GlasPort Rumen Tech overview

GlasPort Rumen Tech (GPRT) is developing a ruminant feed additive RumenGlas (active ingredient: CaO_2) to improve ruminal nutrient use efficiency leading to improvements in animal performance and reductions in enteric methane emissions and indirect reductions in GHG emissions across the production cycle (via shorter finishing time, reduced feed inputs etc.), leading to reduced carbon footprint of livestock produce and reduced scope 3 emissions.

GPRT is developing RumenGlas through a stepwise manner, of validation through *in vitro* models (Rusitec; dual-flow fermenters) before small animal and large animal studies. Our initial focus has been on non-lactating animals (post-weaning calves, heifers, animals for fattening).

Why this route is taken: Currently there is a gap in the market in terms of approved solutions for non-lactating animals. From a population basis and environmental impact, this represents the largest bovine grouping, and one where improved performance through reduced finishing times, leads to extremely large economic and environmental gains. Additionally, by targeting calves, GPRT is taking a holistic view to animal production, and recognise the importance of improved calf performance in later life, leading to improved performance and reduced emissions.

This has informed our development programme, where all aspects of research have centred upon non-lactating animals, utilising beef rumen fluid, beef rumen models to allow for an optimised dosage and feeding regimen in later trials. We recognise the major market attractiveness of additives for the dairy sector. Work is ongoing in-house optimising the dosage rates etc in *in vitro* models of dairy (increased fluid intakes, increased rumen passage rate etc.) and we expect small-scale animal studies to be conducted within the next 12 months. A limited number of studies have been conducted with dairy cows – these are described below. In our studies we aim to shift VFA profiles in the rumen (e.g. through increased production of propionate) and increase digestible microbial biomass production (a key driver of meat and milk production).

Note: All studies have been conducted independently of GPRT – in some cases GPRT have authorship on these papers where input was given to trial design etc., however, no hands-on work was conducted by GPRT. In all instances, GPRT supplied the active ingredient. These trials have not utilised a finalised "product" rather a non-protected CaO_2 powder incorporated into a feed pellet, produced at a commercial feed mill. While CaO_2 is thermal- and pressure-resistant to the pelleting/extrusion process, this has sensitivity to moisture and so instructions were given to third parties to ensure product was stored dry, fed to animals indoors etc. It is known that CaO_2 will degrade in the presence of water and will lead to palatability issues - this has been shown in some studies where protocol was not followed and/or accidental exposure to water occurred. This is particularly relevant for dairy studies. While a moisture-protected version is being developed in-house, this has not been utilised in trials to date.

Similarly, we recognise how amendments to animal diets in conjunction with feeding of CaO_2 may allow for additional improved performance, such studies have not been conducted to date

Our research focus has been focused on non-lactating animals, with only preliminary work on lactating dairy. Research work is ongoing and we expect to conduct small-scale animal studies in dairy cows in the coming 12 months.

Background *in vitro* papers:

O'Donnell *et al.* (2024) and Graham *et al.* (2025)

These studies demonstrate the initial proof of concept of the impact of temporal increase in ruminal ORP to affect changes in enteric methane emissions using the Rusitec rumen model.

Sheep studies:

Results from three separate sheep studies presented at EAAP in 2025 and 2026: Cristobal-Caballo *et al.* (2025), Pugh *et al.* (2025) and Nyamuryekung'e *et al.* (2026)

Cristobal-Caballo *et al.* (2025) describes a study on lowland crossed ewes split into a control group and 2 groups receiving CaO_2 at differing concentrations via concentrate pellet, with trial groups receiving concentrate on a 20% of DMI basis. Animals receiving CaO_2 demonstrated improved ADG (+16% (medium dose); +19% (high dose)) with accompanying reductions in methane intensity of (-17.6% and -27.5% respectively).

Pugh (2025) describes the impact of methane on Ewes and lambs fed a control or CaO_2-containing diet. This study shows that lambs receiving the CaO_2-containing diet performed better with increased ADG and reduced methane emissions/kg liveweight.

Nyamuryekung'e (2026) demonstrating reduced methane emissions (17%) and methane intensity (18%) from animals fed the CaO_2-containing diet.

Non-lactating bovine studies:

Roskam *et al.* (2024) and Kalenikanse *et al.* (2026)

Roskam *et al.* (2024) showing impact of CaO_2 on a finishing beef cohort, with reduced methane emissions ranging from 17-29% depending upon dosing concentration, and improvements in ADG and FCE seen. Further data from trial presented in accompanying slide deck detailing enhanced animal performance (ADG and FCE: 20%+) at the midpoint of the trial when animals were actively growing.

Kalenikanse (2026) Poster presentation (paper in prep). Trial utilising younger cohort of actively growing animals detailing improvements in FCE and ADG. Data from the draft paper in the accompanying slide deck, showing improvements of up to +20.6% (ADG) and +20.1% (FCE)

Lactating studies:

Costigan *et al.* (2024) and Vattulainen *et al.,* (2025)

Costigan *et al.,* is a poster presentation of an initial trial of CaO_2 in dairy cows. A non-optimised dose was utilised in this study, with animals fed the additive via feed pellet twice daily following milking before access to pasture. No negative impact was seen on milk yield, milk composition, body weight. Methane reductions were seen in parity 1 animals (-9.9%) but not seen in parity 2 or 3 animals. This result potentially reflecting different rumen sizes and dry matter intakes of parity 1 animals compared to larger parity 2 & 3 animals, where effective differing dosage levels of CaO_2 (relative to DMI) were seen across the 3 groupings.

Vattulainen *et al.,* (2025) is a publication around feeding of CaO_2 to a cohort of Nordic Red dairy cows on a grass silage/concentrate diet. Again, the inclusion rate of CaO_2 was not optimised for this trial, with the additive fed via concentrate pellet. Unlike other studies in beef cattle, the animals were fed 4 times daily with a sorting of pellets containing the additive indicating reduced palatability via this route. This resulted in a lower feed intake (low:10.5%-high:16.5%) with accompanying decrease in milk yield as a consequence; this however did not impact milk composition.

This study featured a lower dosage rate than employed in the beef studies and varied in terms of a 4-times per day feeding regime of the CaO_2 additive (unlike twice-a-day CaO_2 feeding in other studies). As suggested by the authors this may suggest an altered feeding regime is required (e.g. with longer duration between feeding of CaO_2) or one where dosage may need to be refined (e.g. as ruminal ORP was not recorded, this level of feeding may not have caused a sufficient elevation of ORP in the rumen for efficacy to be seen).

The question of palatability is being addressed in-house, for example, through coating of additive (to allow for greater moisture protection and/or palatability masking), or through a decreased inclusion rate within feed pellets.

Non-feed additive approach

Additionally, GPRT is developing a non-feed additive approach to temporal modification of rumen ORP to improve performance and sustainability. Overview of this approach can be seen in company overview slide deck. In summary, this is based upon the hydrolysis of water/fluids to allow for generation of O_2. This can be tuned to allow for ORP modification to be synchronised with rumen digestion. This has obvious advantages in terms of regulation, market capture (intensive, extensive systems) and residue/consumer concerns. *In vitro* work is ongoing with initial *in vivo* studies expected in Q4 2026/Q1 2027.