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ANIMAL HUSBANDRY

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INFLUENCE OF DIRECTED SELECTION BY MILK PRODUCTIVITY OF HORSES OF THE RUSSIAN HEAVY BREED ON THE FORMATION OF THE EXTERIOR

ANNOTATION

The studied population of Russian draft mares of the milking herd of the breeding kumys complex of the ZAO PZ Semenovsky breeding plant of the Republic of Mari El has high milk productivity, formed as a result of a long-term (over a period of more than 40 years) directed selection. During the period from 1982 to 2022, at the breeding kumys complex, 8 generations of mares of the Russian heavy breed were obtained, in which, due to the direction of selection work, changes in the exterior characteristic of dairy cattle occurred. Growth measurements (height at the withers and height of the leg at the elbow) increased slightly - by an average of 0,4 %. Chest girth decreased significantly - by 9,8 cm* and chest width - by 2,0 cm* (*The difference turned out to be significant and reliable P≥0,99). The physique of dairy mares became less massive, but at the same time increased in length by 1,7 % and became more angular - the depth of the chest increased by 1,09 %. In addition, in mares of the studied population, there was an increase in the length and width of the croup - by 1,06 and 0,7 %, respectively, as well as in the girth of the pastern - by 1,89 %. As a result, as a result of breeding work, in mares there was a decrease in the indices of flatness (chest girth) and compactness by 5,1 and 6,4 %, respectively, while the indices of format, chest depth and pastern girth increased by 1,3 - 0,6 – 2,1 percent. This fact makes it possible to form a dairy type in the population of horses of the Russian heavy draft breed of the kumys breeding complex of ZAO PZ Semenovsky.

Key words: *Russian draft horse breed, selection for milk production, assessment of exterior by measurements, body build indices, milk type.*

Introduction. In 1982, a koumiss farm was built in the Republic of Mari El at the Ovoshchevod state farm in the Medvedevsky district. To complete the livestock, horses of three heavy breeds were brought to the enterprise - Lithuanian, Russian and Soviet. They served as the starting point for this study. The ideological inspirer of the development of a new direction for the Republic of Mari El - dairy horse breeding, was Professor of the Mari State University V. S. Yavorsky. His research served as the basis for the development of intensive dairy horse breeding technology (1988). In the research materials of V.S. Yavorsky [13, 14] gives characteristics of the horses of the Russian heavy draft breed of the first generation, as well as the basic principles in accordance with which the farm was

staffed. The main feature of the horses brought to Mari El was that the selection of animals was carried out by appearance, since there were no clear criteria for selecting high-milk mares of heavy breeds into milking herds. The mares selected for the kumys farm were distinguished by their strong constitution, relatively large stature and massive physique. The mares had a harmonious, dry, small head; short, well-muscled neck; long, sometimes slightly soft back; flat, wide loin, wide, long and well-formed croup; correctly positioned strong limbs. All horses brought to the farm were aged from 1 to 7 years, had never been in the conditions of dairy horse breeding technology and were not used to produce marketable milk. In 1987-1988, replacement young stock from among the mares born here began to be introduced into the milking herd of the kumys farm, and 2nd generation mares appeared. That is why, in our research, we consider the starting point not to be the year the horses were brought to the farm, but 1986. Using horse assessment materials for 1986, we got an idea of the exterior of the mares - the founders of the koumiss farm, as well as their productive qualities.

Characteristics of the kumys farm population for 2000 were obtained from the research of A.V. Onegov [9], who in 1998-2001 studied the influence of types of higher nervous activity on milk production in heavy breed horses. During this period of time, targeted selection for milk productivity had been carried out at the koumiss complex for almost 18 years, and 3rd and 4th generations of Russian draft horses appeared.

The next stage of breeding work is reflected in the works of E. D. Chirgin “Zootechnical principles of intensifying the production of mare’s milk on stationary koumiss farms” (2008-2019) [7, 8]. During this period of time, mares of 5 and 6 generations appeared in the milking herd, and therefore, the grading data for 2011 was used as the reporting period.

In 2022, the milking herd of the breeding koumiss complex consisted mainly of mares of 7 and 8 generations from the ancestors who were once imported. We carried out an assessment based on measurements of 68 milking mares of the Russian draft breed available as part of a milking herd. The results of the research - the dynamics of changes in the measurements of mares of the Russian draft breed over the years of targeted selection for milk productivity and trend lines are presented in Figures 1-9.

It should also be noted that over the more than forty-year period of the farm’s existence, the animals were in almost identical conditions of keeping, feeding and breeding, and the main feature of selection during selection and breeding work was milk productivity.

The purpose of the work is to conduct a comparative assessment based on measurements and physique indices of different generations of mares of the Russian draft breed, which are in conditions of intensive dairy horse breeding technology. As a result of targeted selection for milk production over a period of more than forty years, the mares of the studied population developed not only the highest genetic potential for milk production, but also distinctive features in the exterior characteristic of high-milk animals. Thus, as a result of long-term selection of horses, university scientists and specialist breeders of the farm have come close to the need to register a selection achievement - the formation of a dairy type of horse of the Russian draft breed.

Material and methods. The research material included data from the primary zootechnical records of horses at the kumys farm (breeding kumys complex), cards of brood mares, state stud books of horses of the Russian heavy breed, as well as the results of the grading of horses for the period from 1982 to 2022.

Measurements were taken in accordance with the instructions for grading horses with an accuracy of 1 cm, and the girth of the pastern - with an accuracy of 0.5 cm. To take measurements from mares of the Russian heavy breed of the milking herd of the breeding koumiss complex, the main measuring instruments were used: a measuring stick, a compass and tape. The height at the withers was determined with a measuring stick as the vertical distance from the highest point of the withers to the ground. The length of the body was also measured with a stick, as the distance from the shoulder-scapula joint to the ischial tuberosity. Chest girth was determined using a tape - as the distance from the highest point of the withers tangentially to the posterior corner of the shoulder blade to the base of the sternum and back to the highest point of the withers. Metacarpal girth was determined using a tape at the narrowest point of the metacarpus (the lower part of the upper third of the metacarpus). The height of the leg at the elbow is determined by the tape as the vertical distance from the elbow to the ground. The depth of the chest was determined using a measuring stick as the vertical distance from the highest point of the withers to the base of the sternum, tangent to the posterior angle of the shoulder blade. The width of the chest was determined using a compass, as the distance between the outermost protrusions of the shoulder-scapular joints. To determine the width of the croup, a compass

was also used, calculating the distance between the croup. The length of the croup was determined as the distance from the croup to the ischial tuberosity.

Body physique indices were calculated using the following formulas:

$$Format\ index = \frac{Oblique\ length\ of\ the\ trunk}{Height\ at\ the\ withers} x100\% \quad (1)$$

$$Chest\ Girth\ index = \frac{Chest\ girth}{Beight\ at\ the\ withers} x100\% \quad (2)$$

$$Compactness\ index = \frac{Chest\ girth}{Oblique\ length\ of\ the\ trunk} x100\% \quad (3)$$

$$Chest\ Depth\ index = \frac{Chest\ depth}{Height\ at\ the\ withers} x100\% \quad (4)$$

$$Long - legged\ index = \frac{Height\ of\ the\ leg\ at\ the\ elbow}{Height\ at\ the\ withers} x100\% \quad (5)$$

$$Index\ of\ pastern\ girth = \frac{Pastern\ girth}{Height\ at\ the\ withers} x100\% \quad (6)$$

To carry out a comparative description of the measurements and physique indices of the horses, the study population was divided into four groups in accordance with their belonging to the corresponding generations: the first group - ancestral mares brought to the farm in 1982; second group – mares of the third and fourth generations; third group – mares of the fifth and sixth generations; fourth group – mares of the seventh and eighth generations. The obtained materials were subjected to statistical processing in the EXCEL program.

Research results and discussion. To study the influence of targeted selection for milk production in the studied population of Russian draft horses, we took 9 measurements (height at the withers, body length, chest girth, metacarpus girth, leg height at the elbow, chest depth, chest width, croup width and croup length) and carried out statistical processing of data in accordance with the affiliation of mares to different generations of animals at the complex.

The dynamics of changes in height at the withers in mares of the Russian draft breed over the years of targeted selection for milk production and the trend line are presented in Figure 1.

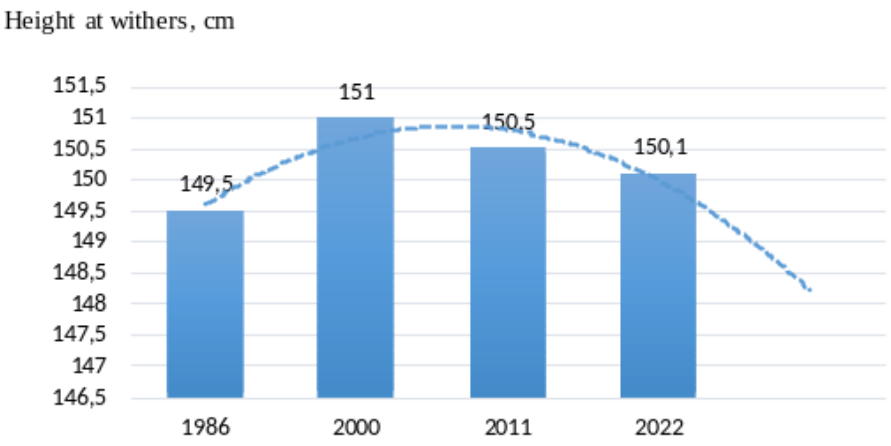

Figure 1 – Dynamics of changes in height at the withers in mares of the Russian draft breed over the years of targeted selection for milk production and the trend line

The materials in the figure indicate that at the initial stage, during selection for the milking herd, larger individuals were selected, which, as a rule, had a higher milk production. This direction of selection led to an increase in the height at the withers of mares by the 3rd-4th generation (2000) by 1.5 cm or almost 1%. Subsequently, the height of horses began to decrease slightly: in 20011 (5-6 generation) it averaged 150.5 cm, and in 2022 (7-8 generation) it averaged 150.1 cm. This, in our opinion, is due to the fact that in conditions intensive technology, milk productivity began to be influenced to a greater extent by the genetics and adaptive abilities of animals rather than the size of the lactating uterus. The trend line also indicates stabilization of the trait due to targeted selection for milk productivity. A similar picture is observed with another height measurement – the height of the leg at the elbow (Figure 2).

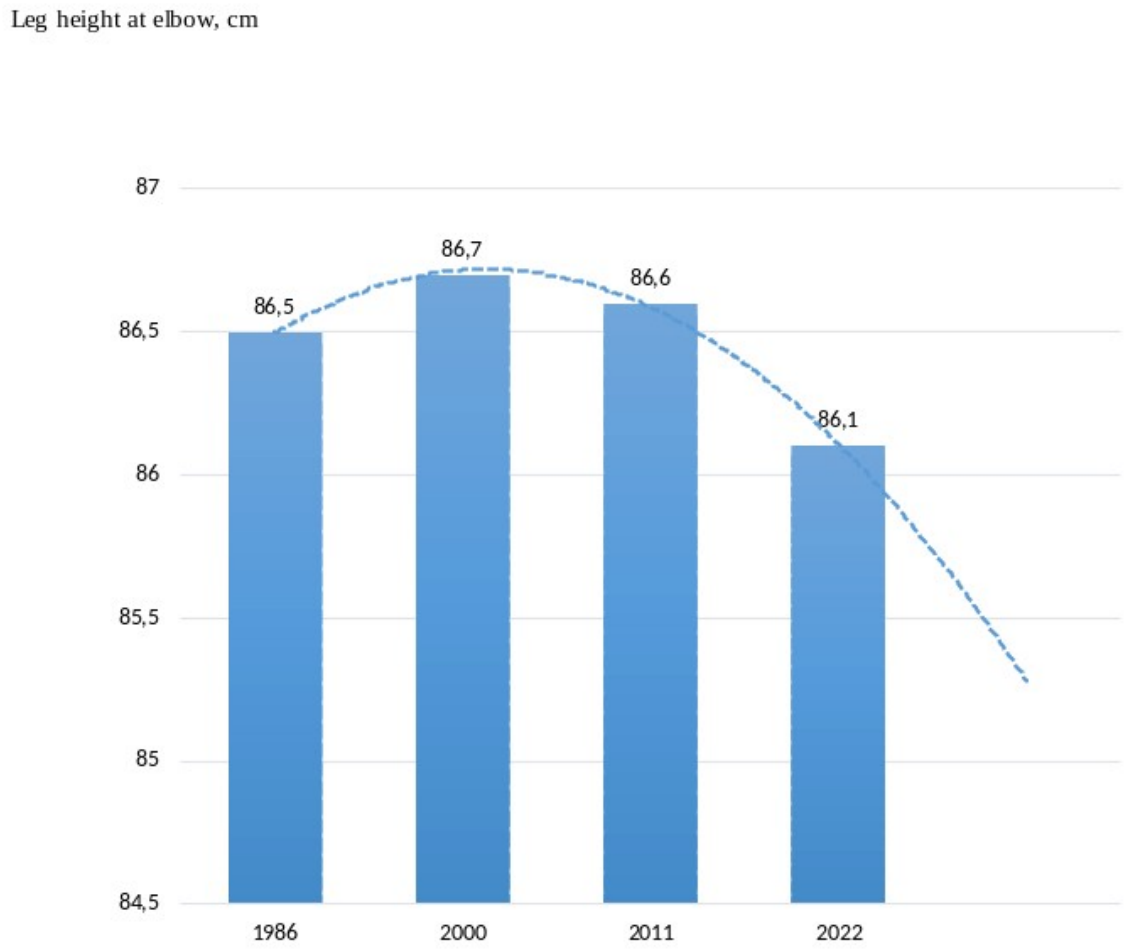

Figure 2 – Dynamics of changes in leg height at the elbow in mares of the Russian draft breed over the years of targeted selection for milk production and the trend line

A slightly different picture was observed when studying the dynamics of changes in chest girth and chest width (Figures 3 and 4).

As a result of targeted selection for milk productivity in mares by 2022 (7th-8th generation), compared with their ancestors (1986 1st generation), chest girth decreased by 4.75%* and chest width by 4.29%*. (*The difference turned out to be significant and significant P≥0.99). These changes in the exterior of animals are due to the fact that in dairy horse breeding there is no heavy load on the muscular system of horses and the powerful development of the chest and lungs is not required at all. It should also be noted that the physique of richly milking mares gradually became less massive, but at the same time increased in length, acquiring a certain elongation.

