KRMIVA

INFLUENCE OF FORAGE QUALITY AND SILAGE SYSTEM ON MILK PRODUCTION

UTJECAJ KAKVOĆE KRME I SUSTAVA SILAŽE NA PROIZVODNJU MLIJEKA

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SUMMARY

The potential of a forage for ruminant production is fundamentally determined by the quantity of digestible organic matter when it is fed *ad libitum.* This depends on the apparent digestibility of organic matter and on the voluntary intake. This paper summarizes the results of several experiments performed at BAL Gumpenstein to determine the influence of forage quality and silage system on feed intake and milk yield of dairy cows.

The objective of Experiment I was to study the effect of forage quality and concentrate level on feed intake and milk yield of Simmental and Holstein Friesian cows as well as possible interactions between these factors. It shows that in order to achieve high milk yields, both high forage quality and sufficient supplementation with concentrates are neccessary. Low forage quality can be compensated by high concentrate levels only to a certain extent.

The impact of different silage systems and the extent of wilting on silage quality, feed intake and milk yield were measured in Experiment II. Grass silages produced in a bunker silo or as big bale silage with a constant or a variable pressing chamber, each wilted to 40 or 60 % DM were tested. The energy concentration and digestibility of organic matter was higher in the big bale silages. The energy concentration was significantly lower in silages with high DM content. Only small differences in forage intake and milk yield could be found. The data show that big bale silages could be used especially in summer feeding or in cases where a certain forage quality is needed for different groups of animals according to their yield. There were only small difference in silage quality between the different silage systems, but clear differences between the two extents of wilting.

The influence of wilting of first cut grass on silage characteristics, digestibility, feed intake and milk yield was studied under unfavourable weather conditions (Experiment III). The nutrient content of the respective grass silages demonstrates that considerable field losses can result during wilting under unfavourable weather conditions. This leads to an increase of the cell wall constituents and a decrease of the cell contents. As a consequence digestibility is reduced. The forage intake increased by 1.1 kg DM from 23 to 26% DM, however, only by 0.4 kg DM from 26 to 32%. Due to the higher energy concentration in the lower DM silages the energy intake was nearly the same in all three groups. There was a tendency for lower milk yield in the group of the highest grass silage DM content. Economic and climatic factors and circumstances on a particular farm will determine the most appropriate silage system to use.

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INTRODUCTION

About 60% of the usable land in Austria is grassland. Therefore the feeding of ruminants is based substantially on forages. The potential of a forage for ruminant production, i.e. the feeding value, is fundamentally determined by the quantity of digestible organic matter when it is fed *ad libitum* (JARRIGE 1989). This depends on the apparent digestibility of organic matter and on the voluntary intake (ingestibility).

This paper summarizes the results of several experiments performed at BAL Gumpenstein to determine the influence of forage quality and silage system on feed intake and milk yield of dairy cows.

Forage quality in Austria

In *table 1* the mean nutrient and mineral content of several forages in Austria is presented. Although these average values can only provide a rough view, the main tendencies can be clearly detected:

- especially the first growth of the natural grassland is generally cut too late
- this leads to high crude fibre and low protein, energy and mineral contents
- the energy concentration of maize silage is usually high, although it is considerably decreased by unfavorable climatic conditions

Table 1. Mean nutrient content of forages in Austria (in DM)
Tablica 1. Prosječni sadržaj hranjivih tvari u krmi u Austriji (u ST)

Forage Krma		Crude protein Sirove bjelančevine	Crude fibre Sirovina vlaknina	NEL NEL	Calcium Kalcij	Phosphorus Fosfor
		g	g	MJ	g	g
Hay[1)] Sijeno	1st cut 1. otkos	103	303	5.35	6.0	2.6
	2nd cut 2. otkos	132	269	5.54	7.8	3.2
Grass silage[1)] Travna silaža	1st cut 1. otkos	137	292	5.84	7.3	3.2
	2nd cut 2. otkos	155	261	5.23	9.5	3.5
Grass silage[2)] Travna silaža	1st and 2nd cut 1. i 2. otkos	-	266	5.60	8.9	3.2
Fresh grass [1)] Svježa trava	1st cut 1. otkos	136	275	6.08	6.7	3.3
	2nd cut 2. otkos	133	277	5.30	10.3	3.7
Maize silage[1)] Kukuruzna silaža	Mean Prosjek	81	228	6.43	2.6	2.1
Maize silage[3)] Kukuruzna silaža	Styrian Enns valley Štajerska dolina	77	250	6.15	-	-

