International Journal on Emerging Technologies 11(2): 495-500(2020)

ISSN No. (Print): 0975-8364
ISSN No. (Online): 2249-3255

Impact of Ruminal Fluid Composition on the Digestibility of Nutrients and Milk Yield

A.P. Velmatov[1], V.V. Mungin[1], T.N. Tishkina[1], N.N. Neyaskin[1], L.N. Velmatova[1] and A.M. Guryanov[2]
[1]Ogarev Mordovia State University, Bolshevitskaya Street, 68, Saransk, 430005, Mordovia, Russia.
[2]Mordovia Research Agricultural Institute – Branch of Federal Agricultural Research Center of the North-East named N.V. Rudnitskogo, Michurina Street, 5, Saransk, 430904, Mordovia, Russia.

(Corresponding author: A.P. Velmatov)
(Received 24 December 2019, Revised 22 February 2020, Accepted 24 February 2020)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: Scientists and practitioners pay great attention to the study of metabolic processes in the body of highly productive animals. This research has been aimed at studying the rumen content and its impact on the digestibility of nutrients and milk yield for various genotypes of cows. Four groups of cows were formed with 20 animals in each, i.e., Group 1 (the control group) included the Simmentals, and Group 2, Group 3 and Group 4 (the trial groups) included the crossbred Simmental-Holstein cows with 50.0, 75.0 and 87.5 % Holstein genotype, respectively. The bacterial count in the ruminal fluid was determined by the method of E.M. Foster. The method offered by A.P. Krotkova and N.I. Mitin was applied, i.e., steam distillation in the McGam apparatus followed by titration of the distillate. For the high half-bred Holsteins with a well-balanced diet, the acidity was more favorable for the digestion of nutrients, thus increasing the ciliata quantity by 120 thousand or 45.8 %, i.e., up to 383 thousand/ml. For the crossbred cows, the concentration of volatile fatty acids ranged between 9.11 and 9.75 mmol/ml, which was by 0.80 – 1.44 mmol/ml, or 13.8 – 17.3 %, higher than for the Simmentals. This emphasizes the stronger metabolism due to the higher productivity during the digestible trial. While increasing the milk yield, it has been registered for the crossbred cows at the level of 2,391 – 2,641 kg in the first 100 days. The protein mass fraction and fat in their milk have also exceeded those of the Simmentals. Per lactation, highly considerable difference has been observed for the crossbred cows with 87.5 % Holstein genotype at milk yield and protein.

Keywords: digestibility, fat, fatty acids, fodder, genotype, milk yield, protein, ruminal fluid.

Abbreviations: BWH, Black-and-White Holstein; EFU, energetic feed unit; NEL, net energy of lactation; NFEF, nitrogen-free extractive fraction; VFA, volatile fatty acids.

I. INTRODUCTION

When implementing the Simmental breed improvement program, it has been possible to create herds with the milk yield of 8.0-10.0 thous. kg, while the productive longevity of cows has not exceeded 2 lactations. The main reason is the imperfect technology of feeding the highly productive Holsteinized animals [1-3]. Taking into account the development of new genotypes with high productivity, there are not enough studies on feeding Holsteinized cows, especially on feeding the cows with the milk yield of 30-40 kg per day [4-6].
Therefore, lately much attention has been paid to the study of metabolic processes in the body of highly productive animals.
The aim of feeding a dairy cow is to obtain larger milk yield and better milk quality within the appropriate limits of heredity, and such cow should remain healthy. This is a complex task. In order to achieve it, it is necessary to take into account a number of economic, technical and managerial factors, as well as a large group of biological factors, many of which are directly related to the special quality of livestock as ruminants.
Holsteinization of the Simmentals has resulted in some increased milk yield of the crossbred cows [7, 8].
Feeding, diet, digestibility of nutrients, age, and breed have impact on the milk yield. For the crossbred cows, digestibility of nutrients has increased by 1.1 – 3.7 % [6, 9, 10], especially during the period of growth and formation of milk yield [11, 12].
The study has been aimed at researching the content of the rumen and its impact on the digestibility of nutrients and milk yield for various genotypes of cows.

