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COMPARISON OF SILAGE COMPOSITIONS OBTAINED FROM SOWN GRASSES AND NATURAL MEADOW GRASS IN TWO DIFFERENT FARMS

Vilma Kolneja, Marlinda Kaša, Evita Kļaviņa
Latvijos biomokslų ir technologijų universiteto Malnavos koledžas,
Kļavu g. 17, Malnava

Abstract

The paper deals with the methods of improving animal husbandry feed rations in two different farms. Forage quality in herd has enormous impact on methane production all over the world, so it is important to find ways to decrease these numbers and also increase the productivity of the whole herd. As a result of research, the chemical composition of the different kind silage of sown grasses and natural meadows will be clarified and proposals are developed for improvement the quality of feed for herd productivity increase.

Keywords: silage quality, feed, greenhouse gas emissions in animal husbandry

Introduction

In order to improve the quality of the environment, livestock farming should pay particular attention to the animal feeding system on farms. The organisation of the catering system shall cover the analysis of feed samples, the evaluation of the results of these analyses and the practical application of the formulation of balanced feed intakes for bovine animals, as well as the technical provision for feeding feed.

Cows release methane gas - one of the most harmful greenhouse gases - in the digestive process. Balanced cow feeding reduces methane release through intestinal fermentation processes by more than 14% per day and by more than 18% per kg of milk (Kreishman, dz, 2015).

Feed quality, feed digestibility and feed intake are interrelated aspects and have a direct impact on the production of CH4 in the cow's rumen. The quality of fodder has a significant impact on methane production, if digestibility of fodder is low, the amount of methane gas increases. Meanwhile, accurately scheduled feed intakes increase the productivity of the herd.

1. Study objects and methods

The balance and completeness of feed intakes is a crucial factor in improving animal productivity, feed usefulness and GHG emissions. As a result of the study, the chemical composition of silage of sown grassland and natural grassland grass will be ascertained and proposals have been developed to improve the quality of food for increasing the productivity of the herd. The object of the study is the composition of the silage produced by sown grassland and natural grassland grass.

Methods used in the study:

1. Analysis of documents;

2. Method of sampling: Commission Regulation (EC) No 152/2009 of 27 January 2009 laying down methods of sampling and analysis for the official control of feedingstuffs;

3. The following methods shall be used for chemical analysis of silage quality indicators: dry matter content (LVS EN ISO 6498: 2012, 7.5), wood fibre content, ADF, NDF crude ash content (LVS ES ISO

12099: 2010) by gravimetry method, volatile organic acids (acetic acid, lactic acid, butyric acid) are determined by titrimetry method (* ГОСТ 23637-90, ГОСТ 23638-90), crude protein by Kjeldahl method (LVS EN ISO 12099: 2010), phosphorus P by spectometry (LVS EN ISO 12099: 2010), calcium - by absorption iometry method (LVS EN ISO 12099: 2010). Preparation of samples has been performed in accordance with LVS EN ISO 6498: 2012 standards

4. Statistical processing method.

2. Results

Within the framework of the project "comparing the silage composition from sown grassland and natural grassland grass on both farms, 4 different silage samples were removed on farms in collaboration with Sylvia Dreyer, head of livestock farming at LLKC. Sampling probe was used for sampling at 5 different locations for each batch of silage. Further, the samples were delivered for testing to the agronomic analysis Unit of the LLU biotech Scientific Laboratory.

Previously, these farms had never been subjected to laboratory testing of nutrients.

Table 1. Results of laboratory examinations of silage samples from ZS Bērzi and ZS Laimītes, in 2022

Indicators	ZS Bērzi		ZS Laimītes	
	1. Natural grasses (green rolls)	2. Natural grasses (white rolls)	3. Galega, grasses 1st cut	4. Red clover, grasses 1st cut
dry, %	28,72	38,83	21,74	26,12
NEL,MJ/kg	5,37	6,07	5,90	5,99
Protein ,%	10,84	12,12	13,99	16,92
Ca,%	0,68	0,92	0,80	1,32
P,%	0,28	0,27	0,33	0,36
NDF, %	59,04	49,58	50,65	44,41
ADF, %	40,59	31,76	33,98	32,82
Koplen, %	8,02	8,14	10,00	10,93
butyric acid, %	0,02	0,00	0,42	0,80

(According to Department of Agronomic Analysis of the LLU Biotechnology Scientific Laboratory. TESTING REPORT No. D-918-2022 (Animal feed) 24.10.2022)

In order to be able to produce balanced feed intakes, it is necessary to know the chemical analysis of feed materials, it can be determined by means of appropriate catalogues, but the drawing up of the feed intake is much more objective when carrying out individual analyses of feed material.