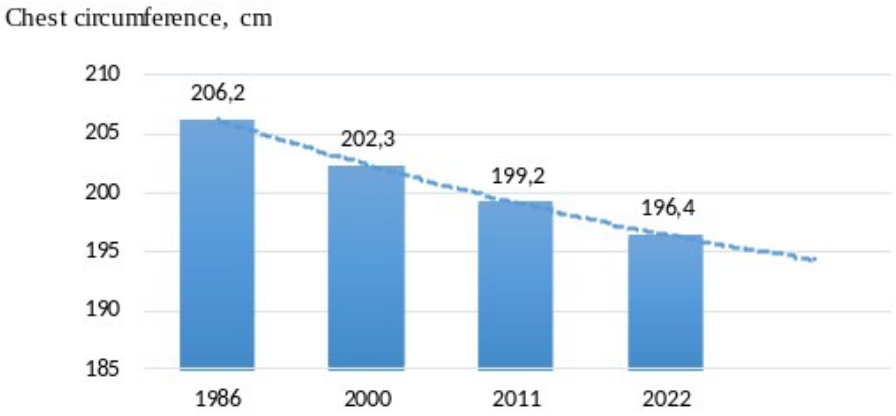

Figure 3 – Dynamics of changes in chest girth in mares of the Russian draft breed over the years of targeted selection for milk production and the trend line

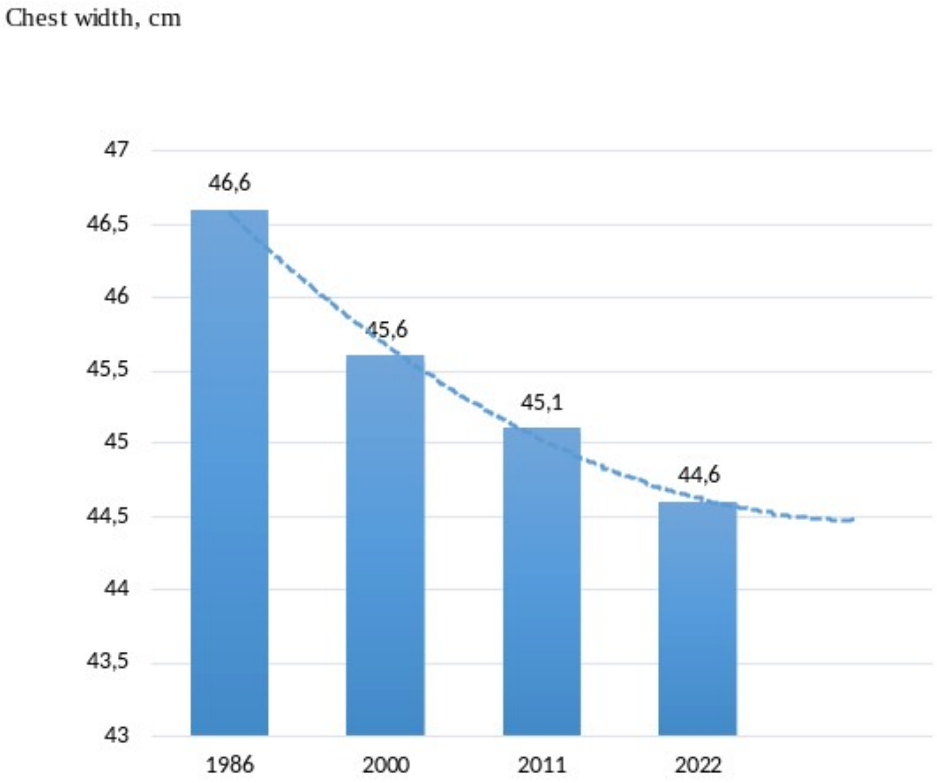

Figure 4 – Dynamics of changes in chest width in mares of the Russian draft breed over the years of targeted selection for milk productivity and the trend line

The dynamics of changes in body length in mares of the Russian draft breed over the years of targeted selection for milk production and the trend line are presented in Figure 5.

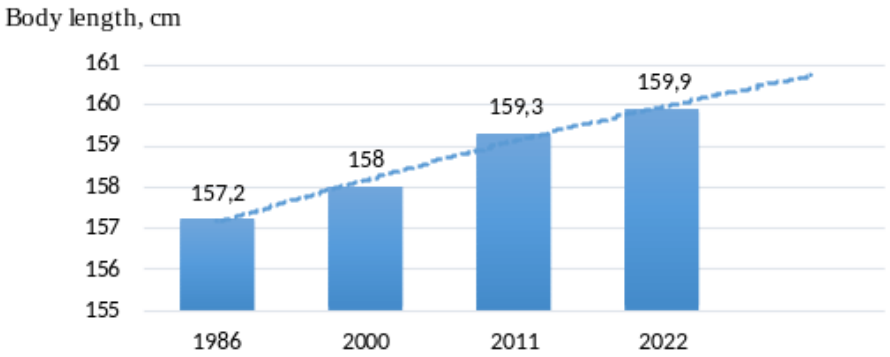

Figure 5 – Dynamics of changes in body length in mares of the Russian draft breed over the years of targeted selection for milk productivity and the trend line

The presented materials indicate a trend of increasing body length during selection for milk productivity. Thus, the body length of mares, due to targeted selection, increased in the 7th-8th generation of mares by an average of 2.7 cm, which amounted to 1.7%. A similar picture was observed with the development of chest depth (Figure 6).

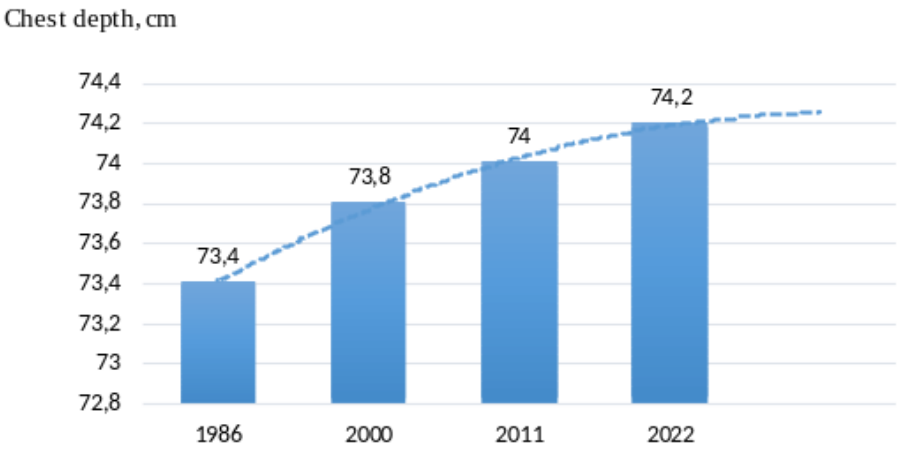

Figure 6 – Dynamics of changes in chest depth in mares of the Russian draft breed over the years of targeted selection for milk production and trend line

As a result of targeted selection for milk productivity, the chest depth in mares of the Russian draft breed increased from 73.4 cm in 1986 to 74.2 cm in 2022, which amounted to 1.09%. An increase in chest depth with a decrease in chest girth is precisely what gives mares the “angularity” characteristic of highly productive cattle.

The dynamics of changes in the width and length of the croup in mares of the Russian draft breed over the years of targeted selection for milk productivity are presented in Figures 7 and 8.

The development of the croup (its width and length) in mares is usually associated with reproductive qualities, since a wide and long croup indicates good development of the reproductive organs, as a result of possibly lighter foals. In addition, an increase in the linear measurements of the croup may indirectly indicate an increase in the mare's udder, which is associated with the growth of secretory tissues of the mammary gland due to intensive milking. Studies have shown that in the period from 1986 to 2022, mares increased slightly: the width of the croup - by 0.7% (0.4 cm) and the length of the croup - by 1.06% (0.6 cm).

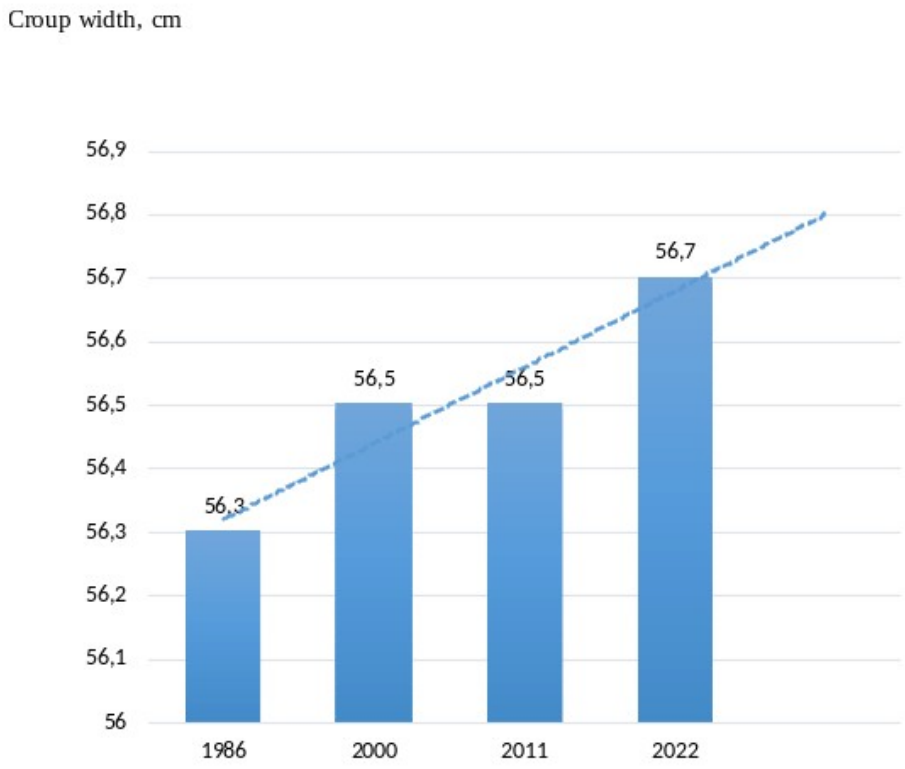

Figure 7 – Dynamics of changes in croup width in mares of the Russian draft breed over the years of targeted selection for milk productivity and trend line

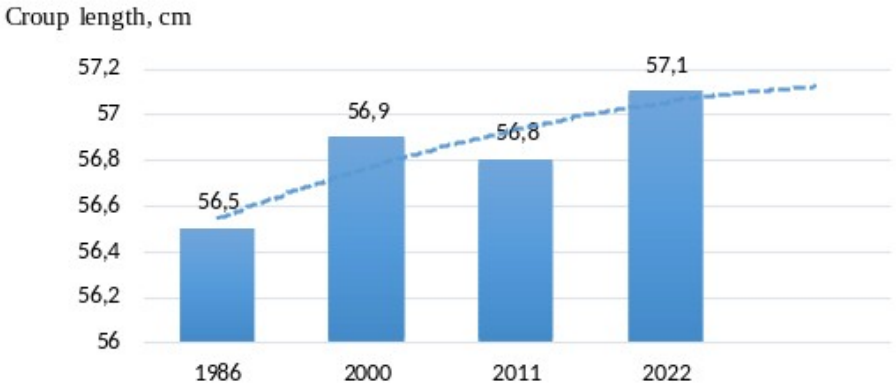

Figure 8 – Dynamics of changes in croup length in mares of the Russian draft breed over the years of targeted selection for milk productivity and trend line

The dynamics of changes in pastern girth in mares of the Russian draft breed over the years of targeted selection for milk production are presented in Figure 9.

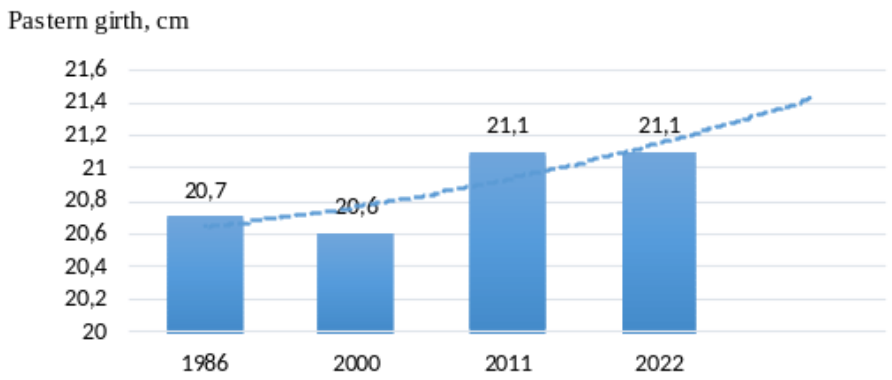

Figure 9 – Dynamics of changes in pastern girth in mares of the Russian draft breed over the years of targeted selection for milk production and trend line

It follows from the figure that in mares, as a result of long-term selection for milk productivity, an increase in pastern girth is observed - by 1.89%. This fact, in our opinion, is due to the development of the skeletal system - as the main calcium depot. High milk productivity implies a large removal of calcium from the body with milk yield, which is why the skeletal system of horses develops.

To confirm our opinion about changes in the body proportions of mares, we calculated body indices at the same time intervals as the measurements, and presented the information obtained in the table.

Table - Dynamics of changes in body indices in mares of the Russian draft breed over the years of targeted selection for milk production

Index	Years (generation of mares)			
	1986 (1)	2000 (3-4)	2011 (5-6)	2022 (7-8)
Format, %	105,1	104,6	105,8	106,5
Chest circumference, %	137,9	133,9	132,4	130,8
Compactness, %	131,2	128,0	125,0	122,8
Chest depth, %	49,1	48,9	49,2	49,4
Long-legged, %	57,9	57,4	57,5	57,4
Pastern girth, %	13,8	13,6	14,0	14,1

From the table it follows that long-term selection for milk productivity led to a decrease in the indices of roundness (chest girth) and compactness by 5.1 and 6.4%, respectively (due to a decrease in chest girth and width). At the same time, there was an increase in the format index - by 1.3% (due to an increase in body length and a decrease in height at the withers), chest depth index - by 0.6% (due to an increase in chest depth and a decrease in height at withers) and a metacarpus girth index – 2.1% (due to an increase in the girth of the pastern and a decrease in the height at the withers).

Conclusion. As a result of the conducted research, it was established that targeted selection for milk productivity had an impact on the formation of the exterior characteristics of the mares of the milking herd of the breeding koumiss complex of the Semenovsky breeding plant CJSC. Growth measurements (height at the withers and height of the leg at the elbow), having slightly increased in animals of the 3rd-4th generation - by 1%, subsequently stabilized and even began to decrease slightly: by 0.3 and 0.6%, respectively, in the 5th-6th and 7th generations -8 generations. At the same time, a comparison of the growth measurements of the uterus of the ancestors and mares of the 7th-8th generation showed a slight superiority of the latter - by 0.4%. The absence of loads on the muscular system of horses led to the fact that in mares of the 7th-8th generation, compared with their ancestors, the chest girth significantly decreased - by 4.75% and chest width - by 4.29%. The body of heavily milked mares became less massive, but at the same time increased in length by 2.7 cm or 1.7% and became more angular - the depth of the chest increased by 1.09%. In addition, in mares of a milking

herd there is an increase in the linear measurements of the croup (its length and width) and the girth of the pastern. This fact, in our opinion, is due not only to the development of the organs of the reproductive system, but also the udder, as well as the skeletal system (the main calcium depot).

Thus, as a result of long-term selection, mares of the Russian draft breed with a high level of milk productivity have developed distinctive exterior features characteristic of dairy cattle. This fact makes it possible to form a dairy type of horse in the Russian draft breed.

Similar results were obtained in studies by a number of scientists on mares of local horse breeds. Thus, A.M. Allaguzhin [1], Yu.N. Barmintsev [2, 3], I.A. Saigin [6] recommended using a moderately wide body, elongated body and long croup as signs of high milk production in local mares.

