Ensilability and silage quality of different *Festulolium* hybrids in comparison to *Festuca arundinacea*

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Introduction *Festulolium* hybrids as cool-season grasses may be used as dominant species for winter pastures in year-round outdoor livestock systems. The utilisation of these species during summer is limited due to low intake as a fresh pasture grass by grazing ruminants. Therefore, ensiling the primary growths of these hybrids may be an alternative approach to using these species during the growing season. However, information on the quality of *Festulolium* silages under central European conditions is not available. The objective of this research was to determine ensilability and silage quality of four *Festulolium* cultivars (of *festucoid* or *loloid* type*)* compared to one *Festuca arundinacea* cultivar.

Materials and methods The experiment was established on the Research Station near Giessen (160 m above sea level), central Germany. The primary growths of the cultivars Felina *(festucoid*), Lofa (*loloid*) and Hycor (*festucoid)* of the species *Festulolium pabulare*, Perun (*loloid*), of *Festulolium braunii*, and Kora, *Festuca arundinacea* (as "standard"), were harvested in the beginning of June, pre-wilted (= 32 % dry matter, DM) and ensiled with a storage period of 90 d in a laboratory ensiling experiment. To characterise the ensilability, the concentration of water-soluble carbohydrate (WSC) (Yemm & Willis, 1954) and the buffering capacity (BC) (Weissbach, 1967) were determined and the WSC/BC-ratio was calculated. Silage quality was assessed by pH (potentiometric determination), lactic acid concentration (colorimetric determination) and concentrations of volatile fatty acids and ethanol (gas chromatorgraphy).

Results In both years the cultivars Lofa and Perun had the highest WSC concentrations due to their loloid attributes (Table 1). As the concentrations of the festucoid cultivars, including *Festuca arundinacea,* are at a lower level, the factor cultivar is important. This influence is also reflected in the WSC/BC-ratio. The ratios of Lofa and Perun are always above the required value of 2 (for DM of 30 %). Related to their higher buffering capacity and their lower WSC concentrations, the WSC/BC-ratios of Kora, Felina and Hycor were below that required ratio in 2000. This result suggests comparatively better ensilability of the loloid cultivars Lofa and Perun, but there was little evidence of this in the quality aspects determined in the silages. None of the silages exceeded the critical pH of 4.5. Furthermore, concentrations of lactic and acetic acid were adequate and concentrations of other volatile acids, including butyric acid, were negligible.

Table 1 Effect of cultivar on forage and silage (DM 32 %) composition

Cultivar	Kora	Felina	Lofa	Hycor	Perun	$LSD_{5\%}$
Year 2000						
WSC (g /kg DM)	55.9	48.7	131.4	55.5	100.1	12.1
WSC/BC-ratio	1.4	1.2	3.1	1.4	2.3	0.31
pH	4.3	4.3	4.2	4.2	4.1	0.69
Lactic acid (g/kg DM)	41.7	43.7	49.9	41.3	52.2	17.3
Acetic acid (g/kg DM)	9.0	9.9	10.3	8.1	9.7	3.34
Year 2003						
WSC (g/kg DM)	104	112	156	105	160	16.5
WSC/BC-ratio	2.7	3.7	5.0	3.5	4.3	0.67
pH	4.0	4.0	4.0	4.0	4.1	0.69
Lactic acid (g/kg DM)	37.4	53.0	46.7	37.7	34.3	8.04
Acetic acid (g/kg DM)	10.4	11.6	12.4	10.8	13.6	1.41

Conclusions The loloid *Festulolium* hybrids show a higher concentration of water-soluble carbohydrates and an adequate WSC/BC-ratio compared to the other varieties. This suggests that their ensilability might be better. However, the determined aspects of silage in all the *Festulolium* hybrids were comparable to those for *Festuca arundinacea*.

References

Weissbach, F. (1967). Die Bestimmung der Pufferkapazität der Futterpflanzen und ihre Bedeutung für die Beurteilung der Vergärbarkeit. *Tagungsber. Deut. Akad. Landwirtschaftswiss*, Berlin, 92, 211-220.

Yemm, E.M. & A.J. Willis (1954). The estimation of carbohydrates in plant extracts by anthrone. *Biochemistry Journal*, 57, 85-97.