

TESTING ADDITION OF FEED ADDITIVE FOR DAIRY COWS ON MILK QUANTITY AND QUALITY

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Abstract

The purpose of the research was to examine the impact of feed additive on calf rearing and cow's milk used by humans, which is significant for milk production efficiency. Lactation starts with the birth of a calf, lasts cca 305 days and ends cca two months before new calf is born. Cow is constantly producing and that is why it is necessary to secure adequate quality food. In the last decades and recent years, the work was carried out in order to determine which feed or additives affect favourably the quantity and quality of milk.

As part of research, group biological experiment was carried out using the method of dividing cows into two groups: control and trial. According to experiment plan, additive "Wisar raps" product of "Ibeca panto" from Hamburg (Germany) was applied. The experiment was performed in the period of 6 months (from May to November) on cow mini farm in Veliki Siljegovac near Krusevac - Serbia. The number of cows in the experiment was 18 equally divided into two groups of 9-control and trial group. The cows were domestic spotted cows, Simmental. Quantity of milk was from 16 to 18 kg with control group, and 18 to 20 kg with trial group. The percentage of milk fat was from 3,7 to 3,9% with control group, and 4 to 4,1% with trial group. Additive was given to cows together with silage in the quantity of 150 g per ton.

On the basis of calculation, statistic significance of the application of this additive has been determined on the quantity and quality of milk.

Key words: Additive, Wisar raps, Dairy cows, Nutrition, Quantity and Quality of Milk.

1. Introduction

It is a well-known fact that a cattle breeding is a branch of livestock farming where milk and meat production play an important role. Milk characteristics related to quantity and quality are: lactation characteristics in terms of length and all changes during lactation; reproduction characteristics in terms of length of service period, pregnancy, etc. and milking characteristics that represent ability of udder to release fast, completely and uniformly as per individual quarters. All this depends on milking characteristics. Domestication of animals led to significant division and selection for production for milk, meat and for work. According to some authors, milk must be healthy for feeding calves and humans and must not present the basis for development of harmful substances in it.

History of development and written documents are dated to 3.100 BC [6], and all this has been improving along with the development of humankind. First attempts in increase milk production were made in time of old Sumerians with some techniques (blowing into anus) during milking because they believed that the air influences the increases of milk production. Milk may be used for various purposes: production of butter, cheese, probiotic, etc. At the same time, food reduction has been carried out with the increase of genetic and paragenetic factors. Market and economic issues have an important role. Importance of milk in nutrition is high since it is the only foodstuff that can feed both calves and humans completely for a longer period of time without other foodstuff since it contains energetic and protective ingredients (building substances: proteins and minerals, energy matter (C-hydrates and fats), as well as protective substance (vitamins).

Milk can replace meat entirely. Due to this the objective and the aim of this paper has been the increase with the help of paragenetic factors, out of which one is nutrition; therefore, in recent years, additives that improve quantity, and if possible quality of milk, are used. Statistical significance is often determined by setting working hypothesis on differences. It enables better marketing on the market which depends on the quantity, chemical composition, hygiene and microbiological correctness (presence of microorganisms, somatic cells, antibiotic residues, chemical compounds and organisms [6]).

During lactation from its beginning until its end and in the chemical composition of milk obtained, reproductive parameters will change with all dairy cows and therefore also with the ones that underwent testing. Domestic spotted cow, type Simmental, is present worldwide and also in our country. Various authors carried various experiments/testing with this type. Antov *et al.* [3] carried out testing the impact of Simmental bulls and cows on body measurements. The same authors determined the performances of Simmentals in milk production and concluded that domestic spotted cow, type Simmental, is the best for milk production. Antov *et al.* [2] determined that Europe, with its 17 million Simmental cows, is the continent with the largest number of all heads. Emphasis is often put on bigger milk yield, as in the case with Montbeliard cow in France. In former Socialistic Federal Republic of Yugoslavia and Socialistic Republic of Yugoslavia, domestic spotted cow, type Simmental, was created by importing and crossbreeding. In such a way, crossbreeding of some domestic types such as Busha and Podolic with Simmental bulls imported from Switzerland, Germany and Austria. Some of the authors, like Mitic [5], claims that there are no Simmentals in Montenegro, except in certain municipalities (Bar, Budva, Ulcinj). Milk yield of this type is under great impact of external factors which are often unfavourable. In particular, this is the case with nutrition.