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ТҮЙІН

Марий Эл Республикасы Семеновск асыл тұқымды зауыты ЖАҚ асыл тұқымды қымыз кешенінің сауын табынының ресейлік шалғын биелерінің зерттелген популяциясы ұзақ мерзімді (40-тан астам кезеңде) нәтижесінде қалыптасқан сүт өнімділігі жоғары. жылдар) бағытталған іріктеу. 1982-2022 жылдар аралығында асыл тұқымды қымыз кешенінде орыстың ауыр тұқымды биелерінің 8 ұрпағы алынды, оларда селекциялық жұмыстардың бағытына байланысты сүтті малдың сыртқы сипаттамасында өзгерістер орын алды. Өсу өлшемдері (шұңқырдағы биіктік және шынтақтағы аяқтың биіктігі) аздап өсті - орта есеппен 0,4%. Кеуде қуысының көлемі айтарлықтай төмендеді - 9,8 см* және кеуде ені - 2,0 см* (*Айырмашылық маңызды және сенімді P≥0,99 болып шықты). Сауын биелердің дене бітімі азырақ массивті болды, бірақ сонымен бірге ұзындығы 1,7% -ға ұлғайып, бұрыштық болды - кеуде тереңдігі 1,09% -ға өсті. Сонымен қатар, зерттелетін популяцияның биелерінде қырқының ұзындығы мен ені сәйкесінше 1,06 және 0,7%-ға, сондай-ақ балауыздың ені 1,89%-ға ұлғайған. Нәтижесінде, асыл тұқымды жұмыстардың нәтижесінде биелерде жазықтық (кеуде аймағы) және ықшамдылық көрсеткіштері сәйкесінше 5,1 және 6,4%-ға төмендесе, формат, кеуде тереңдігі және қойнаулық қоршау көрсеткіштері 1,3-ке өсті. - 0, тиісінше ,6 - 2,1 пайыз. Бұл факт П.З.Семеновский атындағы ЖАО қымыз өсіру кешенінің ресейлік ауыр жылқы тұқымының жылқыларының популяциясында сүтті типті қалыптастыруға мүмкіндік береді.

РЕЗЮМЕ

Исследуемая популяция русских тяжеловозных кобыл дойного табуна племенного кумысного комплекса ЗАО племенной завод «Семеновский» Республики Марий Эл обладает высокой молочной продуктивностью, сформированной в результате длительной (за более чем 40 летний период) направленной селекции. За период с 1982 по 2022 годы на племенном кумысном комплексе получены 8 поколений конематок русской тяжеловозной породы, у которых вследствие направления селекционной работы произошли характерные для молочного скота изменения в экстерьере. Ростовые промеры (высота в холке и высота ноги в локте) увеличились незначительно – в среднем на 0,4 %. Значимо уменьшились обхват груди - на 9,8 см* и ширина груди - на 2,0 см* (*Разница оказалась значительной и достоверной P≥0,99). Телосложение дойных кобыл стало менее массивным, но при этом увеличилось в длину на 1,7% и стало более угловатым - глубина груди возросла на 1,09%. Кроме того, у кобыл исследуемого поголовья произошло увеличение длины и ширины крупа – соответственно на 1,06 и 0,7%, а также обхвата пясти – на 1,89%. Как следствие, у кобыл в результате селекционной работы произошло уменьшение индексов сбитости (обхвата груди) и компактности соответственно на 5,1 и 6,4%, в то время как индексы формата, глубины груди и обхвата пясти увеличились соответственно на 1,3 - 0,6 - 2,1 процентов. Данный факт позволяет сформировать в популяции лошадей русской тяжеловозной породы племенного кумысного комплекса ЗАО ПЗ «Семеновский» молочный тип.

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THE CONNECTION OF THE EXTERIOR OF THE MARES OF THE RUSSIAN HEAVY-DRAFT BREED WITH THEIR DAIRY PRODUCTIVITY

ANNOTATION

Dairy horse breeding is actively developing in Russia. One of the promising breeds for the production of mare's milk is the Russian heavy horse breed. For the cost-effective production of mare's milk, it is necessary to improve the method of selection of dairy mares by exterior. Scientists-horse breeders of the Republic of Mari El have been engaged in breeding mares of the Russian heavy-duty breed for dairy productivity for more than forty years. The links between the dairy productivity of mares with their live weight and exterior were analyzed. Measurements and morphological features of the udder of milking and non-milking (suckling) mares were investigated. It was found that the mares of the Russian heavy-duty breed as a result of breeding for milk productivity increased measurements of the trunk and some body indices. At the same time, the massiveness index and the downness index decreased in animals. In highly dairy mares, the growth rate of live weight increased during all periods of ontogenesis, they reached the age of physiological maturity and the age of the highest milk productivity earlier. As a result of targeted breeding for milk productivity in mares of the Russian heavy-duty breed, measurements of udder length by 49.46%, udder width by 34.00%, udder depth by 30.94% have significantly increased. The length of the nipples in dairy mares increased by 35.48%, the width of the nipples – by 26.67% and the distance between the nipples – by 12.24% in comparison with the indicators of suckling mares.

Ключевые слова: *лошади, экстерьер, удой, вымя, молочный тип.*
Key words: *horses, exterior, milk yield, udder, milk type.*

Introduction. Productive horse breeding in the Russian Federation is the fastest growing branch of horse breeding. Dairy horse breeding has good prospects for development in Russia.

For successful development, dairy horse breeding should be based on deep knowledge of the biological basis of horse productivity and rational technological solutions for obtaining products from them. The possibilities of effective selection of dairy mares for dairy productivity are still constrained by the weak development of methodological and theoretical issues of breeding work in dairy horse breeding[1, 2, 3, 4].

With the further development of dairy horse breeding, there is a need to include in the list of selection signs, along with traditional signs, a number of new ones, for example, technological

parameters of the udder of mares, features of the exterior of animals correlating with their high milk content, which will significantly increase the efficiency of the selection of dairy mares by a set of signs.

There is a need for the formation of an intrabreed dairy type in heavy-duty horse breeds that will more effectively transform feed into milk. At the same time, the production of mare's milk will become more cost-effective.

Scientists of the Mari State University have been engaged in breeding horses of a number of heavy-duty breeds for dairy productivity for more than forty years. It has been proved that intensive milking of mares increases their milk productivity and makes it possible to fully utilize the genetic potential of animals Chirgin E.D., Semenov V.G., Mokretsova A.S. et al. (2021) [5].The association of milk productivity with the types of higher nervous activity and udder capacity of mares was revealed Chirgin E.D., Semenov V.G., Ivanova E.N. (2021) [6]. It turned out that the mares of the Russian heavy-duty breed had high milk productivity. In the studies of Chirgin E.D., Semenov V.G., Nikitin D.A. at al. (2021) [7] it was found that the stallions-producers of the Russian heavy-duty breed had a great influence on the properties of the udder of daughters.

Nine families with a population of 8 to 37 mares each were formed in the population of mares of the Russian heavy-duty breed of the Republic of Mari El. The milk productivity of the family leaders ranged from 4007 to 5235 kg of milk for 210 days of lactation. The mass fraction of fat in the milk of mares ranged from 1.6% to 2.0%, and the coefficient of milk content ranged from 591.5 to 696.0 kg.

Since mares of heavy-duty breeds are used in dairy horse breeding relatively recently, there are no clear criteria for the selection of dairy mares by their appearance. There is little research on the study of the exterior features of high-milk mares of heavy-duty breeds. As a rule, when selecting horses for kumys farms, the type of physique and features of the exterior of the animals are taken into account. But the type of physique of horses of heavy-duty breeds corresponds to the traits of meat-dairy animals, and not specialized dairy productivity.

We believe that with long-term breeding of horses for milk productivity, the characteristics of specialized dairy type animals should be manifested in the Russian heavy-duty breed. And indeed, individual signs of the exterior of highly dairy mares in our studies indicate that the selection process is moving towards the formation of an intra-breed dairy type of animals.

The purpose of the work was to identify the features of the exterior of dairy-type mares in the Russian heavy-duty breed. To do this, several tasks were solved:

- to establish a connection between the exterior of mares and their milk productivity;
- to establish the relationship between the live weight of mares and their milk content;
- to trace the changes in the shape and measurements of the mares' udders;
- to find out how the measurements and the shape of the udder of mares are related to their exterior and milk productivity.

Materials and methods. The research was conducted in 2015-2021 at the breeding kumys complex of the closed joint stock company Semenovsky Stud Farm, located in the village of Yakimovo, Medvedevsky district of the Republic of Mari El. The average annual number of horses of the Russian heavy-duty breed at the complex was 350-370 heads, including 120-150 mares. All the mares involved in the research belonged to the "elite" class. The examined mares of the Russian heavy-duty breed were distinguished by a strong constitution, large stature, and a harmonious physique.

The exterior and constitutional features of the mares of the Russian heavy-duty breed were studied by taking measurements with measuring instruments and weighing on scales. Four main measurements were measured: height at the withers, oblique length of the trunk, chest girth and pastern girth. According to these measurements, the indices of the physique of animals were calculated.

The milk yield of mares was calculated on the basis of data obtained during control milking, carried out two or three times a month. Milk productivity was determined for full lactation and for 210 days of lactation. The milk content of mares for the first month of lactation (when the mare was not milked) was determined by the first control milking in the second month of lactation (or the first month of milking the mare). The milk yield for lactation was summed up with the milk consumed by the foal during lactation (at night, when the mares were not milked), and this amount was determined

as the estimated milk yield for lactation. The average milk productivity of mares for all lactation was determined by summing the amount of milk for each lactation and dividing this amount by the number of lactation. The coefficient of milk production was determined by the method generally accepted in animal husbandry: the estimated milk yield for lactation was divided by the live weight of the mare and multiplied by one hundred. In total, data on 463 mares of the Russian heavy-duty breed were used in the research.

The morphological properties of the udder of mares were evaluated in the second to third month of lactation according to the original technique developed by E.D. Chirgin, the following udder measurements were measured: the width and length of the udder were measured with a measuring compass; the height of the udder, the length and width of the nipples, the distance between the nipples were measured using a measuring tape; the shape of the udder and the shape of the nipples were determined by visual inspection. The density of attachment of the udder of mares was determined by measuring the angle between the cranial wall of the udder and the abdominal wall of the animal. The udder properties of the milking mares of the Russian heavy-duty breed were determined immediately before the next milking, that is, two hours after the previous milking.

To compare the morphological features of the udder, a group of mares with foals of a Russian heavy-duty breed from another farm were taken, which were never milked, and analogues were selected from them by live weight, age and month of lactation of the mares examined. These suckling mares of the Russian heavy-duty breed were initially beaten off foals, two hours later, when their mammary glands were filled with milk, their udders were examined, and after that the mares were connected to the foals again.

When isolating the dairy type in the population of the Russian heavy-duty breed, measurements, live weight, exterior features, and the index of milk content were determined in horses. Adult horses were bonitized at the age of 3 years, 4 years, 5 years, 7 years and 10 years.

Statistical processing of research data was carried out on the basis of generally accepted statistical methods on a personal computer using the Microsoft Excel program. The reliability of the difference between the average values of the signs was determined by the Student's td-criterion.

Research results and their discussion. Since mares of heavy-duty breeds are used in dairy horse breeding relatively recently, there are no clear criteria for the selection of dairy mares by appearance. Not enough research has been conducted to study the exterior features of high-milk mares of heavy-duty breeds.

In general, the mares of the Russian heavy-duty breed are distinguished by a strong constitution, large stature, and a harmonious physique. They have a harmonious, dry, small head, a short, well-muscled neck, a long, sometimes slightly soft back, an even, wide loin, a wide, long well-muscled croup, a wide and deep chest, well-placed strong limbs.

Table 1 shows the changes in the mares' measurements that occurred during their breeding for milk productivity.

Table 1 – Change in body measurements of mares of the Russian heavy-duty breed by generation

Years	Bodymeasurements, cm				Physiqueindices			
	heightatthewithers	obliquebodylength	chestgirth	pasternggirth	format	massiveness	downed	bones-standing
2015	149.40	156.70	202.70	20.50	104.80	135.70	129.50	13.10
2018	151.90	162.00*	194.00*	20.60	106.60*	127.70*	119.70*	13.50*
2021	150.50	159.30	199.20	21.10*	105.80	132.40	125.10	14.00
2021 as % of 2015	100.74	101.66	98.27	102.93	100.95	97.57	96.60	106.87

P<0,05*

As a result of intensive breeding for milk productivity, the oblique length of the trunk increased by 1.66%, the chest girth decreased by 1.73% and the pastern girth increased by almost three percent

on average in mares of the Russian heavy-duty breed. The indices of massiveness and downness decreased slightly in all the examined animals, but the index of bone structure increased.

These changes in the exterior of the animals were expected by us: since there are no heavy loads on the muscular system of horses in dairy horse breeding, they do not require powerful lung development, which is why the chest girth of mares decreased.

In general, it can be noted that the physique of the dairy mares of the Russian heavy-duty breed became less massive and slightly more angular, that is, changes in the exterior shifted in the direction of the dairy type of physique, modeled on dairy cattle. And the increase in the girth of the pastern in mares indicated an increase in the strength of the physique, which is also characteristic of dairy-type animals. Intensive milk productivity implies a large withdrawal of calcium from the body with milk yield, which is why the main calcium accumulator in the body developed – the bone system of horses.

Table 2 analyzes the relationship of the exterior with milk yield in mares of the Russian heavy-duty breed.

Table 2 – Change in body measurements in mares of the Russian heavy-duty breed with different milk productivity

Groups of mares by productivity	Number of heds, hed.	Average milk productivity per lactation, kg	Bodymeasurements, cm				Physiqueindices			
			heightatwithers	obliquebodylength	chestgirth	pasternggirth	format	massiveness	downed	bones-standing
<1999	4	1586.9	148.50	152.50	193.25	20.00	102.67	130.26	126.96	13.46*
2000 - 2999	16	2466.0	149.75	159.31*	195.69	20.75*	106.37*	130.66	122.87*	13.86
3000 - 3999	16	3314.6	152.25*	163.44*	202.81*	21.00	107.36	133.27*	124.12	13.80
>4000	2	4181.6	151.50	165.50	199.50	20.50	109.22	131.63	120.49*	1352*

P<0,05*

In mares of the Russian heavy-duty breed, with an increase in milk productivity in the range from 2000 kg to 4000 kg of milk, on average, all body measurements increased during lactation. And, accordingly, all the indices of physique increased with the exception of the index of downed animals.

Milk productivity depends on the body weight of the animal. Russian Russian heavy-duty mares had a positive correlation coefficient between milk productivity and live weight, but low + 0.24.

We calculated the index of milk production in Russian heavy-duty mares. On average, it turned out to be equal to 573.9 kg. In mares-recordist of the Russian heavy-duty breed with an estimated milk yield for lactation over 5000 kg, the milk index was significantly higher and averaged 856.5 kg. Highly dairy mares produced 282.6 kg more milk for every 100 kg of their weight than mares on average on the farm.

Our studies have shown that the live weight of highly dairy mares exceeded similar indicators of their peers in almost all periods of ontogenesis (Table 3).

Table 3 – Dynamics of live weight growth of mares of the Russian heavy-duty breed with different milk productivity

Indicators	Allmares,	Mares with an estimated annual

	n=213, head	milk yield of more than 5000 kg, n= 37, head
Live weight: at birth, kg	56.86	56.92
At 6 months, kg	280.36	314.47*
At 12 months, kg	378.68	434.07*
At 18 months, kg	449.80	515.17*
At the first fertilization, kg	527.41	528.43
At the first lactation, kg	608.21	606.94
Age at first fertilization, days	749	574*

P<0,05*

Analysis of data on changes in the live weight of young horses showed that mares with high milk yield were characterized by higher growth energy in all periods of ontogenesis. So, at six months, their live weight was 34.11 kg or 12.17% more than the average for the herd. At the age of one year, the live weight of the future recordists exceeded the live weight of their peers by 55.37 kg (or by 14.63%), and at 18 months – by 65.37 kg (by 14.53%). The highly dairy mares of the Russian heavy-duty breed were also distinguished by increased precocity. The age of their first fruitful insemination occurred 175 days earlier than the average for all mares.

