T. Sh. Assanbayev, L. N. Kassymbekova,
L. M. Bauzhanova

# PEDIGREE ZONING AND BREED TESTING IN LIVESTOCK PRODUCTION

Pavlodar

Ministry of Education and Science of Republic of Kazakhstan

Pavlodar State University named after S. Toraygyrov

T. Sh. Assanbayev, L. N. Kassymbekova,
L. M. Bauzhanova

# PEDIGREE ZONING AND BREED TESTING IN LIVESTOCK PRODUCTION

Textbook

Pavlodar
Toraighyrov University
2019

УДК 636.02 (075.8)
ББК 45.3 я73
А90

**Recommended for publication by Scientific council of Pavlodar State University named after S. Toraygyrov**

**Reviewers:**

U. Kh. Almishev – doctor of agricultural science, professor of Pavlodar State University named after S. Toraygyrov;

Z. A. Rymzhanova – candidate of biological science, professor of Pavlodar Pedagogical State University;

M. M. Omarov – candidate of agricultural science, assistant professor of Innovative University of Eurasia, academician of International Academy of informatization.

**Assanbayev T. Sh., Kassymbekova L. N., Bauzhanova L. M.**
А90 Pedigree zoning and breed testing in livestock production : textbook / T. Sh. Assanbayev and al. – Pavlodar : Toraighyrov University, 2019. – 134 p.

ISBN

The study guide «Pedigree zoning and animal breed testing» views not only such questions as pedigree zoning but also issues of organization and conduct of breed testing of newly bred domestic breeds, breed groups, factory types, lines and families as well as a number of animal breeds of foreign selection who are transported in a big mass nowadays, which gives interest for the breeders in the questions of productive and adaptive qualities improvement of raised animals.

The textbook is recommended to students of agricultural specialties.

УДК 636.02 (075.8)
ББК 45.3 я73



ISBN

## Introduction

The livestock industry in Kazakhstan produces about 43 % of all gross agricultural output and is one of the main strategic directions of its development, which is viewed as the foundation of employment source, nutrition and the source of rural income.

The vast territory of pastures and pasture areas of the Republic (which is one hundred and eighty-seven million hectares) forms a significant breeding potential with enough number of agricultural species and breeds that possess some breeding potential in different climatic, feed and economic zones and regions of the country.

There are several valuable breeds and offspring of farm animals in Kazakhstan even at the conditions of extensive management. In particular, among them, there is Edilbai breed of fat sheep, which has wonderful meat qualities, and Etti merino sheep breed, which demonstrates fine meat forms and wool that are well adapted for breeding in the southern regions of the Republic. Kazakh horses of such types as zhabe and adai are distinguished by good performance as well as high meat and dairy efficiency. Exceptional productive and adaptive qualities have Mugalzhar horse breed (1998) that was received by way of pure breeding based on the Kazakh breed type such as zhabe.

To improve breeds there was organized crossbreeding of the local breeds with the factory. As a result, there were created herds of red steppe cattle, Auliekol, Kazakh white-headed cattle breed, merino, and Karakul sheep breed whereas in the horse breeding there were derived such horse breeds as Kushum, Kustanay and Kabinsk types.

Viewing selection and breeding work in animal husbandry of the Republic it should be pointed that highly productive livestock breeds maximize their genetic and geographical potential only under some certain climatic, economic factors, and appropriate feeding and housing conditions. Otherwise, any breed loses its valuable qualities during the period of one or two generations and will be at the level of indigenous breeds, or will disappear as a breed. For this purpose there has been developed a plan for breeding zoning in our country which assures planned distribution of agricultural animals by regions and their directed improvement, depending on the natural-historical and economic conditions of the region. Alongside this pedigree zoning, that is one of the main breeding and improvement elements of the cattle type is not a once and for all the present action. It can be changed depending on the intensification of breeding areas, breeding of new breeds with excellent adaptive qualities in more extreme breeding

conditions, developing new feeding and housing technologies and changing economic conditions.

This discipline gives an understanding of its role and importance of breeding zoning about the qualitative transformation of domestic breeds of farm animals, the role of local scientists and specialists in a proper selection and breeding in specific economic and regional animal breeding areas.

Forty kinds of livestock were created during the process of continuous domestication and evolution that currently determine the state of agriculture and livestock production.

Wide genetic diversity of existing animal breeds is an outcome of selection of the best individuals that are caused due to the environmental factors, controlled breeding and farming system variation. This variation, which was created over the millennia, is the most valuable property of the owner of the domesticated animals. Wide genetic diversity of existing animal breeds is a certain resource of mankind at solving tasks connected with different environmental changes, disease threats, new knowledge, and people's needs as well as changing of social and economic relations.

Accumulation of genetic resources and their diversity by species and farm animal breeds are needed to establish successful development of animal breeding. Animal genetic resources bred in different world regions have their specific characteristics depending on the social and economic, climatic and fodder conditions of various breeding areas.

Kazakhstan in this regard is no exception too. Formation of the gene pool of farm animals of the republic was produced over the millennia from the moment of animal domestication. More conscious animal selection on productive and adaptive qualities begins with the development of nomadic animal husbandry. Starting with the VIII century BC nomadic tribes were breeding four species of animals at the territory of Kazakhstan such as horses, cattle, sheep, goats, and camels. As a result of such selection, productive livestock was developed, in particular, meat and dairy horse herd breeding, greasy sheep and cattle breeding with a longer pasture-feeding season.

Zootechnic research on the improvement of productive qualities of local animal breeds in Kazakhstan of the last century (20–30 years) was held about identification and practical use of the best animal genotypes of that time. A search of optimal selection breeding options of local cattle breeds with the improvers from Russia, Baltic and European countries allowed to accumulate a sufficient genotype of more productive individuals. Consequently, new domestic breeds of cattle, sheep, goats, pigs, horses, and birds were created.

Selection and breeding work at the formation of the more productive genetic potential of domestic livestock was carried out using best elite stallions in reproduction process as a strict selection of pairs according to selectable features as an import from the foreign countries of imported individuals with a high genotype and other breeding material like seminal fluid and embryos.

A wide variety of breeds that exist nowadays is a result of enormous human labor. Currently, there are two thousand seven hundred and thirty seven animal breeds including one thousand of cattle, two hundred and three of pigs, one hundred and sixty of sheep, twenty of goats, three hundred and twelve horses, two hundred and thirty two of birds, sixty of rabbits, four hundred of dogs and twelve of deers. In the CIS there are bred approximately three hundred of animal breeds with the fifty-two of representatives of cattle, thirty-one of pigs, ninety of sheep, fifty of horses, thirty-six of birds, ten of rabbits and five of deers.

At present, many domestic breeds of cattle, horses, and sheep are used outside the borders of Kazakhstan as improvers. Thus, Russian scientists from the Research Institute of animal husbandry, which is a Siberian Department of the Russian Academy of Agriculture and Science, formed mogoytuy type of meat cattle of the Kazakh white-headed breed. Horses of Mugalzhar and Kushum Kazakh breed of zhabe type are used in the Republic of Sakha and areas of productive horse breeding in Siberia. Kazakh sheep breeds of greasy meat direction are successfully used abroad.

The amount of breed depends on many factors such as its value, adaptability to the breeding zone, quality of producers and female fecundity as well as other. Currently, the number of new breeds in the CIS for each animal species is determined by a special instruction for testing of breeds.

## 1 Breed doctrine and factors of breed formation

A breed is a large group of domestic animals created by humans that have a common genetic root of origin which steadfastly inherits domestic and biological features that **possess** of a certain body type and develops (evolves) according to economic criteria of the social era.

Whereas economic factor is determined as the main one in matters of breeding a particular breed (type) in specific climatic and feed zone.

It should be marked that the breed is a dynamic category capable to change depending on economic requirements. It makes a great difference! Since on the change of requirements, there is also a change in the directions of the animal selection process.

For example, continuous work with a meat breed of cattle for the selection of animals by early precocity (such as Aberdeen-Angus, shorthorns, and Herefords) brought to a decrease in body weight and its rapid obesity led to an increase in payment for food products.

For this reason, in several countries, livestock of this type did not become in demand. They were replaced by a more contemporary type of meat cattle with a large elongated body, longer growth of soft active tissue and the process of fat deposition occurs at a more mature age (e.g., Sharole and Kian).

Thus, the demand for low-fat and juicy beef led to a change in the direction of selection in animal breeding.

A similar situation is noted in other branches of animal husbandry, in particular in pig, sheep and horse breeding and other. Consumers of pork frequently preferred low-fat meat and bacon. In this regard, along with the change of animals in the direction of greasy meat and bacon, the average live weight of pigs gradually decreased during slaughter.

Demand for high-quality horse meat and national products from it made breeders create new types of a horse of meat and dairy direction such as Kushum and Mugalzhar that have no analogs in the world.

The lack of necessary demand for wool productivity created the prerequisites for the work of breeders in the direction of the increase of meat and greasy type of sheep breeding.

There is a conclusion, breeds are changing and many of them that do not meet current men's requirements disappear and are being replaced by new ones.

Wild animals are not divided into breeds. Only domestic animals could be divided. In the animal husbandry, the breed is defined as the main systematic unit in the classification of animals in agriculture as well as in zoology regarding species and varieties.

The first mentions of the breed arose in the XII century when a man began to cross animals deliberately. At the same time, they emphasize the common origin, invariability, and constancy of the characteristics of the breed. The following scientists such as Zettegast, Wilkins, Kronakher, Krueger, and others gave various definitions of the breed. For instance, Krueger identified animal breed with a pure line. He wrote: «A breed is a group of animals that are identical and hereditarily pure concerning all inherited traits». Ch. Darwin defined breed as a species of domestic animals created by humans and adapted to meet his needs.

D. A. Kislovsk, under the term breed, meant a big group of animals in which a certain type was developed, conditions of existence and ability to not only save its specificity but also progress relatively quickly and when crossed with other breeds have an improving effect.

Summing up many definitions, breed should be called a holistic group of animals of one species, created by human labor in a specific social and economic conditions that have a common history of development and origin, commonality to the requirements of production technology and natural conditions, differing from other breeds by characteristic signs of productivity, type, constitution and firmly transmitting their qualities to posterity.

There are following breed characteristics such as common origin, breeding adaptability in certain climatic conditions, presence of certain economically useful qualities, heredity stability and at the same time a big variability of symptoms inside the breed and finally some animals required for the breeding.

P. N. Kuleshov considered, that inside of the breed, there must be several thousands of identical by the type of highly productive animals that reflect chosen breed direction. A. S. Serebrovsk pointed out that the breed must have at least twenty thousand animals based on the need to assess producers for the quality of offspring and identification of the leader of the breed.

D. Kislovsk stated that there must be at least four thousand and five hundred females and one hundred and fifty breeders in a breed and only under these conditions related to animal mating could be avoided.

All animal breeds have different geographic and economic distribution. Accordingly, there are four types of breeds.

**The breeds of a wide range.** These types of breeds have a big amount of livestock in total (tens of millions of heads) and are widespread all over the globe. Thus, the black-and-white breed of cattle and its offspring are bred on all continents. Except for CIS it can be met in England, Sweden, and the USA, Denmark, Australia, and other countries. A huge number, a

large breed variability as well as high genetic potential allow you to successfully conduct further improvement of this breed. In the post-war period, all countries are characterized by a growth in the livestock of black-and-white cattle represented by various offspring. The livestock of this breed has more than 70 million heads in the world. In the CIS it takes the third place according to the number and range. Simmental breed also belongs to breeds with a wide range, with a population of only 40 million in Europe alone.

Group of breeds with a wide range includes a large white breed of pigs, thoroughbred horse breed, Karakul sheep breed, and others.

**Interzonal breeds.** They are widespread in a range of different soil and climatic as well as economic zones. The number of these breeds is somewhat less than in the first group. Among them, there are such as Schwyz, the red steppe cattle breed, Orlov Trotter, English thoroughbred horse, prekos, Tsigai sheep and others. The value of these breeds in the further development of animal husbandry is great.

**Zonal breeds**. For these breeds, the area covers one zone. Bestuzhev's cattle are determined as the basic target breed for the area of Middle Volga. It is bred in 135 regions of the Russian Federation, Kazakhstan, Tatarstan, and Bashkortostan. This breed group includes also Ukrainian white steppe, North Caucasian pig breed, Kazakh fine-fleeced, Stavropol breed of sheep, Akhaltekin breed of horses and others.

**Local breeds of local value.** Their area is one region or brim. The local value has Yakut cattle, breeds of cattle of the Caucasus, Karabakh, Pecher, Vyatka horse, Romanov sheep, and others. It should be pointed out that zonal and local breeds that are perfectly adapted to local conditions, despite its scarcity, have not lost its value in modern conditions of livestock development. Animals of these breeds are the most valuable material for the breeder, engaged in the improvement of factory inter-zonal breeds, as they possess such valuable qualities as endurance and good adaptability to the breeding zone. Local breeds must be preserved as a "genetic pool" for selective breeding.

## 2 Pedigree zoning and breed testing, methodology and establishment of breed testing

**Breed zoning of animals is a process of** breeding animals in certain climatic and fodder conditions. Thus, planned breeds must have high adaptive qualities according to the given conditions of the region and to ensure the maximum number of livestock products with minimal labor and funds. Also, the breed zoning plan should ensure the organization and conduct of the program of selection and breeding work to improve the productivity of animals raised in this region.

**Breed testing of farm animals** is the establishment of features of animal development, the formation of productivity in young animals in the conditions of intensive growing and fattening and full feeding with typical for the zone breeding rations. There are assessed criteria of relatively small but carefully selected, that are typical for the breeds of animal groups, obtained in equal feed and climatic conditions.

Comparative assessment of breeds due to selected types, offspring, lines and mixtures carry out simultaneously in two ways:

- generalization and analysis of zootechnical accounting and evaluation data of animals of different breeds in the farms with a sufficient level of feeding and productivity;
- in-depth study of animal qualities at special stations for breed testing.

Breeds are tested based on **orders** or contracts with regional or republican state agro-industrial complexes as well as to fulfill research plans of scientific and educational institutions. Planned breeds are subject to an assessment that is bred in the region and republic as well as imported animal breeds, crossbreeds of different blood degrees due to the improved and improving breed. Animals of comparable breeds must be set in equivalent conditions of feeding and housing. Animal evaluation is produced by live weight, slaughter yield, milkiness, fat content in milk, wool productivity, development and build, suitability for machine milking, reproductive ability, fattening, and feeding features, etc.

At the moment of breed testing, people register animals and fill in a certificate including such information as test start date, number of animals in each of the compared breeds and average parental productivity. Those animals for testing are selected with the productivity of their mothers not lower than the requirements of the first class for each breed but with a difference of no more than 10–15 % due to the main selectable features.

Number of animals in experimental and control groups should be sufficient to obtain statistically significant differences between them, but

not less than 20 animals in each of them. Every group has an animal that is clinically healthy and belongs to leading lines used in the region.

Age differences in a group must be within two or three months. In general, groups must be selected due to the analog principle.

The main evaluation criteria of productivity of compared breeds as the following:

1. High productivity.
2. Payment for feed by-products.
3. Reproductive qualities.
4. Cost efficiency in terms of value.

Pedigree associations and regional state agro-industrial complexes may apply to the Ministry of Agriculture of the Republic about the change in the breed zoning plan or about the need to import animals of the breed that turned out to be the best during the test breeding.

**Principles of breed zoning.** Every breed must be bred in the most suitable climatic and fodder conditions. However, the best cattle breeds are distinguished by a big number of adaptation qualities to the most diverse climatic and forage conditions. When breeds get under the influence of new conditions they change, adapt to them and lose a little in productivity. Nevertheless, with the improvement of technological conditions they retain or even improve economically useful traits and such a phenomenon is called geographic heterosis.

In modern conditions breed zoning, according to large regions of the country, should be organized due to the following principals:

1. The breed must provide a maximum number of livestock products at the minimum cost of labor and resources.
2. Animals of the planned breed must have maximum adaptive properties to the given conditions of the region.
3. Breed zoning plan must provide organization and fulfillment of the program of selection and breeding work to improve the productivity of raised animals.
4. Organization or possibility of establishing breeding base (if there is none) in a given region or area.

The main condition that simplifies the implementation of these requirements is the elimination of multi-species in the region.

The breed zoning plan is constantly changed and improved. More effective results could be reached if there are no more than two breeds in the administrative region.

## 3 Breed testing methods, goals and aims of breed testing

The diversity of breeds of different productivity directions allows you to choose the most advantageous of them for breeding in those or other climatic or feed conditions.

Choice of the most productive and economically advantageous breeds or breed groups is carried out based on a comparative assessment of their productivity and the cost per unit of production.

Due to the comparative assessment of breeds or breed testing you can as increase as profitability as quality and increase significantly the number of animals of the most productive breeds, breed groups, and types. Thus, the growing demand of the population in food issues could be satisfied.

Considerable importance is given to breeding testing and issues connected with the breeding of new breeds of farm animals, breed groups and interbreed factory types. Verification of the effectiveness of their breeding in comparison with the breeding of already existing breeds in specific climatic conditions will make it possible to take reasonable decisions for the approval and distribution of new breeds and breed groups.

Comparative breed testing give a sense of specific characteristics of each of the breeds that are determined by genetic and ecological factors as well as to establish similarities and differences between the compared groups and breeds of animals when breeding them in the same conditions.

Comparative study used by manufacturers of different breeds of one or several areas of productivity and various options for industrial crossing are envisaged in the process of breed testing.

**The main aims of breed testing are:**

1. To reveal breeds, breed groups and interbreed factory types that are most suitable for the breeding in specific conditions and give maximum production with minimal costs for its production.

2. To make characteristics of genetic and phenotypic characteristics of the breeds, breed groups and types on an increase of its productivity by climatic and fodder conditions.

3. To reveal best breeders from the amount of compared breeds and establish more favorable crossbreeding variants of different breeds between themselves.

Breeding materials are used for the importation and distribution of breeding animals for individual zones of the country, taking into account local conditions.

**The main methodological provisions of breed testing.** Experience of carrying out a breeding test formulates the main methodological

regulations at the process of organization of comparative assessment of various breeds and animal breed groups:

1. Breeds test of animals is carried out in each region and republic. Tests are provided by zonal institutions and experimental stations with the participation of farm specialists.

To provide tests one or two farms with equivalent feeding and housing conditions are chosen. With the significant differences in these conditions the breed testing must be carried out in two or three zones of the region or the republic.

2. For a comparative assessment not only breeds recommended by the breed zoning plan are selected also those that were not previously included in the breed zoning plan but used in this breeding zone.

In the regions, where for a long time crossbreeding of a domestic breed with the breed improvers was used, hybrids are defined as subjects to be tested.

3. Every tested breed, group or hybrids must be at least of the first class and typical in terms of quality.

4. The number of each test group should not be less than 100 heads. This is to ensure that the number of animals of the same sex is sufficient to obtain a reliable comparative assessment.

5. For a reliable assessment, animals are selected at a young age not older than 1.5-2 years.

6. Compared animals are selected into one group and the same feeding and maintenance conditions are created.

7. The study of groups of animals lasts several years (four or five years). During this period, not only formed groups but their offspring are also studied due to productive peculiarities and adaptive qualities.

