



UDC 636.621:631.547

INFLUENCE OF FEEDING CANOLA MEAL ON THE MILK PRODUCTIVITY OF MILK COWS

Buchkovska V.I. / Buchkovska V.I.*candidate Doctor of Science, Associate Professor.*

ORCID: 0000-0002-6574-8840

Ievstafieva I.M. / Ievstafieva I.M.*candidate Doctor of Science, Associate Professor.*

ORCID: 0000-0001-5914-893X

*Higher education institution «Podillia State University»,**Kamianets-Podilskyi, Shevchenko, 12, 32316*

Annotation. To date, the issue of growing rapeseed for the production of biodiesel has already been raised in Ukraine. In such conditions, a large number of rapeseed processing products, in particular meal, will soon appear on the market, which raises the question of studying the effect of feeding this ingredient on the productivity of farm animals, in particular dairy cows, which led us to conduct our research. In order to determine the effect of replacing part of the grain feed with rapeseed meal in the diet, a research and production experiment was conducted on lactating cows of the Ukrainian black-spotted dairy breed in the winter-stall period according to the methodology generally accepted in zootechnics. Substitution of 15% dry matter of grain fodder with rapeseed meal had a positive effect on the productivity of dairy cows, the chemical composition of milk, as well as on the efficiency of feed use by animals.

Key words: rapeseed meal, cattle, feed, ration.

Introduction. An important factor in the creation of an effective system of production and use of fodder in dairy cattle breeding in modern conditions is the creation of a permanent and stable fodder base capable of providing high-yielding cows with the necessary complex of nutrients and biologically active substances, which is a prerequisite for obtaining high productivity of animals, product quality and preserving their reproductive capacity [1, 3, 11]. All this should be achieved under the condition of preserving the environment, saving energy resources, and sufficient competitiveness of the obtained products [8, 9].

Experience shows that in Ukraine, after sunflower, rapeseed is the second oil (and protein) crop [4, 5].

With a sufficient amount of nutrients and moisture, rapeseed grows well [7]. Rapeseed oil, according to chemical analyses, has a high level of unsaturated fatty acids, among which erucic acid occupies up to 55% mainly in ancient varieties. In addition, Europe has long been producing biodiesel, which is much cheaper than traditional fuel.

To date, the issue of growing rapeseed for the production of biodiesel has already been raised in Ukraine. In such conditions, a large number of rapeseed processing products, in particular meal, will soon appear on the market, which raises the question of studying the effect of feeding this ingredient on the productivity of farm animals, in particular dairy cows, which led us to conduct our study [2, 10].

The research was carried out in the conditions of the PE «Kalinsky Klyuch» village. Kalynya of the Kamianets-Podilsky district of the Khmelnytskyi region during 2023-2024.



In order to determine the effect of replacing part of the grain feed with rapeseed meal in the diet, a research and production experiment was conducted on lactating cows of the Ukrainian black-spotted dairy breed in the winter-stall period according to the method generally accepted in zootechnics [2, 6]. The scheme of conducting these studies is shown in Table 1.

Table 1 - Scheme of the experiment

A group of animals	Experiment periods and duration in days	Number of animals, head	Characteristics of animal feeding
I, II	Preparatory, 15	20	Basic ration (OR)
AND	Experimental, 45	10	OR (control)
II	Experimental, 45	10	In the grain base, 15% of the dry substance was replaced with rapeseed meal

The experiment was conducted on groups of lactating cows (10 cows each), selected according to the principle of analogues by age, lactation period, period after calving, level of milk productivity and live weight. Cows of 3-4 years of age (second lactation) were used in the experiment. During the preparation period (15 days), all animals of both groups were kept in the same conditions and fed on the main diet, which consisted of clover hay, fodder beet, corn silage and a grain mixture according to the composition: wheat groats – 50%, barley groats – 30%, oat groats – 20%. Watering of animals was carried out with auto-watering machines.

During the experimental period, lasting 45 days, the cows of the experimental group were replaced with rapeseed meal in the main ration of protein from the grain group.

The amount of milk milked from the animals of the control and experimental groups was calculated daily. Physico-chemical composition and quality of milk were determined using the ECOMILK Standard ultrasonic milk analyzer. The ash content was determined by burning a sample in a muffle furnace at a temperature of 500° C

Feeding rations of cows were made based on the nutritional value of feed in accordance with existing feeding standards. The obtained digital data were processed statistically using standard computer programs.