II. MATERIALS AND METHODS

This study was carried out at the joint-venture Bogdanovskoye, LLC of the Staroshaygovsky district in the Republic of Mordovia. The objects of the study were the Simmental and crossbred Simmental-BWH (Black-and-White Holstein) animals with 50.0, 75.0 and 87.5 % Holstein genotypes.
In order to properly study the milk yield and digestibility of nutrients, four groups of cows were formed with 20 animals in each, i.e., Group 1 (the control group) included the Simmentals, and Group 2, Group 3 and Group 4 (the trial groups) included the crossbred Simmental-Holstein cows with 50.0, 75.0 and 87.5 % Holstein genotype, respectively.
The animals were stratified by their genotype, age, and physiological state. They were fed according to the diet approved by the Russian Academy of Agricultural Sciences [13].
Four subgroups (consisting of five cows) were formed in each group for the digestible trial. The animals under observation were on the 55 – 75 days of their first lactation.

The chemical composition of their fodder, feces, and urine was determined according to the generally accepted methods in the certified laboratory of the FSBI "GTSAS" Mordovsky".

The bacterial count in the ruminal fluid was determined by the method of E.M. Foster [14].

In order to determine the total amount of volatile fatty acids, the method offered by Krotkova and Mitin (1957) was applied [15], i.e., steam distillation in the McGam apparatus followed by titration of the distillate.

The milk yield per lactation was monitored on a monthly basis by conducting three control milkings with the determination of the fat and protein composition with the Clover-1M device in the analytical lab of the Agrarian Institute. The fatty acid composition of milk fat was determined by gas-liquid chromatography with the Chrom-5 chromatograph.

Table 1 shows the diet within the digestible trial.

Table 1: Weighted Average Daily Diet for Cows (Composition and Nutrition).

Parameter	Milk yield, kg	
	25	30
Meadow brome forage	1.5	1.0
Corn silage	14	14
Lucerne hay	14	14
Flattened corn	3.0	3.0
Barley groats	3.0	4.0
Sunflower grist	2.5	3.0
Rape cake	1.0	1.5
Dried beet chips	1.0	1.0
Molasses	1.0	1.2
Energy Acetone, g	0.18	0.23
Fine salt, g	110	130
The diet includes:		
EFU (energetic feed unit)	21.8	23.8
Dry solids, kg	21.0	23.3
Crude protein, g	3,193	3,676
Crude fiber, g	4,493	4,360
Starch, g	3,755	4,142
Sugar, g	2,164	2,351
Fat, g	661	832
Calcium, g	133	155
Phosphorus, g	83	102
Magnesium, g	34.6	42.5
Potassium, g	280	310
Sulphur, g	37.2	39.5
Ferrum, mg	4,120	4,221
Copper, mg	205	315
Zink, mg	965	1,273
Cobalt, mg	11.7	15.4
Manganese, mg	1,005	1,215
Iodine, mg	13.4	17.0
Carotin, mg	977	1,019
Calciferol, 1000 ME	16.4	19.9
Tocopherol, mg	733	853

Statistical processing of the obtained data was carried out using the Statistics v2.6 package.

III. RESULTS

Generally, a stall barn system was used for keeping cows in farms; all of them were tied year-round with daily exercise on walking grounds 2.5 hours per day. Each stall was equipped with an automatic tiered drinking-bowl. Each stall had 185 cm length and a wooden base. Sawdust was used as litter, and straw was placed on walking grounds.

The microclimate, i.e., air temperature, humidity, velocity parameters, and carbon dioxide, ammonia, hydrogen sulfide concentrations did not excess the maximum concentration limits, and were at all times maintained at the required levels and according to the hygiene requirements due to the use of the ventilation system. Therefore, the most comfortable living and industrial conditions for cows were created. The entire milking herd was differentiated and grouped by physiological conditions and milk yield. All farm diets were calculated with the Korma Optima feed software.

The cows were fed by a vertical scaled mixer-feeder.

