

Yield and Amino Acid Composition of Pulp and Protein Extracted and Recovered from Legumes and Grass

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Motivation

- Increasing demands of animal protein
- Sustainable, locally produced feed protein
- Soya bean protein
 - Deforestation
 - EU27 imports 20,000,000 tonnes annually

Green Biomass

- Legumes and grasses
 - High availability in Northern Europe
 - High yields
 - High quality protein
 - High content
 - Amino acid composition comparable to soya bean protein
 - Nutritional value
 - High content of water

Study

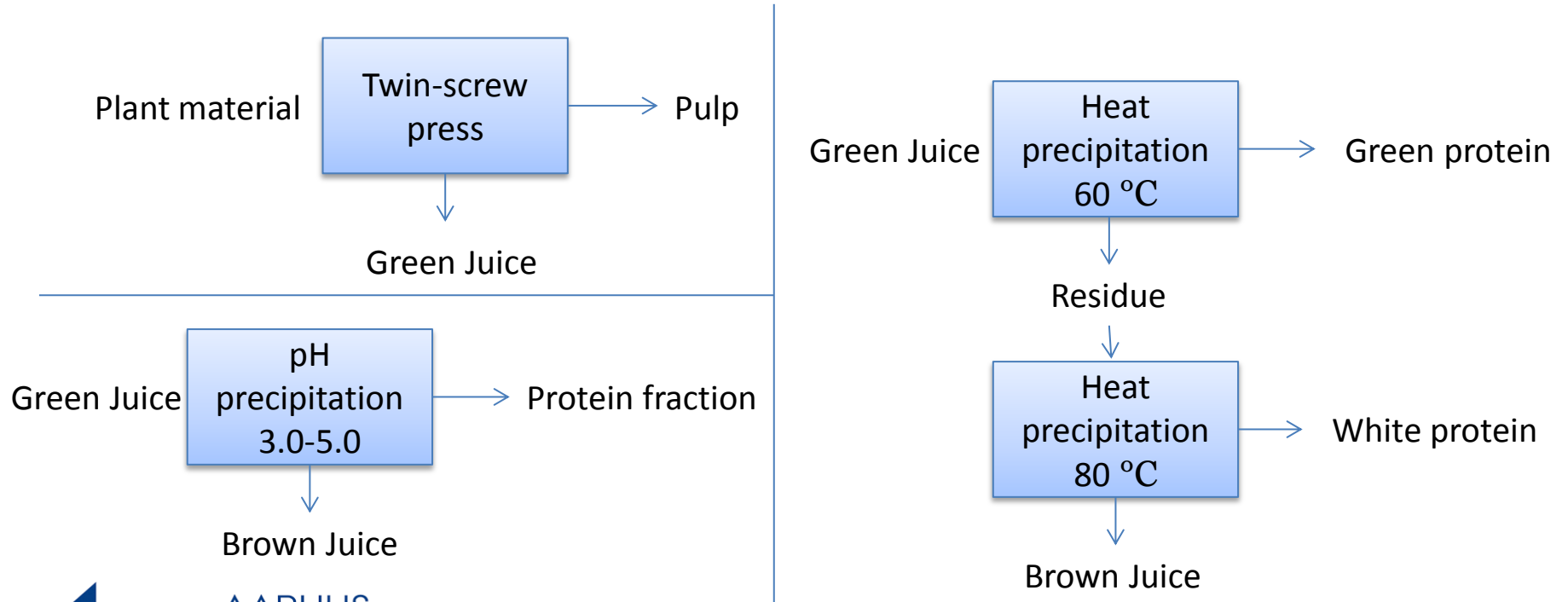
- Purpose
 - Examination of extraction and recovery of protein from locally grown plants
 - Analysis of the recovered protein
 - Amino acid content
 - Amino acid composition and distribution
 - Most suitable plant species
 - Most feasible method of recovery

Materials and Methods

- Material
 - Three seasons
 - White clover
 - Red clover
 - Lucerne
 - Ryegrass
- Methods
 - Twin screw press
 - Two-step heat precipitation
 - Acidic precipitation



Flow Chart



Dry Matter Balance

Dry Matter	Plant	Pulp	Green juice	Loss
White clover	100g	55g	36g	9g
Red clover	100g	55g	30g	15g
Lucerne	100g	63g	28g	9g
Ryegrass	100g	68g	32g	0g

Recovered by
Heat Precipitation

Green protein	White protein	Brown juice
15g	<1g	20g
13g	<1g	17g
13g	<1g	15g
12g	<1g	20g

Crude Protein Balance

Crude Protein	Plant	Pulp	Green juice	Loss
White clover	100g	55g	38g	7g
Red clover	100g	53g	35g	12g
Lucerne	100g	54g	43g	4g
Ryegrass	100g	67g	29g	4g

Recovered by
Heat Precipitation

Green protein	White protein	Brown juice
22g	1g	14g
21g	1g	13g
25g	1g	17g
17g	1g	13g

