Beacon

A series of key messages
from works by academics
useful for tackling
industrial animal agriculture
in developing countries

A project of Burning Questions Initiative

TINY BEAM FUND

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Seven studies are featured. They cover:

1. Industrial animal agriculture's many facets.
2. Powerful meat industry does not pay for harms caused.
3. Market value of farmed animals globally.
4. Local impact of farming shrimp in India for export.
5. Vegetarian advocacy in China faced backlash.
6. JBS's profits benefit top execs, not workers and Brazil society.
7. Beef industry's growth in South Africa can hurt smallholders.

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Table of Contents:

Brief mention (non-academic reports)

1 Hinchliffe, Stephen, et al. **"Understanding the roles of economy and society in the relative risks of zoonosis emergence from livestock."** *Royal Society Open Science* 11.7 (2024): 231709. link.

The problems caused by industrial food animal production are more multifaceted than is often realized.

Industrial animal agriculture has scientific, social, political, and economic dimensions. Neglecting these multiple aspects may lead to incomplete or even misleading conclusions. In this study, examining the social and economic sides of industrial food animal production in addition to physical and biological factors reveals a higher risk of disease than was previously understood.

- A recent study examined the potential for intensive vs extensive animal agriculture to give rise to novel microbes with the potential to cause a pandemic. It concluded that intensive animal agriculture poses a lower risk.
- This new paper by Hinchcliffe et al. examines the assumptions used in that study. By incorporating knowledge and analysis from a wider range of academic disciplines, the authors show that intensive animal agriculture is likely to be *much riskier than the previous study found*.
- They also find that reducing disease risks from intensive animal agriculture will require much more than simply asking farms to exclude or contain harmful organisms.
    - For example, even on the most "biosecure" farm, animal manure can degrade nearby wildlife habitats, potentially weakening wild animals and raising the risk of disease transmission.
- Overall, this study exemplifies why identifying and solving problems caused by industrial animal agriculture must involve investigating *broadly and deeply*, using approaches from *a variety of disciplines*.

Why is this academic study particularly useful for addressing 'burning questions'?

- This study is relevant to PROD1: "What is the impact of industrial animal agriculture (including animal feed) on achieving a just and sustainable food system, and on each of the 17 United Nations Sustainable Development Goals?"
- In the process of examining the disease risks posed by intensive animal agriculture, this paper touches on many issues: the isolation of workers on biosecure farms, the effects of farms on local ecosystems, the clearing of forests to produce animal feed, and how the industrialization of poultry production pushed Chinese farmers into raising wild geese, likely contributing to avian influenza outbreaks, etc.
- This illustrates the enormously wide-ranging impacts of industrial food animal production, even when viewed through the lens of a single problem.

- As there are Sustainable Development Goals in many areas related to societies, health, and the environment, *there are many points at which the SDGs and industrial animal agriculture collide*.

Deeper Dive

- Animal agriculture can disturb wild animal habitat, provide a reservoir for microbes, and supply points of contact between wild animals, farmed animals, and humans. These are all risk factors for the emergence of new human diseases, with the potential for causing pandemics.
- How exactly a new microbe with pandemic potential might develop, and the likelihood of this occurring, will differ according to whether animals are produced in extensive (e.g. pasture- or rangeland-based) or intensive (indoor, potentially very large-scale) systems.

At first glance, intensive animal production is lower-risk

- A previous study attempted to compare extensive and intensive animal production in terms of these risks.
- They started by assuming that a certain quantity of animal products will be produced in the future. That amount could be supplied by either intensive or extensive agriculture.
- The authors characterized intensive animal agriculture as using less land and fewer animals to produce the same amount of food. They also described it as being biosecure, relatively automated, with less movement of animals, and having less wildlife habitat in the vicinity of livestock.
- These characteristics reduce the amount of contact between humans, farmed animals, and wild animals, and provide a smaller number of potentially disease-hosting livestock.
- While some factors like lower genetic diversity might raise the risk of new infectious diseases emerging, the authors concluded that intensive systems pose a lower risk overall.