Sources: [1)] GRUBER et al. 1994
Izvori: [2)] BUCHGRABER & RESCH, 1993
[3)] HEIN, 1993

INFLUENCE OF FORAGE QUALITY ON DIGESTIBILITY, FEED INTAKE AND MILK YIELD OF DAIRY COWS (EXPERIMENT I)

The objective of this experiment was to study the effect of forage quality and concentrate level on feed intake and milk yield of Simmental and Holstein Friesian cows as well as possible interactions between these factors (GRUBER et al. 1995).

Experimental design:

- 2 · 3 · 2 factorial design
- 2 forage qualities (FL, FH)
- 3 levels of concentrate (C0, C50, C100)
- 2 breeds (Simmental (SI), Holstein Friesian (HF))

Forage:

- 35% hay, 40% grass silage, 25% maize silage

To produce different forage qualities (*table 2*) hay and grass silage were harvested at different vegetative stages (FH - ear emergence, FL - 3 weeks later). There were hardly any differences in the botanical composition of the swards from which the two forages were produced. The quality of maize silage was made to differ by adding 20% maize grain (FH) to a maize silage of low energy content typical of this region (FL).

Concentrate: 20.4% barley, 20.4% wheat, 20.4% maize, 20.4% oats,

9.2 % soybean meal, 9.2% faba beans

C0: feeding without concentrate

C50: feeding 50% of the amount of concentrate required to meet energy requirements

C100: supplementation of forage with concentrate according to recommendations (GEH 1986)

All groups were provided with minerals and vitamins according to recommendations (GEH 1986).

Experimental animals:

- 10 animals per treatment, N=120
- total lactation study
- multiparous cows
- average milk yield in the lactation before starting the experiment:
- 5.046 kg (SI), 6.294 kg (HF)
- in the dry period preceeding the experiment all cows were treated equally, with forage only.

Nutrient content of the feedstuffs

The critical characteristics of the feed value of the forages were determined by harvesting at different vegetative stages (*table 2*). The hay OM digestibility was 57.6 and 65.8% and that of grass silage 59.4 and 69.7% in FL and FH, respectively. Similar differences could be seen in the crude fibre, crude protein and mineral concentrations.

Feed intake and ration criteria

The forage intake in the groups without concentrate was 12.3 and 14.5 kg DM in FL and FH. Because of the higher nutrient content the protein and energy intake from forage and the total ration were considerably improved (*table 3*). These results confirm the importance of forage quality on feed and nutrient intake of dairy cows which was also found in previous experiments (SPAHR et al. 1961, STEACY et al. 1983, CLEALE & BULL 1986, ASTON et al. 1994). The reason for the increased feed intake lies in the faster and more effective degradation of feed in the forestomachs.

As found by regression analysis, the forage intake increased linearly with increasing forage quality (2.4 kg DM per MJ NEL), a coefficient quite similar to the value of 2.2 published by SCHWARZ & KIRCHGESSNER (1985). The importance of forage quality, however, decreased with increasing concentrate level (2.7, 2.5 and 2.0 kg DM per MJ NEL in treatments C0, C50 and C100, respectively). The forage intake decreased linearly by 0.28 kg DM per kg DM concentrate. The substitution of forage tended to be lower in FL (0.23) than in FH (0.33), but not significantly.

The crude fibre content of the forage was 30 and 27% and the forage OM digestibility was 61.5 and 68.7% in FL and FH (*table 3*). Due to its effect on milk yield and forage intake the stage of lactation had a direct influence on the proporton of concentrates in the diet. In FL the maximum concentrate proportion was nearly 40%, while in FH it was only 35%.

