lack of mitigation of climate change could lead to stranded assets in this industry. Investors also overwhelmingly (94%) think that reducing methane emissions alongside carbon emissions is important, while 83% think that investors should encourage companies to reduce their methane emissions. More than half of respondents (55%) think that investors are not sufficiently addressing these risks.

This survey provides a good insight into what the financial sector finds important with regards to how the meat and dairy sector will address its climate footprint and adapt to increasingly destabilised climate system. Current global actions to reduce greenhouse gas (GHG) emissions are wholly inadequate if warming is to be limited to 1.5˚C. We have already exceeded 1.1˚C and are on a path to 3˚C temperature increase. To meet the 1.5˚C target, global net zero must be achieved by 2050[1] at the latest and there need to be rapid and deep cuts in emissions of methane,[2] a potent GHG which has 82.5-times more warming potential than CO2 over a 20-year period,[3] and other short-lived climate pollutants. A reduction of 45% of methane emissions by 2030 would avoid nearly 0.3˚C degrees of warming by the 2040s.[4] Yet, methane emissions continue to rise even faster than CO2 and 2021 saw a record increase in methane levels for the second year in a row.[5]

Food production – especially the production of meat and dairy – is responsible for around 37% of GHG[6] and is uniquely dependant on stable climate conditions. Business as usual growth in animal products would account for 49% of the total GHG emissions budget for 1.5 degree by 2030.[7] Livestock agriculture is also the single largest source of methane, responsible for around 32% of anthropogenic methane emissions.[8]

Climate science is not reflected in the business-as-usual growth projections for the meat and dairy sector. The assumption is that meat production will expand by 40mt to 366mt by 2029[9]. Dairy production is expected to grow by 1.6% per year by 2029.[10] EAT-Lancet projects that both red meat and dairy production will increase by over 50% by 2050 compared to 2010 baseline.[11] On the other hand, climate scientists expect a decline in livestock of 7-10% if we were to reach 2°C by 2050, with economic losses between $9.7 and $12.6 billion.[12] The alarming effects of climate change on the sector multiply the more that temperatures increase. And negative climate impacts on the sector are not in the future – they are already impacting farmers around the globe.



Stranded in a vicious cycle? The case for transformation in animal agriculture

The findings of the survey and interviews conducted for this briefing show that the investment community recognises the risks of climate change but is gripped by an inertia that prevents action. The majority of survey respondents were concerned that not enough is happening to mitigate climate impacts. They also recognise that the more we delay mitigation, the graver the consequences.

Financial institutions and actors in the finance sector should engage with the meat and dairy industry and ensure that it begins its transformation by radically reducing its carbon and methane emissions. Actions investors can take range from requesting companies to report and reduce methane emissions to supporting the growth of genuinely sustainable alternative protein and better food production practices. Society is currently at a crucial crossroads that will determine the future of food production for decades to come and investors have an important role to play in this transition.



# 1. Climate change and agriculture: the context

## 1.1. Climate change already impacting our food system

In the first half of 2022 the IPCC published two reports: one on adaptation,[13] the other on mitigation.[14] In both, the message was clear: dangerous and costly climate impacts are happening now and will be more widespread and extensive than predicted. Climate change will have unprecedented negative impacts on society and the environment and the reports represented *"a damning indictment of failed climate leadership"* (António Guterres, the United Nations Secretary General). This failure of leadership is true of nearly all sectors of society, and the finance sector is no exception.

The direct impacts of climate change are wide-ranging but can be broadly divided in two categories: sudden onset climate events and slow-onset climate processes. Sudden onset climate events include flooding, cyclones, hurricanes, typhoons, heatwaves, mudslides and wildfires. Slow-onset climate processes include frequent droughts, glacial retreat, sea level rise, saltwater intrusion, desertification, and ocean acidification. Both types of events affect ecosystems, agriculture, livelihoods and trigger migration,[15] with huge human and financial costs.

These impacts are already happening. Between 1970 and 2019 a weather, climate or water-related disaster has occurred on average every day, taking the lives of 115 people and causing $202 million in losses daily.[16] **Agricultural losses to drought between 1983 and 2009 amounted to $166 billion,[17] whilst food systems cost $12 trillion in hidden social, economic, and environmental impacts.**[18]

Current global plans to reduce greenhouse gas (GHG) emissions are wholly inadequate if warming is to be limited to 1.5˚C. We have already exceeded 1.1˚C and are on a path to 3˚C. To meet the 1.5˚C target, global net zero must be achieved by 2050 at the latest.[19] However, reducing CO2 to net zero alone is not enough. There need to be rapid and deep cuts in methane emissions,[20] which are the second biggest contributor to GHGs and 82.5-times more potent than CO2 over a 20-year period.[21]

Methane emissions continue to rise rapidly. According to NOAA, 2021 saw a record increase in methane levels for the second year in a row.[22] A reduction by 45% (180 million tons of methane emissions per year) by 2030 is critical and would avoid nearly 0.3 degrees of warming by the 2040s.[23] Rapid methane reductions represent one of the most important levers to reduce the speed of global temperature increase and our best chance to stay below 1.5 degrees warming, avoiding dangerous tipping points.

## 1.2. Food production: a source and a casualty of climate change

Food production contributes around 37% of global GHG emissions: 17.3 billion metric tonnes of carbon dioxide equivalent per year, which is almost 19-times more than commercial aviation.[24] The same study shows that 57% of these emissions come from the production of animal-based foods, which are also uniquely vulnerable to disruptions as they rely on feed and on stable climate conditions.

