

Sustainable contribution of amino acids from animal proteins vs. marine proteins for livestock

Charles Starkey

Aquaculture Symposium

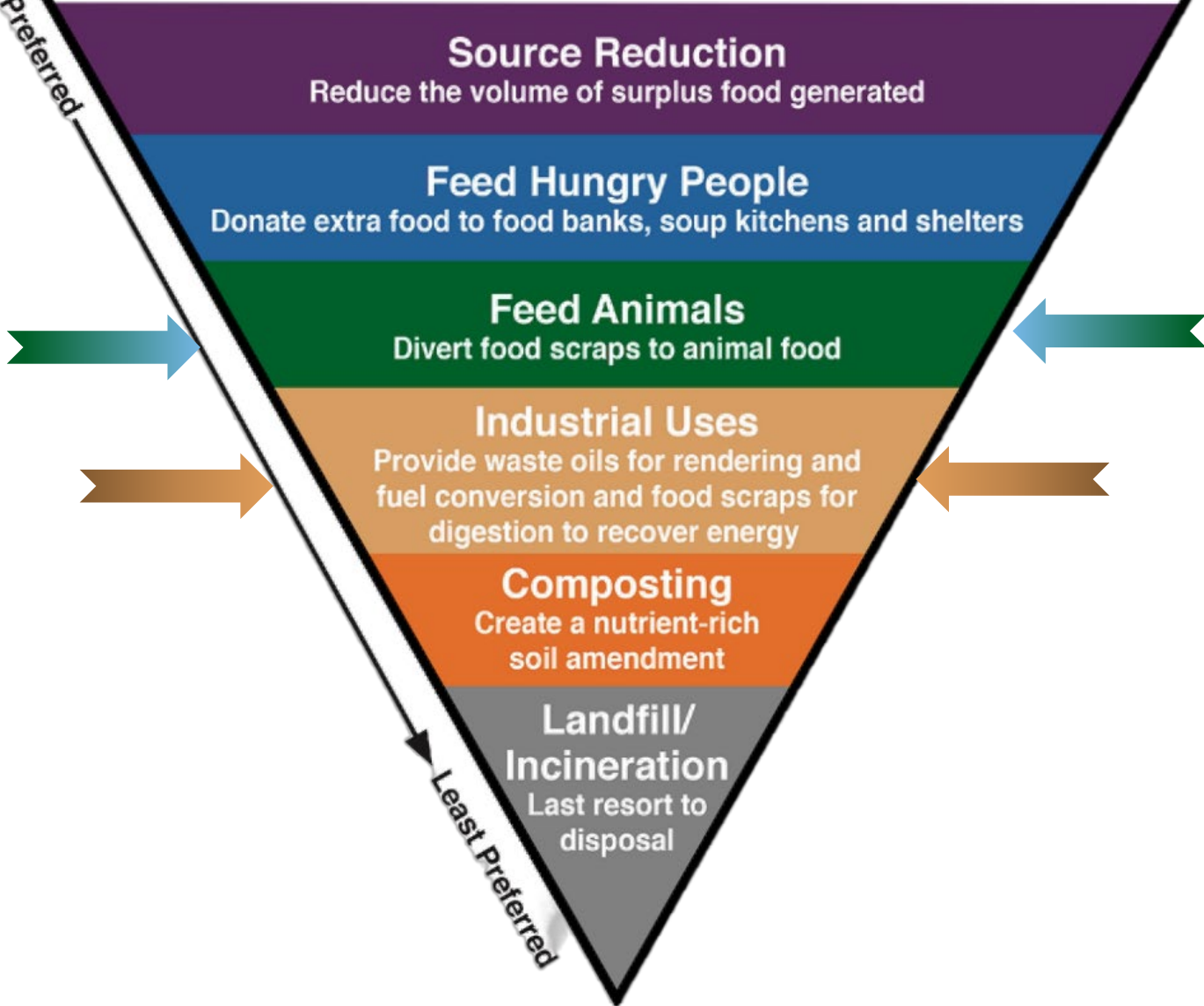
November 2023





Food Recovery Hierarchy

Most Preferred



Least Preferred



UN SUSTAINABLE DEVELOPMENT GOALS



The Original Recyclers



RENDERING COMBATS CLIMATE CHANGE

Rendering protects the environment from high greenhouse gas emissions of other disposal methods. It reduces the environmental impacts of animal agriculture by sequestering 5 times more greenhouse gases than are produced.

This is equal to removing **18.5 million** cars off the road each year.

If all renderable products were sent to landfills, all available space would be gone in **4 years.**



Grocery Stores generate

Super Foods

1.92 BILLION POUNDS

of scraps, fat, bone, expired meat & used cooking oil annually

Renderers collect



4.4 BILLION POUNDS

of used cooking oil per year in the U.S. and Canada

RENDERING RECLAIMS AND PROTECTS

3.7 billion gallons of water that would otherwise be wasted are reclaimed during rendering, cleaned, and returned to rivers and streams. Rendering also improves water quality by reducing grease and oil that clog sewer and wastewater systems.



FEEDING THE FUTURE

Rendering helps grow the next generation of food by “recycling” unwanted meat into new and clean ingredients for animal food and fertilizer.



Rendering: IS RECYCLING

Avoid waste

Reduced landfills outputs

WHAT ARE THE PRODUCTS OF RENDERING?

Renderers collect:

56 BILLION POUNDS

of raw materials every year
in the U.S. and Canada



If all renderable product was sent to the landfill, all available space would be used in

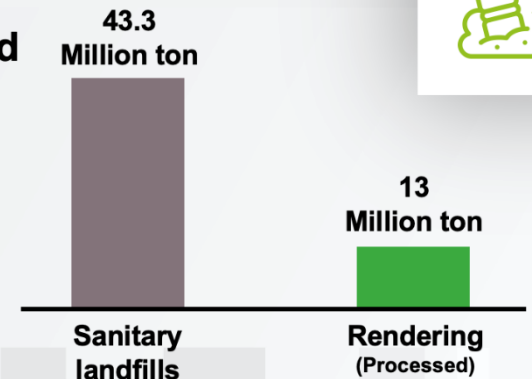
4 YEARS

<https://nara.org/wp-content/uploads/2019/12/Rendering-is-Recycling-Update.pdf>

ENVIRONMENTAL SUSTAINABILITY

Brazil currently has more than 3 thousand sanitary landfills spread all over the country

Without the renderers job, this number would increase by 30.7%, about 921 new sanitary landfills.



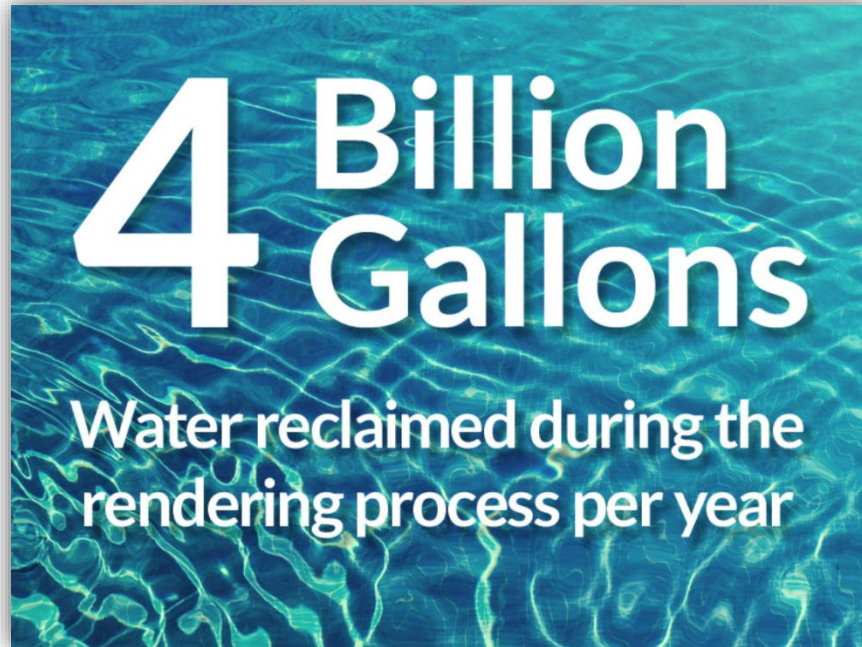
<https://abra.ind.br/conheca-o-setor/?lang=en>



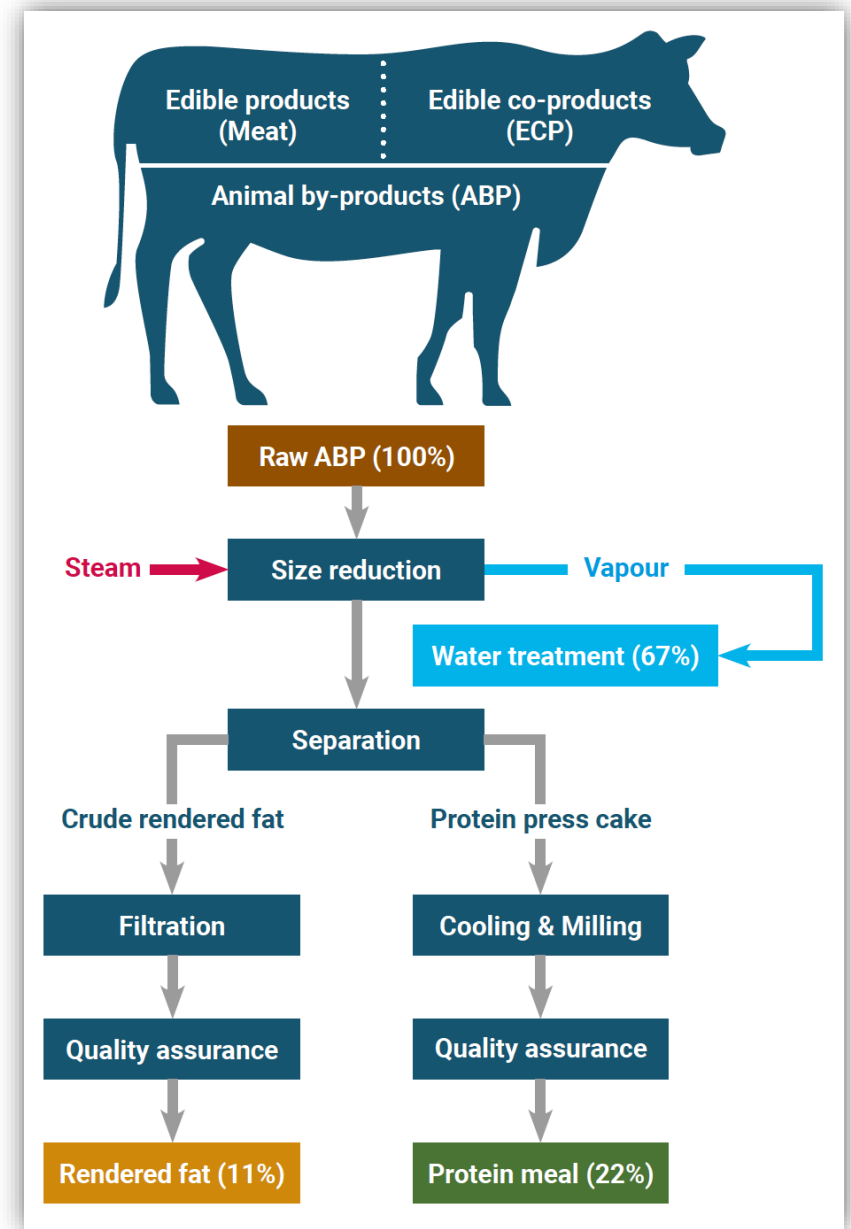
Rendered products: WATER RECOVERY

**Water: from 50% to 90% is water reclaimed,
and is treated before released**

Yearly in USA & Canada:



<https://nara.org/sustainability/water-recovery/>



<https://efpra.eu/wp-content/uploads/2022/05/EFPPA-SUSTAINABILITY-CHARTER-V1a.pdf>

Rendered products: GHG EMISSIONS

Rendering reduces Greenhouse Gas Emissions (GHG)

- ✓ **Rendering reduces GHG emissions by 72% and fossil fuel use by 80%** (when compared to petroleum diesel)
- ✓ **An average rendering plant sequesters 5 times more greenhouse gas (GHG) emissions from the environment (such as carbon dioxide) than it emits. Some are even more efficient than that**
- ✓ **Rendering avoids at least 90% of the potential GHG emissions compared with industrial composting**



Rendered products: Nutrient and Land-Conservation

Valuable nutrients are saved / upcycled

The demand for arable land and fertilizers is lowered

For example in 2017 Brazilian renderers:

- ***recycled 1.9 million tons of pure protein and 32.4 billions kcal (5.3 million tons of fats and meals)*. The phosphorous recycled were equivalent to 650 thousand tons in dicalcium phosphate*****
- ***To replace the rendered products by corn/soybean, 2.1 millions hectares of arable land and 910 thousand tons of NKP would be needed*.***