Research results

During the research period, the cows of both groups were fed with fodder produced by PP «Kalinsky Klyuch» - this is leguminous-cereal hay, corn silage, clover hay, wheat, barley and oat groats.

It should be noted that the main diet adopted in the experiment fully provided the animals with the main nutrients for obtaining the planned productivity of the cows. In the structure of such a ration, hay occupied 22,8%, corn silage – 35,8%, clover hay – 8,6%, concentrated fodder – 32,7%, of which 16,6% – wheat chaff, 10,8% – barley and 5,4% – oat groats. From mineral fodder, the animals received 115 g of table salt and 160 g of monosodium phosphate.

During the experimental period, the cows of the research group were fed a similar diet, in which 15% of the grain base based on dry matter was replaced with ordinary



rapeseed meal (the second group of animals) while maintaining the caloric content of the diet.

The introduction of rapeseed meal into the diet of experimental animals had an effect on their milk productivity. From the data presented in Table 2, it can be seen that the milk productivity of the animals of the second experimental group, which were replaced by 15% of the nutritional content of the grain base of the diet with ordinary rapeseed meal, was, respectively, 19,3% ($P < 0,001$) higher compared to the animals of the control group groups

During the experimental period, the fat content of milk in cows of the experimental group compared to the control group increased by 0,1% ($P < 0,05$).

Due to a significant increase in milk productivity and an increase in milk fat, the cows of the second experimental group obtained an additional 6.2 kg of milk fat during the experimental period, or 22,8% more ($P < 0,001$) compared to the animals of the control group.

Table 2 - Milk productivity of experimental cows ($M \pm m$, $n=10$)

Indicator	Groups of animals	
	AND	II
Duration of the experimental period, days	45	45
Milk yield per cow for the entire period of the experiment, kg	787,5 \pm 12,1	940,5 \pm 11,8 **
Average daily hope, kg	17,5 \pm 0,3	20,9 \pm 0,8**
Fat content in milk, %	3,45 \pm 0,05	3,55 \pm 0,13
Received milk fat, total, kg	27,2 \pm 1,37	33,4 \pm 1,71**
Received 4% milk, kg	679,2 \pm 9,64	834,7 \pm 9,03**

** – the difference with the control is probable ($p > 0,99$).

In terms of 4% milk, compared to animals of the control group, more of it was obtained from cows of the second ($P < 0,001$) experimental group.

Chemical composition and organoleptic data are important for commodity and nutritional evaluation of milk.

As a result of our organoleptic evaluation of the milk obtained from the cows of the control and experimental groups, it was established that the color of the milk practically did not change during the experiment.

The consistency of the milk obtained from the cows of the experimental group in general did not differ from the consistency of the milk of the cows of the control group. The milk from the cows of both studied groups had a uniform, slightly viscous consistency, a pleasant, specific smell typical of fresh milk.

It is known that the protein content of milk is one of the most important components that determines its quality. As a result of our research, we found that the level of total protein in the milk of the cows of the studied groups was within 3,3-3,55% (Table 3). We found the lowest level of protein in the milk of cows of the control group of 3,3 \pm 0,1%, while it was 3,39 \pm 0,07 in the cows of the experimental group.



Table 3 - Physico-chemical composition and quality of milk of experimental cows (M \pm m, n=10, %)

Indicator	Groups of animals	
	AND	II
Dry matter	12,76 \pm 0,25	12,87 \pm 0,47
Fat	3,45 \pm 0,15	3,55 \pm 0,13
White	3,30 \pm 0,10	3,39 \pm 0,07
Milk sugar	5,21 \pm 0,15	5,25 \pm 0,12
Dry skimmed milk residue	9,31 \pm 0,27	9,32 \pm 0,35
Protein in 100 rfat	95,65 \pm 0,21	95,69 \pm 0,17
Ash	0,80 \pm 0,05	0,88 \pm 0,09
Acidity $^{\circ}$ T	17,45 \pm 0,08	17,61 \pm 0,12

It should be noted that in the milk of the cows of the experimental group, compared to the control group, an increase in the content of all indicators is found.

We did not detect any significant changes in the lactose content in the milk of cows of the control and experimental groups. The introduction of ordinary rapeseed meal into the diet of dairy cows did not have a significant effect on the content of mineral substances in milk.

Research aimed at increasing the productivity of animals will be effective only if they contribute to the saving of feed resources to one degree or another, so a calculation of the dynamics of feed costs for milk production under the influence of the studied factors was carried out. Therefore, we determined the consumption of feed for the production of milk by experimental animals (Table 4).

