UDC 577.12:591.132.1/.2:636.086 DOI: 10.32636/agroscience.2023-(2)-1-4

DIRECTION OF THE FERMENTATION PROCESSES AND LEVEL OF THE VOLATILE FATTY ACIDS IN LIQUID CONTENT OF BULL RUMEN WHEN FEEDING THEM DIFFERENT FORMS OF CELLULOSE-CONTAINING FODDER

Andrii SHELEVACH, candidate of agricultural sciences
Institute of Agriculture of Carpathian Region,
National Academy of Agrarian Sciences of Ukraine
Hrushevskoho street, 5, Obroshyn, Lviv Region, Lviv Oblast, 81115, Ukraine
e-mail: 1059@i.ua

The direction of the fermentation processes and level of the volatile fatty acids (VFA) in liquid content of bull's rumen, when feeding them different forms of cellulose-containing fodder, were studied. It was established, that total amount of VFA, that comes from rumen to blood and tissues, influences significantly energetic supply of ruminants organism. Some VFA, which are coming from rumen to blood and tissues, are able to influence the direction metabolism processes and synthesis of particular components of ruminants' organism. It was shown, that influence of different forms of cellulose-containing fodder on direction metabolism processes in rumen and VFA assay in its fluid depends from time relative to beginning of feeding. It was established also, that different forms of cellulose-containing fodder are able to regulate fermentation processes in bull's rumen under condition of feeding to them young grass an combined fodder, as well as total amount and assay of some VFA in ruminal fluid depends from form of cellulose-containing fodder in ration.

Keywords: fermentation processes, volatile fatty acids, rumen, fiber-containing feed, ruminants.

Introduction

It is known that roughage fiber, having a low nutritional value, in the body of ruminants can also perform the function of a surface on which amylo-, lipo- and proteolytic microorganisms in the rumen show their maximal activity (Aliev, 1995; Bhat et al., 2019) . They, in turn, break down nutrients and make them available to the host's body (Chandra et al., 2018; Chaplin et al., 2017). It should be noted that this function of fiber as a surface is poorly studied. In addition, the function of roughage fiber as a nutrient sorbent in the gastrointestinal tract of animals is poorly understood (Cunningham et al., 2017; Debrecen et al., 2015; Doig et al., 2018). The question of which of these three functions of fiber – nutritional, surface or adsorbing – is more valuable for the body of a ruminant animal is also little known (Febel et al., 2018; Firkins et al., 2017).

The influence of roughage fiber with different particle sizes on the processes of formation and absorption of volatile fatty acids (VFA) in the rumen of ruminants, as well as in the gastrointestinal tract when feeding green mass of cultivated pastures, is insufficiently studied (Givens, 2014; Granner et al., 2019).

The dry matter of the diet of ruminants should normally contain an average of 22% fiber (Groleau et al., 2011). The latter in the rumen, which is one of the sections of the compound stomach of ruminants, is subject to destruction by microorganisms, primarily cellulolytic bacteria (et al., 2019; et al., 2019; et al., 2019). As a result of the fermentation process of fiber breakdown products in the rumen of ruminants, a large amount of VFA is formed (Kononskiy, 1998; Kurylov, 1999). The mass of the latter per day can reach 4.5 kg (Lough et al., 2013; Ludden, 2020). The direction of fermentation processes (acetic, propionic or butyric acid fermentation) in the rumen of ruminants depends on the concentration of hydrogen ions in it (MacLeod et al., 2014; Michalet-Doreau et al., 2020). Part of the formed VFA in the rumen of ruminants, with the help of microbial synthetases, is transformed into higher molecular weight fatty acids with even and odd number of carbon atoms in the chain (Miron et al., 2020). As a result of synthesis processes, the content of high-molecular-weight fatty acids in the rumen of ruminants can be 3-5 times higher than the amount that comes with feed (Moloney et al., 2021). Another part of the VFA formed in the rumen is absorbed by its wall and enters the liver through the circulatory system (Pascale et al., 2017). In the body tissues of ruminants, they serve as a source of energy and a substrate for the synthesis of higher molecular weight substances (Vorobiev et al., 2021). VFA provides up to 70% of the ruminant's body's energy needs (Yan Shi et al., 2017).