The main quality indicators were preset in these diets, i.e., each of them was almost completely balanced. Thus, the table below shows 21 points of the main quality indicators required to prepare the diet to feed dairy cows properly. Having analyzed those diets, it was found out that the share of concentrates in terms of dry solids made up to 45 – 49 %, and the milk from NEL (net energy of lactation) amounted to 26.07 – 32.4 kg per day. This value was achieved due to the high digestibility of those diets. The group of first-calf heifers was about 150 days on the diet. During this period, all first-calf heifers fully recovered after calving and reached the peak of their lactation curve, which on average ranged 63 – 75 days of lactation.

As shown by the researchers the creation of weakly alkaline environment necessary for vital activity of the microorganisms was ensured by the absorption of volatile fatty acids, the entry of slightly alkaline saliva into the rumen, as well as the buffering properties of the ruminal fluid. With pH above 7.0 – 7.5 in the rumen, the absorption rate of acids decreased. When pH dropped below 4.5, the normal functioning of the rumen was disrupted, and its motility was inhibited. For the ruminal fluid, a pH value clearly correlated with the concentration of volatile fatty acids (VFA). Their concentration depended not only on the regimen, type of feeding, quality and physical shape of the fodder, but also on many other factors [10, 16, 17].

The authors' studies showed that the productivity and genotype of a cow had impact on the composition of its ruminal fluid. A well-balanced diet helps create a favorable environment in the rumen for the ciliata formation. The acidity in the rumen was within the physiological norms, i.e., pH = 6.50 – 6.78 for the crossbred cows and 7.04 for the Simmentals (Table 2). For the high half-bred Holsteins, the acidity was more favorable for the digestion of nutrients, thus increasing the ciliata quantity by 120 thousand or 45.8 %, i.e., up to 383.7 thousand/ml. For the crossbred cows, the concentration of VFA ranged between 9.11 and 9.75 mmol/ml, which was by 0.80 – 1.44 mmol/ml, or 13.8 – 17.3 %, higher than for the Simmentals. This emphasized the stronger metabolism due to the higher productivity during the digestible trial: 29.8 kg of milk in the crossbred cows with 87.5 % Holstein genotype, 25.9 – 27.4 kg of milk in the crossbred cows with 50.0 – 75.0 % Holstein genotype, and 21.3 kg of milk in the Simmentals.

Table 2: Composition of Ruminal Fluid for Cows with Different Genotypes (n = 5).

Parameter	Genotype			
	Simmental	1/2 S + 1/2 BWH	1/4 S + 3/4 BWH	1/8 S + 7/8 BWH
	M ± m	M ± m	M ± m	M ± m
Daily milk yield, kg	21.3 ± 1.4	25.9 ± 1.5	27.4 ± 1.6	29.8 ± 1.8
Acidity, pH	7.04 ± 0.1	6.78 ± 0.1	6.67 ± 0.1	6.50 ± 0.1
Ciliata quantity, thousand/ml	263.1 ± 32.7	310.2 ± 40.1	337.0 ± 41.1	383.7 ± 45.4
VFA concentration, mmol/100 ml	8.31 ± 0.29	9.11 ± 0.25	9.44 ± 0.36	9.75 ± 0.30
VFA content, %	100	100	100	100
Acetous acid, %	52.79 ± 1.44	53.35 ± 1.23	55.10 ± 1.33	55.27 ± 1.69
Propionic acid, %	21.82 ± 1.20	22.43 ± 1.25	22.91 ± 1.01	23.13 ± 0.99
Oil acid, %	16.54 ± 1.23	16.31 ± 1.27	16.01 ± 1.30	15.05 ± 1.9
Isovaleric acid, %	3.92 ± 0.59	3.51 ± 0.61	2.90 ± 0.55	2.74 ± 0.44
Valeric acid, %	4.92 ± 0.36	4.41 ± 0.44	4.07 ± 0.36	3.81 ± 0.23

As noted by Makartsev [18]; Ovchinnikova [19] in their research, the intensity of fermentation processes in the rumen is very high. Up to 4.0 – 4.5 kg of VFA are formed in the rumen of dairy cows per day. Such acids are the main source of energy for cows because they are completely absorbed in the stomach and digested better than their salts.

