



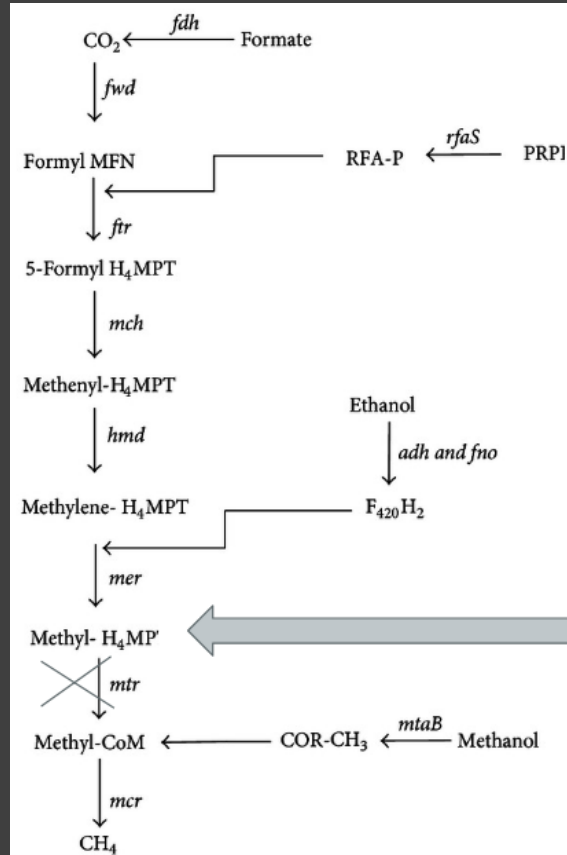
Asparagopsis Science Update

NZ Agricultural Climate Change Conference – June 2nd 2021

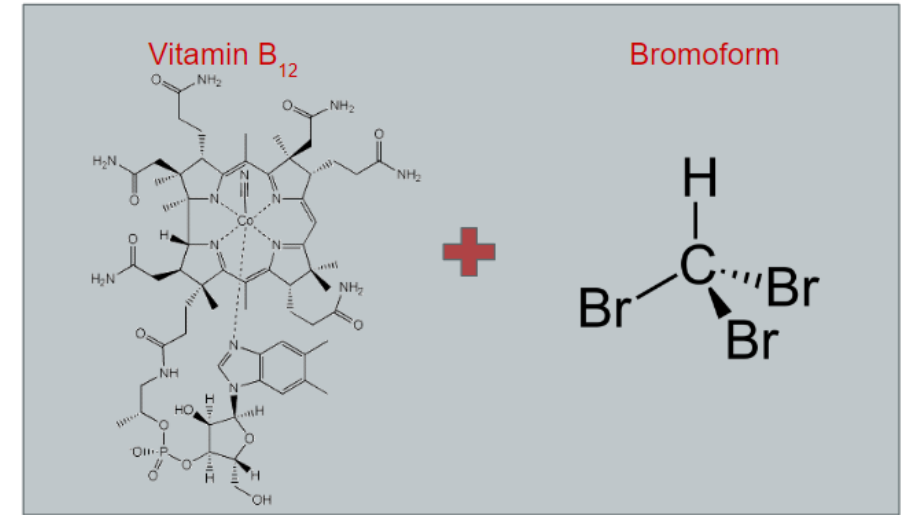
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VP Biology and Chemistry