The IPCC has five different scenarios for climate change up to 2100, from a rapid decline to net zero in 2050 to a tripling of emissions by 2100. **Under all the IPCC scenarios it will cost more to produce food, and infrastructure will become more expensive.** For example:

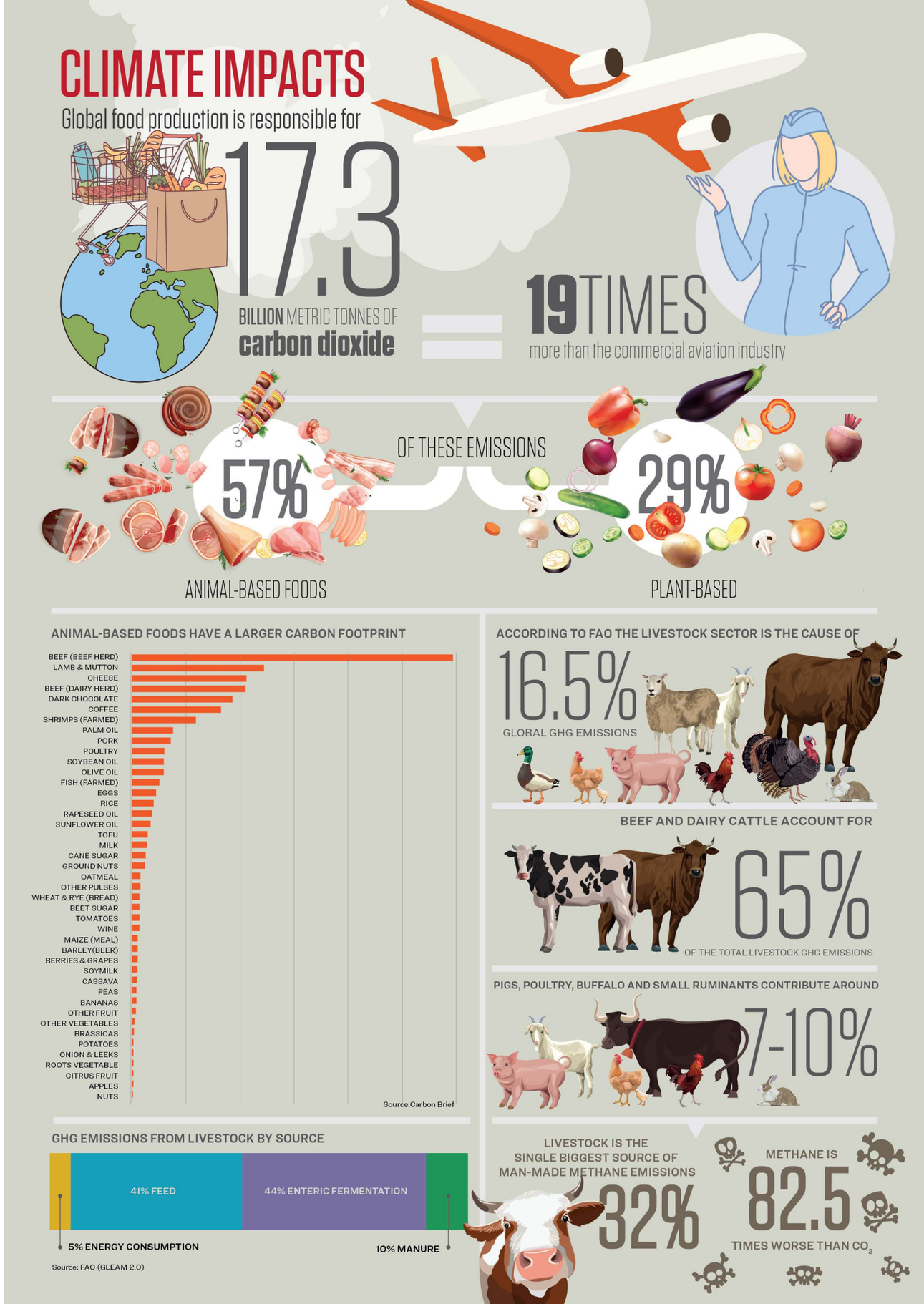
- Staple crops like maize, rice, wheat, and other cereal crops (which are a significant source of animal feed) will be impacted, particularly in Africa, Southeast Asia, and Central and South America.
- It will become more energy intensive to heat or cool industrial livestock facilities.
- Livestock will be adversely affected, due to the changes in feed quality and quantity, pastures and commodity crops like soy, diseases and water resources the impacts of heat shocks on livestock's health and resilience.[25]

### *1.2.1. Business-as-usual projections at odds with the climate science*

Global meat production is currently projected to expand by 40mt to 366mt by 2029, with the developing regions accounting for 80% of this growth. Beef production is set to grow particularly in the Americas such as Argentina, Brazil and the United States.[26] Dairy production is expected to grow by 1.6% p.a. over the same period. India and Pakistan will contribute to over half this growth, while the EU, the second largest milk producer, will grow more slowly than the global average.[27] EAT-Lancet projects that both red meat and dairy production will increase by over 50% by 2050 compared to 2010 baseline under the business-as-usual scenario and without tackling food waste.[28]

These growth projections are at odds with the climate science, as the effects of climate change are already impacting the productivity and profitability of the sector, which is expected to get much worse in the future, depending on how much the average temperatures will increase.





