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Diet System of Milking Cows with Silage of Wet Corn

T. Radovanović, M. Gutić, V. Dosković, Vera Rajičić

Faculty of Agronomy, Cacak, Yugoslavia

Abstract: In the five trials rationed with the basic component being the silage with a high moisture percent, around 70%, particular attention was paid to the nutritional value, i.e. consuming of hay to be minimally 2 kg hay/100 kg body mass of cows.

The first ration combination, with conventional silage of the wet ear and two concentrate mixtures with 32 and 20% proteins, proved to be successful allowing the diet with this type of the meal was excelling over the first lactation stage, while at its end, the cows were somewhat more fattened than expected.

The second combination of meals, i.e., a separate provision of different combinations required solely individual diet or division of the cows into smaller groups according to the production level.

The third combination of the meals, i.e. whole meal with the silage mixed with concentrate, required that ready meal be mixed right before feeding, particularly over the warm and wet weather. Addition of ration 0.2-0.3% Ca-propionate for feed conservation can be recommended.

The fourth combination, i.e. whole meal made at feeding time also gave good results, so we strongly recommend its crushing and mixing during nourishment with "mixing" trailers.

The fifth combination of meals was made during ensilaging. In this meal, special attention was paid to the share of mineral matter in the meal of the macro and micro- elements.

The diet with above presented combinations of the cow meals caused no digestive disturbances and gave good production and reproduction results over the whole period of experimentation.

Keywords: milking cows, dried cows, silage of wet corn, concentrate

Introduction

Silages of wet corn have been confirmed as outstandingly efficient feeds of milking cows in view of nutritional and economical value, too. If the corn is provided and properly ensilaged over the fodders harvest, the feed unit may be cheaper up to 50% compared to the other fodders. Therefore, the silages of wet corn are being used in various forms with great success on a large number of holdings in and out of the country. However, on some farms, the meal containing great amounts of the silage with a high moisture percent, can be problematic.

Material and methods

Over the research, we provided five ration combinations, which, if strictly following recipes, may efficiently feed milking cows with a great silage rate and a high moisture percentage, as well.

On the basis of the five rations, the ensilaged wet maize was found to have equal and, in some cases, even a higher nutritional value than the dry one provided that both roughages have equal DM rates. The results pointed to assumptions that an efficient diet with the silage of the wet corn may be performed only if the whole meal (conventional maize silage + concentrate) is well balanced considering the share of proteins, minerals and vitamins. If too much of the conventional corn silage is given as a diet, the consumption of other roughages is decreased, which leads to digestive problems.

In order to efficiently perform feeding of milking cows with meals of the silages from wet corn, five different recipes balanced in view of everything needed for good nutrition, were set up, using combinations, as follows:

- I separate provision of equal rates to all the cows with corn silage
- II separate provision of the various corn silage rates
- III mixed provision of the corn silage and concentrate
- IV feeding with wholesome and mixed meal at the feeding time, and
- V feeding with a wholesome meal made at feeding time.

In order to balance these five combinations of meals, the concentrate mixture A with 32% proteins and B mixture with 20% proteins, were used.

Results and Discussion

The cows of body mass amounting to 560 kg and the average milk production amounting to 23 kg with 4% milk fat, were used for the experiment.

The moisture of corn silage rate accounted for 70% and its average nutritional value was adequate, with cows consuming 2 kg of hay per 100 kg body mass, which, based upon the newest scientific knowledge, may be considered to be the minimal values.

Basic Types of the Experimental Diet with Silages of the Wet Corn

I Separate Feeding with Equal Amounts of the Roughages Used

Type of roughage Type of silage Rate	Meals	
	1 Corn	2 Urea+corn
	32	33
Silage of wet ear	4.5	4.5
Concentrate	KM ₂	KM ₂
Protein u concentrate	32	20
<i>Silage of wet ear ratio concentrate/milk</i>		
daily milk rate/kg	The ratio of concentrate/milk	
up to 13.5	0.5 : 4.50	0.5 : 7.00
13.60-22.70	0.5 : 2.50	0.5 : 2.50
22.70 i više	0.5 : 1.60	0.5 : 1.60
dried cows kg	1	1

In this ration combination, the cows achieved excellent production results. Taken on the whole, the ration proved to be very efficient. In this combination, the wet corn grain can substitute for ear, without any change in diet combination. Also, dry corn may be used in that the rates with 30% wet corn are divided in the ratio 1:2. The amount of wet corn given to drying and milking cows can be reduced to 4 kg daily per head, since, with this diet manner, the cows in the late lactation stage and the drying ones can be fattened. Work on young bulls fattening with corn silage was performed by Obradović (198); Čobić et al., (1984).

