

## THE PRELIMINARY RESULTS OF THE QUALITY OF GRASS SILAGE PREPARED WITH PLANTANAZE

### UVODNI REZULTATI KVALITETE SILAŽE TRAVE PRIPREMLJENE S PLANTANAZOM

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#### SUMMARY

On Kmetijsko gospodarstvo Kočevje two additives were used in preparing grass silage: Ensimax, a product on the base of formic acid and Plantanaze which contains *L. plantarum* and *P. pentosaceus* and cellulolytic enzymes. Silage was prepared from fresh and wilted raw material in the second half of May and in the first half of June in bunker silos of different length. Samples for analyses were taken first at 40 days and the last at 150 days after ensiling. From each treatment 12 samples were taken. Between additives there are statistically significant differences in pH, contents of ammoniacal nitrogen, acetic acid, butyric acid,  $\beta$ -karotene and in estimation by Flieg, all to credit of Plantanaze. In silage from fresh and wilted grass there are statistically significant differences in the contents of dry matter, acetic acid, butyric acid,  $\beta$ -carotene and in pH value.

#### Introduction

On Kmetijsko gospodarstvo Kočevje, a lot of grass silage is prepared every year. Therefore, they are very concerned about the quality of silage and use silage additives several times.

Originally the purpose of the application of silage additives was to insure the predomination of lactic acid bacteria in the fermentation process. For this purpose molasses is completely satisfactory. Therefore it is not surprising that they are used in practice in large amounts.

In 1929, Virtanen introduced a completely different approach. He recommended a fast acidification of plant material by addition of mineral acids up to approximately 3.5 pH value. The thought that in such a manner the activity of enzymes of plant and microbic origin would be stopped (McDonald et al., 1991). This kind of treatment was used until recently in Scandinavian countries. In development of silage additives there are several aims followed now. It is still important that the supplement

controls the fermentation. The improvement of nutritive value and decrease of nutrient loss are important as well.

#### Material and method of work

Silage was prepared from the first meadow cut in the latter half of May and first half of June in 1992, it means before the drought started. When the weather conditions allowed the raw material was wilted. If the wilting was not possible, the grass was ensiled fresh. Before ensiling the grass was always cut up. The composition of the fresh and wilted material from grassland is shown in Table 1.

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**Table 1. The composition of forage from grassland, g kg<sup>-1</sup> DM**

**Tablica 1. Sastav krme s pašnjaka, g kg<sup>-1</sup> ST**

	DD ST g kg <sup>-1</sup>	XA	XP	XF	XL	XX
Fresh Svježe (n=3)	167,0	90,5	202,2	239,7	46,7	420,9
Wilted Uvelo (n=3)	378,0	77,9	150,3	273,9	38,5	459,4

Silage was prepared in the bunker silos of different length. It is possible to put 250 t of green forage in the smallest one, 900 t in the largest one. The silage was prepared in the same conditions as in usual practice.

Two additives were in usual ensiling. Ensimax (E), a product on formic acid and Plantanaze (P), which contains lactic acid bacteria *L. plantarum* and *P. Pentosaceus* and cellulolytic enzymes. Both products were added according to the producers' directions.

For the analyses 24 samples were taken. Twelve samples were taken from the silage prepared with Ensimax and twelve from the silage prepared with Plantanaze. There were always three silage samples from fresh material and three from wilted material. Samples were taken successively, for the first time 40 and for the last one 150 days after ensiling. Chemical analyses connected to the evaluation of silage quality were performed: pH value, ammoniacal nitrogen, total nitrogen, lactic acid, acetic acid, butyric acid, vitamin E,  $\beta$ -carotene and dry matter. The results of chemical analyses were calculated by the analysis of variance.

### Results and discussion

Ammoniacal nitrogen, mean contents, g kg <sup>-1</sup> TN	
Amonijakalni dušik, prosječne vrijednosti, g kg <sup>-1</sup> SN	
Total-ukupno, n=24	50,6
Fresh-svježe, n=12	53,3
Wilted-uvelo, n=12	47,9
Ensimax, (E), n=12	83,6
Plantanaze, (P), n=12	17,6
Fresh-svježe, (E), n=6	98,0
Fresh-svježe, (P), n=6	26,7
Wilted-uvelo, (E), n=6	69,2
Wilted-uvelo, (P), n=6	8,5

The differences between silage prepared with Ensimax or Plantanaze are statistically very highly significant. There are differences between the content of ammonia nitrogen in fresh and wilted grass silage but they are not statistically significant.

Lactic acid, mean contents, g. kg<sup>-1</sup> DM

Mlječna kiselina, prosječne vrijednosti, g kg<sup>-1</sup> ST

Total-ukupno, n=24	23.6
Fresh-svježe, n=12	25.1
Wilted-uvelo, n=12	22.2
Ensimax, (E), n=12	21.4
Plantanaze, (P), n=12	25.9
Fresh-svježe, (E), n=6	26.7
Fresh-svježe, (P), n=6	28,3
Wilted-uvelo, (E), n=6	16.2
Wilted-uvelo, (P), n=6	23.5

There is no statistically significant difference although there are evident differences between fresh and wilted grass/silage, or Ensimax and Plantanaze.

Acetic acid, mean contents, g kg<sup>-1</sup> DM

Octena kiselina, prosječne vrijednosti, g kg<sup>-1</sup> ST

Total-ukupno, n=24	4.6
Fresh-svježe, n=12	5.8
Wilted-uvelo, n=12	3.3
Ensimax, (E), n=12	5.5
Plantanaze, (P), n=12	3.6
Fresh-svježe, (E), n=6	7.2
Fresh-svježe, (P), n=6	4.5
Wilted-uvelo, (E), n=6	3.8
Wilted-uvelo, (P), n=6	2.8

The differences between fresh and wilted and between Ensimax and Plantanaze are statistically very highly significant.

