Rumenaut

Hydrogen Shuttle

A novel approach to reducing Enteric Methane

No Chemicals

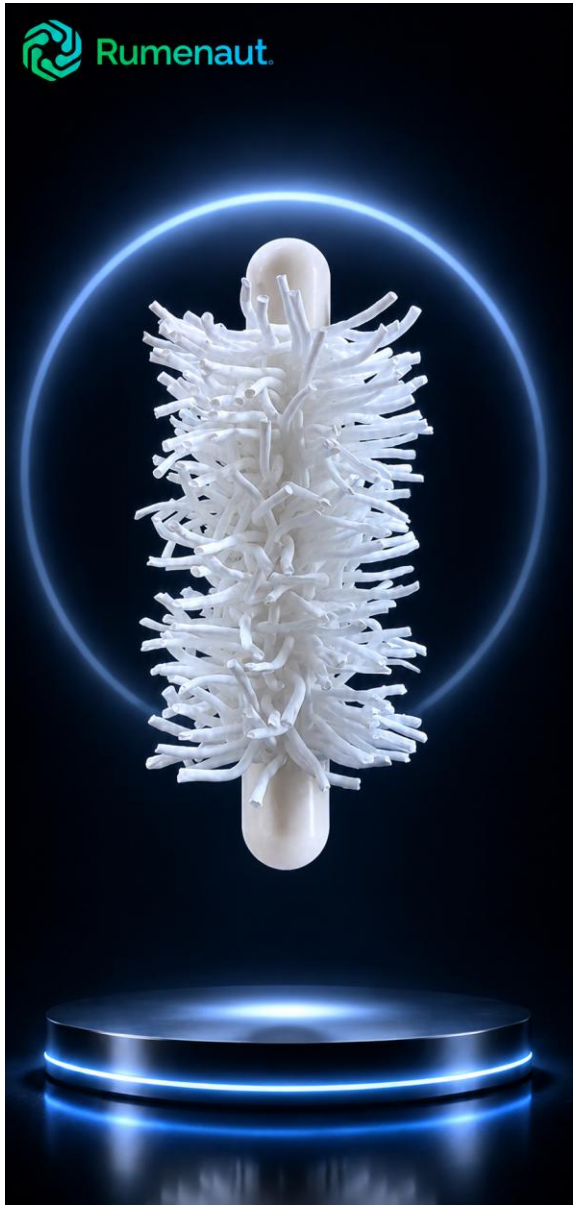
Low COGS
<1 cent per day

Game Changer

Hydrogen
Shuttle Capsule

Single Application

NC



Rumenaut.

Hydrogen Shuttle

"Removes hydrogen from the rumen so that it can't be used to make methane"

- Administered into the animal
- Designed to reside in the rumen
- Made from FDA-approved materials
- Resilient to biofouling
- "One of a kind" non-chemical device
- For additional information click QR Code

Proof of Concept

EVALUATION VIA ROBOTIC RUMEN

- ***in vitro* testing** using the Rumenaut Robotic Rumen
- The Hydrogen Shuttle resulted in a **reduction in methane emissions of 20 %**
- Increase in hydrogen emissions
- **No change in VFA production**

Scale of the Opportunity

COMMERCIAL OPPORTUNITY (GWP100)

1.25B cattle × **100 kg CH_4** per head per year × **28** GWP100 = **3.5** Gigatonnes CO_2e Total annual emissions − **0.7** Gigatonnes CO_2e Reduction with Hydrogen Shuttle @ 20% efficacy −

HYDROGEN PRODUCED & IMPACT *

Hydrogen produced (by capturing H_2): **12.5** Million tonnes H_2 (20% of theoretical 62.5 Mt H_2)

= Climate impact of H_2 (GWP100 = 12): **150** Million tonnes CO_2e = 12.5 Mt H_2 × 12

= **NET CARBON BENEFIT** **0.55** Gigatonnes CO_2e (550 million tonnes CO_2e)

* Reduction in CH4 is slightly offset with increase in H2 emission

TOTAL ANNUAL IMPACT (GWP100)

(AFTER H_2 IMPACT ACCOUNTED FOR)