Petrović, M. D. *et al.* [7] in their research work on production characteristics over complete lactations of Simmental cows from "Zlatiborske suvati" dairy farm. It was determined that there was statistical significance of impact on all production characteristics with the exception of length of complete lactations where there was no statistical significance.

Vukašinić Marija [12] in their experiment, monitored the quality of fodder for dairy cows from Rashka region. Apart from carbohydrates, fats and proteins, they also monitored acidity, content of mineral matter and microbiological correctness. Milk quality passed quality requirements set in the Rulebook on content of toxic substances that were below the detection limit. Sretenović Ljiljana [9] monitored nutrition factors that improve the quality of milk and meat as well as pro-

ductive and reproductive parameters with cows. Possibility of changing the contents of particular essential substances (vitamins, organic forms of some microelements, unsaturated fatty acids) through diet has been presented. Recommendations are the result of modern research.

Ševković *et al.* [10] presented the needs in terms of nutrition for milk production and recommendations for making these meals. Therefore, for milk production they proposed bulk fodder (hay) with silage, and with the additional of concentrated fodder. They recommended 2-3 kg of hay per 100 kg of body weight, 15-36 kg of silage, 9 - 10 kg of concentrates with 18% of raw proteins. Of course, all this depends on production and body weight. Jovanović [4] gave recommendations for diet of cows, dairy cows as well, for satisfying the needs, depending on what the milk is intended for in further processing. Radovanović *et al.* [8], recommended adequate quantities of microelements, vitamins and on amino acids, fats, oils, NPN sources of nitrogen, growth stimulators, substances of absorption improvement, smell and taste corrigents, ion exchangers and technological feed additives.

Ostojić [6] talks about the impact of diet on quantity and quality of milk. Rational diet regulates milk production. Rational diet regulates milk production as well as the intention for further processing into industrial products (butter, cheese, and yoghurt - related milk products). Additional introduction of some fodder increases quantity of milk and milk fat, but also the sum of all factors that secure high-quality fodder and normal transformation of substances in the body. The author also mentions the impact of types where combined types produce milk with similar ratio of fats and proteins which is technologically adequate for quality cheese production.

Alps *et al.* [1] carried out a research of milk production in 1 and 2 lactations with Simmental type in Bavaria on a large sample of 499 532 cows in one, and 358 005 cows in 2 lactations and determined the average quality of milk first lactation of 4.065 kg, i.e. 4.606 kg in second lactation. Vujičić [11] in his work titled: Dairy Industry, Part I, described the development, chemistry, physics, hygiene, milking and processing of milk although some of his works remained unpublished until 2007.

2. Materials and Methods

The experiment was carried out on dairy cow farm in Veliki Šiljegovac on 18 dairy cows that were equally divided in 2 groups of 9 cows - domestic spotted cow, type Simmental. One group was a control group, and the other was trial group. Cows in control group had regular meals whereas cows in trial group had additive "Wisan raps" (Table 1) manufactured by the company

“Ibeca panto” from Hamburg, Germany. The experiment lasted 180 days from 01.05.2009. to 31.10.2009. Cows were all approximately the same age and gave birth to calves almost at the same time. They were of same size, had selection marks and are entered in adequate records of selection services (offices).

A Wisan rap is a protein additive in the form of pellets. It is obtained completely naturally, without use of any chemical substances with 62% of proteins protected from pre-stomach degradation. Degradation takes place in abomasums and small intestine, therefore the animal obtains it in the form of amino acids. It contributes to the increase of quantity of milk and reduces the danger of ketosis.

Table 1. Composition of fodder in the experiment

Feedstuffs	Control group (%)	Trial group (%)
Corn grain	29,00	29,00
Cracked wheat	15,00	15,00
Soya bean	7,00	7,00
Sunflower meal	25,00	25,00
Fodder flour	20,00	20,00
Dicalcium Phosphate	1,50	1,50
Premix Panto R 58	2,50	2,35
Wisan raps		0,15
Total	100,00	100,00

According to the manufacturer’s recommendations in reference to cows with larger milk production, Wisan raps is given 0,5 to 1 kg with adding of bulk fodder part, here it is overlooked since it is given also in silage and bulk fodder, and it is prepared in concentrated feed mixture.

