

A. Steinwigger, E. Zeiler, T. Guggenberger, J. Häusler, A. Schauer and L. Gruber (2003): **Effect of particle size and dry matter content of grass silage at different concentrate levels on feed intake, digestibility and ruminal fermentation patterns**

1st Note: Feed intake, digestibility and ruminal fermentation patterns of ruminally fistulated cattle (in German).

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### Summary

In a 3 factorial experiment with 6 ruminally fistulated cattle the effects of particle size (H, K, L) and DM content of grass silage (T35, T50) at different concentrate levels (K25, K55) on feed intake, digestibility and ruminal fermentation patterns were examined. The experiment followed an incomplete Latin square design of 6 periods of 14 days each. The different particle lengths of grass silage were achieved by using different harvesting techniques (H=crop chopper, S=short cut silage trailer, L=long cut silage trailer). The increase of the DM content of the grass silages from 35 % (T35) to 50 % (T50) were achieved by a longer field wilting period. The forage ration consisted of 60 % grass silage and 40 % corn silage and was supplemented by 25 (K25) or 55 % (K55) concentrate.

The mean particle length of grass silage T35 was 38, 62 and 148 mm and that of T50 was 32, 61 and 141 mm in the groups H, K and L respectively. On an average the mean particle length of the total ration, regarding both grass silages (T35 and T50), was 20, 31 and 69 mm at low concentrate level (K25) and 13, 20 and 42 mm at high concentrate level (K55) in the groups H, K and L.

In group T35 the particle size (H, K, L) had a significant influence on the digestibility (73.1, 71.3, 66.2 resp.) and the energy content (10.3, 10.1, 9.3 MJ ME resp.) of the grass silages. In T50 no effects of the particle size on the digestibility of OM (71 %) and the energy content (10.1 MJ ME) were found. During fermentation and storage parts of the grass silages of the groups T50 got mouldy – these parts had to be excluded from the feeding experiment.

Feed and nutrient intake, the digestibility of the total ration and ruminal fermentation patterns were not influenced by the particle size of the grass silages. The grass silage intake in the group T50 was significantly lower than in T35. The digestibility of OM, XP and XF of the whole ration was significantly lower in group T50 than in T35. The digestibility of XL, XX, NDF and ADF also tended to be lower in group T50. Ruminal fermentation patterns (pH, VFA, NH<sub>3</sub>) were not influenced by the DM content of the grass silages.

The increase of the concentrate content from 25 to 55 % of the total ration (K25, K55 resp.) reduced the forage intake from 9.0 to 6.6 kg DM and increased the feed intake from 12.0 to 14.6 kg DM. The digestibility of XF (67 and 60 %), of NDF (63 and 59 %) and ADF (63 and 59 %) in group K25 was significantly higher than in group K55. In the daily mean the ruminal pH in group K25 (6.4) was higher than in group K55 (6.2). In the course of the day the highest differences between the concentrate groups K25 and K55 were found 4 – 7 hours after the beginning of feeding. High concentrate intake increased acetic acid (67 and 73 mmol/l), propionic acid (17 and 24 mmol/l) and butyric acid (12 and 15 mmol/l) concentrations in the rumen.

**Keywords:** particle size, feed intake, ruminal fermentation, digestibility, cattle

### Zitat (Deutsch):

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1. Mitteilung: Versuchsmethoden und Ergebnisse zur Futterqualität sowie der Untersuchungen an pansenfistulierten Rindern. Züchtungskunde, 75, (3), 176-189.