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False Flax Cakein Mixed Feed For The Fattening Of Lactating Cows And Dairy Stores.

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ABSTRACT

In order to obtain data on the efficiency of the use of the false flax cake, 2 scientific and economic experiments on lactating cows and on bulls during the final period of fattening were conducted on the basis of agricultural enterprises in the Samara region. The studied cake was obtained by processing the seeds of the winterfalse flax of variety Penzyak and contained 38.0% of crude protein. Mixed feed-concentrates were developed and tested with the replacement of 10.0-15.0% of sunflower oil cake for false flax. It was found that the average daily milk yield at natural fat content and after recalculation by 4.0% fat content in cows of the 2nd and 3rd experimental groups, respectively fed with 10.0 and 15.0% incorporation of false flex cake, was higher by 2.8-4.2% in comparison with the milk yield of the animals of the 1st control group. On average, over the period of the experiment, the cows of the experimental groups increased the content of fat in milk by 0.05-0.07 abs.%, of protein by 0.03-0.07abs.%in comparison with the control. The replacement in feed concentrate of 15.0% of sunflower oil cake for false flaxcake ensured an increase in the digestibility of nutrients in the feed of the ration: organic matter by 0.3-1.2%, fibre by 2.3-2.0%. According to the results of biochemical studies, there was a tendency of increase in the total proteincontent in the blood serum of experimental group cows by 2.2-2.8% compared with the control, reducing the urea level by 6.5-7.6% with a reliable increase in glucose by 20.8-23.2%.Bulls in the final period of fattening, receiving mixed feeds with the inclusion of 10.0 and 15.0% of the false flax cake exceeded their herd mates from the control group by the average daily weight gain by 3.2-6.1%.

Keywords: lactating cows, fattening bulls, false flax cake, lactation performance, growing capacity.

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INTRODUTION

Currently, 30.0% of the crop acreage in the Samara region is occupied by sunflower crops. This leads to an intensification of soil degradation processes. The sunflower is susceptible to damage by many kinds of diseases, including the broomrape flower parasite which can fully destroy the crop yield. In this regard, there is a necessity to cultivate oil crops alternative to sunflower. It is advisable to have up to 20% of alternative oil crop plants in the structure of acreage of oil crops in Samara region [9]. In recent years, traditional oil-bearing crops, especially the cabbage (cruciferous) family, have been of great interest. However, the cruciferous seeds, as well as the products of their processing, contain a group of anti-nutrients, which affect the intake of feed rations, the productivity of animals [12, 13, 14, 15, 16, 17, 18, 19, and 20].

In this regard, attention is drawn to the winter false flax (Camelinasilvestris), in particular the Penzyak variety.

False flax is characterized by a sufficiently high yield of seeds (up to 2.8 tons perhectar). Seeds contain 40-46% of drying oil. False flax oil is used in people's nutrition, in the feeding of farm animals and poultry. In addition to oil, meal and cake are used as components in the production of mixed feed [1, 2, 4, 6, 7].

Sown areas under winter false flax in Samara region have grown from 546 hectares to 15,000 hectares in recent years.

False flaxcake is an important source of fodder protein refill. The cake used in our studies had the following chemical composition and nutritional content: 12.2 mJ of metabolic energy, 38.0% of crude protein, 9.4% of raw fat, and 13.9% of crude fibre. Being a valuable source of protein, this cake has a well-balanced amino acid composition. As for the quality of the protein, it is very close to soybean’s, but unlike it is characterized by a better ratio of lysine and sulfur-containing aminoacids.

The effectiveness of the use of the false flax cake in rations of ruminant animals is pointed by the results of investigations by a number of authors [3, 8, 10].

Inclusion of this protein component in the composition of mixed feed for lactating cows against the silage-haylagefeed and for fattened young cattle that are on the haylage-concentrate type of diet has not been sufficiently studied and it is an actual task.

The aim of the research is to evaluate the effectiveness and appropriateness of using the false flax cake in rations of dairy cattle.

Research tasks: to develop recipes for mixed fodders with false flax cake for lactating cows and bulls at the final stage of fattening, to study the effectiveness of mixed feed prepared according to the developed recipes and their effect on animal productivity, digestibility of nutrients in rations, the intensity of intermediary metabolism, fattening and meat qualities.

