

CHEMICAL COMPOSITION AND SUITABILITY FOR ENSILING OF SOME INTERGENERIC HYBRIDS OF GRASSES IN 1.ST AND 2.ND CUT

Negovanović, D¹., Djordjević Milošević Suzana¹, Trenkowska Snežana¹, Ružić Dragana¹, Dinić, B²., Stošić M²., Ostojic S²., Tomic Zorica², Ignjatovic Snežana²

1. Institute for Animal Husbandry, Belgrade-Zemun and Institute for Agricultural
2. Research, "Serbia", Center for Forage Crops, Kruševac, Yugoslavia

Proceedings of the "6th International Conference on Sheep and Goat
Production and 4th Symposium on the Reproduction of Domestic Animals"
September 9-11, 1998 Ohrid, Macedonia

Experiment was conducted in order to evaluate chemical composition and suitability for ensiling of four intergeneric hybrids and *Festuca arundinacea* K20, in 1.st and 2.nd cut. Hybrid grasses Felina (FE), Hykor (HY), Perun (PE) and Becva (BE) are bred in Plant Breeding station in Hladke Zivotice (Czech republic), and *Festuca arundinacea*, K - 20, is bred in Center for Forage Crops, Kruševac.

Examination is carried out on two locations, on experimental fields of Institutes in Belgrade and Kruševac (50 and 200 m of altitude). Grasses are seeded in spring, fertilizing was with 300 kg/ha NPK 15:15:15 and the mowing was in full earing phase.

Chemical analyses of 40 samples are made in laboratories of both Institutes using Weende, Dubois (WSC), and Weisbach (buffer capacity) methods. Feeding value (NEL and PDI) is calculated upon coefficient of digestibility of Fojtik (1997) and equation from INRA (1982). Suitability for ensiling was calculated on the bases of data of chemical analyses and methods of Weisbach (1993) - coefficient of fermentability (FC) and minimal DM for butyric free silage (DMmin). Values of pH are calculated upon equation of Fajmanova et al (1997).

Results of examination (Tables 1. and 2.) showed that chemical composition of grasses was better in first than in the second cut (higher values of CP, NFE, NEL and lower CF).

Also, suitability of green mass for ensiling was better in first cut, what is shown in almost all parameters. Average content of WSC was 82 g and in 1.st and 2.nd cut 92 and 71 g. in kg of DM.

Content of WSC, protein and the suitability for ensiling were better in 1.st cut. Differences in examined parameters between hybrids were smaller and insignificant. Highest WSC and BC values, protein content, and also, best suitability for ensiling, had Becva. Festucoid Hykor had good characteristics for silage production. *Festuca arundinacea*, K - 20, had values of suitability for ensiling slightly below the average but content of NEL, MJ was higher and crude fiber was lower than average

Key words: hybrid grasses, *festulolium*, chemical composition, suitability for ensiling, coefficient of fermentability

INTRODUCTION

Within the forage production and ruminant nutrition the interest of scientist is focused very much on forage with higher feeding value, which mostly depend on chemical composition and suitability for ensiling, which is influenced very much by hybrid, phase of harvesting and cutting number.

Intergeneric hybrids *Festulolium* are perspective varieties for using on arable land, at meadows and in pastures and can be used as green mass, hay or as silage and haylage (Fojtik et al., 1993). Felina (F), Hykor (H), Perun (P) and Becva (B), were first generic hybrids, bred in years 1988-91, in Plant Breeding station in Hladke Zivotice (Czech republic). These varieties are produced by method of intergeneric hybridization between genus *Lolium* (*L. multiflorum*, *L. hybridum*) and *Festuca* (*F. pratensis*, *F. arundinacea*). Hybrids with loloid character are Becva and Perun (which is loloid and intermediate typ). Hybrids with festucoid typ are Felina and Hykor.

Hybrid grasses are high yielding, with increased content of net energy (NEL), protein (CP) and water soluble sugar (WSC) while % of crude fiber (CF) is reduced. All these hybrids, except Felina, are very suitable for silage and haylage making, (Fojtik 1989, 1994, Fojtik et al., 1990, Jambor et al., 1995 a,b, Turek et al. 1993).

Turek et al.(1993), had found that loloid hybrids, Becva and Perun, had higher content of WSC and lower content of CF and CP than festucoids Felina and Hykor.

In examination of suitability for silage of these 4 grasses, Zilakova et al. (1995), established better quality of green mass for ensiling in the first then in the second cut,

because the content of WSC was higher in first and crude protein content was insignificantly higher in second cut.

