

Research Article

Productive Qualities of Cattle in Dependence on Genetic and Paratypic Factors

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ABSTRACT.

Among the factors determining the indicators of milk quality and dairy products, the main place occupied the origin of animals, the conditions of breeding work and the features of the technological process. Studies were carried out in a number of breeding enterprises of the Ural zone on cows of black-and-white breed in different periods of lactation. It is established that the milk productivity of cows depends more on the age of their first fertile insemination and exteriors. The difference between the groups in these cases was from 1007.0 to 1159.0 kg of milk. The chemical, physical and technological properties of milk differed in animals of various external complex classes. The maximum differences in the groups were in casein (0.21%), serum proteins (0.12%), skim solids (0.12%), lactose (0.08%), leach (0.015%) and milk density (0,87°A). With the purpose of obtaining high-quality milk and its processing products, the dairy industry enterprises are recommended to take into account the origin of dairy cows and the features of their exteriors when organizing the technological process.

Keywords: milk of cows, chemical composition of milk, physical properties of milk, technological properties of milk, genetic and paratypic factors.

1. INTRODUCTION

The production of high-quality milk is the main indicator of the enterprises' effective operation and a guarantee of its vitality. In modern market conditions, the industry makes high demands on raw milk products due to the fact that only those milk processing enterprises that use the highest quality product with a reducing cost of producing it get a sufficiently large profit. The lack of a high-quality product hampers the development of the modern dairy industry and does not contribute to the process of reducing the supply of milk and dairy products from abroad. Under the circumstances, there was an objective need to improve the quality of raw materials for the dairy industry with the maximum use of animals with a high estimate of qualitative and quantitative productivity indicators. Documents regulating the production of milk and dairy products, provide high

requirements for raw materials, products of its processing, as well as for technological processes in their production. The main milk indicators, as an object of technological processing, are its physical, chemical and technological properties, which are influenced by various factors. In a number of factors that determine the quality of milk and dairy products, the origin of animals (breed, mother, father), the conditions of breeding work (selection efficiency) and the features of the technological process (reproduction of the herd, the organization of milking, feeding, keeping) take the main place. Definition and analysis of these factors undoubtedly contributes to the competent process of producing a high-quality product. This all confirms the relevance and necessity of investigating this problem [1,2,3,4,5,6,7,8,9,10].

2. CHARACTERISTICS OF GENETIC AND PARATYPIC FACTORS INFLUENCING THE INDICATORS OF COW MILK QUALITY.

Research work was carried out in a number of breeder enterprises in the Ural area: Kurganskoye LLC, Razliv PZF of the Kurgan Region, SovkhozCervishevsky OJSC of the Tyumen Region. The research object was cows of black-and-white breed during the first lactation period. The indicators of milk quality and milk productivity of cows are evaluated depending on linearity. For this purpose have been formed three groups of cows by the method of couple- analogues. The first group included animals of Vis Back Ideal line 1013415, the second - Reflection Sovering 198998 and the third - MontvikChiftain 95679. The milk of cows was evaluated depending on the productivity of their mothers by forming three groups of first-calves. The first group included first-calf cows, whose mothers had milk production up to 6000 kg of milk for the highest lactation, for the second group - 6000-7000 kg, for the third group - more than 7100 kg. All mother cows had a complex quality class of elite-record. In the first group, 7.8% of mothers had category B, 30.8% - category A, 61.5% - AB. In the second and third groups, respectively, the animals had the category A - 18.2% and 40%, the category AB - 81.8% and 60%. An analysis of the effect of the animal's exteriors on the milk quality indicators was carried out. Four groups of first-calf heifers were formed, depending on the exterior complex class. The first group is the "Superior" complex class; the second group is "Excellent"; the third group - "Good with a plus"; the fourth - "Good"; the fifth is "Satisfactory". The estimation of the exterior was carried out according to the method "Estimation of the dairy cattle exteriors" from the 30th to the 120th day of lactation in accordance with the requirements of the "Rules for evaluating the daughters of servicing bull of milk and meat breeds CHII P-96" and international standards. In order to assess the effect of the age of the first fertile insemination of cows on their milk productivity, the animals were divided into two groups, depending on the

technology adopted at the enterprise: the first group - early insemination (13-15 and 17-18 months), the second group - later insemination (respectively after 15 and 18 months). The age of the first fertile insemination, with respect to which the groups of research animals were formed, averaged 18.6 months (± 0.3) at JSC SovkhozChervyshevsky, 15.3 months (± 1.8) in SPK PlemzavodRazliv.