Young grass contains an insufficient amount of fiber – only 18-19% of dry matter (Fondevila et al., 2011). As a result, the microorganisms that inhabit the rumen and the body of the ruminant animal do not fully use the nitrogen of protein and non-protein nitrogen-containing compounds in the young grass to build its body (Junqin et al., 2010; Kijora et al., 2014). For better use of nitrogen-containing compounds, ruminants are fed roughage – hay or straw straw (Bhendar et al., 2019; Brown et al., 2018). The direction of fermentation processes in the rumen of ruminants and the level of VFA in it after feeding them young grass with various types of roughage are not studied.

Based on the above, the aim of our research was to establish: 1) the direction of fermentation processes in the rumen of ruminants; 2) the concentration of VFA in the liquid fraction of the rumen content – depending on the time in relation to the start of feeding and the presence in the diet, along with young grass, of various forms of fiber-containing feed.

Materials and methods

In the "Litynske" farm of the Drogobytskyi district of the Lviv region, three groups of bulls (4 animals each) were formed, similar in origin, age and live weight. Three animals from each group underwent scar fistulas. During the months of May-July, animals of the control group received the basic ration (BR), which contained the green mass of cereal-legume pasture (35 kg) and compound feed (2.5 kg), under the conditions of tethered housing and two-time feeding. The animals of the research groups were fed 1 kg of winter wheat straw in addition to the main diet. Moreover, the animals of the I and II experimental groups were fed straw with a particle size of 0.2–2.0 and 3.0–5.0 cm, respectively. At the end of the experiment, samples of its liquid contents were taken from the cattle with rumen fistulas.

The latter were taken before morning feeding, as well as at 2nd and 7th hours after its start. In the liquid content of the rumen, the concentration of VFA was determined according to the method of Rivis and others (Rivis et al., 2004).

The obtained research results were processed using the standard package of Microsoft EXCEL statistical programs.

Results and discussion

As can be seen from the Table, the direction of fermentation processes in rumen of I and II experimental groups, which were fed young grass, mixed fodder and various forms of fiber-containing feed for 90 days, in comparison with bulls of the control group, which were fed only young grass and mixed fodder, before morning feeding changes towards an increase in propionic acid fermentation (after feeding straw cuttings with a particle size of 0.2 – 2.0 and 3.0 – 5.0 cm, respectively 20.8 and 20.1% versus 17.9%) and a decrease in acetic acid fermentation (after feeding straw cuttings with a particle size of 0.2 – 2.0 and 3.0 – 5.0 cm, respectively, 61.0 and 61.6% against 63.6%). This may indicate more intensive processes of fermentation of nutrients in the rumen of bulls of experimental groups, compared to bulls of the control group.

Table. The dynamics of the concentration of VFA in the liquid content of the rumen of the experimental bulls, g/l, M±m

VFA and their code	Groups of animals		
	control (basic ration – BR)	I experimental (BR + straw cutting with particle size 0.2-2.0 cm)	II experimental (BR + straw cutting with particle size 3.0-5.0 cm)
Before morning feeding			
Acetic, 2:0	3.67±0.031	3.60±0.033	3.34±0.030***
Propionic, 3:0	1.03±0.009	1.23±0.016***	1.09±0.014**
Butyric, 4:0	0.97±0.015	0.96±0.035	0.90±0.033
Isovaleric, iso 5:0	0.10±0.003	0.11±0.005	0.09±0.004
At the 2nd hour from the start of morning feeding			
Acetic, 2:0	5.83±0.054	4.82±0.072***	5.05±0.075***
Propionic, 3:0	2.17±0.024	1.91±0.039***	1.78±0.036***
Butyric, 4:0	2.18±0.057	1.43±0.055***	1.53±0.059***
Isovaleric, iso 5:0	0.22±0.019	0.10±0.015***	0.14±0.014**
At the 4th hour from the start of morning feeding			
Acetic, 2:0	4.90±0.045	4.08±0.019***	5.35±0.024***
Propionic, 3:0	1.52±0.049	1.40±0.029*	1.80±0.008***
Butyric, 4:0	1.67±0.050	1.32±0.065**	1.90±0.014**
Isovaleric, iso 5:0	0.09±0.011	0.04±0.007**	0.07±0.10

Note: *= P < 0.05 – 0.02; **= P <0.01; ***= P < 0.001

It should also be noted a decrease in the concentration of all VFA in both experimental groups compared to the control at the 4th hour after the start of feeding. Nevertheless, the reason for this may be a more intensive absorption of VFA by the walls of the rumen along with a high level of their synthesis.