Experiment was conducted in order to evaluate the influence of variety of grasses and 1.st and 2.nd cut, on chemical composition, nutritive value and suitability for ensiling of these four hybrid grasses compared with *Festuca arundinacea*, K - 20, bred in Center for Forage Crops, Kruševac.

MATERIAL AND METHODS

Examination was carried out in factorial plan 2x5 (cuts x varieties), during years 1994 - 95 in two locations on experimental fields of Institutes in Belgrade and Kruševac (on altitude of 50 and 200 m). Grasses are seeded in spring on fields 5x4 m, in 4 repetitions. Fertilizing was with 300 kg/ha NPK 15:15:15. The mowing was in full earing phase. Chemical analyses of 40 samples are made in laboratories of both Institutes using Weende, Dubois (WSC), and Weisbach (buffer cappacity) methods. Suitability for ensiling was calculated using data of analyses: coefficient of fermentability (FC) and minimal DM for butyric free silage (DMmin) are calculated upon Weisbach et al 1974.

Results are calculated by statistical methods - analyse of variance and lsd-test.

RESULTS AND DISCUSSION

Results of examinations are showed in Tables 1, 2, 3, 4 and Grafts 1 and 2.

Chemical composition

Average values of chemical composition of green mass, high content of crude protein as well as net energy (NEL), and medium content of crude fiber in grasses (Table1.),

demonstrate high quality of examined grasses. It was particularly evident in 1.st cut of grasses Becva, Perun and K20 (Table 3.).

The comparison of examined cut order on chemical composition show differences in all nutrients but they are not statistically significant (Isd test). First cut had higher content of CP, NFE and NEL, MJ and lower content of CF. DM content was also lower.

By the comparison of examined grasses, we can see that Becva has the best chemical composition and nutritive value.

Content of dry matter was lowest in loloid hybrids, Becva and Perun (217 g) and highest in festucoid, Felina and Hykor (237 and 239 g kg⁻¹). Content of crude protein was highest in Becva and Hykor and lowest in Felina. Content of NFE was highest in K20 and Becva and lowest in Hykor. Crude fiber content in DM was lowest in K20 and Becva and highest in Hykor. Becva also has highest content of NEL, 5,60 MJ NEL in DM. Lowest content of NEL, has festucoid Felina, 5,36 MJ NEL.

Table 1. Influence of cutting order and hybrid on chemical composition, NEL and PDI, g/kg DM

Treatment	n	DM	CP	CF	Fat	Ash	NFE	NEL
1. cut	20	218	148	261	37	130	424	5.51
2. cut	20	239	141	287	35	122	415	5.41
Isd 0.05	40	28.4	42.3	36.3	4.7	22.9	38.9	0.29
Felina	8	237	138	277	38	127	421	5.36
Hykor	8	239	149	286	34	129	402	5.42
Perun	8	217	143	280	37	123	417	5.37
Becva	8	217	149	266	37	119	428	5.60
K-20	8	232	142	262	33	132	430	5.55
Isd 0.05	40	45.0	56.5	57.4	7.5	36.2	61.6	0.46
Average	40	229	144	274	36	126	420	5.46

In Grass 1 an 2 Suitability for ensiling

Average suitability for ensiling (Table 2.), measured through content of WSC, BC, CP and parameters WSC/CP, WSC/BC, FC, DMmin, is high enough to ensure good quality and butyric acid free silage, without wilting.

Table 2. Influence of cutting order and hybrid on ensiling suitability of examined grasses

Treatment	n	WSC	BC	WSC/C P	FC	WSC/BC	pH	DM min
1. cut	20	92	29	0.79	48.1	3.11	3.93	201
2. cut	20	71	25	0.56	47.8	2.81	4.17	225
Isd 0.05	40	24.1	2.7	0.31	6.6	0.63	0.29	50.5
Felina	8	72	25	0.61	47.9	2.85	4.17	222
Hykor	8	80	26	0.65	49.3	3.01	4.07	209
Perun	8	80	27	0.63	46.3	2.91	4.07	217
Becva	8	96	29	0.80	49.1	3.24	3.88	190
K-20	8	81	28	0.69	47.0	2.81	4.06	225
Isd 0.05	40	38.1	4.3	0.49	10.5	1.0	0.45	79.8
Average	40	82	27	0.68	47.9	2.96	4.05	213

Average content of WSC, buffer capacity (BC) as well as ratio of WSC/BC and WSC/CP are important parameters for evaluation of suitability for ensiling.