## Case study: **Climate change already impacting production of meat and dairy**

Since March 2020, US farmers have been forced to sell their cattle due to a long-lasting, advancing drought.[29] The southwestern US experienced its most severe drought on record in 2021, exacerbated by historic high temperatures that the US government linked to global warming.[30] The current mega-drought gripping the Southwest is the region's driest period in 1,200 years.[31] This mega-drought is threatening water and power supplies, with water levels in two of the largest reservoirs showing record lows.[32]

Farmers are already in a situation where they cannot grow or afford to buy feed, what they have planted is too small to harvest and there is a lack of water and too much heat. All of this results in farmers having to sell their animals at rock bottom prices.[33] The US drought has led to higher beef prices, but the money has not been reaching farmers because they were forced to sell cattle and significantly reduce herds.[34]

Extreme heat in 2022 also already had deadly consequences. News outlets reported that thousands of cattle died in Kansas – one of the top three beef producing states - due to record breaking heat.[35] A peer reviewed study found that heat stress alone can lead to significant production losses: global meat and dairy sector can see annual losses between $15 (for low emissions scenario) and $40 billion (for high emissions scenario) by the end of the century.[36] This represents between 3.7 to 9.8% of 2005 value of the sector.[37] In the US, the beef and dairy production is projected to decline by 6.8% also by the end of this century.[38]

This situation is not unique to the US and will worsen if we do not accelerate climate change mitigation. Recent research from the UK observed the impact that heat stress in dairy cows in both grazed and housed systems has on the full sales value of milk. The findings showed that heat stress for dairy cows in grazing systems can lead to more than £20,000 on average in milk yield losses for every 200 cows, compared to £10,000 for housed dairy cows.[39]

### *1.2.2. GHG emissions on the rise*

According to the FAO, the livestock sector contributes 16.5% of GHG emissions.[40] Of this, beef and dairy cattle account for 65% of the total livestock GHG emissions, while pigs, poultry, buffalo and small ruminants contribute around 7-10%.[41] Livestock production is the biggest single source of methane emissions, responsible for 32% of all methane emissions globally.[42]

Emissions from livestock need to be brought under control, if we are to meet climate targets. **Business as usual growth in the livestock sector would account for 49% of the global emissions budget for 1.5 degree by 2030.**[43] Scientists warned that "[c]ontinued growth of the livestock sector increases the risk of exceeding emissions budgets consistent with limiting warming to 1·5°C and 2°C, limits the removal of CO2 from the atmosphere through restoring native vegetation, and threatens remaining natural carbon sinks where land could be converted to livestock production".[44]

Another part of this vicious cycle is the increasing amount of land that growth in meat and dairy requires, even when efficiencies are considered. Agriculture currently occupies 38% of the terrestrial surface of the earth, divided among 1.5 billion ha of cropland and 3.4 billion ha of pastures.[45] While livestock takes up most of the world's agricultural land, it only produces 18% of the world's calories and 37% of total protein. Other crops make up 23% of agricultural land and produce 82% of global calories and 63% total protein.[46] Agricultural land expansion is already linked as well to massive emissions from land-use change, for instance, through deforestation. Conversion to pasture for cattle in particular, as well as oilseeds, such as soy, that is used to feed livestock are amongst the largest commodity-based driver of global deforestation.[47]





Meeting the food demand projected for 2050 may require an additional 0.2 to 1 billion ha of land.[48] However, suitable land for agricultural production will become scarcer, as at the higher end of temperature increase projections, more than a third of existing areas for crops and livestock production will become unsuitable by the end of the century. The areas most at-risk coincide with the world's top livestock-producing regions in Brazil, China and India.[49]

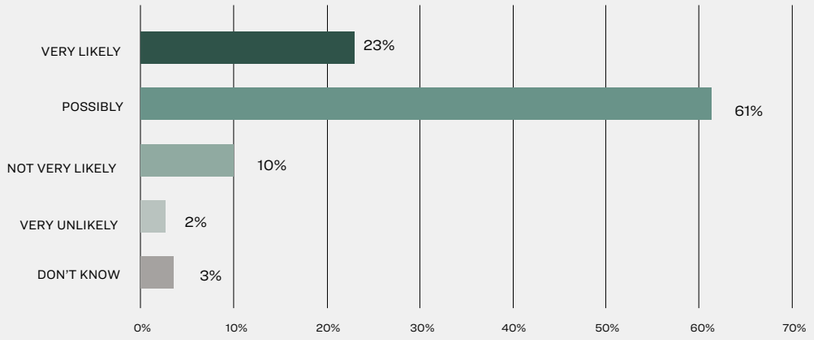
In this changing climate with rapidly rising temperatures, increasing meat and dairy consumption with its enormous land requirements does not seem viable, especially given that land is also perceived as an important carbon sink by preserving existing forests and ecosystems and reforesting lands to increase carbon capture.

## Box 1: **Stranded assets?**

The industry growth projections are at odds with the climate science. **A decline in livestock of 7-10% is expected if we were to reach 2°C by 2050, with economic losses between $9.7 and $12.6 billion**.[50] The more temperatures rise, the less suitable many places become for livestock or to grow their feed. Water scarcity is also a significant factor that will affect viability for growing different (feed) crops or to produce meat and dairy.