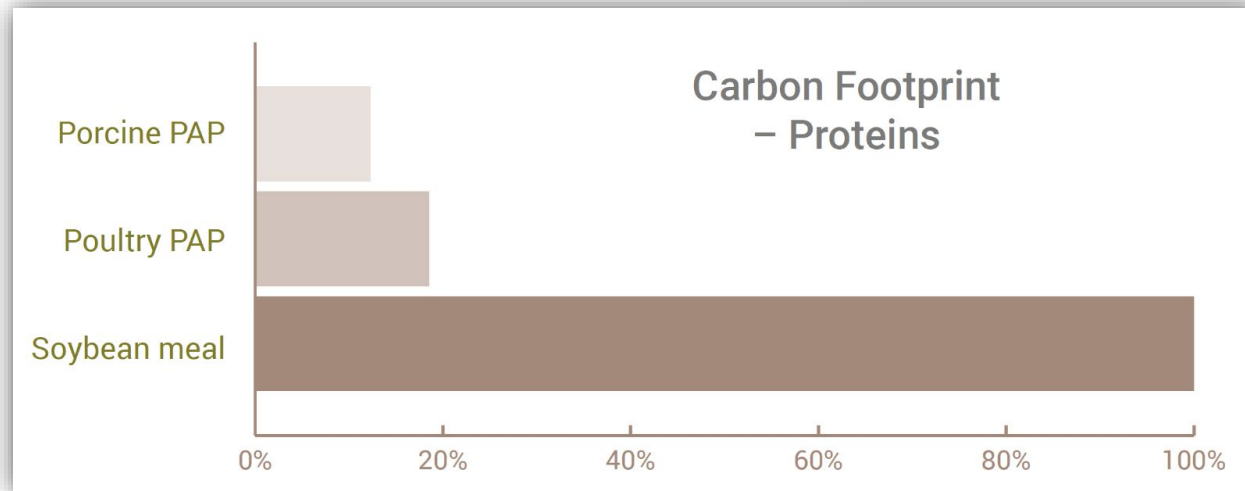
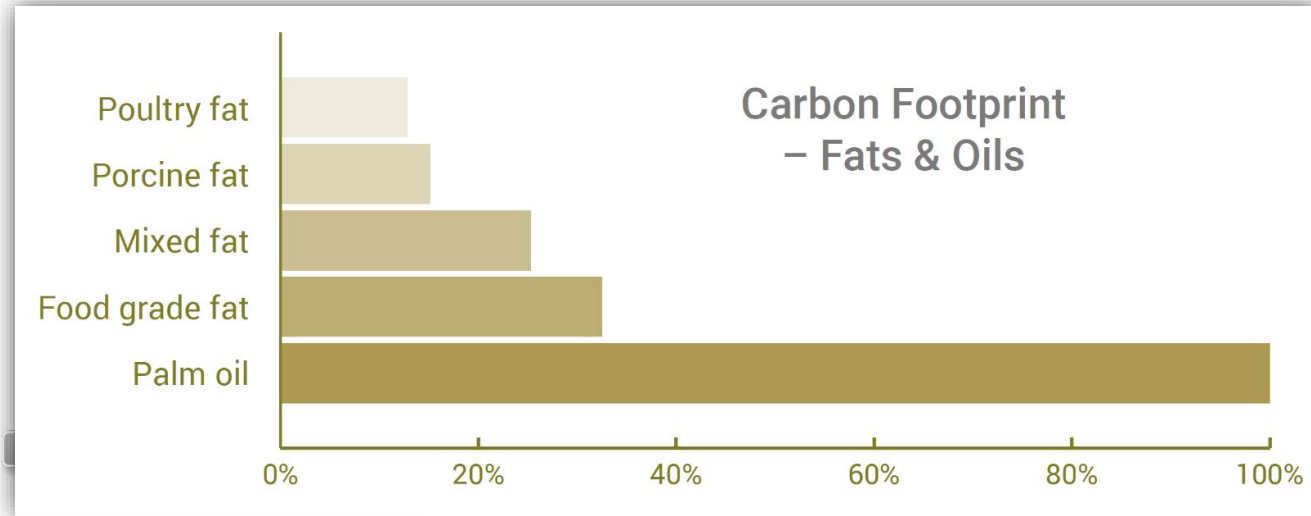


***: L. Cypriano, Revista Reciclagem Animal, Jan/Feb 2018, pp. 60 a 63 - <http://www.mflip.com.br/pub/stilo/?numero=61&edicao=10598#page/61>**

**** : L. Cypriano, Revista Reciclagem Animal, Dec/Nov 2017, pp. 50 a 55 - <http://www.mflip.com.br/pub/stilo/?numero=60&edicao=10538#page/51>**

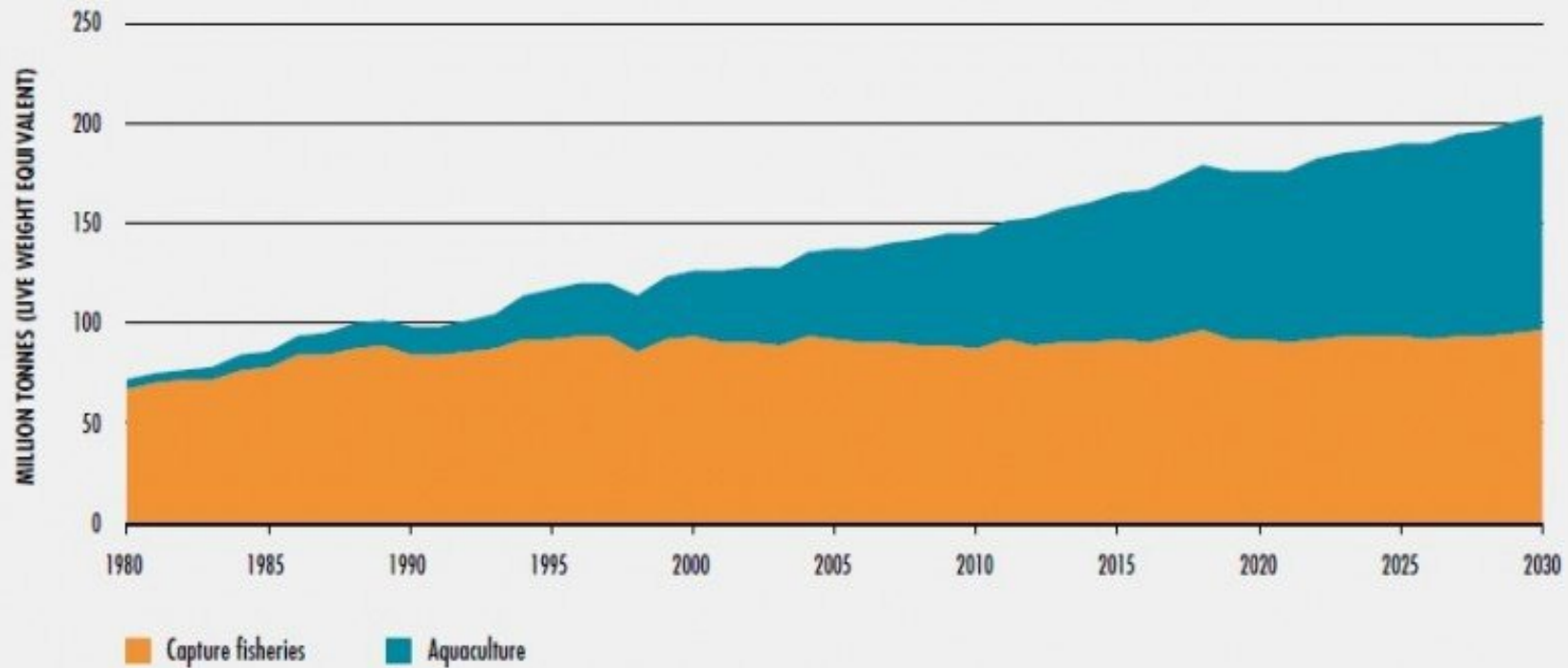
Rendered products: Low Carbon Footprint

**Rendered products do not
compete with food!**



What does this mean, globally?

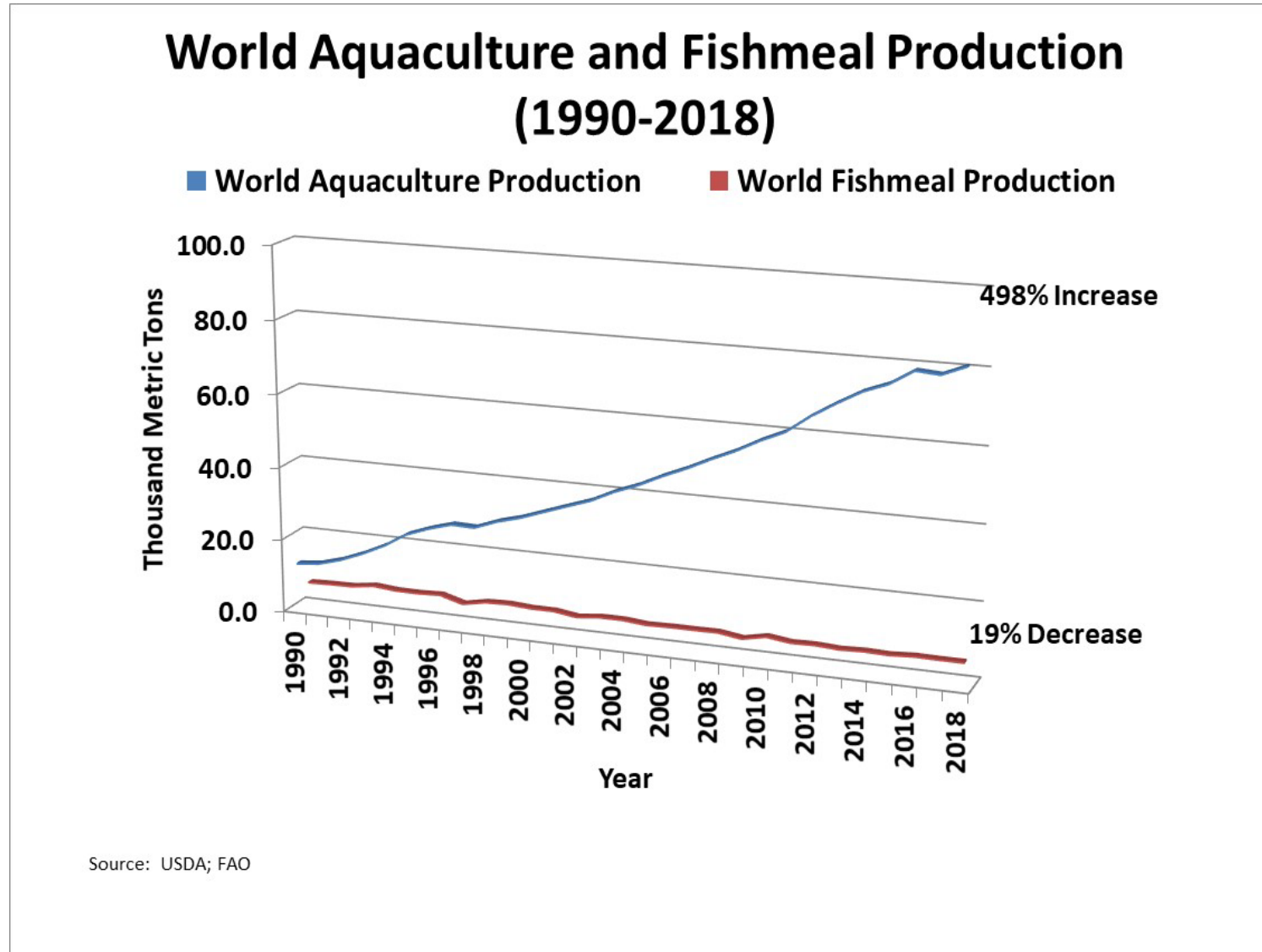
FIGURE 51
WORLD CAPTURE FISHERIES AND **AQUACULTURE PRODUCTION**, 1980–2030



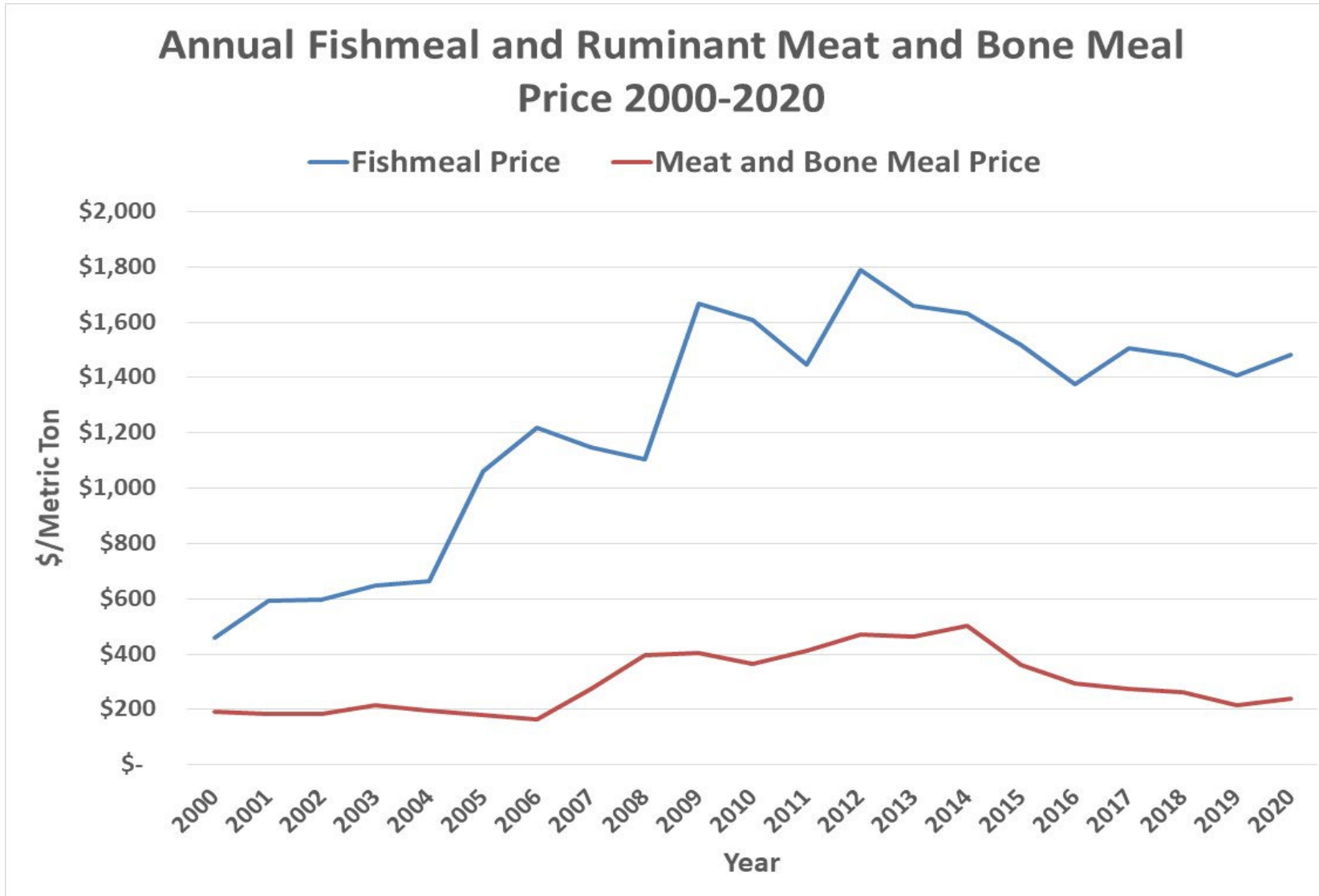
SOURCE: FAO.



What does this mean, globally?