The feeding of the evaluated cows was carried out according to the diets used in the farms. Rations are made by specialists taking into account age, lactation period, level of productivity, body weight and physiological state. There are tie-up housing and pipeline milking. Indicators of milk quality and milk productivity of animals were evaluated in accordance with the "Rules for the evaluation of milk productivity of cows of dairy and beef breeds SNP P23-97", GOST 31449-2013 raw cow milk. Technical conditions. The processing of research results was carried out in the program "Microsoft Excel" with the calculation of the basic statistical and biometric indicators.

3. INFLUENCE OF LINEAR BELONGING ON INDICATORS OF COW MILK QUALITY

One of the effective ways of improving the black-and-white breed is to breed along the lines. In our researches under the conditions of SPK "Plevenzavod" Razliv " showed the yield of the cows of the Wis Back Idial line is higher than this indicator of other groups on 782 kg (12.2%) ($p < 0.05$) and 511 kg (7.9%). The mass fraction of fat in cows' milk of the Vis Back Idial line is higher than that of the herd mates by 0.05 and 0.13%. The cows of the Reflection Sovering line exceeded their herd mates in the lines Vis BeyIdial and MontvikChiftein respectively - by the mass fraction of skim solids in milk on 0.01 and 0.10%, by the proportion of whey proteins on 0.02 and 0.05%, by lactose on 1, 14 and 0.05%. At the same time, the milk density index in the Wis Back Idial line is higher in comparison with the milk of other groups of cows - on 0.11 and 0.08 ° A, and the acidity on 0.06 and 0.07 ° T, respectively.

Table 1. Indicators of cows' milk quality of black- and-white breed Depending on the linearity

| Index | Group, line | | | | | |
|--------------------------|----------------------------------|-------|---------------------------------------|-------|------------------------------------|-------|
| | I, Wis Back Ideal 1013415 (n=13) | | II, Reflection Sovering 198998 (n=13) | | III, Montvik Chiftein 95679 (n=13) | |
| | $\bar{X} \pm S_{\bar{X}}$ | Cv, % | $\bar{X} \pm S_{\bar{X}}$ | Cv, % | $\bar{X} \pm S_{\bar{X}}$ | Cv, % |
| Milk yield, kg | 6435,0±101,2* | 5,7 | 5653,0±301,3 | 19,2 | 5924,0±241,4 | 14,7 |
| Fat mass fraction, % | 3,82±0,1 | 11,5 | 3,77±0,1 | 10,0 | 3,69±0,1 | 10,2 |
| Protein mass fraction, % | 3,12±0,02 | 2,5 | 3,13±0,04 | 4,5 | 3,12±0,05 | 5,4 |
| Skim solids, % | 8,47±0,05 | 2,06 | 8,48±0,03 | 1,15 | 8,38±0,03 | 1,35 |
| casein, % | 2,43±0,02 | 2,83 | 2,42±0,01 | 1,91 | 2,46±0,04 | 5,82 |
| whey protein, % | 0,69±0,01 | 2,83 | 0,71±0,04 | 1,90 | 0,66±0,02 | 5,85 |
| dry matter, | 12,48±0,18 | 5,26 | 12,40±0,13 | 3,68 | 12,24±0,14 | 4,13 |
| lactose, | 3,27±0,50 | 54,85 | 4,41±0,01 | 1,15 | 4,36±0,02 | 1,35 |
| leach, | 0,678±0,004 | 2,07 | 0,679±0,002 | 1,13 | 0,670±0,003 | 1,36 |
| density, °A | 28,99±0,14 | 1,74 | 28,88±0,14 | 1,77 | 28,80±0,24 | 3,04 |
| acidity, °T | 17,38±0,03 | 0,67 | 17,32±0,04 | 0,92 | 17,31±0,03 | 0,62 |

Thus, according to the quantitative characteristics of milk productivity, the cows of the Wis Back Idial line were superior, while in terms of the milk quality, the Reflection Sovering line were ahead of their herd mates in other lines with an unreliable difference in rates.

