

GlasPort Bio



GlasPort
RumenTech



Company introduction | May 2026

Company overview

- Irish agricultural sustainability company – established 2018
- Development and commercialisation of anti-methanogenic technology

Vision

Improve agricultural productivity and profitability by optimising nutrient use to reduce waste and environmental harm

Products

- GasAbate (GlasPort Bio) – manure management technology
- RumenGlas (in development) (GlasPort RumenTech) – ruminant feed additive



RumenGlas Innovative rumen enhancement

Our starting point:

Not: *“Can we reduce enteric fermentation emissions?”*

But: *“Can we improve rumen performance?”*

Inefficient digestion = poor nutrient use = performance and environmental issues
GlasPort Rumen Tech aims to change this dynamic

Room for rumen improvement?

Concentrates: 80-90% digestibility; grasses and silage: 60-75% digestibility; low-quality forage: 40-55% digestibility

No feed additive focused on methane-reduction results in improved performance

Methane emissions reduced, but H₂ emissions increased

→ Cost to farmer - - no material benefit to farmer - - no incentive to use - - poor uptake seen

How to improve rumen function?

- Modify rumen conditions - allow alternative microbial communities/niches – diversion of energy

Implications of improved rumen function:

- Economic benefits: increased profitability; increased productivity
- Environmental benefits: decreased GHG emissions/decreased scope 3 emissions

Finishing cattle earlier can reduce emissions by 32% - ABP

The study was conducted over the last 10 years at the ABP demonstration farm in Carlow, where 5,500 cattle have gone through its system.



J. Dairy Sci. TBC
<https://doi.org/10.3168/jds.2025-27925>

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Associations of growth rates during the first 2 months of life with feeding behavior, development, and first-lactation performance in Holstein heifers

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Increased ADG to weaning = +13% increase in milk yield

Addressing all stakeholder needs

THE SCIENCE BEHIND OUR SOLUTIONS

Temporal inhibition of methanogenic archaea via transient increase in rumen/slurry oxidation-reduction potential (ORP)

--> peroxide-mediated ORP increase

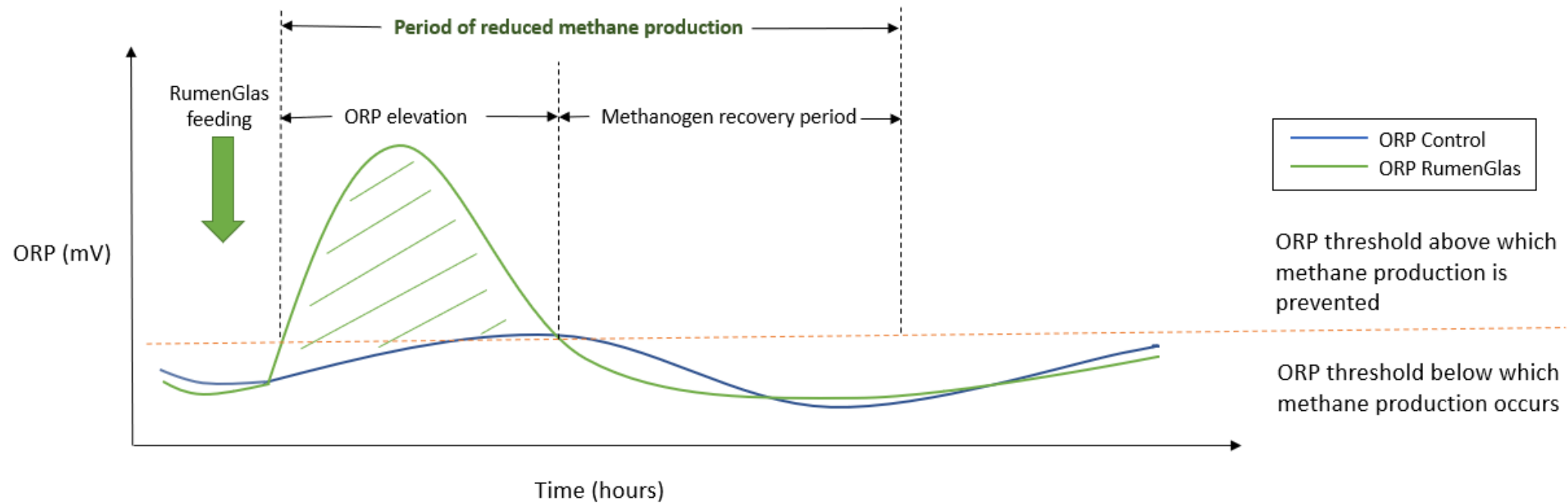
RumenGlas: CaO_2 ---- GasAbate: H_2O_2

CaO_2 – safe, established human food ingredient (E930); used in soil/aqua-remediation; no residues ($\text{CaO}_2 \rightarrow \text{O}_2 + \text{Ca}$ (excreted in the faeces)); thermo-resistant/pressure-resistant allowing for incorporation into standard feed pelleting manufacture

Oxidation-Reduction Potential (ORP) modulation

Methanogens highly sensitive to increases in ORP

- RumenGlas: Temporal inhibition of methanogenic microorganisms
- Inhibition during ORP elevation plus recovery period of several hours following return to baseline ORP



RumenGlas Beef trial #1 – finishing beef

Beef finishing trial – 80-day trial – whole tract digestibility

Fed additive twice daily – AM & PM (mimicking pasture-dairy systems)

- *ad lib* silage throughout day

Methane emissions (Green Feed) – residue testing – histology

3 doses/formats:

- (i) 'low' dose added in mixed ration
- (ii) 'high' dose added in mixed ration
- (iii) 'high' dose incorporated in feed pellet



Results:

	Control	(i) 'low' MR	(ii) 'high' MR	(iii) 'high' pellet
Methane reduction (%)	-	-17%	-29%	-28%
H ₂ reduction (%)	-	-33%	-27%	-30%
CO ₂ reduction	-	-3%	-6%	-6%



Additive feeding at 12h intervals – sustained methane reduction throughout 12h period