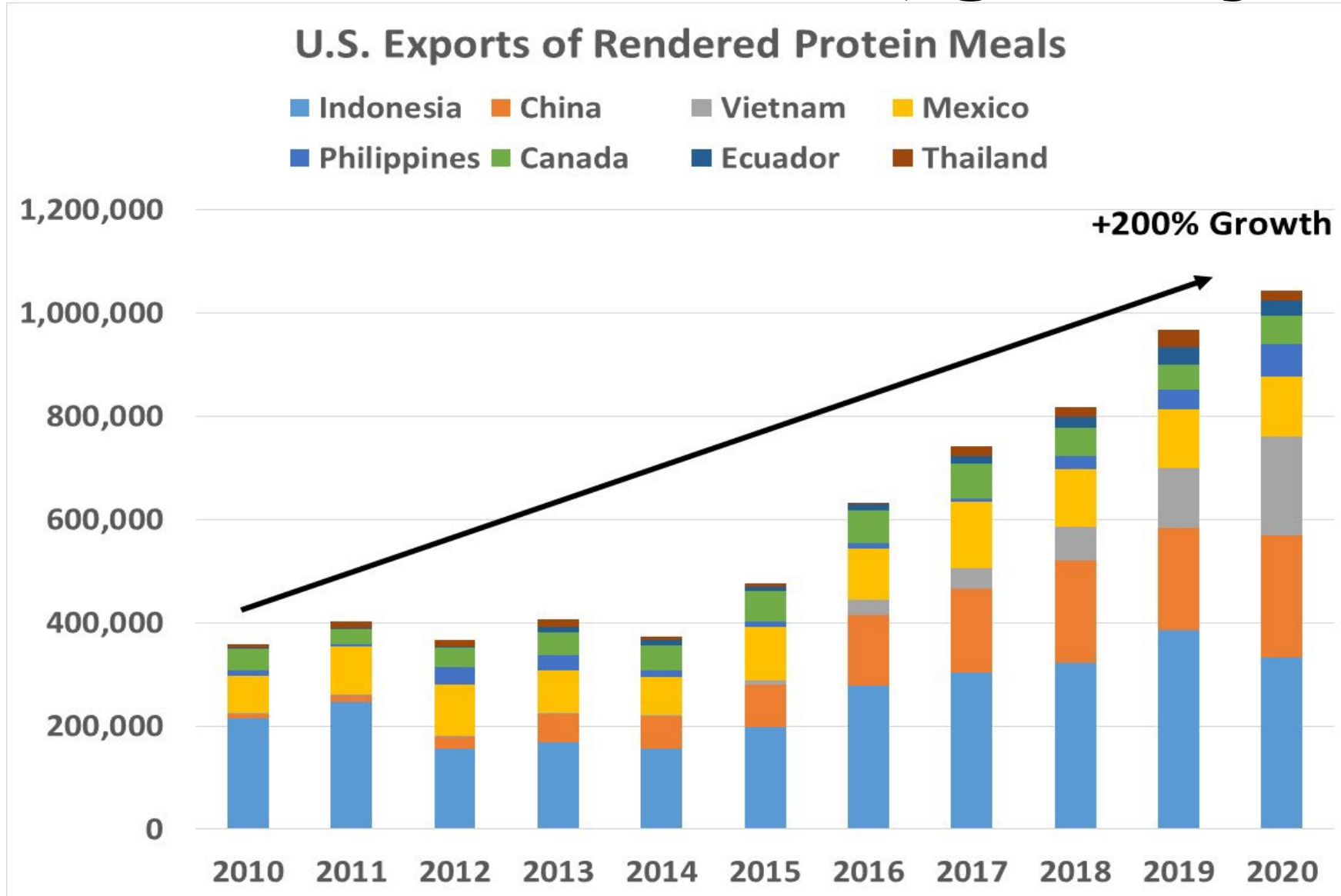
What does this mean, globally?



Source: The Jacobsen Report
USDA/FAS Oilseeds: World Markets and Trade



What does this mean, globally?



livestock's long shadow

environmental issues and options



Repercussions



Repercussions



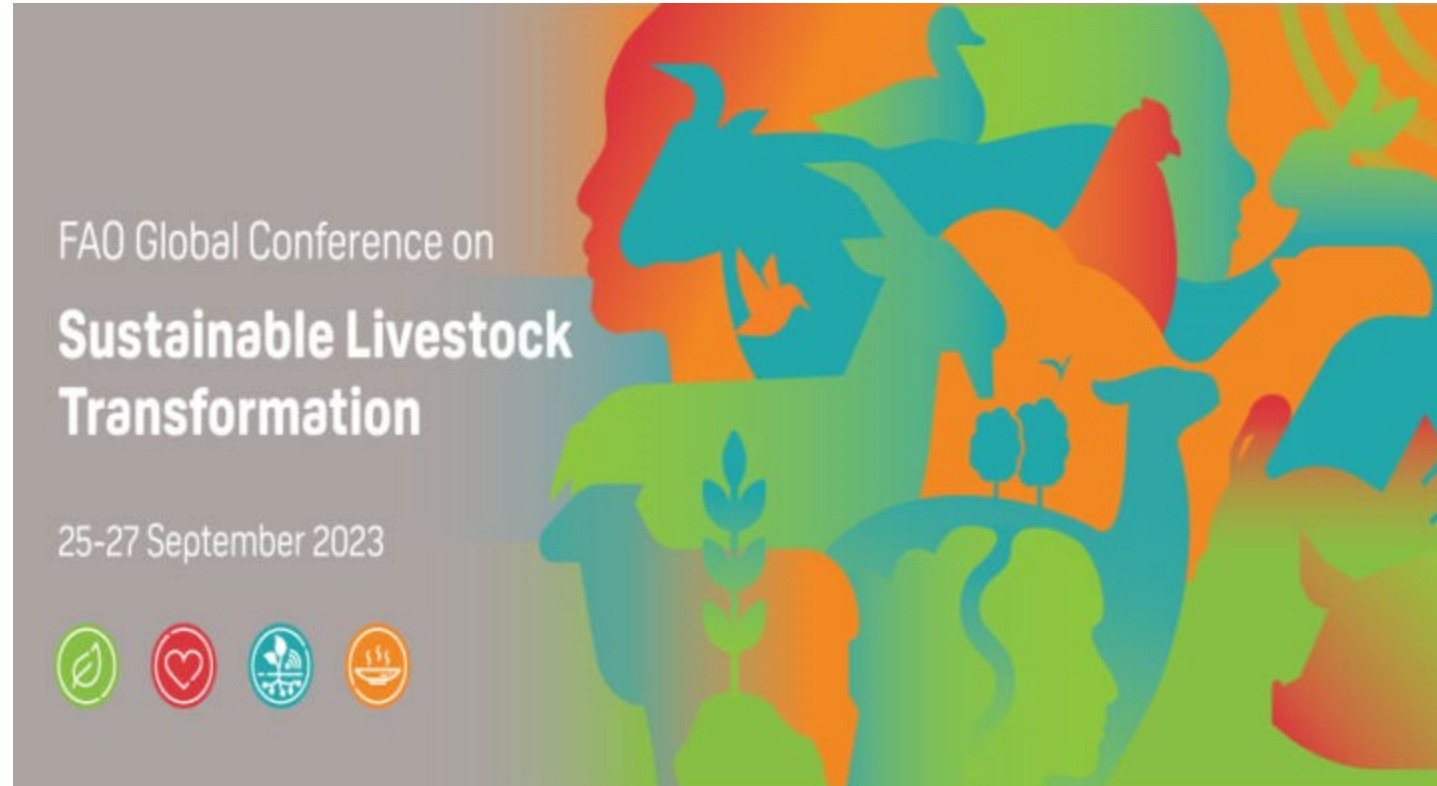
Repercussions



Repercussions



Alternatives



Food vs Fuel

California Environmental Protection Agency
Air Resources Board

California Environmental Protection Agency

Air Resources Board

Low Carbon Fuel

User Guide V

LCFS Reporting

Credit Bank and Trans

Release Date: A

Last Updated: Ma

Disclaimer: The California Air Resources Board (CARB) makes no warranty or assumes no liability or responsibility for any error or omission in this User Guide and/or to the products described in this User Guide. Please send in your comments and feedback to help us improve the User Guide. If you believe a comment appears incorrect, misleading, or incomplete.

European Commission

English Search

Energy Menu

Home > Topics > Renewable energy > Bioenergy > Biofuels

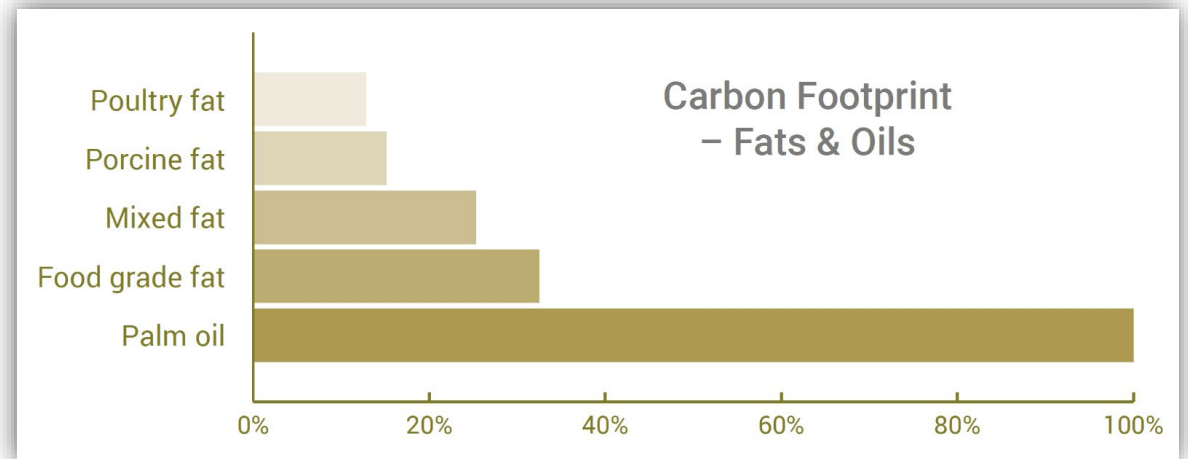
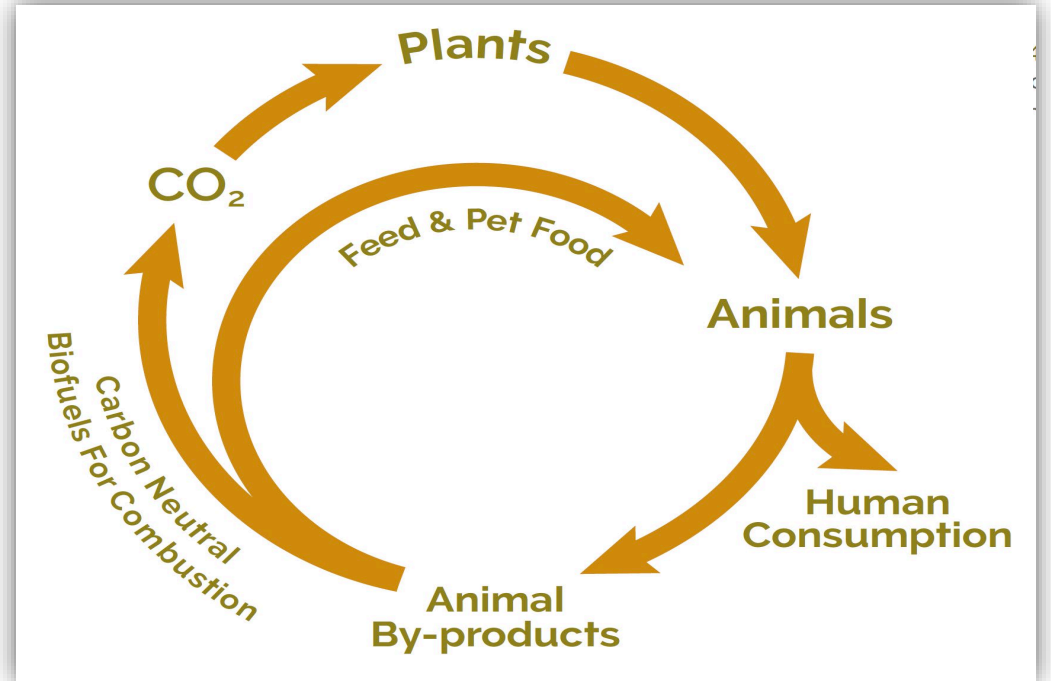
Biofuels

The EU is working on the transition towards advanced biofuels made from sustainable feedstock.

Biofuels are liquid or gaseous transport fuels, such as biodiesel and bioethanol, made from biomass. They serve as a renewable alternative to fossil fuels in the EU's transport sector, helping to reduce greenhouse gas emissions and improve the EU's security of supply.

By 2030, the EU aims to increase the share of renewable energy in transport to at least 14%, including a minimum share of 3.5% of advanced biofuels. EU countries are required to set out an obligation on fuel suppliers that ensures the achievement of this target.

Sustainability criteria



California Low Carbon Fuel Standard (LCFS) Carbon Intensity (CI) Scores (gCO₂e/MJ)

California Low Carbon Fuel Standard (LCFS) Carbon Intensity Scores (gCO ₂ e/MJ)			
Biodiesel Feedstock		Renewable Diesel Feedstock	
<u>North America</u>		<u>North America</u>	
Tallow	34.46	Tallow	36.29
Used Cooking Oil (UCO)	20.16	Used Cooking Oil (UCO)	20.84
Distillers Corn Oil	29.55	Distillers Corn Oil	32.80
Soy Oil	54.23	Soy Oil	55.22
Canola Oil	53.36	<u>Singapore</u>	
		Tallow	36.22
		UCO Global	21.25
		UCO Asian	16.89

Source: California Air Resources Board (CARB);
<https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities>



U.S. Production & Use (bio-based diesel) of Rendered Fat in MT; (Annual 2022)

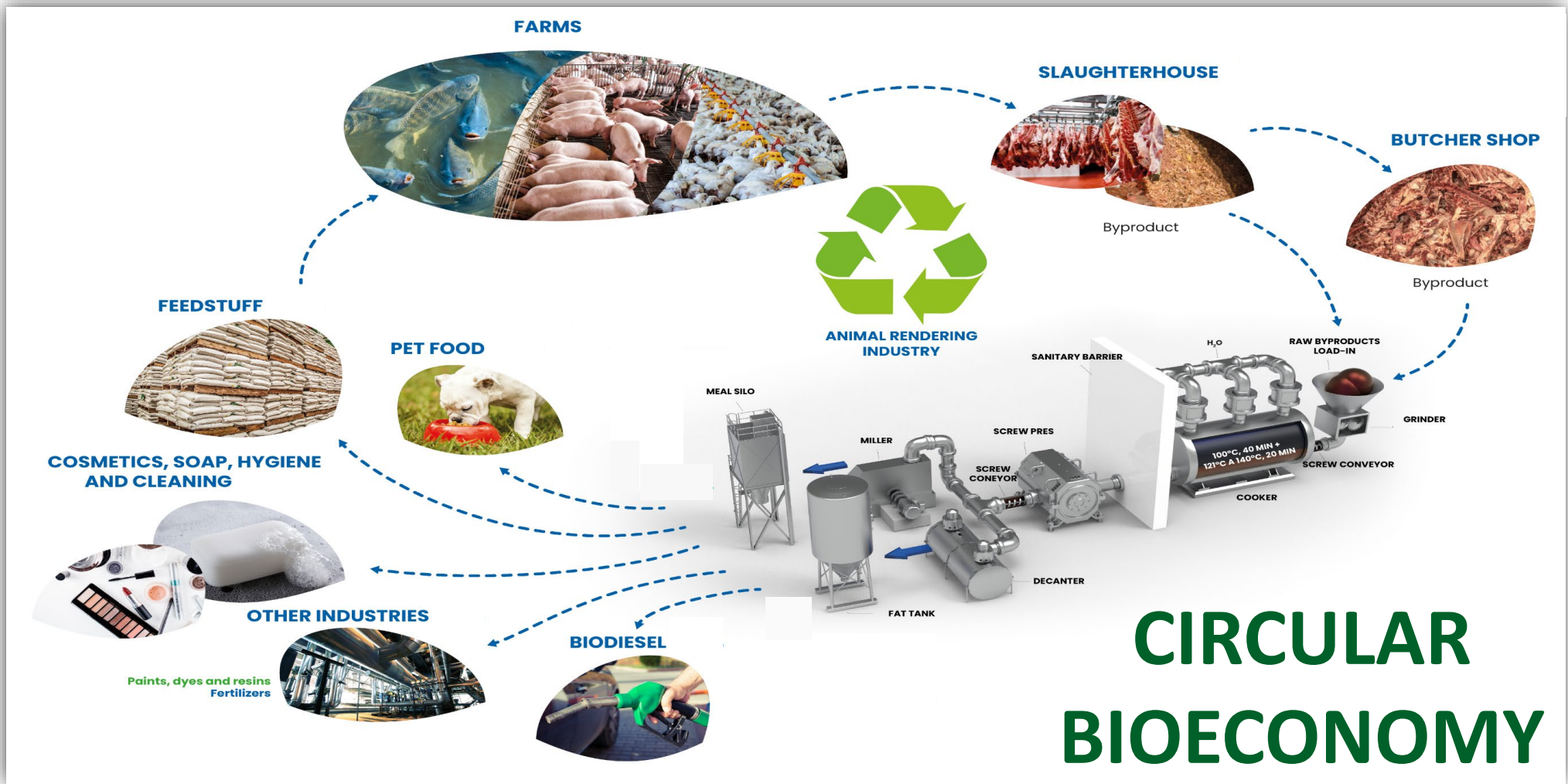
Product	Production	Imports	Total Supply	Consumption in Bio-based diesel	Percent of Production	Percent of TOTAL Supply
Poultry Fat	917,953	2,992	920,945	73,288	8%	8%
Tallow	2,834,157	554,064	3,388,221	794,616	28%	23%
White Grease	745,891	49,616	795,507	300,239	40%	38%
TOTAL*	4,498,001	606,672	5,104,673	1,168,142	26%	23%