After registering quantities and quality of milk, statistic processing has been carried out and the following has been determined: Standard Deviation (S), Standard Error of Arithmetic Mean (Sx), Coefficient of Variation (Cv), Variation Interval (Iv) and testing the justification of differences between arithmetic mean groups, determined on the basis of analysis of variance and result determined with LSD test. Statistically important dif-

ference ($p < 0,05$) is marked with one asterisk (*), and statistically very important difference ($p < 0,01$) with two asterisks (**).

Quantity of milk is monitored per months, by measuring with scales, and quality of milk is evaluated by milk fat content by means of standard lab methods. Milk fat fractions were not monitored; therefore, it is to be carried out in other experiments.

3. Results and Discussion

Results obtained through quantity as well as quality (milk fat) of milk are presented in this research paper. Table 2 contains chemical composition of fodder determined according to Weende methods, with average samples.

Table 2: Chemical composition of fodder in the experiment

Chemical composition	Control group (%)	Trial group (%)
Crude moisture	12,50	13,00
Ash	5,20	5,40
Proteins	16,00	16,50
Fats	3,50	3,80
Cellulose	12,50	13,00
Nitrogen Free Extracts	50,30	48,30
Total	100,00	100,00
Calcium	3,10	3,00
Phosphorous	1,50	1,60
Basic unit/kg	0,95	0,98

Table 3 presents the quantity of milk per months for both groups.

With the application of LSD test, statistically very significant difference per months has been determined between control and trial group from May until August, also statistical significance in September, whereas it was not determined in October. Through the entire experiment, larger statistical significance ($P < 0,05$) has been determined with LSD test.

Table 3. Quantity of milk per groups and months (kg)

Month	Control group					Trial group				
	X	S	Sx	Cv	Iv	X	S	Sx	Cv	Iv
May	17,00	1,12	0,37	6,59	15-18	20,33**	1,50	0,50	7,37	19-22
June	17,44	2,83	1,06	6,42	16-19	19,66**	1,96	0,65	9,96	16-21
July	17,44	1,06	0,38	6,07	16-19	19,22**	0,86	0,79	4,48	18-20
August	16,77	1,12	0,12	6,67	15-18	20,55**	1,76	0,59	8,56	18-24
September	17,00	1,25	0,14	7,35	15-18	18,55*	0,73	0,25	3,99	18-20
October	17,22	1,30	0,14	7,54	15-18	17,55	1,39	0,45	7,92	16-19
Total Average:	17,13	1,45	0,37	6,77	15-19	19,31*	1,37	0,54	7,05	16-24

$p < 0,05$ ** $p < 0,01$

Analysis of variance and values of experiment results were carried out with the application of LSD test. According to nutritionists worldwide, the quality of milk depends. „Food is the source of life but also the flame that burns the man“. In order to achieve maximum milk production it is necessary to achieve maximum consumption of food, i.e. dry matter until 10 weeks after giving birth to a calf. It is well-known fact that cows of high milk yield should eat 4% of dry matter of body weight for each kilogram of milk; they should eat 0,5 kg of dry matter. By giving fresh food after each milking, dry matter consumption is increased. Cows should be provided with up to 5 litres of water for each kilogram of produced milk. Attention should be paid to satisfying nutrient needs in particular with young cows that are still growing. Cows of high milk yield achieve earlier maximum daily milk yield, have larger production and better lactation persistence. Quality of bulk fodder is prevailing in the diet of dry cows.

According to the results of the research per months, it is evident that the quantity of milk is bigger with trial group cows and lower with control group, which implies that the additive Wisan raps caused bigger quantity of milk since it is protein pellet. It is natural, without chemical elements with 62% proteins protected from pre-stomach degradation.

Quality of milk (milk fat) was the second part of the experiment. That is why pellet or finely ground fodder is not used without bulk fodder because it causes reduction of milk fat since there is cellulose in bulk fodder that, through acetic acid, create milk fat.