A recent report from Planet Tracker and CDP showed that "*assets in water-stressed regions could become stranded temporarily, or permanently, if assumptions made about water availability and access prove inaccurate, regulatory responses are unanticipated, or if risk mitigation and stewardship plans are not put in place.*" The same report also showed that sectors exposed to water scarcity are already reporting closure of operations.[51]

Our survey shows that a vast majority of respondents think that the lack of mitigation of climate change could lead to stranded assets in the meat and dairy industry. 61% said it is a distinct possibility while almost a quarter, 23%, say that the risk of stranded assets is very likely.




*Graph 1. Perception that lack of mitigation of climate change could lead to stranded assets in the meat and dairy industry*

# LAND USE IMPACTS

CURRENTLY OVER

## 70 BILLION LAND ANIMALS SLAUGHTERED FOR MEAT

A 2018 ESTIMATE

**69** BILLION **CHICKENS** — 1 UNIT = 100 MILLION

**1.5** BILLION **PIGS** — 1 UNIT = 100 MILLION

**656** MILLION **TURKEYS** — 1 UNIT = 10 MILLION

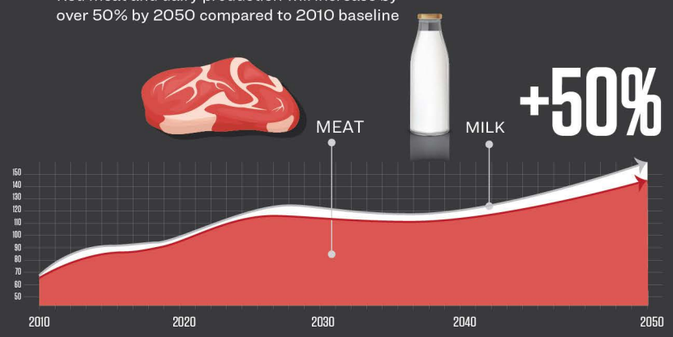
**574** MILLION **SHEEP** — 1 UNIT = 10 MILLION

**479** MILLION **GOATS** — 1 UNIT = 10 MILLION

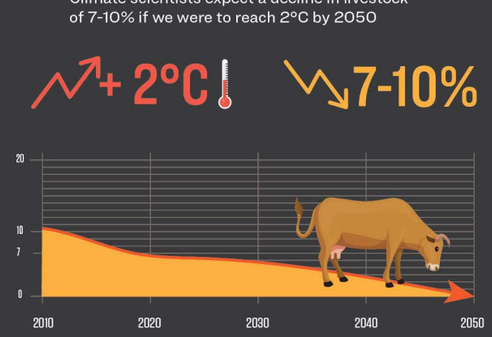
**302** MILLION **CATTLE** — 1 UNIT = 10 MILLION

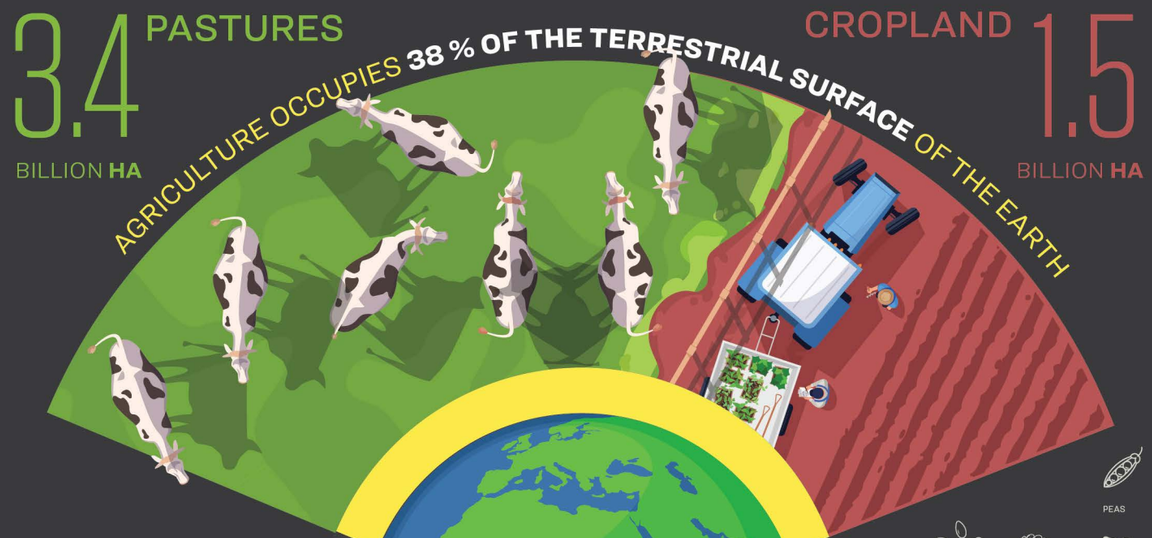
### GROWTH PROJECTIONS VS CLIMATE IMPACTS

Red meat and dairy production will increase by over 50% by 2050 compared to 2010 baseline




Climate scientists expect a decline in livestock of 7-10% if we were to reach 2°C by 2050




While livestock takes up most of the world's agricultural land it only produces

18% WORLD'S CALORIES

37% TOTAL PROTEIN


Other Crops make up 23% of agricultural land and produce 82% of global calories and 63% of total protein