8. Breeding of tested breed group is pure whereas crossbreed is "in itself".

9. At breed test, the following is taken into account:

a) results of individual valuation;

b) yielding (meat outcome, shearings, etc.);

c) bodyweight that is received by periodic weighing during the test period;

d) fattening and meat quality;

e) feeding in a comparative aspect;

f) reproductive ability;

g) survival which is based on animals murrain during the test period. The murrain is determined according to the season (spring, summer, autumn, and winter);

h) milkiness. The milkiness is determined based on young animals growth.

10. It is established accurate, individual accounting and numbering (branding) of tested animals.

11. Comparative assessment of economic efficiency, cost accounting of feed, material resources, the quantity and quality of obtained products is done during the whole testing period. All calculations are done on average per head.

12. For more deep studies of productive and biological peculiarities, the research institute must take additional research on the growth and development, phenotypic and genetic characteristics of animals.

## 4 Large-scale breeding in livestock at the present stage

In the conditions of concentration, specialization, and intensification of animal husbandry as well as the development of scientific and technical progress the selective work in the animal husbandry is formed on principals of large-scale breeding.

Under the term of large-scale breeding, it should be viewed as the centralized system of the organization of breeding work with the whole breed or its zonal type based on the intensive use of breeder improvers. Also, there is the use of modern science and technology achievements.

**At the current stage of development of breeding work such items are included in the system of large-scale breeding as:**

- evaluation and selection of mothers and fathers of repair breeders according to a single program for the entire breed, regardless of its area and number;
- cultivation, evaluation and selection of repair breeders due to development, performance, reproductive ability indicators, and other features;
- evaluation of breeders due to offspring quality;
- regulation of sperm use checked and evaluated by the quality of breeder's offspring;
- creation of collecting, accumulating and processing system of data of the breed with the use of genetic and mathematical methods;
- the appliance of biotechnology achievements in the breeding;
- immunogenetic certification of the origin of breeding animals, cytogenetic assessment of producers, embryo transplantation, etc.

**The scheme of actions of large-scale breeding:**

- in each breed or an individual breeding zone, all breeding farms are grouped into a small number of groups in which selection process is carried out according to a single plan;
- each group of the pedigree herd specializes at the breeding of certain lines that are unrelated lines of other groups of breeding herds.

Domestic and foreign experience shows that for a population of 100 to 500 thousand of breeding queens it is desirable to have no more than five or six of such groups.

Annually from every breed livestock farm is selected one elite breeder whose sperm is used for the insemination of the most valuable dams of the same group to obtain repair producers from them.

In order to increase effectiveness of large-scale breeding according to breeds' types with a wide zoning it is appropriate to form zonal centers of breeding and artificial insemination of livestock with a more rational use of

breeders-improvers at the base of regions and republics with the developed breeding base and satisfactory conditions for assessing the genetic potential of livestock. In the region or republic with the developed breeding base, it is created a stock of sperm from the breeders-improvers to inseminate dams both in your region and in the republic. At the same time, the area which is served by one tribal association could be increased to one million breeding queens and even more.

An indispensable condition for the development of large-scale breeding is the use of computer automation.

**The breeding data bank by breed types should have the following structure:**

- information about mothers of breeders including data about productivity and breeding value of the breeding queens themselves and their ancestors;
- information about breeders including data about yielding and breeding value of the breeders themselves as well as their ancestors.
- information about breeders' daughters;
- selection and genetic, zootechnical and economic parameters that characterize the entire breed population.

**With the help of the data bank a computer breeding center decides every task connected with the large-scale breeding:**

- performs analysis and makes plans of the breeding work;
- evaluate breeders due to the development, reproductive ability and quality of offspring;
- provide a selection of breeders' mothers and fathers;
- provides the selection and evaluation of breeding queens.

## 5 Animal breeding planning. methods of drawing up selection and breeding work plan

The plan of selection and breeding work in the animal farms is drawn up for a year, five years, and for a longer period depending on the task. Long term data of breeding records in the farm as well as results of scientific and research works on this topic are viewed as the basis for drawing up such plans.

Relevant branch of research institutes work out guidelines for drawing up plans of breeding work for breeding farms and the Ministry of Agriculture of the Republic of Kazakhstan makes recommendations.

**The plan includes seven sections:**

1. Brief history of the herd.
2. Characteristics of the herd.
3. Tasks of further breeding work in the herd.
4. Organization and methods of herd breeding.
5. Measures for feeding and keeping animals.
6. Herd breeding techniques.
7. Breeding schedule by year.

1. There is a short description of climatic and fodder conditions of the farm as well as water availability, presence and number of cattle rooms, development of other animal fields on the farm and availability of agricultural and other equipment. During the process of description such information is used as weather data for several years, geobotanical research results, certification of pastures as well as farm production reports for the recent years. The plan points the creation year of the herd, breed, and class of imported producers and dams, cattle as where they were purchased, methods of breeding for the previous years, signs of a qualitative change in the herd and its productivity over the last 5–10 years.

2. It holds an analysis of the test data and other indicators of productivity. Besides, there is data about breeders for the last years and who are available at the herd for the moment of plan-making.

3. Goals of the further breeding work in the herd must be formed accurately. By this, quantitative growth of the herd is calculated based on economic tasks for production (meat, milk, fur and other) including the upbringing and sales of breeding animals. There is performed justification of the desired type of livestock, which should be multiplied, and which will form the basis of the qualitative change of animals on the farm.

4. One of the most important sections of the plan must be such as a plan of testing of breeders due to the offspring quality, work with lines and

families and procedure for the selecting of the replacement stock to stock the herds.

5. It must be provided with a short characteristic of the development of the farm food supply. Here must be specified feedstuff that is intended for the use in the farm, system of maintenance of breeding animals, the level of the feeding of various groups of animals is also determined as well as specific rations and total feed requirements. Rational terms of breeding queens horsing are established as well as the breeding ground of summer and winter keeping of animals.

6. It must be an established organization of primary zootechnical and pedigree accounting. Also, a list of required journals and statements for the organization and conduct of this accounting must be included.

7. The schedule of pedigree work contains a list of main works with an indication of exact deadlines and persons in charge. These works include:

1) offspring registration;

2) valuation;

3) animal selection to replenish the herd;

4) animal weighing;

5) preparation of stud-horse for the organization of horsing complain;

6) registration of cover and insemination of breeding queens;

7) preparation of breeding documentation for accounting and their processing;

8) issuance of documents for selling breeding animals;

9) posting of results of breed registration in the cards and other.

Plans of selection and breeding work are made usually for five years due to the stated above scheme. There is also a plan for the commercial farm but which is prepared more simply.

**Stockbreeding scheduling with the breed:** It is necessary to develop a plan of breeding work with the breed for systematic and continuous improvement of one or another breed of animals in different farms. There are considered such items as methods of breed improving coordination of breeding work in individual herds, the scale of breed distribution and use of the best animals in the breed as well as the volume and types of linear and interline breeding, etc.

Scientific institutions recommend the following scheme of the breeding plan with the breed:

1. A short story of creation and breed spread.

2. Characteristics of the breed due to the main constitutional and economically useful features.

3. There are following goals of further breeding work with the breed:

а) change in the number of livestock breeds and their breeding zones;

б) herd structure;

в) description of the desired type of animal breed;

г) increase in the number of animals of the desired type and their breeding qualities.

4. Organization, methods, and techniques of breeding:

a) in the stud-farms;

b) in the breeding farms;

c) in the commodity farms.

5. Measures connected with feeding, keeping animals and caring for them in regards to the peculiarities of the breed and the natural conditions of their breeding areas.

6. Organizational plan:

a) establishment of new plants and stud-farms;

b) plan of growth and sales of breeding animals;

c) forms of cooperation of stud plants and stud-farms with breeding stations and artificial insemination;

d) and other organizational issues.

Plans of the breeding work with the breed are made by professionals who know peculiarities of the breed and for the period of eight or ten years. The Council of breeding manages the process of its creation. Prepared plans have to be discussed at the meetings of Council in territorial research institutions of livestock, in the regional and republican departments of agricultural farms and are approved in the Ministry of Agriculture of the Republic of Kazakhstan.

**The value of breeds in animal husbandry**. Intensification of production requires improving the quality of animal breeds. At the same time the number of breeds increases.

For the consumer, it does not matter what the type of the breed is from whom there are received milk and meat. Moreover, he may not even know the breeds although people usually prefer lean beef cattle in comparison with the fatty meat of nit specialized breeds.

Whereas for the zootechnical breed characteristics are of big importance as quality and quantity depend on it. Therefore, zootechnical work with the breeds of farm animals occupies a special place in a system of breeding.

**There are the following tasks for improving breeds:**

1. Increase of economic efficiency of converting feed into animal products (selection of payment for feed products).

2. Increase of the role of elite breeders in selection work. It is the selection of breeders due to the quality of offspring.

3. Supply of commodity farms with offspring who possess high productivity and excellent adaptive qualities.

4. Selection of the breed to increase natural resistance and disease resistance.

Animals of contemporary breeds must satisfy human needs at the maximum extent in high-quality food products and supply industry with raw materials.

**Factors of breed formation and breed evaluation.** The process of breeding and evaluation of breeds is determined by social and economic as well as natural historical factors whereas decisive role-plays by social and economic factors. Breeds of domestic animals must be considered in an inseparable connection with the human production process and the social formation of human society.

M. Wilkins considers that the main breeding factors are naturally historical factors such as climate, soil and other. However, this is not quite true.

It is a well-known fact that at the frontier of the XVIII-XIX centuries, with the development of capitalism that replaced feudalism, there was created approximately ten breeds of cattle, ten breeds of pigs, six breeds of horses, more than thirty breeds of sheep and other types of agricultural animals in England. The main factor of such a demographic explosion was the development of socio-economic relations, development of production, technology as well as the development of new productive forces and production relations including new means of production in the form of agricultural animals. New socio-economic formation demanded the progress of old technology, new methods of breeding work, maintaining of the studbook, new methods of assessing animals by exterior and quality of offspring, consolidation, and concentration of production and capital.

The most important changes in the breed composition of animals occurred after the October Revolution. In a relatively short time, in the USSR, over 50 new domestic breeds of cattle, pigs, sheep, horses, and poultry were created, which sufficiently began to satisfy the growing needs of society. Kazakhstan that stepped over one social-historical formation (capitalist system) also went to one of the leading states. New animal breeds were created on the territory of Kazakhstan that has no analogs in the world among which there are such horse breeds as Kustanai (1951) and Kushum (1976). There were created such sheep breeds as North-Kazakhstan merino, Arkharomerinos, half-fine wool, early-meat half-fine wool sheep and breeds of wool goats. There are created such unique breeds as Kazakh white-headed, Aulietin, and Alatau. In the pig breeding, there

are following as Kazakh pedigree group of hybrid pigs, Aksai black-and-white pedigree group.

After the famous «perestroika» of 1991 when the whole economic and social structure of public life was rebuilt and reoriented to a new method of management there became an issue of reorientation of the agricultural farming, in particular, the livestock industries. During this period scientists of Kazakhstan despite temporary difficulties, created a new, unique breed of horses of productive direction such as Mugalzhar (1995), Kabinsk meat type of horses of Kazakh breed (1995) that do not give in live weight of some heavy breeds but significantly superior to them in adaptive and meat qualities. In Pavlodar Priirtyshiye there were created such breeds as Seletin (2013) and Bestau (2015) factory types of the Kazakh horses breed of zhabe type. In the cattle breeding, there were created such as Auliekol breed, interbreed types of Simmental and some other types of cattle breeds. In the sheep breeding, there was received a new type of breed of meat wooly direction «Etti merinos», pedigree type «Bais» of the Kazakh fat-tailed semi-coarse-haired wool, etc.

Thus, breeds are created and improved mainly under the influence of socio-economic factors but it happens under certain natural-historical conditions.

## 6 Concept of constancy and breed plasticity. Breed structure and classification

**Constancy** is stamina that is viewed in transmitting traits to offsprings. Constancy is provided by a work of stock breeding that accumulates the same qualities of animals from generation to generation, strengthen the outstanding performance of separate individuals and turns it into characteristic features of the breed. The constancy of the breed covers the exterior-constitutional and productive features of the breed. Therefore, animals are divided into classes according to the results of the assessment that are based on these features.

The constancy of a breed is relative and it is maintained by selection and matching.

**Breed plasticity** is a variability of the breed depending on the direction of selection that provides it with the opportunity to adapt to various conditions and which is defined as a factor of further breed progress. Breed plasticity is defined by interbreeding types. Particularly, a widely distributed type of breed in our country is Simmental, which holds several interbreed types, the Kazakh horse breed that consists of seven types and offsprings. Animals of these types are distinguished by a strong constitution, favorable for breeding work, and are distinguished by high milk and meat productivity.

Breed plasticity and presence of animals of several interbreed types in it, makes it possible to avoid closely related mating, and related in this regard, overdevelopment, and underdevelopment of the organism. From time to time insertion of animals of other types into the herd is sufficient enough to correct them.

M.F. Ivanov pointed out that the variability and plasticity of the breed are viewed as important assertive quality and the basis of further breed progress.

**Breed structure** is created from different breed types that make the primary stage of breed formation. The approved breed consists of the breed group, offsprings (zonal types), intra-breed types, lines, families, and plant.

Breed group or as it is also called sub-breed is a big group of animals that participate in a process of breed formation but not yet having stable traits peculiar to already created new breeds.

Offspring these are zonal types in the formation of which, the main role is played by natural and economic factors (soil, heat, fodder and grazing factors, moisture, light and costs per unit of production).

Practice shows that it is very difficult to conduct isolated breeding work with individual offspring of livestock. Nevertheless, there is no necessity in this.

**Intra-breed type** is a constitutional and desirable type of animal. Breeder defines the selection of animals of desired types as the start point of his work on improvement of the breed or individual herd.

The desired type of Simmental, for example, throughout the world is determined by good latitudinal and volumetric measurements of animals, with their optimum growth and live weight, which ensures sufficient meat and dairy productivity with good economic indicators.

Animal homogeneity is a good indicator of a selection of non-breeding herds. Whereas in the stud farm variability of animals due to the type forms good conditions for the selection and matching.

**The line** is a highly productive group of pedigree animals that originates from an outstanding ancestor, similar to him in the constitution and productivity. Linebreeding is one of the most important methods of improving animal breeds. Lines are valuable as long as certain genotypes are fixed in them. When the genotypes fade away, new lines of animals are created to meet the objectives of the breeders.

**A family** is a group of high-value breeding queens that originate from one outstanding ancestor who steadfastly transfers valuable characteristics to offsprings. Valuable families are important to interbreed structural parts on which the progress of individual herds and breeds as a whole also depends since the origin of eminent stud-horses is closely related to breeding queens' families.

The breed animals have specific body features and productivity that have only this particular plant breeding and its subsidiaries.

Offsprings, intra-breeds, lines, and families form a hard structure of the breed. The complexity of a living organism as well as inheritance of qualities of father, mother and other more distant ancestors all these make breeders conduct in-depth work with all structural units.

Work with lines is first of all selection of males and their hereditary inclinations. Lines are created and tested (rated) in the breeding factories and breeding farms.

Work with the family is the improvement of females in all farms that have a certain breeding queens' stock.

Work with the intra-breed types is based on defining and widespread in the herd animals of desired types.

Work with offspring is connected with the creation in the breed of big zonal groups of animals.

Thus, breeder using these methods can improve both individual herds and the breed as a whole. The structure of the breed is created and improved by a system of the planned activities:

Intra-breed types are also in all farms. Nevertheless, in the herds of breeding farms, it is better to keep different types of animals and in industrial farms well selected according to the animals' types.

**Breed classification.** There are different types of classification of animal breeds. Charles Darwin divided animals into inartificial and artificial. M. I. Pridorogin (1906) suggested grouping them due to the ecological features into mountain, lowland, coastal and island breeds. However, mountainous types of the breed can move to lowlands and low-lying breeds to mountain areas, therefore, this classification turned out to be impractical.

P. N. Kuleshov (1926) subdivided breeds into the ancient, universal, improved and indigenous. Classification of P. N. Kuleshov played a certain role in ordering the world's breed stock. In the cattle breeding, there was suggested the classification of breeds due to the craniological feature that fulfilled its role in the process of establishment of the origin of animals by the structure of the skull. There are exist other classifications too nevertheless none of them have found its practical application.

Charles Darwin considered that any genuine classification must be genetic. Based on this creation of the world classification of breeds is a necessity. Intensification of the production process demands the use of world achievements when working with animal breeds and finding out their genetic connection as well as the subsequent association of genetically close and similar in breeds. Along with the creation of new breeds of animals in the world animal husbandry, there is a process of combining breeds that are similar in type and genetically related.

At present most common breed classifications due to the degree of investment of human labor in their creation as well as their classification in the direction of productivity.

**In the first case there are distinguished such breeds as primitive (aboriginal and primitive), transitional and industrial:**

**1. Primitive breeds** these are such that were formed mainly under the influence of climatic conditions. Animals of this breed are characterized by the constancy of features in comparison to animals of the industrial breed with late ripeness, low as a rule endurance and universal productivity. There are almost no primitive breeds left.

**2. Transitional breeds** take a medium position between industrial and primitive breeds. Along with natural conditions, human labor is also embedded in their formation.

**3. Industrial (stud) breed** these are such breeds in the creation of which human labor was mainly invested such as selection. Animals of stud breed are distinguished by high productivity, precocity, and the presence of a significant number of intra-breed types.

Under the influence of directional selection and matching of animals of these breeds, there was created a certain structure with the increased heritability of the most important features. Industrial breeds possess high productivity and precocity and, therefore, serve as improvers of less productive ones. For the industrial breeds, it is characterized by high variability of productivity. The range of variability, for instance, viewing milkiness of cultural breeds varies from 1500 to 25 000 kg and as for the native breeds it changes from 600 to 1000 kg. From sheep of the native breeds receive one or two kg of wool, whereas from the cultural breeds there are from 5 to 35 kg of wool. Increased intra-breed variability of the industrial breed is the result of the creative election and the basis of its further improvement. Most modern specialized breeds of cattle, horses, sheep, and pigs relate to the industrial breeds.

**Animals are divided due to the direction of productivity:**

**Cattle breeds:**

Dairy – black-pied, red steppe, Kholmogor, Yaroslav, Jersey, and others.

Meat – Hereford, Shorthorn, Aberdin-Anguss, Sharole, Kian, Kalmyk, Santa-Gertrude and others.

Double productivity (combined) – Simmental, Schwyz and their derivates and other.

**Sheep breeds:**

Fine-fleeces – Soviet merino, Askan, Caucasian fine-fleeced, etc.

Semi fine-fleeces – Tsigai, Kuibyshev and etc.

Semi coarse-haired, coarse-haired – fur-coat (Romanov), Karakul, meat and fat (fat tail), etc.

**Horse breeds:**

Riding - thoroughbred horse, Arab, Akhaltekin, etc.

Fine harness horse – Orlov, Russian, American trotters, etc.

Heavy harness horse – Soviet, Vladimir, Russian Suffolk punch, etc.