Sustained methane reduction (~17%) for 7 days post-removal of additive

RumenGlas Beef trial #1 – Finishing Beef

Trends towards animal performance

- Trial not designed to detect performance
- Ideally younger animals in trial to capture intensive growth phase

	Control	Low	High	High Pellet
End of study analysis				
Start BW (kg)	487	487	482	483
Final BW (kg)	566	576	559	565
DMI (daily kg)	9.36	9.57	8.43	9.15
ADG (kg/day)	1.24	1.39	1.21	1.31
FCE (ADG/DMI)	0.135	0.14	0.155	0.133
Mid-point study analysis (day 33 of 77)				
Start BW (kg)	487	487	482	483
Mid-point BW (kg)	524	531	525	526
DMI (daily kg)	9.26	9.27	7.79	8.81
ADG (kg/day)	1.18	1.43	1.36	1.39
FCE (ADG/DMI)	0.128	0.155	0.175	0.157
FCE improvements wrt control		+21.09%	+36.71%	+22.65%



RumenGlas Beef trial #1 – finishing beef

Persistent effect (8-12h) from additive

Reduced H₂ emissions

- increased microbial biomass usage

Efficacy of low dosage suggestive of likely success of TMR usage

Pathology: No negative impacts seen

- rumen wall, kidney, liver heart

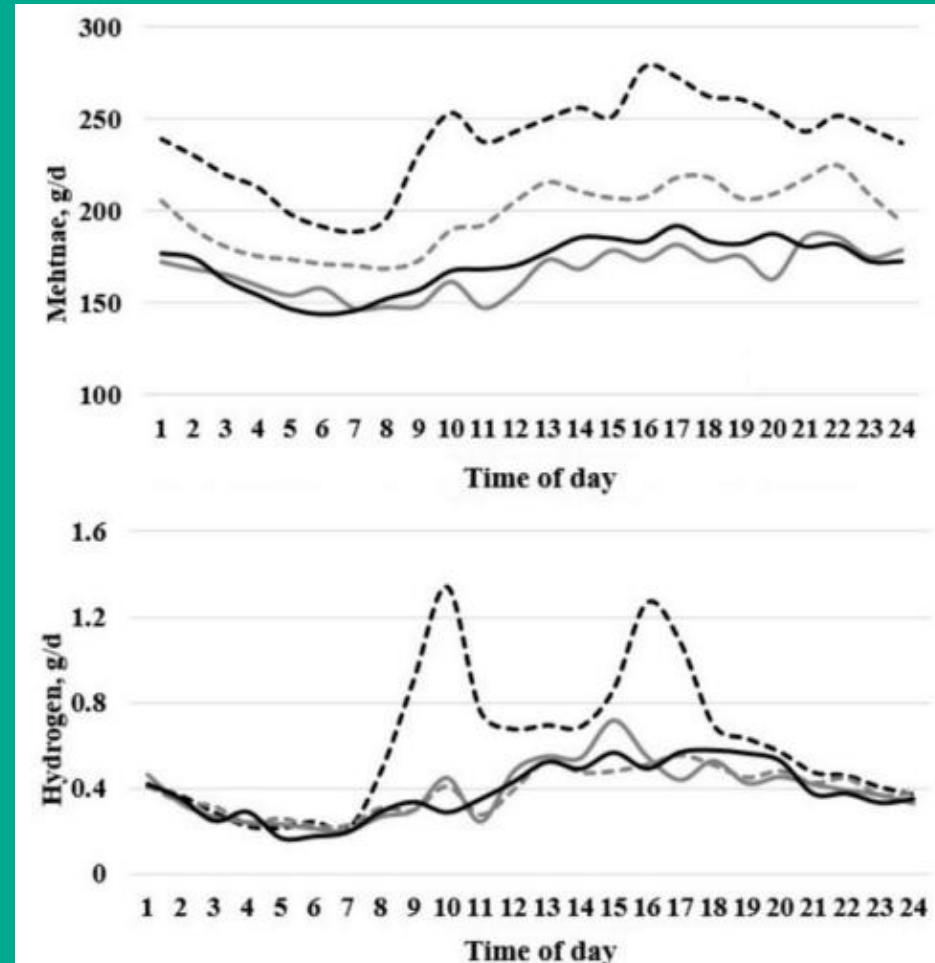
- no observable ulceration, pathological damage, tissue adhesion or flattening of rumen villi

- no negative impact on blood markers and liver enzymes

Sensory panel:

No impact taste, smell, appearance of meat

Persistency post-trial: indicative of microbial shifts in rumen



RumenGlas Beef trial #2 – Growing Beef

Younger animal cohort
Slightly different CaO₂ concentrations
Delivery solely via pellet



Table1: Effect of dietary calcium peroxide inclusion levels on production performance and gaseous emissions of growing beef cattle

Parameters	Dietary Treatments				SE	P-value
	CON	LID	MID	HID		
DMI (kg)	8.97 ^b	8.76 ^a	8.76 ^a	9.05 ^b	0.084	<0.001
Starting BW (kg)	466 ^a	463 ^a	456 ^a	476 ^a	7.48	0.12
Finishing BW (kg)	532 ^{ab}	535 ^{ab}	529 ^a	556 ^b	8.34	0.04
ADG (Kg/d)	0.97 ^a	1.05 ^{ab}	1.07 ^{ab}	1.17 ^b	0.004	0.02
FCE (Kg ADG/Kg DMI)	0.11 ^a	0.12 ^{ab}	0.12 ^{ab}	0.13 ^b	0.005	<0.001
FCE improvement wrt control		+11.71%	+13.26%	+20.14%		
CH ₄ (g/d)	236 ^b	234 ^b	215 ^a	212 ^a	4.04	<0.001
CO ₂ (g/d)	7923 ^b	7759 ^a	7669 ^a	7758 ^a	86.7	<0.001
H ₂ (g/d)	0.310 ^a	0.297 ^a	0.290 ^a	0.317 ^a	0.007	0.019
CH ₄ (g/kg DMI)	26.3 ^b	26.7 ^b	24.5 ^a	23.5 ^a	0.54	<0.001
CH ₄ (g/kg ADG)	252 ^c	226 ^{bc}	209 ^{ab}	188 ^a	10.25	<0.001