Deeper scrutiny suggests the opposite

- The new paper by Hinchcliffe et al. adds expertise from geography, anthropology, policy, and other fields. When they examine the problem using knowledge from these disciplines, they find that the picture is more complex.
- For instance:
    - In industrial animal agriculture, there are pressures and incentives towards producing ever more output. Intensive production might lead to *more* animals, not fewer.
    - There is in fact a lot of movement of animals in intensive systems. Pigs often live in different facilities at different life stages, while dairy cows and calves in the US are routinely transported over large distances.
    - There are well-documented cases of industrial animal facilities degrading their local environments. This can change the feeding behavior and disease susceptibility of local wildlife, possibly resulting in greater disease transmission.
    - Biosecurity measures can be expensive, difficult, imperfect, and at odds with other goals. Farmers may struggle or be reluctant to implement them.
    - Previously unknown problems may also arise, Past examples include the "mad cow disease" outbreak in the UK (caused by feeding sheep tissue to cattle), or attacks on large pig farms in China, in which drones were used to drop meat allegedly infected with African swine fever.

Multiple perspectives are important

- To genuinely understand the disease risks posed by animal agriculture, and to find solutions, it is necessary to consider the problem from many angles.
- More generally, industrial animal agriculture causes a multitude of negative impacts. Appreciating the full spectrum of harms, understanding their causes, identifying solutions, and minimizing unintended consequences, *requires paying attention to multiple factors, contexts, issues, and disciplines*.

2 Sievert, Katherine, et al. **"How power in corporate-industrial meat supply chains enables negative externalities: Three case studies from Brazil, the US, and Australia."** *One Earth* 7.8 (2024): 1424-1441. link.

Meat corporations are so powerful that they don't have to pay for the wide range of harms they cause around the world.

Industrial meat production causes a wide range of harms, affecting everything from water quality to working conditions in many countries. Why is this allowed to happen? There are deep power asymmetries in the current food system, and industry holds the upper hand.

- Market concentration has created a *handful of big players* with massive power and influence.
- These companies are usually involved in many steps of the production process, meaning that they exert strong control up and down supply chains. Their complex, global, supply chains are also opaque and difficult to police.
- Governments sometimes directly fund meat companies or interest groups; staff frequently move between positions in government and industry; and industry stakeholders may even draft regulations.
- Consequently, the industry is able to obtain favorable regulations, minimal enforcement, and low penalties for wrongdoing.
- In addition, prevailing cultures favor meat and meat-eating, and meat is positioned as a solution to hunger and malnutrition. The meat industry both promotes and benefits from these norms and narratives.
- Simple policy interventions (such as taxes and standards) do not address the industry's sweeping power, and therefore allow many negative externalities to continue.
- Reducing the harms of industrial meat production will require using *a suite of interrelated policies to rebalance power in the food system.*

Why is this academic study particularly useful for addressing 'burning questions'?

- This study is relevant to ECON1: "How does industrial animal agriculture impact the economic growth and development of LMICs when "true cost" accounting is used (i.e., including ecological devastation, pollution, GHG emissions, negative public health outcomes, etc.)? How can these external costs be communicated effectively to decision makers and those who influence them in LMICs?"
- This paper uses case studies to illustrate some of these external costs, and how and why the meat industry is not held accountable for them.

- In the case of the China-Brazil soy trade (growing soy in Brazil for China to use as animal feed), both countries have received economic benefits from allowing the negative effects of large-scale soy production to occur.
- However, not everyone has shared in these benefits. For example, land clearance for soy production in the Amazon has displaced indigenous communities, and the resulting GHG releases affect the global climate.
- *Those who make or influence decisions need to understand the meat industry's power to escape responsibility.* They also need to develop and support packages of complementary interventions that change the balance of power.