Butyric acid, mean contents, g. kg<sup>-1</sup> DM

Maslačna kiselina, prosječne vrijednosti, g kg<sup>-1</sup> ST

Total-ukupno, n=24	0.3
Fresh-svježe, n=12	0.3
Wilted-uvelo, n=12	0.2
Ensimax, (E), n=12	0.4

Plantanaze, (P), n=12	0.2
Fresh-svježe, (E), n=6	0.5
Fresh-svježe, (P), n=6	0.2
Wilted-uvelo, (E), n=6	0.3
Wilted-uvelo, (P), n=6	0.2

The difference between fresh and wilted grass/silage is statistically significant. The difference between Ensimax and Plantanaze is statistically very highly significant.

Estimation by Flieg, mean values, points

Ocjena po Fliegu, prosječne vrijednosti, točke	
Total-ukupno, n=24	88.71
Fresh-svježe, n=12	85.42
Wilted-uvelo, n=12	92.00
Ensimax, (E), n=12	79.83
Plantanaze, (P), n=12	97.58
Fresh-svježe, (E), n=6	72.00
Fresh-svježe, (P), n=6	98.83
Wilted-uvelo, (E), n=6	87.67
Wilted-uvelo, (P), n=6	96.33

The difference between Ensimax and Plantanaze is statistically significant.

$\beta$  -carotene, meanvalues, mg kg<sup>-1</sup> DM

$\beta$ -karotin, prosječne vrijednosti, mg kg <sup>-1</sup> ST	
Total-ukupno, n=24	143.33
Fresh-svježe, n=12	174.42
Wilted-uvelo, n=12	112.25
Ensimax, (E), n=12	79.42
Plantanaze, (P), n=12	207.25
Fresh-svježe, (E), n=6	78.33
Fresh-svježe, (P), n=6	270.50
Wilted-uvelo, (E), n=6	56.74

Wilted-uvelo, (P), n=6	59.84
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The difference between fresh and wilted silage/grass is statistically significant. The difference between Ensimax and Plantanaze is statistically very highly significant.

Vitamin E, mean values, mg kg<sup>-1</sup> DM

Vitamin E prosječne vrijednosti, mg kg<sup>-1</sup> ST

Total-ukupno, n=24	52.47
Fresh-svježe, n=12	46.65
Wilted-uvelo, n=12	58.29
Ensimax, (E), n=12	79.83
Plantanaze, (P), n=12	97.58
Fresh-svježe, (E), n=6	72.00
Fresh-svježe, (P), n=6	98.83
Wilted-uvelo, (E), n=6	87.67
Wilted-uvelo, (P), n=6	96.33

The difference between fresh and wilted grass/silage or Ensimax and Plantanaze is evident, but not statistically significant.

### Conclusion

Between silage prepared with both additives there were statistically significant differences in the pH value, the contents of ammoniacal nitrogen, acetic acid, butyric acid,  $\beta$  - carotene, and naturally, in estimation by Flieg, all in favour of Plantanaze.

Between silage prepared from fresh and wilted grass statistically significant differences were found in the contents of dry matter, acetic acid, butyric acid,  $\beta$  - carotene and pH value, which is a conformation of the already known facts.

### REFERENCES

1. McDonald, P., A.R. Henderson, S.J.E. Heron, (1991): The Biochemistry Silage. Chalcombe Pub., Marlow, 340 .

## SAŽETAK

Na Kmetijskom gospodarstvu Kočevje u pripremanju silaže trave upotrijebljena su dva dodatka: Ensimax, proizvod na bazi mravlje kiseline i Plantanaze što sadrži *L. plantanum* i *P. pentosaceus* i celuloitične enzime. Silaža je pripravljena od svježe i uvenule sirovine u drugoj polovici svibnja i prvoj polovici lipnja u bunker silosu različite dužine. Uzorci za analizu uzeti su 40 dana nakon spremanja u silos i zadnji 150 dana nakon spremanja. Iz svakog postupka uzeto je 12 uzoraka. Između dodataka postoje statistički značajne razlike u pH, sadržaju amonijevog dušika, octene kiseline, maslačne kiseline,  $\beta$ -karotina i ocjeni po Fliegu, sve zahvaljujući Plantanazi. U silaži svježe i uvele trave postoje statistički značajne razlike u sadržaju suhe tvari, octene kiseline, maslačne kiseline,  $\beta$ -karotina i vrijednosti pH.

## IZVLEČEK

### PREDHODNI REZULTATI O KAKOVOSTI TRAVNE SILAŽE PRIPRAVLJENE S PLANTANAZE

Na Kmetijskom gospodarstvu Kočevje so pri siliranju trave uporabljali dva dodatka: ensimax, priprevek na osnovi mravljične kiseline in plantanaze, ki vsebuje *L. plantarum* in *P. pentosaceus* in celuloitične encime. Silaža je bila pripravljena iz sveže in ovele surovine konec maja in v začetku junija v koritastih silosih različnih velikosti. Vzorci za analizo so bili odvzeti prvič 40 dni, zadnjič 150 dni po siliranju. Od vsakega postopka je bilo odvzetih po 12 vzorcev. Med dodatkom obstajajo statistično značilne razlike v pH, vsebnosti amoniakalnega dušika, očetne kisline, maslene kisline,  $\beta$ -karotena in v oceni po Fliegu, vse v dobro plantanaze. V silažah iz sveže in ovele trave so statistične značilne razlike v vsebnosti suhe snovi, očetne kisline, maslene kisline,  $\beta$ -karotena in v pH vrednosti.