RumenGlas Potential impacts on beef production

Increases in Average Daily Gain (ADG)

→ shorter finishing time

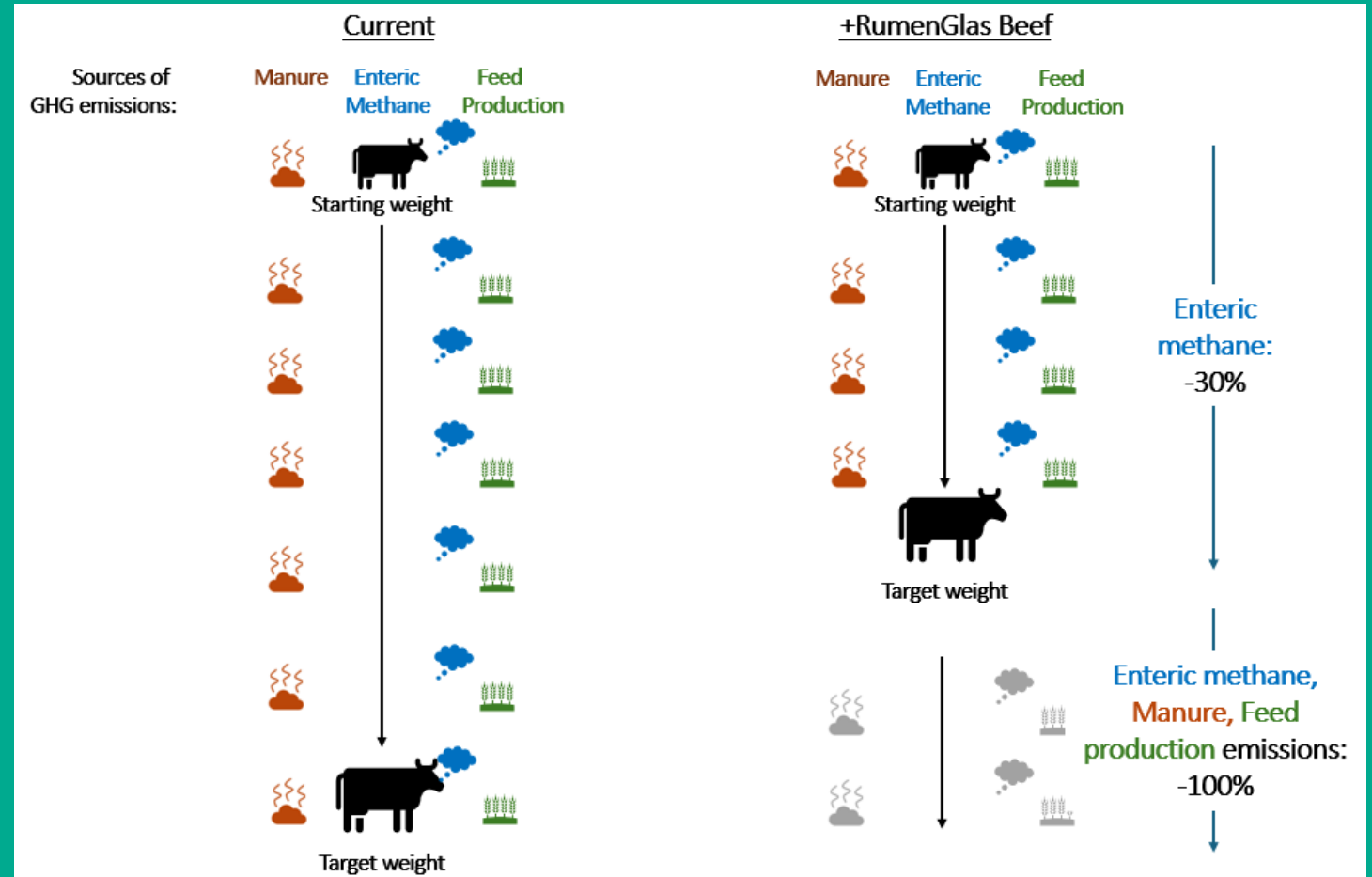
- **Economic impact:**

- reduced labour costs
- reduced feed costs
- reduced banking costs

- **Environmental impact:**

- direct impact:
 - 30% reduction in enteric methane emissions
- Indirect impact:
 - reduced emissions related to feed production
 - reduced enteric and manure emissions from shortened life

Potential for further improvements through precision nutrition



RumenGlas Potential impacts on beef production

Potential impact – RumenGlas feeding during indoor period (+15% ADG)

Assumptions: labour & banking cost (€1/day); indoor feed costs (€3.50/day); carbon credit pricing (€50)

	EU		US	
	Dairy Beef	Suckler Beef	Dairy Beef	Suckler Beef
Months on grass	9	6	0	14
Months indoors	6	4	14	6
Reduced finishing time	27 days	18 days	64 days	27 days
Reduced feed costs	€95.81	€63.88	€223.56	€95.81
Reduced labour/banking costs	€27.38	€18.25	€63.88	€27.38
Carbon credit generation	€14.74	€9.83	€52.34	€18.15
Total savings	€137.93	€91.96	€339.78	€141.34

RumenGlas Regulatory roadmap

Regulatory Consultants Pen + Tec/Argenta (Spain)