MATERIALS AND METHODS

To solve these tasks two scientific and economic experiments were conducted. The first experiment was in agricultural production cooperative "ZavetyLenina" in Neftegorsky district of Samara region. For the experiment, 24 heads of black-and-white newly calved cows were selected. The animals were divided into three groups of 8 heads each according to the principle of analogues, taking into account the age, the terms of calving, the average daily milk yield, the content of the mass fraction of fat and protein in milk. The duration of the accounting period was 100 days.

The main diet in all groups was the same and consisted of alfalfa-bromehay, corn silage, alfalfa haylage, feeding molasses. Deficiency of nutrients of the basic diet was balanced with mixed fodders.

The animals of the 1st control group received standard feed for cows, in which 20.0% of the sunflower meal was injected as a protein component. The cows of the 2nd experimental group were fed by mixed feed,

in which 10.0% of the sunflower cake was replaced byfalse flax cake, and in the mixed feed for the cows of 3rd experimental group 15.0% of the sunflower cake was replaced by false flax cake.

The account of milk productivity was done every day. The content of the mass fraction of fat, protein and lactose was measured by the device "Lactan 1-4", and somatic cells content was measured by "Somatos-mini". Digestion trial was conducted at the end of the 4th month of lactation. Biochemical blood tests were performed on the automatic analyzer Mindray BS-380 in the FGBNU Samarskaya NIVS.

The second scientific and economic experiment was carried out at the fattening site in the agricultural cooperative of the scientific production association"Uchkhoz-Agro". The duration of the experiment was 120 days. For the experiment, 30 heads of black-and-white bulls were selected with an initial live weight of 310 kg. By the principle of analogs (age, living weight), 3 groups of 10 heads each were formed. In the course of the main ration consisting of 4 kg of brome hay, 1 kg of feeding molasses, 14 kg of corn silage, the bull received mixed feed-concentrates in the amount of 4 kg per head per day. The animals of the 1st control group received a standard mixed feed, in which 15.0% of the sunflower cake was injected as a protein component, 10.0% was substituted for the false flax cake in the mixed feed of the 2nd test group, and 15.0% of the sunflower cakewas replaces by false flax in the 3rd experimental group. In the experimental period, control animals were slaughtered (3 heads from each group). Animal growth was monitored by individual monthly weighing in the morning before feeding for 2 adjoining days.

RESULTS AND DISCUSSION

Analysis of the rations of cows according to actually consumed feeds in the 1st and 2nd scientific and economic experiments showed that as for their energy packaging, nutrient, mineral and biologically active substances content they coincided with the feeding norms of lactating cows and of bulls during the final period of fattening [11].

The main criterion in assessing the feeding full value and the productive effect of diets in dairy cattle breeding is milk productivity and the quality of milk.

As can be seen from the data in Table 1, the daily average liquid milk yield for the experimental period in the cows of the 2nd experimental group exceeded the control by 1.3%. They had a fat content somewhat higher, as a result of which the daily average milk yield, corrected for 4% fat content, in cows of the 2nd test group was 2.8% higher than the control. The animals of the 3rd experimental group exceeded the control by the average daily milk yield of natural milk by 3.7%, and corrected by 4% fat content by 4.2%.

Table1: Milk producing ability of cows

Criterion	Group		
	1st control	2nd experimental	3rdexperimental
Daily average liquid milk yield, kg	21,8±0,84	22,1±0,91	22,6±0,72
Weight content, %			
fat	3,89±0,05	3,94±0,11	3,92±0,06
protein	3,11±0,08	3,14±0,02	3,19±0,05
Somatic cells content, thousand/cm^3	305±120	301±119	299±130
Daily average 4% milk yield, kg	21,2±0,61	21,8±0,52	22,1±0,71
Costs per 1 kg of milk of 4% fat content			
metabiloc energy, mJ	8,89	8,53	8,57
dry matter, g	869	843	847
crude protein, g	140	135	137
mixed feed, g	349	343	348

Within the period of the experiment 8.53-8.57 mJ of exchange energy was consumed for production of 1 kg of 4% fat milk by cows of 2nd and 3rdexperimantal groups, which is 4.2 to 3.7% less in comparison with animals of the 1st control group .

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Similar results were obtained for the costs of dry matter, crude protein and feed.