Pack animals – Gutsul, etc.

**Pig breeds:**

Greasy – Mangal, Liven and etc.

Meat and greasy – Yorkshire, Berkshire, Mirgorod, etc.

Meat – landrace, Pyitren, etc.

**Chicken breeds:**

Egg – leghorn, white Russian, etc.

Meat – egg – Plimutrok, Avstralorop, Pervomai, etc.

Meat – Cornish, etc.

The direction of breed productivity is not constant and changes depending on the direction of selection work with the breed.

**Breed acclimatization** is an adaptation of animals to new living conditions (climate, feed and housing conditions).

Plasticity of individual breeds let them acclimatize in different climatic conditions. Such breeds as Simmental, Scswyz and some others that adapt well in different areas of the country.

Except for plastic breeds, some breeds are well adapted to a particular climate. For example, the red steppe breed of the cattle feels great in the southern parts of Ukraine than other breeds. Zebu, for instance, better carries the heat than cattle which is explained due to a number of its biological features (coloring, density as well as density of the hair, the character of sweating, skin structure, location of sebaceous and sweat glands).

**Rebirth and greed degradation** under some inauspicious conditions (such as poor and inadequate feeding, weak adaptive qualities, and overdevelopment of the constitution) of the breed can be reborn and even degenerate.

Under rebirth animals of the industrial breed by its qualities are close to the primitive ones. Thus, their productivity decreases and they no longer meet the requirements of the selection.

Degeneration (degradation) is an extreme form of the rebirth of animals. This is connected with the weakening of the constitution (overdevelopment) as well as the weakening of sexual function, which leads to a decrease in fecundity and appearance of anomalies in the growth and development. Degeneration occurs as a result of prolonged related mating. To skip this phenomenon it is necessary to adhere to the planned and reasonable work with animal breeds.

**The role of the stud-farms in the improvement of the existing breeding and new breeds of animals.** Stud farms carry out in-depth breeding work to improve existing and breeding new breeds of animals. Improvement of breeds is accompanied by the improvement of the breed and productive qualities of animals, breeding of highly productive industrial lines and families, growing of young stock of high quality and valuable stud-horses for commercial farming.

The role of breeding farms is of great importance also in the breeding of new animal breeds which use various types of crossing in their arsenal and possessing valuable breeding materials.

**Test questions:**

1. What the breed is?
2. What are the factors that influence the process of breed creation of farm animals?
3. What is the constancy and plasticity of the breed?
4. What is meant by the structure of the breed? What offspring, intra-breed type, line, and family are?
5. What classifications of farm animal breeds do you know?
6. What is the nature of dividing breeds into primitive, transitional and industrial?
7. What is the classification of the breed due to the productive direction?
8. What breed acclimatization is?
9. What breed rebirth and degeneration are? And what are their causes?
10. Tell about the importance of breeding farms in the improvement of the existing and breeding of new breeds of animals.

## 7 Breeding methods of farm animals

Method of animal breeding is a system of selection of animals for mating taking into consideration type of species, breed and linear belonging.

Variability of tasks of breeding requires the use of different breeding methods:

- in some cases it is used the way of gradual absorption of the blood of the improved breed by the improving blood;
- in other cases it is used the way of mating the best animals within the same breed;
- third, it is used the way of mating individuals of different breeds and species.

Depending on this there are three main types of animal breeding such as purebred, crossbreeding and hybridization.

**Pure breeding** is the mating of animals within the same breed.

**Crossbreeding** is the mating of animals of different breeds. Crossbreeding could be absorptive, introductory, reproductive, industrial and variable.

**Hybridization** is the mating of animal species of different origin.

**Pure breeding** is widely used in the process of improvement of existing breeds. The main goal of this is in the maintaining and improvement of valuable qualities of the breed.

The method of pure breeding is relatively slow. If you want to improve, for instance, speed of a thoroughbred riding horse, merino sheep wool fineness or quality of krimmer skin of Karakul sheep by way of its mating with other breeds it is impossible because they are the most perfect productive breeds of this type.

A separate technique of pure breeding is related to mating that is called **inbreeding**. Such kind of mating is used in pedigree herds with the aim of preservation and enhancement of the hereditary qualities of outstanding by the productivity factor of ancestors of his offsprings. Inbreeding is understood as the pairing of a father with a daughter, a mother with a son, brothers with sisters and several more distant relatives among themselves.

The breed received as a result of related mating is called **inbred** and looks more like a common ancestor. This is explained due to such factors as heredity is narrowed, more compact and more homozygous since the number of its ancestors is smaller than that of the offspring obtained as a result of unrelated breeding. Heredity narrowing of inbred animals leads to their homogeneity and similarity with an outstanding ancestor. In this case,

heredity is sent in the right direction. At the same time, with a longer relative breeding offspring vitality and adaptive qualities are reduced as a result of the accumulation in his genotype of identical hereditary factors and the absence of hereditary enrichment.

The mating of unrelated animals has a positive effect on health promotion only if such individuals were raised in relatively different conditions. If unrelated animals that in several generations were raised under the same conditions and do not have any differences between them then the viability of offspring from such parents can also be lowered. Such a phenomenon in zootechnics is called «imaginary kinship».

Agricultural animals of different groups react differently when related mating is used. Animals that are most sensitive to it are pigs showing the weakness of fertility, constitution, and vitality, whereas less sensitive is cattle and sheep.

Inbred is less dangerous while stud-horses and dams are not very similar to each other, whereas it becomes more dangerous in the conditions when stud-horses and dams become more similar and even homogeneous. Creation of favorable conditions such as feeding, care, and maintenance smooth out the harmful effect of related mating.

The lifespan of inbred animals is much shorter than outbred animals. An outbred animal is received when unrelated animals are paired.

As the results received from the mating of animals of different degrees of kinship are not the same in the practice of breeding it is distinguished the level of related mating and which is usually expressed by the number of generations to a common ancestor in the pedigree. Animal, received in the result of the mating of a brother and a sister, has the common ancestor in the second row of the pedigree, a grandfather from the side of both father and mother and the degree of related mating, in this case, will be as II-II. When there is the mating of cousins and sisters the common ancestor is in the third row of the pedigree and the degree of kinship is stated as III-III. Mating of fathers and daughters, sons and mothers, brothers and sisters as well as cousins and aunts is viewed in the following degrees as II-I, I-II, II-II, III-II and that is considered as closely related or incest, while mating in such degrees as III-III, III-IV, IV-IV is defined as reasonable and at last mating in such degrees as V-IV, V-V and further is denoted as a far relative breeding. Reasonable and far related breeding are stated as the most common forms as in this case there are no undesirable biological phenomena is observed.

The method of related mating is used only in the breeding herds when there is in-depth work connected with the improvement of the breed and under the condition of the necessity of inbreeding which is approved by

such a factor as maintenance in the breed of outstanding qualities of animals.

Related mating in itself does not guarantee the success of improving the breed as it is also necessary to create relevant conditions that contribute manifestation of desirable hereditary qualities in the descendants as well as to provide the systematic selection of animals which is in the highest degree corresponds to requirements.

**Linebreeding.** Linebreeding takes a significant place in the process of improvement of highly productive agricultural animals. One of the first conditions of line breeding is **the selection** of outstanding breeding animals. The second condition is the **selection due to the type** of productivity of related animals. The third condition is the tough **culling** of animals who do not meet the requirements of the desired type of animals.

Leading stud-horses of the line must be distinguished due to such criteria as impeccable origin, health body structure and a good exterior which is typical by productivity and differs in offspring quality. The line gets its nickname thanks to the outstanding stud-horses.

When there is the line-breeding it is mostly used homogeneous selection that is mating of homogeneous animals and in extreme cases related breeding. Thus, related mating of animals in the line intensifies transmission of desirable qualities to offsprings. In the beginning, when the line is just at the very beginning of its formation and there is no opportunity for the selection of valuable stud-horses of the desired type people use the method of closely related mating. At the following stages when there is enough number of stud-horses of the desired type people use a reasonable type of breeding and lastly the distantly related breeding of homogeneous animals.

There are distinguished such lines as **genealogical** and **industrial**. Genealogical lines include animals that are related by origin from the common ancestor and they could be rather different as there was no selection due to the standardization.

Genealogical lines are of interest if they include from two to three rows of descendants and defined as the stock for the formation of industrial lines.

Under the industrial line, it is accepted a sufficient group of animals in the breed that has the common ancestor and qualities which are qualitatively different from the main animal breeds.

The significance of the line inside of the breed is that highly productive line has a positive impact on the entire breed as stud-horses from such lines are used in many farms and thereby improve the breeding qualities of the breed.

Good results could be achieved when there is the mating of animals from the two different lines. Such a method is called the crossing of lines or **cross**. The effectiveness of the crossing of lines is because in some cases one line complements the other with its qualities and offspring by its heterozygosity inherit all valuable qualities of the original lines. In the majority of cases, the crossing of lines is distinguished by the selection of animals that are similar due to productivity but not of the related lines. The number and quality of lines depend on the level of industrial work with the breed. The industrial lines have lots of valuable ones whereas the primitive breeds do not possess them.

**Cross breeding.** The cross breeding is accepted as one of the methods of improvement of the local low-yield cattle by more highly productive in the animal husbandry and is used for a long time. Charles Darwin pointed out that offsprings received as the result of crossing are distinguished by the greater strength of development and increased fertility. Increase of vitality, tenacity as well as endurance and productivity of offsprings that is received as the result of crossbred of unrelated species and grown in different conditions was called **heterosis.**

At the cross breeding of animals of different breeds and receive of hybrids by this way it is important for the selection breeder that their heredity would be enriched and accumulate all the most valuable traits of both breeds.

The results of the cross-breeding depend on the correct selection of the original breed and to what extent they are suitable for obtaining hybrids with desirable qualities. It is equally important to select individual stud-horses from which people receive crossbred offsprings since they are relatively different in each breed. The success of crossbreeding depends on the conditions in which crossbred offsprings are raised and bred.

Depending on the stated goals there are distinguished the following types of crossbreeding:

1. absorbing or converting;
2. introductory or «blood transfusion»;
3. reproductive or industrial;
4. industrial;
5. variable.

In those cases when two breeds are crossed it is called as a simple one and when there are three and even more it is defined as a difficult.

**The concept of «proportion» of blood and accounting of such aspects as a thoroughbred of crossbred animals.** To establish the degree of influence of the original breeds on offspring there is such a term as

«proportion» of blood moreover «thoroughbred» or breed determine the level of manifestation of breed traits.

It is considered that the influence of father and mother on the proband is the same which accordingly makes 50 to 50 percent (or 1/2). Influence of each of the ancestors of the second line of the pedigree is 25 % (or 1/4), of the third line of the pedigree is 12,5% (or 1/8), of the fourth line, is 6,25 (or 1/16), of the fifth line, is 3,125 % (or 1/32), of the sixth line, is 1,5625 % (or 1/64), of the seventh line, is 0,78125 % (or 1/128) and so on.

If there is an absorbing crossbreeding then the first generation hybrid receives 50 % (or ½) of «blood» from each parent, the second generation gets 75 % (or ¾), the third generation gets 85 % (or 7/8) and the fourth generation gets 93, 75 % (or 15/16).

Therefore, when there is a clear expressed type the crossbreeds of the fourth generation can be classified as purebred animals.

The animal breed is defined based on data of origin and parent's breed with the mandatory inspection of animals. Animals are divided according to the breed (thorough-bredness) into such groups as purebred species, hybrids and improved one.

**Purebred** are species that originate from parents of the same breed which is confirmed by the relevant documents.

Hybrids of the fourth generation (15/16 of thorough-bredness) that are received due to the absorbed breeding with supporting documents of origin and the animals themselves are distinguished by typical breed and good development.

Animals that are received as a result of the crossbreeding of purebred parents of related breeds such as Kazakh White Head and Hereford, Simmental and Sychyov, red steep and red Danish, grayish-brown Latvian, red Estonian, red Lithuanian and other.

When there is crossbreeding of animals of the related breeds offsprings belong to the planned breed that is bred in this zone or to the breed of the main breeding stock of the farm.

**Hybrids** are species that come from the crossbreeding of the two breeds except the related.

There is the breeding of hybrids «in itself» except for species of the related breed.

It is the crossbreeding of the local and improved cattle with the purebred animals and hybrids.

**Improved cattle include** such ones as hybrids of the unknown origin without obvious signs of typicalness of any breed.

**Types of crossbreeding. Absorption (or converting) type** is such one when the unproductive dams of one breed are crossbred with the highly

productive stud-horses of another breed in several generations. Moreover, local inefficient breeds that require improvement are called improvable whereas highly productive industrial breeds are called as improvers. Thus, qualities of the improvable breed are absorbed with the qualities of improvers. The process of the absorption is stopped if the hybrids, in terms of productivity, exterior, constitution, and typicality do not differ from animals of improving the breed. Hereinafter such hybrids are bred «in themselves».

With every new generation of hybrids, the "thoroughbred" of the original maternal breed is reduced by half compared with the previous generation.

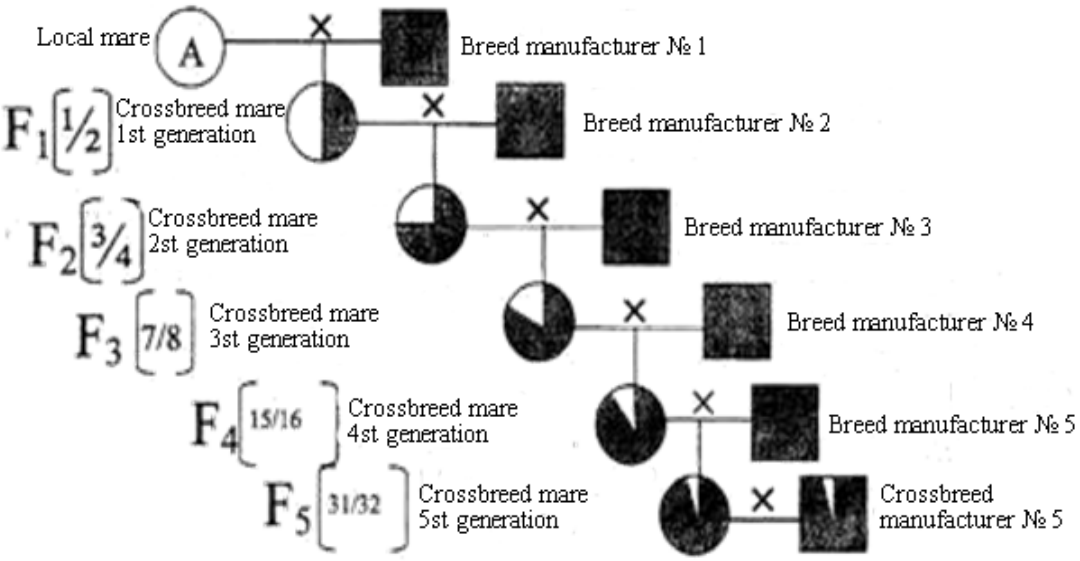
The necessity of the re-crossbreeding is because unimproved breeds that are long-bred in the same conditions are distinguished by increased hereditary stability. In order to replace one hereditary qualities with others, for example, a lower live weight with a more weighty one, or a low yield to a higher one, then they need not only to be achieved, but also to be hereditarily fixed in a number of generations as well as to form stability in transition of these qualities for the next generation and thus, that is the reason due to which this necessity of re-crossbreeding arises.

If there is an absorbing crossbreeding there are distinguished hybrids of the first, second, third and the fourth generations. They are conventionally called as 1/2 – half-breed, 3/4 – thorough-bred, 7/8 – thorough-bred and 15/16 – thorough-bred. This name arose as a result of the idea that the animal receives half of the hereditary qualities from the father and the other half from the mother. The division of the hybrids by blood shares is conditional, it does not reflect the real biological essence but only gives a rough idea.

Absorption breeding qualitatively improves local breeds and at the same time keeps their useful qualities such as adaptation to the conditions of existence and strength of the constitution, etc. Therefore, improved livestock with the use of the absorption method is not an exact copy of the improving breed.

In commodity farm absorption crossbreeding is carried out till the fourth or fifth generation, while in the breeding herds the work is done more carefully till the fifth or seventh generation with the use of only purebred stud-horses. Upgrading crossbreeding can be used to create new breeds.

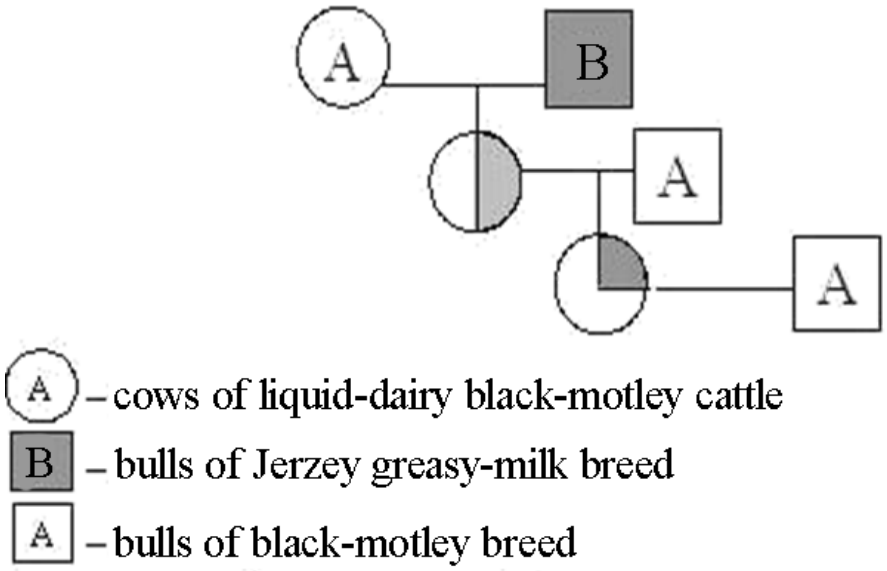
**The scheme of the upgrading crossbreeding**




**Preliminary crossing (blood inflow).** This method is used in case if the previously breed demands improvement of one of the productive side. Improvement is made by the way of crossing with another equivalent breed that surpasses the first in missing quality. At the same time in order not to change the type of the improved breed there is a restriction of obtaining hybrids of the 1 generation that further are mated with the best stud-horses of the improved breed, whereas hybrid stud-horses of desirable qualities are mated with the dams of the improved breed. Consequently, there is the breeding of hybrids «in themselves». Thus, there is a process of «blood inflow» of the improving breed.

For example, to increase the butter-fat yielding capacity of black and motley breed it is crossed with the related but fat-dairy breeds like the Dutch, Tagil and some other breeds. Then, hybrid cows are crossed with the best-purebred bulls of the black and motley breed. As a result, people receive hybrid cattle with a high butter-fat yielding capacity. With the aim of the improvement of the red steppe cattle in milk productivity, butter-fat yielding capacity, precocity, exterior and constitution there is a preliminary crossing with the animals of the related breeds such as Danish, Angeln, the Red Swedish and some other breeds. The result of this is mixed bred cattle with the high fat content of milk. With the aim of increase of such criteria as milkiness, there is a procedure of blood inflow of the related animals of the Monbeliard breed (France). The preliminary crossing is used as a rule in the breeding farms.