Asparagopsis
reduces enteric
methane



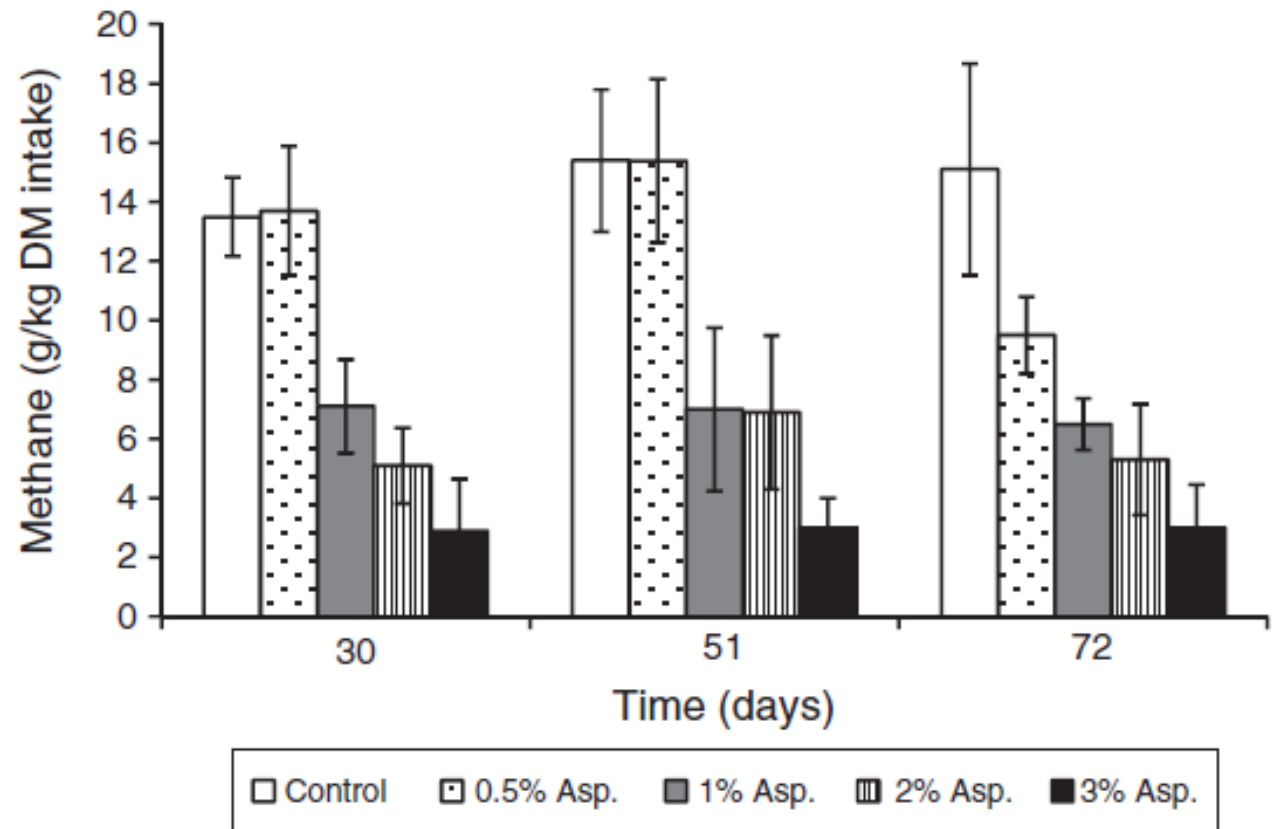
Inhibited Methanogen Pathway



- Red seaweed, low inclusion rates, large methane reduction
- Brominated compounds inhibit methanogen metabolism