Table 2. Nutrient content of feedstuffs in Experiment I
Tablica 2. Sadržaj hranjivih tvari krmiva u pokusu I

Feedstuff Krmivo	Unit Jedinica	Hay Sijeno		Grass silage Travna silaža		Maize silage Kukuruzna silaža		Conc. Koncentrat
Forage quality Kakvoća krme		low niska	high visoka	low niska	high visoka	low niska	high visoka	-
Crude protein Sirove bjelančevine	g kg^{-1} DM (ST)	100.00	129.00	121.00	145.00	84.00	84.00	176.00
Crude fibre Sirova vlaknina	g kg^{-1} DM (ST)	331.00	293.00	320.00	286.00	246.00	221.00	62.00
OM digestibility Probavljivost organske tvari	%	57.60	65.80	59.40	69.70	69.60	72.00	85.20
Energy content Sadržaj energije	MJ NEL kg^{-1} DM (ST)	4.52	5.24	4.67	5.67	6.21	6.56	8.46
Calcium - Kalcij	g kg^{-1} DM (ST)	5.40	6.20	7.10	7.10	3.20	3.20	1.00
Phosphorus Fosfor	g kg^{-1} DM (ST)	2.30	3.30	3.10	3.50	2.20	2.40	4.10
Days of vegetation Dani vegetacije		97.00	61.00	89.00	70.00	153.00	153.00	-

Milk yield

Milk yield increased by 4.3 kg ECM when energy content increased by one MJ NEL. As with feed intake the importance of forage quality decreased with increasing concentrate level. Independently of forage quality, the milk yield increased by 1.52 kg ECM per kg DM concentrate. However, a highly significant interaction was found between concentrate level and breed. The efficiency of concentrate was 1.27 in SI and 1.77 in HF cows. According to COULON & REMOND (1991) the utilization of additional energy supply depends mainly on the degree of energy supply, on the stage of lactation, on the duration of under- and overfeeding and on the protein supply.

Regarding the total lactation the cows fed according to requirements (C100) yielded 6.414 kg ECM with FL and 7.366 kg with FH. This shows that in order to achieve high milk yields, both high forage quality and sufficient supplementation with concentrates are necessary. A low forage quality can be compensated by high concentrate levels to only a certain extent.

Feeding value of silages from big bales and bunker silos at different degrees of wilting in dairy cows (Experiment II)

The impact of different silage systems and the extent of wilting on silage quality, feed intake and milk yield were measured in a feeding trial using six Simmental and six Holstein Friesian cows in a 6 x 6 Latin square design (STEINWENDER et al. 1992). The treatments were grass silages produced in a clamp silo (CS) or as big bale silage with a constant (BBSc) or a variable (BBSv) pressing chamber, each wilted to 40 or 60% DM (3 x 2 factorial design). The forage ration was composed of 60% grass silage and 40% maize silage without hay. The experimental design and the results of the feeding trial are shown in table 4.

Table 3. Design and results in Experiment I (GRUBER et al. 1995)
Tablica 3. Plan i rezultati u pokusu I