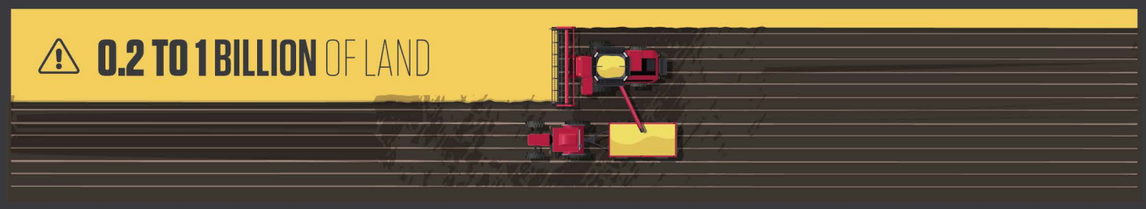
23% OTHER CROPS

82% GLOBAL CALORIES

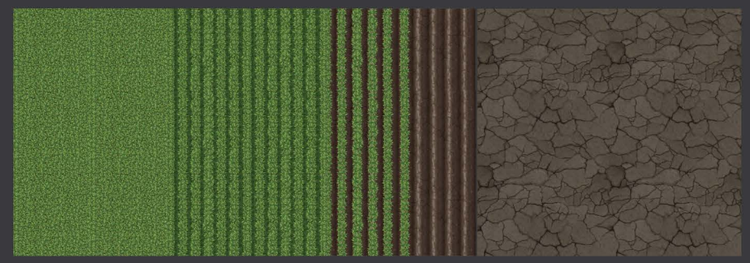
63% TOTAL PROTEIN

77% OF GLOBAL FARMLAND IS DEVOTED TO GROWING ANIMALS OR THEIR FEED.

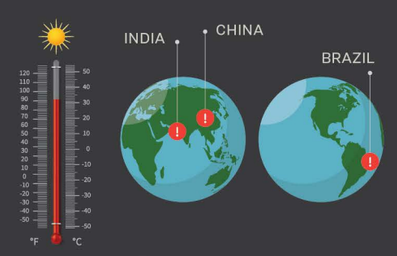
MEETING THE FOOD DEMAND PROJECTED BY **2050** MAY REQUIRE AN ADDITIONAL




SUITABLE LAND FOR AGRICULTURAL PRODUCTION WILL BECOME SCARCER, AS AT THE HIGHER END OF TEMPERATURE INCREASE PROJECTION



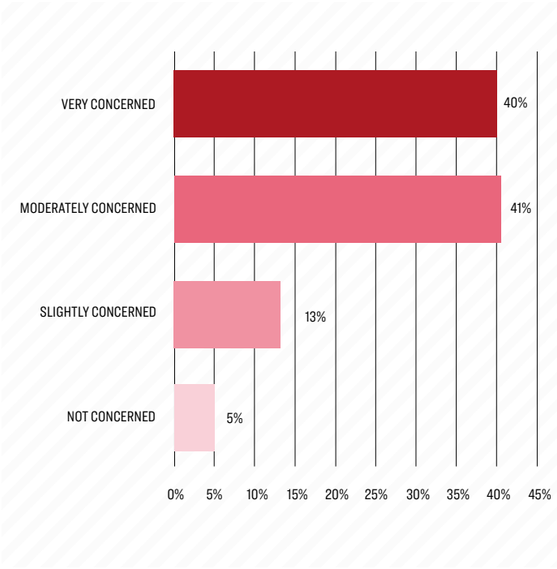
**MORE THAN 1/3** OF EXISTING AREAS FOR CROPS AND LIVESTOCK PRODUCTION WILL BECOME UNSUITABLE BY THE END OF THE CENTURY.



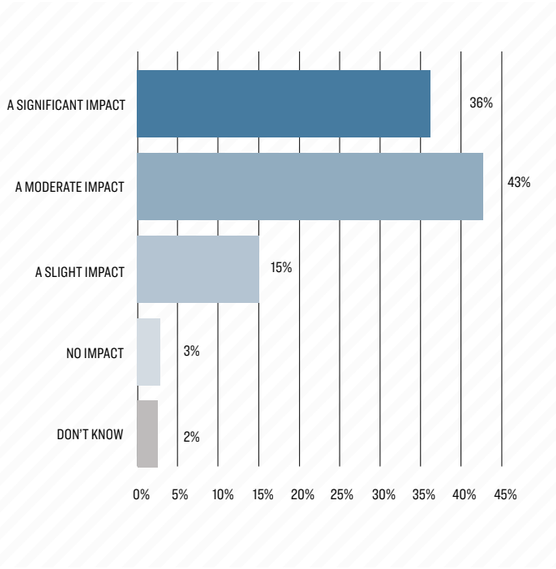

The areas most at-risk coincide with the world's top livestock-producing regions in Brazil, China and India.

# 2. Investors concerned about climate impacts on meat and dairy

There is increasing awareness of the climate risk in the investment community. We wanted to investigate the level of awareness investors have around the impacts of climate change on meat and dairy sector. Over three-quarters of participants in the survey stated that they are concerned about climate change affecting the availability and performance of investment products and opportunities, with two-fifths noting that they are very concerned. Nearly 80% of respondents said they expect that climate change will have either a moderate or significant impact on the meat and dairy industry and associated investment products and opportunities, while over a third anticipated the impact as significant.