In the liquid content of the rumen of the steers of the experimental groups, there was a tendency to decrease the concentration of each of the VFAs (Table). With the exception of the 4th hour values in group II for acetic, butyric and isovaleric acids, as well as for propionic acid in group I before feeding, all other values (except butyric

acid in experimental group I before feeding) were significantly lower relative to the control.

From the experimental data, it is also clear that the concentration of all VFA decreases the most in the 1st experimental group at the 4th hour after feeding, i.e. in the experimental animals, which were additionally fed straw straw with a particle size of 0.2–2.0 cm in addition to the main diet. It is quite likely that by the 4th hour, the maximum formation of VFA in the rumen of animals of the 1st experimental group passes and the process of their absorption begins to dominate. In addition, it should be taken into account the fact that straw particles with a size of 0.2–2.0 cm leave the rumen by the 4th hour after feeding and continue to perform mainly the function of a sorbent of nutrients in the gastrointestinal tract animals

The validity of this assumption is confirmed by the data relating to the 4th hour after feeding of the II experimental group: it was these animals at the 4th hour after feeding that showed the highest level of VFA. Moreover, it is always higher not only in comparison with the control, but also in comparison with the 1st experimental group with a minor exception regarding the content of isovaleric acid. At the 4th hour after feeding, the level of all VFAs, except for propionate, was also higher in the animals of the II experimental group compared to the animals of the I experimental group. It is also worth noting that in the rumen fluid of test group I bulls, compared to the control, the concentration of VFA (except propion) decreased at the 2nd and 4th hours.

As for the total amount of VFA in the liquid content of the rumen of cattle, before feeding it was the highest in animals of the I experimental group, at the 2nd hour after feeding it increased more noticeably in the animals of the II experimental group, and at the 4th hour after feeding it was the highest in the animals of the II experimental group, while it was the lowest in the animals of the I experimental group.

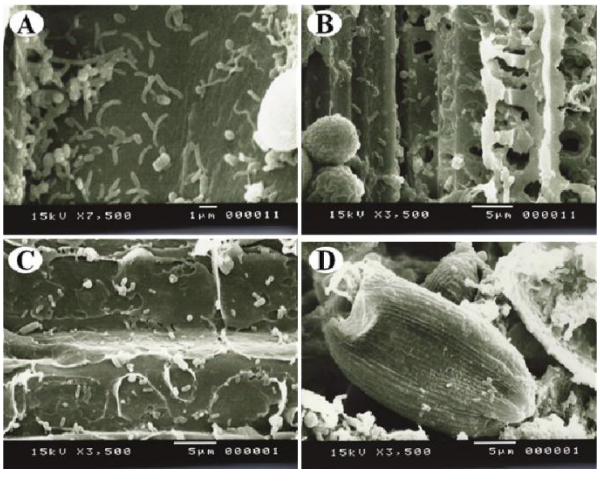
Such fluctuations in the concentration of VFA in the rumen fluid of the experimental bulls depending on the time in relation to the beginning of their feeding may be related not only to the specificity of the directionality of metabolic processes in the rumen, but also to temporal changes in the intensity of absorption of VFA in it and the rate of evacuation to the lower departments gastrointestinal tract. In particular, this may be a consequence of the fact that straw with a particle size of 0.2–2.0 cm moves much faster from the rumen to the following parts of the gastrointestinal tract than particles with a size of 3.0–5.0 cm.

Despite the low nutritional value of winter wheat straw, the data we obtained indicate that its presence in the rumen of ruminants significantly affects the intensity and directionality of metabolic processes of VFA in it. The speed of passage of the contents of the rumen into the lower parts of the gastrointestinal tract depends on the size of its particles.