In the authors' studies, in the crossbred cows that received the same diet, an advantage was noted in the VFA and specific fatty acids concentrations, in particular, propionic acid (responsible for protein metabolism and protein formation in milk). The VFA concentration was by 0.61 – 1.31 % higher than that of the Simmentals. As a result, the protein content in the milk of the crossbred cows was by 0.02 – 0.06 % higher than that of the Simmentals.

The concentration of acetic acid in the rumen of the crossbred cows with 75.0 – 87.5 % Holstein genotype was by 2.3 – 2.47 % higher as the main energy indicator and milk fat precursor. Despite the higher milk yield of the crossbred cows, the fat content in their milk was by 0.02 – 0.05 % higher than that of the Simmentals. The genotype had lesser effect on the concentration of other volatile acids (1.2 – 1.9 %).

With better parameters of their ruminal fluid and ciliata quantity, the crossbred cows more effectively digested the nutrients within their diets (Table 3).

Comparing the data in Table 3, it was found that the crossbred cows with 50.0 % Holstein genotype had better digested dry solids (+0.8 %), organic substance (+1.6 %), and protein (+0.9 %). For the Holstein genotype up to 87.5 %, it was established that the high half-bred Holsteins had higher ratios for digestibility of nutrients, i.e., for dry solids (+2.9 %), organic substance (+2.3 %), protein (+3.7 %), fat (+5.3 %) ($P \geq 0.999$), fiber (+2.4 %), and NFEF (+3.3 %) ($P \geq 0.99$).

Table 3: Digestibility of Nutrients, %.

Parameter	Genotype			
	Simmental	1/2 S + 1/2 BWH	1/4 S + 3/4 BWH	1/8 S + 7/8 BWH
	M ± m	M ± m	M ± m	M ± m
Dry solids	71.4 ± 0.33	72.2 ± 0.44	73.3 ± 0.49	74.3 ± 0.42
Organic substance	76.3 ± 0.46	77.9 ± 0.47	78.0 ± 0.58	78.6 ± 0.51
Protein	68.2 ± 0.55	69.1 ± 0.41	70.7 ± 0.63	71.9 ± 0.49
Fat	62.4 ± 0.97	63.3 ± 1.01	65.2 ± 1.02	67.7 ± 1.15
Fiber	61.2 ± 0.61	62.1 ± 0.87	62.7 ± 0.99	63.6 ± 0.53
NFEF (nitrogen-free extractive fraction)	80.1 ± 0.47	80.9 ± 0.55	81.9 ± 0.64	83.4 ± 0.64

Thus, improved digestibility of nutrients increased the milk yield.
While increasing the milk yield in this study, the crossbred cows gave 2,391 – 2,641 kg in the first 100 days (319 – 569 kg more (P ≥ 0.999) than for the Simmentals) (Table 4). For the entire first lactation, the milk yield of the crossbred cows was by 504 – 1,092 kg more than that of the Simmentals (P ≥ 0.999), and the protein mass fraction and fat in their milk exceeded those of the Simmentals (by 0.01 – 0.06 % (P ≥ 0.99) and 0.02 – 0.05 %, respectively). Per lactation, the highly considerable difference was observed for the crossbred cows with 87.5 % Holstein genotype at milk yield (+46.1 kg) and protein (+40.6 kg) (P ≥ 0.999).

Table 4: Milk Yield for the Entire First Lactation (n = 20).

Parameter		Genotype			
		Simmental	1/2 S + 1/2 BWH	1/4 S + 3/4 BWH	1/8 S + 7/8 BWH
		M ± m	M ± m	M ± m	M ± m
Milk yield for the first 100 days of lactation, kg		2,072 ± 46.3	2,391 ± 62.1	2,501 ± 61.4	2,641 ± 57.2
Milk yield for 305 days of the first lactation, kg		5,697 ± 121.0	6,201 ± 134.0	6,511 ± 140.1	6.789 ± 139.4
The content in milk, %	fat	3.91 ± 0.02	3.90 ± 0.02	3.93 ± 0.02	3.96 ± 0.02
	protein	3.34 ± 0.01	3.35 ± 0.02	3.37 ± 0.02	3.40 ± 0.02
Mass, kg	milk fat	222.7 ± 3.6	241.8 ± 3.7	255.9 ± 4.0	268.8 ± 3.9
	milk protein	190.2 ± 3.7	207.7 ± 3.8	219.4 ± 4.0	230.8 ± 4.0
Live weight of cows, kg		554.1 ± 3.6	558.4 ± 4.01	540.9 ± 4.06	534.6 ± 4.17