Forage quality - Kakvoća krmiva	Unit - Jedinica	Low - Niska			High - Visoka		
Concentrate level - Razina koncentrata		C0	C50	C100	C0	C50	C100
Feed and nutrient intake - Uzimanje hrane i hranjivih tvari							
Forage - Krma	kg DM (ST)	12.32	12.23	11.08	14.45	13.78	12.89
Concentrate - Koncentrat	kg DM (ST)	-	1.60	5.16	-	1.54	4.75
Total feed - Ukupno hrane	kg DM (ST)	12.65	14.06	16.49	14.72	15.53	17.87
Total feed per kg LM* - Ukupno hrane po kg/Ž.V.*	g DM (ST)	108	116	129	121	125	139
Crude protein - Sirove bjelančevine	g XP	1329	1576	2083	1830	2005	2478
Crude protein at duodenum Sirove bjelančevine u duodenumu	g NPD	1349	1609	2147	1775	1966	2463
Net energy - Netto energija	MJ NEL	63.9	75.9	100.5	84.0	92.8	115.5
Criteria of the ration (in DM) - Kriterij obroka (u ST)							
Crude protein contentSadržaj sirovih bjelančevina	g	104	112	126	124	129	138
Crude fibre content - Sadržaj sirove vlaknine	g	299	273	224	270	249	213
Energy concentration - Koncentracija energije	MJ ME	8.63	9.13	10.08	9.62	9.97	10.63
OM digestibility - Probavljivost organske tvari	%	61.5	64.2	69.3	68.7	70.4	73.7
Concentrate proportion - Omjer koncentrata	%	-	11.4	31.2	-	9.9	26.2
Milk yield - Proizvodnja mlijeka							
Milk yield - Proizvodnja mlijeka	kg	13.45	15.74	19.76	17.34	18.9	22.86
Milk yield - Proizvodnja mlijeka	kg ECM	13.47	16.33	21.03	17.52	19.84	24.15
Fat content - Sadržaj masti	%	4.26	4.49	4.67	4.29	4.59	4.58
Protein content - Sadržaj bjelančevina	%	2.88	2.97	3.13	3.00	3.08	3.21
Milk from forage (NEL) - Mlijeko od krme	kg	8.74	8.15	5.79	14.71	13.28	11.51
Live weight - Živa vaga	kg	571	601	645	609	627	653

The energy concentration and digestibility of organic matter (dOM) was higher in the big bale silages. The energy concentration of concentrate and maize silage was estimated on the basis of *in vivo*-digestibility coefficients (wethers), the energy concentratin of the different grass silages with the *in vitro* gas production test (Hohenheimer Futterwerttest, MENKE & STEINGASS 1988). The energy concentration was significantly lower in silages with high DM content. Only small differences in forage intake and milk yield from forage could be found. The feed intake was slightly higher in silage with high DM content. There were no significant differences in actual milk yield between the groups. The data show, that big bale silages could be used especially in summer feeding or in cases where a certain forage quality is needed for different groups of animals according to their yield.

There were only small differences in silage quality between the different silage systems, but clear differences between the two levels of wilting. Intensive wilting leads to a high pH-value, low concentration of lactic acid and a high number of yeasts (*table 5*).

Table 4. Design and results in Experiment II (STEINWENDER et al. 1992)
Tablica 4. Plan i rezultati u pokusu II

Item Predmet	Unit Jedinica	Silage system Sustav silaže			Degree of wilting (%DM) Stupanj uvenuća (%ST)	
		CS	BBSc	BBSv	40	60
Nutrient content of the grass silages (in DM) - *Sadržaj hranjivih tvari u travnoj silaži (u ST)*						
Crude protein - Sirove bjelančevine	g	120	113	115	116	115
NEL	MJ	5.38	5.52	5.53	5.55	5.40
ME	MJ	9.13	9.33	9.35	9.38	9.15
OM digestibility - Probavljivost organske tvari	%	64.9	65.8	65.9	66.1	64.9
Feed intake - Uzimanje hrane						
Forage - Krma	kg DM (ST)	12.2	12.2	12.3	12.1	12.4
Concentrate - Koncentrat	kg DM (ST)	2.4	2.0	2.4	2.2	2.3
Forage energy - Energija u krmi	MJ NEL	68.8	70.5	70.7	69.8	70.2
Milk yield - Proizvodnja mlijeka						
Milk yield - Proizvodnja mlijeka	kg	15.6	15.2	15.8	15.4	15.6
Fat content - Sadržaj masti		4.40	4.44	4.45	4.49	4.37
Protein content - Sadržaj bjelančevina		3.02	3.00	3.02	3.01	3.02
ECM yield - Proizvodnja ECM	kg	16.0	15.6	16.3	16.0	16.0
Milk from forage - Mlijeko od krme	kg	10.9	11.4	11.5	11.2	11.4
Liveweight - Živa vaga	kg	572	574	573	574	572

Influence of wilting on silage quality and feeding value of grass silage under unfavourable weather conditions (Experiment III)

The influence of wilting of first cut grass (permanent grassland) on silage characteristics, digestibility, feed intake and milk yield was studied under unfavourable weather conditions (BUCHGRABER et al., unpublished results; GRUBER et al., unpublished results). It was intended to achieve DM contents of 20, 33 and 50%. Due to rainfall after harvesting of the first DM level (direct cut silage) the actual DM content was 22.6, 26.3 and 32.0 %, respectively. As usual the pH-value increased and the concentration of the fermentation acids decreased with increasing DM content.