4. PHYSICAL AND CHEMICAL PROPERTIES OF COW MILK DEPENDING ON THE PRODUCTIVITY OF MOTHERS

As is known, the widespread breeding of highly productive cows contributes to the accumulation of valuable genetic potential in subsequent generations, increases the chances of obtaining even more productive breeding herds. Studying the question of the influence of mothers' productivity on milk yield and the qualitative content of daughters' milk, was carried out research in the SPK "Plemzavod" Razliv " on black-and-white first-calf heifers of this herd (Table 2). The yield of the cows of the second group exceeded the yield of herd mates on 694 kg ($p < 0.05$) and 354 kg, respectively. The mass fraction of fat in milk of the first-calf heifers was higher than the values of the second and third groups by 0.14 and 0.04%, respectively. The mass fraction of protein in the milk of animals of the first group is higher than that of the same age group by 0.06% and 0.05%, respectively. The share of nonfat milk solids of cows, whose mothers had a productivity of up to 6,000 kg and from 6,000 to 7,000 kg of milk, did not differ and was 8.29%. At the same time, in the first-calf heifers of the third group, the mass fraction of skim solids in milk is lower on 0.17% in comparison with contemporaries. Mass fractions of casein and whey proteins are higher in the first group of animals than in the second group on 0.15 and 0.01% respectively, with the third group at 0.02 and 0.04%. In addition, with an almost equal amount of leach in the milk, a group of cows where the productivity of mothers was less than 6000 kg of milk exceeded the animals of the second and third groups by the mass fraction of dry matter on 0.17 and 0.19% respectively, by the lactose in milk - on 0.01%. The milk density in the first group of cows is higher in comparison with other groups of animals on 0.44 and 0.69 ° A. The acidity of milk was lower in the first group of animals than in the second group on 0.04 ° T and than in the third group on 0.02 ° T.

Table 2. Indicators of cows' milk quality of black -and-white breed depending on the productivity of mothers

| Index | Group of cows, productivity of mothers | | | | | |
|--------------------------|--|-------|---------------------------|-------|-------------------------------|-------|
| | I, less than 6000 kg (n=13) | | II, 6000-7000 kg (n=22) | | III, more than 7000 kg (n=15) | |
| | $\bar{X} \pm S_{\bar{X}}$ | Cv, % | $\bar{X} \pm S_{\bar{X}}$ | Cv, % | $\bar{X} \pm S_{\bar{X}}$ | Cv, % |
| Milk yield, kg | 5369±252,9 | 17,0 | 6063±230,3* | 17,8 | 5709±337,3 | 22,9 |
| Fat mass fraction, % | 3,89±0,10 | 9,63 | 3,75±0,10 | 11,96 | 3,85±0,11 | 11,57 |
| Protein mass fraction, % | 3,16±0,04 | 4,51 | 2,97±0,14 | 22,85 | 3,11±0,03 | 3,51 |
| Skim solids, % | 8,29±0,18 | 6,91 | 8,29±0,11 | 4,05 | 8,12±0,09 | 3,65 |
| casein, % | 2,47±0,04 | 5,29 | 2,32±0,11 | 22,86 | 2,45±0,03 | 3,79 |
| whey protein, % | 0,69±0,06 | 30,31 | 0,68±0,05 | 34,12 | 0,65±0,03 | 17,88 |
| dry matter, | 12,58±0,13 | 3,59 | 12,41±0,12 | 4,60 | 12,39±0,18 | 5,45 |
| lactose, | 4,40±0,02 | 1,48 | 4,39±0,01 | 1,45 | 4,39±0,02 | 1,56 |
| leach, | 0,678±0,003 | 1,49 | 0,676±0,003 | 1,88 | 0,678±0,004 | 2,13 |
| density, °A | 29,23±0,21 | 2,30 | 28,79±0,17 | 1,90 | 28,54±0,22 | 2,39 |
| acidity, °T | 17,33±0,05 | 1,01 | 17,37±0,04 | 0,96 | 17,35±0,03 | 0,69 |