We also tested the relationship between the age of the first insemination of mares and the age at which the animals achieved the highest milk productivity. The correlation coefficient between these indicators turned out to be positive. And its value in the first generation of dairy mares was +0.04, in mares of the second generation – +0.15 and in mares of the third generation – +0.29. The same trend also manifested itself here: due to targeted breeding, each next generation of dairy mares reached the highest milk productivity faster due to the fuller realization of their genetic potential.

The greatest changes in the exterior of milking mares compared to suckling mares were manifested in udder measurements (Table 4).

Table 4 – Udder measurements of mares of Russian heavy-duty breed, cm

Uddermeasurements	n, head.	M	lim	σ	C_v, %
sucklingmares					
Length	74	18.15	12.00-26.00	2.77	14.97
Width	74	15.41	12.00-22.00	2.13	13.82
Depth	74	9.73	5.00-17.00	0.32	3.29
milkmares					
Length	75	27.65*	22.00-34.00	2.50	9.04*
Width	75	20.65*	14.00-30.00	3.47	16.80
Depth	75	12.74*	6.00-20.00	3.22	25.27*

P<0,05*

Udder measurements in dairy mares significantly exceeded similar indicators of suckling animals: udder length by 49.46%, width – by 34.00%, depth – by 30.94%. The coefficient of variability of the udder depth in dairy mares was more than eight times higher than the variability in suckling mares, while the variability of the length and width of the udder of mares differed slightly.

In milking mares of the Russian heavy-duty breed, the measurements of the udder nipples increased markedly compared to similar indicators in suckling mares (Table 5).

Table 5 – Nipple measurements in mares of the Russian heavy-duty breed, cm

Nipplemeasurements	n, head.	M	lim	σ	C_v, %
sucklingmares					

Length	74	2.48	2.00-5.00	0.71	28.63
Width	74	3.75	3.00-5.50	0.66	17.60
Depth	74	6.37	3.00-12.00	1.46	22.92
milkmares					
Length	75	3.36*	2.00-5.00	0.71	21.13
Width	75	4.75*	3.50-7.00	0.89	18.74
Depth	75	7.15*	3.00-12.00	2.10	29.37

P<0,05*

The length of the nipples in dairy mares increased by 35.48%, and the width of the nipples – by 26.67% compared to the indicators of suckling mares. The distance between the nipples changed the least: the increase was 12.24%. The variability of nipple measurements in dairy mares has not changed significantly.

The coefficients of heritability of the length and width of the udder of mares of both studied breeds varied from 0.49 to 0.82. Measurements of the length and width of the udder of mares of heavy-duty breeds, thus, were largely determined by hereditary factors. The indicators of the heritability of udder depth measurements were significantly lower (0.22-0.36), since, in our opinion, they were greatly influenced not by genetic, but by phenotypic factors: the development of the udder's capacitance system, the completeness of milking the mares' udders, muscle tone, elasticity of the udder ligaments, etc.

The coefficients of heritability of nipple measurements were low (0.12-0.48), which was also expected by us, since the size of the nipples with the existing technology of milking mares was largely determined not by the amount of milk in the udder, but by the activity or, conversely, passivity of the effect on the foal's nipples during lactation. Indicators of the heritability of the distance between the nipples in mares were at an average level (0.32-0.58).

The coefficients of repeatability of udder measurements in mares were significantly less than the coefficients of heritability of these signs, since the coefficients of repeatability, as we believe, were more influenced by the physiological state of foals, which from lactation to lactation, even in the same the mares varied greatly.

Due to intensive milking of animals, the shape of the udder and nipples in milking mares underwent changes (Table 6).

Table 6 – The shape of the udder and nipples in milking and suckling mares

Morphological features of mares' udders	Numberofmares, %	
	suckling	milking
The shape of the udder of mares: cup-shaped	46.30	14.00
bath-shaped	53.70	86.00
The shape of the nipples in mares: cone-shaped	100.00	98.30
cylindrical	-	1.70

Of all the examined suckling mares of the Russian heavy–duty breed, about half had a tub-shaped, and the second half had a cup-shaped udder. In dairy mares, the tub-like shape of the udder, as more characteristic of dairy animals, prevailed over the cup-shaped one. In a small number of dairy mares, besides cone-shaped nipples, cylindrical nipples also appeared.

The amount of milk in the udder of mares is indirectly indicated by such an indicator as the angle of attachment of the udder. Our research has shown that the higher the milk yield of mares, the greater the angle of attachment of the udder. In suckling mares, the angle of attachment of the udder averaged 121.93 °, and in milking mares, this indicator increased to an average of 137.24 °, or 12.56%.

Our studies have not revealed a noticeable relationship between the morphological features of the udder and the measurements of the udder of mares on the one hand and with the exterior and body measurements of mares on the other hand in horses of the Russian heavy-duty breed. This lack of

relationship between the signs was expected by us and quite natural: since the exterior and body measurements of animals reflect their viability, adaptability to environmental factors of the environment, and udder measurements more correspond to the needs of foals in mother's milk or the degree of separation of mares.

Studies of the exterior of horses in dairy horse breeding are constrained by the fact that dairy mares are not covered and not worn. In such conditions, horse measurements become a very time-consuming process, and measurements of mares' udders are not only time-consuming, but also dangerous. To facilitate the assessment of the exterior of horses in dairy horse breeding, we plan to use modern technologies.

Currently, there is a development and creation of new technologies based on virtual and augmented reality Gaivoronskiy V.A., Trubitsyna D.I. (2022), but most often these technologies are limited to the playback of videos and photographic materials, although the possibilities of using these technologies have a huge potential Egorov AD, Reznik MS. (2023), Specialized Computer Systems (2018). For example, modern multi-camera systems have the ability to conduct panoramic photo and video shooting, but there are no software tools that build a three-dimensional model of the surrounding space based on the data obtained Konstantinov I.S., Gaivoronsky V.A. (2023), Sorokin A.N. (2021).

We plan to use modern technologies to build three-dimensional animal models on which to evaluate the exterior. We hope that modern technologies will allow us to quickly assess a large number of animals and more accurately identify the signs of mares of a specialized dairy type.

Conclusion. In mares of the Russian heavy-duty breed, as a result of selection for milk productivity, measurements of the trunk and some body indices increased. At the same time, the massiveness index and the knock-down index decreased.

In highly dairy mares, the growth rate of live weight increased during all periods of ontogenesis, they reached the age of physiological maturity and the age of the highest milk productivity earlier.

As a result of targeted breeding for milk productivity, udder measurements have significantly increased in mares of the Russian heavy–duty breed: length – by 49.46%, width – by 34.00%, depth - by 30.94%. The length of the nipples in dairy mares increased by 35.48%, the width of the nipples – by 26.67% and the distance between the nipples – by 12.24% in comparison with the indicators of suckling mares.

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ТҮЙІН

Ресейде сүтті жылқы шаруашылығы белсенді дамып келеді. Бие сүтін өндіру бойынша перспективалы тұқымдардың бірі – ресейлік жылқы тұқымы. Бие сүтін тиімді өндіру үшін сауын биелерді сыртқы түріне қарай іріктеу әдістемесін жетілдіру қажет. Марий Эл республикасының жылқы ғалымдары қырық жылдан астам уақыт бойы сүт өндіру үшін ресейлік лойық биелерді іріктеп келеді. Биелердің сүттілігімен олардың тірі салмағымен сыртқы түрі арасындағы байланыстар талданды. Сауын және саумайтын (сауын) биелердің желінің өлшемдері мен морфологиялық ерекшеліктері зерттелді. Сүт өнімділігі бойынша іріктеу нәтижесінде ресейлік шалғын тұқымды биелерде дене өлшемдері мен кейбір дене құрамының көрсеткіштері жоғарылағаны анықталды. Бұл ретте малдың массалық көрсеткішімен тоқырау көрсеткіші төмендеді. Сүтті биелерде тірі салмақтың өсу қарқыны онтогенездің барлық кезеңдерінде жоғарылады, олар физиологиялық жетілу жасына және ең жоғары сүт жасына ерте жетті. Сүт өнімділігі бойынша мақсатты іріктеу нәтижесінде ресейлік ауыр тұқымды биелерде желіннің ұзындығы 49,46% - ға, желіннің ені 34,00% - ға, желіннің тереңдігі 30,94% - ға едәуір өсті. Сүтті биелердегі емізік ұзындығы 35,48% – ға, емізік ені 26,67% – ға және емізік арасындағы қашықтық 12,24% - ға өсті.

РЕЗЮМЕ

Молочное коневодство активно развивается в России. Одной из перспективных пород для производства кобыльего молока является русская тяжеловозная порода лошадей. Для рентабельного производства кобыльего молока нужно совершенствовать методику отбора молочных кобыл по экстерьеру. Ученые-коневоды Республики Марий Эл более сорока лет занимаются селекцией кобыл русской тяжеловозной породы по молочной продуктивности. Были проанализированы связи молочной продуктивности кобыл с их живой массой и экстерьером. Были исследованы промеры и морфологические особенности вымени дойных и не дойных (подсосных) кобыл. Было установлено, что у кобыл русской тяжеловозной породы в результате селекции по молочной продуктивности увеличивались промеры туловища и некоторые индексы телосложения. Уменьшались при этом у животных индекс массивности и индекс сбитости.У высоко молочных кобыл увеличивалась скорость роста живой массы во все периоды онтогенеза, они раньше достигали возраста физиологической зрелости и возраста наивысшей молочной продуктивности. В результате целенаправленной селекции по молочной продуктивности у кобыл русской тяжеловозной породы значительно увеличились промеры длины вымени на 49,46 %, ширины вымени на 34,00 %, глубины вымени на 30,94 %. Длина сосков у дойных кобыл увеличилась на 35,48 %, ширина сосков – на 26,67 % и расстояние между сосками – на 12,24 % в сравнении с показателями подсосных кобыл.

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THE USE OF SHEEP PRODUCERS OF THE AKZHAIK MEAT AND WOOL BREED TO IMPROVE THE MEAT PRODUCTIVITY OF FINE-FLEECED SHEEP

ANNOTATION

The article presents the results of a comparative assessment of the growth, development and meat productivity of young animals of the Volgograd fine-fleece breed and crosses obtained as a result of introductory crossing of Volgograd fine-fleece ewes with rams of the Akzhaik meat-wool breed of the Saltanat peasant farm.

Differences between groups in live weight are explained by the breed characteristics of the paternal forms of animals and the manifestation of heterosis. Thus, rams from Akzhaik breeders were superior in live weight to rams from Vogograd breeders at birth by 9.1% (P<0.05), at cutting by 2.1% and at 8 months by 5.2% (P<0 .05). The eggs, respectively, were superior at birth by 0.4 kg or 9.8% (P<0.05), at 8 months by 1.6 kg or 5.8% (P<0.01).

Data from body measurements and the values of body composition indices, which characterize the severity of meatiness, show the advantage of young animals from sires of the Akzhaik breed over the offspring of sires of the Volgograd breed.

To study meat productivity, control slaughters of lambs at the age of 4 and 8 months were carried out. At the same time, in terms of slaughter weight, the offspring of Akzhaik rams was superior by 1.27 kg or 5.8%

***Key words**: akzhaikskaya, volgogradskaya, growth, development, young, live weight, slaughter qualities*

Introduction. Providing the country's population with food is the most important task of the agro–industrial complex. The main direction of solving this problem is to increase the productivity of animals [1, 2, 3]. Interbreeding allows you to expand the hereditary foundations of the body, which helps to produce offspring with higher productivity [4,5, 6,7, 8, 9, 10]. Obtaining high productivity is impossible without organizing full-fledged feeding of sheep. Feeding affects the growth rate and carcass quality of crossbred animals. At the same time, crossbred animals have a high level of metabolism, digest feed nutrients more efficiently, and use them better, and this in turn has a positive effect on the productive qualities of animals [11,12, 13, 14].

In modern intensive sheep farming, the main focus is on the production of lamb meat and young mutton. Crossbred animals of the first generation surpass their ancestors in live weight, slaughter yield, and feed payment [15, 16, 17].

Materials and methods of research. The uterus of Volgograd fine-wooled sheep bred in the Saltanat farm used in the experiments was characterized by average indicators. The average live weight of the queens of the farm was 49.0 kg, the cut of the washed wool was 1.5 kg at a yield of 42.7%, the length of the wool was 6.5 cm. Experienced uteruses in terms of fiber thickness in the middle zone of the staple are characterized by an average of 60 quality. The tonin of wool fibers in the lower zone of the staple was 22.5 microns, in the middle – 23.7 microns and in the upper – 24.4 microns.

To improve the meat qualities of sheep bred on the farm of the Volgograd meat-wool fine-wool breed by the method of introductory crossing in the autumn of 2021, producing sheep of the Akzhaik meat-wool breed from the Kuanysh farm of the Akzhaik district were imported to the Saltanat farm.

The productivity of sheep producers of the Akzhaik meat-wool and Volgograd fine-wool breeds is shown in Table 1. The sheep selected for research meet the standards (minimum requirements) of their breed in terms of productive qualities.

Table 1 - Productivity indicators of sheep producers

Breed	Ind. №	Class	Live weight, kg	Wool length, cm	Shearing of wool, kg		Output of washed fiber, %	Wool quality
					dirty	washed		
AMWB	517	Эл	95	14,5	8,7	5,7	65	48
	5265	Эл	94	14,0	8,6	5,5	64	50
VG	6835	Эл	93	9,0	11,0	5,5	50	60
	3413	Эл	94	9,5	11,4	5,6	49	64

For a comparative assessment of the meat and wool indicators of crossbreeds obtained from the use of producing sheep of the Volgograd and Akzhaik breeds on sheep of the Volgograd breed, we studied the growth, development, and meat productivity of the queens of the compared breeds. The results of the study. Body weight is the main indicator of the growth and development of an organism at various stages of its life. Many factors influence the growth and development of animals, both in the embryonic and subsequent periods. The dependence of the weight of lambs at birth on the conditions of feeding and keeping of queens during pregnancy, their age, body weight, sex of lambs, breed, etc. is known [6].

Changes in the live body weight of experienced young animals born in 2021 can be traced in Table 2.

Table 2 - Age-related changes in body weight of experimental animals, kg

Breed	Paul	n	Live weight, kg		
			at birth	when beating off	8 months
½ AMWB x ½ VM	Bright	102	4,5±0,13	26,6±0,46	29,2±0,47
	Rams	93	4,8±0,19	28,5±0,54	34,1±0,57
VG purebred	Bright	72	4,1±0,18	25,8±0,66	27,6±0,55
	Rams	76	4,4±0,16	27,9±0,54	32,4±0,65

The data in table 2 show that lambs are characterized by quite satisfactory body weight indicators, both at birth and in subsequent periods. Lambs from Akzhaik rams had the best body weight, both at birth and when they were beaten and at 8 months old. During all weighing periods, lambs obtained from producers of the Volgograd fine-wool breed had the lowest live weight. Sheep from Akzhaik producers outnumbered sheep from producers of the Vogograd breed at birth by 9.1% ($P<0.05$), when beaten by 2.1% and in 8 meat by 5.2% ($P<0.05$). The eggs, respectively, exceeded at birth by 0.4 kg or 9.8% ($P<0.05$), at 8 months by 1.6 kg or 5.8% ($P<0.01$). Significant differences in live weight between the groups are observed during all weighing periods.