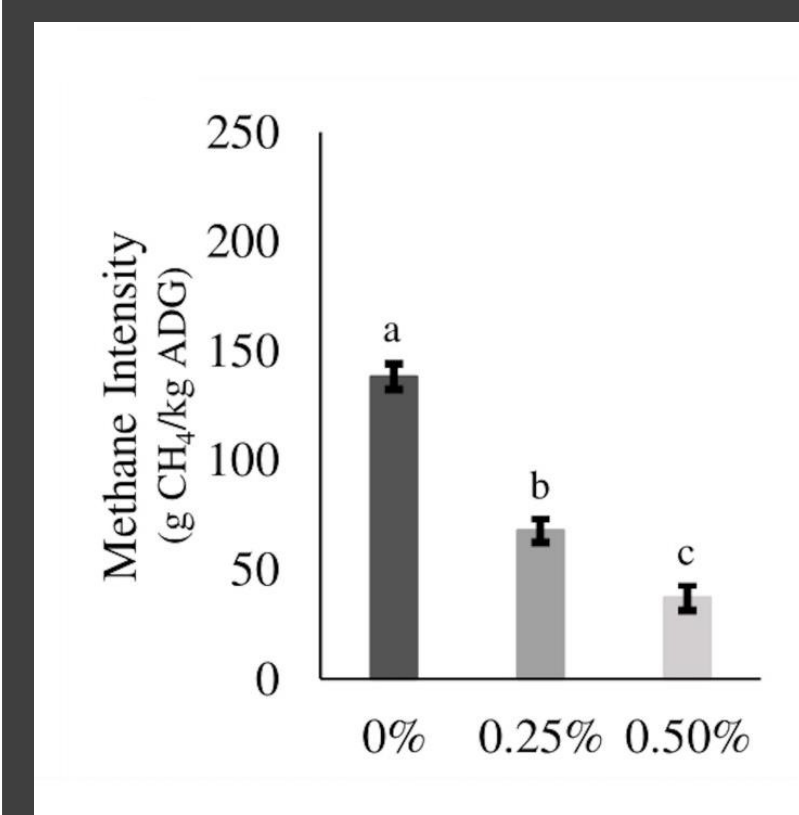
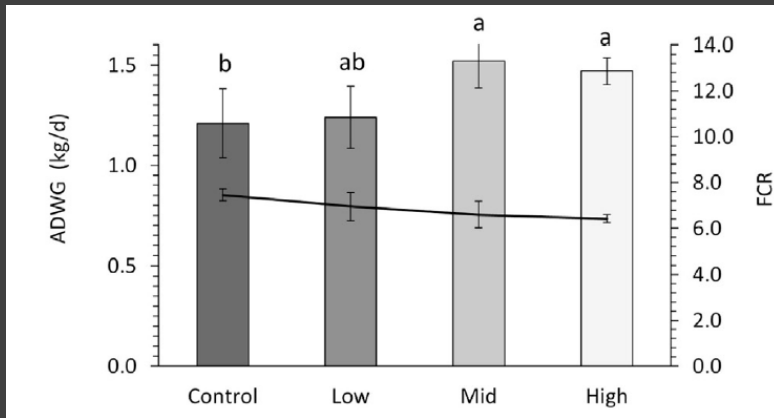
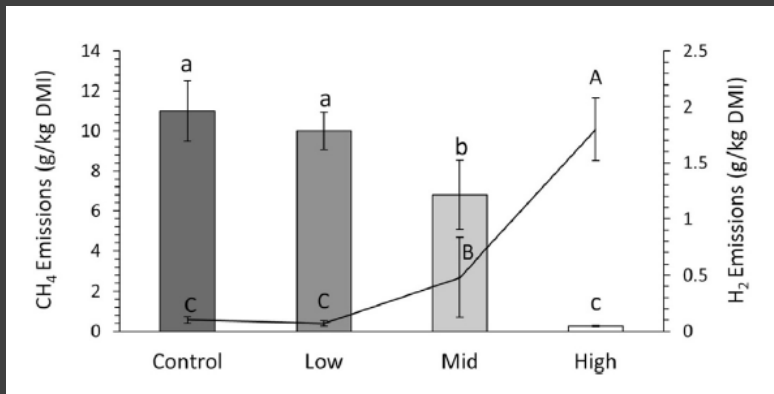


Effective and safe in multiple trials

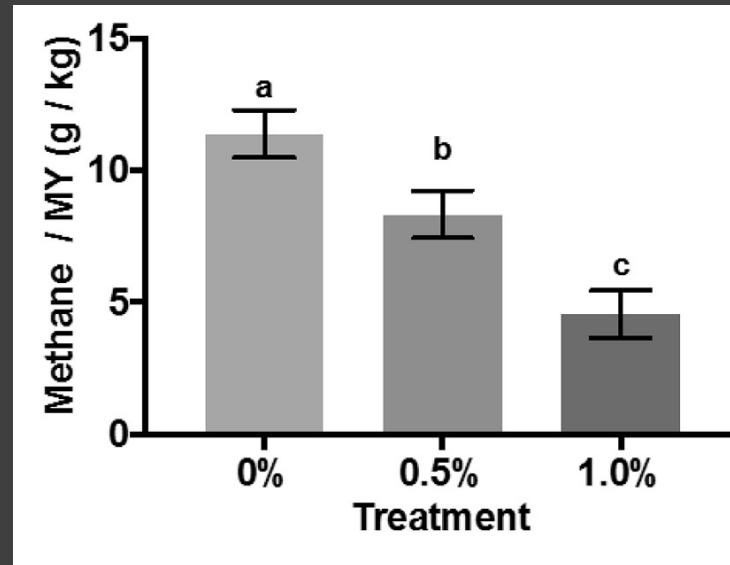
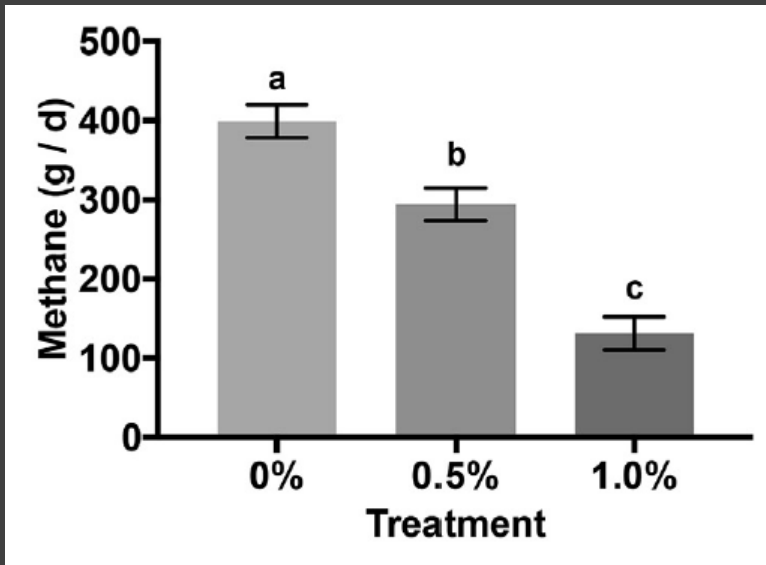