In addition, in the rumen fluid of bulls of the I and II experimental groups, compared to the bulls of the control group, the total amount of VFA slightly changes (after feeding particles with a size of 0.2–2.0 and 3.0–5.0 cm, respectively, 5.90 and 5.42 g/l versus 5.77 g/l in the control). In the bulls of the 1st experimental group, compared to the bulls of the control group, this is due to an increase in the content of propionic acid (Table). In bulls of the II experimental group – with an increase in the level of propionic acid, but a decrease in acetic acid. At the same time, the relative (1.9 vs. 1.7%) and absolute amount of isovaleric acid in the liquid fraction of the rumen contents of test group I bulls compared to control group bulls slightly increased.

It should be emphasized that propionic acid fermentation in the rumen of ruminants takes place at a relatively low concentration of hydrogen ions, while acetic acid fermentation occurs at a high concentration of them. Isovaleric acid is formed in the rumen of ruminants as a result of the activation of the deamination process of such an amino acid as valine.

Before morning feeding in the rumen of bulls, which are fed various forms of fiber-containing feed (straw cut with a particle size of 0.2–2.0 and 3.0–5.0 cm) for 90 days, propionic acid fermentation prevails over acetic acid. This is apparently due to the very low concentration of hydrogen ions in it. In particular, the latter can also be created by nitrogen-containing compounds (Chandra et al., 2018). We found that at that time in the rumenal fluid of the animals there was a very low level of total, protein and non-protein nitrogen. At the same time, the total amount of VFA in the rumen fluid of bulls fed fiber-containing feed with a particle size of 0.2–2.0 cm slightly increases (mainly due to propionic acid), and bulls that consume fiber-containing feed with a particle size of 3.0–5.0 cm, – decreases (mainly due to acetic acid).



The above-mentioned processes of nitrogen exchange in the rumen of ruminants are accompanied by changes in the direction of fermentation processes in it and the level of certain VFAs in its liquid. Nitrogen-containing compounds affect the direction of fermentation processes in the rumen due to a change in the concentration of hydrogen ions in it. In turn, the different directionality of fermentation processes in the rumen is accompanied by changes in the content of certain VFAs in it. In addition, such an amino acid as

valine is directly related to such a volatile fatty acid as isovaleric acid. The latter is formed as a result of the process of deamination of the above amino acid.

On the 2nd hour after the start of feeding in the rumen of bulls of the I and II experimental groups, which were fed young grass, compound feed and various forms of fiber-containing feed, compared to bulls of the control group, which were fed only young grass and compound feed, the direction of fermentation processes changes towards predominance acetic acid fermentation (after straw cutting with a particle size of 0.2–2.0 and 3.0–5.0 cm, respectively, 58.4 and 59.4% versus 56.1%) over butyric acid fermentation (after straw cutting sharps with a particle size of 0.2–2.0 and 3.0–5.0 cm, respectively, 17.3 and 18.0% versus 21.0%).

As can be seen from the table, before the morning feeding, the most noticeable difference in the content of acetic acid compared to the control was in the rumen of animals of the II experimental group, and in terms of the content of propionic acid, the animals of the I experimental group were characterized by its highest content and to a somewhat lesser extent – the animals of the II experimental group.

While the difference in the concentration of butyric acid and isovaleric acid between the animals of the control and both experimental groups before feeding was insignificant, at the 4th hour after feeding, the concentration of isovaleric acid in the animals of the first experimental group was almost twice as low as compared to the control. In general, this is a positive indicator, since a decrease in the relative level of isovaleric acid may be a consequence of a decrease in the intensity of valine deamination. The content of butyric acid at the 4th hour after feeding in the rumen of animals of the I experimental group was also significantly lower compared to the control.

It is characteristic that while the concentration of all other studied VFA in the ruminal fluid of bulls before feeding has a tendency to decrease, the concentration of propionic acid, especially in bulls of the 1st experimental group, has a noticeable tendency to increase (Table). This may be caused by the long-term effects on the microflora of the rumen of exactly this amount of straw cutting, despite the fact that the latter is evacuated from the rumen more quickly.