II Separate Feeding with Different Rates of the Roughages Used

In the second trial, milking cows were split up into two groups, each being fed with the same basic meal and different concentrates per protein amount and with concentrate amount per one liter of milk.

II Separate use of different rates

Type of roughage	MEALS	
	3 Corn	4 Urea+corn
Usual silage kg	33	33
Silage of the wet ear	2.70	2.70
Cows up to 13.50 kg milk	4.5	4.5
13.62-22.70 kg milk	9.00	9.00
22.70 kg milk and more	A	Bacteria
Concentrate type	15	10
Proteins in concentrate %	Ratio concentrate/milk	
Concentrate rate kg	Ratio concentrate/milk	
depending on the milk level up to 13.50	0.5 : 4.50	0.5 : 7.00
13.60-22.70	0.5 : 2.50	0.5 : 2.50
22.70 end more	0.5 : 1.50	0.5 : 1.60
Drying cows kg	1	1

The other diet manner requires the possibility of the individual nutrition of cows (keeping in stables by chain system) or that of head division into more categories as the production level may be.

III Diet method with mixed ration of the silages of wet corn and concentrate

Type of roughages Silage type kg Rate	MEALS	
	5 Corn	6 Urea+corn
Mixture wet ear %	24	36
Concentrate A %	21	/
Concentrate B %	/	10
The Ratio of Mixture and Milk Production		
Mixture rate per milk rate: up to 13.50 kg	0.5 : 1.60	0.5 : 1.60
13.60-22.70 kg	0.5 : 1.20	0.5 : 1.10
22.70 kg and more	0.5 : 1.00	0.5 : 1.00
Drying cows kg	1.80-2.70	2.50-3.20

In order to achieve an efficient diet with this combination, ration mixture should be made immediately before feeding, especially when it is hot and wet outdoors. Ready ration mixture should be given to the cows within ten hours after the meal has been made ready or earlier. If it is too hot and impossible to give meal to the cows during this period, 0.2-0.3% Ca-propionate should be added to the mixture to prevent it from wetting.

IV mixture as the wholesome meal made at the time of feeding

Type of roughage Meal's formula	MEALS	
	7 Corn	8 Urea+corn
Silage	36	34
Corn's wet ear	4.70	10.00
Concentrate A 14.5%	4.5	/
Concentrate B 14.5%	/	2.0
Food rate acc. to milk production, kg	Ratio of food and milk	
up to 13.50	1 : 0.5	1 : 0.5
13.60-22.70	0.8 : 0.5	0.8 : 0.5
22.70 and more	0.7 : 0.5	0.8 : 0.5
Drying cows kg	24.5-25.5	25.5-26.5

The process of the conventional ensilaging and mixing with ear and concentrate can be mechanized so that this meal is also made most practically by

means of 'mixer' trailer. What matters is that complete meals should be made according to the moisture content in the corn and silage. The above given values refer to the moisture mentioned in the paper. The papers on the use of conventional silage in the diet of young bulls, were published by Stojković et al., (1996) and Radovanović and Rajić (1990).

The formula in method IV can also apply to that of V in that the roughages mixed at the time of ensilaging and so the complete meal is made.

However, the formulae for the above mentioned models have the value only if the silage contains 70% and maize 30% moisture. The studies on different combination of diets in the ruminants diet were performed by Jovanović (1993 and 2001) and Radovanović et al., (1990 and 1997).

V Whole meals for ensilaging in kg

FODDERS	MEALS	
	9	10
Maize	1000	1000
Urea	/	5.00
Wet ear	130	225
Concentrate A 32%	120	/
Concentrate B 20%	/	60

The amounts used are equal to those in the formula IV.

The data about concentrate mixtures are given in tab.1.

Tab. 1: The value of corn gain with high moisture content

A	A 32%	B 20%
Wet corn grits	40.0	24.6
Oats	/	46.0
Soya oil seeds	50.0	19.0
Molasses	5.0	5.0
Mineral mixture	1.6	1.5
Ca ₃ (PO ₄) ₂	0.3	0.9
Cow chalk	2.5	2.1
Na ₂ SO ₄	0.6	0.9
Vitamin A unit / kg	21000	21000
D ₁	13000	13000

According to the author's recommendation, substitution of the ingredients can be done, while the level of energy, minerals and proteins must be maintained at the proposed level. 1.5% urea can be used in the concentrates of the variant A or in the whole meal, on which not less than eight days should elapse up to the optimal level.