- Dry seaweed supplement in addition to high grain total mixed ration (TMR)
- Bromoform in seaweed 0.4 mg/g
- Up to 3% in diet

- Up to 80% methane reduction
- No difference in weight gain
- No residue detected in fat or muscle
- Feeding self-regulated at $<\sim 1.5\%$ DMI



- Beef cattle feed trials
- Two studies, feeding up to 0.5% DMI
- Seaweed mixed into TMR
- Bromoform >6mg/g
- Up to 80-98% methane reduction
- Improved feed conversion
 - No change in feed intake, higher weight gain
 - Lower dry matter intake, no difference in weight gain
- No residue detected in meat, kidney, fat, feces
- Meat quality unaffected, objectively and subjectively



- Lactating Dairy Cow Feed Trial – UC Davis
- Dry seaweed mixed into TMR
- Inclusion rates of 0.5% and 1% of DMI
- ~6 months feeding trial

- Up to 60% reduction in methane
- Improved feed conversion: lower dry matter intake, no difference in weight gain, productivity
- Bromoform found in milk in all treatments, including negative control
 - <500x lower than US EPA drinking water maximum

What not to do

Poorly designed and executed experiment
leads to negative results

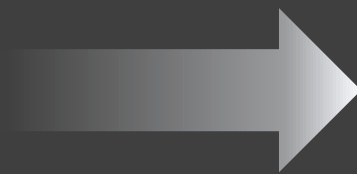


- Lactating Dairy Cow Feed Trial - Wageningen
- Seaweed mixed into liquid form, with base diet withheld until seaweed eaten
- Inclusion rates ranged from 0.005%-33%
- Effectively starvation in some cases
- No negative controls



