Alfalfa as protein feed for monogastric animals

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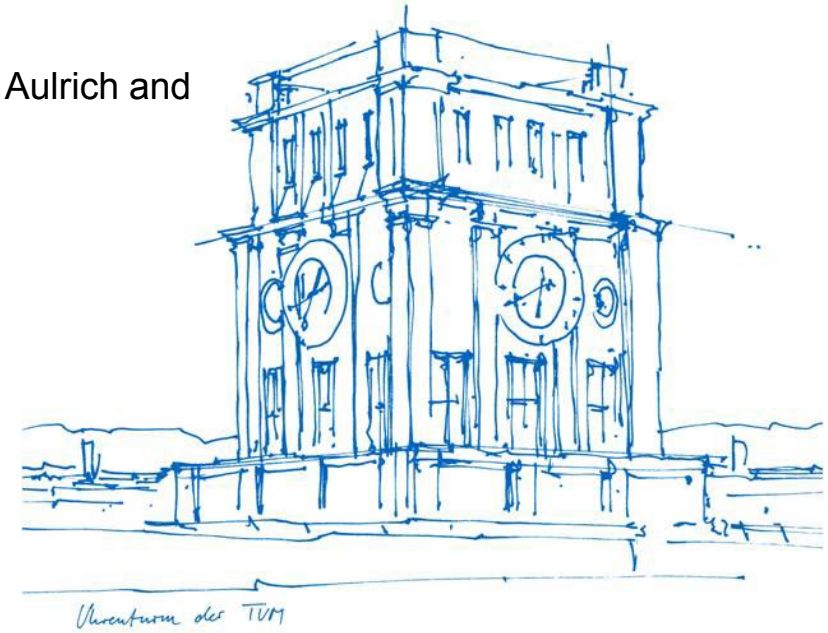

Introduction

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What are the options for alfalfa as a protein feed for monogastric animals?

Protein gap in Germany

Munich
48° 8' 6.45" N

San Diego
32° 42' 56.657" N

- Soybean is a short day crop
- larger cultivation only since about 10 years in the south of Germany
- yields still fluctuate between 2.2 t/ha and 3.2 t/ha

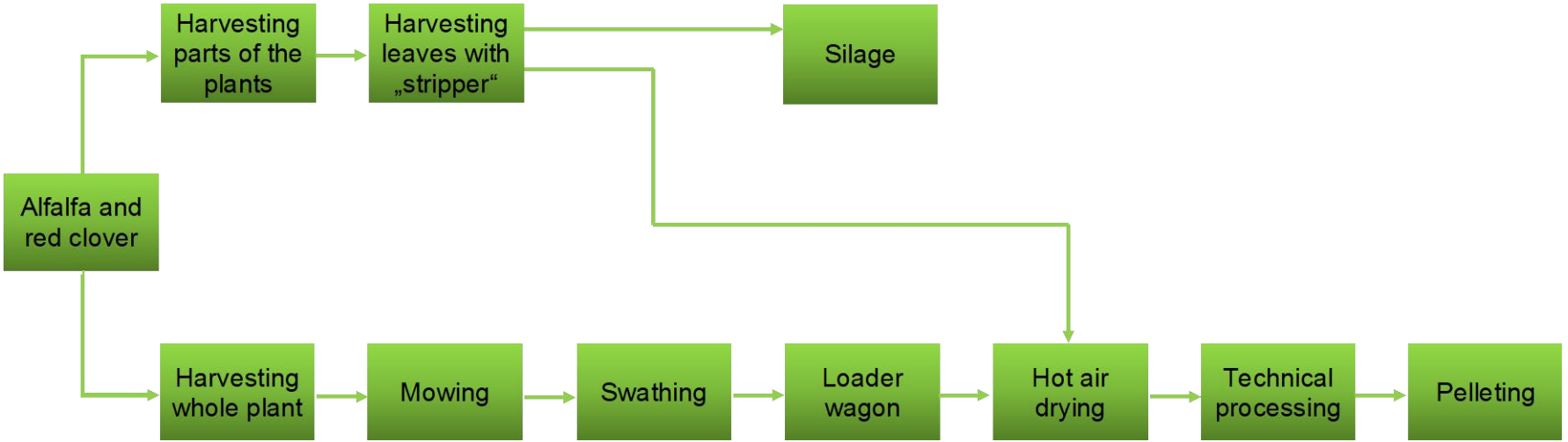
Introduction

Alfalfa leaves as protein feed for monogastric animals
Higher protein content (Sommer and Sundrum, 2015) compared to whole plants