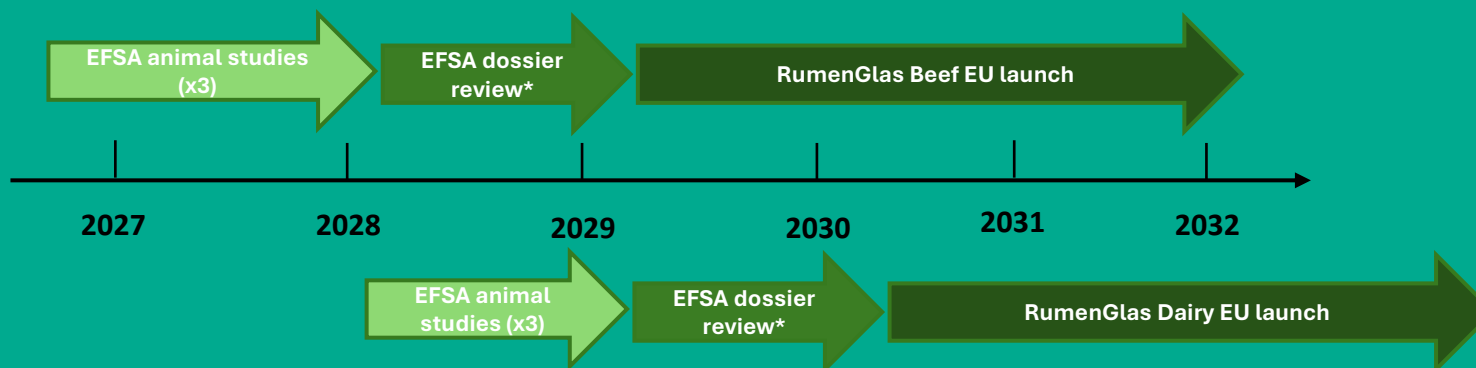
EFSA Zootechnical Feed Additive approval sought

Approval strategy to mirror development programme i.e. beef most advanced; dairy approx. 12 months behind:

- Main focus: Beef feed additive approval
- Secondary focus: Dairy feed additive approval

Regulatory Dossier: EFSA-regulated product ('zootechnical feed additive')	
Dossier Sections	GlasPort Rumen Tech Progress
Identity and characteristics: Manufacturing process/stability studies/homogenous distribution within feed	- feed nut manufactured - stability studies in-house
Safety: General toxicity/animal safety/user safety/environmental risk	- majority covered via external literature review (complete) - In-house studies ongoing
Efficacy: 3x long-term studies	planned EFSA studies (Q1-Q3, 2027)

European timeline:



RumenGlas USPs

Methane reduction and performance benefit

- Addresses concern of 'who pays?' – performance benefit product resulting in farmer economic return
- Financial return and meaningful methane reduction encourages widescale commercial take-up (contrast: Bovaer/Red Seaweed)

Well known active ingredient (calcium peroxide) - extensive use in human food

- Reduces risk of consumer fear/safety concerns (assigned E-number: E930) (contrast: Bovaer/Arla debacle)
- Excellent safety profile (contrast: bromoform 'probable carcinogen')

Residue-free approach

- Excess Ca excreted via faeces
- No processor/consumer/taste concerns
- No residue concerns (ref: Bovaer/bromoform/red seaweed)

Easily and widely manufactured allowing for large-scale rollout

- Allows for large-scale global rollout (contrast: supply chain issues Bovaer, Red Seaweed)

Medical device approach to improved rumen function

Aim: Temporal increase in ruminal ORP

RumenGlas – physical introduction of O₂ through feed (via CaO₂)

Medical device approach:

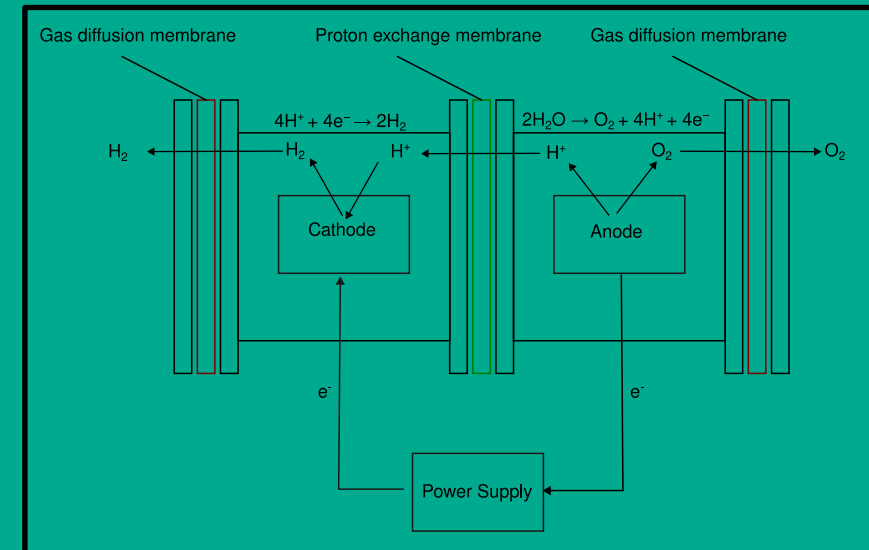
Utilise oxygen atoms in the rumen to form O₂

- Via electrolysis of water

Delivered via bolus utilising CE-marked materials

In vitro testing

- increase in rumen model ORP
- reduction in methane emissions



Medical device approach to improved rumen function

USP

- Available to all livestock systems (intensive, pasture)
- No residue concerns
- Regulatory position
 - 'device-like' product
 - Potential shorter development time
 - Potential shorter regulatory approval



GlasPort Bio: GasAbate™

Improved nutrient use from slurry
Reduced environmental impact

Novel paradigm for manure management

Who are GlasPort Bio?

- A multi-award winning Irish biotech company founded in 2018, based in Galway
- Developing science-backed technologies to reduce greenhouse gas emissions from agriculture across multiple sectors
- Successfully secured €10m investment into the company in 2025

Our Products

- GasAbate™ - Manure management technology (commercialised)
- RumenGlas - Ruminant feed additive (R&D ongoing)

Our Vision

To make measurable, science-led emissions reduction a standard part of livestock farming, delivering a climate impact at scale all while improving on-farm performance and sustainability across global food supply chains.

