

122. Impact of stage of maturity and method of conservation of a ryegrass-clover sward on *in sacco* degradability and factors describing physical structure (Einwirkung von Vegetationsstadium und Konservierungsmethode einer Weidelgras-Klee-Mischung auf die *in sacco*-Abbaubarkeit und Struktur beschreibende Faktoren). Frigga Dohme*, C. M. Graf, Y. Arrigo, and M. Kreuzer – Posieux/Zürich

In order to cover the requirements of high-producing dairy cows and to maintain their rumen function, it is important to find a balance in nutrient concentration and amount of effective fibre in the diet. The objective of the present study was to investigate how maturity and form of conservation of the forage influence physical effective neutral detergent fibre (peNDF; 1), structure value (SV; 2), particle size distribution and *in sacco* degradability. This should show whether conservation of the same material affects the structural properties of fibre and whether a higher effectiveness of the fibre is generally associated with a lower ruminal fibre degradability of the material as such.

Methods: Two maturity stages of the first cut of a mixed sward (start of stem elongation (young, Y) and flowering stage (mature, M)) were harvested from a two years old ryegrass-clover ley in May and June 2002. The cut forages were either wilted to 300 (silage; SI) or 500 (haylage; HL) g dry matter (DM)/kg and ensiled in polyester containers or were sun-dried (hay; HA). A particle separator (Gorr; screens with hole diameters of 19 and 8 mm) was used to determine particle size distribution in the six forages (n=4). The *in sacco* degradability of DM and NDF was determined in four rumen-cannulated cows by incubating the forage samples in polyester bags for 3, 6, 12, 24, 48 and 96 h (n=4). The effective degradability of DM and NDF was calculated with an assumed passage rate of 6 %/h. Data were evaluated by analysis of variance based on the two-factorial experimental design.

Results: The NDF content was higher in the Y than in the M stage (ø 400 vs. 568 g/kg DM). The conservation effect was low. SI had the highest proportion of particles >19 mm (96.3%) followed by HL (91.2%) and HA (89.9%; $P<0.001$) whereas the reversed order was observed in the size class 8-19 mm ($P<0.001$). In SI the proportion of particles <8mm was significantly lower than in HL and HA ($P<0.001$). Merten's (1) peNDF, as calculated from % particles >8 mm and NDF content, was lower in the Y than in the M stage (ø 383 vs. 543 g/kg DM). Hay (ø 491 g/kg DM) had the highest and HL the lowest (ø 432 g/kg DM) peNDF content while SI (ø 468 g/kg DM) took an intermediate position. The same order was observed for SV as calculated by the mean of NDF and crude fibre content using the equations of De Brabander et al. (2). The soluble (A) and degradable (B) fractions characterising the kinetics of the degradation of DM and NDF were affected by conservation and were lower in the M than in the Y stage ($P<0.001$). Fraction A was highest for HL and lowest for HA ($P<0.001$) whereas the opposite holds true for fraction B ($P<0.001$). The effective DM degradability was highest in HL (60.6%) followed by SI (58.4%) and HA (56.7; $P<0.05$). The stage of maturity affected both degradability of DM (Y: 67.6 % M: 49.5%; $P<0.001$) and NDF (Y: 65.4%; M: 47.7%; $P<0.001$).

Conclusions: The clear differences among methods of conservation of the same material were unexpected although the effect of the sward maturity was still larger. The estimated effectiveness of fibre increased in the order of haylage, silage and hay while the effective degradability of DM and NDF decreased. This shows that not only changes in fibre effectiveness due to maturity but also those due to conservation technique are associated with contrasting changes in fibre degradability. This has to be considered when estimating the positive effects of adding effective fibre to complete acidosis-prone diets.

1) MERTENS, D. R. (1997): J. Dairy Sci. 80:1463-1481

2) DE BRABANDER, D. L., DE BOEVER, J. L., VANACKER, J. M., BOUCQUE, C. V. and BOTTERMAN, S. M. (1999): Recent Advances in Animal Nutrition. pp. 111-145

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