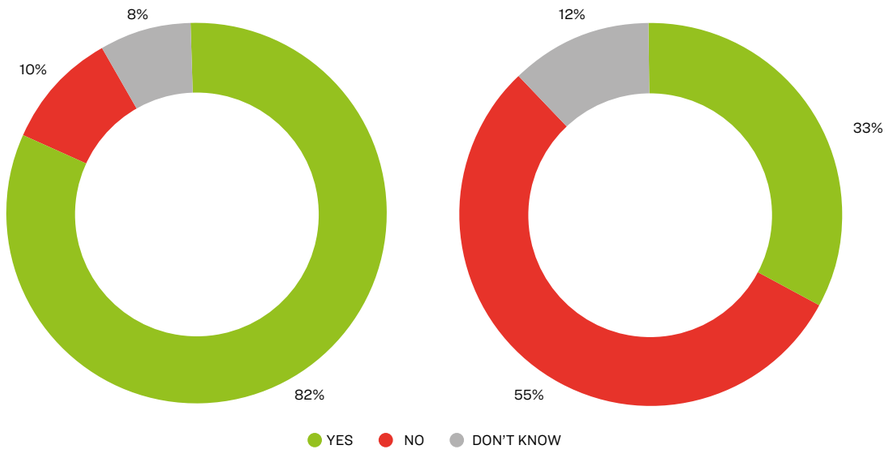



*Graph 2. Concern about climate change affecting the availability and performance of investment products and opportunities*




*Graph 3. Expectation of climate change having a significant impact on the meat and dairy industry and associated investment products and opportunities*

Of those surveyed, 82% agree that climate change presents a material risk to meat and dairy industry-related investments and that action is needed urgently. But 55% also say that investors are not sufficiently addressing those risks.



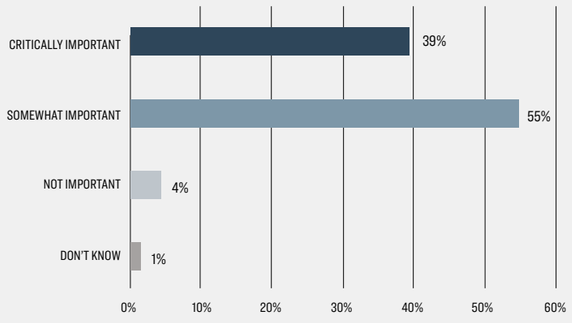

*Graph 4. Perception of climate change representing a material risk to meat and dairy industry-related investments*

*Graph 5. Investors' perception of addressing any risks that climate change might have on current and future meat and dairy industry-related investments*

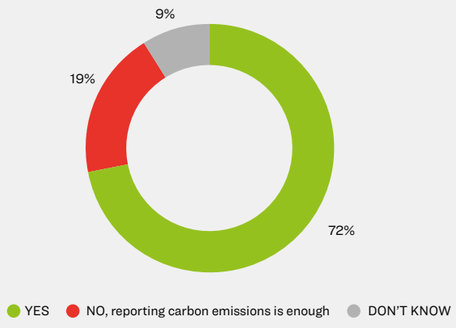
## Box 2: **Focus on methane**

### *Survey shows investors' concern over methane*

94% of respondents recognise the importance of reducing methane emissions alongside carbon emissions, with 2 in 5 saying that this was critically important. 72% of respondents also thought that companies should report their methane emissions alongside their carbon emissions. The majority (83%) of respondents think that investors should encourage companies to reduce their methane emissions. Previous Changing Markets report *Blindspot: How lack of action on livestock methane undermines climate targets* has shown that none of the big meat and dairy companies analysed have methane reporting or reduction plans in place.[52]




*Graph 6. Importance for meat and dairy companies reducing their methane emissions alongside carbon emissions*



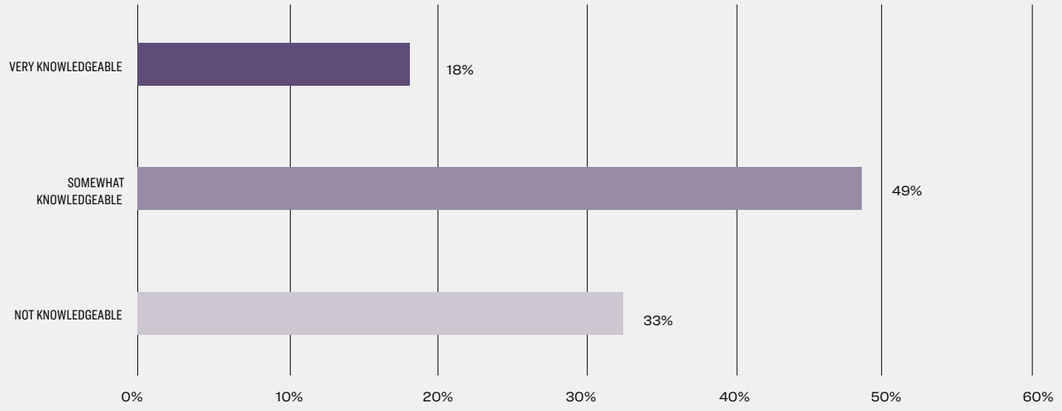

*Graph 7. Perception that companies should report on their methane emissions alongside carbon emissions*


*Graph 8. Perception that investors should encourage companies they invest in to reduce their methane emissions*

### *Global Methane Pledge*

COP26, the 2021 UN climate summit, saw more than 110 countries sign up to the Global Methane Pledge. This is a commitment to collectively cut global methane emissions by 30% by 2030.[53] The signatories were from countries that emit nearly half of all methane and represent 70% of global GDP.[54] This is a collective, not an individual national reduction target and it is not yet clear how the effort will be distributed or what will be the governance framework around the Pledge.