Source: USDA/National Agricultural Statistics Service

Energy Information Agency



Sustainability



CIRCULAR BIOECONOMY

Alternatives



Sustaining relationships through science

PET FOOD ALLIANCE

The [Pet Food Alliance \(PFA\)](#) is a joint project facilitated through Colorado State University and the Fats and Protein Research Foundation (FPRF) to bring together members of the rendering, pet food, laboratory, academia, and technology industries to collaborate and develop solutions for industry-wide challenges and explore mutually beneficial opportunities.



Research Funding, *utilizing research and data to...*

- Economic sustainability
- Increasing markets
- Improvements in quality
- Supportive safety information



New research demonstrating benefits of rendered products on sustainability

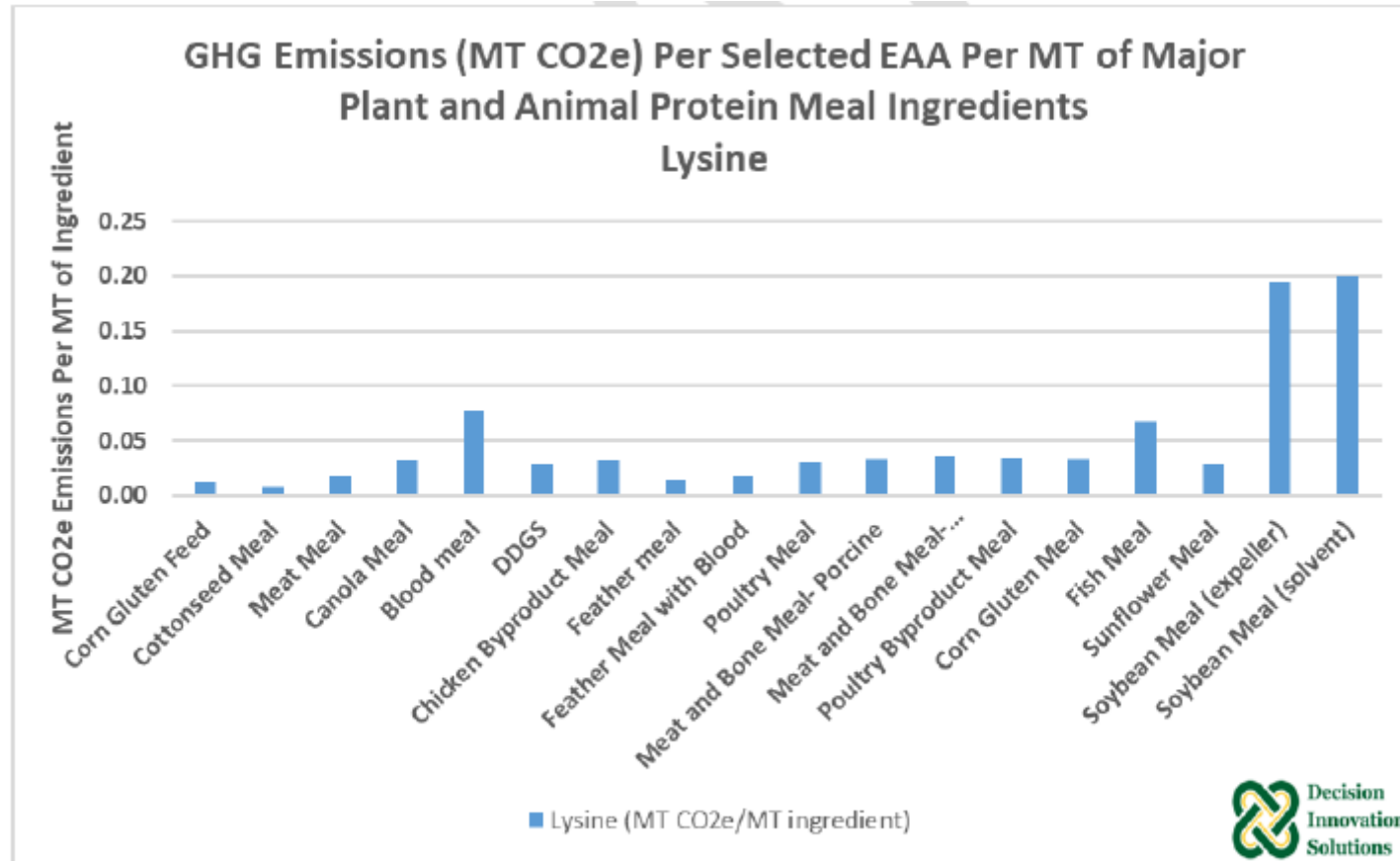


Figure 7. GHG Emissions Per Selected EAA Per MT of Major Plant and Animal Protein Meal Ingredients, Lysine



New research demonstrating benefits of rendered products on sustainability

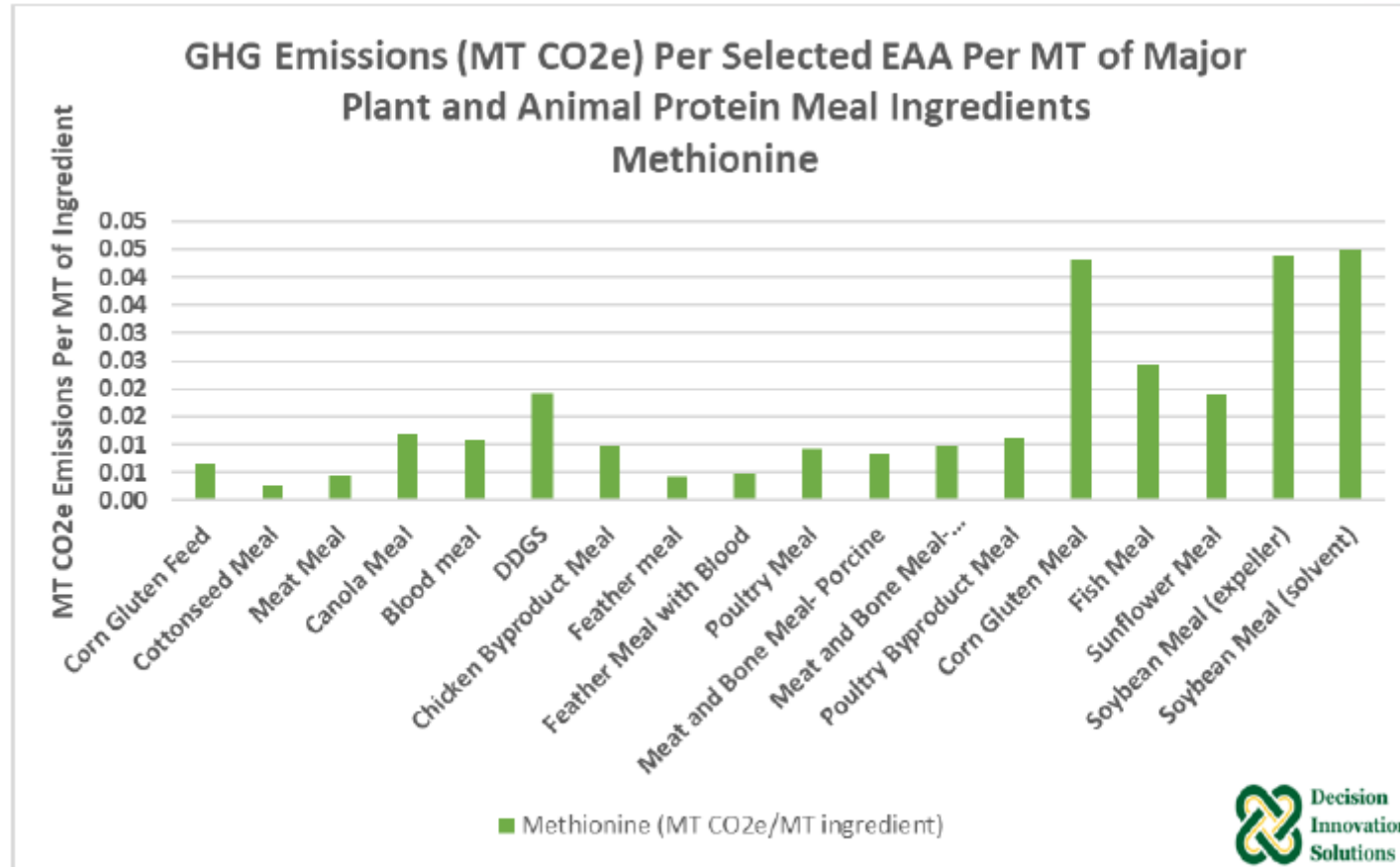


Figure 8. GHG Emissions Per Selected EAA Per MT of Major Plant and Animal Protein Meal Ingredients, Methionine



New research demonstrating benefits of rendered products on sustainability

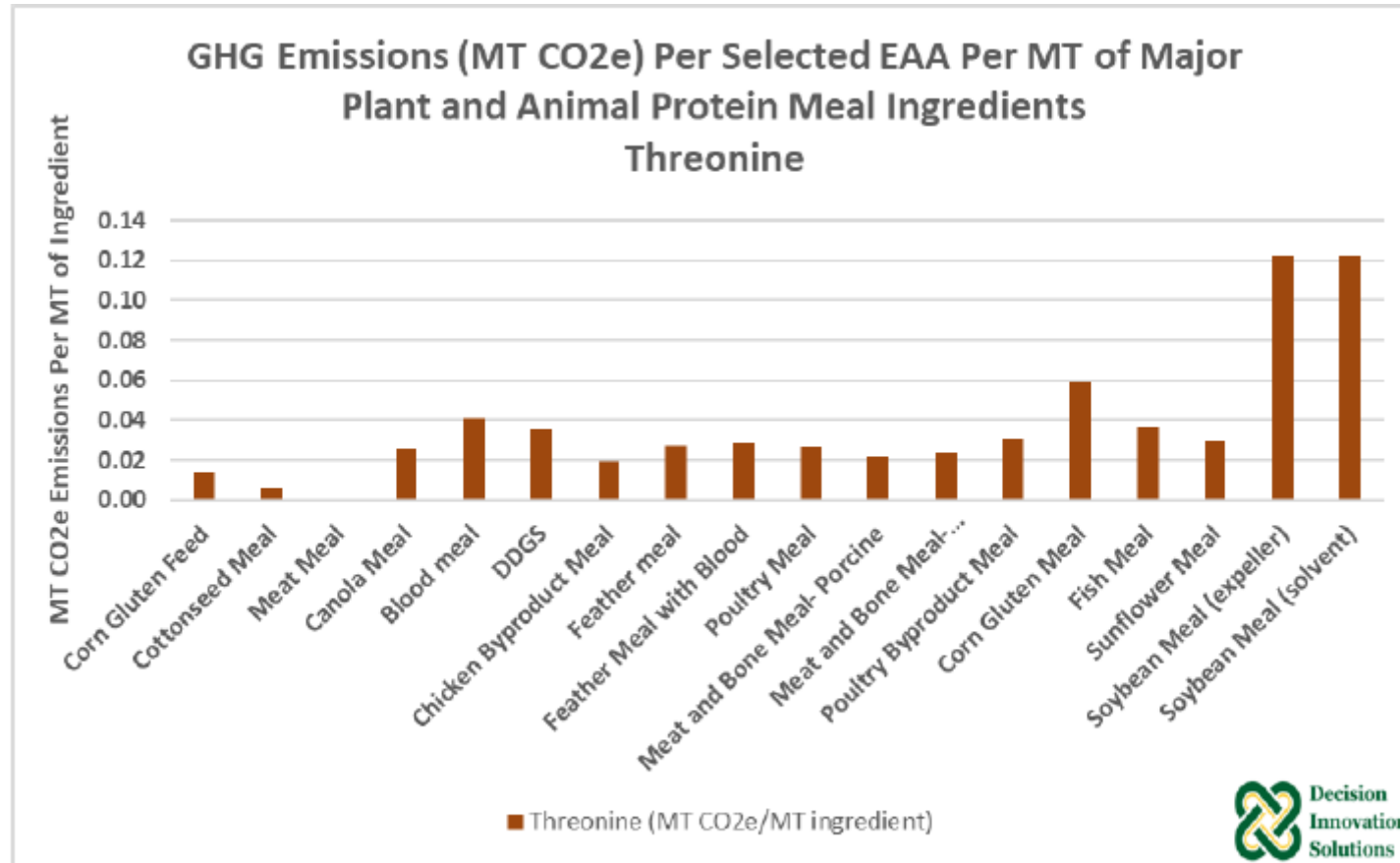


Figure 10. GHG Emissions Per Selected EAA Per MT of Major Plant and Animal Protein Meal Ingredients, Threonine