Strictly Private & Confidential





Backed by Science - Driven by Impact

Peer-Reviewed Journals

1. Thorn, C., Nolan, S., Lee, Chui-Sang; Friel, R., O'Flaherty, V. 2022: Novel slurry additive reduces gaseous emissions during storage thereby improving renewable energy and fertiliser potential. Journal of Cleaner Production, 358, p. 132004.
<https://doi.org/10.1016/j.jclepro.2022.132004>
2. Connolly, S., O'Flaherty, V., Krol, D.J. 2023: Inhibition of methane production in cattle slurry. Journal of Cleaner Production, 394, p. 136272.
<https://doi.org/10.1016/j.jclepro.2023.136272>
3. Nolan, S., Hughes, D., Thorn, C., Friel, R., O'Flaherty, V. 2024: Scale-up of a peroxide-based pig slurry additive for gaseous emission reduction and downstream value retention. Cleaner Environmental Systems, 12, p. 100157.
<https://doi.org/10.1016/j.cesys.2023.100157>
4. Connolly, S., Krol, D.J., Kelleghan, D., O'Flaherty, V., 2025: Hydrogen Sulphide inhibition in cattle slurry by use of an oxygen based slurry amendment. Process Safety and Environmental Protection, 193, p. 125-131.
<https://doi.org/10.1016/j.psep.2024.11.022>
5. O'Neill, W. K., Thorn, C., Williams, P., Hughes, D., Chin, J., Nolan, S., O'Flaherty, V., McGrath, J. 2026: Effects of Pig Slurry Treatment with a Peroxide-Based Additive, GasAbate, on the Seasonal Growth of Perennial Ryegrass. Journal of Soil Science and Plant Nutrition. <https://doi.org/10.1007/s42729-026-03296-4>

**Further publications in preparation/under review*

Patents

24 patents granted in various jurisdictions globally (EU, Japan, China, US)

GasAbate™ holds globally granted patents covering its proprietary anti-methanogenic additive technology for animal manure and slurry management. Patents are active across multiple jurisdictions.



Introducing GasAbate™

What is GasAbate?

GasAbate™ is a simple, on-farm system that treats stored slurry to prevent harmful gases from forming before they escape into the atmosphere.

An additive that is injected as a liquid solution directly at the base of the tank, ensuring optimal distribution throughout the slurry column from the point of application.

Compatible with slurry ranging in dry matter (DM) content up to 14%, designed to be completely hands-free for the farmer, cutting emissions at source while keeping slurry safe to spread, improving air quality and is suitable across a wide range of livestock sectors and manure storage systems.

Performance in Numbers



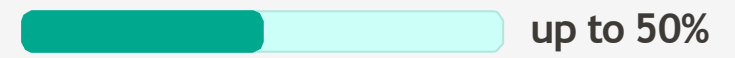
CO₂e Reduction

Methane emissions



H₂S Reduction

Hydrogen sulphide emissions



NH₃ Reduction

Ammonia emissions

Food Chain Safety & Risk Profile

GasAbate™ offers a critical advantage for processors from a brand and supply-chain integrity perspective.



Does Not Enter the Food Chain

No perception or residue risk for processors or retailers – a clear differentiator from feed additives or animal-applied interventions.



Breaks Down Safely

The active ingredient breaks down fully into **oxygen and water**, ensuring alignment with regulatory expectations and customer assurance requirements.

Strictly Private & Confidential





VALIDATION

Third-Party Assurance from The Carbon Trust

Following a rigorous scientific review, The Carbon Trust, an internationally recognised authority on carbon reduction and sustainability, has issued an independent opinion statement surrounding GasAbate's ability to significantly reduce greenhouse gas emissions from manure.

78% Reduction in Methane

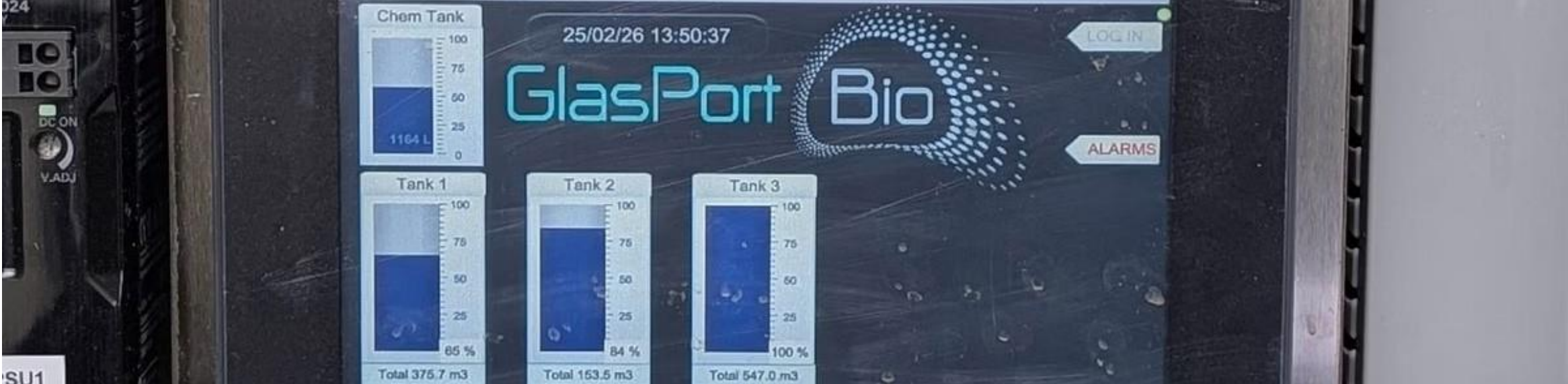
The statement published by The Carbon Trust at the end of 2025 confirmed that GasAbate™ can reduce methane emissions from livestock and swine manure by up to 78%.

Scientific Efficacy & Standards

This landmark validation follows an in-depth evaluation of our scientific efficacy, dosage and verification system, aligning with international standards like the IPCC Guidelines in the Greenhouse Gas Protocol.

7+ Years of Dedication

Achieving this recognition is a fantastic milestone for the business and a testament to the GlasPort Bio team's over seven years of research, validation and science behind our technology.



Compli360™: Audit-Ready, Hands-Free Compliance

GasAbate™ is deployed through **Compli360™**, GlasPort Bio's fully automated dosing, monitoring and verification platform.

1

Hands-Free Dosage

Complete automated dosing system with continuous operation.

2

Secure Data

Time-logged, verifiable records meeting processor, retailer and regulatory audit standards.

3

Auditable Credits

Generates robust, auditable and verifiable carbon insetting credits.

☐ Compli360™ enables credible **Scope 3 insetting**, underpinned by transparent and defensible data.