Table 5: Fat Acids in Milk Fat, %.

Parameter	Genotype			
	Simmental	1/2 S + 1/2 BWH	1/4 S + 3/4 BWH	1/8 S + 7/8 BWH
	M ± m	M ± m	M ± m	M ± m
Caprylic acid	0.10	0.10	0.11	0.11
Caprinic acid	1.22	1.23	1.24	1.27
Undecylic acid	0.18	0.17	0.17	0.17
Lauric acid	2.71	2.56	2.50	2.47
Tridecyl acid	0.20	0.19	0.19	0.18
Myristic acid	13.01	12.99	12.80	12.77
Palmitic	33.7	34.1	34.5	35.10
Margaric acid	1.60	1.60	1.59	1.59
Stearic acid	10.01	10.2	10.69	11.21
Arachic acid	0.19	0.19	0.21	0.24
Behenic acid	0.63	0.65	0.60	0.53
Saturated acids	63.54	63.98	64.6	65.64
Myristoleic acid	2.27	2.24	2.25	2.26
Palmitoleic acid	2.94	2.90	2.80	2.75
Oleic acid	23.8	23.9	24.0	24.1
Linolic acid	2.91	2.87	2.41	2.12
Linolenoic acid	1.15	1.00	0.98	0.94
Arachidonic acid	0.27	0.26	0.26	0.26
Eicosanoic acid	0.51	0.44	0.40	0.37
Eicosatrienoic acid	0.20	0.20	0.19	0.19
Unsaturated acids	34.05	33.81	33.29	32.99
Not identified	2.41	2.21	2.11	1.37
Saturation index	1.87	1.89	1.94	1.99

The properties of milk as a raw material for high-quality dairy products are the most important. In order to evaluate the quality of milk used to produce butter, it is important to know the following details: fat content, dispersion of fatty phase, and chemical composition of milk fat [9, 20, 21]. Considering the fact that the volumes of the processed milk obtained from the crossbred cows continuously increase, its quality becomes of much importance. Therefore, the fatty acid composition of milk fat is to be scrutinized. Having compared the fatty acid composition of the milk (Table 5) from cows of different genotypes, certain increase in the saturated acids in milk fat of the crossbred cows, i.e., palmitic acid (+0.04 – 1.4 %) and stearic acid (+0.09 – 1.2 %) was determined. All this caused growth of the lipid saturation index for the milk from the crossbred cows. These acids increased the resistance of butter to oxidation and improved its technological qualities (storage stability) to some extent. With a slight increase in the concentrations of saturated acids in milk fat in the crossbred cows, some decrease of polyunsaturated fatty acids, mainly linoleic (0.04 – 0.79%) and linolenic (0.15 – 0.21 %) was determined. These acids are considered to be indispensable and increase the biological value of milk fat, but the difference between the genotypes is not confirmed by reliable data and may vary more depending on the season of the year and type of fodder.

IV. DISCUSSION

According to the study results, it can be noted that the cross of Simmental cows with Holstein bulls increased milk yield, improved the composition of milk fat of the crossbred cows from the point of view of storage stability, but slightly worsened its biological value. This is especially important when large quantities of milk are processed. In the Republic of Mordovia, at the present stage, selective breeding is carried out for obtaining of a new intrabreed type of animals with high heredity of Holstein breed, requiring optimization of genotypes that determine the qualitative indicators of milk [5]. The study of rumen metabolism in cows of various genotypes allows assuming that the content of VFA and the concentration of essential acids in the rumen of cows having 87.5% of Holstein genotype are most pronounced, which sharply differs from the content of the rumen of Simmental animals. In addition, many agricultural enterprises are involved in the Holsteinization process in breeding as the process having high potential. Therefore, the issues of proper feeding provision to newly bred animals are quite relevant.