At the 4th hour after feeding, the concentration of acetic and butyric acids in the 1st experimental group is at a lower level compared to the control, and in the 2nd group, their concentration, as well as the propionic acid content, on the contrary, is higher. A similar trend is also observed with regard to isovaleric acid, but with a less pronounced increase in its concentration at the 4th hour in the II group.

It should be said that in the rumen of bulls of the 1st experimental group, compared to bulls of the control group, the growth of acetic acid fermentation is accompanied by an increase in propionic acid (23.1 vs. 20.9%). This once again indicates that when cattle are fed straw cuttings with a particle size of 0.2-2.0 cm in their rumen, the intensity of ferme the fermentation process of feed nutrients increases.

At the same time, in the rumenal fluid of bulls of the I and II experimental groups, compared to the bulls of the control group, the total concentration of VFA decreases (after straw cutting with particle sizes of 0.2–2.0 and 3.0–5.0 cm, respectively 8.26 and 8.50 g/l against 10.40 g/l). At the same time, in their scar fluid, the relative is greatly reduced (after straw cuttings with a particle size of 0.2 – 2.0 and 3.0 – 5.0 cm, respectively, 1.2 and 1.6% versus 2.1%) and the absolute amount of isovaleric acid.

As a result of feeding young grass, mixed fodder, and straw clippings with a particle size of 0.2-2.0 cm to bullocks of the I experimental group, compared to bullocks of the control group, which were fed only young grass and mixed fodder, at the 2nd hour from the start of feeding the direction of fermentation processes in the rumen changes strongly towards an increase in propionic acid fermentation (20.5 vs. 18.6%) and a decrease in butyric acid fermentation (19.3 vs. 20.4%). At the same time, the level of VFA in their scar fluid is significantly reduced (6.84 vs. 8.18 g/l). It is reduced by acetic, propionic, butyric and, especially, isovaleric acids. This may be due to the fact that this form of fiber-containing feed accelerates the evacuation of the contents of the rumen into the lower parts of the gastrointestinal tract.

After feeding the cattle of the II research group with young grass, compound feed and straw clippings with a

particle size of 3.0-5.0 cm, compared to the cattle of the control group, which were fed only young grass and compound feed, at the 2nd hour from the start of feeding, the direction fermentation processes in the rumen changes towards an increase in propionic acid (19.7 vs. 18.6%) and butyric acid (20.8 vs. 20.4%) fermentation, but a decrease in acetic acid (58.7 vs. 59.9%) fermentation. At the same time, the total amount of VFA increases in their scar fluid (9.12 vs. 8.18 g/l). It grows due to acetic, propionic and butyric acids (table). This occurs against the background of a decrease in the relative level of isovaleric acid (0.8 vs. 1.1%). The above-mentioned changes in the direction of fermentation processes in the rumen and the concentration of VFA in its liquid may be related to the fact that this form of fiber-containing feed does not contribute to the rapid evacuation of the contents of the rumen to the lower parts of the gastrointestinal tract.

The total amount of VFA, which enters the rumen into the blood and tissues, significantly affects the energy supply of the ruminant's body. Individual VFAs, which enter the blood and tissues from the rumen, are able to influence the direction of metabolic processes and the synthesis of individual components of the ruminant's body. Therefore, it is important that different forms of fiber-containing feed, having low energy and nutritional value, can significantly influence the direction of fermentation processes in the rumen and the level of certain VFAs in it.

The above-mentioned changes in the direction of fermentation processes in the rumen and the concentration of VFA in its liquid may be related to the fact that different forms of fiber-containing feed (and with them other types of feed) are retained and digested differently in this part of the stomach.

Thus, the directionality of fermentation processes in the rumen and the concentration of VFA in its liquid depends on the presence of various forms of fiber-containing feed in the diet of cattle. In addition, the direction of fermentation processes in the rumen and the content of VFA in its liquid depends on the time in relation to the start of feeding the rumen.

The direction of fermentation processes in the rumen has an effect on the concentration of individual VFAs in its liquid. In turn, VFAs have a direct effect on synthesis in the rumen, with the participation of enzymes of microorganisms, saturated and monounsaturated VFAs. As a result of this process, the concentration of VFA in the rumen of ruminants increases by 3-5 times, in relation to the amount that entered their body with feed.