Table 5. Silage characteristics in Experiment II (STEINWENDER et al. 1992)
Tablica 5. Značajke silaže u pokusu I

Item Predmet	Unit Jedinica	40% DM (ST)			60% DM (ST)		
		CS	BBSc	BBSv	CS	BBSc	BBSv
DM content - ST sadržaj	%	41.9	39.3	40.0	61.4	62.3	62.3
pH		5.1	5.2	5.3	5.8	5.9	5.8
NH_4-N	% of N	12.9	19.5	16.3	11.6	14.4	14.0
Lactic acid - Mliječna kiselina	g kg^{-1} DM (ST)	28.4	23.7	23.0	6.0	5.8	12.0
Acetic acid - Octena kiselina	g kg^{-1} DM (ST)	3.1	5.6	4.8	1.0	1.4	1.6
Butyric acid - Maslačna kiselina	g kg^{-1} DM (ST)	11.9	13.2	11.8	3.3	5.5	9.0
Lactic acid bacteria Bakterije mliječne kiseline	mio g^{-1} FM	-	120	86	-	5	7
Yeasts - Kvasac	1000 g^{-1} FM	148	47	81	499	360	2163

Table 6. Silage characteristics in Experiment III (BUCHGRABER et al., unpublished results)
Tablica 6. Značajke silaže u Pokusu III

Item Predmet	Unit Jedinica	Degree of wilting (% DM) Stupanj uvenuća (%ST)		
		21	23	29
DM content - ST sadržaj	%	20.9	22.5	29.1
pH		4.1	4.5	4.5
NH_4-N	% of N	8.7	13.3	10.5
Lactic acid - Mliječna kiselina	g kg^{-1} DM (ST)	139.5	95.7	70.8
Acetic acid - Octena kiselina	g kg^{-1} DM (ST)	23.3	14.4	17.4
Butyric acid - Maslačna kiselina	g kg^{-1} DM (ST)	0	33.7	2.9
Lactic acid bacteria - Bakterije mliječne kiseline	Mio g^{-1} FM	20.1	44.0	41.0
Yeasts - Kvasac	1000 g^{-1} FM	0.4	5.1	0.5

Table 7. Design and results in Experiment III (GRUBER et al., unpublished results)
Tablica 7. Plan i rezultati Pokusa III (neobjavljivani rezultati)

Item Predmet	Unit Jedinica	Degree of wilting (% DM) 23	26	32
Nutrient content of the silages (DM) - Sadržaj hranjivih tvari silaža (ST)				
Crude protein - Sirove bjelančevine	g	155	154	153
Crude fibre - Sirova vlaknina	g	260	271	272
N-free extracts - Bezdušične ekstraktivne tvari	g	433	429	427
NDF	g	440	466	482
OM digestibility - Probavljivost organske tvari	%	72.7	69.3	68.6
NEL	MJ	5.97	5.55	5.40
ME	MJ	10.01	9.44	9.21
Feed intake - Uzimanje hrane				
Forage - Krma	kg DM (ST)	13.3	14.4	14.8
Concentrate - Koncentrat	kg DM (ST)	2.7	2.7	2.3
Forage energy - Energija krme	MJ NEL	79.5	80.5	80.1
Milk yield - Proizvodnja mlijeka				
Milk yield - Proizvodnja mlijeka	kg	17.3	18.9	14.9
Fat content - Sadržaj masti	%	4.56	4.10	4.93
Protein content - Sadržaj bjelančevina	%	3.42	3.32	3.71
ECM yield - ECM proizvodnja	kg	18.8	19.0	17.1
Milk from forage - Mlijeko od krme	kg	13.1	12.9	12.3
Liveweight - Živa vaga	kg	655	691	730

Fifteen Simmental x Red Holstein cows were used in a Latin square design, the periods lasting for 3 weeks. The experimental grass silage was the only forage. Concentrate was fed when milk yield exceeded 14 kg ECM.