Deeper Dive

- Three case studies illustrate how the meat industry's power manifests itself in practice.

1. The China-Brazil soy trade

- 50% of all pigs in the world are now raised and slaughtered in China. To feed these animals, China purchases roughly half of Brazil's soybean crop.
- Negative impacts of the soybean trade include greenhouse gas emissions from deforestation, displacement of indigenous communities, and the use of slave labor.
- Large, government-funded Chinese firms operate extensive soy-related infrastructure in Brazil. They exert market and political power by virtue of being one of just a handful of soybean buyers.
- At the same time, there are close links between Brazil's government and the soy industry. Politicians have funded soy production in Brazil while ignoring its negative impacts, then gone on to hold top roles at soy companies.
- Soy (and meat) producers have made various sustainability pledges. However, skeptics view these as a way of gaining social license to operate while fending off potential government regulation.

2. COVID-19 and US meatpacking workers

- US meat processing companies reduce labor costs by maintaining high slaughter line speeds and output quotas. This leads to workers operating in close proximity for long shifts, making them vulnerable to airborne infections.
- Despite high rates of COVID-19 infection in 2020, the federal government mandated that slaughterhouses would remain open. This was based on the premise that a "continued supply of protein" was essential to the population.
- Industry stakeholders and the Department of Agriculture appear to have influenced this decision, drafting a presidential executive order and interacting with public health officials.
- Slaughterhouse workers had little opportunity to push back, as meat processing plants employ large numbers of immigrants, refugees, and minority groups with limited bargaining power.

3. Live animal exports from Australia

- Australia is the world's largest exporter of live animals for use in meat and dairy production. Live export enables farmers to ship animals abroad for fattening when domestic pasture conditions are poor.

- Animals have been found to experience very poor welfare during transport and upon arrival at their destinations. Incidents such as the death of 2,500 sheep on a ship to the Middle East have led to public outcries against the practice.
- However, live transport continues to take place, and some regulations have even been loosened in recent years.
- Ties between industry and government, dominant cultural narratives, and international law combine to permit harm to animals by the meat industry:
    - The Meat and Livestock Association receives state funding, submits research to the Department of Agriculture emphasizing the economic value of live export, and monitors animal mortality rates during transport.
    - Meat and animal agriculture play a significant role in Australian culture, and live export is framed as part of the country's contribution to "the global protein task".
    - Until recently, WTO rules stated that animal welfare is not a valid reason for imposing trade restrictions.

How society should respond

- The authors view the harms caused by large-scale meat production as a symptom of system-wide dysfunction in the food system. They argue that narrow, 'siloed', and 'incremental' interventions, such as taxes or labeling alone, cannot fix the fundamental problems.
- Instead, they propose an "ecosystem" approach, *using a spectrum of regulatory tools in concert to transform the underlying distribution of power.*
- These could include changes to subsidies, restrictions on advertising, stricter enforcement of antitrust laws, and international agreements related to environmental and labor issues.
- With industry's agenda-setting power reduced, sustainable meat production and healthy consumption levels would be achievable.

3

Schrobback, Peggy, et al. **"Approximating the global economic (market) value of farmed animals."** *Global Food Security*, 39 (2023): 100722. link.

Regardless of one's views of various scales and types of livestock production, it is important to understand the market value of farmed animals especially in LMICs.

This study estimates the global market value of live animals and their products at 1.6 - 3.3 trillion USD (compared to roughly 2.6 trillion USD for crops). Policymakers and advocates may use such estimates to guide and influence decision-making around future production systems, environmental impacts, and livelihoods. These numbers may be particularly relevant in certain LMICs, where the per-capita value of animals is relatively high.