Thus, milk productivity and cow milk quality had some differences depending on the productivity of their mothers. The yield of cows, whose mothers' productivity ranged from 6000 to 7000 kg of milk, is higher in comparison with herd mates. In this case, was noted the superiority of the first group on protein and milk fat content.

5. BASIC PHYSICO-CHEMICAL PROPERTIES OF COW MILK DEPENDING ON THEIR EXTERIOR INTEGRATED CLASS

Milk productivity can be predicted by the type of constitution, the severity and development of individual points of the exteriors and signs of milkiness. Was noted certain dependence of the milk quality indicators on the complex evaluation of cow exteriors. When assessing animals by appearance (Table 3). So, in JSC "SovkhozChervyshevsky" the first-calf heifers complex class "Good with plus" exceeded by milk yield on 183 kg (3.8%), 254 kg (5.3%) and 299 kg (6.2%) respectively class "Superior", "Excellent" and "Good". In enterprises SPK "Plemzavod" Razliv "and LLC" Kurgan ", the

first-calf heifers complex class "Superior" exceeded the herd mates of other classes by an average of 828.0 kg (13.0%) and 190.0 kg (3.2%), respectively farms. At the same time, the cows of the class "Good with plus" differed from "Excellent" and "Good" class animals in the larger side - on average by 454.5 kg (7.7%) and 158.5 kg (2.8%) accordingly on the enterprises. The first-calf heifers of "Good with Plus" class in OJSC "SovkhozChervyshevsky" were inferior to their herd mates by the mass fraction of fat in milk on average by 0.02%. The butterfat milk of the cows of the SPK "Plemzavod" Razliv "is higher than this index of the first-calf heifers of the complex class "Excellent" on average by 0.28%.

Table 3. Indicators of quality of first-calf heifers milk of black –and-white breed depending on complex exterior class