Table 4 - Average feed costs for milk production per experiment

Indicator	Groups of animals	
	AND	II
Total milk received, kg	787,5	940,5
Spent dry matter in total, kg	896,8	898,2
Including 1 kg milk	1,14	0,95
Total digestible protein consumed, kg	70,66	78,68
Including for 1 kg milk, g	89,73	83,66

Over the entire experimental period of the experiment, cows in the control group spent 896,8 kg of dry matter of the ration on the production of milk, while in the experimental group, due to the difference in the chemical composition of the rations, it was 1,6% more. At the same time, the consumption of 1 kg of milk in the control group was 1,14 kg, while in the experimental group it was 16,7% less. The saving of digestible protein by the cows of the experimental group was at the level of 6,8%.

Therefore, the animals of the experimental group used the energy and nutrients of the feed more efficiently, compared to the control group.

Conclusions . The conducted studies give reason to recommend for feeding dairy cows in order to increase their productivity, reduce feed costs per unit of production,



in the composition of rations, rapeseed meal, replacing with it up to 15% of the dry matter of concentrated feed.

Literature:

1. Бащенко М., Сотніченко Ю. Передові технології в молочному скотарстві. *Тваринництво України*. 2015. № 1/2. С. 2-5.
2. Бучковська В.І., Євстафієва Ю.М. Ефективність використання кормів дійними коровами різних порід. *Науково-технічний бюлетень Інституту тваринництва НААН*, 2021, № 126. – с. 45-52. Інститут животноводства НААН — Інститут животноводства НААН (animal.kharkov.ua) (дата звернення 13.10.2024).
3. Бучковська В.І., Євстафієва Ю.М. Вплив згодовуванні мінерально-вітамінної добавки на продуктивність молодняку великої рогатої худоби. *Таврійський науковий вісник*, 2023. № 134. С. 234-241 DOI <https://doi.org/10.32782/2226-0099.2023.134.30> https://www.tnv-agro.ksauniv.ks.ua/archives/134_2023/30.pdf (дата звернення 15.10.2024).
4. Вантух А., Вовк С. Молочна продуктивність корів при використанні добавок соєвої і ріпакової макухи у раціонах. *Теорія і практика розвитку АПК*. Львів, 1999. С. 270-271.
5. Високопротеїнові добавки у живленні великої рогатої худоби / [Снітинський В., Вовк А., Кружель Б., Яремко Р.]. *Науково-практичні аспекти кормовиробництва та ефективного використання кормів: Матер. міжн. н.-пр. конф. 16-18 вересня 2003*. ЛДАУ. Львів, 2003. С. 337-344.
6. Вовк С.О., Вантух А.Є. Економічна ефективність використання шротів у раціонах лактуючих корів. *Вісник Львів. держ. аграр. ун-ту*. Львів, 2002. № 9. С. 176-178.
7. Євстафієва Ю.М., Бучковська В.І. Втрати українського скотарства внаслідок агресії рф. *Науковий прогрес у тваринництві та птахівництві: Матеріали XVI Всеукраїнської науково-практичної конференції молодих вчених, присвяченій 120-річчю від дня народження доктора сільськогосподарських наук, професора, академіка, Даниленка Йосипа Абрамовича 27 жовтня 2023 р., м. Харків, 2023*. <https://lfi-naas.org.ua/materialy-hvi-vseukrayinskoyi-naukovo-praktychnoyi-konferentsiyi-molodyh-vchenyh/> (дата звернення 16.10.2024).
8. Ермантраут Е.Р. Тенденції розвитку ріпаківництва в світі та Україні. *Корми і кормовиробництво: Міжвід. тем. н. зб. Вінниця: Тезис*, 2003. Вип. 51. С. 218-221.
9. Кононенко В.К., Ібатуллін І.І., Патров В.С. Практикум з основ наукових досліджень у тваринництві: *Навч. посіб. для вищ. аграр. закл. III - IV рівнів акредитації зі спец. «Зооінженерія»*. Київ., 2000. 96 с.
10. Лихочвор В.В. Ріпак озимий та ярий. Львів: *Українські технології*, 2002. 48 с.
11. Норми, орієнтовні раціони та практичні поради з годівлі великої рогатої худоби: посібник; за ред. І.І. Ібатулліна, В. І. Костенка. К., 2013. 486 с.



References.