The nutrient content of the respective grass silages demonstrates that considerable field losses can result in wilting under unfavourable weather conditions. The main reasons are cell respiration, microbial fermentation and mechanical crumbling

losses of highly digestible plant parts on the field. This results in an increase of the cell wall constituents (NDF, crude fibre) and a decrease of the cell contents, i.e. digestible organic matter (*table 7*). As a consequence digestibility and energy concentration are significantly reduced in higher DM silages.

The forage intake increased by 1.1 kg DM from 23 to 26% DM, however, only by 0.4 kg DM from 26 to 32%. Due to the higher energy concentration in the lower DM silages the energy intake was nearly the same in all three groups. There was a tendency for lower milk yield in the group of the highest grass silage DM content.

In the so called EUROWILT project (ZIMMER & WILKINS 1984) DM field losses were 2.5 % for unwilted and 8.6 % for wilted silages. The corresponding in-silo losses averaged 16.1% compared with 8.5 %. Total losses were higher with unwilted than with wilted silages. With wilted silages, total losses tended to be higher and heterolactic fermentation and deanimation increased when weather during the field wilting period was poor. Differences in feeding value were small. DM intake was higher with wilted and digestibility with unwilted silages. This is in line with the results of Experiment III. Therefore economic and climatic factors and circumstances on a particular farm will determine the most appropriate method to use.

REFERENCES

1. Aston, K., C. Thomas, S.R. Daley, J.D. Sutton, M.S. Dhanoa, (1994): Milk production from grass silage diets: Effects of silage characteristics and the amount of supplementary concentrate. Animal Production, 59: 31-41.
2. Buchgraber, K. R. Resch, (1993): Der Einfluß der Produktion von Grassilagen auf die Futterqualität und Gärbiologie sowie die Auswirkungen auf die Verfütterung und Milchqualität in der Praxis - Silageprojekt "Steirisches Ennstal". Veröffentlichungen der BAL Gumpenstein, 20, 11-32.
3. Cleale, R.M. L.S. Bull, (1986): Effect of forage maturity on ration digestibility and production by dairy cows. Journal of Dairy Science, 69: 1587-1594.
4. Coulon, J. ß., B. Remond, (1991): Variations in milk output and milk protein content in response to the level of energy supply to the dairy cow: a review: Livestock Production Science, 29: 31-47.
5. GEH (Gesellschaft für Ernährungsphysiologie der Haustiere - Ausschuß für Bedarfsnormen), 1986. Energie- und Nährstoffbedarf landwirtschaftlicher Nutztiere, Nr. 3: Milchkühe und Aufzuchtrinder. DLG-Verlag, Frankfurt/Main. pp 92.
6. Gruber, L., G. Wiedner, A. Vogel, Th. Guggenberger, (1994): Nutrient and mineral content of forages in Austria. Evaluation and interpretation of the forage analyses in the foodstuff laboratory at Rosenau of the agricultural board of Lower Austria. Die Bodenkultur, 45:57-73.
7. Gruber, L., R. Steinwender, W. Baumgartner, (1995): Einfluß von Grundfutterqualität und Kraftfutterniveau auf Leistung, Stoffwechsel und Wirtschaftlichkeit von Kühen der Rasse Fleckvieh und Holstein Friesian. Bericht über die 22. Tierzuchttagung der BAL Gumpenstein, 9.-10. Mai 1995, 1-49.
8. Hein, W., (1993): Die Qualität von Maissilage im Steirischen Ennstal. Veröffentlichungen der BAL Gumpenstein, Heft 20, 33-41.
9. Jarrige, R., (1989): Ruminant Nutrition. Recommended Allowances and Feed Tables. John Libbey Eurotext. London Paris Rome. 389 pp.
10. Menke, K.H., H. Steingass, (1988): Estimation of the energetic feed value obtained from chemical analysis and in vitro gas production using rumen fluid. Animal Research and Development, 28: 7-55.
11. Schwarz, F.J., M. Kirchgessner (1985): Grundfutteraufnahme von Milchkühen in Abhängigkeit von Lebendgewicht, Zahl der Laktationen, Kraftfutterzufuhr und Grundfutterqualität. Züchtungskunde, 57:267-277.
12. Spahr, S.L., E.M. Kesler, J. W. Bratzler, J.B. Washko, (1961): Effect of stage of maturity at first cutting on quality of forages. Journal of Dairy Science, 44: 503-510.
13. Steacy, G.M., D.A. Christensen, M.I. Chochran, G.M.J. Horton, (1983): An evaluation of three stages of maturity of hay fed with two concentrate levels for lactating cows. Canadian Journal of Animal Science, 63: 623-629.
14. Steinwender, R., L. Gruber, K. Buchgraber, J. Häusler, (1992): Futterwert von Silagen aus Rundballen und Flachsilos verschiedenen Anwelkgrades bei Milchkühen. Die Bodenkultur, 43: 265-274.
15. Zimmer, E., R.J. Wilkins, (1984): Efficiency of silage systems: a comparison between unwilted and wilted silages. Landbauforschung Völkenrode, Sonderheft 69, 88 pp.