| Index, Complex class | JSC "Sovkhoz Chervyshevsky", n=70 | | SPK "PZ" Razliv ", n=56 | | LLC "Kurgan", n=55 | |
|--------------------------|-----------------------------------|-------|---------------------------|-------|---------------------------|-------|
| | $\bar{X} \pm S_{\bar{X}}$ | Cv, % | $\bar{X} \pm S_{\bar{X}}$ | Cv, % | $\bar{X} \pm S_{\bar{X}}$ | Cv, % |
| «Superior» | (n=18) | | (n=11) | | (n=6) | |
| Milk yield, kg | 4634,0±87,8 | 8,0 | 6337,0±386,1 | 19,3 | 5873,0±531,1 | 20,2 |
| Fat mass fraction, % | 3,80±0,03 | 2,82 | 3,68±0,09 | 8,10 | 4,17±0,22 | 11,53 |
| Protein mass fraction, % | 2,97±0,02 | 3,30 | 3,11±0,03 | 2,80 | 3,09±0,02 | 1,25 |
| casein, % | 2,31±0,01* | 2,36 | 2,43±0,02 | 2,59 | 2,41±0,03 | 2,51 |
| whey protein, % | 0,66±0,00** | 2,60 | 0,69±0,05 | 20,79 | 0,69±0,02 | 5,98 |
| dry matter, | 11,94±0,04 | 1,34 | 12,31±0,13 | 3,41 | 12,38±0,25 | 4,44 |
| Skim solids, % | 8,14±0,04 | 1,94 | 8,47±0,06 | 2,20 | 8,52±0,10 | 2,55 |
| lactose, | 4,29±0,05 | 4,99 | 4,44±0,04 | 2,66 | 4,45±0,05 | 2,70 |
| leach, | 0,653±0,004 | 2,47 | 0,684±0,006 | 2,67 | 0,689±0,007* | 2,33 |
| density, °A | 28,03±0,13 | 1,91 | 23,76±3,72 | 49,47 | 28,46±0,13 | 1,02 |
| acidity, °T | 17,21±0,18 | 4,33 | 17,49±0,05 | 0,85 | 17,27±0,08 | 1,10 |
| «Excellent» | (n=25) | | (n=19) | | (n=25) | |
| Milk yield, kg | 4563,0±89,7 | 9,8 | 5416,0±277,8 | 21,8 | 5728,0±230,2 | 19,7 |
| Fat mass fraction, % | 3,81±0,03 | 3,74 | 4,03±0,11* | 11,77 | 4,14±0,10 | 12,29 |
| Protein mass fraction, % | 2,88±0,01 | 2,58 | 3,06±0,02* | 3,10 | 3,12±0,02 | 2,94 |
| casein, % | 2,26±0,01 | 2,31 | 2,40±0,02 | 3,39 | 2,44±0,02 | 3,18 |
| whey protein, % | 0,64±0,00 | 2,83 | 0,72±0,03 | 18,74 | 0,68±0,02 | 14,73 |
| dry matter, | 11,97±0,05 | 1,98 | 12,63±0,15 | 5,12 | 12,70±0,14 | 5,48 |
| Skim solids, % | 8,18±0,04 | 2,61 | 8,35±0,05 | 2,79 | 8,36±0,04 | 2,56 |
| lactose, | 4,52±0,07 | 7,26 | 4,38±0,02 | 2,12 | 4,37±0,02 | 2,01 |
| leach, | 0,669±0,005 | 4,05 | 0,674±0,004 | 2,28 | 0,676±0,003 | 2,15 |
| density, °A | 28,07±0,15 | 2,75 | 28,48±0,19 | 2,82 | 28,54±0,16 | 2,67 |
| acidity, °T | 17,13±0,10 | 2,97 | 17,38±0,03 | 0,76 | 17,26±0,09 | 2,65 |
| «Good with plus» | (n=19) | | (n=17) | | (n=16) | |
| Milk yield, kg | 4817,0±129,6 | 11,7 | 5881,0±250,8 | 17,1 | 5789,0±295,4 | 19,8 |
| Fat mass fraction, % | 3,78±0,04 | 4,50 | 3,75±0,11 | 11,31 | 4,02±0,21 | 2054 |
| Protein mass fraction, % | 2,88±0,02 | 2,54 | 3,18±0,04 | 4,45 | 3,16±0,03* | 3,24 |