In the physiological experiment, a tendency was established of increase the digestibility of nutrients in the animals of the experimental groups which were fed by mixed feed-concentrates with false flax cake (Table 2).

The inclusion in the ration of cows of the experimental groups of false flax cake increased the digestibility of organic matter by 0.3-1.2%, mainly due to better digestibility, protein by 0.4-0.6%, fibre by 2.3-2.0% and nitrogen-free extractive substances - by 0.3-1.2%.

Table2: Digestibility and use of nutrients

Criterion	Group		
	1st control	2nd experimental	3rd experimental
Digestibility, %			
organic matter	65,4±1,7	65,7±0,5	66,6±0,9
protein	63,1±1,4	63,5±1,5	63,7±2,0
fat	53,2±1,1	53,0±1,2	53,1±1,1
fibre	62,1±1,9	64,4±1,0	64,1±2,1
nitrogen-free extractive substances	70,2±2,3	70,5±2,4	71,4±0,5
Put on in the body, g			
nitrogen	9,7±0,31	10,6±0,04*	13,0±0,18**
calcium	11,1±0,6	28,1±2,0**	30,3±1,4**
phosphorus	9,9±0,22	22,5±0,11	33,8±0,16
Used from accepted, %			
nitrogen	22,2	27,2	27,9
calcium	30,8	36,7	36,9
phosphorus	28,6	31,2	32,6

*P<0,05;**P<0,01

The features of digestibility and the use of nutrients in dietary feeds in cows of experimental groups noted in physiological studies had an influence on the characteristics of intermediary metabolism (Table 3).

After the analysis of protein metabolism, there was a tendency to increase the level of total protein in the blood serum of animals in the experimental groups by 2.2-2.8% compared with the control. The intensity of this process is determined by the protein index;- the higher this index, the more intensive the metabolism takes place. The protein index was the highestin animals of the 3rd experimental group.

The level of urea in the blood of the cows of the experimental groups was lower than that of the analogues from the control group. Probably a low concentration of ammonia in the rumen leads to a slight absorption in the blood, entering the liver, where ammonia is converted to urea. In the blood of the cows of experimental groups, which received a different amount of false flax cake in the composition of mixed fodders, there was a tendency to decrease the level of urea from 6.5 to 7.6%. This indicates a higher use of nitrogen in the body of experimental cows.

Biochemical studies showed that in the blood of animals in the experimental groups, a lower activity of the transamination enzymes (ALT and AST) was observed. Differences in this index of protein metabolism between the 1st control and 2 experimental groups were statistically reliable. Obviously, this is due to more intensive biosynthetic processes in the rumen, as a result of which more microbial protein was supplied from the intestinal stomach to the intestine, which corresponded to the needs of the animals of the experimental groups according to the amino acid composition.

Table 3: Biochemical status of blood of tested cows

Criterion	Group

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	1st control	2nd experimental	3rd experimental
Total protein, g/l	81,3±4,31	83,1±4,53	83,6±4,42
Albumins, g/l	36,9±0,7	37,7±0,8	38,5±0,3
Globulins, g/l	44,4±3,1	45,4±3,4	45,1±2,9
A/Gcoefficient	0,83±0,07	0,83±0,12	0,85±0,06
Urea, mmol/l	5,21±0,36	4,89±0,62	4,84±0,13
ALATlevel, U/l	35,4±1,12	30,6±1,43	29,1±0,85
AST level, U/l	86,6±2,14	79,5±2,15	77,9±2,41
Glucose, mmol/l	3,41±0,05	4,12±0,07**	4,20±0,12**
Totallipids, mmol/l	5,63±0,11	5,41±0,03	5,32±0,07
Phospholipids, mmol/l	2,21±0,12	2,43±0,01	2,54±0,03
Cholesterol, mmol/l	5,21±0,12	5,18±0,09	5,09±0,07
Lipidindex	0,39	0,45	0,47

**P<0,001

The content of blood glucose in the cows of experimental groups was higher, compared to the control, by 20.8-44.3%, which can characterize a higher level of energy supply.

Lipid metabolism in cows that received false flax cake showed that a decrease in the content of total lipids was observed in the blood. Apparently, this is due to the fact that lipids were intensively consumed both for energy purposes and for the synthesis of milk fat. When characterizing this metabolism, great importance is attached to the lipid index, which reflects the ratio of the concentration of phospholipids to the amount of total lipids. The lipid index in the blood of the cows of the experimental groups was 15.4-20.5% higher than the control.