0.55 Gt CO_2e Net Carbon Benefit × **$50** per t CO_2e Carbon Price = **$27.5B** Total Annual Market Opportunity

| **$4.6B** Annual COGS = **$22.9B** Annual Gross Carbon Margin

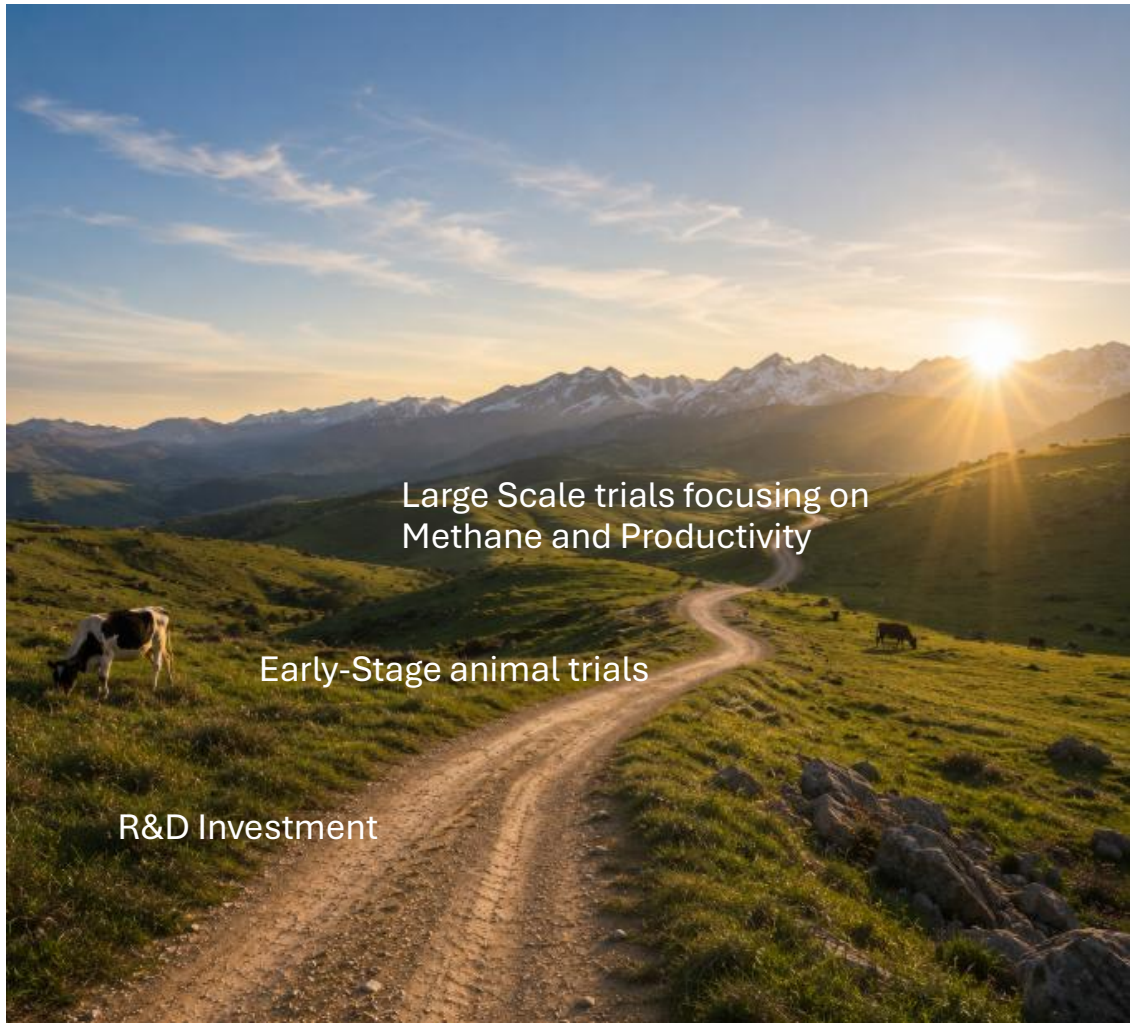
PLANET IMPACT (USING GWP20)

Climate impact of global cattle methane and the Hydrogen Shuttle solution

1.25B cattle (global herd) × **100 kg CH_4** per head per year × **80** GWP20 (CO_2e per t CH_4) = **8.0** tCO_2e per head per year × **1.25B** cattle (global herd) = **10.0** Gt CO_2e Total annual emissions (GWP20) → Hydrogen Shuttle 20% efficacy → **2.0** Gt CO_2e Annual reduction (GWP20)

12.5 Mt_{H_2} × 37 (GWP20) = 0.46 Gt CO_2e = **1.54** Gt CO_2e Net climate benefit (GWP20)

Where to from here?



Future Focus

1. Expand the **R&D investment** in materials science, increased in-vitro capacity. Product development.
2. Conduct **early-stage animal trials** targeted at safety and efficacy
3. Conduct larger-scale cattle trials **targeted at methane and productivity**

Enquiries

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Team

A passionate team of scientists and commercial experts
driving innovation for a more sustainable future

Rumenaut Science Team

Dr Peter Fennessy

Director

Peter Fennessy has been involved in businesses in the biotech and agritech sectors for the last 30 years following a career in R&D. He has expertise as a ruminant biologist working in the areas of physiology, nutrition and genetics.

Dr Stephen Sowerby

CSO

Stephen Sowerby has been involved in applied technology conception, research, and development for over 30 years and is inventor on multiple granted patents from 11 diverse patent families.

Dr Martin Jones

CTO

Martin Jones has spent over 30 years taking novel technology from research to market and leading the multi-disciplinary teams behind it. He specialises in analytical robotics and software.

Rumenaut Commercial Team

Tom Sturgess

Director

Founder of MMV majority shareholder of Rumenaut, owner of Lone Star Farms, investor in Lumina Lamb plus chair of Regeneration.vc IC.

US and NZ domiciled, Tom invests heavily in decarbonization technologies globally to deliver compelling economic outcomes.

Juan Di Varo

CEO-Designate

He has over 20 years' leadership experience across the medical, scientific, technology, and compliance sectors. Juan has experience in building business from the ground up.

Adrian Barker

Director

Adrian heads up the ventures arm of the Sturgess family office, is a director of MMV (involved in JV's & commercialisation) and sits on the Regeneration.vc investment committee. Adrian has 35 years in CEO, founder and senior management roles in new ventures.