During all periods of weighing, the differences in live weight in the compared groups are statistically significant, with the exception of the rams obtained from the manufacturers and VG manufacturers, when beaten. The large differences between the groups in terms of body weight are explained by the breed characteristics of the paternal forms of animals and the manifestation of heterosis. One of the important features of sheep is their precocity. It is known that in conditions of favorable feeding and maintenance, young animals grow and develop most intensively at an earlier age. With increasing age, the energy of growth decreases. One of the indicators of the intensity of growth of young animals is the average daily increase in body weight [18,19,20].

Young animals grow most intensively during the suckling period, and subsequently their productivity decreases sharply. The average daily increase in crossbred sheep from birth to culling was

188 g, which is 20 g more than in purebred sheep of the Volgograd fine-wool breed. The best growth energy is possessed by the young of the Akzhaik breed producers, the worst is the young from the producers of the Volgograd fine–wooled sheep.

In zootechnical practice, the assessment of animals by exterior is carried out by the ocular method and by measurements and subsequent processing of measurements. A fairly comprehensive idea of the growth and development of an animal is provided by the measurement of the body [7].

The measurement results of the experimental young are shown in Table 3. Measurements taken from lambs at birth indicate a fairly proportional development of their embryonic period. There is some superiority of the sheep and eggs obtained from the Akzhaik producers over the offspring of the Volgograd breed of sheep. In the period after beating, there is a slowdown in the growth of young animals of all groups. In all periods of measurement, the primacy of young animals is observed from producers of the Akzhaik breed by measuring over the offspring of producers of the Volgograd breed.

It should be noted that the eggs from all mating options are somewhat inferior in size to the sheep. An analysis of the measurements obtained showed that half-blooded sheep and yarrows have a longer body. At the age of 4 months, the sheep obtained from the Akzhaik sheep exceeded their purebred peers by 4.2 cm or 6.7% (P>0.999) in oblique body length, and the yarrows by 4.1 cm or 6.7%, with a high reliability of the difference (P>0.999).

The same trend persists at the age of 8 months. According to other measurements, the superiority of half-blooded lambs is also observed in all age periods. In terms of chest circumference at the age of 8 months, the sheep received from the Akzhaik rams surpassed their peers in chest circumference by 3.4 cm or 4.1%, at P>0.999, and the eggs by 3.6 cm or 4.4%, at P>0.999. In terms of chest width, the difference between the sheep of different groups reached 0.6 cm or 3.6% in favor of half-blooded sheep, and the difference between the groups of eggs was 0.9 cm or 7.1%, P>0.95.

Thus, measurements show that lambs obtained from Volgograd queens and Akzhaik sheep have a longer and wider body, they are taller than lambs of the purebred Volgograd breed.

Table 4 - Physique indices of experienced young animals, %

Index	Age, months	AMWB x ½ VG		VG	
		rams	yarochki	rams	yarochki
Leggy	at birth	64,4	65,6	65,6	66,1
	4	59,9	60,1	60,9	61,1
	8	59,2	59,6	60,5	60,86
Sprawl	at birth	84,2	80,3	82,5	80,16
	4	113,8	114,6	109,4	109,1
	8	119,1	118,4	115,1	115,8
Pelvic-thoracic	at birth	108,2	107,6	11,8	113,5
	4	100,0	101,2	100,6	98,7
	8	99,7	96,5	99,4	95,7
Thoracic	at birth	67,5	68,2	66,3	64,61
	4	70,6	72,2	72,6	70,1
	8	70,0	69,9	71,7	69,3
Knocks	at birth	119,01	122,35	121,7	124,7
	4	118,9	120,7	123,8	124,7
	8	121,1	121,7	123,4	122,3
Massiveness	at birth	100,5	99,48	100,2	100,0
	4	135,3	138,3	135,5	136,1
	8	144,1	144,0	142,0	142,1
Meat products	at birth	71,59	70,05	70,9	70,5
	4	81,7	82,8	81,6	81,6
	8	87,8	87,8	85,6	85,4

Table 3 - Measurements of experienced young animals, see

Breed of lambs	Age, months	Height at the withers	Height at the withers	Chest circumference	Chest width	Chest depth	Width in mockups	Butt half-girth
Rams								
AMWB x ½ VG	at birth	39,6±0,71	33,4±0,93	39,7±0,64	9,5±0,38	14,1±0,39	8,8±0,38	28,3±0,51
	4	58,6±0,53	66,7±0,42	79,3±0,43	16,6±0,29	23,5±0,32	16,6±0,34	48,9±0,28
	8	59,8±0,46	71,2±0,52	86,2±0,32	17,1±0,24	24,4±0,27	17,2±0,23	52,5±0,42
VG purebred	at birth	39,2±0,58	32,3±0,77	39,3±0,57	9,9±0,26	13,5±0,41	8,0±0,35	27,8±0,30
	4	57,1±0,32	62,5±0,37	77,4±0,41	16,2±0,28	23,3±0,46	16,1±0,25	48,6±0,32
	8	58,3±0,29	67,1±0,37	82,8±0,41	16,5±0,23	23,0±0,31	16,6±0,36	49,9±0,43
Yarochki								
AMWB x ½ VG	at birth	38,9±0,76	31,5±0,39	38,7±0,77	9,1±0,29	13,1±0,44	8,5±0,18	27,0±0,52
	4	56,9±0,55	65,2±0,40	78,7±0,42	16,4±0,31	22,7±0,30	16,2±0,42	47,1±0,25
	8	59,8±0,47	70,1±0,57	85,3±0,31	16,7±0,34	23,9±0,32	17,3±0,23	52,0±0,35
VG purebred	at birth	38,3±0,53	30,7±0,63	38,3±0,67	8,4±0,25	13,0±0,39	7,4±0,29	27,0±0,29
	4	56,0±0,43	61,1±0,62	76,2±0,24	15,3±0,40	21,8±0,49	15,5±0,34	45,7±0,25
	8	57,5±0,39	66,6±0,47	81,7±0,41	15,6±0,32	22,6±0,42	16,3±0,23	49,1±0,31

Measurements, although they provide objective information, cannot fully characterize the physique of an animal, since they are taken in isolation from each other. Therefore, when characterizing the exterior of an animal, the absolute value of the measurement is less significant than its relative magnitude. Calculating the ratio of anatomically related measurements, or body indices, makes it possible to more correctly determine the proportions of the body, the constitutional type and the propensity of the animal to produce basic products.Calculated by us on the basis of measurements, seven indices of the physique of experienced young animals most fully characterize the exterior of sheep (Table 4).

The leggy index characterizes the growth and development of legs in height. A slightly higher index of legginess was noted in young animals from producers of VG sheep. With age, this index decreases in all experienced lambs. The highest elongation index was observed in young stock of Akzhai producers and the lowest in young stock from the Volgograd breed.

The index of the pelvic and thoracic characterize the development of the breast in width. These indicators at birth were significantly higher in lambs from producers of Volgograd meat sheep, and in subsequent periods they were approximately equal in all groups.

The relative development of body weight is characterized by the downness index. According to this index, in all periods, the rams and yarochki from producers of Volgograd meat sheep were superior. The lowest rates were observed in young animals from Akzhaik producers.

The index of massiveness and meat characterizes the meat virtues of animals. According to these indices, lambs from Akzhaik producers are superior at the age of 8 months. The index of massiveness in half–blooded sheep was 144.1, in yarrows – 144.0, and in Volgograd - 142-142.1. The meat index in crossbred lambs was 87.8, and in the offspring of VG – 85.4-85.6.

Thus, the resulting half-blooded young stock has a physique inherent in the meat-wool breed with appropriate precocity and surpasses the purebred young stock of the Volgograd breed in terms of massiveness and meat content.

Quantitative and qualitative indicators of sheep meat productivity are determined by a number of different interrelated factors – genetic and environmental. Due to the changed economic relations in the country and a decrease in demand for wool, further improvement of meat and wool sheep should be carried out in the direction of increasing meat productivity while maintaining the basic qualities of wool in accordance with the requirements of the wool processing industry.

To study meat productivity, we conducted control slaughtering of sheep obtained from Akzhaik and Volgograd producers at the ages of 4 and 8 months. Typical sheep were selected for slaughter according to the level of development and severity of productive traits that meet the standards of the lines and the desired type.

Table 5 - Meat productivity of rams, (n=3)

Indicator	½ AMWB x ½ VG		VG	
	4 months	8 months	4 months	8 months
Pre-slaughter live weight, kg	31,3	46,7	31,0	45,2
Carcass weight, kg	13,74	21,85	13,45	20,74
Carcass output, %	43,9	46,80	43,4	45,9
Internal fat	0,45	1,39	0,31	1,23
Internal fat output, %	1,44	2,97	1,0	2,72
Slaughter weight, kg	14,19	23,24	13,76	21,97
A killer exit, %	45,3	49,8	44,4	48,6

The feeding abilities of young animals of various groups have been studied by placing them for fattening immediately after culling. The total increase during the period of fattening of young animals from Akzhaik rams was 15.40 kg, and from Volgograd rams – 14.42 kg. As a result of the slaughter of 4-month-old sheep, some advantage in pre-slaughter weight was noted in lambs obtained from Akzhaik sheep (by 0.3 kg, or 0.9%). By slaughter weight, this superiority was 0.43 kg or 3.1%, and at the age of 8 months – 1.27 kg or 5.8%. According to the slaughter yield, the difference was 0.9 and 1.2%, respectively, by age.

Conclusion. In terms of slaughter weight, the superiority of offspring from Akzhaik sheep was noted by 1.27 kg or 5.8%. The superiority of offspring from Akzhaik rams was also noted – 49.8% against 48.6% from the offspring of Volgograd rams. At slaughter at the age of 4 months, fairly good carcasses weighing 13.45 kg or more were obtained from all crossing options, and after fattening the carcass weighing 21.97 kg with the advantage of offspring from Akzhaik sheep.

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ТҮЙІН

Мақалада волгоград биязы жүнді саулықтарды ақжайық етті-жүнді қошқарларымен кіріспе шағылыстыру нәтижесінде алынған будандар мен волгоград биязы жүнді қозыларының өсу, даму және ет өнімділігін салыстырмалы бағалау нәтижелері берілген.

Топтар арасындағы тірі салмақтары бойынша айырмашылықтар жануарлардың аталық формаларының тұқымдық ерекшеліктерімен және гетерозистің қасиетімен түсіндіріледі. Сонымен, ақжайық етті-жүнді еркек қозылары тірілей салмағы бойынша волгорадтық биязы жүнді қатарластарынан туғанда 9,1%-ға (P<0,05), енесінен айырғанда 2,1%-ға және 8 айлығында 5,2%-ға (P<0 ,05) артық болды. Ұрғашы қозылар, сәйкесінше, туғанда 0,4 кг немесе 9,8% (P<0,05), 8 айда 1,6 кг немесе 5,8% (P<0,01) басым болды.

Еттілік қасиеттерін сипаттайтын дене өлшемдері мен дене индекстерінің көрсеткіштерінің мәндері бойынша ақжайық етті-жүнді тұқымының төлдері волгоград биязы жүнді қошқарлардың ұрпақтарынан артықшылығын көрсетеді.

Ет өнімділігін зерттеу үшін 4 және 8 айлық еркек қозылардың бақылау союлары жүргізілді. Бұл ретте сойыс салмағы бойынша ақжайық етті-жүнді тұқымының төлі 1,27 кг немесе 5,8 пайызға артық болды.

РЕЗЮМЕ

В статье приводятся результаты сравнительной оценки роста, развития и мясной продуктивности молодняка волгоградской тонкорунной породы и помесей, полученных в результате вводного скрещивания волгоградских тонкорунных овцематок с баранами акжаикской мясо-шерстной породы крестьянского хозяйства «Салтанат».

Различия между группами по живой массе объясняется породными особенностями отцовских форм животных и проявлением гетерозиса. Так, баранчики от акжаикских производителей превосходили по живой массе баранчиков от производителей вогоградской породы при рождении на 9,1% (P<0,05), при отбивке на 2,1% и в 8 мясяцев на 5,2% (P<0,05). Ярочки, соответственно, превосходили при рождении на 0,4 кг или на 9,8% (P<0,05), в 8 месяцев на 1,6 кг или на 5,8% (P<0,01).

Данные промеров тела и величины индексов телосложения, характеризующих выраженность мясности, показывают примущество молодняка от производителей акжаикской породы над потомством производителей волгоградской породы.

Для изучения мясной продуктивности проводились контрольные убои баранчиков в возрасте 4 и 8 месяцев. При этом по убойной массе отмечено превосходство потомства от акжаикских баранов на 1,27 кг или на 5,8%.

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STUDY OF THE EFFECT OF PROTEIN-VITAMIN-MINERAL FEED ADDITIVES ON THE INCREASE IN LIVE WEIGHT OF HORSES

ANNOTATION

Agriculture is considered an important industry for Kazakhstan. Consumer demand for livestock products (beef and dairy cattle) is very high. Protein-vitamin feed additives are of great importance in the breeding of meat and dairy animals. Feed additives not only increase live weight gain, but also strengthen the immunity of animals and increase resistance to adverse environmental factors. The article discusses the results of experimental studies on the influence of a feed additive of a new composition on the physiological condition of horses on the yield and quality of meat products. As an obyect, horses of the Kazakh breed aged 1.5-2.0 years were selected, that located in the stall. Based on the study of blood composition, an increase in the values of erythrocytes, hemoglobin, leukocytes and platelets was revealed in the experimental groups of horses taking the feed additives, compared with the animals of the control group. This indicates the activation of immunity and the improvement of protein-carbohydrate metabolism in horses of the experimental groups. The purpose of the research work is to study the effect of a protein vitamin mineral feed additive on the meat and productivity of horses. This feed additive allows you to expand the range of feed additives that increase the live weight gain of farm animals.

Key words: *feed additives, animals, vitamins, horses, metabolic processes, proteins, and agricultural production.*

Introduction. The leading agricultural sector in Kazakhstan is animal husbandry, which satisfies the population need for basic food products. In this regard, special attention is focused on improving animal productivity, improving product quality, and reducing its cost [1].

The development of livestock production largely depends on the state of the forage base and the balanced feeding of farm animals. Most of the feed balance includes feed products produced from forage crops grown in a particular region, in particular, the Turkestan region, as well as feed products obtained from the processing of grain and industrial crops.

In recent years, foreign and domestic scientists have proven and scientifically substantiated the expediency of introducing various feed additives, including energy ones, into the composition of recipes for cattle. This is due, first of all, to the increased genetic potential of animals and the development of new technologies in the production of feed additives [2].

As a result of the increase in livestock production, i.e. intensive industrial animal husbandry has caused a lot of stress in animals. As a result, the number of diseases of the digestive system increased in farm animals, and, accordingly, this negatively affected the productivity of animals [3-4].

The problem of full-fledged feeding of farm animals is becoming increasingly important. It has been proven that it is important not only to satisfy the needs of animals for the main nutritional factors, but also the ratio of individual nutrients in the diet (sugar-protein, energy-protein, acid-base), in the absence of antinutritional and toxic substances in the feed [5].