WSC/BC has proven to be a suitable parameter to evaluate the acidification potential of a crop. The extent of acidification required to give a butyric acid free silage is related also to the dry matter content of silage. Critical pH values required for stability of silages (Weisbach, 1968) are for 15, 20, and 25 % DM of green mass, 4, 10, 4, 20 and 4, 35 pH.

Results of DM_{min} (Table 2 and 4.) show the minimal DM content which is needed for successful ensiling. All values of DM of grasses are high enough to

Occurrence of butyric acid in silages made of grass are in relation to the fermentability coefficient (FC). Upon the examination of Honig (1993) if FC is > 45, butyric acid fermentation is not to be expected.

Results of our examination are mostly in accordance with data of Turek et al (1993). They found that Perun, Becva and Felina had average WSC content, 98, 108 and 37 g in DM, in 1.st cut.

Because of high content of WSC, for ensiling are particularly suitable Becva and Perun. The results of ensiling of Becva and Perun (Turek et al., 1993) showed that these hybrids ensiled with 26,5 and 25,0% DM, had pH 3,9 and ratio of lactic to acetic acid 2,5 and 2,95. Quantity of these two acids were in DM: 1,8 and 0,72 % and 1,62 and 0,55%.

Our results of examination, average pH, DM content, FC, WSC/BC, WSC/CP and DM_{min}, show good suitability for ensiling of all varieties of grasses in both cuts to ensure good quality and butyric acid free silage, without wilting. But in order to have better ratio of the lactic and acetic acid, we recommend wilting until 25-27% DM.

In tables 2 and 4 we can analyse the chemical composition and suitability for ensilage by varieties and cuts. In all grasses 1.st cut had better suitability for ensiling and higher energy content. This is showed also in Graf 1. and 2.

Differences in examined parameters between hybrids were smaller and insignificant. Highest WSC and BC values, protein content, and also, best suitability for ensiling had Becva.

Festucoid hybrid Hykor had good properties for silage production and it have long life in production, 6 -8 years. Becva gave the best quality of green mass for silage but in using of this grass the problem is its short time of life - only 2 or 3 years (Turek et al., 1993).

Festuca arundinacea K-20 had good energy content and low % of crude fiber. The suitability for ensiling was slightly below the average of all examined grasses.

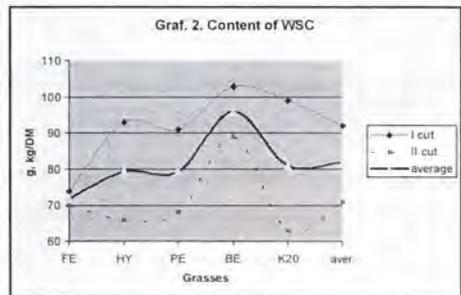
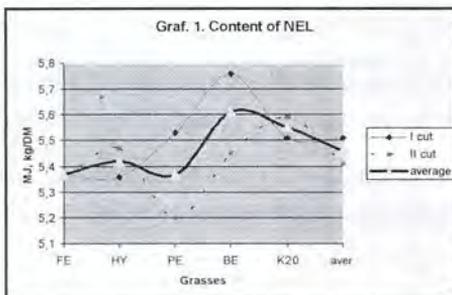


Table 3. Values of chemical composition, NEL and PDI of examined grasses in two cuts, g/kg DM

Treatment	n	DM	CP	CF	Fat	Ash	NFE	NEL
I. cut F	20	235	136	262	39	133	430	5.37
H		230	151	287	33	132	396	5.36
P	20	196	149	257	42	122	431	5.53
B		208	156	246	35	130	434	5.76
K20	40	219	148	253	35	135	429	5.51
Average I	8	218	148	261	37	130	424	5.51
II. cut F		239	140	292	37	121	412	5.36
H	8	247	147	284	36	125	408	5.47
P		238	137	303	33	124	403	5.20
B	8	226	143	286	39	109	423	5.45
K20		246	136	272	32	129	431	5.59
Average II	8	239	141	287	35	122	415	5.41
Average		229	144	274	36	126	420	5.46