When feeding high milk yield cows with high quantity of green mass, we must add digestion agents. Energy-rich substances are: lactose, milk fat and its fatty matters. These matters are lipids, organic matters widespread in nature. Milk fat is important as an ingredient because in livestock farming, traditional selection of milk is the one rich with milk fat that presents half of the total milk value as well as high biological value in reference to other fats. Milk fat is neutral without specific taste and smell. Milk fat is mostly comprised of

triglycerides (95 - 96%), followed by diglycerides (1,3 - 1,6%). Glycerides of milk fat are different from other fats in terms of composition and quantity of fatty elements.

That is why, Table 4 presents milk fat.

In this part of the experiment, there was no statistical significance, which implies that concentrated fodder has low impact on milk quality and that only bulk fodder is important (already mentioned); however, larger percentage of fat is found in cows from trial group, but this can also be due to genetic parameters. According to manufacturer's declaration, adding Wisan rap prevents ketosis (acetonemia) as well as obesity of cows.

Milk fat is a component on the basis of which differentiation of milk quality is carried out. In our country, quality of milk is determined on the basis of quality of milk fat in it. Other criteria are reduced to „current minimum o minimum allowed“. Milk fat is valued quantitatively through fat unit.

During setting up the experiment and planning of improving milk production, the objective was to increase quantity and quality of milk. Although coverage of cattle farming is low that is an indicator of extensive production. Milk must be healthy and this is the objective of improving zoohygienic conditions. This is in accordance with some of the authors, economic production which is the objective of the research and aim of this paper (Jovanović [4] and Ostojić [6]). Therefore, milk quality depends on the breed [2]. In our country, combined breeds are glorified and developed which is in agreement with our research [5].

It is significant that there is an impact of concentrated fodder and additives. Nutrition, as a paragenetic factor, impacts milk production, which reflects favourably on various additives such as Wisan raps that increases the quantity of milk - the same objective that modern fodder producers have and actively work on.

Apart from paragenetic factors (including nutrition, zoohygiene), there are also genetic factors; therefore, it is difficult to distinguish impact on quantity and quality of milk.

Table 4. Quantity of milk fat in cows in the experiment with Wisan raps (%)

Month	Control group					Trial group				
	X	S	Sx	Cv	Iv	X	S	Sx	Cv	Iv
May	3,34	2,82	0,94	8,44	3,6-3,9	4,00	0,11	0,04	2,75	3,6-4,1
June	3,74	0,02	0,05	0,66	3,5-3,9	3,56	0,13	0,04	3,65	3,8-4,1
July	3,79	0,09	0,03	2,37	3,6-3,9	3,97	0,07	0,02	1,76	3,8-4,1
August	3,77	0,07	0,02	1,85	3,5-3,9	3,97	0,10	0,03	2,52	3,8-4,1
September	3,72	0,12	0,04	3,22	3,5-3,9	3,92	0,11	0,04	2,80	3,8-4,2
October	3,77	0,09	0,03	2,39	3,6-3,9	3,78	0,09	0,03	2,38	3,6-3,9
Total Average:	3,69	0,36	0,18	3,16	3,5-3,9	3,87	0,10	0,03	0,03	0,03

4. Conclusions

On the basis of research, the following can be deduced:

1. Quantity of milk depends on the breeding period - Simmental type, with crossbreeding and hybridisation with other breeds.
2. Today, there are various types with nutrition having various roles.
3. Recently, nutrition includes various types of fodder, but genetics plays a certain role since there are limitations in inheritance.
4. Fodder must be provided in specific quantities with a lot of substances such as proteins, fats, C hydrates. Therefore, each meal rich with proteins may be inefficient if there are not enough C hydrates; the metabolism is then disrupted and obesity occurs. Some fodder independently influence milk and their smell is often transferred into milk. Monotonous diet influences the quality of milk in a way that increases or reduces the quantity of milk.
5. On the basis of everything above-mentioned, it is evident that diet influences more the quantity, but less the quality of milk.
6. Therefore, use of Wisan raps shows that it should be used and its usage should be intensified since its significance was demonstrated per months except for October when milk yield was reduced after 5 months of lactation.
7. There are no significances in quality of milk (milk fat) when giving this additive.

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