V. CONCLUSION

As a result of the authors' study, it has been determined that various compositions of the ruminal fluid, differences in the concentration of VFA, and their proportion under the same conditions of feeding helped influence the digestibility of nutrients, and contributed to improving the lactogenesis.

REFERENCES

[1]. Velmatov, A. A., Lomanov, V.N.,Tishkina, T. N., Velmatov, A. P., & Erofeev, V.I. (2015).Realizatsiyapotentsialamolochnoyproduktivnostikrasno-pestrogoisimmentalskogoskotaavstriyskoyselektsiiraznykhgenotipov [Realization of the Milk Production Potential of Red-and-White and Simmental cows of the Austrian Selection of Different Genotypes].*Chief Livestock Specialist, 5-6*, 3-10.

[2]. Velmatov, A. A., Velmatov, A. P., & Tishkina, T.N. (2018). Sovremennyyetekhnologiiproizvodstvamoloka s ispol'zovaniyemgenofondasimmentalskogo, ayrshirskogoigolshtinskogoskota: monografiya [Modern Technologies for the Milk Production Using the Gene Pool of Simmental, Ayrshire and Holstein Cows: Monograph]. Saransk: Mordovsky University Publishing House.

[3]. Katmakov, P. S. & Anisimova, E. I. (2015). Metodypodborakakgeneticheskiyistochnikformirovaniyavnutriporodnykhtipov [Selection Methods as a Genetic Source for the Formation of Inbreed Types]. *Bulletin of the Ulyanovsk State Agricultural Academy, 2*(30), 94-100.

[4]. Anisimova, Ye.I. (2018). Vliyaniyelineynoyprinadlezhnostinavosproizvoditelnuuspoosobnostkorov [How Linear Affiliation Influence the Reproductive Ability of Cows]. *Agrarian Journal of the South-East, 1*(18), 5-6.

[5]. Velmatov, A. P., Velmatov, A. A., Erzamaev, A.V., Tishkin. T. N. & Hamza Al-Isawi Ali-Abdulamir (2018). Produktivnyyekachestvapomeseysimmentalskoyigolshtinskoyporod [Productive Qualities of the Crosses of Simmentals and Holsteins].*Chief Livestock Specialist, 1*, 43-50.

[6]. Ratoshny, A. N., Andreeva, N. V., & Babunov, A. I. (2004). Povysheniyeeffektivnostiispolzovaniyakormov v ratsionakhdoynykhkorov [Improving the Efficiency of Feed in Diets of Dairy Cows]. Past, Present and Future of Livestock Science: Materials of the International Scientific and Practical Conference. Tr. VYZH. No. 62. *3*, Dubrovitsy, 267-272.

[7].Gavrilenko, A. P., Katmakov, P. S., Bushov, A. V. & Prokofiev, A. N. (2018).Selektsionno-geneticheskiyeparametrykorov-pervotelokprisozdaniistadmolochnogoskota [Selection and Genetic Parameters of First-calf Heifers for Creating Herds of Dairy Cows].*Chief Livestock Specialist, 7*, 2-5.

[8]. Katmakov, P. S. & Anisimova, E.I. (2017). Sovershenstvovaniyesimmentalskoyporodyskotametodamivnutriporodnoyselektsiiiskreshchivaniya [Improvement of Simmental Cattle by Methods of Inbreeding and Crossbreeding]. Ulyanovsk.

[9]. Karamaev, S. V., Valitov, H. Z., & Karamaeva, A. S. (2018). Skotovodstvo [Cattle Breeding]. Saint-Petersburg: Lan Publishing House.

[10]. Nikolaeva, N. A. (2018). Obmenveshchestv u korovraznogogenotipapriispolzovanii v kormleniizernovoypatoki v TsentralnoyYakutii [Metabolism in Cows of Different Genotypes when Used in Feeding Grain Molasses in Central Yakutia].*Agriculture, 1*: 60-65. DOI: 10.7256/2453-8809.2018.1.28029.