SAŽETAK

Vrijednost krme u proizvodnji preživača određuje se, u osnovi, količinom probavljive organske tvari kod hranjenja ad libitum. Ona ovisi o stvarnoj probavljivosti organskih tvari i o slobodnom uzimanju hrane. U ovom se radu ukratko prikazuju rezultati nekoliko pokusa provedenih u BAL Gumpensteinu da bi se odredio utjecaj kakvoće krme i sustav silaže na uzimanje hrane i proizvodnju mlijeka mliječnih krava.

Cilj pokusa br. I bio je proučiti djelovanje kakvoće krme i razine koncentrata na uzimanje hrane i proizvodnje mlijeka simentalskih i Holstein-frizijskih krava kao i moguće međusobno djelovanje ova dva čimbenika. Da bi se postigla visoka proizvodnja mlijeka potrebna je visoka kakvoća krme kao i dovoljno dodavanje koncentrata. Slaba kakvoća krme može se nadomjestiti visokim razinama koncentrata samo do stanovite mjere.

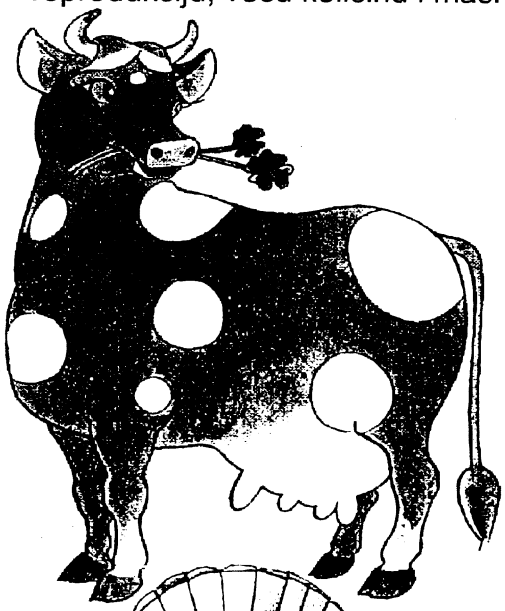
Djelovanje raznih sustava silaže i stupanj uvenuća na kakvoću silaže, uzimanje hrane i proizvodnju mlijeka mjereni su u pokusu br. II. Ispitivana silaža trave proizvedena je u bunker silosu ili u velikim balama sa stalnom ili promjenljivom pritisnom komorom, uvenula na 40 ili 60% ST. Koncentracija energije i probavljivost organskih tvari bile su više u silaži u velikim balama. Koncentracija energije bila je znatno niža u silaži s visokim sadržajem ST. Nađene su samo male razlike u uzimanju hrane i proizvodnji mlijeka. Podaci pokazuju da su se silaže u velikim balama mogle upotrijebiti osobito u ljetnom hranjenju krmom ili u slučajevima kad je potrebna određena kakvoća krme za razne skupine životinja prema njihovoj proizvodnji. Postojale su samo male razlike u kakvoći silaže među raznim sustavima silaže, ali očite razlike između dva stupnja uvenuća.