**The scheme of the preliminary crossing**

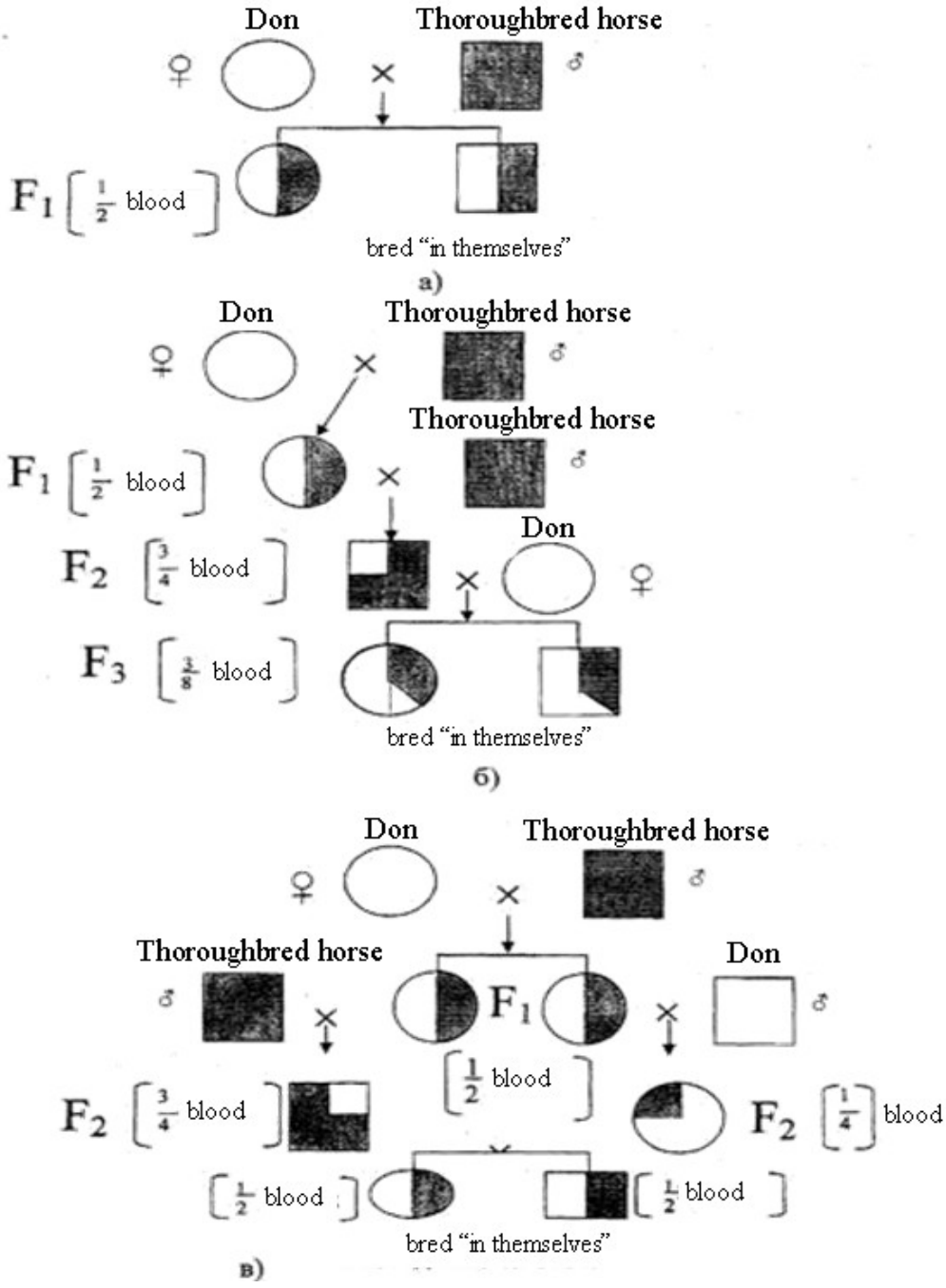



**Reproductive or plant crossbreeding.** The goal of this method is in the creation of a new top-quality breed based on two or several original breeds. In case if in the process of creation two breeds take part then such crossbreeding is called as a simple but if there are more than two breeds then it is called as a difficult one.

The share of participation or influence of the crossed breed during the creation process can be different. As a common in the practice of plant crossing one of the breeds is of primary importance. In the majority of cases of hybrids «in themselves» at the creation of a new breed by the method of reproductive crossbreeding the second generation is applied with a highly strict selection as sometimes it happens so that out of hundreds of heads the choice for a further crossbreeding is given to only several.

Due to the method of reproductive crossbreeding, there were received such breeds of horses as Orlov trotter and Bestuzhev, Kazakh white head breed of the cattle, English big white breed of a pig, Kazakh fine wool breed of a sheep as well as Kuibyshev meat and fur and other types.

**The scheme of reproductive crossbreeding**




**The industrial crossbreeding.** The nature of this method consists in the creation of high productive herds to apply the heterosis effect at the practice. Industrial crossbreeding can be both simple (with the use of two breeds) and difficult (with the use of three and more breeds).

Such type of crossbreeding is mostly widespread in animal husbandry. Hybrids of the first generation possess an increased speed of growth, good

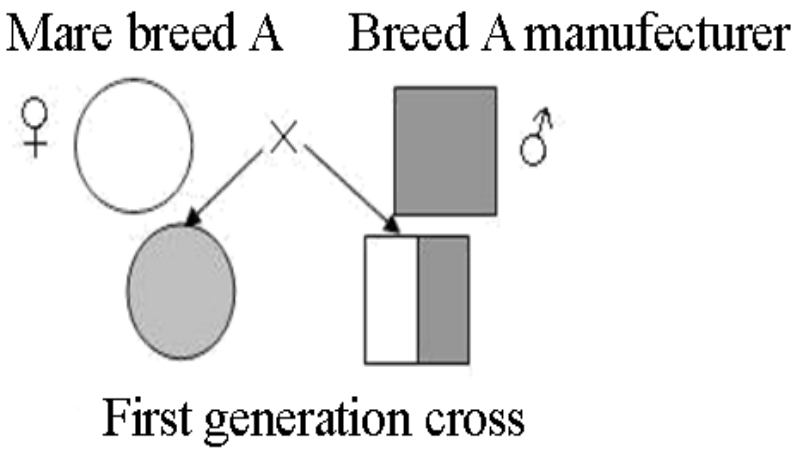
fattening qualities, which is especially valued in the animal husbandry, and good adaptive qualities.

Experience of crossbreeding of Kazakh and Kalmyk cattle with Hereford showed the effectiveness of this method in the meat cattle breeding. Hybrids of the first generation of Hereford – Kazakh breed at the age of one year they were 40 kg heavier than the Kazakh bulls and were only 16 kg inferior to Hereford. Hereford – Kalmyk hybrids exceeded Hereford by 19 kg and Kalmyk bulls by 27 kg.

To get animals with high milk fat content as well as high yielding, there is crossbreeding of animals of the Jersey breed with the representatives of abundant dairy breeds. In the USA for instance hybrid cows of the Red Danish and Jersey breeds crossed with the bulls of Holstein-Friesian breed and as a result the milkiness has risen to 6530 kg with the richness of 4,4% (or 287 kg of milk fat per year), which is much higher than the productivity of the original breed.

It is also recommended crossbreeding of dairy cows the bulls of the meat breeds. In this case, non-pedigree animals are chosen as young animals are mainly used for meat. The youth of the first generation after the fattening process is sent for the meat.

**The scheme of the industrial crossbreeding**

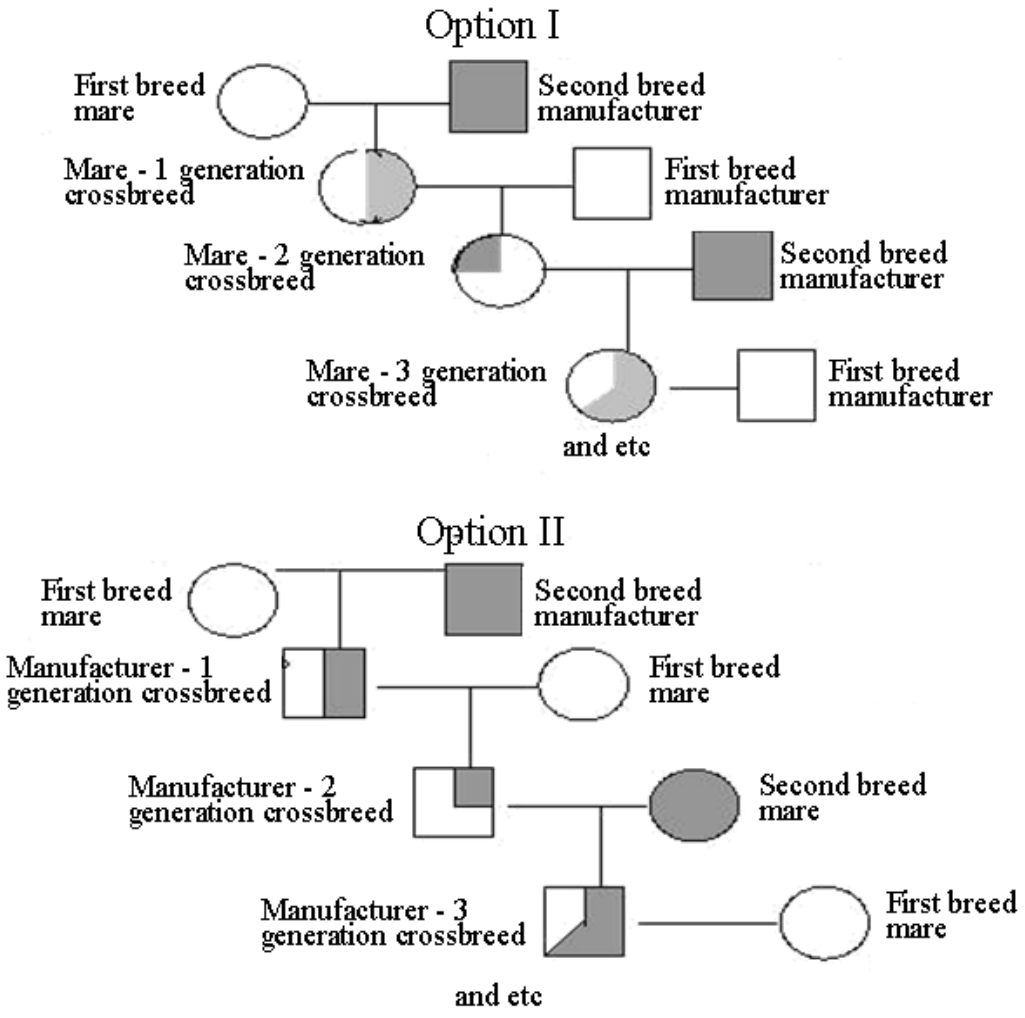



**Alternate crossbreeding.** This is a type of industrial crossbreeding (also known as a rotation). By the use of this method the dams of the first generation that are left in the herd are mated again with the stud-horse of one of the original improver breed or with the stud-horse of a new breed. Most of these hybrids are sent for meat and some of the dams cross with the stud-horse of the other breed. Thus, the breed of the stud-horses in

every generation changes and the received hybrids ½ of the thoroughbred in the latest breed of stud-horses possess of heterosis. Such type of industrial crossbreeding was named as **an alternate**.

Alternate crossbreeding can be of 2-, 3-, and 4- breed. Most often this type of crossbreeding is used in pig breeding, fine-wool sheep and poultry farming, i.e. in those branches of animal husbandry with a relatively quick change of generation.

**The scheme of alternate crossbreeding**




**Hybridization.** Hybridization is a crossbreeding of animals of different species. In nature, if animals of two closely related species live in the same area sometimes there are intermediate forms of them such as **hybrids.** For example, in the areas of widespread of grouses and wood grouse sometimes can be met so-called **boundary belts** the hybrid of a

grouse and wood grouse. Along Ural mountains, you can meet hybrids of marten and sable so-called Kidas. Hybridization in the animal husbandry is used both to receive animals of the industrial area and create new breeds. If wild species are crossed with the cultural species then in the genotypes of the hybrids of the first generation there are praised such features as immunity and resistance to various diseases, harsh living conditions, etc. Hybrids embody a reserve of combinational variability since their genotype combines a more diverse set of genes than in the genotype of individuals obtained by intraspecific crossing.

One of the major drawbacks for remote hybridization is species inconsistency which is based on the incompatibility of germ cells during fertilization that is caused by biochemical and physiological differences of species. Among the negative consequences of the hybridization, there is also complete or partial sterility of species.

Study in «Askania – Nova» of the causes of hybrid infertility (banteng x cattle; zebu x banteng, etc.) showed that distant hybrids have problems with the spermatogenesis. There is no spermatogenesis in hybrids of a horse and kulan at all (there are only rare examples of single spermatogonia). All fertile hybrids (cattle x zebu; mouflon x domestic sheep; one-humped and double-humped camels) showed usual spermatogenesis that is with the formation of active viable sperm. Academician Ivanov M.F., pairing the dams of the merino breed with the wild mutton mouflon, received fertile offspring, which were again crossed with merino sheep. Consequently, it was received a new breed of sheep with fine wool that does not inferior in quality to merinos but significantly superior them in adaptive qualities to mountainous terrain.

By the method of hybridization of wild mutton argali with the fine-wool fleeced sheep a new breed such as the Kazakh arharomerinos has been received. They produce thin wool as merino and the breed is well adapted to the mountainous areas.

To create a dairy breed of cattle for the regions of the Caucasus, where piroplasmosis is a disease of livestock, the breed of the red steppe cattle was crossed with zebu which is unaffected by this disease. It should be noticed that hybrids are fertile.

In the USA due to the hybridization of zebu breed Braman with the shorthorns, there are received such meat species as Santa – Gertrude, Brangus (Zebu x Aberdeen Angus), Bifmaster (Zebu x Hereford), Charbrey (Zebu x Charolais).

In the Altai Mountain fat dairy breed was created by the hybridization of cattle with yak. Often, males in the first generation are barren, and females are fertile, but in the second generation, males become fertile too.

**Test questions:**

1. What breeding methods are used in animal husbandry?
2. Tell about the role and importance of purebred breeding.
3. What are the peculiarities of breeding farm animals bylines?
4. What is heterosis?
5. What is the biological nature of crossing?
6. Why the life processes of offspring that are obtained from closely related parents decrease? What are the elimination ways of the harmful effects of close kinship breeding?
7. What animals belong to purebred, crossbred and improved?
8. What kind of crossbreeding is used for breeding new breeds of animals and what kind to correct certain deficiencies of old breeds?
9. What is the nature of industrial crossbreeding? In which branches of animal husbandry is it most often used?
10. How the increase of the strength of the constitution and productivity of interspecific hybrids can be explained?
11. List the animal breeds obtained as a result of hybridization.
12. What are the related breeds of cattle?
13. How "blood" share and breed (thoroughbred) of crossed animals can be established?
14. Draw schemes of various types of the crossing.
15. What offspring is called interbred and outbred?

## 8 State of livestock breeding in Kazakhstan

According to the Ministry of Agriculture of the Republic of Kazakhstan breeding network farms are represented by 379 economic entities. Out of the 355 grow and sell young breeders, 61 of which have the status of the breeding plant and 294 are in the status of the breeding farms. There are 24 subjects in the field of livestock breeding including 2 breeding farms and 22 distribution centers that produce and sell semen of farm animal stud-horses.

Over the last three years, the base of the republic's livestock breeding has been replenished with 146 farms. A significant part of the bred livestock farm was created due to the purchase by farmers of the breeding stock from farms of the breeding network of the republic and its expanded reproduction of the herd. From year to year, increasing amounts of financial support for economic entities in the field of livestock breeding have become a good incentive for the revival of breeding farms. It should be noticed that agricultural producers have become interested in livestock breeding, which allowed to restore some of the breeding farms that had previously lost this status. Expansion of the base of livestock breeding in such sectors as cattle breeding and sheep breeding is proceeding at an accelerated pace. The number of entities in the herd of dairy and meat cattle increased up to 66 farms and in the sheep farming at 44 farms.

Currently, there are 106 entities in the branch of the dairy cattle industry including 17 breeding plants and 89 breeding farms. Forty-six entities deal with the beef cattle that are presented by eleven breeding plants and thirty-five breeding farms. One hundred and thirteen entities are specialized at the growing of breeder sheep including twenty breeding plants and one hundred and thirteen breeding farms. Twenty-one subjects are involved in the pig breeding including two breeding plants and nineteen breeding farms. The horse breeding is represented by seventy-five subjects including eighteen stud farms and fifty-seven breeding farms. There are twenty-six breeding farms in the camel industry. Antler reindeer husbandry is presented by five breeding farms where four are specialized at the breeding of the red deer and one deals with the one-spotted deer. At last, there are thirteen breeding farms in the poultry.

Several legal and physical entities engaged in the cultivation and sale of breeding animals have at the same time the status of a breeding plant and a collective farm. So, LLP «Tokmansay» of Aktobe region is also a breeding plant for breeding Tsigay sheep, as well as a breeding farm for breeding cattle of Kazakh white-headed and horses of Mugalzhar breeds.

Some farms are both breeding plants and breeding farms as well as

there are bred at the same time two or three breeds of animals. For example, «Yunchi», Production cooperative of Zhambyl region, is a breeding plant for breeding cattle of Aulietin breed and a breeding farm for breeding sheep breeds of the South Kazakh merino.

As it was stated above some breeding plants and farms bred several species of animal breeds and in this regard, they have two or three status simultaneously. Thus, the common number of breeding plants and farms taking into account species and breeds of animals is equal to 425 (including 68 breeding plants and 357 breeding farms). 106 is engaged in a dairy cattle breeding, 46 is in a beef cattle breeding, 133 is in a sheep breeding, 21 is in a pig breeding, 75 is in a horse breeding, 26 is in a camel breeding, 13 is in a poultry farming and 5 is in an antler reindeer breeding.

In the industry of dairy cattle breeding, there are 106 individuals and legal entities are employed out of which 17 have the status of breeding plants and 89 breed farms. According to the recommendations connected with the zonal breeding of the cattle in the Republic, it is envisaged breeding of eight breeds of the dairy cattle among which there are black and motley, Alatau, Simmental, the red steppe, Aulietin, brown Latvian, Ayrshire and Holstein breeds.

There are forty-six individuals and legal entities in the beef cattle. Eleven has the status of the breeding plant and thirty-five are breeding farms. According to the recommendations connected with the zonal breeding of the cattle, it is envisaged breeding of six breeds of the beef cattle among which there are Kazakh white-headed, Auliekol, Hereford, Santa-Gertrude, Gullovean, and Kalmyk.

There are 133 individuals and legal entities in the area of sheep breeding where twenty possess of the status of the breeding plants and one hundred and thirteen are breeding farms.

The sheep breeding of the republic develops in five directions such as fine-wool, semi-fine-fur, semi-coarse, coarse and Karakul.