- Farmed animals contribute to society in various ways that can potentially be evaluated in economic terms. In addition to outputs such as meat, this includes the maintenance of cultural traditions, value generated by the knowledge that farmed animals exist, etc. (Figure 1).
- In LMICs, the value of animals for purposes such as draft power, insurance, and social status can be particularly important.
- Animal farming also has costs, such as environmental degradation, which can also be valued.
- This paper uses FAO data to evaluate a subset of these values and costs: the market value of live terrestrial animals and the primary products (meat, eggs, and milk) of both terrestrial and aquatic animals (*dashed box in Figure 1*).
- The study provides market values by country, for different years, and divided into live animals and animal products. It shows that *cattle supply most of the value* in terms of both live animals and products.
- These numbers are useful for purposes such as estimating by how much animal diseases lower the value of animals and their products. The authors also suggest that countries that generate a lot of value from animals should pay more towards mitigating the costs of animal production (greenhouse gas emissions, soil erosion, biodiversity loss, etc.).

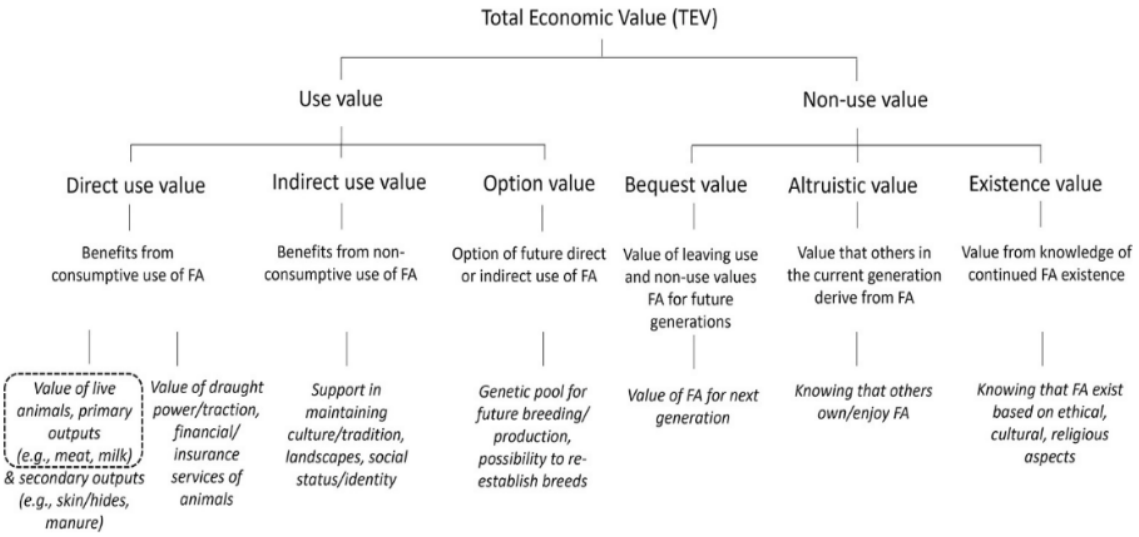

Figure 1: The ways in which farmed animals can contribute economic value to society. This study estimates the value contributed by the contents of the dashed box: the market value of live animals and primary outputs such as meat, eggs, and milk. From Schrobback et al. 2023.

4 Durai, Nagarajan R., and K. R. Babuji. **"The political ecology of shrimp aquaculture in Tamil Nadu: A case study from Mayiladuthurai District."** *Grassroots - Journal of Political Ecology*, 30.1 (Apr 2023): 371-380. link.

Global capitalism shapes shrimp aquaculture in India, with far-reaching consequences at the local level.

In India, export-oriented shrimp aquaculture has been encouraged by international institutions and the national government as a way of earning foreign currency to pay debts. This has led to a cycle in which local environmental degradation and social inequality reinforce each other.