Conclusions

Different forms of fiber-containing feed regulate the directionality of fermentation processes in the rumen of steers fed with young grass and compound feed. The total amount and content of individual VFAs in the ruminal fluid of cattle fed young grass and compound fodder depends on the forms of fiber-containing feed in the diet. The effect of different forms of fiber-containing feed on the direction of fermentation processes in the rumen and the concentration of VFA in its liquid depends on the time relative to the beginning of feeding cattle.

References

Aliev A. A. (1995) Lipid metabolism and productivity of ruminants / A. A. Aliev // M.: Kolos. 380 p.

Bhat S., Wallace R. J., Orskov E. R. (2019) Study of the relation between straw quality and its colonization by rumen microorganisms. J. Agric. Sci. Vol. 110. p. 561-565.

Bhendar A., Weimer J. (2019) Feeding plant oil to ruminants is more competitive due to higher growth rate of microorganisms. Microbiology. V. 78. P. 27–35.

Brown W. F., Kunkle W. E. (2018) Improving the feeding value of hay by anhydrous ammonia treatment. Anim. Sci. V. 12. p. 1–17.

Chandra S., Givens D. (2018) Plant oils and other oil-containing fodder feeding to ruminant animals is good practice in early winter and late spring. J. Agric. Sci. V. 56. p. 114–125.

Chaplin R. (2017) Experiments in straw handling. J. Agric. Sci. V. 178. p. 11–30.

Cunningham F., Fung D., Hunt M. (2017) Supplementation of ammoniated wheat straw in wintering diets of gestating beef cows. Agric. Experimental. V. 19. p. 116.

Debrecen K., Birken S. (2015) Rumenal microorganisms and their interaction with substrate in conditions of different fat additives feeding. J. Anim. Sci. V. 81 (2). p. 242–251.

Doig B. (2018) Beef cow rations and winter feeding guidelines. Saskatchevan Agriculture. V. 82. p. 73–78.

Febel H., Fekete S. (2018) Factors influencing microbial growth and the efficiency of microbial protein synthesis. Acta Vet. Hung. V. 44 (1). p. 39–56.

Firkins J. (2017) Maximizing microbial protein synthesis in the rumen. J. Nutr. V. 126 (4). p. 1347–1354.

Fondevila M., Dehority B. (2011) Interactions between Fibrobacter succinogenes, Prevotella ruminicola, and Ruminococcus flavefaciens in the digestion of cellulose from forages. J. Anim. Sci. V. 74 (3). p. 678–684.

Givens D. (2014) Nutritional characterisation of forages. Grass Farmer. V. 55. p. 10.

Granner M., Chedar K., Retons A. (2019) Microbial fatty acids retention processes in rumen under different feed diets and their influence on total VFA uptake in first-born cows. J. Anim. Sci. V. 31 (2). p. 188–195.

Groleau D., Forsberg C. (2011) Cellulolytic activity of the rumen bacterium Bacteroides succinogenes. Can. J. Microbiol. Vol. 27. № 5. p. 517-30.

Junqin C., Weimer J. (2010) Competition among three predominant ruminal cellulolytic bacteria in the absence or presence of non-cellulolytic bacteria. Microbiology. V. 147. p. 21–30.