There are thirty-nine individuals and legal entities in the sheep breeding including six in the status of the breeding plants and thirty-three are breeding farms. They breed sheep of five breeds such as Kazakh fine-wool, South Kazakh Merino, North Kazakh Merino, Kazakh Arharomerinos and Australian merino.

There are eight individuals and legal entities in the fine-wool sheep breeding where one has the status of the breeding plant and seven are breeding farms. They breed such one as Tsigai, Kazakh meat-wool, Deger half-fine, Kazakh half-fine with crossbred wool, Akzhaik meat-wool with crossbred wool.

There are eight individuals and legal entities in the semi-coarse sheep

breeding where one has the status of the breeding plant and seven are breeding farms. They breed sheep of Kazakh fat-tailed and Degesi semi-coarse-haired wool breeds.

There are forty-one individual and legal entities engaged in coarse wool sheep breeding where five have the status of a breeding plant and thirty-six are breeding farms. They breed four sheep breeds such as Edilbai, Kazakh fat-tailed coarse-haired, Saryarka fat-tailed coarse-haired and Atyrau fat-rumped-ary.

There are thirty-seven individual and legal entities in the astrakhan sheep breeding where seven have the status of the breeding plant and thirty are breeding farms. They breed astrakhan sheep of four colors such as black, grey, sur and white.

There are twenty-one individual and legal entities in the pig breeding where two has the status of the breeding plant and nineteen are breeding farms. They breed three breeds of pigs such as large white, German noble and Duroc.

The horse breeding in the republic is presented by the following directions as riding, riding draft animal, trotting, weight-lifting and productive. There are seventy-five individual and legal entities in the horse breeding where eighteen has the status of stud farms and fifty-seven are breeding farms. They breed ten breeds and three species of the horse such as:

a) riding that is purebred riding, Arab and Akhaltekin;

b) riding draft animals that are Kostanai, Karabair, and Russian Don;

c) trotting that is the Russian trotting;

d) weight-lifting that is the Russian weight-lifting;

e) productive that are Kushum, Mugalzhar, Kazakh, Adai and Kazakh Zhabe horse as well as Kabinsk meat type of Kazakh horse breed.

There are twenty-six individual and legal entities in the camel breeding. Currently, there are no plants for camel breeding nevertheless there are twenty-six breeding farms that breed camels of Kazakh Bactrian and Dromedary Arvan breeds.

There are five individual and legal entities in the antler reindeer husbandry where four breed marals and one is specialized at the breeding of the spotted deers.

There are thirteen legal entities in poultry farming. There are practically no breeding plants in this area. Eight poultry farms raise egg production chickens, three are engaged in breeding of Medeo cross ducks, one farm breeds turkeys, and the other breeds black African ostriches.

## 9 The Breeding direction in the CIS and foreign countries

In the USSR during the ears of the Soviet Union, there were received eighty new breeds including thirteen of cattle, eleven of horses, twenty-eight of sheep and goat, sixteen of pigs and three of birds. In the majority, these are the breeds of the combined direction of productivity such as dairy-meat cattle, meat-greasy breeds of pigs and meat-fur breeds of sheep. There are few specialized breeds of beef cattle and bacon pigs. Therefore, the main direction in the formation of the breeds for the nearest years is the creation of highly productive specialized breeds that are adapted for industrial technology.

To accelerate the development of beef cattle, it is necessary to create new early ripening breeds of high intensive type. A big number of animal breeders work in this area at the present moment. In the area of pig breeding, there is a tendency in the direction of receiving meat and bacon pigs as the demand for bacon-type pork has increased dramatically. In the sheep breeding, along with the breeding of new specialized fine-wool breeds, they create semi-fine-grain breeds for breeding in different zones of the country. In the horse breeding, they are mainly engaged in the improvement of existing and the creation of new breeds of sports type. In the poultry, there is an intensive work connected with the receiving of highly productive lines of both egg and meat poultry. So, the creation of breed will continue. For this purpose, it is planned to use the rich gene pool of the breeds that exist in our country and the countries of near and far abroad.

In connection with the intensification of animal husbandry, an important event is the breed test, which gives objective data on the breeding and productive capabilities of each breed. On this basis, the breed zoning of the country should be reviewed. The breed test method was developed by Soviet scientists A.I. Ovsyannikov, G.R. Litovchenko, I. O. Chinarev and T. G. Dzhaparidze.

At present, there are more than one thousand breeds of cattle where 37 % belongs to dairy, 9 % is meat and 20 % are of combined productivity. The rest share the direction of meat and dairy work. In the western European countries, the share for the dairy and dairy-meat breeds is 80 % of the cattle.

In the former USSR there were formed seven new breeds such as the Belarusian black-and-white, Semirechensk pig breeds, North Caucasian merino, Volgograd fine-fleeced meat-wool, Kemerovo, Degers meat and wool breed, Kushum horse breed, Moscow breed of chicken, Kuban breed of geese and a large number of new breed types of beef cattle, pigs, sheep,

fur animals and about a hundred highly productive animal lines.

In the countries of Europe, the creation of new breeds of agricultural animals in recent years is significantly reduced.

In the USA the number of dairy breeds of cattle is decreased up to five among which there are Holstein Frisian, Ayrshire, Schwyz, Hornsey, Jersey, meat is decreased up to ten, the number of pig breeds is decreased up to nine, fine-fleeced sheep is decreased up to three, long-haired sheep is decreased up to nine, fine-fleeced sheep is decreased up to three, long-haired sheep is decreased up to four and meat are decreased up to eight.

New breeds are received in the majority of cases for the regions with the severe climatic conditions. The work of breeders on the creation of new breeds of fish, minks and fur animals continues. An increase in the number of meat breeds is one of the main features of breeding abroad. When breeding meat breeds for harsh extreme conditions (areas with hot climates), zebu-like cattle are widely used. In the USA on the basis of zebu-like cattle there created highly productive meat breeds such as Santa Gertrude, Beefmeister, Brocfjord and Brangus, that are well adapted to the conditions of hot climate, in Brazil there is Sao-Paule, in the Philippines there are cherbey-filomen, in Australia there are Murian grey and in Canada there is converter.

At the modern stage of breed formation of all countries, there is one common feature such as a large distribution of breeds with a wide genetic potential (like black-and-white and Simmental). It should be noted that a big number of breeds in our country are received from one genetic root. For example, at the base of the brown cattle, there were created such breeds as Kostroma, Lebedin, Alatau, brown Carpathian and Caucasian brown. Simmental breed birth such breed as Sychev and others. A group of scientists suggests uniting small breeds of the same genetic root. The union of small breeds of the same origin will form favorable conditions for the use of outstanding animals and increase the pool of the combinational variation.

## 10 Breed testing and horse pedigree zoning

There are more than three hundred and twelve (four hundred) breeds and breed groups of horses in the world including sixty in the CIS and thirteen in Kazakhstan. The breeds are distinguished by the origin, purpose, performance, biological features and use, as well as on the exterior and live weight.

Thus, all the horse breeds are divided into several groups:

**1**. **Plant (specialized) breeds** that include such breeds as riding, trotting and weight-lifting direction of productivity. **The riding breed** is presented by such as purebred riding, Arab purebred and Akhaltekin and is used in the equestrian sport mainly in smooth and barrier jumps on race tracks as well as in the breeding work as improvers of the riding qualities in a so called “semiblood” horse breeding (like Trakenen, Russian riding, Hanover, Budenov and Kustanai). **Trotting breeds** of horses are used in the running sport at the hippodromes and as the improvers of the work and sled animals they include Orlov, Russian trotting and American standard bred breeds. Nowadays, the Russian trotting is absorbed by the American and loses its independence. **Weight-lifting** breeds are used mainly as the improvers of the work horses as well as horses of the productive direction in the brunch. These breeds are presented by such one as Russian, Soviet, Vladimir weight-lifting and horses of Persheron breed. All horses of specialized breeds are bred and raised in stable and grazing conditions.

**2. Transitional breeds.** These are universal breeds that are suitable for work under a saddle and in a harness (Latvian, Tori, Belarusian coach horse, Zhemaychu). In addition, this group includes horses of partially sporting use such as Don, Kabardian and Karachai breeds.

**3. Aboriginal (or local) horse breeds.** These horses are close in type to the wild ancestors of modern animals. By the area of habitat they are subdivided into forest steppe and mountain breeds. The forest breeds include Yakutian, Vyatka, Tavdin and Mezen horses. The steppe breeds have such as Kazakh, Bashkir and Transbaical. The mountain breed is presented by Altai breed. Horses of these breeds are used for various purposes in general as stud-horses. They are bred and cultivated in the conditions of winter-grazing and cultural-heritage.

**The plan of horse pedigree zoning** is a significant state event aimed at the development of the horse brunch as well as improvement of quality and more effective use of horses. The plan is drawn up taking into account the natural history of the region, biological characteristics of the breed and feasibility of its breeding in a particular area.

The plan of pedigree zoning is worked by the Ministry of Agriculture of the republic. In Kazakhstan the main planned breeds are Kazakh (types of Zhabe and Adaev), Kushum, Mugalzhar, Kustanai and Russian Don breeds.

In traditional area of the herd horse breeding the local horse breeds is bred. In order to increase meat and dairy productivity they are mated with different breeds of weight-lifting such as the Russian, Soviet and Lithuanian, and also with the new Altai, which gives encouraging results in increasing meat and milk productivity of local Kazakh horses.

**Kazakh breed of horses.** This breed was created at the territory of Kazakhstan not immediately but for many centuries under the influence of natural and climatic conditions as well as pasture-forage conditions. They are successfully adapted to the local climate, suitable for the universal use (like working, meat and dairy), differ in seasonality of fat deposition (for the spring and autumn seasons), intermittent growth and development (intensive in the period of the spring and slow in winter), late ripeness, strong constitution, unpretentiousness to the conditions of feeding and housing, seasonality of mating and foaling.

Among their physic characteristics there are such as medium height, wide body, long body length, relative short leg and small live weight. Kazakh horse serves as the prototype for breeding of new horse breeds and they are accepted as the base for the development of dairy and meat horse. The best part of the Kazakh horses are improved by way of breeding “in themselves” where selection process is directed both for the productivity increase and development of adaptive qualities.

There are distinguished two horse types as Zhabe (toad) and Aday.

Horses of Zhabe (toad) type were forms in the Southern regions of Aktyubinsk. The head of this horse is coarse; the neck is fleshy, the body is wide and deep, the back is wide too, croup is muscular, the limbs are bony, the skin is thick and dense, the mane and tail are long and thick. The horse have such colours as chestnut, red, light-brown, mouse colored, grey and raven. The measurement is the following 142–150–179–18,5 cm. The live mass is in the range of 430 and 480 kg. It is distributed in Kazakhstan across-the-board.

Horses of Aday type are bred on the South-West of Kazakhstan and are characterized by the characteristics of riding direction, have a thin constitution, a lighter head and more obvious wither there is also narrow chest, insufficiently muscled croup and skeleton. It can be of such colours as grey, chestnut, red and light-brown. The measurement is the following 141–144–172–17,6 cm. The live mass is in the range of 320 and 380 kg. It is bred in the Southern – Western parts of Kazakhstan.

In addition, Kazakh horse breed depending on the region of breed as well as climate and pasture and forage conditions is divided into several offsprings. According to Yu.N. Barmintsev (1958) there were distinguished seven offsprings of Kazakh horses like West – Kazakh, Aday, Aulietin, Central–Kazakh, Semirechensk, Naiman and South-Altai. In 1995 by the order of the Ministry of Agriculture of the Republic there was approved a new type of the Kazakh horse breed like Kan. Genetic potential of live weight of stallions is 650 kg and 530 kg of mares with the slaughter yield of 54–57 % and with the fertility of 85–90 %. This type is received due to the crossbreeding of Kazakh mares with the stallions of the Soviet weight-lifting breed. The distribution area is East Kazakhstan. Every of these offspring has a common origin, identical conditions of keeping and nature of economic use.

So, the West Kazakhstan offspring is distinguished by the largest horses. The Naiman spawn is represented by the smallest horse.

**Kushum horse breed.** It is received on the basis of Kazakh horse breed in the Western Kazakhstan and Aktyubinsk region. This is the first horse breed in the world of meat and dairy productivity received by a way of complex reproductive mating. In the formation of the breed were involved such breeds like the Kazakh, the trotter, the thoroughbred horse and Russian Don. In 1963 Commission of the USSR Ministry of Agriculture husbandry tested the Kushum breed and 1976 was approved as an individual one.

**There are three types of horses in the breed:** the main one is presented by horses of the saddler type; the massive ones are horses of higher live mass with the stretched and stubby torso that are differ in high growth. The saddler type is presented by the horses of the saddler direction of productivity that have high growth, shortened torso, bulk breasts and strong limbs. The tendons are outlined in relief, the knucklebones are of the average magnitude of a normal inclination and with small fetlocks.

The fertility of mares is high up to eighty or eighty-five foals for one hundred of breeding queen. The average measurements and live weight of stallions are the following 162–164–188–21cm, 610 kg; whereas mares have the following 158–160–190–20 cm, 550 kg. The authors of the breed are Yu. N. Barmintsev, M. N. Borissov, S. S. Rzabayev, B. Gubashev, M. Nurgaliyev and other.

**The Mugalzhar breed.** The breed was approved in 1998 by order of the Ministry of Agriculture of the Republic of Kazakhstan from December 30, 1998 number 156. The breed is created by way of the purebred breeding on the basis of the Kazakh breed type Zhabe.

There are four types in this breed such as Emben and Kulandin intrabreed types, Kaindin and Saryarka factory types.

The average live weight of stallions is 530 kg and mares are 470 kg (580; 540 kg). The slaughter exit is up to 60 %, the fertility is of 85–90 % and the milkiness is up to 1700 liters per lactation.

**The Kustanai breed.** The breed was received by Kustanai and Maikul stud farm of Kostanay region as well as in the Troitsk stud farm of the Chelyabinsk region. It is approved in the 1951. The one was received by a way of crossbreeding of the Kazakh mare with the stallions of purebred riding, Russian Don, Kalmyk, Streletsk and Orlov-Rostopchin breeds. There are distinguished three intrabreed types in the Kustanai breed such as the main, riding and steppe. The main type has more significant forms of the riding horse. Horses of the steppe type are distinguished by a rougher constitution, massiveness, unpretentiousness to the conditions of feeding and keeping.

**Russian Don horse breed.** It was formed as the breed in the XV–XVI centuries in the lower reaches of the river Don. The base if this breed is performed by local Nogay mares and stallions of the Eastern breeds such as Turkish, Karabakh and Turkmen. For a long time horses of this breed were viewed as the best improvers of the local horse breeds including such one as the Kazakh.

The average measurements of mares are the following 161–165–190–20 cm. The breed is presented by the four types such as characteristic, oriental, massive and riding. Russian Don horse breed shows good characteristics of tittup and distance with the daily mileage of Kagal stallion of 264km.

## 11 Breed testing and zoning of breeds in the cattle breeding

Cattle belong to the division of vertebrates, to the class of mammals, detachment of artiodactyls, the family of bovid, the subfamily of oxen, the genus of bulls. The bull subfamily is divided into three geniuses such as first of all the Asian water buffalo, second the African buffalo and third is the bull itself. The Buffalo clan does not interbreed with representatives of the bull itself.

Bulls are subdivided into the following sub-breeds like cattle, zebu, yaks, aurochs and bison, banteng, gaur and gayal. The crossbreeding of these sub-breeds gives offspring of different fertility. Hybrid breeding queens at the crossbreeding with the males of one of these sub-breeds are always fertile whereas hybrid males are not capable to give a proper sperm. It points at the difference in the biological features of different sub-breeds.

The cattle are one of the oldest groups of animals. According to most scientists both domestic and foreign modern cattle are derived from the wild European and Asian aurochs. The wild aurochs was a very large animal with a height of withers over 180 cm and with a narrow, long skull with large horns. The color is brown up to the black.

With the transition to a sedentary lifestyle, a man in all corners of the earth began to tame more animals, which he used to get meat, milk, and skins.

Under the influence of climatic and fodder conditions as well as under the influence of man the cattle changed, new qualitative signs appeared that it is different from its wild relatives.

Many factors have a significant influence on the evolution of cattle such as climate, soil, temperature, feeding, etc., whereas the most important of these is the feeding factor. For example, the wild ancestor of cattle, which fed mainly on the vegetable feed, had a longer length of the intestine over the length of the body at twenty-eight times, while cultural breeds had an indicator of twelve times.

If the cattle, for some years, are on a poor diet, it has poorly developed bones and muscle tissue, which affects the exterior, constitution, and productivity of animals. Therefore, proper breeding of livestock is directly related to its feeding, care, and maintenance.

Cattle breeding, depending on the economic and natural conditions of individual zones, have a different direction.

**The nearest relatives of cattle and their use.** Zeba, yaks, buffaloes, banteng, gaur, and gayal are the closest animals in origin to cattle. The economic significance and application of which in the national economy are different.

**The Zebu**. It takes a special place among its congeners. In the area of the withers Zebu has strongly developed rhomboid and trapezius muscles that form the hump. The hump of Zebu is a fat-forming apparatus. The bulls have more developed hump than the cows. Zebu is bred in such countries as India, Afghanistan, Turkey, Iran, China, Korea, Africa, South America, and other places. In the countries of the CIS, it is bred in Azerbaijan, whereas there is no such one in Kazakhstan. There are some varieties of Zebu. Talyshen zebu (Azerbaijan) is presented by a small type with the average weight of cows 250 kg and 450 kg of bulls respectively. The milkiness is of 600 kg per lactation with the fatness of 5,2–5,8 %. When under good conditions the yield rises to 2000–2500 kg with the fat of 5,5 %. Zebu can give high gains with satisfactory meat quality. The slaughter out is 44–46 %. The skin serves as a good plantar material. In the process of crossbreeding cultivated breeds with the cattle, it is received fat dairy hybrids that are resistant to piroplasmosis diseases. In the USA there was received a new breed like Santa-Gertrude based on zebu.

**Yaks.** In the countries of the CIS domestic yaks are bred in the regions of Altai, Pamir, and Transbaical as well as in Mongolia, China, India, and Afghanistan. The wild yaks are met in the mountains of Tibet with the live weight 700–750 kg. Domestic yaks are smaller, the bulls are 450 kg and cows are 300 kg. Yak has a huge fringe in particular from the sides, belly, and tail. Yak is well adapted to the mountain regions that are of 1500–4000 meters under the sea level. Low places and foothills with a warm climate stands badly. The productivity of milk is 650–700 kg (with 180–220 days of lactation) and the richness is 6–8,5 %. By the end of the lactation period, the richness increases up to 12–15 %. Yak’s milk is reacher in protein, sugar and very high in calories. Yak meat is coarse-fiber, satisfactory in taste, mainly used for the production of canned and sausage products. The slaughter out is 45 %. The skin is used at the production of footage and for the technical needs.

Cattle and yaks in the process of crossbreeding give fertile offsprings. Hybrids of stallions of the first generation are sterile while the mares are fertile. The quality of the meat of hybrids is very high, the slaughter yield is 62 % and milkiness is 3000–3500 kg. Due to the experimental work of professor Ivanov V.V. and other at the crossbreeding of yaks with the Swedish and Simmental breeds in the fourth generation (1/8 and 1/16 yaks blood) gave fertile hybrid bulls.

