Feed-a-Gene

Adapting the feed, the animal and the feeding techniques to improve the efficiency and sustainability of monogastric livestock production systems

Protein from green biomass as a sustainable protein source for monogastric animals

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ABSTRACTS

The increasing demand for protein worldwide has led to intensive search for sustainable alternative protein sources for monogastrics. This study demonstrate the work performed on extracting and utilizing protein and residual pulp from green biomass for livestock animals.

INTRODUCTION

- There is a demand for sustainable protein sources to reduce EU dependency on imported protein sources.
- In temperate climate such as Northern Europe, grass and forage legumes are possible sustainable sources due to their high yields of dry matter and protein, and balanced amino acid composition.
- For proper utilization in monogastrics the protein needs to be separated from the fibers and other antinutritional factors in order to be efficiently utilized.



OBJECTIVES

- To study green biomass as a potential sustainable protein source for monogastric animals.

MATERIALS AND METHODS

- Processing of green biomass from red and white clover, perennial ryegrass and lucerne into a soluble juice fraction and an insoluble pulp fraction.
- Precipitation of protein in the juice by acid fermentation or heat.
- Processing without and with the use of cell wall degrading enzymes.

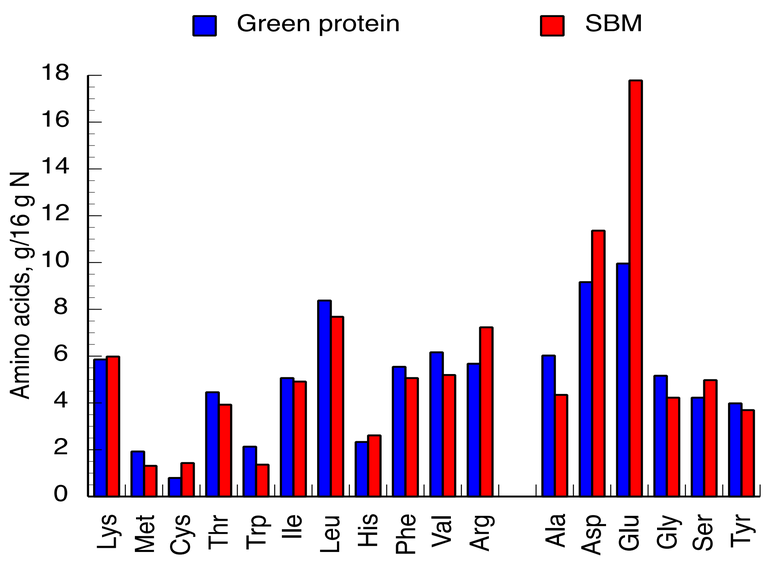




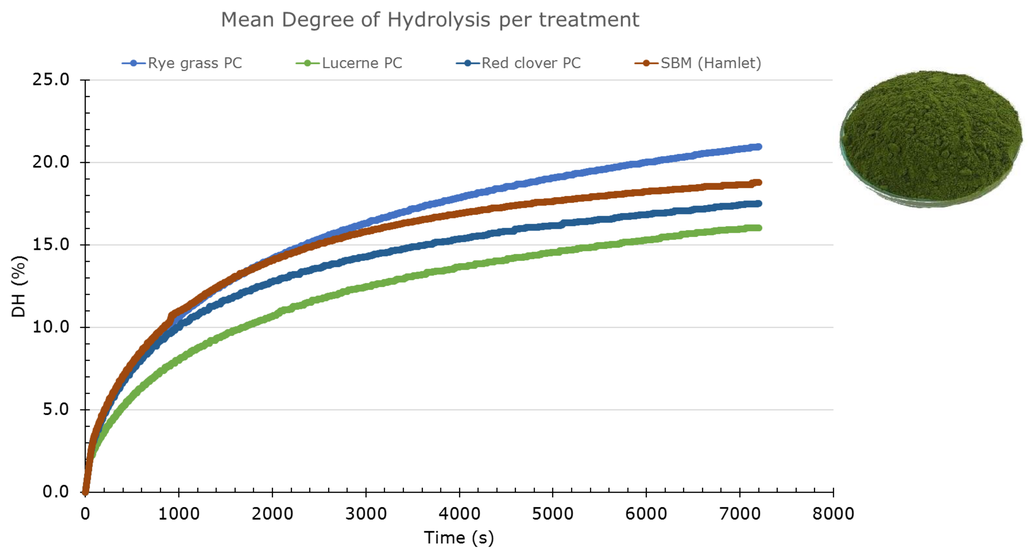
- Analyses: Proximate composition; Fibre composition; amino acids composition; In vitro protein degradation (pH-stat); In vivo ileal digestibility of protein concentrate in cannulated pigs; Upgrade of protein concentrate by bioprocessing; Performance experiments with pulp in rabbits.