- In the coastal village in this study, groundwater depletion and saltwater encroachment had already taken some farmland out of production by the 1990s. Two companies bought this land and converted it into large-scale shrimp farms. A few local landowners also began smaller-scale aquaculture.
- A few years later, shrimp diseases arrived. The companies left, but local farmers, with their knowledge of local ecosystems and ability to experiment, found ways of persisting.
- A handful of larger landowners, who were well-off before the arrival of shrimp aquaculture, continue to make good profits from shrimp farming. They also sell feed on credit to smaller farmers, and *collect their shrimp to distribute to exporting companies*. This reinforces their place at the top of the hierarchy.
- Water seeps out of the shrimp ponds and has to be replenished. However, excessive pumping of groundwater causes seawater to enter the water table, making the water supply unfit for drinking and leaving agricultural fields too salty for cultivation.
- Smaller landowners therefore must either sell their farmland to existing shrimp farmers, or become small-scale shrimp farmers themselves.
- The Dalit caste group has fared worst of all. Their traditional role as agricultural laborers is being eroded. Many men have migrated to find work, while women are deemed unsuitable for work on shrimp farms but also not free to leave. As farmworkers, Dalits used to have access to healthy food. Now they rely on low-quality public food assistance, and have to walk long distances for clean water.

5 Zeng, Guojun, Zheng Chen, and Shuru Zhong. **""We Chinese just want meat!" An analysis of Chinese netizens' reactions to vegetarian advocacy."** *Food Quality and Preference* 115 (2024): 105128. link.

Some vegetarian advocacy work in China has faced considerable backlash.

Advocacy tactics and messages in LMICs need to be very nuanced, sensitive, and attuned to local conditions and sentiments. Negative reactions to a Chinese documentary about vegetarianism suggest that the film overlooked important differences in how meat and food choices are perceived in Western and Chinese culture.

- This study analyzes a documentary about vegetarianism featuring a well-known Chinese actress, Zhang Jingchu, and the negative response to it on Chinese social media.
- The documentary presented vegetarian diets as healthy and nutritious, while emphasizing the harmful effects of meat production on animals and the environment. It featured Western-influenced Chinese elites, and evidence from Western societies.
- Comments on Zhang Jingchu's Weibo account about the film were surprisingly negative, given the long history of vegetarianism in China.
- Prominent themes among the comments included defending the recently-gained freedom to eat meat; questioning Zhang Jingchu's expertise and motivations; and perceiving a "cult-like" message in the film.
- The authors identify some key aspects of Chinese culture that may explain these negative reactions. For example, meat is seen as "an individual entitlement associated with the nation's progress and dignity", as opposed to the fundamental dietary component it is viewed as in the West.
- In Western countries, vegetarianism may be understood as a way of achieving liberation and justice for all beings. However, *vegetarian advocacy risks being perceived as a form of oppression in the Global South*.
- Promoting meat reduction, flexitarian diets, and emphasizing health benefits may capture some of the benefits of vegetarianism while lowering this risk.

6 Pina, Raisa. **"Feeding inequality: The hidden costs of Brazil's meat industry monopoly."** Tiny Beam Fund, 24 March, 2024. link 1 (English). link 2 (Portuguese).

JBS receives huge support from government of Brazil and global investors, but profits go to top executives, not its workers and society in Brazil.

JBS's exponential growth is powered by the long-term support provided by government policies and public financial institutions in Brazil. Its ascendency is in stark contrast to the escalating social and economic inequalities in Brazil which JBS has done little to alleviate. The main beneficiaries of its enormous wealth are its top executives, shareholders and investors.

- Started as a modest butchery in 1953, JBS clinched the title of the world's largest food company in the 2020s. It ranks first in beef and chicken production and second in pork and salmon.
- JBS owes its success to unwavering and significant support given by the government of Brazil since its early days. In the last 20 years, US $6 billion has flowed to JBS in public finance through the Brazilian Development Bank (BNDES).
- For example, it was with BNDES support that JBS purchased several large competitors during the 2008 global financial crises, including the U.S. firms Smithfield Beef and Pilgrim's Pride Corporation.
- JBS has an annual revenue of US $77 billion. Its financial footprint in Brazil is vast, contributing 2.1% to Brazil's GDP and 2.7% of its employment.
- Despite JBS's slogan "We feed the world with the best", poverty and hunger have increased in 11 of 12 Brazilian cities where JBS is heavily involved according to 2013-2023 indicators.
- Over a hundred thousand workers at JBS earn around US $393 monthly, *a third of what is estimated as a living wage in Brazil*. On the other hand, each of the five top JBS executives take home the equivalent of US $420,000 every month. At the helm are family members of the founder – José Batista Sobrinho – holding 49% of JBS's shares. BNDES has a 20.8% stake, while foreign investors have 11%.