**Banteng, gaur, and gayal.** These breeds belong to the sub-species of South Asian fore-bull bulls. These animals are characterized by a forked basement, elevation in front of the spine and white coloring of the lower legs.

**Banteng** lives both in Indochina and on the islands of Malay Archipelago as wild as domestic ones. They are used mainly as meat and working animals. Banteng is successfully crossbred with the domestic European cattle.

**Gaur** is widespread in the jungles. In the wild form is found in the mountainous regions of India and Burma. These are large animals with a height of 150–160 cm in withers and that do not possess great economic value.

**Gayal** lives in the mountainous regions of Burma. They are used as a meat and working animals. Milk of Gayal reacher with fat. Gayal is easily crossbred with the domestic European cattle.

**Buffalos**. Two species of buffalos such as a European is known as aurochs and American that is buffalo. By its origin, they are close to each other and give fertile offsprings at the crossbreeding.

Aurochs are mighty, large animals with the height of wither 180 cm that live in the mountainous and forest regions. They are found in Belovezhskaya Pushcha, Poland and in the Caucasus. They are used as meat animals.

**Buffalos.** By its biological characteristics buffalo is a transitional form between antelopes and cattle groups, and is subdivided into two groups such as first one African (Africa, Kongo, Nigeria, and Morocco) and the second is Asian (India, China, Bulgaria, Romania, countries of the CIS like Azerbaijan, Transcaucasia and the Black Sea coast of the Caucasus. Buffalos are used as working and milk animals. The average mass is 450–500 kg. The meat of old buffalo is tough with weak taste features, while the meat of the young stock does not give up to quality beef. The slaughter out is 42–49 %. The yield of milk is from 1000 to 2000 kg and with the richness of 6,5 up to 12,5 %. They are resistant to piroplasmosis and tuberculosis. Pregnancy lasts from 11 to 12 months and they can multiply up to 16–20 years.

**The direction of animal husbandry and the principles of breed zoning.** A cattle breeding, depending on the economic and natural conditions of individual zones, has a different direction of productivity. Where the provision of milk and dairy products is of paramount importance, dairy and combined cattle breeding develop. Animals of these zones are distinguished by increased milk productivity from the realization of which, as a rule, they receive the main cash income.

Dairy farming is carried out more intensively than beef as it is better provided with feed, better care and maintenance and a higher level of mechanization on farms. The proportion of cows here is high and exceeds more than 30 %.

The regions that are rich in natural pastures and watering-places aim at the development of beef cattle breeding. The major and sometimes the only product of these regions is a beef. In herds of beef cattle breeding the proportion of cows does not exceed in most cases 30%. The Cattle breeding develops herein through the use of natural forage and field crop waste.

Beef cattle's breeding is particularly developed in the southern and central regions of the Republic. Moreover, in some places with the developed cattle breeding, it is recommended to use stud bulls of industrial crossbreeding with underproductive dairy cows to increase the production of the beef.

It is dealt with the pedigree zoning of cattle of the Republic based on the natural-historical, economic and zoo-technical prerequisites. Symbolically we can define the three main areas of animal husbandry. The zone of the dairy cattle breeding includes the northern and central parts of the Republic. Areas of the steppes and semi-deserts are consigned for the breeding of livestock of meat productivity. In all other regions of the republic, there is prevails whether dairy-meat or meat and dairy cattle breeding depending on the natural and economic conditions.

Natural historical conditions play a less important value in the pedigree zoning. Livestock of high productive breeds, received with the active participation of the man, under the creation of favorable conditions is well-bred at any place. Therefore, natural and climatic factors do not play a decisive role in the distribution of certain breeds. However, sometimes natural and historical factors play an important role in the process of choice of the planned breed. This is, for instance, some regions of the Republic with high temperature, with not favorable piroplasmosis diseases and prolonged low air temperatures. Not every animal breed can tolerate such extreme climatic changes and can acclimatize.

From the zoo-technical prerequisites, it is considered the correspondence of the regional breed to the tasks of improving local cattle or other breeds bred in the region. It is efficient to take the certain breed as the planned one and especially in those regions where purebred livestock breeding was used. It is certainly necessary to consider the suitability of the breed for the local economic conditions.

Of less importance in terms of zootechny is the number of cattle on the breeding area of one or another breed of cattle. Prevalence in the number of cattle of the planned breed makes the process of improvement of the local cattle faster and better. If in the zone of the breeding of any breed there are areas of animals of another breed with better productive qualities, it is not advisable to use it as a planned improving breed because of its small number. In the selection of the breed for breeding, farms should

consider specific conditions and recommendations of specialists. Along with the main planned breeds of livestock, it is permissible in some areas to breed livestock of other breeds as well.

Nevertheless, the pedigree zoning defined as the main one for the breeding and improvement of livestock is not an established dogma. It can be changed with the better organization of the feed base and feeding of livestock, with the introduction of the new technology of maintenance and care, breeding of new livestock and some other reasons.

**Breeds of cattle zoned in Kazakhstan. The black and mottled breed** was approved in 1959. The breed was received at the base of the Holland breed and some other breeds derived from it. The color is black and mottled. The body constitution is strong and occasionally rough.

The milk productivity depends on the area of the breeding and varies from 2800 till 3 500 kg, in the best farms the index varies from 5000 till 6 400 kg, with the records of 10 000 and 12 000kg and with the richness of 3,2–3,9 %.

The average live weight of cows varies in the range of 470–550 kg and respectfully bulls with the weight of 800-900 kg. The slaughter exit of cows makes 50 % and bulls 52–53 %.

The breed is well adapted to different climatic conditions. The work of stock breeding is aimed at the standardization of the breed as well as the elimination of differences by the basic useful and productive qualities, an increase of richness and protein in the milk and finally, the rise of milk yields.

**The red steppe breed.** It was received at the end of the XVIII century in a big Taurian province, in the area of the river Molochnaya by the way of crossbreeding the gray Ukrainian cattle with the imported bulls from Western Europe. Thus, as a result in the second half of the XIX century, there was created a significant breed mass. The color is homogeneous red also they can be with the white marks on the head, the lower part of the belly, udder, and legs. Milk productivity is in the range of 4000-5500 kg. The best species can give from 8900 till 12420 kg with the richness of 3,3–4,1 %. The live weight of cows varies at the range of 500–650 kg and for bulls, the index is 850–1280 kg. The slaughter exit of cows is 53 % and 18–24 for the monthly calves is 54 %. It possesses good adaptive qualities. Breeding work is carried out to improve milkiness, live weight, and milk richness.

**The simmental breed.** It was received in Switzerland by the way of systematic selection and choice of the best animals among the best. The color varies from straw-colored and pale-yellow mottled to the red and motley. The productivity in the breeding farms is of 3500–4500 kg and

with the richness of 3,7–3,8 %. The record belongs to the cow «Dama» (Hungary) that for the period of 358 days gave 19664 kg of milk with the highest daily milk yield of 70,1 kg.

The live weight of cows is 600-650 kg (700–900 kg) and bulls are 900–1000 kg (1300). The slaughter exit of cows is 56 % and for the fattened oxen it is 65 %. The breed work is carried out to improve the milkiness by the way of purebred breeding through the targeted selection and choice.

By prevalence, the breed is ranked as the first one in the CIS among other breeds. The distribution of Simmental cattle imported from the European countries began in the second half of the XIX century and was until the beginning of the XX century, which led to intensive use to improve local livestock of different breeds. A result is a large number of hybrid animals that were united into one big group such as the pale-yellow mottled cattle. At present, there are five zonal species of Simmental cattle in the CIS that is characterized by its peculiarities.

Based on Simmental cattle in Russia (1951) **the Sychev breed** of combined productivity was bred. While at the territory of Ukraine there were bred **Ukrainian pale-yellow mottled cattle**.

In the steppe area of Russia such as Kursk, Orlov and Tambov were received the **third group of the pale-yellow mottled cattle**.

**The fourth group of the pale-yellow mottled cattle** is spread in Kuibyshev, Saratov, Volgograd and Orenburg regions. This group was formed as the result of the crossbreeding of Kalmyk, Kazakh and local Central Russian cattle of the Volga region with the Simmentals.

**The fifth group of the pale-yellow mottled cattle** was formed in the eastern regions of Kazakhstan, Altai and Krasnoyarsk regions, Buryatia and some regions of Eastern Siberia and the Far East. The group is the result of the crossbreeding of Kazakh, Kalmyk and mainly Siberian cattle with the Simmentals.

In the Pavlodar region, the best herds are concentrated in the farms of Peschansk, named after Kirov and Telman.

The breed is of the combined direction of productivity.

**The hereford breed.** It was received in England, county of Hereford, Shropshire, Oxford, at the beginning of the XIX century by purebred breeding of the local cattle. The live weight of cows is 550–600 kg (on the area of the native land it is of 600–700 kg) and the bulls are of 800–850 kg (on the area of the native land it is of 800–1500 kg). The breed is fast-growing. The meat of this breed is «marble» and high-calorific.

The breed is improved by purebred breeding and the selection is done due to such criteria as meat and fast-growing. In Kazakhstan, the breed is used as the improver of meat qualities of local cattle.

**The kazakh white-large breed.** It was approved in 1951. The work was carried out with the use of the absorbing crossbreeding of the local Kazakh and Kalmyk cattle with the stud-bulls of the Hereford breed. Hybrids of the first and second generations were bred «in themselves».

There are defined two species of the breed (offspring). The main species is of meat direction and the second one is of the milk and meat directions. During the formation of the meat type, a long-term keeping of animals on the steppe pastures was applied; the calves were raised by the use of the suckling method. The selection process was done due to the meat criteria. While as for the milk and meat species the selection process was done due to the meat, milk and richness criteria. Calves were grown with manual feeding.

The weight of cows is 500–550 kg and as for the bulls, it is 850 kg. The daily growth is 750–850 grams. The slaughter exit is 53–63 % (74,3 %).

The breed is improved by purebred breeding and backcrossing with the Herefords. It is bred all over Kazakhstan.

**The shvid breed.** It is formed in Switzerland at the end of the XIX century. The breed is of the milk and meat direction of productivity. The productivity is 3470–4290kg with the average richness of 3.77 %. There is a record that belongs to the cow «Lvitsa» MSH–499–10214 kg. The live weight of the cow is 465–530 kg and for the bulls it is 850–1110 kg. The slaughter exit is 50–65 %.

**The alatau breed**. It was formed at the base of the breeding farms of Kazakhstan and Kyrgyzstan by way of crossbreeding local Kazakh and Kyrgyz cattle with Schvid, Lebedin and Kostroma breeds. It is approved in 1950. The productivity of breeding farms due to the milk criteria is 2000–5100 kg with the richness of 3.78–3.91 %. There is a record that belongs to the cow «Vokha» – 10200 kg with the richness of 3.8 % and high daily milk yield of 52.5 kg.

The live weight of the cow is in the range of 500–540 kg and for the bulls it is 850–1000 kg. The slaughter exit of cows is 54 % and the bulls' index is 61.8 %.

It is bred in Kazakhstan only in a limited (south) region.

**The breeding work in the cattle breeding.** The breeding work in the cattle breeding is accepted as a targeted improvement of productivity and other hereditary qualities of animals. It includes some zootechnical and organizational activities. First of all, it is the creation of a stable feed base

with the uninterrupted and abundant feeding as well as providing good conditions. Moreover, it is the use of the advanced methods of cattle breeding and rearing of excellent stock for the improvement of the herd. Finally, it is a proper selection and choice of animals for the mating as well as the organization of pedigree accounting and reports, etc.

The number of animals in the herd is also of an important criterion for the maintenance of the cattle breeding. In majority, among the herds of dam groups, it is rare to meet animals with the desirable characters in a sufficient number, which makes the selection process more difficult and, therefore, animals with high rates of productivity must prevail in the herd. The greater number of productive animals in the herd leads to faster and more efficient results of the selection. This applies to both the dam's material and the stud manufacturers.

Breeding work with the cattle of milk and combined breeds must be aimed at the increase of milk productivity of cows, the content of richness and protein in milk as well as an increase in body weight of animals. While for the beef cattle it must be aimed at an increase in the speed of growth, live weight, meat qualities and payment of fodder by-products.

The direction of breeding work in the tribal as well as non-tribal farms is not the same and defines different tasks. The main task for the tribal farms is in the improvement of the herd and productive qualities of animals of bred breeds. It is also the creation of new lines and families and interbreeds species, growth of youth and form of subsidiary farms as well as sales of young breeding stock to merchants. Also, individual breeding farms can be engaged in the creation of new breeds for this breeding zone.

The selection work at the non-tribal farms is aimed at the accumulation of highly productive animals and thus an increase in the overall productivity of the herd under stable conditions of feeding and maintenance.

In tribal farms, it is mainly used purebred breeding and absorption crossbreeding. There must be formed both nuclear stocks and selected herds.

In non-tribal farms, it is used purebred and interbreeding crossings.

During a performance of the selection work, it is widely used a study of heredity and variation of a living organism which let make a systematic selection and choice of the best animals of the desired qualities, perform crossbreeding of animals of different breeds and use influence on the body of various environmental factors. Also, at the process of improvement of the cattle, it is important to consider such features as the quality of offspring that is the stability of transmission of desirable traits to offsprings.

**The selection and matching in the cattle breeding.** Charles Darwin is a person who established the doctrine about the selection and matching in the cattle breeding as one of the factors of evolution in nature. He considered that artificial selection and matching of animals is a special factor of the breed forming. Among the followers of this doctrine was P. N. Kuleshov, Ye. A. Pridorogin, Ye. F. Liskun and others. The selection forms the abilities of systematic selection from one generation to another generation and keeps animals that match desirable features of the breeder.

The selection involves pairing based on the principle of “the best one with the best”. The proper selection provides the birth of a new animal generation with better hereditary inclinations. As a result, the herd is improved in a certain direction.

**The organization of animal selection.** In the cattle breeding the selection is carried out according to the periods of animal development: at birth, at six, twelve, eighteen, twenty-four months and older. Stallions are selected due to such criteria as origin, breed typicalness, exterior and constitution, live weight, productivity, quality of offspring, payment for feed by the goods and longevity. To improve animals during, the selection process, there are left young species of good origin, typical due to the breed, good exterior, and strong constitution.

**The assessment and selection of stud-bulls.** A proper choice of good stallion let improve animal productivity in a short period.

The stallions are assessed due to the origin, individual characteristics and offspring quality. From each bull hundreds and thousands of sprawls can be received per year at the condition of proper artificial insemination.

Bulls are chosen due to the **pedigree**-based on the productivity of its female predecessors no less than in two or three generations (mothers, grandmothers, and great-grandmothers) as well as tribal qualities of male ancestors. The stallion should come from the breeding queen with high milk productivity, fatness and a high quantity of protein in the milk for the whole period of lactation. It is wrong to assess the milk productivity of cows only due to such criteria as high lactation as in this case the assessment is going to be doubtful.

Preference during the selection process due to the pedigree must be given to the stallions whose male ancestors received a positive assessment due to the offspring quality and recommended themselves as the herd improvers. In this regard, it is significant to assess bulls due to the productivity characteristics of both sisters and half-sisters on the father's side.

It is necessary to take into consideration belonging to bull’s pedigree to a certain line at the performance of the analyses. It is preferable to have

bulls related to outstanding lines and families. In this case, it is considered that the stallion transfers its positive qualities to offspring more consistently. It is more expedient to choose stallions received as the result of a moderate kinship mating based on outstanding ancestors due to the productivity.

The breed of the bull is also shown in the pedigree. It is established that if in three generations of the pedigree, from the paternal and maternal sides, there are only purebred animals then the inheritance of the breed will be consistently transmitted to the offspring. Therefore, the purebred bulls are always preferable to crossbred bulls.

Based on data, on the origin of the bull, it is possible to carry out a preliminary selection, which makes it possible to judge its tribal qualities.

The bull is selected for its **individual qualities,** which are the exterior and constitution, sexual activity, sperm quality, typicalness, and some other signs.

A bull must have a pronounced male type. Bulls in all areas of productivity and breeds must have well-developed muscles, strong bones, and a proper constitution. It depends on the hereditary background and feeding conditions as well as maintenance and care.

After weaning of young bulls of meat breeds from their mothers at the age of nine-fifteen months they are checked for growth intensity and their quality is judged on the average daily gain obtained.

Nevertheless, it is impossible to judge the hereditary qualities of stallions by the origin and individual qualities only. **The quality testing of offspring** is a fundamental and the final point in the assessing of tribal virtues of bulls.

Dairy and combined breed bulls are assessed for daughters' productivity such as milkiness, fatness, protein, udder forms, milk yield characteristics, live weight, and exterior as well as payment for feed products. Bulls of meat breeds are estimated by precocity, weight gain, etc.

The breed farms and plants assess the bulls due to the quality of offspring. Usually, the bulls are checked at the age of fifteen-eighteen months by the posterity.

The dairy and combined breed bulls are assessed at the age of 4,5–6 years upon completion of the first lactation of their daughters.

The assessment of bulls of meat types due to the quality of offsprings is done at the age of 3 or 4 years, as offsprings received from those, at the age of 12 and till 18 months are given for the fattening and slaughtering.

There is a preliminary assessment of the bulls due to such criteria as growth and development of offsprings at the ages of six, twelve and

eighteen months when they reach 70–75 % of the weight of an adult animal.

To receive a reliable assessment of the bulls due to the quality of offspring there should be checked 15–20–25 dairy daughters received from each bull.

In the cattle breeding the following methods are used to assess bulls by the quality of offspring:

1) comparing daughters of two or several bulls against each other due to such criterion as productivity;

2) comparing the productivity of daughters of one bull with the productivity of their herd mates;

3) comparing the productivity of daughters with the breed standards (requirements for the cows of the first class);

4) comparing the productivity of daughters with the productivity of their mothers.

It is recommended to use several methods at the assessment of the bulls.

**The assessment and choice of cows.** During the working process of the breeding work, the selection is performed not only due to the stallions but to the breeding queens too. The selection of cows consists of the establishment of their pedigree, evaluation of the exterior and constitution, productivity, product quality, reproductive abilities, and health. It should also be taken into account such criterion as belonging of cows to purebreds or hybrids. The second criterion at the assessment of the breeding queens in their constitution. The animal must have good health, a good constitution, and an exterior. A great significance is given to the forms of udder good milk yield during the milking as inherited ones. The cows are assessed for the breeding goal after the third lactation. The lactation of cows over some years (the lactation curve) should be balanced. For every 100 kg of live weight of cows in the period of lactation, the milk should be produced at the measure of 800–1000 kg and even more.

The culling of cows depends on the average milk production of the herd. If on farms the average milk production is 5,000–6,000 kg, then cows with a yield of less than 2500 kg of milk are removed from the herd. If the average milk yield is 3000–4000 kg, then cows with a milk yield of 1500–2000 kg are culled. The less unproductive animals are culled, the slower the herd improves.

**The matching process in cattle breeding.** The matching is the choice of the best animals (both the breeding queen and the stallion) for further crossbreeding between themselves.