RESULTS

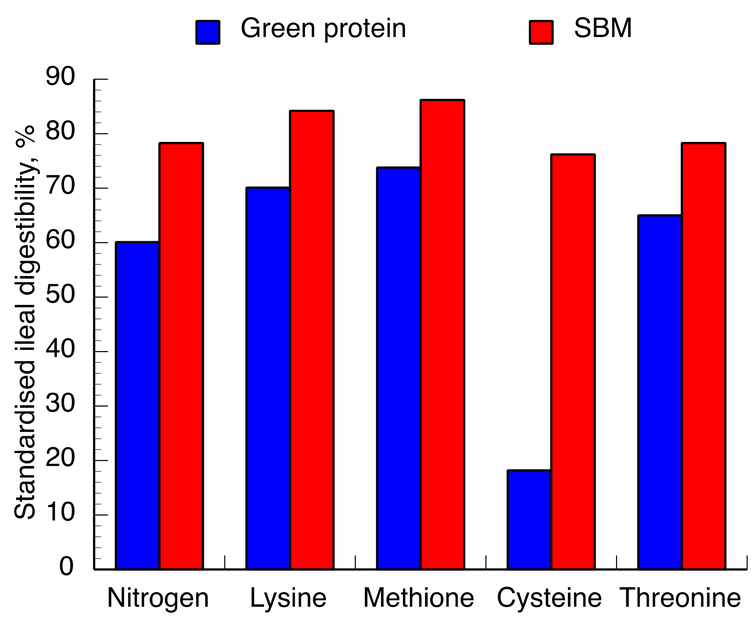
- The protein concentration was lower in green protein concentrates than in soybean meal (SBM) primarily due to high ash content but the amino acid composition was almost similar. Little influence of plant species and processing without and with cell wall degrading enzymes.

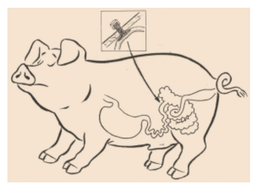


RESULTS (continued)



- The in vitro protein digestibility (rate and extent) of protein concentrates were similar to that of a good quality SBM.



.. but the in vivo standardized ileal digestibility of nitrogen and amino acids of green protein concentrates were lower that of a good quality SBM.

- Protein concentrates precipitated by acid fermentation was not suitable for the bioprocessing technology used at Hamlet Protein. Modest improvements could be obtained for steam precipitated green protein.

- The pulp in form of silage has been shown to be well utilized by ruminants in national projects.
- Replacing alfalfa with pulp from green biomass processed without and with the use of cell wall degrading enzymes did not affect growth performance but total tract apparent digestibility was reduced.


- *With improved harvest and processing technologies it has recently been possible to produce protein from green biomass with concentration and amino acid composition similar to SBM.*

CONCLUSIONS

- Knowledge generated during the course of the Feed-a-Gene project have helped improving harvest and processing conditions enabling production of protein concentrates from green biomass with similar nutritional quality as SBM.

CONTACT

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Feed-a-Gene

Feed-a-Gene is a European H2020 project involving 23 partners which aims to adapt feeds, animals and feeding techniques to improve the efficiency and sustainability of pig, poultry and rabbit production systems. It is coordinated by INRAE (France), started in March 2015 and will last 5 years. The project aims to reduce the environmental impact of monogastric livestock production by improving and diversifying animal diets and feed technologies and by integrating new selection criteria for these animals. The Feed-a-gene project further aims to develop new management systems for precision feeding and precision farming and to evaluate the overall sustainability of the different management solutions proposed in the project.

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