Revenue Architecture

Beyond Methane: Multi-Revenue Model

GasAbate generates value across multiple dimensions on every farm installation. This stacked value model means GlasPort Bio is not dependent on any single regulatory driver, carbon price, or subsidy regime – a critical structural advantage in a complex EU policy environment.

Ammonia Compliance



Regulatory alignment with EU air quality directives. Opens additional compliance pathways and processor-mandated sustainability programmes.

Nutrient Retention



Higher nitrogen value in treated slurry reduces synthetic fertiliser spend – a direct, quantifiable saving that resonates strongly with farmers.

Operational Efficiency



Reduced slurry agitation requirements and improved handling characteristics lower labour and equipment costs across the farm.

Livestock Performance



Improved air quality in pig and poultry housing environments supports animal welfare and has demonstrated potential productivity gains.

GasAbate increases grass yield by 21%



New research by Queen's University Belfast



Reduced nitrous oxide emissions from fertiliser production



Increased biodiversity



Improved soil health



Improved water quality



Greater supply chain resilience



Increased farm profitability

Backed by science. Verified with data.



Farmer-Centric Benefits

A core strength of GasAbate™ is that it delivers environmental gains while **reducing burden on farmers**, rather than adding to it.



No Changes to Existing Operations

No change to farming practices, production systems or animal management.



Reduced Labour & Costs

Reduced slurry agitation frequency, lowering labour, fuel and electricity use.



Nutrient Retention

Enhanced nutrient retention in slurry, enabling measurable reduction in chemical fertiliser use.



Health & Safety

Significant odour reduction and lower hydrogen sulphide exposure risk for farm workers, especially during spreading and agitation.



Increased Biomethane Yield

GasAbate™-treated slurry retains its energy during storage, making it a high value biogas feedstock for anaerobic digestion plants.





SLURRY TREATMENT TECHNOLOGY

GasAbate™ Delivery Systems: Flexibility & Full MRV

GasAbate™ offers two deployment options, both designed to ensure consistent methane abatement and full Monitoring, Reporting, and Verification (MRV) compliance with zero farmer input required.



Automated Dosing System



Manual Dosing System



SLURRY TREATMENT TECHNOLOGY

GasAbate™ Automated Dosing: Seamless Integration

This system involves a **permanent pipe network** installed into the base of each slurry tank, all connected to an external manifold. An integrated Programmable Logic Controller (PLC) with an array of sensors in each tank **remotely monitors slurry activity daily** to treat it automatically.

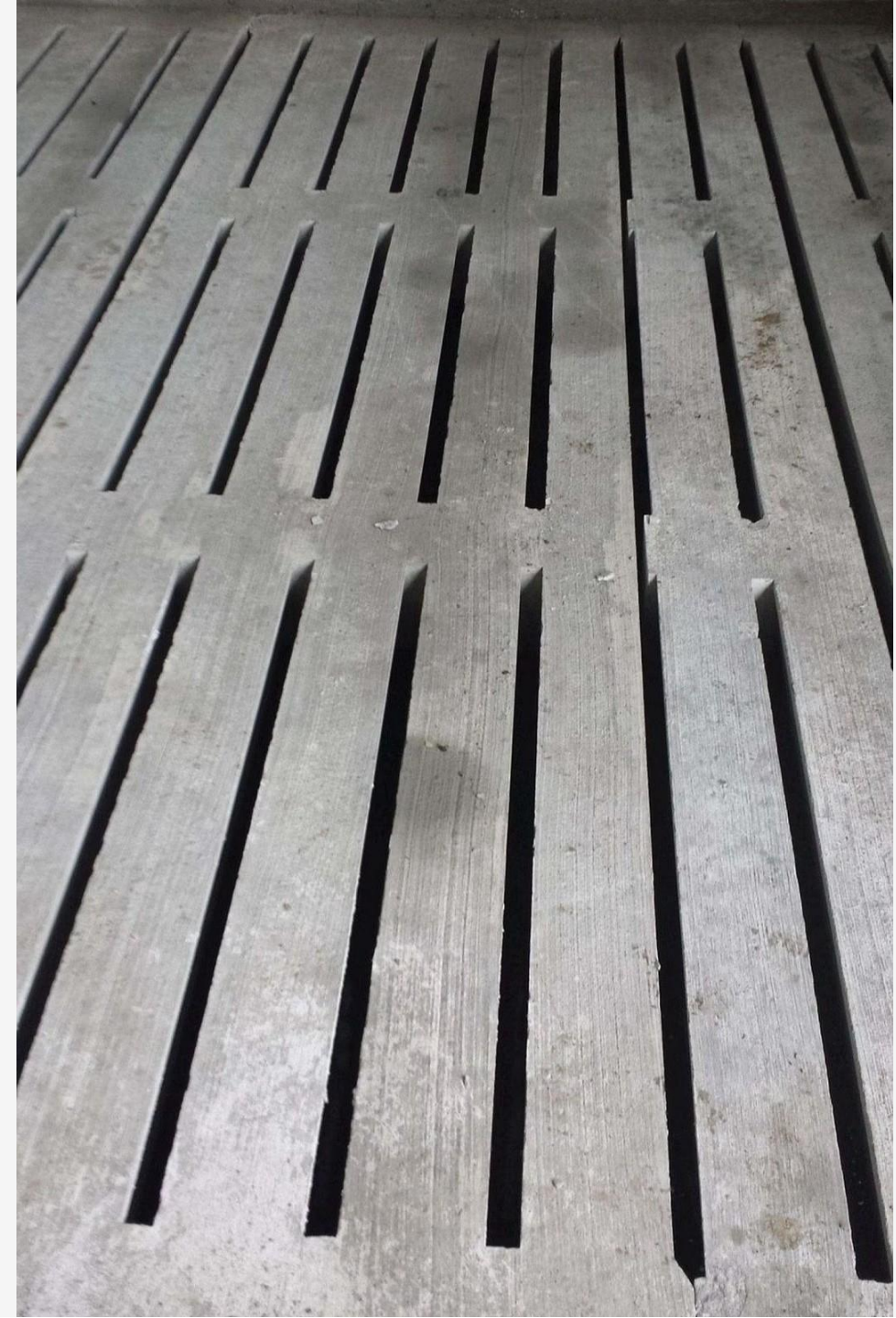
- ✔ • Fully plumbed into the additive storage tank on-farm.
- Requires zero farmer input from day one of operation.
- Once off installation where the slurry tanks need to be emptied in order for the tank works to be completed.
- Can be deployed across most slurry storage systems such as slatted tanks, storage towers, plastic lined lagoons, etc.