New research demonstrating benefits of rendered products on sustainability

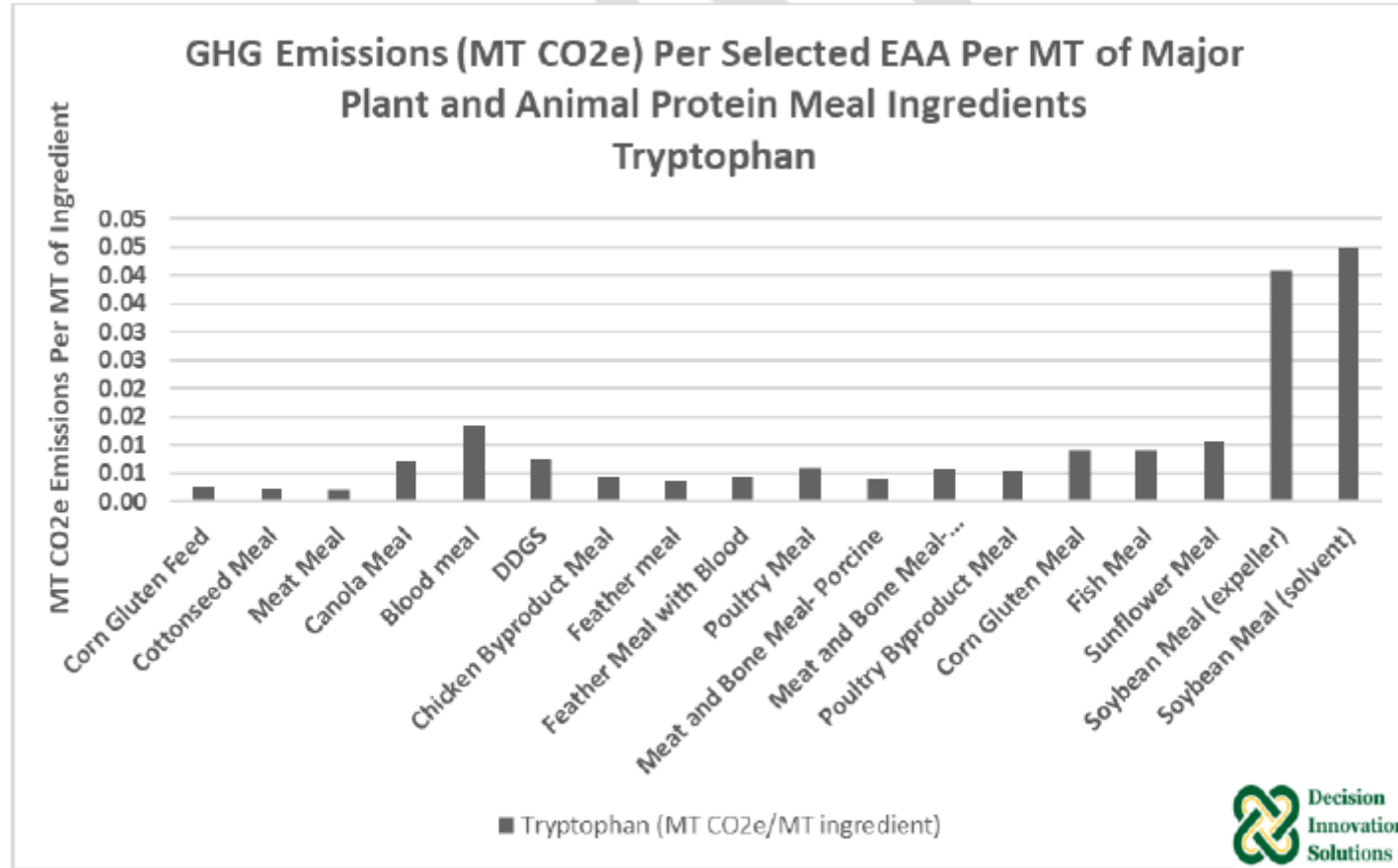
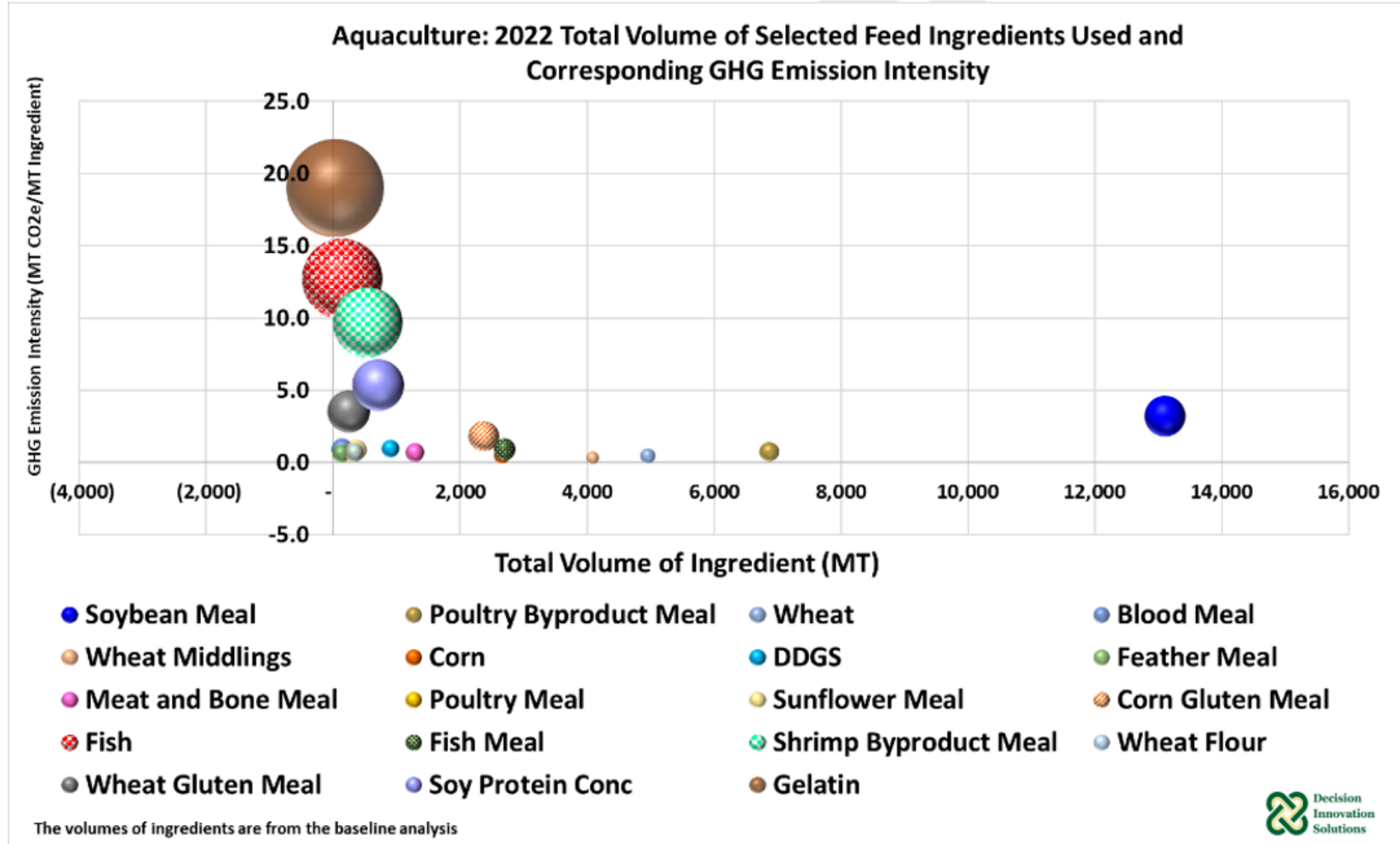


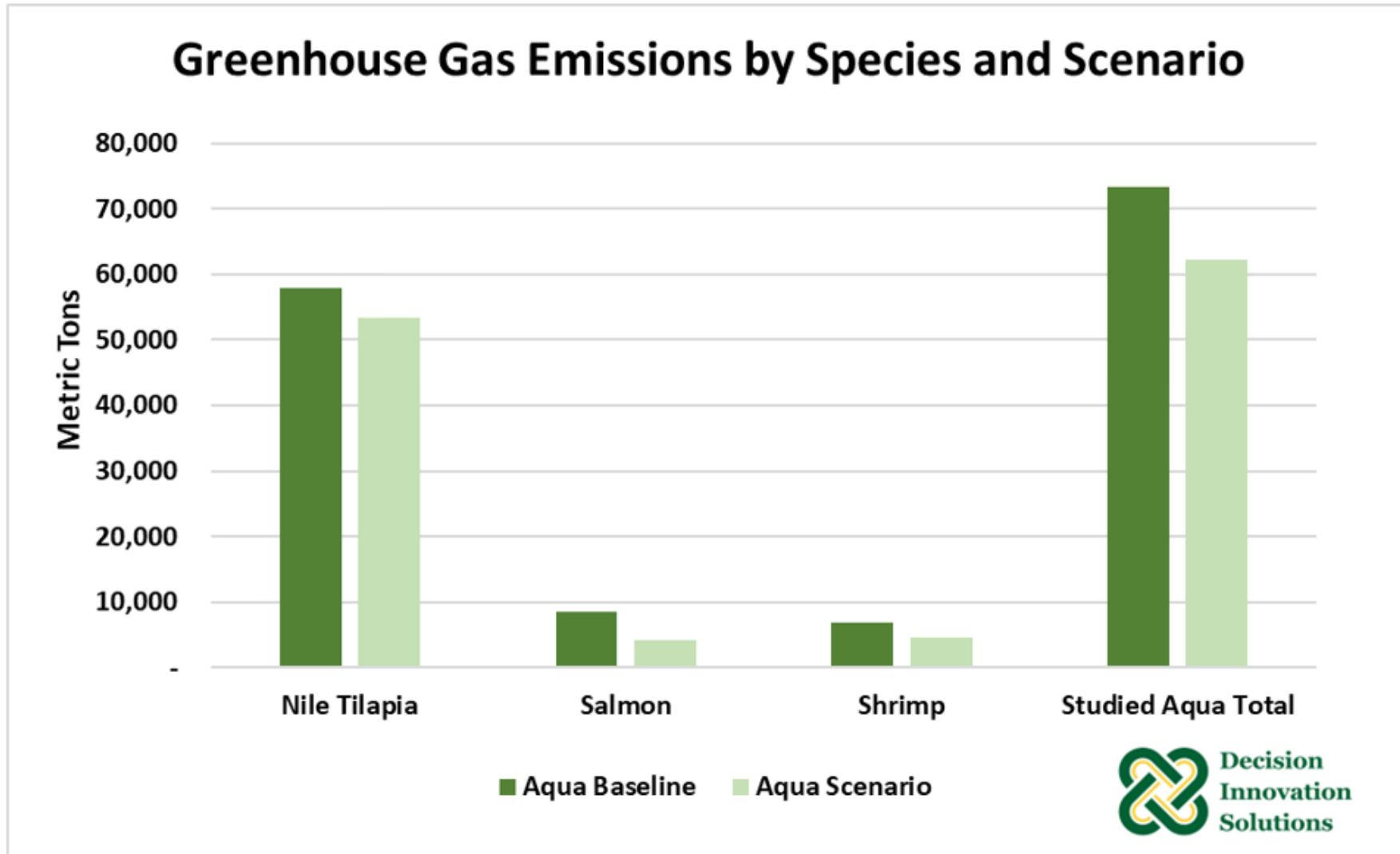
Figure 11. GHG Emissions Per Selected EAA Per MT of Major Plant and Animal Protein Meal Ingredients, Tryptophan



New research demonstrating benefits of rendered products on sustainability



New research demonstrating benefits of rendered products on sustainability



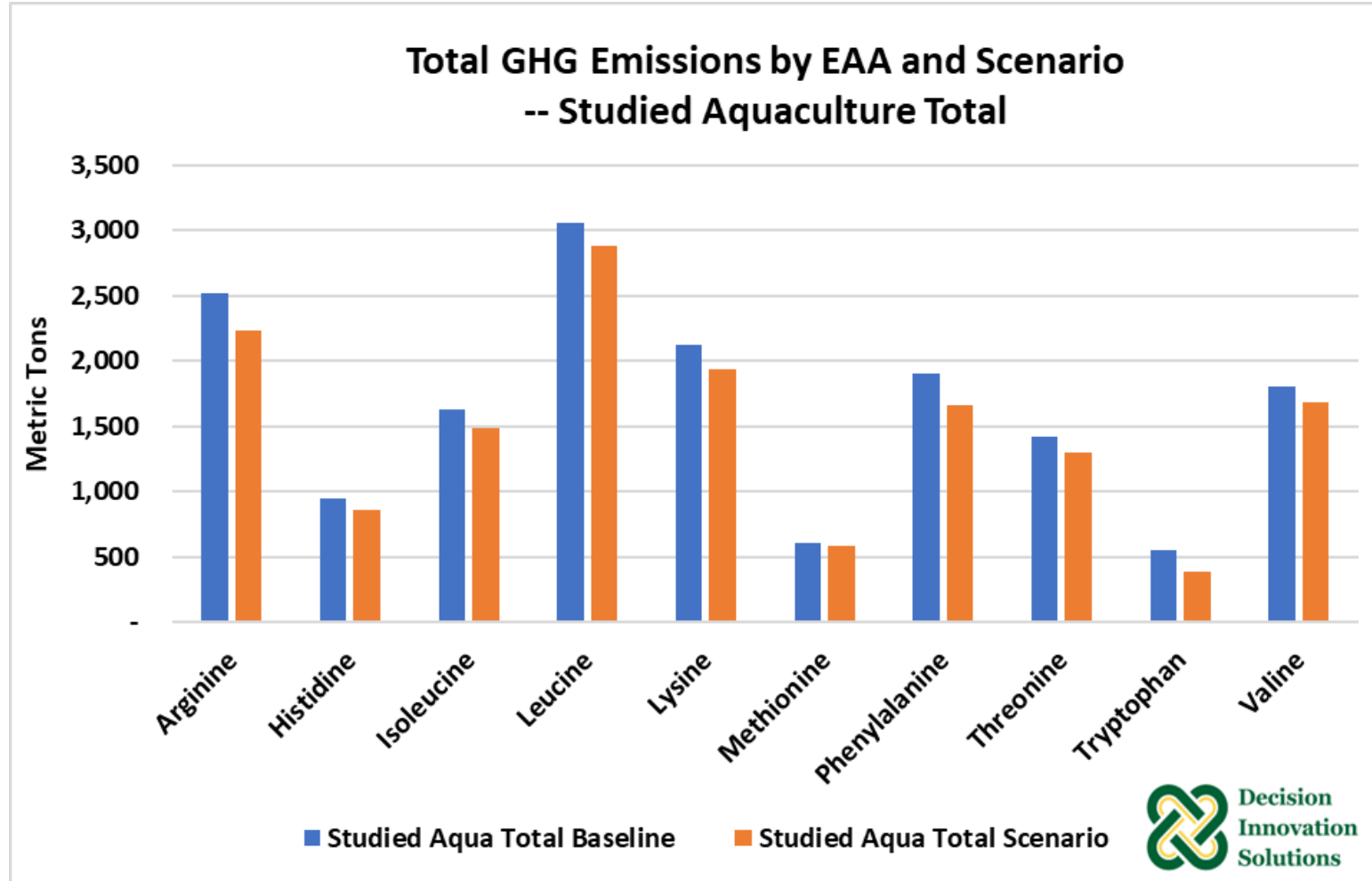
New research demonstrating benefits of rendered products on sustainability