The dry matter in the silage samples varied between 21.74% and 38.83%. 13-17%, 18-39% normal, 40-55% high can be considered as low, so the limit of almost high dry matter was for silage from sample 2. in sample 3, the dry matter content is already approaching the lower limit, indicating that the green mass has not been sufficiently dried before wrapping, which we also verified at the time of sampling by analysing it organoleptically.

Silage with dry matter above 55% has a chance of heating, while dry matter below 30% may be associated with poor fermentation and lower eating, respectively.

After the results of the test, it is concluded that the amount of dry matter of GI birches in the silage samples is higher than the ZS Laimites. In white rolls of natural grassland, it reaches 38.83 per cent, in green rolls 28.72 per cent. On the second farm, galegas, grasses reach 21.74% in the 1 st harvest, red clover, grasses in the 1 st harvest – 26.12%.

Kopprotein ranged between 10.84% and 16.92% in the drug's silage samples. A feed sample of 10-14% crude protein in the dry matter may be considered preferable. It should be noted that too long field drying (even under good climatic conditions) of forage intensively reduces the amount of crude protein due to plant protein-degrading enzymes.

Kopprotein was better for samples 4 and 3, 16.92 per cent and 13.99 per cent respectively, a good measure. This silage was laid from the green mass of the 1 st harvest. This is also due to the fact that both Eastern Galega and red clover are richer in protein than natural grasslands. Both samples were taken from ZS Laimites. On the second farm, the amount of crude protein in dry matter was relatively lower, at 10.84% and 12.12%.

Depending on the maturity of the green mass at the time of harvesting, the quantity of neutral flushed wood fibre (NDF) in the silage samples varied between 44,41% and 59,04%, the recommended norm limits being between 48% and 54%. Overall, this indicates that the green mass for silage preparation has been mown down in good time, with the exception of ZS Berzi sample No 1, which has the highest NDF content. As the owner confirmed, this has been the most recent harvest.

The acid-rinsed wood fibre (ADF) ZS Berzi sample 1 indicator was above the normal limit of 40.59%. On the other hand, the figure for sample 2 taken on the same holding was relatively lower at 31.76%, which is slightly below the normal limit. On the second holding (ZS Laimites), the indicators were within the norm, the results for both samples were relatively close – 33.98% and 32.82%. This indicator also shows that the silage of 2.3 and 4 samples has been mown down at the most appropriate time.

The energy value of the feed, expressed in terms of the quantity of NEL, was relatively similar on both farms and was within the range of 5,37-6,09 MJ NEL/kg dry matter, corresponding to good quality feed. Lowest it is in sample No. (1) indicating a lower energy value of the nutrient.

In naturally acidified silage samples, lactic acid varied between 3,09% and 4,30% according to low-norm values and acetic acid between 0,35% and 0,80%; pH between 4,44% and 5,26%. These samples correspond to feed of good and excellent quality. Some silage samples showed the presence of butyric acid between 0,00% and 0,80%, corresponding to medium quality feed. Butyric acid accumulates in silage, which is low in dry matter when silage is prepared practically from wet (20-25% dry matter), salted mass. Therefore, samples NR 3 and 4, which were lower in dry matter, also have a higher butyric acid content.

The total ash in the silage samples ranged from 8,02 to 10,93% on the dry matter. Within the limits of the norm (7-11%) on both farms (see Table 1), it can be concluded, however, that the total ash in the samples taken by the GFU birch is less than the GFU winnings. To which the field from which the silage in sample 4 is derived is adjacent to the ground pavement road and dust from passing cars regularly reaches the field.

The calcium content in silage samples also varied from 0.68% to 1.32%. ZS Berzi in sample 1 taken from green rolls of natural grassland was 0.68%, in sample 2 from white rolls was 0.92%. When looking at the analysis data for ZS winnings, it can be concluded that the percentage of calcium in sample 4 is the highest, at 1.32%. This is because this is a sample of red clover silage. in sample 3, the CA sauhandle is 0,8%, although obtained from:

The lack of phosphorus is responsible for the worsening use of feed, lower growth in live mass and lower milk productivity. Such cases are common in farms where animals are fed lots of root leaves and sugar beet cuttings (Burow, 2011).