SLURRY TREATMENT TECHNOLOGY

GasAbate™ Manual Dosing: Expert-Led Precision

A trained GlasPort Bio technician visits the farm every three weeks to manually treat the slurry through the slats in each tank. Sensors are still installed across each tank to monitor slurry levels and report additive requirements to the technician ahead of each visit.

- Technician treats slurry using a lance across a calculated map of intervals in the shed.
- Requires zero farmer input, technician completes work without interrupting daily activities.
- Once off installation where the slurry tanks do not need to be emptied to begin slurry treatments.
- Can only be deployed across slatted tank slurry storage.



Wide range of GasAbate™ installs across Europe



Above-Ground Stores



Plastic-Lined Lagoons



Underground Slatted Tanks



Grass-Based Dairy Farms



Reducing the Carbon Footprint of Milk Production

GasAbate™ delivers a measurable reduction in the carbon footprint of milk production, cutting emissions intensity across the full dairy system.

7 - 18% Reduction in Carbon Footprint

Per kg of Fat & Protein Corrected Milk (FPCM) – the internationally recognised measure of dairy emissions intensity.

0.5-1.5/t CO₂e Saved Per Cow/Year

From manure management alone. In intensive dairy systems, GasAbate™ cuts from 0.5-1.5/t tonne of CO₂-equivalent per cow annually across grass based and intensive dairy systems.

78% Methane Reduction

From stored slurry – third party assured by The Carbon Trust (2026), the highest verified reduction of any manure management technology globally.

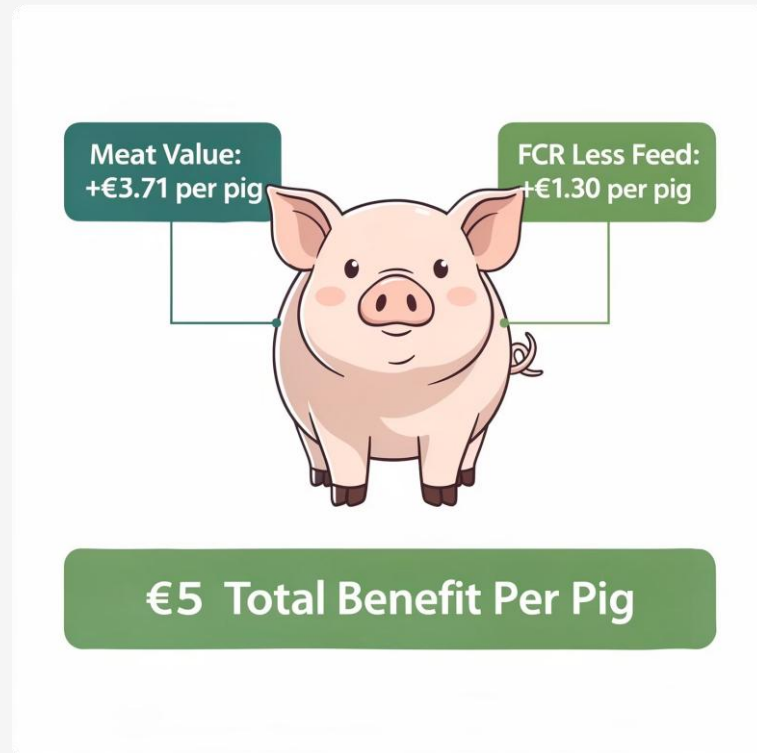
📄 GlasPort Bio is rapidly scaling, working with Europe's largest and leading dairy and beef processors on the commercial rollout of GasAbate™

Improved Pig Performance, Welfare & Productivity

GlasPort Bio has investigated the impact of reduced H₂S and ammonia on pig welfare, growth performance and operative working conditions.

GasAbate™ Trial on 2,400 Pigs

Conducted on a modern pig unit facility with exceptional baseline performance. Potentially higher levels of improvement on typical pig units.



