Correlation between epiphytic microflora and microbial pollution and fermentation quality of silage made from grasses

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Introduction Grass forage in Latvia is the main and inexpensive cow feed, however its composition and nutritive value differ during the growth period of grasses. The traits of grasses, their natural ensilage capacity, count of epiphytic microflora, the timing of harvest and ensilage making technology affecting the quality of grass silage are important issues to be studied. Silage making for the winter period is the treatment of green material to minimise the breakdown of nutrients being the results of biochemical and microbiological processes. The aim of the research was to clarify the methodologies to reduce the count of epiphytic microflora and CFU count of microorganisms in grass silage and improve fermentation quality (Woolford, 1998; Wilkinson, 1999).

Materials and methods We investigated the fresh material and silage (2001-2003) from: Perennial ryegrass (*Lolium perenne L.),* Meadow fescue *(Festuca pratensis L.),* Timothy (*Phleum pratense)* and others at three stages of maturity (branching – stage 1, shooting – stage 2, blooming – stage 3). We analysed samples biochemically and microbiologically. Fermentation coefficient (FC) – calculated according to Weissbach:
FC = DM% + 8 WCS/BC. We used correlation analysis and three-factorial dispersion analysis in statistical data processing with SPSS computer program, GLM model.

Results and discussion Results of green material analysis showed different chemical composition, buffer capacity (BC), FC in grass during its development, which characterised green mass ensilage capacity. Total microorganisms colony forming units (CFU) count greatly varied in different grasses green material during growth. Count of microorganisms had a tendency to increase during growth in all green material of the studied grasses (except lactic acid bacteria). Count of silage microflora tended to decrease during growth in all silages of the studied grasses (except moulds) (Table 1). The count of epiphytic microflora influenced the fermentation quality in grass silage ($P<0.01$). The count of butyric bacteria was greater at blooming stage of maturity in fresh material of grasses, but it was higher at the branching stage in the ensiled mass. Grasses with a dry matter content of 250-300 g/kg resulted in good fermentation (i.e. stable pH 4-4.2) thus preventing the development of non desirable microorganisms. A negative correlation (r = 0.66) existed between butyric bacteria CFU count in fresh material and grass silages fermentation quality. The highest FC in fresh material (characterising ensilaging ability of mass) resulted in the lowest count of undesirable microorganisms in silage. In our investigations correlations were not observed between CFU count of yeast fungi in different grasses fresh material and in silages made from them.

Table 1 Changes of microflora in timothy fresh grass and silage (Lg from count of CFU in 1 ml susp.) (n=6)

Stage of maturity	Fresh grass			Silage		
	Lactic acid bacteria	Butyric acid bacteria	Moulds	Lactic acid bacteria	Butyric acid bacteria	Moulds
Branching	6.000	4.699	7.650	6.492	6.492	6.489
Shooting	5.802	5.627	8.401	5.514	5.925	6.798
Blooming	3.451	6.238	8.397	4.277	5.542	7.924

Conclusion The count and composition of microflora changed significantly ($P<0.01$) during growth in grasses fresh material and in silages made from it. The count of butyric bacteria correlated negatively with the count in fresh grass material and in silages (r = – 0.66). The CFU count of moulds in fresh grass material correlated positively with its count in silages during growth. The negative correlation existed between FC and count of lactic acid bacteria in fresh grass material, but positively correlated between FC and silage quality.

References

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