Percent Change in GHG Emissions by EAA and by Species from Baseline

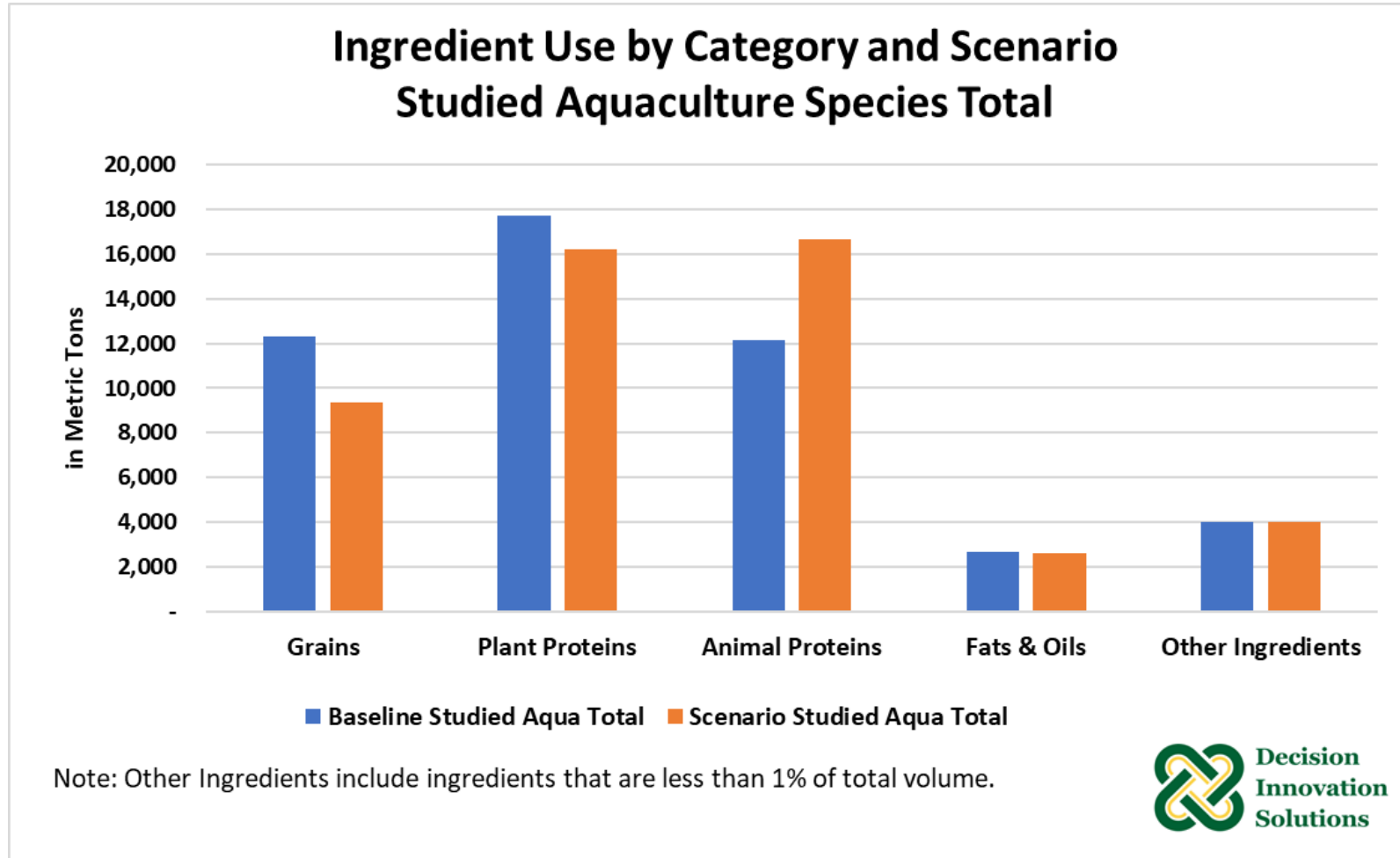
	Arginine	Histidine	Isoleucine	Leucine	Lysine	Methionine	Phenylalanine	Threonine	Tryptophan	Valine
Nile Tilapia	-2.8%	-2.1%	-2.5%	3.0%	-2.6%	-0.2%	-5.6%	-1.0%	-18.1%	-0.5%
Salmon	-48.0%	-42.1%	-39.6%	-42.5%	-41.5%	-18.2%	-46.6%	-39.8%	-72.8%	-31.9%
Shrimp	-36.4%	-32.5%	-31.7%	-28.7%	-29.8%	-26.3%	-35.5%	-29.2%	-51.8%	-30.0%
Studied Aqua Total	-11.1%	-9.3%	-8.8%	-5.7%	-9.0%	-4.5%	-13.0%	-8.0%	-29.3%	-6.7%