Under this, the homogeneous and heterogeneous selection is distinguished. The best results in the improvement of the breeding give homogeneous selection. Its essence is in the mating of animals of the same body type, productivity, similar in origin, and with the outstanding qualities for which goal the selection is conducted.

The heterogeneous selection is used to form certain types of animals, to convert the non-breeding herds into the breeding herds, as well as to create high-grade factory herds. Such kind of selection is used to combine in posterity the positive qualities of individual outstanding animals or lines, as well as sometimes at the crossbreeding of different breeds. For example, a dairy line that gives milk with a high-fat content or a breed with a high-milk line or the breed itself. As a result, there is a herd with high milk yield.

In the matching process, as well as in the selection, the main attention is paid to the animal qualities being selected. In the dairy cattle breeding the attention is paid at the milk yield, fat and protein content in the milk; while in the meat production it is given for the precocity, constitution and live weight. When the animals are selected it is considered their pedigrees where the main ancestors' factors of productivity are pointed.

**The livestock judgment.** Under the livestock judgment, it is considered a complex assessment of the animals according to individual productivity and tribal qualities. Livestock judgment is carried out throughout the year. The livestock judgment is done by the livestock breeders, farms, and people who have passed special courses of assessment. The breed of cattle is set based on the breeding recordings and pieces of evidence, tribal cards and other documents confirming the origin of animals. Also, they are visually inspected, the typicalness is established, and the exterior and constitution are also evaluated. According to the results of the livestock judgment, the animals are referred to as purebred, hybrids of different generations or to the local improved ones.

According to the exterior and constitution, cows are estimated visually after the first and third calving. Special attention for the dairy cows is paid to the typicality of the breed, correct constitution, size and shape of the udder, the suitability of cows for the machine milking, defects and lack of the exterior. Among the cows of the meat breeds, more attention is paid at the harmony of the physique, development of muscles and the general meat forms. Assessment of the articles of adult animals is produced on a 100 point scale, whereas for the young animals on a 5 point scale; whereas you should take account of its general development and type expressiveness.

At the final assessment of the animals, it is used an appropriate type of the scale. For the cows' such factors as milk productivity, exterior and genotype are considered; whereas for the bulls these are exterior, constitution, live weight and genotype; the youth requires for the genotype, exterior, and development. The assessment class is established according to the results of the livestock judgment (according to the instruction). After this, the class of the animal is established due to the sum of the score and complex of signs such as elite record, elite, first and second classes. The animals that do not suit the requirements of the relevant classes are classified as extracurricular.

The class mark of the animal is characterized due to productivity and its tribal qualities.

During the process of the livestock judgment of animals, there is applied a special instruction worked out by the Ministry of Agriculture of the Republic.

**The adaptive ability of cattle in different climatic conditions.** The cattle of the best breeds of the CIS and the West is being imported to the Republic of Kazakhstan. In this regard, the problem of studying zoning and acclimatization of animals is of great scientific and industrial importance.

One of the most characteristic features of all living creatures is a wide opportunity to adapt to environmental conditions. Since environmental conditions are not constant, this ability not only determines the possibility of life itself but also is the cause of the evolutionary transformation of living creatures.

Adaptation of animals to the new environmental conditions is very multifaceted. First of all, it is a morpho-physiological and genetic adaptation.

Morpho-physiological adaptation includes morphological, physiological, biochemical and ethological changes. All these processes create prerequisites for animals to show their qualities and survive in specific environmental conditions. Animals actively accelerate the process of adaptation, gaining a certain experience, and are trained to behave according to the required circumstances.

Changes in the conditions of existence, as well as excessive activation of any processes in the animal's body, lead to a shift in the parameters of the internal environment. To exclude the possibility of changes incompatible with life, and to restore the original constancy of this environment, adaptive adaptation mechanisms are activated.

Zh. A. Karabayev and others consider that to study the acclimatization of animals adaptation at the moment of delivery it is necessary to take clinical indicators which subsequently will be the starting point of

subsequent measurements. Repetition of experiments by year, repetition at a different level of productivity or on other breeds, as well as a repeated readout of clinical indicators during the day is necessary conditions for studying the complex processes of acclimatization and adaptation of farm animals.

An excess or deficiency of one or another environmental factor according to B. Damesinov harms the organism of animals. Also, animals have the ability of unequal growth, development, and level of productivity in various environmental conditions.

Therefore, genetic factors play a crucial role in the process of long-term adaptation. Genetic adaptation leads to hereditary changes that are specific for species characteristics and that allow populations to exist in the changed environmental conditions.

The phenomena of adaptation in nature have been known among biologists for a long time. However, the true scientific understanding of adaptation in biology was substantiated by Ch. Darwin, who in his famous work «The Origin of Species» established that the evolution of living forms, primarily of species, is carried out through the evolution of their adaptability to the external environment. He considered the adaptation as a set of changes that are beneficial to the body, representing a more or less accurate reflection of the impact of external factors.

According to A.V. Tereshkin, N.K. Tezekbayev, M.V. Tamarovsk and other, the transfer of animals of any breed to areas with other feed and climatic conditions inevitably causes changes in the body's response to environmental factors. Climate change affects body temperature, respiration, feed digestion, fertility, etc.

S. Brodi wrote that knowledge and study of questions related to the climatic physiology of the cattle are especially necessary for connection with the movement of animals in different climatic zones of the globe and extensive use of crossing to improve local breeds.

According to E. Bursell, the growth energy and productivity of an individual depends on the temperature conditions in which it lives.

An important specific feature of cattle thermoregulation is its ability to tolerate low temperatures well, while it is more difficult to adapt to high temperatures.

Any adaptive property of biosystems, both the simplest and the most complex, were considered by S.V. Puchkovsky as adaptation.

V.U. Davydov, who understood under adaptation accommodation capability of an animal organism to the changing existence conditions, considered that it is performed by homeostatic reactions, which are a combination of coordinated neurohumoral regulatory mechanisms.

A.S. Kashin considered adaptation as a restructuring of body functions in new environmental conditions that ensure its preservation, development, and normal vital activity.

According to R.M. Ibragimov in the process of evolution in mammals during the transition from the prenatal period of development to independent life, a peculiar adaptation model was developed. The essence of this model has mutually agreed on interactions under the influence of environmental factors.

R. Young and B. Walker having conducted large-scale studies on the adaptation properties of cows in the new conditions concluded that the adaptability of animals to new conditions depends on the ability to resist the influence of these conditions and maintain homeostasis. Regarding the adaptation, there are significant individual differences.

I. N. Nikitchenko believed that due to certain specificity, acclimatization among adaptations occupies an independent position. Under acclimatization, it is considered a whole complex of factors to which an animal must adapt transferred to a new living environment for it and which for a long time, often for many generations, will determine its way of life and affect its productivity.

Most experts under acclimatization understand something else, to be exactly as the adaptation of an organism to new conditions of existence, carried out as a result of the interaction of the system, the organism is a new environment.

Due to F.F. Eisner acclimatization is a process of adaptive changes of delivered animals and their offspring in several generations under the influence of complex new environmental conditions. The degree of this change depends on differences in the specifics of conditions of the main limiting amplitude factors of the adaptability of the delivered animals. Nevertheless, for all this, the change may not coincide with the direction of change of the entire population as well as in some generations under the influence of the selection.

The degree of adaptation, that is the origin of adaptive changes that have been developed over several generations, can be judged by the change in indicators of zootechnical characteristics of animals, such as milk production, reproductive ability of cows, duration of use, etc.

Many factors influence the adaptability of the organism to new existence conditions. Whereas, among these factors, the most important are climatic and fodder conditions.

The urgency of the acclimatization problem has increased in recent years because the transfer of livestock to an industrial basis is associated with the extensive use of genetic resources of foreign countries, which is

impossible without studying the issues of acclimatization of imported livestock.

According to I.V. Lushnikov, the especially relevant aspect is the study to identify both adaptive and acclimatization properties of black-and-motley as well as the cross-breed cattle of meat breeds in terms of industrial technology. It was established that in the conditions of the feedlot the animals of the Kalmyk breed exceeded the Sharolese, Shorthorn and Hereford peers by 19.4 %, 16.1 %, 13.5 %, respectively, according to the adaptation coefficient of R. Benzer.

Differences in the adaptive qualities of animals of different breeds are noted. Several breeds of world-wide-purpose (Simmental, Holstein, Schwyz, red, black-and-white and some other meat breeds) are characterized by high adaptation to environmental conditions.

It is known that the adaptability of the imported animals may have a completely different character than their descendants in some generations. In the first case, changes in animals are part typical, which are limited by their heredity. In the second case, under the influence of selection, genetic factors come into play: there is a restructuring of the cumulative genotype in the population.

Research of F.M. Mukhamedgaliyev showed that within each zone the degree of animal adaptability to new habitat conditions is not the same. Thus, if the animals accustomed to poor natural pastures are moved to well feeding conditions, not all of them will respond to these changes with an adequate increase in productivity.

According to V.M. Serokurov, the adaptation of black-and-motley cattle in Ukraine proceeded positively among domestic breed animals and was negative due to the inconsistency of the environment with the genotype of the latter among the imported animals.

Studies carried out on the reproducing farms «Ukrainka» and «Klichevka» of the Kharkiv and Poltava regions on the example of a pure-bred Ayshir livestock imported from Finland showed that the yield of Aishir first-heifers was 3898–5417 kg, with a fat content of 4.10–4.25 %.

I. G. Moroz and T.M. Gorobetz claimed that acclimatization of the imported heifers of the black-and-motley breed from the Crimea to the uchkhoz of Voroshilovograd Agricultural Institute was successful. Milk productivity of the first lactation was 2617 kg of milk, or 161 kg more than that of cows' analogs grown at the farm, with a higher fat content of 0.1 % of lower feed costs for the production of 1cwt of milk. For 100 cows there were received 95 calves or 2 heads more against control.

The experiments conducted by U. Kalimbetov on the black-and-white, red steppe, red Lithuanian breeds in the conditions of Karakalpak showed

that the cows of these breeds outperform the local improved cattle. Black-and-motley cows go through the acclimatization best of all.

L.V. Alimzhanova, according to the results of her research, noted that among many dairy breeds the first place in Northern Kazakhstan is given to the red steppe. It is best adapted to the conditions of Northern Kazakhstan, characterized by a sharply continental climate, intense heat, and frequent droughts. Due to good acclimatization to such conditions, the red steppe breed is widespread in the Republic of Kazakhstan.

Sh. I. Nagiyev, while studying acclimatization abilities of brown Latvian cattle in the region of Ashkhabad, Turkmenistan, concluded that due to a set of adaptation features the cattle over the course of several years adapts satisfactorily in a sharply continental climate.

T. V. Podpalaya and O.A. Drobitko studied economic useful signs of red Danish cattle in the process of acclimatization in the conditions of the Kherson region. Their data showed that the red Danish cattle in the new conditions did not reduce their productivity. Comparison of the average milk yield for the first and second lactations of cows-daughters of the first generation showed their significant superiority over mothers, respectively, by 218,859 kg of milk. In terms of butter-fat yielding capacity and quantity of butterfat, there were also daughters' superior. In subsequent lactations, the level of milk production of mothers (imported livestock) and their daughters (as such reproduction) was leveled. Animals of the second generation were characterized by sufficient adaptive qualities. Their average milk yield was 4899 kg, with the fat content of 3.77 % and the butterfat of 185 kg. This data confirms that red Danish cattle acclimatize well in the conditions of southern Ukraine.

R.A. Khaertdinov, E.S. Gubaidullin, and S.V. Kornilov consider that Holstein cattle have wide acclimatization abilities. However, when these animals are brought from other countries to the conditions of the farms of Tatarstan, they are exposed to certain effects. The results of studies on the physique, productive, and reproductive qualities showed that the descendants of imported individuals had significant changes due to adaptation. Differences in body measurements between animals of the second and third genetic ecological generations (GEG) are expressed to a much lesser extent than between animals of the first and second GEG. Their superiority in the yield was 807 and 467 kg, the milking rate was 0.17 and 0.21 kg a minute. The authors concluded that Holstein cattle in the conditions of Tatarstan led to a decrease in the size of animals, but at the same time, a rather high heritability of the main breed traits indicates successful acclimatization.

The acclimatization ability of Gallovei cattle on the South-East of Kazakhstan was studied by N. Tezekbayev which showed satisfactory adaptation of Gallovei cattle in the region of Zaili Alatau.

N.S. Bodunovskaya, studying acclimatization of red Estonian and brown Latvian cattle in the conditions of Northern Kazakhstan, established that the acclimatization of animals is quite satisfactory. The delivery of these breeds justifies itself from the economical side.

K.K. Sarsembin cites material on Estonian black-and-white cattle in the conditions of Alma-Ata region K.K. The productivity of Estonian black-and-white cows was high, and during the first lactation was 3559 kg, with 3.8 % of butterfat in milk at a good reproductive ability. The author considers the import and breeding of heifers from the Baltic Republics into the farms of South-east Kazakhstan as justified and efficient to create highly productive dairy herds.

Tests of G.P. Leshchuk, performed on animals of German black-and-white as well as Ural black-and-white breeds in the conditions of Trans-Urals, showed that duration of service and the intercooler periods of the German black-and-white cows were 6.5 and 11.0 days, respectively, whereas, the age of the first fruitful insemination was lower among heifers of the Ural black-and-white breed by 18.3 days. However, the animal of Ural origin was inferior to German in the milk yield by 155 kg.

V. P. Prozherin in his studies found that Holstein cows, imported from West Germany, in the conditions of the Vologda region are well acclimatized. Initially, imported animals showed a decrease in reproductive ability, which was restored to the second and subsequent lactations. It was also revealed that in the new conditions they did not lose an evident milky body type, were distinguished by a strong constitution, and had good morphofunctional properties of the udder. The productivity of imported cattle exceeds the peers of the black-and-motley breed of the selection by 939 kg of milk.

T. Zh. Chitchyan paid attention to studies of changes in the economic and biological properties of black-and-white cattle under its moving to the mountainous area of Armenia. The results of the research showed that imported black-and-white cattle retained exterior characteristics of the breed and desirable udder forms. The milk productivity naturally increased with age at a constant milk ratio of 6.9–7.0.

The delivery of Frisian, Jersey, and Guernsey breeds to India showed that in the new conditions the cows had increased inter-calving period due to changes in sexual cycles.

Research materials of South American scientists showed satisfactory acclimatization in the conditions of South Africa of Hereford livestock

«Afrikander» because they had thicker skin than Aberdeen Angus and Shorthorns.

B. Tulebayev conducted a comprehensive assessment of the adaptability of Alatau cows of different genotypes in the conditions of the Almaty region. He concluded that while the thoroughbred increases among the Schwyz breed, in the process of adaptability to the new environment among heifers, the yield for the first lactation of the first generation increases by 546 kg, and in the second by 389 kg. Also, udder morphological and functional properties improve as well. The lactation intensity in the first and second generation of crossbred heifers is 1.85–1.78 kg a minute, which is higher by 0.26 and 0.19 kg a minute than of their Alatau peers.

Due to the work of T.V. Lobanov the purebred Holstein cattle, imported into the conditions of Altai, preserved milk productivity, exterior, and constitutional features.

M. K. Aybashev's research, carried out on cows of the black-and-white breed and their hybrids with Holstein, showed that in the conditions of hot climate the hybrids in milk productivity exceeded their purebred peers by 287 kg.

D. K. Karybaev, V. F. Zubriyanov, B. T. Tulebaev studied the adaptability of animals of different genotypes (such as purebred Alatau, half-blood crossbreeds F1, crossbreed with blood of Schwyz of 75 %, crossbreed from backcrossing with blood circulation 25 % of Schwyz) in the conditions of Almata region and in the result of which they found, that when creating an intensive type of Alatau cattle, based on the use of Schwyz of the American selection, an improving effect was obtained to preserve physiological stability of organism with a high lactation function and adaptive ability.

The data obtained by Yu. M. Kriventsov, V. P. Prozherin, in studying the acclimatization ability of imported Holsteinized cattle of Germany selection under the conditions of the Vologda region, showed that imported animals and their descendants (the second genetic-ecological generation), grown under the conditions of farms of this area, adapt well to local conditions. The average age of the first calving of imported animals was 27.1 months, which is 1.5 months less than that of purebred peers. Exterior, morpho-functional properties of the udder, and milk productivity indexes also surpass the cows of local selection.

In the process of acclimatization of Jersey cattle in the South-East of Ukraine, the cows of the first genetic-ecological generation exceeded the red steppe breed by the yield of 800–1820 kg, in fat and protein content by 1.85–2.52 % and 0.88–0.93 %, respectively.

In the experiments of O.A. Maslova on the study of the adaptive ability of cows of the black-and-white and Ayrshire breeds in the Moscow region to the conditions of industrial technology, it was shown that the adaptation syndrome is reflected in a yield decrease of heifers of both breeds. The decrease in milk yield to the milk yield in the maternity ward was 53.9 %, and according to the Ayrshires 43.2 %. Exterior analysis of animals showed that black-and-motley animals were tall. They also had the best indicators of reproductive ability.

According to Sh.A. Zhantemirov, who provided his research in Uzbekistan, Samarkand region, among such breeds like Charolais, Limuzin, Schwyz, and Black-and-motley better adapted two of them as Charolais and Limuzin. Their heat resistance index was 81.8 and 85.9, respectively. In the group of the local cattle, this indicator was equal to 89.2.

According to the results of I.M. Volokhova, the crossbreeding of the Simmental cattle with the red-and-mottled Holsteins makes it possible to receive viable youngsters with good acclimatized abilities in the conditions of Nizhniy Povolzhie. A comparative study of high air temperatures' influence on the physical-biochemical status of the organism and the productive qualities of Simmental and Simmental-Holstein hybrids showed some advantage of the hybrids in comparison with purebred animals.

The good adaptive abilities of the red-motley Holstein cattle brought from Germany under the conditions of the Belgorod Region are indicated by V. A. Abanshin and others.

G.D. Katz and F.I. Gurgach evaluated the acclimatization ability of the crossbred cows (the red steppe, the red-motley, and the black-and-motley Golstein breeds) of the purebred red steppe cows, in the conditions of dry Ukraine steppe, came to the conclusions that reaction of hybrids to air heat was different. The hybrids experienced functional stress of the thermoregulation systems that are confirmed by the heat resistance index, which was 4.2 % lower than the black-and-white cows.

P. T. Tikhonov and K. N. Samoilov studied adaptive abilities of crossbreeds of the red steppe and Angler breed in the conditions of Southern Ural have established that the most sensitive to the air temperature increase were hybrids of ¾ thorough-blooded on the line of Angler breed.

According to A. I. Zhitikov the practice of the local livestock breeds of Western Siberia by the method of the absorbed crossbreeding or breeding stock introduction shows that the effect depends on the extent to which the environmental conditions are adequate to the physiological needs of the organism of hybrid or introduced animals. Animal adaptation to new

habitat conditions, as a rule, is accompanied by various diseases, especially suffers the reproductive system and metabolism, which leads to premature retirement.

The adaptability level in certain climatic conditions depends on the ecogenesis of the introduced animals.