The Pledge itself is reasonably well known by the investment community, with 67% survey respondents saying they were somewhat or very knowledgeable about it. However, in-depth interviews with experts from financial institutions and civil society for this report revealed investors' concerns that voluntary commitments of this kind risk not driving sufficient change, however well supported and funded.




*Graph 9. Investors' knowledge about the Global Methane Pledge*

### *First food company reporting methane emissions*

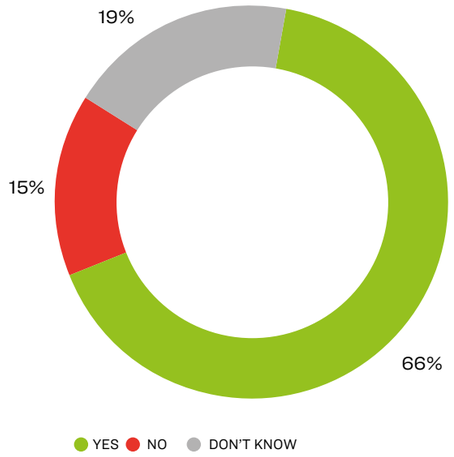
Upfield, the company behind well-known plant-based brands like *Violife* and *I Can't Believe It's Not Butter,* is the first major food company to release a detailed report on their corporate methane emissions. The report, released in March 2022, showed that even though dairy makes up only 1% of the company's ingredients, this small percentage corresponds to 63% of their methane emissions. Another 27% of their methane emissions come from topical and liquid oils.[55]

The company's move to release the report came as a result of witnessing how the Global Methane Pledge's methane reduction commitments introduced at COP26 were directed at the fossil fuel industry, leaving the food and agriculture industries – the largest source of anthropogenic methane emissions – largely ignored. Upfield worked with sustainability experts to develop a methodology that can enable them to track their methane emissions and develop an emissions reduction plan. Through this exercise, the company was able to determine that methane forms 7.5% of their total greenhouse gas emissions.[56] Upfield also called on others in the food and agriculture sector to report their methane emissions.[57]

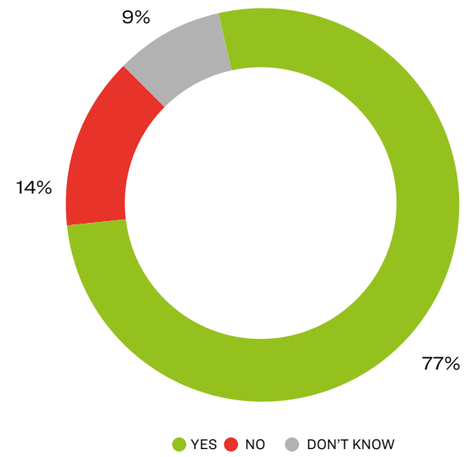
# 3. Concerns over greenwashing and lack of action

In the in-depth interviews for this briefing, many respondents highlighted concerns around greenwashing in finance. Greenwashing is considered an unfair commercial practice, as it disadvantages businesses that are genuinely trying to make change by those that are making false or misleading claims. Interviewees suggested that many companies and financial institutions are keen to be seen as doing something but less concerned about real action, and that change would require a shift in thinking and in leadership.

The survey confirmed such concerns, with two thirds of respondents saying they were concerned about greenwashing in the finance sector. The majority (77%) believe that investees' claims about ESG should be independently verified or pre-approved, in order to avoid accusations of greenwashing. Almost 80% of the respondents believe that regulation is needed to address 'greenwashing' in the financial sector.



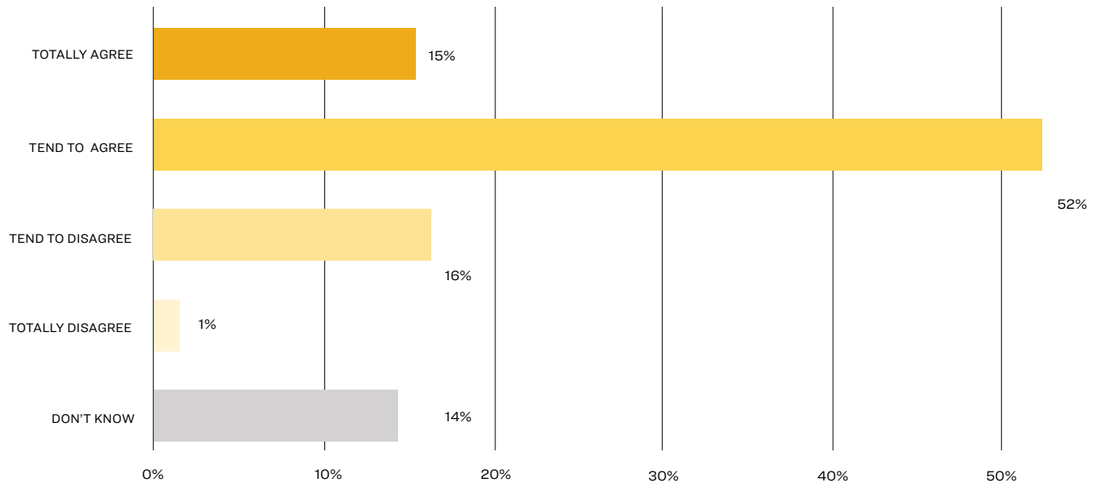

*Graph 10. Perception that greenwashing is taking place within the finance sector*




*Graph 11. Perception that claims investees make about ESG should be independently verified/pre-approved*


*Graph 12. Perception that regulation is needed to address greenwashing in the financial sector*

The majority also consider greenwashing represents a regulatory risk to their investees (67%), with 15% totally agreeing with the statement.