Financing to JBS via loans and direct investments		
INSTITUTION	**PERIOD**	**AMOUNT**
BNDES	2003-2017	US $6 billion
Brazilian Stock Market (IPO)	2007-2013	US $12 billion
UK, EU and US based financiers	2013-2019	US $2.5 billion
Bank of China	2015	US $1 billion
Royal Bank of Canada	2018	US $900 million
Fidelity Management	2021	US $253 million
BlackRock Group	2021	US $241 million
Vanguard Group	2021	US $202 million
Barclays	2021	US $84 million
Dimensional Fund	2021	US $84 million
Santander Group	2021	US $36 million
Deutsche Bank	2021	US $10 million
HSBC Group	2021	US $3.5 million
BNP Paribas Group	2021	US $2 million
JP Morgan	2021	US $623 thousand
Bank of Montreal	2022	US $1.5 billion
TOTAL	2003-2023	US $24,816,123,000

Major investments in JBS (2003-2023). Raisa Pina, 2024.

7 Bennie, Andrew, and Andrew Bowman. **"The beef with climate change: Growth, equity, and a just transition in the beef sector in South Africa."** Tiny Beam Fund, 12 September, 2024. link.

South Africa beef industry's planned production increase for export jeopardizes smallholder cattle farmers as well as transition to a just and sustainable agriculture system.

The South Africa beef industry, with backing from the government, plans to incorporate smallholder farmers into the main commercial value chain to increase production for export as a way to address racialized inequalities in the industry. A critical review suggests that these strategies may not work. Coupled with increased greenhouse gas emissions from the projected industry growth, they may even deepen agrarian inequalities while leaving ecological problems unresolved.

- This study is done against the backdrop of a new South Africa government plan Agricultural and Agro-processing Master Plan (AAMP). The beef industry turns AAMP's prioritization of beef into a strategy for expansion – in particular export – by 20% by the year 2030, *using the core mechanism of integrating smallholder farmers into the beef industry.*
- It is doubtful that these commercialization strategies can result in broad inclusion and development for a just transition. Reasons include:
    - Smallholder cattle farming in South Africa is quite different to commercial production, "not simply in scale but in production methods and aims pursued." They already face serious challenges.
    - Commercialization "typically target/benefit a small elite of the best-resourced farmers".
    - "Disruption to existing mixed livelihoods and farming systems, where cattle serve multiple functions beyond beef production."
    - Farmers may face increased exposure to risk and shocks as well as new costs.
    - Cattle breeds better-suited to feedlots are less hardy than indigenous ones.
    - Smallholders may be subject to large bargaining power disparities.
- Climate impacts and ecological problems from beef cattle's high emissions further complicate matters.
    - Enteric fermentation and manure from cattle is by far the largest direct source of livestock and agricultural greenhouse gas emissions in South Africa.
    - The average commercial farmer is in a better position to respond to climate impacts than the average smallholder.
    - Climate change mitigation and impacts can potentially intensify agrarian inequalities that already exist.
- The planned growth of the beef industry does not seem to provide sufficient answer to the question of how to achieve a just transition, balancing holistic ecological sustainability, regeneration and resilience, with equitable livelihoods and decent work for smallholder cattle farmers.