| | | | | | | |
|--------------------------|----------------|------|--------------|-------|---------------|-------|
| casein, % | 2,26±0,01 | 1,75 | 2,47±0,03 | 4,53 | 2,48±0,03 | 4,61 |
| whey protein, % | 0,64±0,00 | 3,08 | 0,65±0,04 | 23,90 | 0,69±0,02 | 11,69 |
| dry matter, % | 11,91±0,06 | 2,11 | 12,40±0,15 | 4,73 | 12,40±0,16 | 4,88 |
| Skim solids, % | 8,15±0,04 | 2,37 | 8,42±0,04 | 1,78 | 8,43±0,04 | 1,81 |
| lactose, % | 4,60±0,07 | 6,80 | 4,36±0,01** | 1,00 | 4,36±0,01 | 1,00 |
| leach, % | 0,674±0,006 | 4,10 | 0,671±0,002 | 1,038 | 0,674±0,002 | 1,07 |
| density, °A | 28,00±0,14 | 2,14 | 28,92±0,17 | 2,31 | 29,09±0,14 | 1,80 |
| acidity, °T | 17,07±0,15 | 3,70 | 17,25±0,03 | 0,73 | 17,30±0,06 | 1,40 |
| «Good» | (n=8) | | (n=5) | | (n=8) | |
| Milk yield, kg | 4518,0±167,7 | 10,5 | 5437,0±611,1 | 22,5 | 5533,0±657,3 | 31,4 |
| Fat mass fraction, % | 3,79±0,04 | 2,96 | 3,81±0,12 | 6,33 | 4,01±0,24 | 16,13 |
| Protein mass fraction, % | 2,89±0,02 | 1,90 | 3,25±0,09 | 5,59 | 3,16±0,03* | 2,15 |
| casein, % | 2,26±0,01 | 1,84 | 2,55±0,09 | 6,82 | 2,55±0,07 | 7,19 |
| whey protein, % | 0,63±0,01 | 2,75 | 0,77±0,11 | 28,94 | 0,60±0,08 | 34,26 |
| dry matter, % | 12,00±0,08* | 1,90 | 12,50±0,21 | 3,38 | 12,44±0,17 | 3,53 |
| Skim solids, % | 8,27±0,05*** | 1,62 | 8,42±0,06 | 1,47 | 8,40±0,04 | 1,28 |
| lactose, % | 4,73±0,07*** | 3,97 | 4,41±0,02 | 0,95 | 4,40±0,01 | 0,83 |
| leach, % | 0,689±0,005*** | 2,08 | 0,678±0,004 | 1,234 | 0,679±0,003 | 1,23 |
| density, °A | 28,20±0,20 | 1,99 | 29,05±0,13 | 0,88 | 29,33±0,04*** | 0,38 |
| acidity, °T | 17,25±0,15 | 2,44 | 17,20±0,06 | 0,69 | 17,23±0,05 | 0,78 |
| «Satisfactory» | (n=0) | | (n=4) | | (n=0) | |
| Milk yield, kg | - | - | 5330,4±961,9 | 31,3 | - | - |
| Fat mass fraction, % | - | - | 3,75±0,26 | 12,00 | - | - |
| Protein mass fraction, % | - | - | 2,98±0,05 | 3,17 | - | - |
| casein, % | - | - | 2,34±0,03* | 1,93 | - | - |
| whey protein, % | - | - | 0,66±0,01 | 1,90 | - | - |
| dry matter, % | - | - | 12,30±0,27 | 3,84 | - | - |
| Skim solids, % | - | - | 8,41±0,08 | 1,66 | - | - |
| lactose, % | - | - | 4,41±0,06 | 2,28 | - | - |
| leach, % | - | - | 0,680±0,008 | 2,080 | - | - |
| density, °A | - | - | 28,82±0,32 | 1,93 | - | - |
| acidity, °T | - | - | 17,29±0,06 | 0,57 | - | - |

The differences were found to be true for the mass fraction of fat between the classes "Superior" and "Excellent" ($p < 0.05$). In cows of the "Excellent" class, these indicators are greater by an average of 0.11% and 16.0 kg, respectively. In the "SovkhozChervyshevsky" nucleus the mass fraction of protein in milk is higher for first-calf heifers "Excellent" class - on 0.09 ($p < 0.05$) - 0.09-0.08% than for herd mates. In the herd of SPK "Plemzavod" Razliv" the mass fraction of protein was higher to cows of "Good" class on average by 0.17%. At the same time, significant differences were found in this indicator between the classes "Excellent" and "Good" ($p < 0.05$).

In the herd of breeding animals LLC "Kurgan", the mass fraction of protein in the milk of cows of the complex class "Good with plus" and "Good" turned out to be, on average, 0.06% ($p < 0.05$) in comparison with other groups of cows. According to the

composition of the milk, the cows of the complex class "Good" in the herd of the nucleus "SovkhozChervyshevsky" kept up with the "Excellent" animals. And on dry matter, skim solids, lactose and leach exceeded by 0.06-0.13 ($p < 0.05$) - 0.44 ($p < 0.001$) - 0.036% ($p < 0.001$), respectively. Mass fraction of casein, the number of whey proteins was superior to animals of the "Excellent" class by 0.05 ($p < 0.05$) - 0.05-0.05% and 0.02 ($p < 0.01$) - 0.02 - 0.01%, respectively, than in herd mates. There was a similar situation in the herd of SPK "Plemzavod" Razliv". Animals of the "Good" class differed from the "Excellent" class herd mates in terms of casein and whey proteins on 0.12 and 0.08%, respectively. In this case, the cows of the "Superior" class had large values of the mass fraction of skim solids, lactose and leach in milk, respectively, on 0.09-0.06-0.35%, than in the first-calf heifers of other classes. Cows of the class "Excellent", "Good with a plus" and