Kijora C., Simon O., Jacobi U. (2014) Nitrogen metabolism in the large intestine of ruminants. 3. Microbial utilization of intracecally administered 14C- and 15N-marked urea. Arch. Tierernahr. V. 36 (9). p. 839–850.
Kononskiy A. I. (1998) Biochemistry of animals / A. I. Kononskiy // K.: Vyshcha shkola. 415 p.
Kurylov A. P., Krotkova N. B. (1999) Physiology and biochemistry of ruminant digestion. M.: Kolos. 432 p.
Lough A., Smith A. (2013) Influence of the products of phospholipolysis of phosphatidylcholine on micellar solubilization of fatty acids in the presence of bile salts. Brit. J. of Nutr. V. 35. p. 89–96.
Ludden P. A. (2020) Effects of oscillating dietary protein on nutrient digestibility, nitrogen metabolism, and gastrointestinal organ mass in sheep. J. Anim. Sci. Vol. 80. p. 3021-3026.
MacLeod N. A., Orskov E. R., Atkinson T. (2014) The effect of pH on the relative proportions of ruminal volatile fatty acids in sheep sustained by intragastric infusions. J. Agric. Sci. Vol. 103. p. 459-462.
Michalet-Doreau B. I., Fernandez G. A., Fonty A. I. (2020) Comparison of enzymatic and molecular approaches to characterize the cellulolytic microbial ecosystems of the rumen and the cecum. J. Anim. Sci. Vol. 80. p. 790–796.
Miron J., Ben-Ghedalia D., Morrison M. (2020) Adhesion mechanisms of rumen cellulolytic bacteria. J. Dairy Sci. Vol. 84. p. 1294–1309.
Moloney A. P., Woods V. B., O'Mara F. P. (2021) Characterisation of feedstuffs for ruminants report on a project. J. Agric. Sci. Vol. 108. p. 491-502.
Pascale M., Gerard F., Gouet P. (2017) Competition Between Ruminal Cellulolytic Bacteria for Adhesion to Cellulose. Current Microbiology. Vol. 35. № 1. p. 44-47.
Rivis Y. F., Skorokhid A. V., Protsyk Ya. M. (2004) Gas chromatographic determination of the level of individual volatile fatty acids in biological material. Naukovo-tekhnichnyi biuleten instytutu biolohii tvaryn. Lviv. Vol. 5. № 3. p. 61-65.
Vorobiev E. C. (2021) Effective use of green fodder by lactating cows. Zootekhnyia. № 4. p. 30-32.
Yan Shi L., Christine J., Weimer I. (2017) Competition for cellulose among three predominant ruminal cellulolytic bacteria under substrate-excess and substrate-limited conditions. Applied and environmental microbiology. Vol. 63. № 2. p. 734-742.

НАПРАВЛЕНІСТЬ БРОДИЛЬНИХ ПРОЦЕСІВ В РУБЦІ БУГАЙЦІВ ТА РІВЕНЬ У ЙОГО РІДИНІ ЛЕТКИХ ЖИРНИХ КИСЛОТ ЗА ЗГОДОВУВАННЯ РІЗНИХ ФОРМ КЛІТКОВИНОВМІСНОГО КОРМУ

Андрій ШЕЛЕВАЧ, кандидат сільськогосподарських наук
Інститут сільського господарства Карпатського регіону НААН

Досліджена динаміка направленості бродильних процесів у рубці бугайців і рівень у ньому летких жирних кислот (ЛЖК) за згодовування різних форм клітковиновмісного корму. Встановлено, що загальна кількість ЛЖК, яка надходить з рубця в кров і тканини, суттєво впливає на енергетичне забезпечення організму жуйної тварини. Окремі ЛЖК, які надходять з рубця у кров і тканини, здатні впливати на направленість обмінних процесів і синтез окремих складових організму жуйної тварини. Показано, що вплив різних форм клітковиновмісного корму на направленість бродильних процесів у рубці та концентрацію ЛЖК в його рідині залежить від часу відносно початку годівлі бугайців. Встановлено, що різні форми клітковиновмісного корму регулюють направленість бродильних процесів в рубці бугайців за згодовування молодої трави та комбікорму, а також, що загальна кількість та вміст окремих ЛЖК в рубцевій рідині бугайців за згодовування молодої трави і комбікорму залежить від форми клітковиновмісного корму в раціоні.

Ключові слова: бродильні процеси, леткі жирні кислоти, рубець, клітковиновмісний корм, бугайці.
Отримано: 10.02.2023
Погоджено до друку: 23.02.2023

Наукові дискусії

У перший день весни 2023 року в Інституті сільського господарства Карпатського регіону НААН відбулась робоча зустріч головного редактора наукового журналу "Передгірне та гірське землеробство і тваринництво" – академіка Влізла Василя Васильовича з науковцями Інституту. Обговорювались важливі питання щодо подачі авторами статей на належному науковому рівні. Між учасниками зустрічі зав'язалась цікава і плідна дискусія.