The main criteria for the full value of feeding animals with a positive or negative effect of one or another feed factor are the productivity of the animal and the cost of feed per unit of production.

Analyzing the data presented in Table 4, it should be noted that the average daily weight gain in bulls of the 2nd and 3rdtest groups was higher than in the 1st control group by 3.2-6.1%, respectively. During the period of the experiment, 8.4-8.2 energetic feed units was consumed by bulls of 2st and 3ndtest groups for production of 1 kg of body weight gain, which is 3.6-6.0% less compared to animals of the 1st control group. Similar results were obtained for the costs of dry matter.

Table3: Dynamics of live weight and feed costs per 1 kg of body weight gain

Criterion	Group		
	1st control	2nd experimental	3rd experimental
Liveweight, kg			
At the beginning of the experiment	310,0 ±2,1	311 ±2,7	310 ±2,6
at the end of the experiment	454,6 ±1,32	460,2 ±0,81***	463,4 ±1,14**
Growthofliveweight			
Absolute, kg	144,6	149,2	153,4
Daily average, g	1205±2,3	1243 ±3,2***	1278 ±6,1**
Costs per 1 kg of body weight gain			
Metabolic energy, mJ	86,6	84,0	81,7
Energeticfeedunits	8,66	8,40	8,17
Dry matter, kg	10,02	9,71	9,44

**P<0,01, ***P<0,001

Bulls of experimental groups in comparison with the control have higher slaughter parameters (Table 5).

The pre-slaughter weight in the animals of the experimental groups was higher in comparison with the control by 1.3% and 2.1%, respectively; the mass of the hot carcass was higher by 1.7 and 2.9%. The yield of the carcass in the bulls of the test groups was higher than in the control group bulls by 0.22 and 0.41 abs. %, respectively.

The most heavyweight carcasses were obtained from the bulls of the 3rd experimental group. They overbalanced in this indicator the 1st control and the 2ndexperimental groups, respectively, at 6.49 and 2.58 kg. As for the amount of internal fat the bulls of the experimental groups exceeded the control group by 13.95 and 2.45%.

Table4: Results of control bull slaughter

Criterion	Group		
	1st control	2nd experimental	3rd experimental
Removablelivingweight, kg	454,6 ±1,32	460,2 ±0,81*	463,4 ±1,14**
Pre-slaughter weight, kg	427,3 ±2,18	433,0 ±2,41	436,1 ±2,11*
Mass of the hot carcass, kg	229,01 ±1,31	233,08 ±1,56	235,58 ±2,18
Yieldofthecarcass, %	53,61 ±0,18	53,83± 0,21	54,02± 0,05
Internal fat, kg	10,5 ±0,17	11,9 ±0,05***	12,2 ±0,11***
Slaughterweight, kg	239,51 ±1,65	244,98 ±2,14	247,78 ±1,68**
Slaughteryield, %	56,1 ±0,21	56,6 ± 0,07	56,8 ± 0,06

*P<0,05, **P<0,01, *** P<0,001

The animals of the experimental groups had the advantage of slaughter weight and slaughter yield. In comparison with the control, the difference in favor of the bulls of the experimental groups for the slaughter weight was 2.28 and 3.45%, and for the slaughter yield 0.5-0.7 abs. %.

CONCLUSION

The obtained experimental data indicate that in the first experiment the incorporation of 10.0-15.0% of the false flax cake in the mixed feed allowed to increase the yield of milk fat by 2.6-4.3%, the milk protein by 2.3-6, 0% compared with the control. The average daily yield of natural milk in the first scientific and economic experiment in cows of the 2nd and the 3rd experimental groups was 1.3-3.5% higher than the control, respectively. Feeding cows of experimental mixed fodders did not adversely affect the digestibility and nutrient utilization in the rations, the intensity and direction of intermediary metabolism.

In the second experiment, the replacement of 10.0-15.0% of sunflower cake with the false flax cake in silage-concentrate rations for fattened young cattle promotes an increase in the average daily growth in live weight by 3.2-6.1%, respectively, of slaughter yield by 0.5- 0.7 abs.%.

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