Recovery Comparison

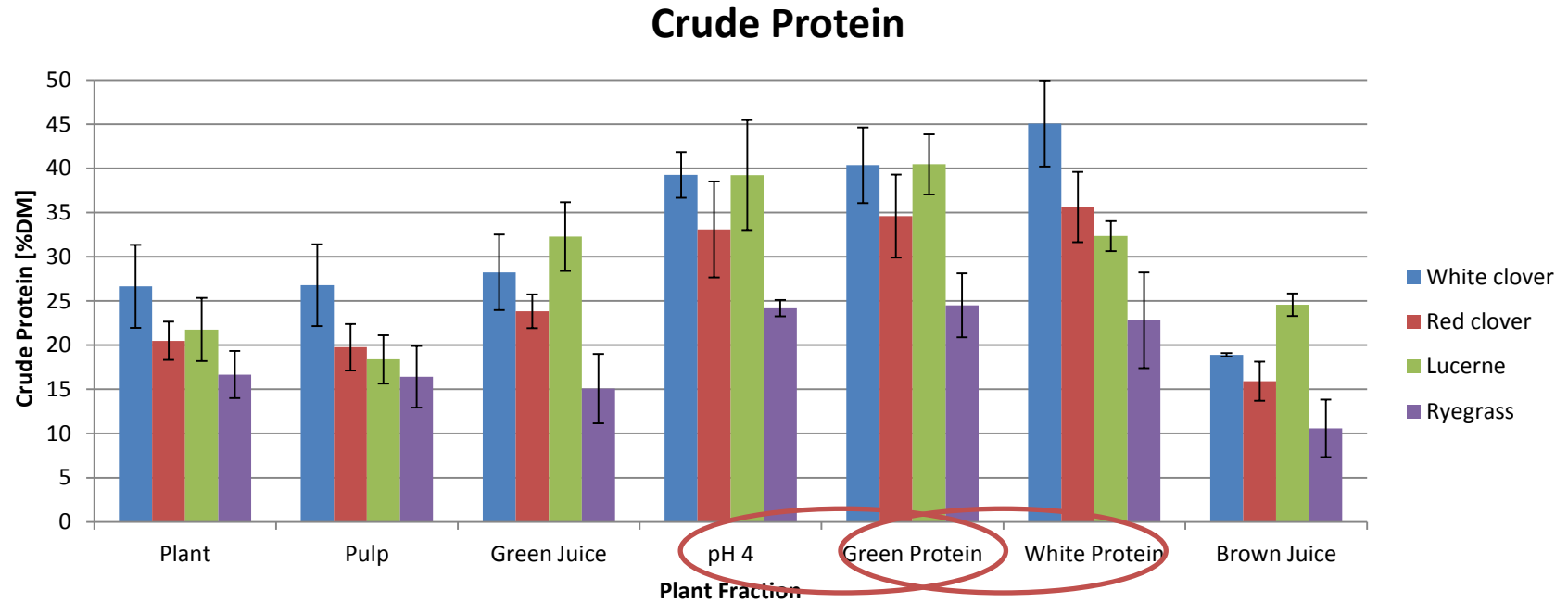
Recovered by
Heat Precipitation

Crude Protein	Green Juice	Green Protein	White Protein	Brown Juice
White clover	100g	57g	3g	40g
Red clover	100g	62g	3g	35g
Lucerne	100g	58g	3g	38g
Ryegrass	100g	56g	3g	41g