Table 4. Suitability for ensiling of green mass of examined grasses in two cuts

Treatment	n	WSC	BC	WSC/C P	FC	WSC/BC	pH	DM min
I. cut F		74	25	0.67	48.5	2.95	4.15	214
H		93	27	0.81	52.0	3.43	3.91	175
P		91	30	0.71	44.3	2.92	3.94	216
B		103	32	0.90	47.2	3.12	3.79	200
K20		99	30	0.86	48.3	3.14	3.85	199
Average I		92	29	0.79	48.1	3.11	3.93	201
II. cut F		70	26	0.56	47.3	2.75	4.19	230
H		66	26	0.48	46.7	2.58	4.23	243
P		68	24	0.56	48.3	2.89	4.21	218
B		89	26	0.70	51.0	3.37	3.97	181
K20		63	25	0.52	45.7	2.48	4.27	252
Average II		71	25	0.56	47.8	2.81	4.17	225
Average		82	27	0.68	47.9	2.96	4.05	213

CONCLUSION

First cut in all examined grasses was better for ensiling. Chemical composition and energy content was also better in grasses in 1st cut.

Becva has the best quality of green mass in the regard of chemical composition and, also, for ensiling. Hykor and Perun have also good characteristic for silage production and, they have longer life. Becva has productive life 2-3 years, Perun 3-5 and Hykor 6-8 years. Festuca arundinacea K-20 has also good suitability for ensiling (on the group average) and good content of net energy (NEL).

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ХЕМИСКИ СОСТАВ И ПОГОДНОСТ ЗА СИЛИРАЊЕ НА НЕКОИ ИНТЕРГЕНЕРИЧКИ ХИБРИДИ НА ТРЕВА ВО ПРВИОТ И ВТОРИОТ ОТКОС

Неговановиќ, Д.¹, Ѓорѓевиќ Милошевиќ Сузана¹, Тренковска Снедана¹, Рудиќ Драгана¹, Диниќ, Б.², Стошиќ М.², Томиќ Зорица², Игњатовиќ Снежана²

1. Стоочарски Институт, Белград-Земун

2. Земјоделски Институт, "Србија", Центар за фуражни култури, Крушевац, Јужославија

Експериментот беше изведен за да се одреди хемискиот состав и погодноста за силирање на четири интергенерички хибриди и *Festuca arundinacea* K20 во првиот и вториот откос. Хибридните треви Felina (FE), Нуког (НУ), Репун (РЕ) и Вецва (ВЕ) се одгледуваат во станицата за одгледување на растенија во Хладке Животице (Чешка), а *Festuca arundinacea* K-20 се одгледува во Центарот за фуражни култури во Крушевац.

Испитувањето се изврши на две локации, на експерименталните полиња на Институтите во Белград и Крушевац (на надморска висина од 50 и 200 метри). Тревите беа посеани на пролет, нагубрувањето беше со 300 kg/ha NPK 15:15:15 и косењето се изврши во полната фаза на зреење.

Хемиските анализи на 40 примероци е извршена во лабораториите на двата Института употребувајќи ги методите на Венде, Дубоа (WSC) и Вајсбах (заштитниот капацитет). Хранливата вредност (NEL и PDI) и се пресметува со коефициентот на сварливост на Фојтик (1997) и равенката од INRA (1982). Погодноста за силирање беше пресметана врз база на податоците од хемиските анализи и методи на Вајсбах (1993)-коефициентот на ферментабилност (FC) и минимален DM за силажа без бутирична киселина (Dmmin). Вредностите на pH се пресметуваат со равенката на Фајманова и др. (1997).

Резултатите од испитувањето (Табели 1. и 2.) покажаа дека хемискиот состав на тревите беше подобар во првиот отколку во вториот откос.

(повисоки вредности на CP, NFE, NEL и понизок CF).

Исто така, погодноста на зелената маса за силирање беше подобра во првиот откос, што се покажува во скоро сите параметри. Просечното количество на WSC беше 82 грама, а во првиот и вториот откос последователно 92 и 71 г/кг од DM.

Количеството на WSC, протеин и погодноста за силирање беа подобри во првиот откос. Разликите во испитаните параметри меѓу хибридните беа помали и незначителни. Највисоките WSC и BC вредности, количество на протеини и исто така најголема погодност за силирање имаше Вецва. *Festucoid* Нуког имаше добри карактеристики за силажно производство. *Festucea arundinacea*, K-20 имаше вредности на погодност за силирање малку под просекот, но количествата на NEL, MJ беа повисоки а на сировото влакно беа под просекот.

Клучни зборови: хибридни треви, фестулолиум, хемиски состав, погодност за силирање, коефициент на ферментабилност.