*Graph 13. Perception that greenwashing represents a regulatory risk to investees*

Two-fifths of survey respondents mentioned that the company they work for has an ESG policy that covers the climate impacts of the meat and dairy industry. However, it was beyond the scope of the survey to establish the level of ambition of these policies and how specific they are in their coverage of the sector. Regionally, those in the US are the least likely to have an ESG policy that covers climate change: only 22% of US respondents reported that their company had policies to this effect, as opposed to 48% in Asia and 54% in Europe.



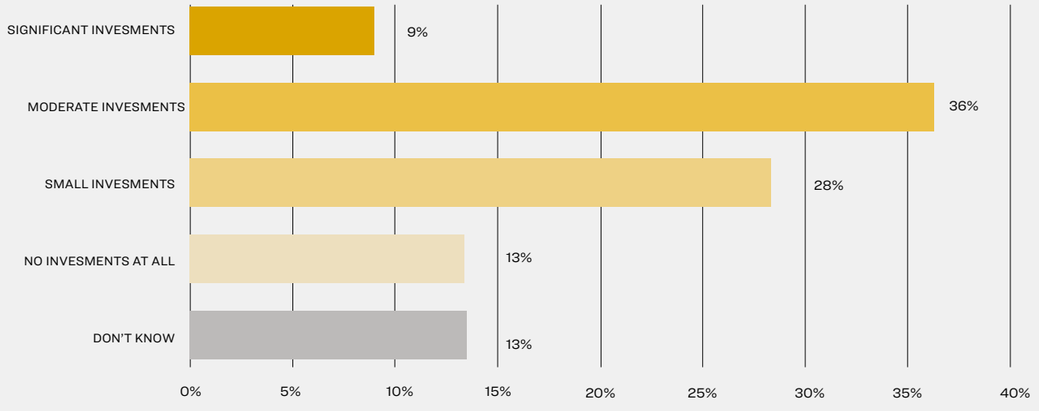



*Graph 14. Availability of ESG or policy within company that covers climate impacts of the meat and dairy industry*

## Box 3: **Investments in meat and dairy alternatives**

As one of the options to mitigate climate change, we specifically enquired in our survey, whether companies they work for have any investment in alternatives, such as plant-based, cultured or fermented products that are considered as a replacement for conventional meat and dairy. A recent study in Nature showed that replacing just 20% of global beef consumption with a meat substitute could halve annual deforestation and carbon dioxide emissions by 2050.[58]

While 36% of survey respondents reported moderate investments and 28% said they had small investments into alternatives, only 9% of those surveyed reported significant investments.




*Graph 15. Company invests in alternatives to meat and dairy*

However, those who said they were concerned about climate change affecting the availability and performance of investment products and opportunities are slightly more likely to make significant (11%) to moderate (42%) investments in alternatives.



# 4. Conclusions and recommendations

The climate science is clear: actions that we take in this decade will define temperatures and the world we live in for the decades to come. The livestock sector is both a significant source of GHG emissions and uniquely vulnerable to the impacts of the climate change that are already being felt by farmers everywhere. The studies show that as temperatures increase further, climate impacts will only get worse, with significant financial implications for the sector.

The interviews and survey conducted for this report show that the investor community is aware that climate change represents a major material risk for the meat and dairy industry. However, the survey also shows that there are concerns about the lack of mitigation and the fact that this may lead to stranded assets in the industry.

The financial community has a crucial role to play in implementing and supporting climate mitigation in the meat and dairy sector. They can take action through their engagement with companies, demanding transparency and disclosure of companies' emissions and investments and rapid action to address climate emergency by cutting methane and other climate pollutants in the sector. They could also reduce climate risks by diversifying protein production. Investments in alternative proteins could transform the industry and reduce negative externalities of meat and dairy production, such as reductions in emissions, land use, improvement of animal welfare and reduced risk for emergence of zoonotic diseases.

## Recommendations for financial institutions

- Publish and report against science-based climate and methane policies that align with achieving net zero by 2050 (in line with the international goal of 1.5 degree temperature increase)
- Ensure that the investees have science-based climate targets and mitigation plans in place, which should include transparent annual reporting of carbon and methane emissions. Given the urgency to reduce methane, it is of crucial importance that investees also put in place specific methane action plans and disclose investments into methane and GHG mitigation measures.

- Ask food companies to disclose and report investments into meat and dairy alternatives, including the names of companies they invest in. Ensure that these alternatives also represent a replacement of conventional meat and dairy production in line with their climate mitigation plans.

- Support the growth of genuine agro-ecological and regenerative farming practices. Investors should ensure that these practices are clearly defined and comprehensive and that those implementing them can show concrete plans on how they contribute to climate mitigation.





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