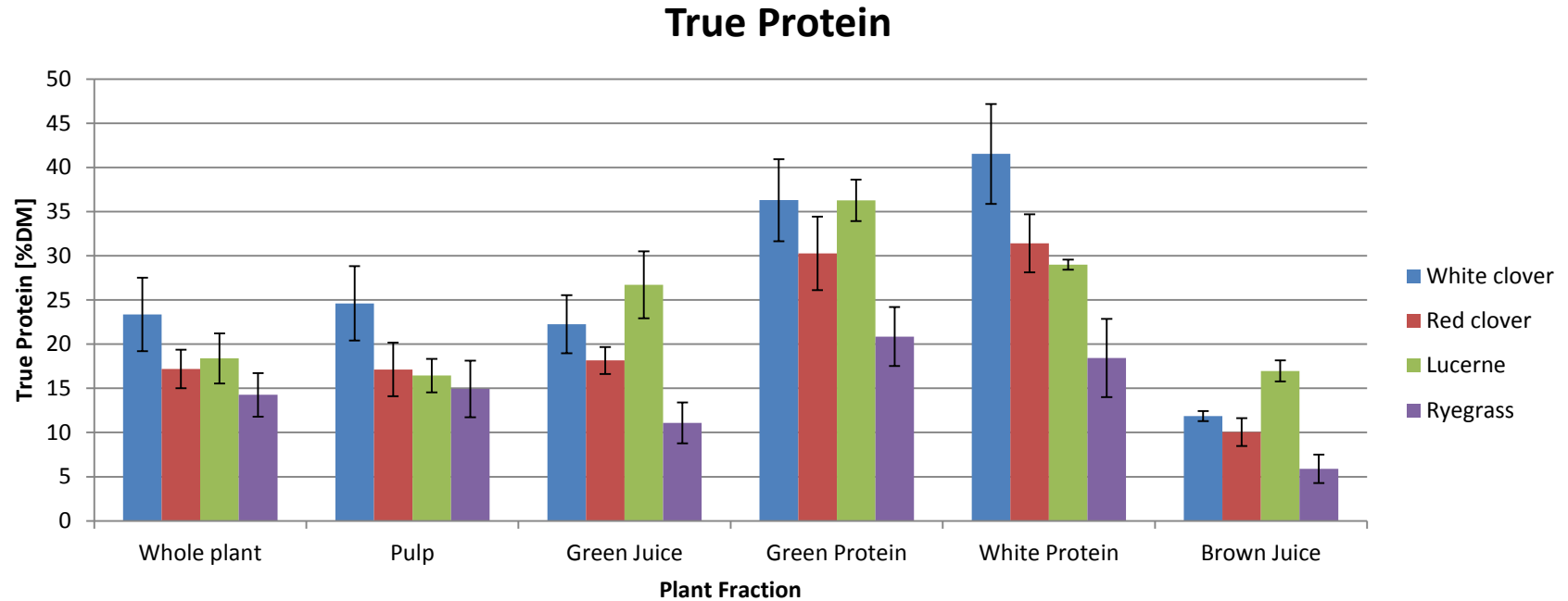
Recovered by
Acidic Precipitation

Green Juice	pH 4 protein	pH 4 Brown juice
100g	70g	30g
100g	75g	25g
100g	65g	35g
100g	64g	36g

Crude Protein Content

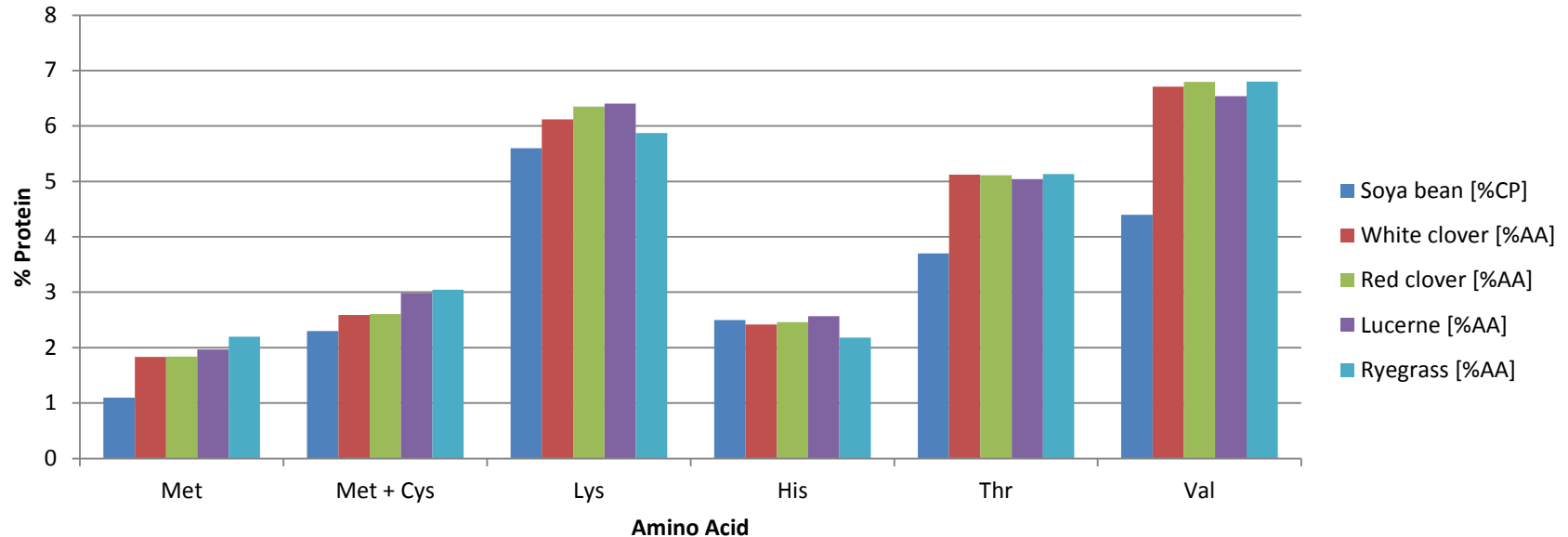


True Protein Content



Limiting Amino Acids – Green Protein

Limiting Amino Acids - Green Protein



Conclusion

- Locally grown plants contain high quality protein
 - Promising contents of extractable protein
 - Satisfying amino acid composition
- Protein from legumes and grasses have a potential to replace a part of the imported soya bean meal
- Generally the legumes gave higher yield than the grass
- Examination of process induced modifications is needed

Perspective

- Application of remaining fractions
 - My ongoing project is examination of the value of the pulp for ruminant nutrition
- Optimisation of the process for purer products
- Higher efficiency of protein extraction and recovery

Collaboration:

BIOVALUE^{SPIR}

BIOBASE

PLATFORMS FOR RESEARCH IN THE USE OF RENEWABLE RESOURCES

Thank you for your attention

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ANY QUESTIONS?