[11]. Permyakova, P. F., Romanova, V. V., Pavlova, L. P., & Rozhina, E. E. (2018). Raspredeleniyeiispolzovaniyeenergiimolodnyakomraznykhgenotipov [Distribution and Use of Energy by Young Animals of Different Genotypes].*Agriculture, 1*: 53-59. DOI: 10.7256/2453-8809.2018.1.27567. Retrieved from http://e-notabene.ru/sh/article_27567.html

[12]. Chagas, L. M., Bass, J. J., Blache, D., Burke, C. R., Kay, J. K., Lindsay, D. R., & Lucy, M. C. (2007). New Perspectives on the Roles of Nutrition and Metabolic Priorities in the Subfertility of High-producing Dairy Cows.*Journal of dairy science, 90*(9): 4022-4032.

[13]. Kalashnikov, A. P., Fisinin, V. I., Shcheglov, V. V., & Kleimenov, N. I. (2003). Normyiratsionykormleniyaselskokhozyaystvennykhzhivotnykh [Norms and Diets of Feeding for Farm Animals]. Reference Manual. 3rd edition revised and expanded. Moscow:Kolos.

[14]. Foster, E. M., Nelson, F. E., Spect, N. L., Doetsch, R. N., & Olson, J. C. (1957). Dairy Microbiology. Englewood Cliffs, NJ: Prentice-Hall.

[15]. Krotkova, A. P., & Mitin, N. I. (1957). Opredeleniyeletuchikhzhirnykhkislot v soderzhimomrubtsa u zhvachnykh [Determination of Volatile Fatty Acids in Rumen Contents of Ruminants]. *Bulletin of Agricultural Science, 10,* 45-46.

[16]. Golikov, A. N., Bazonova, N. U., & Kozhebekov, Z. K. (1991). Fiziologiyaselskokhozyaystvennykhzhivotnykh [Physiology of Farm Animals]. Moscow: Agropromizdat.

[17]. Golovin, A. V. (2018). Vliyaniyesootnosheniyalegkoperevarimykhuglevodov v ratsionenovotelnykhkorovnametabolizm v rubtseiproduktivnost [The Impact of the Ratio of Easily Digestible Carbohydrates in Diet of Newly Calved Cows on the Metabolism in the Rumen and Milk Yield]. *Dairy and Beef Cattle Breeding, 8*, 24-27.
[18]. Makartsev, N. G. (1999). Kormleniyeselskokhozyaystvennykhzhivotnykh [Feeding of Farm Animals]. Kaluga:Oblizdat.
[19]. Ovchinnikova, L. Yu., & Babich, E. A. (2017). Vliyaniyegenotipanaobmenveshchestv v organizmemolodnyakakrupnogorogatogoskota [Impact of Genotype on the Metabolism in the Body of Young Cattle]. *Livestock and Feed Production, 1*(97), 37-43.
[20]. Telnov, N. O. (2016). Vliyaniyegena kappa-kazeinanamolochnuyuproduktivnostitekhnologicheskiye svoystvamolokakorovkrasno-pestroyporody v respublike Mordoviya [Impact of Kappa-casein Gene on Milk Yield and Technological Properties of Red-and-White Cows in the Republic of Mordovia]. *Bulletin of the Ulyanovsk State Agricultural Academy, 2*, 160-164.
[21]. Shevkhuzhev, A. F., Ulimbashev, M. B., Smakuev, D. R., & Tekeev, M. A. (2015). Modern Milk Production Technologies Using the Holstein Cattle Gene Pool: training manual. Moscow:Ileksa.

How to cite this article: Velmatov, A. P., Mungin, V. V., Tishkina, T. N., Neyaskin, N. N., Velmatova, L. N. and Guryanov, A. M. (2020). Impact of Ruminal Fluid Composition on the Digestibility of Nutrients and Milk Yield. *International Journal on Emerging Technologies*, *11*(2): 495–500.