Can we use seaweed in cattle rations?

Impacts of commercially available macroalgae products on in-vitro fermentation

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Why seaweed?

- Population growth, climate change and the associated pressure on land for human food production has led to an increased interest to explore opportunities for utilization of marine biomass as feed for livestock.
In-vitro gas production technique:
- Dry matter, organic matter and fiber components (before and after degradation)
- Cumulative gas pressure & gas composition
- Fermentation kinetics (when & how fast degradation occurs, when it slows down or stops)
- Fermentation products (short chain fatty acids)
- Microbiota identification (gene sequencing)
Seaweed Research:

Cummulative gas pressure per unit dry matter

+/- Seaweed/seaweed products-

- Ocean Feed Swine™
- AlgeaFeed 1.4 (Algea®),

- A lactobacillus prefermented **rapeseed**

- A mixed product of AlgeaFeed and the above rapeseed (**European Protein**)

- **dosage 17% of dry matter**

Beet pulp	Maize Silage
Results 1: Gas produced per gram dry matter

Solid lines denote pure products: maize silage, beet pulp or pure seaweed products. Dashed lines denote products with beet pulp and dotted lines denote products with maize silage.

- AlgaeFeed
- AlgaeFeed
- AlgaeFeed
- Maize silage
- Beet pulp
- Algae&Ferm.Rapeseed
- Algae&Ferm.Rapeseed
- Pre-fermented rapeseed
- Pre-fermented rapeseed
- Ocean Feed
- Ocean Feed
- Ocean Feed

ml gas produced per g DM

Minutes

0 500 1000 1500 2000 2500 3000
Results 2a: Difference between pure feed & product

Solid bars show differences between products & maize silage; dashed bars show differences between products & beet pulp (Standard error of the mean bars show variation)

Pre-fermented rapeseed stimulated fermentation of beet pulp (dashed) from 3 to 12 hours & maize silage (solid) from 6 to 12 hours
Results 2b: Difference between pure feed & product

AlgeaFeed consistently inhibited fermentation of maize (solid) & beet pulp (dashed).
Results 2c: Difference between pure feed & product

To a lesser extent, **OceanFeed** and inhibited beet pulp (dashed green) & maize silage (solid green)
When prefermented rapeseed and AlgeaFeed were mixed (Algea&Rapeseed):

1. The effect was additive (intermediary) for fermentation in maize silage from 3 hours of fermentation (solid bars)
When prefermented rapeseed and AlgeaFeed were mixed (Algea&FermRapeseed):

2. The mixed product provided fermentation that was equal to that of pre-fermented rapeseed alone from 3 to 12 hours \textit{IN BEET PULP} (dashed bars)
Conclusions

• Both seaweed products contain compounds capable of inhibiting rumen fermentation, but with different efficiencies.

• The differential ability of seaweed products to suppress fermentation, depending on the feed being fermented, suggests that specific microbial populations (involved in degradation of different carbohydrate fractions) are targeted.
Conclusions

• CAN WE USE SEAWEED in cattle rations?
• Yes...Maybe not to increase ration degradation – at the given dosages)...
• The differential inhibitory effects of fermentation are exciting and have perspectives targeted digestion strategies.

• We are continuing these investigations!

• THANK YOU for your attention.