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Quality of pressed sugar beet pulp in big bales.

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INTRODUCTION

Pressed sugar beet pulp is the fibrous residue that remains after the extraction of sugar from beets and after a reduction of the initial water content. Fresh pressed sugar beet pulp is prone to aerobic decay and it needs to be ensiled to preserve its qualities. Recently, pressed pulps have also been baled for silage. In Switzerland, a stationary baler is used and the bales are wrapped in a stretch film.

In this study we investigated the quality of pressed sugar beet pulp in big bales. As we expected the problems with aerobic stability to be larger during summer feeding, due to the higher outside temperatures, than during winter feeding, we carried out the investigation particularly during the summer.

MATERIALS AND METHODS

From March to August 2000 we investigated at four different dates (21st March, 30th May, 27th June and 24th July) the quality of eight bales, which were made in autumn 1999. As soon as the bales were opened we took samples and subsequently every day about 75 kg per bale or a layer of about 7 cm was fed to cows. 7 and 14 days after opening the bales again we took samples for chemical and microbial (yeasts and moulds) analyses as well as for testing the aerobic stability. To examine aerobic stability silage samples were exposed to air during 10 days and the temperature was measured every 30 minutes. Aerobic stability is defined as the time until temperature increases 1°C above ambient temperature.

RESULTS AND DISCUSSION

The average weight of the bales was 1'190 kg with a volume of 1,26 m^3. The density was 198 kg dry matter (DM) per m^3. The DM-content was 21 %; the average nutrient contents per kg DM were 48 g ash, 89 g crude protein, 212 g crude fibre and 10 g sugar.

The structure of the pressed sugar beet pulp silage of the bales was similar to that of the fresh pulp. They had a pale colour and an agreeable sour smell. No butyric acid was found in the silage; the quality of the silage was good. According to the DLG-scheme (Weissbach and Honig, 1997) the points varied between 73 and 94. With increasing storage time, the silage had higher DLG points (Table 1). This is due to the fact that also the acetic acid contents increased. Furthermore, the samples taken on the first day, when the bales were opened, had higher pH-values and lower lactic acid contents in comparison to the samples taken after 7 or 14 days. This can be explained with the different density within the bales and the intensity of the fermentation.

The silages showed relatively high yeasts contents. The values varied between 36'000 and 58 million. colony forming units per g of the fresh material. In Table 1 the average yeast contents of two bales, which were opened at the same date, are presented. In the bales, which were opened in March and July, the yeast content increased constantly during the feeding period. In the bales, which were fed in May and June, the highest yeast contents were observed after 7 days. With increasing storage time the yeast content slightly decreased. This can be explained with the decreasing viability of yeasts under anaerobic conditions.

No moulds were detected when the bales were opened nor 7 days later. In two samples only, which were taken after 14 days, some moulds were observed.

After taking out, the decompacted silages heated very rapidly and within 24 hours they reached the temperature maximum of 28 to 40°C. The aerobic stability did not depend on how long the bales stayed open. (Table 1). On the other hand, with a longer storage period of the unopened bales, the silage heated a little less rapidly, but these differences were only small. This observation can be explained with the development of the yeasts. The rise of the temperature led to an increase of the pH value. Already one day after opening the bales higher pH values were measured and after three days most pH values were higher than 6.0.

cfu: colony forming units

Table 1. DLG-points, yeast content and aerobic stability of the sugar beet pulp silage in big bales (average of samples of two bales)

		21st March	30th May	27th June	24th July
DLG-points	day 0	73	83	90	92
	day 7	78	83	86	90
	day 14	78	85	88	94
yeasts	day 0	9.7×10^6	8.5×10^6	1.8×10^6	1.9×10^6
cfu per g	day 7	2.9×10^7	2.0×10^7	2.1×10^7	2.4×10^6
	day 14	3.5×10^7	7.3×10^6	1.9×10^6	4.4×10^6
aerobic stability	day 0	13	14	17	19
hours	day 7	12	11	10	15
	day 14	10	10	22	15

Furthermore, temperature measurements in the highest, compact layer of the opened big bales never showed a heating up. The temperatures in the silages varied between 7.8 and 20.2°C and the ambient temperature varied between 9.8 and 26.8°C.

CONCLUSIONS

The study showed that the quality of pressed sugar beet pulp in big bales is good.

With a daily take out of a layer of approximately 7 cm and without decompacting the silage in the bale, no heating and practically no moulds could be detected in the bale.

As soon as the silage was decompacted, it heated very rapidly and the pH-value increased.

During the summer and with higher temperatures the silage was not more susceptible to aerobic stability.

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