Material	CP [%]
Alfalfa whole plant	~23
Alfalfa leaves	~28

Fractionation of leaf and stems: Crude protein content up to 30%

Material and methods



Material and methods

Harvesting leaves and stems (variant 1)
„Stripper“


Material and methods

Harvesting leaves and stems (variant 1)	Harvesting whole plants (variant 2)
„Stripper“	swathing after one day
	

Results

Dry matter (DM) yield of the variants 1 and 2 for alfalfa and red clover per cut

Variants	DM yield [kg ha^{-1}]
Alfalfa V. 1	2253.17 (±196.22) [a]
Alfalfa V. 2	3396.69 (±284.56) [b]
Variants	**DM yield [kg ha^{-1}]**
Red clover V. 1	2096.35 (±267.37) [a]
Red clover V. 2	3286.05 (±361.28) [b]

Results

Dry matter (DM) yield in kg ha−1 of the variant 1, in leaf (L) and stem (S) for alfalfa and red clover per cut.

Variant 1	**DM yield [kg ha^{-1}]**
Alfalfa L	1180.52 (±111.11) [a]
Alfalfa S	1072.64 (±114.63) [a]
Variant 1	**DM yield [kg ha^{-1}]**
Red clover L	991.49 (±103.34) [a]
Red clover S	1104.85 (±193.54) [a]

Results

Alfalfa leaf material

Results

Leaf portion in percent of the whole plant before cutting/stripping of red clover and alfalfa

Culture	Leaf Portion
Alfalfa	42.61% (±2.08%) [a]
Red clover	45.58% (±2.14%) [a]

Results

Pairwise comparison of leaf portion in percent of the different harvesting techniques' overall trials

Variants	Leaf portion
Alfalfa V. 1 leaf	73.34% (±2.51%) a
Alfalfa V. 2	41.31% (±1.69%) b
Alfalfa V. 1 stem	21.02% (±4.24%) a
Alfalfa V. 2	41.31% (±1.69%) b
Alfalfa V. 1 Ø	47.97% (±3.70%) a
Alfalfa V. 2	41.31% (±1.69%) b

Results

Comparison of crude protein (CP) content of the conventional harvesting technique and the weighted means of the crude protein content of the stripping technique

Variants	CP content [% of DM]
Alfalfa V. 1	21.09 (±1.70) [a]
Alfalfa V. 2	20.45 (±1.43) [a]
Variants	**CP content [% of DM]**
Red clover V. 1	21.72 (±1.53) [a]
Red clover V. 2	20.31 (±1.10) [a]

Results

Crude protein (CP) concentrations of the different variants of harvesting techniques for alfalfa

	CP [% DM]
Alfalfa V. 2	20.44 (±1.43) [a]
Alfalfa V. 1 L	26.53 (±1.57) [b]
Alfalfa V. 2	20.44 (±1.43) [a]
Alfalfa V. 1 S	15.09 (±2.10) [b]
Alfalfa V. 1 L	26.53 (±1.57) [a]
Alfalfa V. 1 S	15.09 (±2.10) [b]

Results

Crude protein (CP) concentrations of the different variants of harvesting techniques for red clover

	CP [% DM]
Red clover V. 2	20.31 (±1.10) [a]
Red clover V. 1 L	26.88 (±1.30) [b]
Red clover V. 2	20.31 (±1.10) [a]
Red clover V. 1 S	16.49 (±1.76) [b]
Red clover. 1 L	26.88 (±1.30) [a]
Red clover V. 1 S	16.49 (±1.76) [b]

Outlook

- Further investigation to improve harvesting technique
- Further investigation in post-harvesting processing and conservation

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