"Satisfactory" in these indicators occupied an intermediate position. It was established that in the LLC Kurganskoe the animals of the complex class "Superior" had large number of skim solids, lactose and leach in comparison with the animals of the classes "Excellent", "Good with plus" and "Good", respectively, on average by 0.12-0, 07 - 0.013%.

The share of casein in the milk of "Good" cows is higher by an average of 0.11% compared to other groups of animals. The share of dry matter in the group of cows of the "Excellent" class is higher in comparison with animals of other classes on 0.29%.

According to the density of milk, animals of the "Good" class showed the best result. In the nucleus OJSC SovkhozChervyshevsky, the density of milk is higher than that of herd mates "Superior", "Excellent" and "Good with plus" on 0.17-0.13 - 0.20 ° A. In the herd of SPK "Plemzavod" Razliv "- respectively, at 5.29 - 0.57 - 0.13 ° A and compared with "Satisfactory" at 0.23 ° A. In LLC "Kurgan" - by 0,87 - 0,79 - 0,24 ° A, respectively.

In JSC SovkhozChervyshevsky, the acidity of milk is lower in cows of the complex class "Good with plus" than in animals of other groups on 0.14-0.06-0.18 ° T. In the herds of SPK "Plemzavod" Razliv "and LLC" Kurgan "the values of this indicator were lower for cows of the " Good" class in comparison with other groups, respectively, on farms for 0,29-0,18-0,05-0,09 ° T and 0.04 to 0.03 to 0.07 ° T.

Thus, as a result of the analysis of the obtained data, have been established some differences in milk yield and milk quality indicators of cows of different complex exterior classes. In terms of milk yield, the "Superior" animals were leading in all enterprises where scientific work was conducted. The chemical composition of the cows' milk of the classes "superior" and "Good", and the physical properties of the cows of the classes "Good" and "Good with plus" had the most optimal values for the production of a high-quality product.

6. AGE OF THE COWS' FIRST FERTILE INSEMINATION AND ITS INFLUENCE ON MILK PROPERTIES

The current stage in the development of dairy cattle breeding posed a number of new issues, among which an important place is occupied by the optimal intensity of raising and the advisability of reducing the age of the first calving of dairy cows to the minimum age limit, based on the objective need for further intensification of the industry. Very interesting is examination the milk quality indicators of cows, depending on the age of the first fertile insemination. The yield of cows in OAO SovkhozChervyshevsky (Table 4), inseminated at the age of 17-18 months, exceeded the yield of animals with later insemination on 305.0 (6.1%).

In SPK "Plemzavod" Razliv "in animals with the first fertile insemination at the age of 13-15 months, the yield is higher than cows with a later insemination on 1159.0 (17.1%) ($p < 0.001$).

Mass fractions of fat in the milk of cows of the second groups were higher than those of the first groups in OAO SovkhozChervyshevsky - by 0.07%, in the SPK "Plemzavod" Razliv "- by 0.14%.

In this case, the protein content of cows with an earlier age of insemination is higher. Thus, the share of protein in the milk of the first group of cows in OJSC SovkhozChervyshevsky exceeded this indicator of the second group by 0.04%. In the SPK "Plemzavod" Razliv "cows of the first group exceeded the animals of the second group in this indicator by 0.02%. According to the composition of the main components of milk, SovkhozChervyshevsky OJSC was led by the cows of the first group. The mass fraction of skim solids in the milk of cows of this group is higher by 0.03% than in the animals of the second group, casein by 0.04% ($p < 0.05$), whey proteins by 0.02% ($p < 0.05$), dry matter - by 0.01%, lactose - by 0.01%. The mass fraction of leach in the group of cows inseminated after age 18 of months is greater than in the first group of animals by 0.002%. The milk density in the first group exceeded the indicator of the second group by 0.26 ° A. The acidity of the milk of the cows of the second group is less than in the first group by 0.2 ° T.