Utjecaj uvenuća trave prvog otkosa na značajke silaže, probavljivost, uzimanje hrane i proizvodnju mlijeka proučavan je u nepovoljnim vremenskim uvjetima (Pokus br. III). Hranjivi sadržaj odnosne silaže trave pokazuje da za vrijeme venjenja u nepovoljnim vremenskim uvjetima može doći do znatnih gubitaka na polju. To dovodi do porasta bitnih dijelova stjenke stanice i smanjenja sadržaja stanice. Posljedica toga je smanjenje probavljivosti. Uzimanje hrane poraslo je za 1.1 kg ST od 23 do 26% ST, međutim samo za 0.4 kg ST od 26 do 32%. Zbog veće koncentracije energije u silaži s nižom ST uzimanje energije bilo je skoro isto u sve tri skupine. Postojala je tendencija manje proizvodnje mlijeka u skupini najvišeg sadržaja ST u travnoj silaži. Gospodarski i klimatski čimbenici i uvjeti na određenoj farmi odredit će upotrebu najprikladnijeg sustava silaže.

Sitni ulog u krupnu dobit!

BJELANČEVINASTO FOSFORNO MINERALNI DODACI STOČNOJ HRANI

Koristiti će Vam za izradu potpunih i dopunskih krmnih smjesa, silaže, za konzerviranje vlažnih i obradu grubih (voluminoznih) krmiva i u individualnoj hranidbi na obiteljskim gospodarstvima uz osnovnu krmu. Pouzdan su izvor nebjelančevinastog dušika, fosfora, kalcija i drugih minerala. Poboljšavaju iskoristivost hrane, prirast tjelesne težine, opće zdravstveno stanje životinja, reprodukciju, veću količinu i masnoću mlijeka i dr.



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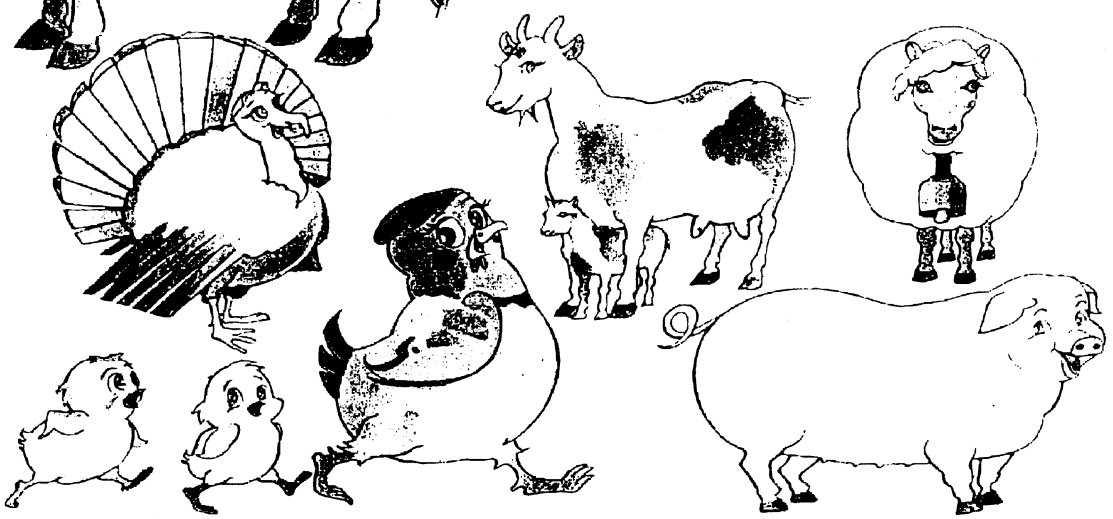

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