Best practices

High quality seaweed
Low inclusion rates
Palatable supplement

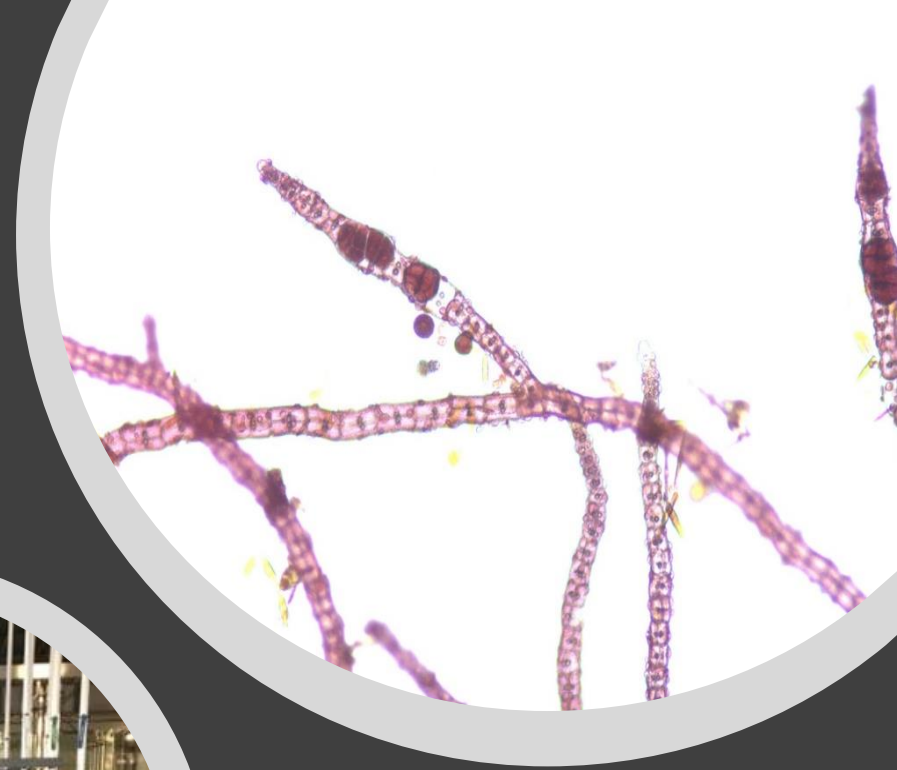


Best results

Strong methane reduction
Improved productivity
No safety/health issues

Cultivation Science Progress

- Optimizing tank-based production
- Identified triggers for spore release
- Developed methods for seeding lines
- Deployed NZ's largest seaweed farm
- Monitoring performance and impacts





Process Engineering Progress

Processed multiple tons of
seaweed

Identified key controls
over bromoform
quality

Key next step

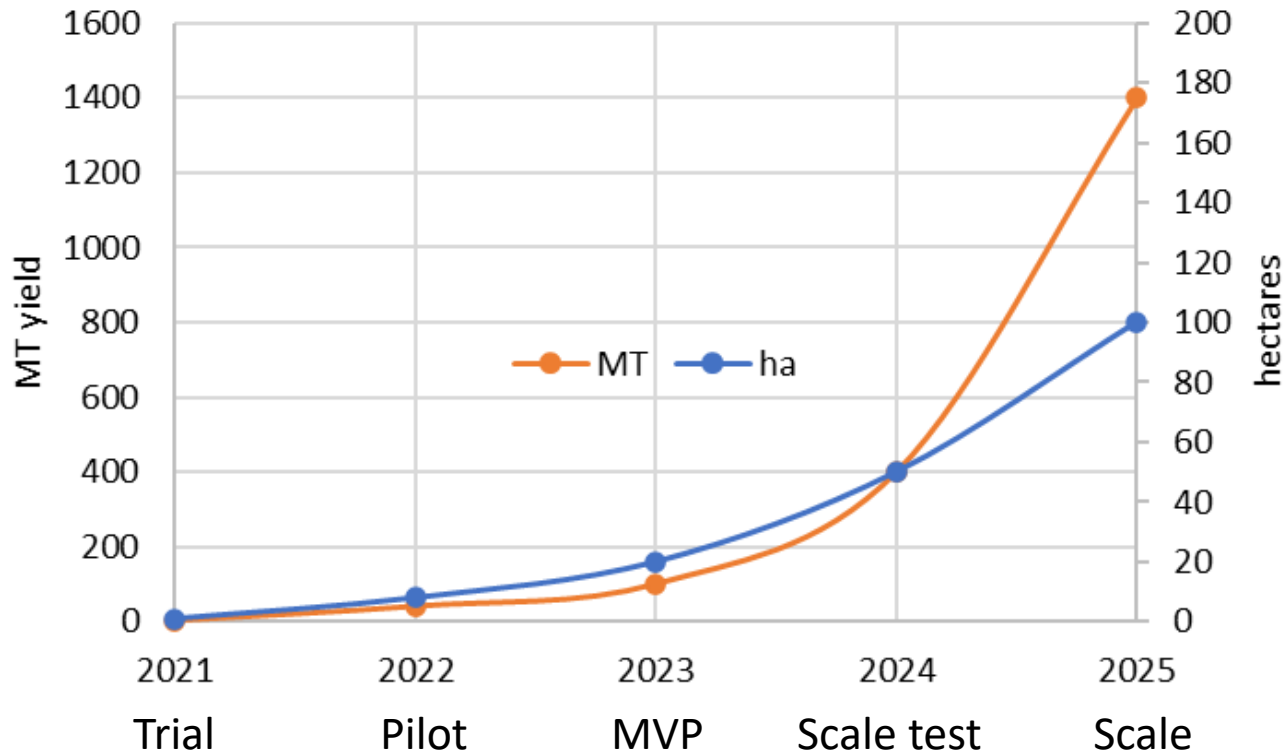
Grazing system feed trials

Pulsed seaweed supplementation

Efficacy, health, product quality and safety

Timelines and Impacts

Near term



Longer term

By 2029, 15,000 MT pa from 800 ha

Enough for 25% of NZ's dairy herd

250 days/yr, twice daily

66% less methane per fed cow

Hits national goal of 15% methane reduction by 2030, without having to reduce the size of the herd



2021

New Zealand Agricultural Climate Change Conference

Meeting the challenges of climate change