GI birch in silage samples is relatively low in phosphorus. 0,28% and 0,27% respectively. This indicates insufficient fertilisation of the countryside. The landlord himself also admitted that the natural meadows did not devour. The phosphorus content is relatively higher in samples nr.3 and 4, 0.33 and 0.36% respectively, which is also insufficient.

On the basis of farm activity and resource surveys and the results of the silos laboratory analyses obtained, the authors of the work shall identify the following errors and deficiencies in the technological process of silage preparation:

1. The green mass was not sufficiently dispersed and dried during the preparation of ZS Laimites silage, resulting in low dry matter content, too wet the feed medium, the samples contain butyric acid
2. High ash content in acidification suggests the presence of land that ended up there from mole digs and adjacent gravel road pavement. Since the soil content of clostrial acid, its high moisture content, contributes to the formation of butyric acid
3. Both farms, but especially ZS Berzies, have insufficient field fertilization

Conclusions

1. Silage samples of ZS Berzi from two natural meadow mows and ZS winnings from the Eastern Galega and red clover first year mows have been removed. ZS Berzi dry matter is higher in silage samples than ZS Laimites. ZS Berzi in natural grassland silage has a dry matter content of 28.72% - 38.83%, ZS Laimites galegas, grasses have 21.74% dry matter, red clover and grasses in silage - 26.12% dry matter. Kopprotein ranged between 10.84% and 16.92% in the drug's silage samples, broadly in line with the preferred norm. Kopprotein is better in ZS Laimites prepared silage (16.92% and 13.99%, respectively). GI birch crude protein was relatively lower in the dry matter (10.84% and 12.12%, respectively). The amount of neutral flushed wood fibre (NDF) in silage samples varies from 44.41% to 59.04%, at the recommended 48% to 54%. Acid-rinsed wood fibre (ADF) ZS Berzi sample 1 is above the normal limit (40.59%), whereas in sample 2 ADF is slightly below the normal limit of 31.76%, these deviations are negligible. The ADF figures for ZS Laimites are within the norm – 33.98% and 32.82%. The energy value of the feed, expressed in terms of the amount of NEL, was relatively similar in both farms and was within the range of 5,37-6,09 MJ NEL/kg dry matter.
2. ZS Laimites silage samples are low in dry matter, suggesting that the green mass has not been sufficiently dried before wrapping. The crude protein content in ZS Berzi silage samples is lower because natural grasslands are poorer with protein like Eastern Galega, and red clover. In general, the content of ADF and NDF in the samples complies with the norm indicating that the feed has been mown at an appropriate stage of vegetation. Increased crude ash content in ZS Laimites silage indicates the presence of land in feed coming there from mole digs and gravel road pavement. The presence of butyric acid in the samples indicates the activity of clocontroces in too damp mass where the presence of the earth is present. The calcium content in all samples is within normal limits, but higher in ZS prize samples because the silage is made from butterfly ointments, which tend to have higher calcium content. The reduced phosphorus shortage in ZS Berzi acidification indicates underfertilised gold. Overall, due to errors in gelemaking and silage technology, silage in all samples is relatively low in NEL.
3. According to the silage composition of both farms, the productivity of cows, the type of food and the nutrients available to farms, 4 doses of feed have been developed. ZS Laimites requires a higher amount of silage because the dry matter content of the feed is lower than ZS Berzi in silage. In order to compensate for the insufficient amount of crude protein, ZS Berzi must include rapeseed in the feed ration, while ZS Laimites uses vegetable fat to improve the protein-fat ratio. ZS Berzies are not included in the feed ration for cows because a feed dispenser is used to organise the food. The different feed intakes confirm the necessity and importance of laboratory feed tests.
4. Due to accurate feed analyses and balanced feed intakes, will contribute to the reduction of methan emissions on the holding.

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Vilma Kolneja, Marlinda Kaša, Evita Kļaviņa
Latvian University of Biosciences and Technologies Malnava College
Kļavu str. 17, Malnava

Summary

Accurate feed analyses were carried out to produce balanced feed intakes. After analysing the data, it can be concluded that almost all indicators were within normal limits. ZS Laimites requires a higher amount of silage because the dry matter content of the feed is lower than ZS Berzi in silage. Balanced feed intakes, will contribute to the reduction of methan emissions on the holding.