

Final report on the project

CO-ENSILING MAIZE AND FODDER BEET

With the focus on harvest, preservation, feeding and analysis results

Head Consultant Karsten Jensen, Heden & Fjorden Agricultural Advisory Centre, Cattle Dept.

Introduction

Over a period of 3 years (2005-2006-2007), samples of co-ensiled maize/beet were taken. 2005 is characterised by very poor quality (low digestibility) maize silage. In the other two years, the maize quality was good.

In each of the years, samples of 5 silages of maize/beet were taken at different premises to gain a picture of the year's harvest and an impression of how the ensiling process went. A number of different nutrients were also measured.

In 2007, the analyses were supplemented by analyses of 5 samples of maize/beet divided into beet fraction (beet pieces) and maize fraction. The content of alcohols and residual sugar was measured in both fractions.

Harvest and ensiling

- The best ensiling result is achieved with a ratio of 1 ha beet to 3-4 ha maize.
- Ensiling should preferably take place in October, when the maize has a dry matter content of 32-33%.
- A beet variety rich in dry matter (for example Magnum) with approximately 20% dry matter should be chosen.
- If the top of the beet is free of weeds, the top can be finely crushed and ensiled as well.
- The beets are crushed in pieces of 4-10 cm in diameter.
- It is important for the beets not to be crushed too finely.
- Ensiling of maize/beet takes place easily.
- Sugar in the beets is converted into alcohols and acids that are utilised by the cows.
- There is virtually never any juice drainage.
- No more heat generation was found in connection when using silage from the clamp than with standard maize silage.

Analysis results

Selected analysis results (2005-2007) (average of 5 samples per year)

	2005	2006	2007
% Dry matter	26.2	31.4	26.3
% Raw ash	4.9	5.6	7.0
Kg dry matter/SFU*	1.37	1.11	1.10
Number of anaerobic spores per gram of dry matter	3725	2161	<3000

* Scandinavian Feed Unit

The volatile substances (alcohols and acids) will evaporate with traditional drying of the sample in connection with the analysis.

To investigate this further, samples of maize and beet pieces were sent in 2008 to Research Centre Foulum, which analysed them for content of ethanol and other volatile substances.

Selected results of analyses of maize and beet fractions of co-ensiled maize/beet/top (average of 5 samples)

	Dry matter %	*Corrected % dry matter	Gram per kg dry substance		
			Ethanol	Glucose	Lactate
Maize	30.4	33.3	70	3.4	24.8
Beet pieces	13.8	17.6	210	12.1	53.4

* Corrected for volatile substances

As the table shows, ethanol is the main substance produced in the fermentation process. Ethanol has a high nutritional value and is utilised by the cows. Therefore, it is necessary to correct for the evaporated remainder when a traditional analysis is carried out.

Feeding

- The cows are very happy to eat the maize/beet silage, in particular the pickled beet pieces.
- Some anaerobic spores were found in the silage, which may come from earth and sand.
- It does not appear that spores are developed in the silage.
- No particular problems were found with spores in the milk when the cows were fed maize/beet.
- It is important that there is one or almost one feeding place per cow.

Example of feeding plan with maize/beet silage

Maize/beet silage	9.0
Grass silage	4.5
Green barley wholecrop silage	1.5
Rapeseed cakes	2.0
HP soya	3.0
Fat	<u>1.0</u>
Total	<u>21.0 SFU*</u>

*Scandinavian Feed Unit

Conclusion

The project has shown that, in practice, it is possible to co-ensile maize with beets and tops and get a valuable feedstuff that is utilised well by dairy cows.

We can thus achieve an even higher proportion of home-grown roughage in dairy cows' feed ration to the benefit of the cows' health, production results and finances.