TRIAL SETUP

CONTROL VS TRIAL



Trial Design

Weaners: Day 28-82

Fatteners: Day 82-160

3 Batches = 3 Repetitions (All in, all out)



Control Rooms

~400 animals

No slurry treatment

Trial Rooms

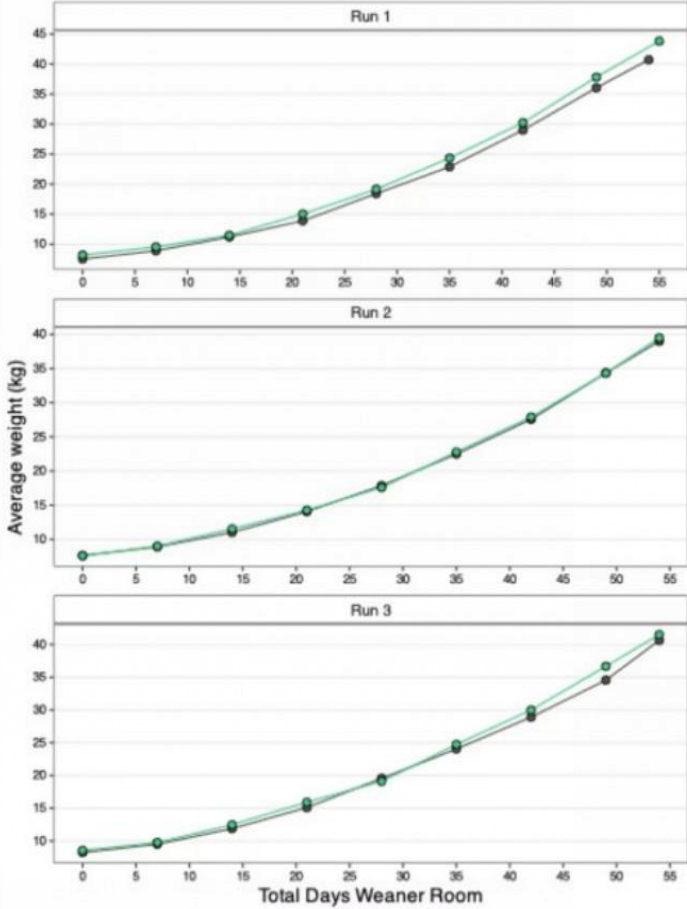
~400 animals

GasAbate™ treated slurry

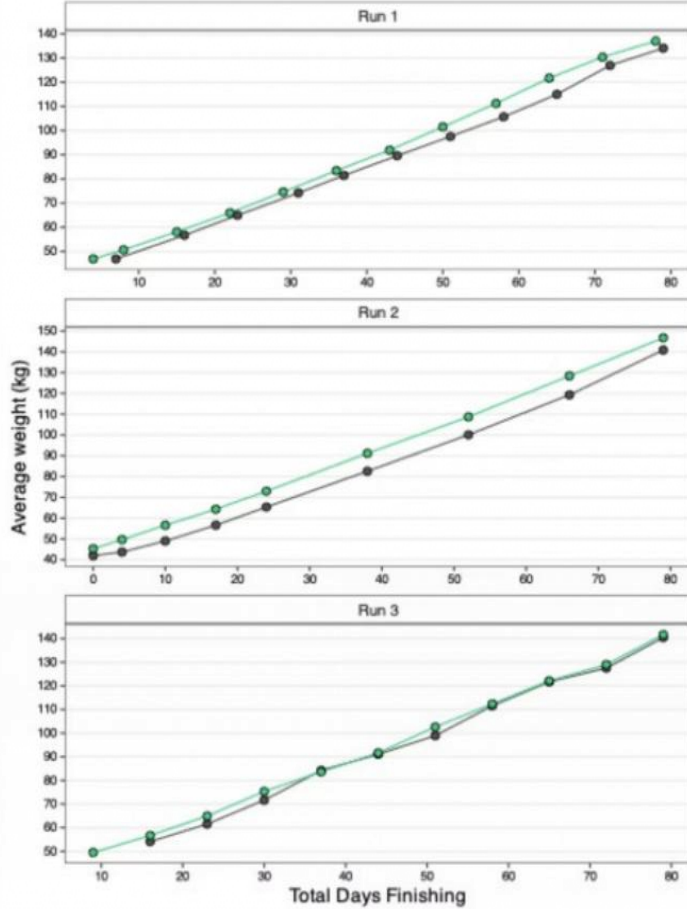
Average weight during trial

● Control ● GasAbate

Weaners



Fatteners



Outcomes for Pig Farmers

Faster Time to Slaughter

Pigs reaching slaughter weight 7-10 days earlier with lower feed consumption to finish.

Improved FCR

Improved feed conversion ratio and noticeable reductions in odour and atmospheric stress within housing.

~10% Less Slurry Volumes

Pigs reaching slaughter 7-10 days earlier means significantly less slurry produced per pig (shorter production cycle, reducing storage, handling and disposal costs).

Reduced Ammonia Levels

Lower slurry volumes combined with GasAbate™ treatment delivers a compounding reduction in ammonia emissions while improving air quality in and around farm buildings.





Swine Sector Opportunity

Lower Footprint

Reduced feed consumption and earlier slaughter means lower embedded carbon in feed and fertiliser applications. Less feed required = less land, water and energy used in feed production.

Improved Slurry Quality

GasAbate™ treated slurry retains more nutrients, making it a higher-value organic fertiliser and reducing the need for synthetic inputs – improving the farm's overall nutrient management plan.

Reduced Odour Impact

Significant reduction in H₂S and ammonia means improved working conditions for staff and reduced odour impact on surrounding communities.

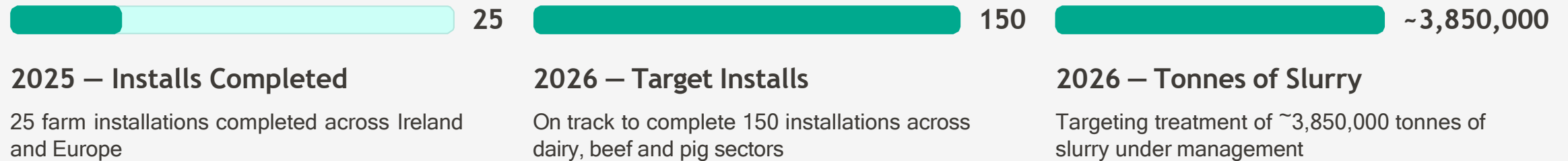
More Valuable Manure

GasAbate™ treated slurry retains its energy during storage, making it a high value biogas feedstock for anaerobic digestion (AD) plants.



Commercialisation Journey

From initial farm installations in 2025 to a further targeted 150 installs across 2026, GlasPort Bio is scaling rapidly with some of the largest food manufacturers and processors in Europe – with over 3,850,000 tonnes of slurry targeted under management by end of 2026.



Each installation treats an average of ~22,000 tonnes of slurry annually. Scaling up to 175 completed installs represents a significant step toward commercial viability and measurable national emissions impact.



Global Engagement & Validation

GlasPort Bio is actively driving the commercial adoption and industry recognition of GasAbate™ across Europe and globally.

Commercial Rollout

Engaging and rapidly scaling with Europe's largest and leading dairy, beef and pig processors for the commercial rollout of GasAbate™.

Regulatory & Industry Recognition

Collaborating with regulatory authorities and global food manufacturers for GasAbate™ recognition in national inventory profiles and Scope 3 insetting claims.

Proven Impact

Our technology is extensively trialed by these organisations and supported by robust, peer-reviewed science, confirming its efficacy and reliability.

Thanks for listening!

At GlasPort Bio, we are delivering practical solutions that help farmers achieve credible Scope 3 emissions reductions across the entire food supply chain, while future-proofing farms for the next generation.

Built on robust science and proven at farm level, GasAbate™ delivers significant greenhouse gas reductions and has earned the trust of farmers, processors, retailers, industry stakeholders, and regulators alike.

Happy to answer any questions you may have!