Table 4. Indicators of milk quality of cows of black –and-white breed, depending on the age of the first insemination, $\bar{X} \pm S_{\bar{x}}$

| Index | Group, age of first insemination | | | |
|--------------------------|----------------------------------|------------------------------------|----------------------------|---------------------------------|
| | JSC "Sovkhoz Chervyshevsky" | | SPK "PZ" Razliv " | |
| | I, 17-18 months (n=17) | II, More than 18 мес. (n=17) | I, 13-15 мес. (n=17) | II, старше 15 мес. (n=17) |
| Milk yield, kg | 5008,0±54,7 | 4703,0±170,1 | 6795,0±171,1*** | 5636,0±245,6 |
| Fat mass fraction, % | 3,76±0,03 | 3,83±0,04 | 3,70±0,08 | 3,84±0,09 |
| Protein mass fraction, % | 2,92±0,02 | 2,88±0,01 | 3,14±0,03 | 3,12±0,04 |
| Skim solids, % | 8,21±0,04 | 8,18±0,05 | 8,40±0,03 | 8,41±0,06 |
| casein, % | 2,28±0,02* | 2,24±0,01 | 2,44±0,02 | 2,44±0,03 |
| whey protein, % | 0,65±0,01* | 0,63±0,00 | 0,66±0,03 | 0,71±0,02 |
| dry matter %, | 11,96±0,06 | 11,95±0,06 | 12,26±0,10 | 12,43±0,12 |
| Lactose %, | 4,64±0,07 | 4,63±0,08 | 4,40±0,02 | 4,38±0,01 |
| Leach %, | 0,676±0,004 | 0,678±0,007 | 0,678±0,004 | 0,673±0,002 |
| density, °A | 28,13±0,11 | 27,87±0,13 | 28,75±0,12 | 28,70±0,17 |
| acidity, °T | 17,25±0,15 | 17,05±0,17 | 17,33±0,05 | 17,30±0,04 |

In the herd of SPK "Plemenzavod" Razliv ", animals with a later insemination period (after 15 months of age) had a higher mass fraction of skim solids in milk on 0.01% in comparison with the herd mates of the first group, the whey proteins - by 0.05% , dry matter by 0.17%. In this case, the cows of the first group were in the lead by the mass fraction of lactose in milk by 0.02%, the leach by 0.005%. The milk density of the first group cows is higher by 0.05 ° A than in the second group. The acidity of milk in the group of animals with the age of the first fertile insemination is lower on 0.03 ° T than in cows inseminated at an earlier age.

Thus, the yield of animals increased with decreasing age of the first fertile insemination. In this case, the fat milkiness of the first-calves heifers declined, and the mass fraction of protein in milk increased. The qualitative composition of milk varied in the studied herds in different ways, which makes it possible to make additional studies in this direction.

7. CONSEQUENCES

1. The milk productivity of cows depends more on the age of their first fertile insemination and exteriors. The difference in these cases was from 1007 to 1159 kg of milk between the groups.
2. The chemical, physical and technological properties of milk differed to a greater extent in animals of various exterior complex classes. The maximum

differences in the groups were in casein (0.21%), serum proteins (0.12%), skim solids (0.12%), lactose (0.08%), sol (0.015%) and milk density (0, 87 ° A).

3. By the quantitative characteristics of milk productivity, the cows of the Wis Back Idial line were superior, while in terms of the milk quality, animals the Reflection Sovering lines were ahead of their herd mates in other lines with an unreliable difference in the indices

8. CONCLUSION

Thus, in order to get high-quality milk and its processing products, the dairy industry is recommended to take into account the origin of dairy cows and the features of their exteriors when organizing the technological process.

9. CONFLICT OF INTEREST

The authors confirm that the presented data do not contain a conflict of interest.

GRATITUDE

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