If the mineral feed is given *ad libitum*, the minerals contained in the meal may be reduced. The concentrates of A and B types should contain more tissues in order to provide limiting amount of 16% raw tissues in the dry matter. If the meal contains silage with fewer tissues, the dry turnip chops may be added. In our opinion, it seems very important that concentrate feed contains the following minerals in the percentages given below:

Concentrate	TYPE	
	A	B
Ca	1.27	1.22
P	0.62	0.62
Mg	0.23	0.20
S	0.45	0.46
K	1.21	0.75
Raw tissues	8.50	10.00

Mineral nutrition *ad libitum* is strongly recommended when the cows are fed with silages or concentrates. It seems highly recommendable that, in each of the wet maize feeding systems, cows receive *ad libitum* minerals from special boxes, microelement salts, Ca and P addition.

We have relied on the maize values displaying differing moisture when making feed.

Tab.2. Maize Grain Value with Differing Moisture

Moisture content %	Base I	Base 2
	15% moisture	10% moisture
10	105.8	100.0
15	100.0	91.5
18	96.6	91.4
20	94.4	89.0
25	88.5	83.5
28	84.6	80.2
30	82.5	77.9
32	80.2	75.6
35	76.6	72.8
40	70.6	66.7
45	67.7	61.4

Base I may be applied to maize ear or grain, and base II to maize and other crops grains.

Based on so programmed nutrition of the milking cows, it is likely to achieve a high output of 5000 l with 4% l milk per cow with physiological norms: gravidity 285 days from 60th day of the drying period, fertility of above 95% and the relationship between milking and drying cows 84:16%, which is

within physiological limits for the high milk output. Over the experiment, no digestion changes in the cows were noticed no matter which one of the tested five feeds was used for feeding, which implies that all the feeds were well-balanced considering a high significance of all the components. The trials with ensilage corn ear in the diet of young bulls, were performed by Čobić et al., (1984) and Obradović (1986).

Conclusion

In the five experiments with feeds with the basic component being the bulky silage with the high moisture percent of up to 70%, special care was taken of the feed nutritional value: that consuming value is hay equivalent minimum 2kg hay/100kg cow body weight.

The initially used combination of the meals with classic silage by means of the wet ear and two concentrate types with 32 and 20% proteins, has proved to be successful with an emphasis on its being highly efficient over the first stage of lactation, whereas at its end, the cows seemed to be fattened more than expected.

The second combination of the meals - separate administering different combinations requires rigorously individualized nourishment or that cows be split up into smaller groups according to the productivity reached.

The third combination of the meals - the whole one with silage mixed with the concentrate, requires that the whole meal be mixed right before nourishment, especially when the nourishment period is warm and wet. The addition of 0.2-0.3% Ca-propionate for conserving feed quality, is strongly recommended.

The fourth combination - whole meal, made at the time of nourishing, has shown excellent results and, as such, recommended to be crushed and mixed during nourishment by "mixing" trailers.

The fifth meal combination is made during the silage. In this case, special attention is paid to the share of the mineral matters in the meal of the macro- and microelements

It should be noted that the nourishment with the combinations described above had no digestive disturbances and displayed excellent production and reproduction results over the experimental period.

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SISTEMI ISHRANE MUZNIH KRAVA SILAŽOM VLAŽNOG KUKURUZA

-stručni rad-

T. Radovanović, M. Gutić, Vera Rajičić, V. Dosković
Agronomski fakultet, Čačak

Rezime

U postavljenih pet ogleda sa obrocima čija je osnovna kabasta komponenta bila silaža sa visokim procentom vlage oko 70%, vodilo se posebno računa da hranljiva vrednost: konzumiranje bude senski ekvivalent minimum 2 kg sena/ 100 kg telesne mase krava.

Prva kombinacija obroka sa klasičnom silažom vlažnim klipom i dve vrste koncentrata sa 32% i 20% proteina pokazao se uspešno sa naglaskom da se ishrana ovim tipom obroka odlično pokazala u prvoj fazi laktacije, dok su se krave pri kraju laktacije nešto više utovile od planiranog nivoa.

Druga kombinacija obroka-odvojeno davanje različitih kombinacija zahteva strogo individualnu ishranu ili podelu krava na manje grupe podeljene prema nivou proizvodnje.

Treća kombinacija obroka-kompletan obrok silaže mešane sa koncentratom, zahteva da se gotov obrok meša neposredno pred hranjenje, naročito ako je vreme hranjenja toplo i vlažno. Preporučujemo dodavanje obroku 0,2-0,3% Ca-propionata kao konzervansa.

Četvrta kombinacija-kompletan obrok napravljen u vreme hranjenja dao je dobre rezultate-preporučujemo da se lomi i meša prilikom ishrane "mikser" prikolicama.

Peta kombinacija obroka pravljena je prilikom siliranja. Kod ovog obroka posebna pažnja posvećena je učešću mineralnih materija u obroku makro i mikroelemenata.

Ishrana sa predstavljenim kombinacijama obroka krava nisu imale digestivnih smetnji, a dale su dobre proizvodne i reproduktivne rezultate tokom celog oglednog perioda.