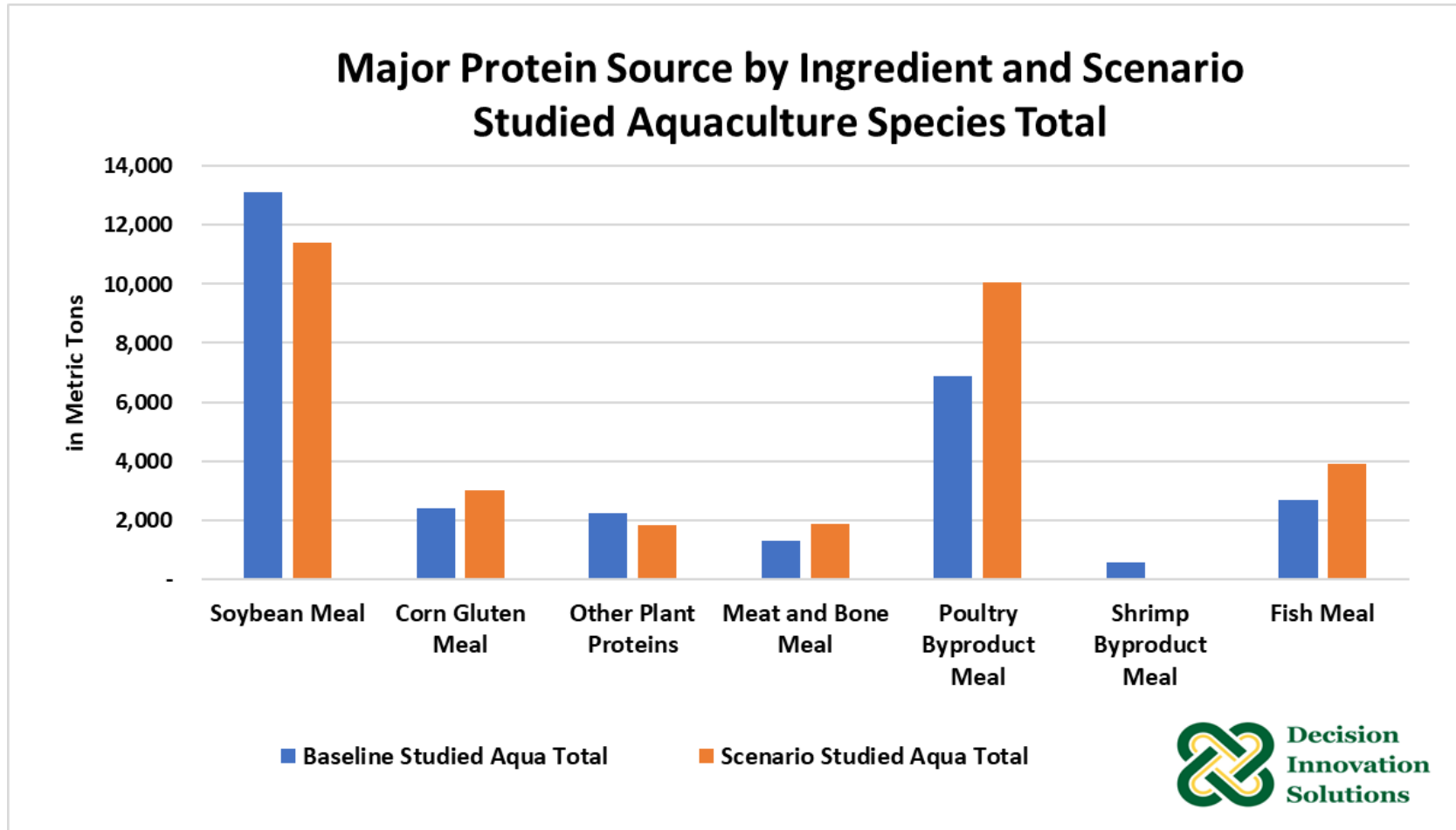
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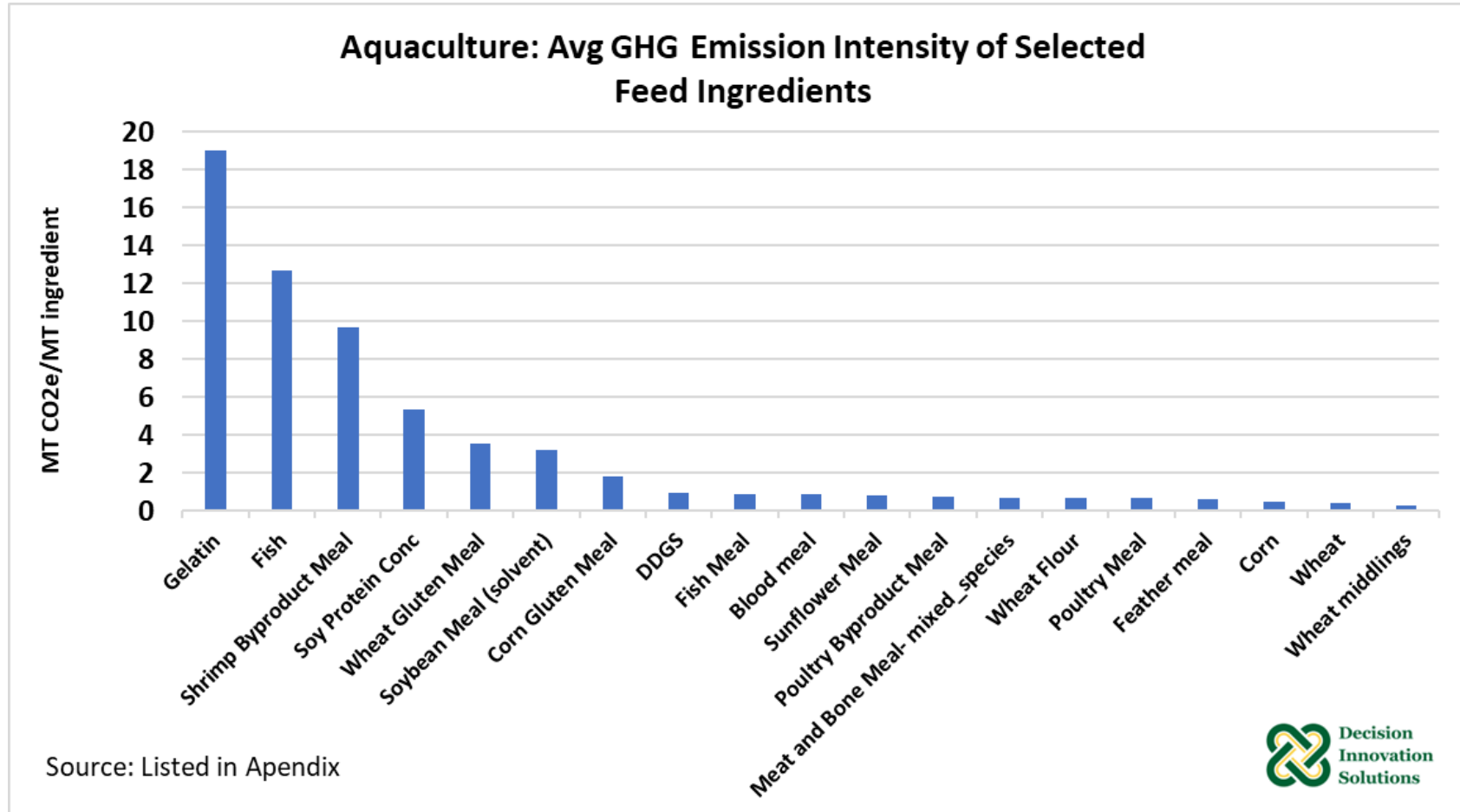
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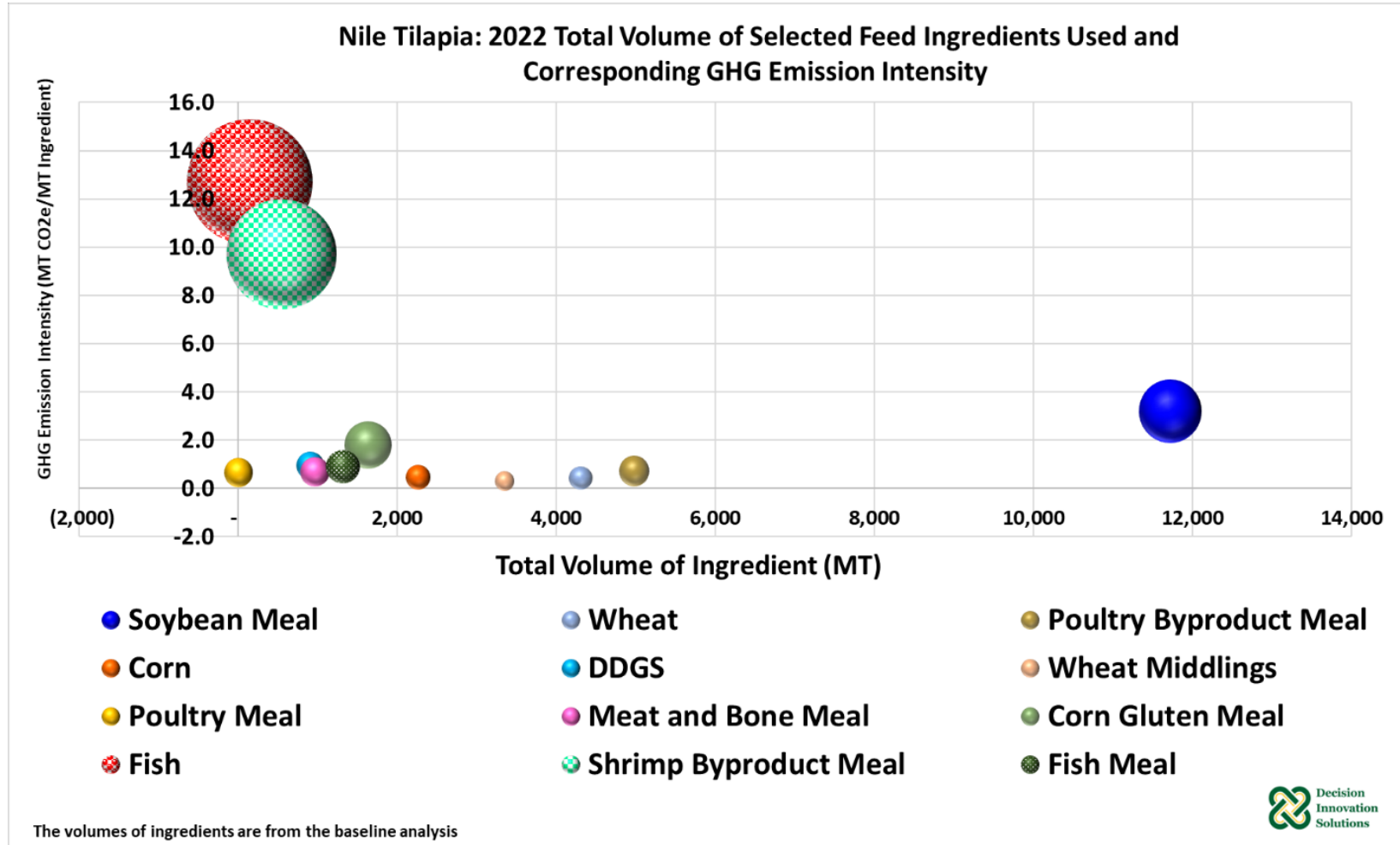
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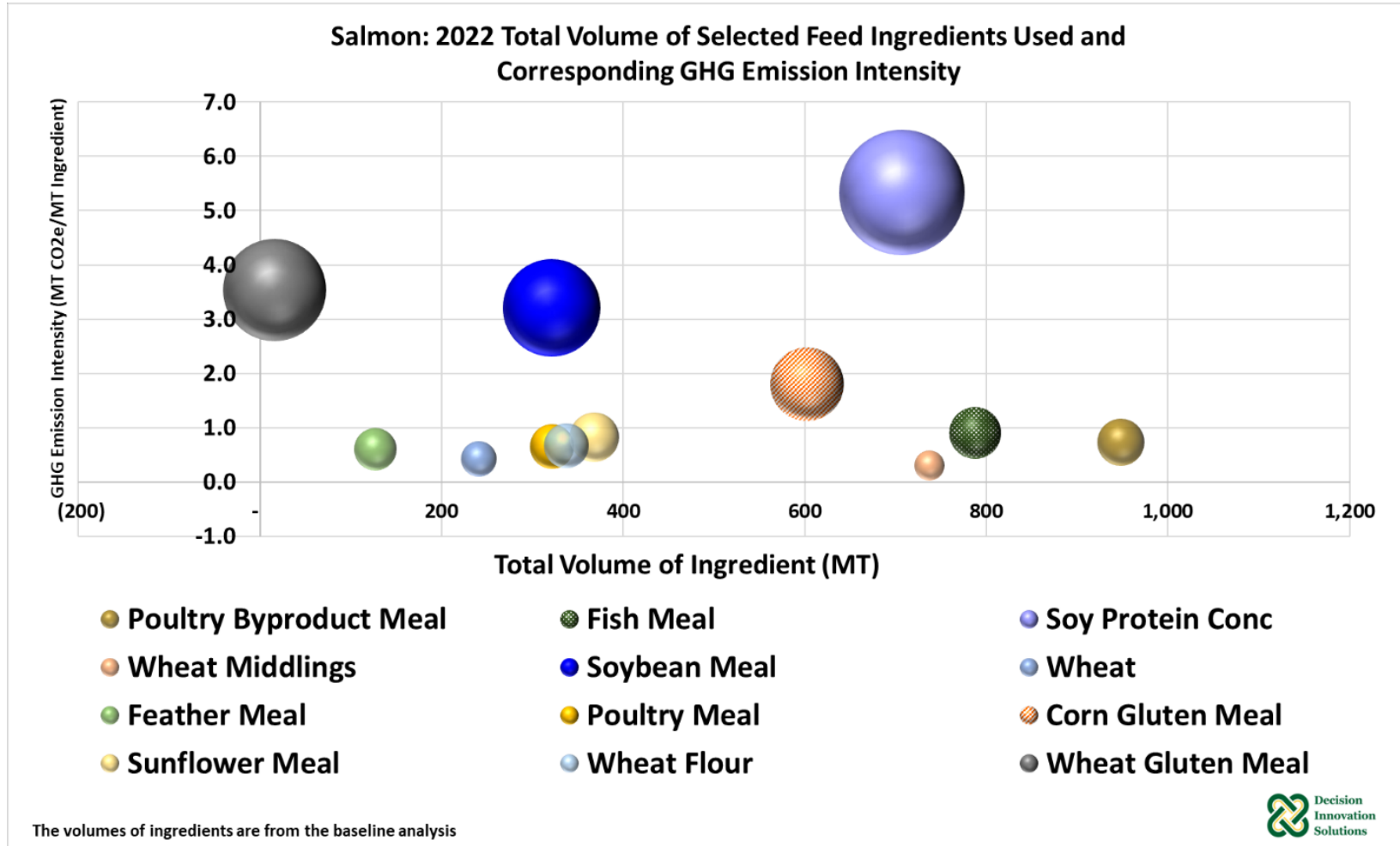
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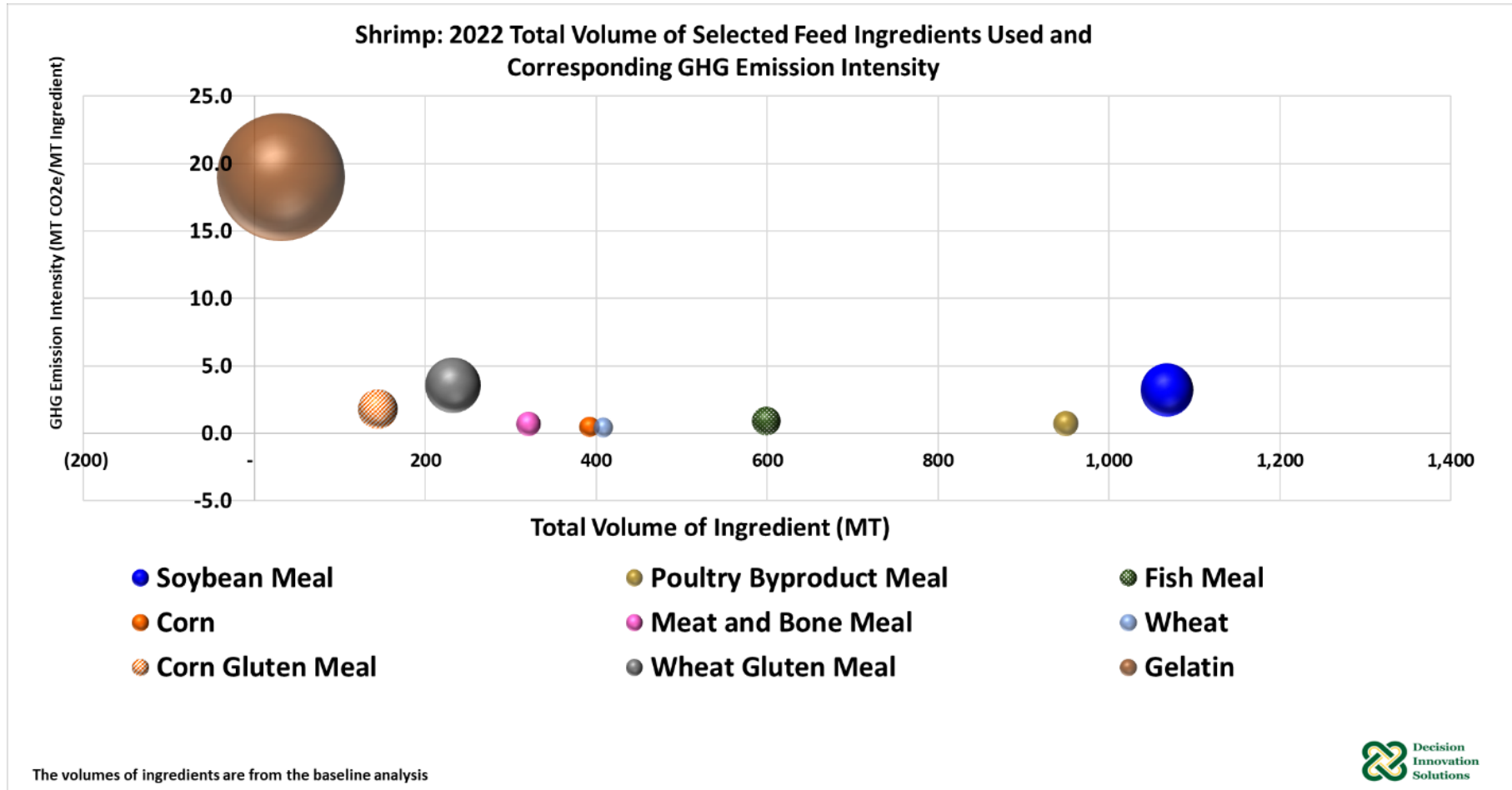
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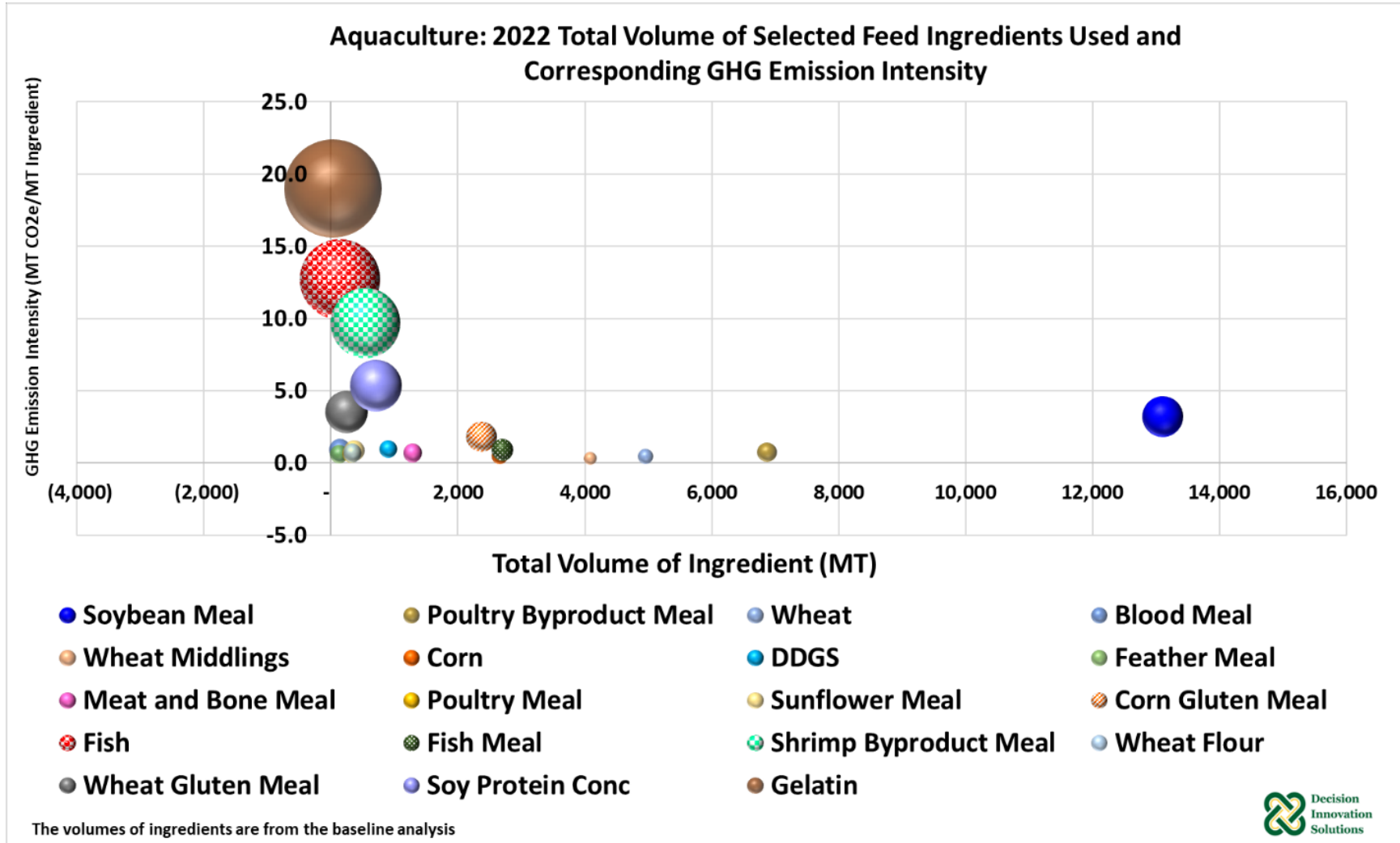
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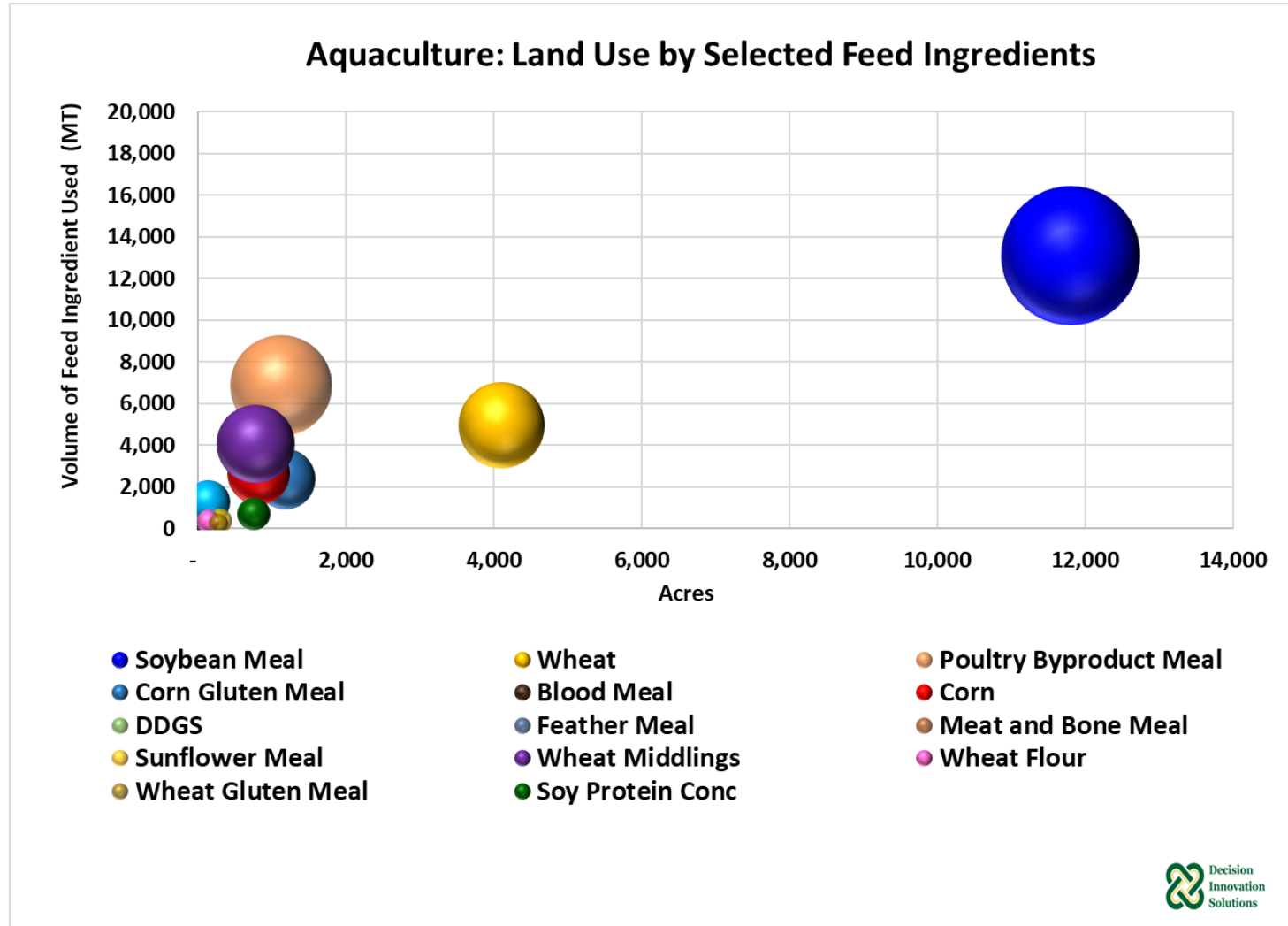
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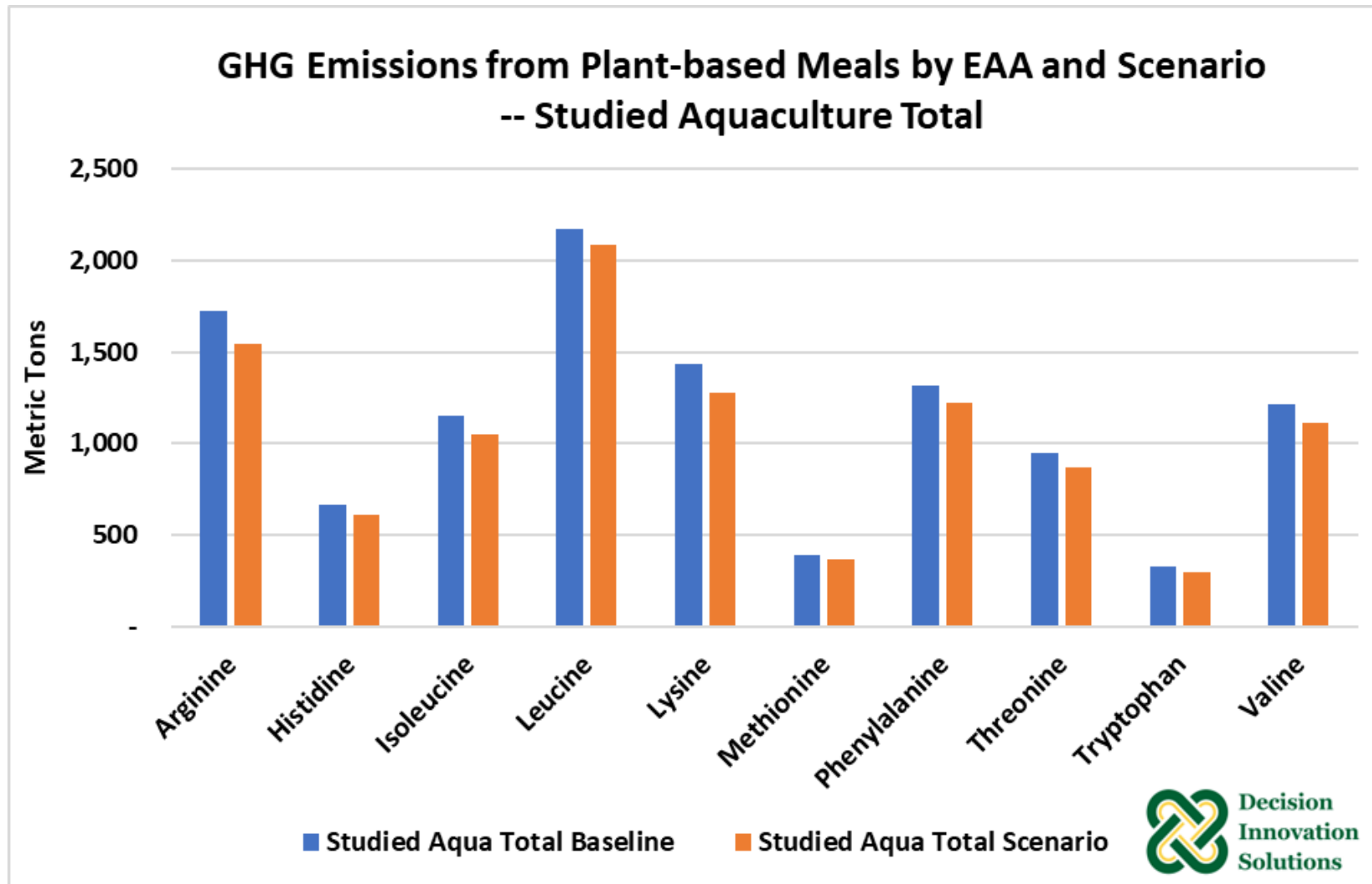
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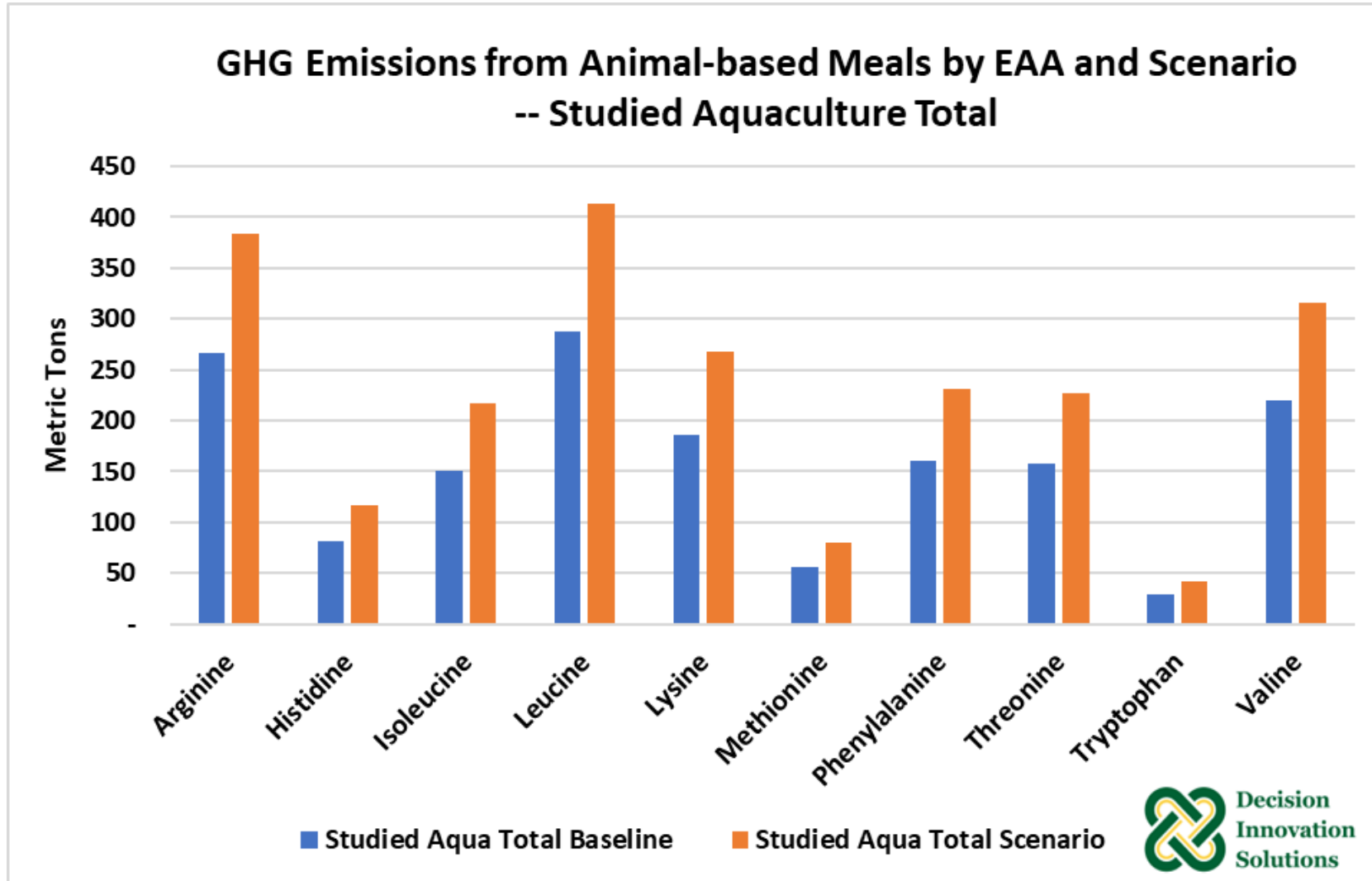
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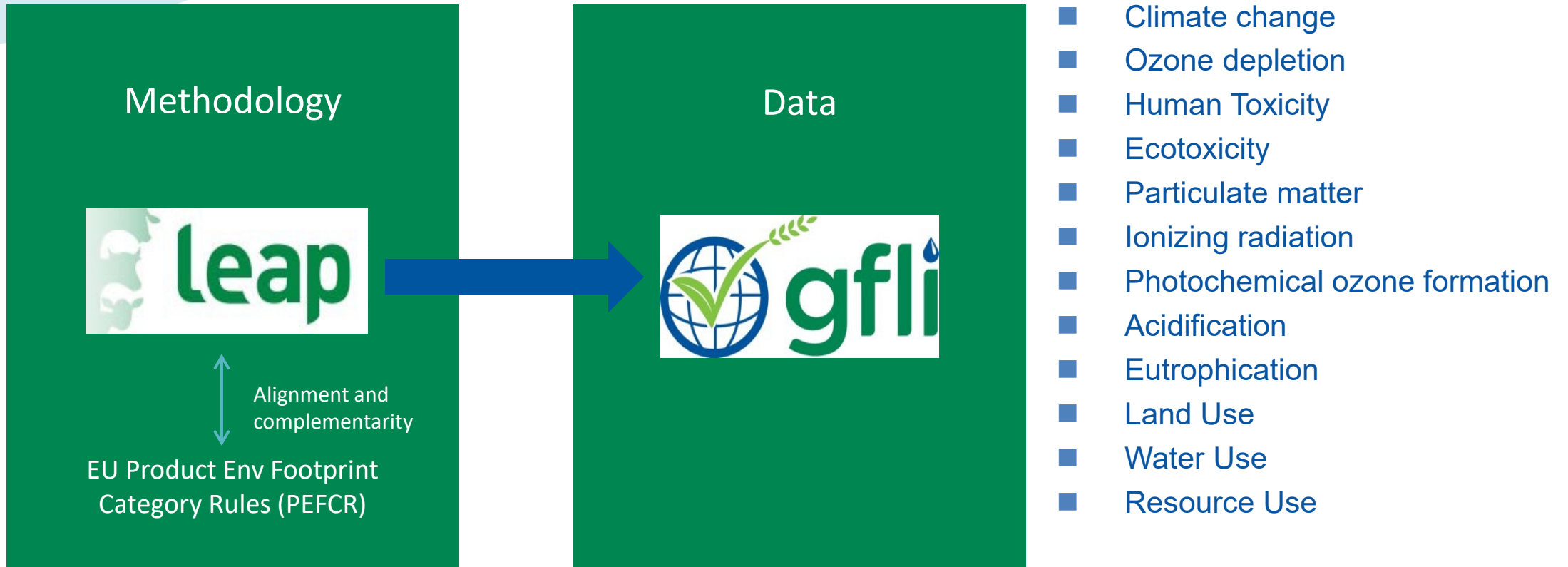