The source of the most important mineral substances for farm animals is vegetable feed. However, the mineral composition of feeds is subject to significant fluctuations depending on their quality, zonal, and other factors. Animals often lack certain elements in their diets. Therefore, in the practice of animal husbandry, it is necessary to widely use mineral supplements to balance diets with missing macro- and microelements on the basis of the recommended norms of requirements, taking into account their content in feed. Depending on the missing 11 mineral elements, appropriate mineral supplements of natural and artificial origin are introduced into the diet of animals [6].

Since the second half of the 20th century, animal husbandry has developed well. In order to obtain quality food and ensure high productivity of animals, the introduction of antibiotic growth promoters into animal feed has been used as a common preventive practice to improve the gastrointestinal health of animals [7-9]. A group of beneficial microbes is used as feed additives in Europe [10]. They were first used in animal husbandry in the 20th century to improve feed efficiency and reduce diarrhea in pigs, and to reduce intestinal colonization by Salmonella in chickens [11].

Improving the safety of animals and their productivity depends mainly on the conditions of animal housing and the quality of the food supply. The feed used for feeding farm animals must contain nutrients in an assimilable form, must not have a harmful effect on the health of animals and the quality of the products received from them. The completeness of the feed is characterized by the content of proteins, a wealth of vitamins, macro-and microelements, and the content of other easily digestible nutrients [12].

In practice, diets of natural animals feed for regulating metabolic processes in their organisms, namely, to satisfy the needs for proteins, vitamins, and minerals, to suppress the activity of certain groups of microbes, stimulate growth and development, feed additives of various nature and compositions are added [13- 14].

Neglecting the existing prohibitions, many farms are introducing certain amounts of antibiotics into feed or feed additives to preserve livestock and stimulate animal growth. As a result of the use of antibiotics in animal husbandry, there is a danger of the emergence of stable forms of pathogenic microorganisms in the environment and a decrease in the therapeutic effect of many antibiotic substances in human disease [15-16].

In this regard, the World Health Organization announced the need to stop the regular use of antibiotics in order to stimulate the growth and prevention of diseases among healthy farm animals. WHO pointed out the usefulness of agricultural production without antibiotics by using an alternative to antibiotics to feed animals. [17-18].

The use of antibiotics in agriculture also negatively affects the quality and safety of the final product, which is noted by many international organizations (WHO, etc.) [19].

Other substances actively used to increase the productivity of animals are hormonal preparations. According to the official report of the European Union, meat supplied from abroad contains hormones - estrogens, gestagens, androgens, etc. These hormones are regularly administered to animals to increase meat productivity and achieve minimal costs for feeding and care, and, accordingly, to maximize profits [20].

The productivity of cattle depends on competent and high-quality nutrition. Various beneficial substances help to balance the diet, provide better digestibility of food, and strengthen the immune system of animals. Enriching the feed base with additives allows milk and meat producers to effectively overcome the difficulties associated with feeding and achieve high production rates.

Over the past decades, the zootechnical science of animal nutrition has accumulated a large amount of experimental data on various nutrients, feed efficiency, and product formation [21].

Every year, in connection with the intensification of animal husbandry, the problem of full-fledged feeding of farm animals is becoming increasingly important. A special role is played by unconventional feed additives, which, due to improving the quality of diets and improving the

physiological state of the body, provide environmentally friendly, competitive, and widely demanded products.

An analysis of literature indicates the widespread use of residues of cotton processing plants, consisting of flaps, cups, bolls, and cotton leaves as additives in traditional feeds to increase the nutritional value of [22], to stimulate the growth as a growth-promoting additive metal peroxide (Ca, Mg, Zn) are used [23]. But, however, these feed additives do not contain animal proteins, namely, essential amino acids of animal origin.

A number of feed additives have been developed by scientific teams of Russia [24-25]. For example, one can note a feed mixture with a high content of complete protein extracted from homogenized biomass of earthworms, mineral additives, yeast, and plants from homogenized biomass obtained using complex technological manipulation [24].

In the work of Irikova O.V. and Zabudsky Yu.I., a laborious and seasonal method for the production of protein and vitamin feed flour from a hybrid of red California earthworm grown on a substrate of apple pomace was proposed [19]. To obtain feed flour, a substrate is prepared from apple pomace, grinding and moistening up to 80-90%. Worms are populated in this substrate and vermicomposting is carried out for 20 days. The obtained mass is dried by the convective method for 2 hours at a temperature of 21 ° C and then for a similar period of time drying of the mixture continues in vacuum at a temperature of 24-27° C. To prepare a commodity form, the resulting dry mass is crushed in a mill to a particle size of 0.02-0.03 mm. The feed mixture, which consists of two components, does not have a high nutritional value, since it contains insufficient nutrient, mineral elements, and plant fiber.

In conditions of intensive development of animal husbandry, only by organizing full-fledged feeding of animals, it is possible to achieve success in obtaining high-quality, environmentally friendly products. In this regard, every year there is a growing interest in the use of new effective feed additives based on the use of non-traditional drugs and biologically active substances in a new generation in animal feeding.

The aim of this study is to obtain a new biologically active feed additive with high nutritional value on the basis of available renewable raw materials, which allows to improve the meat productivity and physiological state of horses in fattening.

Objects and research methods. For the experiments, horses of the Kazakh breed aged 1.5-2.0 years were used. They belonged to the farm and were in a stall. The choice of these animals is associated with an increase in the world market for horsemeat, which is a dietary product rich in highly unsaturated fatty acids (linoleic, linolenic, arachidonic), which favorably influences the metabolism of cholesterol in the human body, and prevents the development of atherosclerosis [26-28].

The intrabreed type of jabe shows itself especially well: the slaughter yield is about 53-57%, and often all 60%; milk production averages about 10 kg per day.

Horse meat is an excellent regulator of metabolism and has the property of drainage of bile in the intestine. Horse meat is used in diet therapy of obesity and supplies a number of necessary microelements, vitamins, and essential fats to the body, and has the ability to neutralize radiation and other harmful effects of ecotoxicants on the human body [29-30]. This creates a real precondition for increasing the export of fattened horses from the republic.

Of the horses, 4 groups (1 control and 3 experimental) were formed taking into account the age, fatness, and physiological condition of the group, each consisting of 5 horses, weighing between 217-229 kg. The Kazakh horse is able to feed on pastures. Their diet consists of highly concentrated, coarse, juicy, and green foods in summer. Feed mixtures based on oats and barley are used as concentrates. For feeding animals, a daily ration of the following composition was used: 750 g wheat flour (3rd grade), 10 kg of clover of 1st cut, 3 kg of bran. The main feed was added to a feed additive of the following composition: 1% dry biomass of California red worms, 2% seaweed, 2% calcium peroxide, 0.5% calcium humate, 5% sodium chloride, 0.5% vitamin complex, 20% corn bran, the rest is a mixture of sunflower oil cake and meal (1:1). We did not add a feed additive to the main diet of the control group. We added a feed additive in amounts of 200 g, 400 g and 600 g to the main diet of the experimental groups (first, second and third). For a day, horses additionally received from 0.2 to 0.6 kg of feed additive with two meals (morning and evening). Table 1 shows a scheme of the experiment with a feed additive for horses.

Table 1 - Experience scheme

Group	Number of horses, n	Feeding index
control	5	13 kg (Basic ration) + 0 g
experimental group 1	5	13 kg (Basic ration) + 200 g
experimental group 2	5	13 kg (Basic ration) + 400 g
experimental group 3	5	13 kg (Basic ration) + 600 g

Before feeding, they were regularly watered 2 times with clean water to a total volume of 45-50 liters. In general, fattening lasted 2 months before the slaughter of animals. The absolute (kg / day) and relative (%) increase in live weight, the yield of meat products were determined using widely known practical methods of calculation [31].

All kinds of effects on the tissues of the body are reflected in the compositionand properties of blood. Therefore, it is important to determine the blood composition of horses. Blood was taken from the horses from the jugular vein. We used the MELET SCHLOESING MS4-3 hematological analyzer to determine hematological parameters. Statistical processing of the results of the study was done using a personal computer and the Microsoft Excel program. Student's confidence criterion was used to calculate the level of differences.

Results and discussion. During the study, to control the physiological state of animals, the biochemical and morphological composition of the blood taken from horses of the experimental and control groups was studied. The content of hemoglobin, erythrocytes, leukocytes, and platelets in the blood of animals was determined (table 2).

Table 2 – Hematological indicators of blood of foals

Indicator	Control	Added concentration of feed additives in the main diet, kg (No. of groups)		
		0,2 (1)	0,4 (2)	0,6 (3)
Erythrocytes, 10^{12}/l	6,19±0,31	7,02±0,40	7,92±0,32	7,90±0,33
White blood cells, 10^9/l	20,8±0,55	21,4±0,39	21,6±0,51	22,8±0,46
Hemoglobin, g/l	98,8±4,1	110,3±4,2✶	118,1±5,0✶	120,0±4,4✶
Platelets, 10^9/l	460,1±5,7	482,5±5,3✶	490,3±4,9✶	493,0±6,2✶
✶P≥0,05				

As a result of biochemical studies of the blood of horses from the experimental and control groups, the increase in hemoglobin content in the experimental groups was found to be 11.5 g/l (group 1), 19.3 g/l (group 2) and 21.2 g/l (3 group), respectively, compared with the control group (P≥0,05).

Platelets take an active part in blood coagulation and nonspecific protective reactions of the body. In our experiment, at the final stage, the formed elements range from 460.1 to 493.0 • 109/l, in percentage terms, the difference in platelet count is 4.9–7.1% in the experimental groups compared to the control group (P≥0,05). This proves the predominant tendency to increase the assimilation of nutrient components in the experimental groups, especially inorganic microingredients.

As can be seen from the results of hematological studies of the blood of animals participating in the experiments, an increase in indicators was revealed - red blood cells, hemoglobin, white blood cells and platelets, which indicates the activation of cellular immunity, indicates a correct metabolism as a result of obtaining good nutrition.

The digestibility of starch in horses varies from 87% to 100%. Horses have low activity of the pancreatic enzyme alpha-amylase, which can compromise the prececal digestibility of diets high amounts or sources of this morphologically complex nutrient (Kinzle, 1994; Meyer, 1995) [32-33]. The post-feed plasma glucose concentration, referred to as the glycemic response, may be affected by particle size, degree of heat treatment, protein composition, fat content, and fiber content of the feed. The biochemical structure and absorption process of carbohydrates may depend on the content and

interval of the previous meal period (Morgado, 2009) [34]. In most cases, all soluble carbohydrates that enter the body are absorbed into the blood and plasma (Santos, 2002) [35].

Table 3 presents the results obtained in the study of the chemical composition and caloric content of meat of the control and two experimental groups, in the diet of which additionally introduced feed additives (FA). It shows the increase in protein and fat in the meat of the experimental groups compared to the control, while the content of both protein and fat increases with increasing concentration of the feed additive in the feed.

Table 3 – The chemical composition of horse meat, %

Indicator	Group			
	Control	experienced with the use of FA, kg / day		
		0,2	0,4	0,6
moisture	70,33±2,23	69,98±2,10	69,50±2,01	67,12±2,14
protein	17,62±0,75	17,77±0,69	18,80±0,71	19,72±0,83
fat	10,12±0,13	10,69±0,12	11,70±0,10	11,95±0,09
ash	1,93±0,02	1,56±0,02	1,00±0,02	1,21±0,01
Energy in 1 kg of meat, kj	1331,93	1400,57	1409,82	1458,12

From the results of studies on the effect of feed additives on animal body weight gain, it follows that the proposed ratio of components normalizes microbiocenosis, increases feed digestibility by activating the gastrointestinal tract, and improves protein carbohydrate metabolism (figure 1).

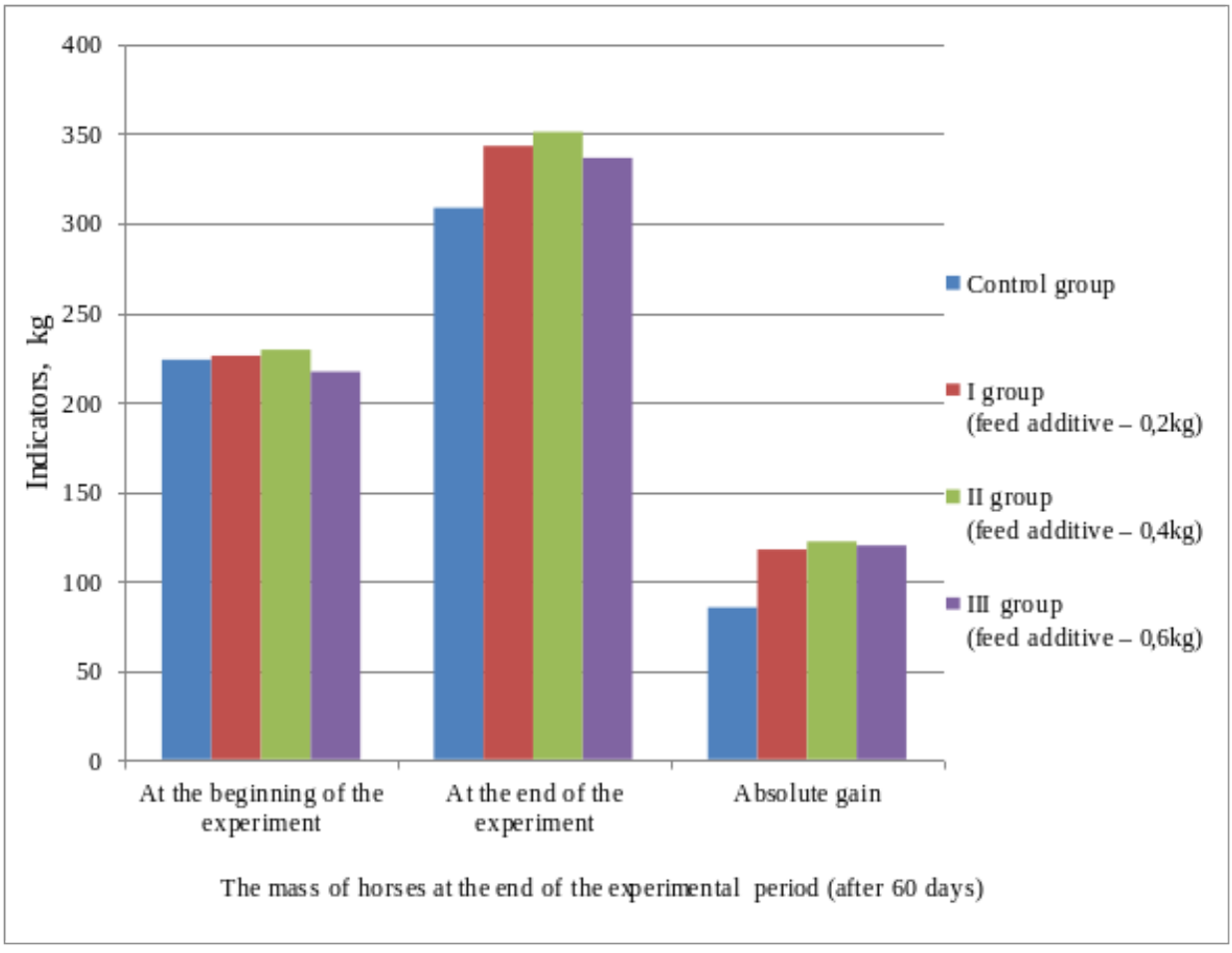

Figure 1 – The effect of feed additives on the increase in live weight of horses

Based on the analysis of the results of experimental studies, it can be noted that feeding horses of the experimental groups with a protein-vitamin-mineral feed additive helps increase live weight gain (figure 2).