Brief mention (non-academic reports):

1 European Commission. *A shared prospect for farming and food in Europe – The final report of the Strategic Dialogue on the Future of EU agriculture*. Brussels: European Commission, September 2024. link 1. link 2.

- "Announced by President von der Leyen in her State of the Union address in September 2023 and launched in January 2024, the Strategic Dialogue on the Future of EU Agriculture brought together 29 major stakeholders from the European agri-food sectors, civil society, rural communities and academia to reach a common understanding and vision for the future of EU's farming and food systems."
- 14 recommendations: 1) Strengthen farmers' position in the food value chain. 2) Deploy a new approach to deliver on sustainability. 3) Reform the Common Agricultural Policy. 4) Finance the transition. 5) Promote sustainability and competitiveness in trade policy. 6) Make the healthy and sustainable choice the easy one. 7) Enhance sustainable farming practices. 8) Reduce GHG emissions in agriculture. 9) Create pathways for sustainable animal farming in the EU. 10) Better preserve and manage farmland and water. 11) Promote robust risk and crisis management. 12) Build an attractive and diverse sector. 13) Better access to and better use of knowledge and innovation. 14) Governance change and new culture of cooperation.

2 Food and Agricultural Organisation (FAO). *The State of food and agriculture 2024 – Value-driven transformation of agrifood systems.* Rome: FAO, 2024. link 1. link 2.

- The 2023 State of Food and Agriculture report revealed agrifood systems generated about 12 trillion dollars in environmental, social, and health hidden costs. The 2024 report refines the understanding of these hidden costs for 153 countries (99% of the world population).
- It analyzes hidden costs according to six categories of agrifood systems: 1) Protracted crises. 2) Traditional. 3) Expanding. 4) Diversifying. 5) Formalizing. 6) Industrial.
- Agrifood systems in protracted crises bear the highest burden relative to their economies, with high environmental and social hidden costs (comparable to 45% of GDP). These costs are also a burden for traditional systems but to a slightly lesser degree. Industrial and diversifying systems account for the highest quantified hidden costs (5.9 trillion), dominated by health hidden costs (70% of all hidden costs).
- Biggest global risk factors: Low consumption of whole grains and fruits; overconsumption of sodium. In formalizing and industrial systems, unhealthy dietary patterns also include those high in processed and red meats.
- A better future requires decent incomes and healthier food choices that fit to local realities. Everyone has a role to play: Farmers, cooperatives, consumers, institutions, policies that set the right incentives.

About Beacon

A project of Burning Questions Initiative

Why?

- Tiny Beam Fund's flagship *Burning Questions Initiative* produces a list of 'burning questions'. These questions were contributed by over 25 organizations and funders critical of and working to tackle industrial animal agriculture, especially concerning low- and middle-income countries (LMICs). These questions focus on topics that they would most like academic researchers to address and answer. The current (2023) list is here.
- Every 'burning question' is complex and multifaceted. It would be foolish to believe that there is a single, simple, definitive answer to a question.
- Addressing these questions requires welding together many pieces of nuanced, contextualized information, research findings, and perspectives drawn from a broad knowledge base, a rich knowledge bank of studies by academic researchers. It also requires extracting key messages from these studies.
- This welding and extracting endeavor is arduous. But, "a journey of a thousand miles begins with a single step". We hope that our curated series of key messages – named *Beacon* – will serve as a beacon, guiding all those keen to take the first step.

Who's the audience?

- Those who have contributed to the 'burning questions', those who are curious about these questions, those who are interested in using the research undertaken by academics to address the questions.
- Anyone can access *Beacon* on our website. It is easy to read and understand. No academic jargon!

What's in it?

- Each issue contains 6-8 main items. These are works by academic researchers in peer-reviewed journals from the past couple of years. Also included are reports written for Tiny Beam Fund by recipients of its *Burning Questions Initiative* fellowship awards (they are all PhD holders or PhD students close to obtaining their degrees). 1-2 'Brief mention' non-academic reports may also be included.

Read This Issue