Sustaining relationships through science

- **Life cycle assessments are expected**
 - **Suppliers are weighed against one another**
 - “Does your company conduct an Environmental and Social Impact Assessment (ESIA) or equivalent for all new business developments?”
- **Models have changed**
 - **Employee welfare and safety**
 - **Environmental consciousness**
 - “We avoid conversion of habitat with valuable biodiversity for biomass production.”
 - “Has your company been in breach of any environmental legislation and/or environmental permits in the past 10 years?”
 - **Brand integrity**
 - “Has any of your locations been a focus of any NGO attacks or negative campaigns during the past 10 years?”
 - “Is your company currently subject to any environmental investigations or legal case(s) regarding environmental matters?”



Data Generation Methodology



Alignment with the FAO-Livestock Environmental Assessment and Performance (LEAP) guidelines for feed and feed additives ensures the integrity & quality of LCA feed datasets.

Independent animal nutrition and food industry non-profit institute with the purpose of:

- developing a **publicly available** Animal Nutrition Life Cycle Analysis (**LCA**) **database**;
- supporting the **meaningful environmental assessment** of animal nutrition products; and
- stimulating **continuous improvement**.

*GFLI database to be recognized as **the global reference** for Feed LCA Data by the public and private sectors.*

We are not getting younger

- Next Generation



Next Generation

- Internships
 - IPPE Student program
 - University job fairs



Next Generation

- JUCO and trade school mentoring
- Leadership development



Thank you, Questions???



NORTH AMERICAN RENDERERS ASSOCIATION
Reclaiming Resources, Sustainably

Animal protein meals,
a sustainable piece
to the feed ingredient puzzle

A large green puzzle piece is the central focus, containing a recycling symbol. Inside the puzzle piece, there are images of animal protein meals, including fish and poultry. To the left, a smaller puzzle piece shows a hand holding a bowl of feed, with text labels: 'Recycled animal proteins from the food chain', 'High Protein', 'Amino Acids', and 'Greater than 10% fat'.

WORLD
R
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O
RGANIZATION

www.worldrenderers.org

A banner for the Aquaculture America 2024 event. The background shows a sunset over a body of water with a Texas flag on the left. The text is in large, bold, white and black fonts.

AQUACULTURE AMERICA 2024

📅 February 18 - 21, 2024
📍 San Antonio, Texas

REGISTER NOW!



NORTH AMERICAN RENDERERS ASSOCIATION
Reclaiming Resources, Sustainably



Charles Starkey

VP Scientific and Regulatory Affairs

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