The total average live weight of 1 horse of the experimental group, fed with feed additives, was ~ 344 kg. The weight of meat obtained after slaughter, including internal fat, liver, kidneys, heart, and other entrails, weighed 206 kg, which corresponded to a slaughter yield of 59.8%. The slaughter yield for horses of the control group that were fed without feed additives did not exceed 53.3%.

before after

Figure 2 – The results of the experiments on horses using protein-vitamin-mineral feed additive to increase live weight gain

Conclusions. On the basis of experimental studies, the effectiveness of including a feed additive in the main diet of horses, containing along with a complex of vitamins, minerals, and biomass of red California worms, which is characterized by a number of medicinal properties has been established. Blood biochemical parameters of all experimental animals were within the standard parameters. The feed supplement helped to increase the average slaughter yield to 59.8%.

The possibility of expanding the range of feed additives contributing to the production of high-quality horse meat with a high content of protein (~ 19%) and fat (~ 12%) is shown.

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ТҮЙІН

Ауыл шаруашылығы Қазақстан мемлекеті үшін маңызды сектор болып саналады. Әсіресе, мал шаруашылығы (етті және етті-сүтті ірі қара мал) өнімдеріне тұтынушылық сұраныс өте жоғары. Етті – сүтті мал өсіруде дәрумендендірілген жем - азықтық қоспалардың маңызы зор болып табылады. Жем-азықтық қоспалар жануарлардың салмақ массасын арттырып қана қоймай, олардың иммундық жүйесін нығайтады және сыртқы ортаның қолайсыз факторларына төзімділігін арттырады. Мақалада жаңа жем-азықтық қоспа құрамының жылқылардың физиологиялық жағдайына, ет өнімдерінің шығымы мен сапасына әсерін тәжірибелік зерттеудің нәтижелері қарастырылған. Зерттеу жұмысының нысаны ретінде: 1,5-2,0 жастағы қазақ тұқымды жылқы жануарлары таңдалынып алынды. Зерттеу жұмыстарының нәтижесінде мал азықтық қоспаларды қабылдаған тәжірибелік топ жануарларының (мысал ретінде жылқылардың) қан құрамындағы көрсеткіштер: эритроциттер, гемоглобиндер, лейкоциттер мен тромбоциттердің бақылау тобындағы жануарлармен салыстырғанда біршама жоғарылағандығы анықталды. Бұл тәжірибелік топтардағы жылқылардың иммунитеті мен ақуыз-көмірсу зат алмасуының жақсарғандығын көрсетті. Ғылыми-зерттеу жұмысының мақсаты – жылқы малының етіне және өнімділігіне протеинді, дәрумені-минералды азықтық қоспаның әсерін зерттеу болып табылады. Бұл азықтық қоспа ауылшаруашылық жануарларының салмақ массасын арттыратын азықтық қоспалардың ассортиментін кеңейтуге мүмкіндік береді.

РЕЗЮМЕ

Сельское хозяйство считается важной отраслью для Казахстана. Потребительский спрос на продукцию животноводства (мясного и молочного скотоводства) очень высоко. Белково-витаминные кормовые добавки имеют большое значение в разведении мясных и молочных животных. Кормовые добавки не только увеличивают прирост живой массы, но и укрепляют иммунитет у животных и повышают устойчивость к неблагоприятным факторам внешней среды. В статье рассмотрены результаты экспериментальных исследований влияния кормовой добавки на физиологическое состояние лошадей, на выход и качество мясной продукции. В качестве объекта были выбраны лошади казахской породы в возрасте 1,5-2,0 года, находящиеся в стойле. На основане исследовательских данных в составах крови лодашей выявлено повышение показателей эритроцитов, гемоглобина, лейкоцитов и тромбоцитов у опытной группы, получавших кормовые добавки, по сравнению с животными контрольной группы. Это свидетельствует об активации иммунитета и улучшении белково-углеводного обмена у лошадей опытных групп. Целью научно-исследовательской работы является изучение влияния белковой витаминно-минеральной кормовой добавки на мясность и продуктивность лошадей. Данная кормовая добавка позволяет расширить ассортимент кормовых добавок, увеличивающих прирост живой массы сельскохозяйственных животных.

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EFFECTIVE TECHNOLOGIES IN DAIRY CATTLE BREEDING

ANNOTATION

This paper describes the effective use of stress-free technology in dairy cattle breeding.This method is widely used in the technology of milking dairy cows and raising cubs.

The article clearly shows the method of caring for calves in the conditions of the Republic of Kazakhstan in the period after milking and milking.A complete comprehensive study of the impact of stress factors on the body of young cubs during the milking period and cows during the milking season was carried out.The article provides a list of work on stress – free care of calves and dairy cows during the milking period.

According to the results of the work, 4 –day Cubs in the experimental group were trained on substitutes with a high content of dairy products from the 12th day, exceeding their live weight by 5.8% in 15 days, and by 8.2% at one month.Cubs during the milking period in this research group at the end of the prophylactic period had a live weight of 77 kg, that is, 6.9% more than Cubs in the control group.This is the result of an early transition from milk to milk substitutes.The results of the conducted studies show that during stress, the number of white blood cells in the control group increased by 29%, the granulocyte increased by 9.02%, the erythrocyte by 7.5% and the average amount of red blood cells by 2.7%.

Shows the effect of crossings on the amount of milking, the decrease in milk yield of dairy cows during zooveterinary measures.

Veterinary Measures for cows of the control group in the farm" zholdybay "reduce the milking rate by 16.7%, in the farm" Beibit "by 13.5 and in the farm" Balke "by 14%, in the farm" Zholdybay "– 10% lower than in the farm" Beibit "by 8.7% and in the farm" Balke " by 9.6%.

Key words:dairy farming, calves, cows, stress, efficiency.

Introduction. Dairy cattle breeding in the Republic of Kazakhstan is developing due to purposeful breeding work and targeted rearing of young animals[1, 2].

Scientific developments on dairy cattle breeding, maintenance and feeding technologies are actively used in specialized dairy farms and large agricultural holdings of the Republic of Kazakhstan [3, 4, 5, 6].

Traditional approaches in dairy cattle breeding are constantly being improved, and advances in technology for reproduction and rearing of repair young are being actively used [7, 8].

Advanced proven foreign technologies for breeding and breeding dairy cattle, taking into account the developments of domestic scientists, are successfully used in Baiserke – Agro LLP of the Republic of Kazakhstan [9].

Despite certain achievements in the breeding of dairy cattle and the technology of keeping on dairy farms, animals constantly need to improve methodological approaches in growing repair young animals and obtaining milk of high technological quality [10, 11, 12, 13].

To determine the service methodology that reduces stress and stress-free work for them, it is necessary to know the classification of stress-inducing factors such as feed, technological, climatic, veterinary and transport.

Feed factors mainly include: violation of the regime, schedule, frequency of feeding, poor feed quality, underfeeding, starvation, overfeed;

Technological ones include the conditions of keeping, density and different ages of animals in groups, the feeding front, the noise of servicing animals of gender and age groups by the stage of their development;

Climatic conditions include temperature, humidity, chemical composition of the air: toxic gases, microorganisms, a sharp transition from hot to cold habitats;

Veterinary services include weighing, treatment, vaccination, castration, fixation, hoof cleaning, etc.

For transport – loading, fitting, shouting noise, crowding, physical stress, temperature regime, transportation distance.

When servicing animals, staff are required to comply with technological requirements to prevent the influence of the above 5 factors. These are related to the work of a calf breeder, a stockman, a tractor driver, a milkmaid, a veterinary specialist, an inseminator, etc.

The purpose of the research. To study the effectiveness of stress-free technology in dairy farming. When raising calves and milking cows.

Research methods. The research was carried out in the farm "Beibit" of the Zhambyl district of the Almaty region, the farm "Balka" of the Beskaragai district of the East Kazakhstan region, the farm "Zholdybai" of the Zhambyl district of the Zhambyl region.

The studied basic farms are located in four regions of the country: in the eastern, southeastern, southern and central regions of Kazakhstan, which affects the conditions of animal husbandry and milk production technology. According to the number of livestock, they belong to the category of small farms. The largest number of cattle was in the farm "Beibit" - 271 heads, including 132 dairy cows, the second place was occupied by the farm "Balke" with 235 cattle, including 107 dairy cows, and in the farm "Zholdybai" there were 172 heads of cattle, 86 heads of cows of the dairy herd. All farms have a tethered maintenance method and a stable-pasture maintenance system.

In all farms, the service period is within the normal range – 51-80 days.The heifers were inseminated at the age of 18 months, when they reached a live weight of at least 360 kg.There are all necessary livestock facilities, including stalls for departments and dispensaries for raising calves from 1-2 days to 2 months old and calf houses from 3 to 6, 7-12 months old. The average milk yield ranges from 2,760 kg in the Balka farm to 4,331 kg in the Beibit farm, and in the Zholdybai farm it occupies the average milk yield and amounts to 3,872 kg per cow.

Due to the tethered content of cows, the loads on milkmaids of 40-43 heads of cows were determined. Cows of 4-7 lactation are found in the dairy herd.The average productive longevity ranges from 4-5 lactation. The farms use walking areas at the rate of 10-15 m2 per head. Cows are milked on LSD in two farms, and on the dairy farm of the Zholdybai farm - on a mobile milking machine Model DK2-RK.

When raising calves, it uses a milk drinking scheme, a whole milk substitute and a feeding scheme for calves up to 6 months of age. Starting from the age of 3 months, he drives the calves out to pasture for 2 hours before lunch. The content of the calves is individual for 1 and 2 heads.

The simplicity of the technology of raising, keeping and feeding livestock in these farms made it possible to study methods and methods of animal care at each stage of the technological cycle, especially their impact on the manifestation of stress in animals. The main digital materials obtained in the experiments were processed biometrically in the EXCEL program.

The results of the research. In order to study the methodology of servicing calves, all elements of the stages of production process technology were covered during the research work, starting with the process of feed preparation, feeding, keeping and milking cows. The results of studying the effects of various factors on the stress state of animals in the conditions of the Zholdybai farm are given in the appendix (Table 1).

The scheme of drinking calves in the Zholdybai farm is presented in Table 2.

Table 1 – Study of the effect of stress factors on the animal body

Factorscausingstress	Premises				
	dispensary	calves	younganimals	cowproduction workshop	milkingparlor
Feed (on the hands of the feeding mode)	+	–	–	+	–
Hierarchical	–	–	+	+	–
Mechanicalnoise, screaming	+	+	+	+	+
Treatmentofservice personnel	+	+	–		+
Zootechnicalevent	+	+	+	+	–
Veterinaryactivities	+	–	–	+	–

Note: + - stress is manifested in animals: - - stress is not manifested in animals

By observation, it was found that in the calf dispensary, 6 points of the stress-free maintenance methodology in the Zholdybai farm, 4 points in the Beibit farm and 5 points in the Balke farm are not performed (Table 3).

The processes of starting, preparing and conducting calving of cows, carrying out measures for veterinary sanitation, conservation, maintenance of newborn calves, as well as the use of special splits, in the process of raising calves, in conducting linear assessments of first-calf cows and in conducting veterinary measures to create conditions for maintaining veterinary well-being on the farm were taken into account.

It was found that calves suffer from diseases of the gastrointestinal tract at an earlier age during the preventive period of rearing, and diseases of the upper respiratory tract at a later age (Table 4).

Table 2 – Scheme of drinking calves of the Zholdybai farm

Group	n	Growingperiods, day				
		0-6	7-15	16-21	21-35	35-60
control	10	colostrum	milk	abrupttransition	3ЦМ-1	ZTSM-1
experienced	10			gradual	ZTSM-1	ZTSM-2

Table 3 – List of work performed for stress-free animal care

1	Compliance with the technology of launching dairy cows, taking into account the level of dairy productivity
2	Creation of appropriate requirements for the conditions of keeping and feeding dry, pregnant cows, especially the last 2 months of pregnancy
3	Preparation for calving of cows and heifers and calving according to veterinary and sanitary hygienic requirements
4	Compliance with conservation measures, first aid to the calf and new-bodied cows
5	Ensuring the individual maintenance of calves
6	Compliance with the drinking and feeding scheme for calves from birth to 6 months of age
7	Using splits for monthly weighing of calves

The influence of stress-causing factors, including special splits of animals, was studied in the Zholdybai Farm, Beibit Farm, Balka Farm (Table 5). When switching from milk to feed of vegetable

origin, the stage of accustoming them to coarse compound feeds is not observed. It has been established that weaning calves after 2-4 days of keeping with their mother causes them nervous stress. When serving colostrum, after weaning from the mother, they do not drink immediately from the bucket, as they require gentle training.

When using infrared lamps in a cage, the calf adapts more quickly to environmental factors. The microclimate is the main factor affecting the health, growth, and development of calves. Some indicators of the microclimate of the dispensary of the dairy farm KH "Balke" are given (Table 6).

In the Zholdybai farm, the calves of the control group could not get used to drinking from a bucket for the first 2-3 drinks, as a result, 5 calves had feed diarrhea, experienced calves, who immediately from day 1 were accustomed to diarrhea, had 3 calves in the first week of life (Table 7).

It was found that 14 cases of gastrointestinal tract disease were registered in control calves, while diseases of older calves appeared. This is due to a violation of the transition from milk to a substitute and to compound feed, and experienced calves have a 33% lower incidence due to gradual habituation and transition from one feed to another (ZCM, prestarter and compound feed).

The indicators of growth intensity in experimental calves during the prophylactic period of rearing were studied (Table 8).

The results of the study showed that the calves of the experimental group, who were accustomed to eating from the age of 4 days old and from the age of 12 days old, began to be accustomed to a substitute with a high content of dairy product and they exceeded the live weight by 4.8% by the age of 15 days, and by 8.2% by the month.

By the end of the prophylactic period, these calves reached a live weight of 77 kg, which is 6.9% higher than that of the control calves.

This is the result of a gentle lifestyle of the maintenance staff, early training in prestarter and a gradual transition from milk and its substitute.

