The effect of additive containing formic acid on quality and aerobic stability of silages made of endophyte-infected green forage

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Introduction *Festuca* species grasses are very often infected with endophytic fungi *Neothypodium,* that produce ergotic alkaloids, peramins etc. (Podkówka *et al*., 2003). Produced green forage can be dangerous to animals. The basic preservation method of such green forages is ensiling, especially with organic acids addition. Organic acids demonstrate destructive action on fungal organisms, as well as influence the quality and aerobic stability of forage. The objective of this study was to determine if the preservation of endophyte-infected green forage by ensiling with formic acid affects quality and aerobic stability of produced fodder.

Material and methods Meadow fescue var. Pasja, *Neotyphodium unicinatum* infected green forage was ensiled in mini silos in two variants: no additive (control E+) and with Kemisile 2000 commercial additive (55% formic acid, 24% 4-ammonium formate, 5% propionic acid, water) (experimental group E+ Kemisile). After 4 months of experiment mini-silos were open and chemical composition and quality were evaluated. Aerobic stability was tested for one week in an air-conditioned room with constant temperature 20^0C ± 0.5 according to the method described by Honig (1990). Hourly temperature measurements were recorded using a Squirrel 2000.

Results Nutritive value, some chemical composition and quality of silages are shown in Table 1. Organic matter was significantly higher for control silage. Crude protein level was higher for experimental silage, differences were significant. Nutritive value estimated according to INRA was similar in both groups – 0.8 UFL, 0.72 UFV, 56.9 g PDIN, 58.2 g PDIE. Both variants of silage did not differ significantly based on the scores of the Flieg-Zimmer silage evaluation method – experimental silage 99.5 points, control silage 86.5 points. Butyric acid was found in control silage and pH was similar for both groups. Figure 1 demonstrates average aerobic stability. Control silage was stable for 123 h (±13 h) while experimental one was stable for 152 h (±13 h), difference was significant ($P \leq 0.05$).

Table 1 Chemical composition (g/kg DM), nutritive value (in DM) and quality of silages

		DM	OM	CP	UFL	UFV	PDIN	PDIE	pH	points	quality
	Mean	278.4	943.5*	24.0*	0.81	0.72	56.4	59.2	4.19	86.5	Very good
E+	SD	8.1	1.3	0.4	0.005	0.0	6.6	2.1	0.07		
E+	Mean	286.8	939.7*	27.4	0.80	0.72	57.4	57.3	4.06	99.5	Very good
Kemisile	SD	2.3	2.3	1.6	0.008	0.00	3.5	0.6	0.02		
	Mean	282.6	941.6	25.7	0.80	0.72	56.9	58.2	4.18	93.0	Very good
	SD	7.3	2.7	2.1	0.007	0.005	5.3	1.8	0.06		

* differences significant $P \leq 0.05$

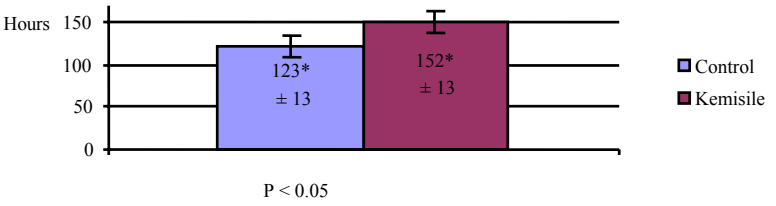

Figure 1 Aerobic stability of silage

Conclusion Quality and nutritive value of silages made with additive was similar to silage with no additives. Chemical additive containing formic acid (Kemisile 2000) improved the aerobic stability of experimental silage comparing to the control one ($P \leq 0.05$).

References

Honig H. (1990). Evaluation of aerobic stability, w: S. Lindger and K. Lunden Patterson (ed.) Proceedings of the EUROBAC Conference Grovfoder, Grass and Forage Reports, Uppsala, Sweden 1986, Special issue 3, 76-82.

Podkówka, L., E. Staszak & J. Mikołajczak (2003). Effect of different silage additives on quality and aerobic stability of silages made of Neotyphodium endophyte-infected meadow fescue green forage. Prace Komisji Nauk Rolniczych i Biologicznych, BTN, Seria B, 51, 211-21.