1. Bashchenko M., Sotnichenko Yu. (2015). Peredovi tekhnolohii v molochnomu skotarstvi [Advanced technologies in dairy farming]. *Animal husbandry of Ukraine*. (in Ukrainian).
2. Buchkovska V.I., Yevstafiieva Yu.M. (2021). Efektyvnist vykorystannia kormiv diiny my korovamy riznykh porid [Effective use of fodder by dairy cows of various breeds]. *Scientific and technical bulletin of the Animal Husbandry Institute of the National Academy of Sciences*. Kyiv. (in Ukrainian).
3. Buchkovska V.I., Yevstafiieva Yu.M. (2023). Vplyv zghodovuvanni mineralno-vitaminnoi dobavky na produktyvnist molodniaku velykoi rohatoi khudoby [The effect of feeding a mineral-vitamin supplement on the productivity of young cattle]. *Taurian Scientific Bulletin*. Kherson. (in Ukrainian). DOI <https://doi.org/10.32782/2226-0099.2023.134.30> https://www.tnv-agro.ksauniv.ks.ua/archives/134_2023/30.pdf
4. Vantukh A., Vovk S. (1999). Molochna produktyvnist koriv pry vykorystanni dobavok soievoi i ripakovoї makukhy u ratsionakh [Milk productivity of cows when using additives of soybean and rapeseed meal in diets]. *Theory and practice of agribusiness development*. Lviv. (in Ukrainian).
5. Snitynskyi V., Vovk A., Kruzhel B., Yaremko R. (2003). Vysokoproteinovi dobavky u zhyvlenni velykoi rohatoi khudoby [High-protein additives in feeding cattle]. *Scientific and practical aspects of fodder production and effective use of fodder: Mater. international BC conf*. Lviv. (in Ukrainian).
6. Vovk S.O., Vantukh A.Ie. (2002). Ekonomichna efektyvnist vykorystannia shrotiv u ratsionakh laktuiuchykh koriv [Economic efficiency of meal use in the diets of lactating cows]. *Visnyk Lviv. state agrarian university*. Lviv. (in Ukrainian).
7. Buchkovska V.I., Yevstafiieva Yu.M. (2023). Vtraty ukrainskoho skotarstva vnaslidok ahresii rf [Losses of Ukrainian livestock as a result of Russian aggression]. *Scientific progress in animal husbandry and poultry: Materials of the 16th All-Ukrainian Scientific and Practical Conference of Young Scientists, dedicated to the 120th anniversary of the birth of the Doctor of Agricultural Sciences, Professor, Academician, Yosyp Abramovych Danylenko*. Kharkiv. (in Ukrainian). <https://lfi-naas.org.ua/materialy-hvi-vseukrayinskoyi-naukovo-praktychnoyi-konferentsiyi-molodyh-vchenyh/>
8. Ermantraut E.R. (2003). Tendentsii rozvytku ripakivnytstva v sviti ta Ukraini [Trends in the development of rapeseed cultivation in the world and in Ukraine]. *Fodder and fodder production: Mezovid. topics n. coll. Vinnytsia: Thesis. Vinnytsia*. (in Ukrainian).
9. Kononenko V.K., Ibatullin I.I., Patrov V.S. (2000). Praktykum z osnov naukovykh doslidzhen u tvarynnytstvi [Workshop on the basics of scientific research in animal husbandry. *Training. manual for universities agrarian closing III - IV levels of accreditation with special «Zooengineering»*]. Kyiv. [in Ukrainian].
10. Lykhochvor V.V. (2002). Ripak ozymyi ta yaryi [Lihokhvor Winter and spring rapeseed]. Lviv. [in Ukrainian].
11. Ibatullin I.I., Kostenko V.I. (2013). Normy, oriientovni ratsiony ta praktychni porady z hodivli velykoi rohatoi khudoby: posibnyk [Norms, approximate rations and practical tips for feeding cattle: a guide]. Kiev. [in Ukrainian].

Abstract. To date, the issue of growing rapeseed for the production of biodiesel has already been raised in Ukraine. In such conditions, a large number of rapeseed processing products, in particular meal, will soon appear on the market, which raises the question of studying the effect of feeding this ingredient on the productivity of farm animals, in particular dairy cows, which led us to conduct our research. In order to determine the effect of replacing part of the grain feed with rapeseed meal in the diet, a research and production experiment was conducted on lactating cows of the Ukrainian black-spotted dairy breed in the winter-stall period according to the methodology generally accepted in zootechnics. Substitution of 15% dry matter of grain fodder with rapeseed meal had a positive effect on the productivity of dairy cows, the chemical composition of milk, as well as on the efficiency of feed use by animals.

Key words: : rapeseed meal, cattle, feed, ration.