Table 4 – Results of the study to determine the methodology of animal care

Balke farm, East Kazakhstan region, Beskaragai district, Birlik village										
Raising calves	Periods	Contents	Drinkings cheme	Feedings cheme	Veterinary activities	Theincidence ofcalves		Animalservices		
						Gastrointestinal TRACT	VDP	when cleaning	whenwalking	feeding
Dispensaries	42-60	there are houses in the index	Scheme-1	Scheme-1	disinfection	1%	–	daily	from 30 days- 1 time	3
The milk period	60-90	there are 5-10 votes in the group cell.	Scheme-2	Scheme-2	if necessary	–	0,30 %		1 time	3
Afterthedairy период	91-180	insectionsof 20-40 goals.	–	Scheme-1	planned work	–	–		2 times	3

Table 5 – Elements of calf maintenance technology for targeted cultivation in dairy farms

Economy	Growingperiods	Periods, days	Contents	Feeding	Morbidity		Veterinaryactivities	Services			
					Gastrointestinal TRACT	VDP		drinking	feeding	cleaning	paddock
KH"Beibut"	preventive maintenance	0-60	in a cell with UV, IR	Scheme 1 scheme 2	2 –	-	disinfection treatment	3 times 3 times	3	1	1
KH"Zholdybay"	colostrum	0-7	in. houses	Scheme 1 scheme 2	3 1	-	measures to protect calves	3 times 3 times	3	1	1
	milky	7-60									
KH"Balke"	after the dairy	61-90	a group cage of 5-10 heads each	farm scheme	- -	1 -	weighing	2 times	3	1	1
	up to 6 months of age	91-180	11-20 heads each								

Table 6 – Microclimate indicators in the dispensary for keeping and rearing calves of the farm "Balke"

№	Temperature .,C⁰	Relativehumidity %	Airvelocity m/s	Ammoniamg/m^3	Carbondioxide	Microbial environment t.m.t/m^3
1	7,2±0,20	81,5±0,16	0,11±0,20	11,15±0,12	0,10±0,13	76,000
2	10,4±0,02	83,4±0,30	0,16±0,03	23,15±0,13	0,15±0,13	83,420
3	3,06±0,03	73,2±0,32	0,17±0,12	16,03±0,13	0,11±0,03	65,240
1	6,5±0,10	74,0±0,10	0,14±0,09	18,03±0,13	0,10±0,14	71,128
2	8,2±0,20	87,4±0,18	0,11±0,11	23,03±0,12	0,13±0,01	78,631
3	7,5±0,40	74,5±0,24	0,15±0,02	13,05±0,10	0,03±0,70	65,330
1	9,0±0,12	79,2±0,20	0,15±0,08	20,04±0,10	0,13±0,05	72,210
2	11,5±0,04	80,0±0,40	0,11±0,01	19,13±0,13	0,16±0,9	83,526
3	10±0,05	81,5±0,03	0,10±0,10	30,08±0,13	0,10±0,02	80,000

Table 7 – Incidence of gastrointestinal tract of calves in Zholdybai farm

Group	n	Growingperiods, days				
		0-6	7-13	14-20	20-28	30-58
thecontrol	10	5	3	5	2	–
isexperimental	10	3	1	2	–	–

Table 8 – Dynamics of live weight of experimental calves during the prophylactic period of cultivation

Group	n	Liveweight, days			
		atbirth	15	30	60
thecontrol	10	32,0±0,6	40,5±1,25	48,0±1,46	70,0±1,70
isexperimental	10	33,5±0,5	41,5±1,31	52,0±1,52	76,0±1,65

The use of special splits for weighing young animals did not cause them noticeable stress, so this light stress ended without going to the second stage. Of the 10 experimental calves, the respiratory rate was increased and two calves had pulse increases, and of the 10 control calves, all calves suffered severe fright, as they were chased with sticks and increased respiratory rate, pulse rate were in 6 calves (Table 9).

Table 9 – Physiological parameters of calves after weighing of the Baby farm

Group	n	The appearance of signs of stress						
		bodytrembling		Breathingrate		heartrate		temperature
thecontrol		heads	time	heads	time	heads	time	
isexperimental	10	3	20:30	6	54,3±1,38	6	154,2±1,43	38,5±1,4
	10	–	5:15	2	43,2±1,01	2	124,2±2,61	38,0±2,0

It was found that the control calves had a respiratory rate of 11 and a pulse rate 30 times higher than that of the experimental calves.

The use of special splits during veterinary measures does not cause severe stress in young dairy cattle when they are weighed monthly in order to determine live weight and average daily gain.

Experienced calves that were weighed using a special split did not lose their daily gain from birth to two months of age (77.1 kg), they easily tolerated stress (Table 10). At the same time, the live weight of the control groups of calves was 73.4 kg or 4.7% lower.

Table 10 – Growth dynamics and development under stress weighing

Indicators	Control			Experienced		
	M±m	σ	Cv	M±m	σ	Cv
Liveweightatbirth	32,4±0,57	1,78	5,33	33,3±0,68	2,10	6,47
1 month	50,5,±1,18	3,70	7,20	56,4±1,26	4,02	7,15
2 months	72,4±1,13	3,56	4,84	76,1±1,20	3,81	4,97

The influence of the use of special splits during veterinary measures on the stability of the level of animal productivity, the well-being of veterinary and sanitary conditions, dairy farms of the basic farms of the Institute has been studied.

In order to clarify the effect of stress on the animal body, we took blood samples to analyze clinical and hematological parameters in calves.Blood for analysis from calves was taken from the jugular vein during veterinary measures.

The conducted studies showed that under the influence of stress, the number of leukocytes in calves of the control groups increased by 29% of the norm, granulocytes by 9.02%, erythrocytes by 7.5% and the average content of erythrocytes by 2.7%.

As a result, anxiety reactions in calves are characterized by involutional processes in the lymphatic system, a decrease in muscle tone, body temperature and blood pressure, the development of inflammatory necrotic processes, and the disappearance of secretory granules of the adrenal glands. At the same time, adrenaline is intensively released — the adrenal hormone, under the influence of which the energy resources of the body are mobilized. Changes in the blood occur - lymphopenia, eosinopenia and polymorphonuclear leukocytosis are registered.At this stage, there is a general mobilization of protective mechanisms to counteract negative environmental factors. In the body, the processes of decomposition of organic substances in muscle tissues (catabolism) are intensified, emaciation, decrease in milk productivity, egg production, etc. are observed. due to the predominance

of dissimilatory processes, a negative nitrogen balance is detected. This stage is accompanied by some blood thickening, increased permeability of the walls of blood vessels, hemorrhages in the mucous membrane of the gastrointestinal tract, subsequently turning into ulcers.

The influence of the use of splits during veterinary measures on the productivity of cows (n=150) was studied in the conditions of basic farms. Table 11 shows the results of average daily milk yields using special splits and without, and their effect on cow yield, on the manifestation of stress in animals in three basic farms.

Table 11 – Results of using special splits and their effect on cow yield (n=150)

Thecontrolgroup	Milk yield of cows to veterinary care without the use of a split	Milk yield of cows after maintenance without splitting	
	M±m	M±m	±
1	2	3	4
Farm"Zholdybai"	9±0,4	7,5±0,32	-1,5
Farm "Beibit"	11,6±0,57	9,9±0,51	-1,7
Farm "Balke"	10,4±0,53	8,8±0,45	-1,6
Anexperiencedgroup	Milk yield of cows before the start of veterinary care	Milk yield of cows after maintenance using split	
	M±m	M±m	±
Farm "Zholdybai"	8,0±0,45	7,4±0,41	-0,6
Farm "Beibit"	11,6±0,65	11,0±0,53	-0,6
Farm "Balke"	10,4±0,52	9,9±0,45	-0,5

Animals of the control group were subjected to veterinary care without the use of special splits, and experimental animals using splits in the conditions of three basic farms.

In the cows of the control group, after maintenance without the use of splits, milk yield decreased in the Zholdybai farm by 16.7%, in the Beibit farm by 13.5% and in the Balka farm by 14.0%, and in the cows of the experimental group, where special splits were used, cow yield decreased in the Zholdybai farm by 6.7%, in the "Beibit" by 4.8% and in the KH "Beam" and 4.4% .

In the Zholdybai farm, the average daily milk yield of cows of the experimental group using split compared with the control group without split exceeded by 0.9 kg or 10.7%, respectively, in the Beibit farm by 1.1 kg or 9.2%, in the Balka farm 1.1 kg or 10.1%.

To identify stress in three basic farms with a total population of 150 heads, the physiological state of cows with and without splitting was studied. The conducted studies showed that the respiratory rate for chest movement with the use of a split showed 39-43 beats per minute (the norm is 15-30), when using harnesses or straps for fixation, the respiratory rate increased by 22-26 beats per minute or 31.7% (Table 12).

The pulse rate in the experimental groups was 85-87 beats per minute (the norm is 50-80), and when using harnesses and ropes to fix the animal, it increased to 95-99 beats per minute or by 13.0%.

Table 12 – Indicators of the physiological state of cows without splitting and using

Economy	thecontrol		isexperimental	
	Respiratory rate,M±m (norm 15-30)	Heart rate,M±m (norm 50-80)	Respiratory rate,M±m (norm 15-30)	Heart rate,M±m (norm 50-80)
Farm"Zholdybai"	53,52±0,98	95,6±1,67	38,12±1,0	83,2±1,30
Farm"Beibit"	55,2±2,70	98,52±1.9	40,4±1,20	85,2±1,21
Farm"Balke"	49,4±2,15	94,32±2,0	40,4±1,21	85,6±1,20

During the operation of the cleavage and fixator for various types of zootechnical and veterinary measures, there were no significant changes in the composition of blood in the animals of the experimental groups, and all hematological parameters of the animals of the control groups turned out to be significantly higher than in the experimental groups of cows.

To calculate the economic efficiency of the split application in experimental farms, farm data on the cost of 1 kg of milk, the selling price of 1 kg of milk, the productivity of experimental and control groups of cows, before and after the use of the split fixator were used (Table 13).

Table 13– Economic effect of animal care using split

Indicators	Economy		
	Farm"Zholdybai"	Farm"Beibit"	Farm"Balke"
The number of dairy cattle, head	75	84	85
Milk yield of cows up to experience, kg	8,0±0,41	12,5±0,6	11,4±0,51
Milk yield of cows using split, kg	8,2±0,43	11,0±0,55	10,9±0,4
Milk yield of cows without the use of splitting, kg	7,5±0,31	10,8±0,51	9,8±0,43
The difference in the average daily milk yield, kg	0,8	1,1	1,1
The number of veterinary activities during the year	16	16	160
The selling price of milk, tg	140	140	140
Efficiency using split by herd, tg	153 200	211 904	219 296
Efficiency using a split by one goal/tg	2016	2464	2464

On dairy farms of basic farms, veterinary measures using splits are carried out 16 times a year. In the Zholdybai farm, the average daily milk yield of cows of the experimental group, using a split, decreased by 6.7%, and the control group by 16.7%, the difference was 10%, respectively, in the Beibit farm of the experimental group decreased by 4.76% and the control group by 13.5%, the difference was 8.77%, in the Balka farm respectively - 4.4% and 14.0%, the difference was 9.6%.

The economic efficiency using the split in the basic farms amounted in monetary terms to between 2016-2688 tenge per head.

Conclusion. It has been established about the need for affectionate treatment of calves, their gradual habituation to eating forages of plant origin. It was determined that calves who were with their mother for 2-4 days after birth and after their transfer to individual maintenance do not drink milk from a bucket without good training, while calves transferred immediately after drying drank colostrum well from a bucket with a pacifier.

Transferring calves to individual cages immediately on the first day of life is easier to tolerate stress and grow well, they are easily tamed for maintenance. In the experiments conducted, calves are well accustomed to eating a starter and a whole milk substitute, in the future they grow more intensively and their superiority over control is 6.9% by live weight by the end of the prophylactic period.

A change in clinical and hematological parameters was found in animals that had experienced stress. For example, in control calves, white blood cells increased by 29% from the norm, and red blood cells increased by 7.5%.

When studying the effect of splits on cow yield, it was found that during veterinary measures, milk yield of dairy cows decreases. In the Zholdybai farm, the cows of the control group, where the vet service was provided by tying them with a lasso to the stall, milk yield decreased by 16.7%, in the Beibit farm - by 13.5% and the Balka farm - by 14%, while the cows of the experimental groups in the Zholdybai farm had a decrease by 10% less, in the "Baby" farm - by 8.7% and in the "Beam" farm - by 9.6% than in the control cows.

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ТҮЙІН

Бұл жұмыста күйзеліссіз технологияны сүтті ірі қара шаруашылығында тиімді пайдалану баяндалған. Бұл әдіс сүтті сиырларды сауу және төлдерді өсіру технологиясында кеңінен қолданылады.

Мақалада Қазақстан Республикасы жағдайында төлдердің сүт ему және сауу мерзімінен кейінгі кезеңдегі бұзауларды бағып – күту әдісі айқын көрсетілген. Сүт ему кезеңіндегі жас төлдер мен сауу маусымындағы сиырлардың ағзасына күйзеліс факторларының әсерін толық кешенді зерттеу жұмыстары жүргізілді. Мақалада сүт ему кезеңіндегі бұзаулар мен сауын сиырларды күйзеліссіз күтіп – бағу бойынша жүргізілетін жұмыстізімі берілген.

Жұмыс нәтижесі бойынша тәжірибе тобындағы 4 күндік төлдерді 12 –ші күннен бастап құрамында сүт өнімдері жоғары алмастырылғыштарға үйретіп, тірілей салмағы бойынша 15 күнде 5,8%, ал бір айлығында 8,2% асып түсті. Осы зерттеу тобындағы сүт ему кезеңіндегі төлдер профилакторлық кезеңнін соңында тірілей салмақтары 77 кг, яғни бақылау тобындағы төлдерден 6,9 % асып түсті. Бұл сүттен сүт алмастырғыштарға ерте ауысудың нәтижесі болып табылады. Жүргізілген зерттеулер нәтижесі бойынша күйзеліс кезінде бақылау тобындағы бұзауларда лейкоциттер саны шамадан 29% өссе, гранулоцит 9,02%, эритроцит 7,5% және эритроциттердің орташа мөлшері 2,7% өскендігін көрсетеді.

Өткелдердің сауым мөлшеріне әсерін, зооветеринарлық шараларды жүргізу барысында сауын сиырлардың сүттілігі төмендейтіндігін көрсетеді.

«Жолдыбай» ШҚ – да бақылау тобындағы сиырларға ветеринарлық шаралар арқанмен қораға байлау сауымды 16,7%, «Бейбіт» ШҚ-да 13,5 және «Балке» ШҚ-да 14% төмендетсе, тәжірибе тобындағы сиырларда сауын мөлшері «Жолдыбай» ШҚ- 10% «Бейбіт» ШҚ-да 8,7 % және «Балке» ШҚ-да 9,6% бақылау тобындағы сауын сиырларға қарағанда төмен.

РЕЗЮМЕ

В статье рассматривается эффективность использования технологии без стресса в молочном скотоводстве. При выращивании телят и доении коров.

В статье изложена методика обслуживания телят в молочный и послемолочный периоды в условиях Республики Казахстан. Проведены комплексные исследования влияния стресс-факторов на организм молодняка и молочных коров. Приведен перечень работ, выполняемых для содержания телят и коров без стресса. Результаты исследования показали, что телята опытной группы, которых приучали к приему пищи с 4-го дня предстартового возраста и с 12-го дня начали приучаться к заменителю с высоким содержанием молочного продукта, и к 15-му дню возраста они превысили в живом весе веса на 4,8%, а по месяцам – на 8,2%. К концу профилактического периода те же телята их сверстников достигли живой массы 77 кг, что на 6,9% выше, чем у контрольных.

Это результат бережного подхода персонала, раннего приучения к предстартеру и постепенного перехода от молока и его заменителей. Исследования показали, что под воздействием стресса у телят контрольных групп количество лейкоцитов увеличилось на 29% от нормы, гранулоцитов - на 9,02%, эритроцитов - на 7,5% и среднее содержание эритроцитов - на 2,7%.

При изучении влияния сплитов на удои коров было установлено, что при проведении ветеринарных мероприятий удои молочных коров снижаются. В хозяйстве “Жолдыбай” у коров контрольной группы, где ветеринарная служба была оказана путем привязывания их лассо к стойлу, удои молока снизились на 16,7%, в хозяйстве “Бейбит” - на 13,5% и в хозяйстве “Балке” - на 14%, тогда у коров опытных групп в хозяйстве "Жолдыбай" снижение было на 10% меньше, в хозяйстве "Бейбит" - на 8,7% и в хозяйстве "Балке" - на 9,6%, чем у контрольных коров.

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