The experiments conducted by N.A. Lisenkov in sovkhoz-tekhnikum «Velsky», Arkhangelsk region, and «Vnukovsky», Moscow region, on such breeds as Kholmogor and Kholmogor-Holstein cows of different genotypes (1/2, ¾, ¼) revealed that body temperature, pulse rate and respiration of all animal groups were within the physiological norm. The highest adaptation coefficient showed animals during the summer period, while crossbreeds who possessed 50 % or more of the Holstein blood differed by increased rates – 2.44–2.48 at the rate of 2.0.

A.V. Martynov studied the adaptive qualities of the Ayrshire cattle, in the conditions of the Yaroslav region, which showed the animals of four different genetic and ecological generations statistically and significantly had higher productivity compared with the average herd, which characterizes positive adaptive capacity in these conditions.

I. M. Karayev presented a complex assessment of the productive qualities and the level of the heredity realization in the conditions of the foothill area of the Republic of North Ossetia, Alania. There were received positive results of satisfactory acclimatization of the hybrid heifers like the Holstein and Dutch breeds in comparison with the black-and-white as well as Kholmogor. Hybrid Holstein cows in comparison with the pure-bred black-and-motley have a more pronounced specialized dairy type; the slanting body length and girth of metacarpus is 6.9 cm and 1.9 cm, respectively, more than their morphological signs, whereas the udder matches more the technological standard of the breed.

B.I. Nikolaev, studying animals of specialized meat breed in the extreme conditions of the mountainous area of Buryatia, revealed that for the harsh natural conditions of this continent, the Kalmyk cattle was promising. It had an advantage even in comparison with the local simmentalized livestock. At the age of 18 months, heifers of the Kalmyk breed weighed 280 kg and 360 kg at the age of 24 months, respectively. The first generation of Kalmyk cows had a live weight of 388.8 kg and at the age of 60 months 420.5 kg, while Simmental peers had 320.0 and 342.2 kg, respectively.

A similar experiment was conducted by G.G. Bolotov in the conditions of Buryatia on Simmental and black-and-white cows. The received results showed that the average point score for the exterior of black-and-white heifers was 8.8 points, Simmental 8.33, respectively. It

was marked that the listed index of the body build of the black-and-white heifers evaded into the side of the dairy-type physique.

However, not always imported livestock into certain climatic conditions is accompanied by good or satisfactory acclimatization of animals. Thus, according to N.V. Kononenko, I.I. Saliy, and N.I. Buyuklu animals of Angler, red Danish and red-motley Holstein breeds, delivered to the southern region of Ukraine, in comparison with the local red-steppe breed do not show the genetic potential that is inherited by these breeds.

The climate in which the animal was grown, and in which it will be brought plays the most significant role.

Thus, animals grown in warm climates adapt to cold conditions more easily than animals grown in cold climates and transferred to hot. Animals of the mountainous breeds acclimatize in lowland conditions of mountains better than their peers of the lowland breeds.

R.A. Arynov believes that adaptation and cold resistance affects the functional abilities of a growing organism. Therefore, studies have been conducted to study the cardiac activity of calves in the conditions of the Semipalatinsk region and the Altai Territory. The results of the experiment showed that with a lower heart rate, the amplitude of the ventricular complex of calves from the experimental group (area of maximum rational risk at minus air temperature) is higher compared to calves of the control group (area of minimum rational risk at positive temperatures).

K.Ye. Yelemessov and M.T. Abdrakhmanov consider there is a solid biological base of domestic livestock at present in Kazakhstan due to the use in the selection process of unique local breeds that are genetically adapted to the natural and climatic zones of the country.

Thus, the data presented by various authors allow us to make a statement that when animals move from their natural and climatic conditions to others, in most cases satisfactory acclimatization occurs and the animals mostly retain their natural features.

**The livestock accounting on farms.** The breeding work is impossible without proper livestock accounting. Livestock accounting data let make choice, assessment, and selection of animals. Without proper accounting, it is impossible to obtain data about the number of products received from livestock as well as its cost.

There are special forms of keeping livestock accounting: magazines, statements, and forms. They record data on the origin of animals, their growth and development, body weight, productivity, dates of feeding and calving, the amount of consumed feed. All records in these forms are kept on the basis of primary documents: acts on animals litter, diaries of milk yield, acts of determining milk fat content, reports on milk intake and

consumption, statements on feed consumption, acts about transferring animals from younger groups to older ones, acts of monthly weighings of young animals, acts of disposal of animals, etc.

Inbreeding farms there are factory books or cards of the established sample. The following information is taken into account in the factory book (card): Nickname, inventory number, STB number, time and place of birth, breed, live weight, productivity, measurement data, and points for the exterior, health status. It also takes into account data on the breeding of a cow, the amount of feed consumed during the reference period and payment by their products.

The factory book of the bulls has information about their use in mating, the number of doses of sperm per year, the number of the inseminated uterus, born offspring, and the productivity of adult daughters.

The factory book is the only document that reflects the primary data about the animal breeding, besides, here you can also gather the necessary information to draw up plans for mating and plans for breeding and breeding work at the farm.

For individual registration, animals need to be tagged after birth. They are usually marked by tattoos, earrings or tweezers on the ears, as well as by burning the numbers on the horns. Simultaneously with the labeling, the animals receive nicknames. Heifers receive nicknames that start with the first letter of their mother’s name, while bulls get the same but from the father’s side. The inventory number is placed on the right ear. The number is burned on the left horn according to the data of State Tribal Book (STB).

**Establishing a plan of breeding work in livestock breeding.** In the system of breeding work, a perspective plan of breeding work is of particular importance. Usually, it is made for five years. Whereas, a long-term plan is being drawn up to create a highly productive breeding herd and a strong forage base on the farm.

The basis of the long-term plan is increasing in the number of livestock, its productivity, and the growth of young animals both for substitution and selling.

**The livestock plan consists of two main sections such as:**

1. the analysis of farm conditions and the breeding work;

2. the ways of further improvement of the productive and herd qualities of the livestock.

The first section provides a description of the farm and its natural and climatic conditions; history of herd formation, use of farm stallions, the number and class of breeding animals; feeding and housing conditions, food supply, economic indicators, animal's maintenance system, data about the productivity as well as examples of outstanding animals, if any, etc.

The second section deals with the questions of targets for livestock growth, productivity, and further direction of breeding work from the side of the qualitative transformation of the herd.

**The factors of breeding in the livestock.** Socio-economic factors have influenced and continue to have a huge impact on the process of breeding. The domestication has led to great changes in the productive qualities of animals. However, at the stage of the nomadic period and then settled one, livestock farming was carried out primitively. The process of livestock formation began to flourish during the period of capitalism (XVIII and XIX centuries). In connection with the increase in demand for livestock products and raw materials for the textile and leather industry, income from livestock production has increased.

Farm consolidation, the concentration of capital in agriculture, application of livestock science achievements all these had a significant value for the breeding of new breeds.

The breeders received a great stimulus to further improvements of the productive qualities of animals and creation on new more valuable, cost-effective breeds. From this, there appeared a need for livestock herds and, especially, rose interest in the valuable stallions. In England, during this period, dozens of highly productive breeds of beef cattle (Shorthorn and Hereford), sheep (Leister), pigs (large white) were created. In Germany, a remarkable breed of dairy cattle Ostfrizian was bred, in the Netherlands - Dutch, in Denmark and Germany - valuable breeds of pigs, in Switzerland - Simmental and Schwyz milk and meat breeds, this played an exceptionally large role in the creation of many breeds. Based on the social order, requirements were developed for the type and direction of the productivity of a particular breed.

With the development of agricultural production and with the change of socio-economic formations the direction of animal husbandry changed several times. The history of the livestock of many countries is rich in such examples. The Shorthorn breed of cattle was bred by the English breeders as a classic meat one. However, changed demands of the market in a range of other countries prompted breeders to create Shorthorns of meat and milk type in 1890–1900es.

The gray Ukrainian cattle breed has undergone a major restructuring under the influence of changing market demands. Previously, animals of this breed had a meat-working direction of productivity. In the XIX century due to the increasing demand for meat and milk, the breed has turned into milk and meat. With the development of the wool-processing industry, the wool breeds of sheep also changed, and new ones were created.

The breed is a historical category that cannot exist forever.

Intensification of animal husbandry aggravates interbreed competition, speeds up the process of replacing some breeds with other, more productive ones. Survive only those breeds that are cost-effective and have higher productivity. The lifetime of breeds is different. Many of the extinct breeds were of high genetic value. To preserve highly productive breeds, in many countries of the world hold special events. In England, for example, a national center is organized, whose task is to collect and preserve endangered breeds. With the help of the «sperm bank» (sperm storage), specialists in the future will be able to use the valuable properties of animals that are no longer alive when improving breeds and creating new ones. In this regard, a great program of state measures to preserve the gene pool of valuable local breeds of livestock is carried out now in our country. In the eleventh five-year plan there will be created special farm-reserves, wildlife reserves, genetic pools for cattle, sheep, horses, and poultry.

In addition to socio-economic factors, livestock formation was greatly influenced by natural and geographical conditions. Peculiarities of soil, terrain relief, and climate affect largely in the process of formation of signs and properties of the breed. Thus, the mountainous climate and relief of Switzerland, of course, contributed to the formation of Simmental cattle with a deep and wide chest, strong bones. It is characterized by a more direct setting of the hind limbs (elephantine). Dutch breed was formed in the conditions of the plains. Animals of this breed have thin bones, thin skin, smooth topline, and well-developed muscles. In areas of hot climates, where piroplasmosis is the scourge of cattle breeding, zebu-like cattle are most suitable for breeding. The zone of high alpine meadows should be used for breeding sheep such as mountain merino or arharomerinos.

An important role in the formation of economically useful signs of animals (horses, dogs, etc.) was played by training – a well-thought-out system of exercises of organs and tissues of the body. It is hard to imagine the creation of an English race or Oryol trotting horse breed without training animals from an early age for running speed and endurance, as well as breeding heavy breeds without a system of exercises and training for carrying capacity.

Breeds of farm animals of different directions of productivity, as a rule, were created for certain climatic and economic zones of the country. This led to livestock specialization and their range. Therefore, the correct placement of breeds, taking into account their biological characteristics in certain areas, is one of the important conditions for improving their productive qualities and in general the development of animal husbandry.

## 12 Breed zoning and sheep breed test

The variety of sheep breeds of different directions of productivity requires the selection of the most favorable ones for breeding in specific conditions. The selection of the most productive and economically advantageous breed or breed of sheep groups can only be made on the basis of a comparative assessment of their productivity and production costs.

Due to comparative evaluation or breed testing, it is possible not only to increase the profitability of the industry, but also to increase the number of sheep of the most productive breeds and types, to expand the production of sheep products in accordance with the needs of country's population.

Sheep breed testing is of significance value at the process of receiving new breeds, breed groups and intrabreed plant types. Verification of the effectiveness of their breeding in comparison with the breeding of already existing breeds in specific natural forage conditions, will allow more correctly and reasonably decide on the feasibility of importation and distribution of new breeds and pedigree groups of sheep on a given territory.

During the breed testing a comparative study of efficiency use of stud-rams of different breeds of one or several productivity directions (fine-wool or semi-fine-wool) and various variants of industrial crossing is also carried out.

**The main goals of the breed testing are the following:**

1. Identification of breeds, breed groups and intrabreed factory types most suitable for breeding in the given climatic and economic conditions. The relative value criterion of tested animals should be the quantity and quality of the obtained product and its cost.

2. Compilation of more detailed characteristics of genetic and phenotypic sheep characteristics of the tested groups makes it possible to carry out breeding work in a specific region more effectively.

3. Identification of the breed of stud-rams out of the number of the compared groups as well as establishment of the most effective variants of crossbreeding of various breeds with each other.

Data from the breed testing is used at the development of planned delivery and distribution of breeding animals in the selected regions of the country. However, organization and management of the breed testing clarifies the plan of breed zoning of sheep of a particular productivity direction in accordance with the economic factor of the zone.

**The results of sheep breeds testing in the CIS and abroad.** Analysis of the comparative assessment of sheep breeds and breed groups carried out in the CIS and abroad, shows that in most cases compared

breeds were assessed mainly by one feature (wool, meat, dairy, reproductive properties, and etc) and only in some cases there was assessment of complex signs.

The results of the breed test deserve much more attention when compared groups are evaluated by complex of productive qualities and economic efficiency in a particular area.

Thus, in Kazakhstan at the experimental station named after Mynbayev (1946–1950) sheep of different breeds were studied by complex of productive and biological features. The tested sheep were presented by such breeds as Arharomerinos, Kazakh fine-fleeced, Precoce, meat-and-wool, and semi-fine-fleeced (Precoce x Kazakh fat-tailed), premature meat-and-wool (Hampshire x Kazakh fat-tailed), Degers, Edilbai, Kazakh fat-tailed with improved wool, karakul and its hybrid (M.A. Yermekov and A.V. Golodnov, 1952).

As a result of the breed test, the authors came to the conclusion that under the conditions of grazing in the foothill zone, sheep of the Kazakh fine-fleece breed develop better, which was recommended to be used as the main improving breed of fine-wool sheep.

The Precoce proved to be more adapted for the breeding in the mountainous and foothill areas in the conditions of grazing. Arharomerinos exceeded Precoce in viability and differed in better health.

Sheep of premature meat-and-wool group in the conditions of grazing by such criterion as premature, productivity and reproductive qualities were inferior to meat-and-greasy fat-tail sheep breeds. According to a number of productivity indicators, half-fine meat-woolly sheep have an advantage over other groups, and only meat productivity is inferior to Edilbai sheep. According to the authors, sheep of this type should be bred in desert and semi-desert pastures of Kazakhstan.

According to P. Mac-Gloglin and S. Karen (1969), in Ireland, they studied the productive qualities of dams of Galloway, Cheviot, Border Leister x Scottish Blackhead and Border Leister x Cheviot. The Galloway breed prevailed in terms of wool and live weight, but hybrids surpassed them in reproductive qualities. In terms of meat quality, the best were descendants of dams of Border Leister x Scottish blackhead.

Based on the analysis of works of comparative assessment of breeds in our country and abroad a detailed method for testing sheep breeds has been developed.

**The main methodological principles of breed testing**

Received practice of breed testing let form the following methodological principles for comparative assessment of different sheep breeds and groups.

1. Testing of breeds, breed groups and types of sheep is organized in each region engaged in the breeding of sheep by different directions of productivity. Zonal institutes and farm specialists are engaged into the breed tests.

2. For a comparative assessment, breeds and breed groups, intrabreed or factory types of sheep of various directions of productivity are selected as recommended by the plan of breed zoning as well as those that are not included into the plan but used at some farms of this zone.

3. Each of the tested breeds and breed groups must be presented by animals of the first class according to the evaluation and selected from the farms where it was bred as the most effective from the economic point of view. Dams must be mated only with the elite class sheep. Only experienced experts select animals for the testing.

4. The number of animals selected for the testing should not be less than 100 heads.

5. Animals that are no older than 1.5 years are selected for the test. The age of stud rams is 2.5–3.5 years.

6. Compared groups are compiled into one shepherd and equal conditions of feeding and keeping are created.

7. The study of breeds and groups of animals should last at least 4–5 years.

8. Sheep of the tested groups are bred by a method of the pure breeding while for the hybrids the method of «inbreeding» is used.

9. During the breed testing the following items are under the accounting and evaluation:

a) the results of the individual evaluation. Evaluation is done twice for the period of the test – at the age of one and two years according to the instructions of the evaluation process. Wool length and fineness are estimated on the side, back, thigh and belly;

b) the quantity of the sheep fleece is counted annually by weighing. The percentage of the washed wool is established annually according to the methods of All-Union Institute of Animal Husbandry and All-Russian Research Institute for Sheep and Goat Breeding, which is also used in the process of establishment of the quantity of the sheep fleece in the condition of pure wool. The wool that weighs at least 200 g is taken from every tenth fleece;

c) the quality of wool is taken into account annually. The class of the fleece is evaluated as well as the average diameter and the true length of the wool fibers once during the test period. The wool classification is carried out by an experienced grader;

d) the live weight is determined annually before the mating. In addition, when the breeding queen reaches the age of 3 or 4 years the weighing is done three times a year (once for the period), in spring, summer, and autumn. The offspring obtained from the compared groups are weighed at birth, when they are separated from mothers, and at the age of 7, 12, 18 and 30 months;

e) to assess fattening and meat qualities, due to the principle of analogs, 20–30 typical castrated rams aged 6–8 months are selected, which are fattened within 60–90 days;

Payment for feed is determined on the basis of the amount of food eaten and increase in the live weight during the fattening period. Meat qualities of slaughtered young cattle for meat are determined at the age of 7–8 months as well as 17–19 months. Five heads are selected of the list of control animals considering the weight before the slaughter and the period of fasting, weight of hot carcass as well as inner fat, slaughter yield and weight of the skin.

**The assessment of feed intake** is done on adult animal once for the test period. Under the conditions of stable keeping not less than 10 heads of medium finish are pointed out of the assessed group. The hand-feed is group with the everyday accounting of cleared up and residual feed intake. Examination of feed intake lasts not less than 30 days before the mating. Animals are weighted individually at 10 day intervals.

**To assess the breeding capacity** such criteria as the birth rate, the heat rate, the number of sowing, lambs dropped per 100 ewes, livability at the time of weaning and display of maternal instinct are determined annually. The number of lose pregnancy, stillbirth lambs, breeding queens with difficult delivery and opens with the identification of the reason is registered.

**The percent alive** is determined on the ground of death loss mature at calendar year and young cattle from the birth till weaning as well as from the weaning till one year of age. The death loss is made seasonably (in spring, summer, autumn, and winter).

**To evaluate milkiness** 15 breeding queens are selected from the compared groups with single lambs of the same gender and the disparity between years must not exceed three day. The milkiness of breeding queens is derived from the figures of young cattle by nature and till 20 day age. When gain figure of a lamb for 20 days is multiplied by index 4.3 (where 4.3 is approximate amount of the milk by the kilogram of additional weight), we receive milking capacity of breeding queens during the specified period of milk secretion.

Each animal is considered individually by mean of marking and opening of an individual record. Figures of sowing, lambing, weighing, shearling hogg, and appraisement (бонитировки) are subjects of individual records.

Feed efficiency ratio, labor, real assets, quantity with quality of gained production are considered to provide cost-effectiveness analysis of sheep of different breeds and groups. All calculations are made by an average of one head in money terms. Profit or loss is found per one sheep as well as net profit margin of each from the compared groups.

Additional research should be conducted by relevant research institutes for a deeper and more complete study of yielding and biological characteristics of sheep of different breeds.

**The ancon zoned in Kazakstan.**

**Edilbai ancon.** The main product received from this ancon is meat and fat. Edilbai ancon considers being one of the biggest fat tailed breeds of mutton-fat sheep direction and is accepted as upgrade in a number of Kazakhstan regions (i.e., Karaganda, Pavlodar, Guryevsk, Aktyubinsk, Semipalatinsk, and Kostanai regions).

Edilbai sheep are characterized by strong constitution, proper physique, wide and deep torso with a well-developed fat tail. The Hissar breed surpasses Edilbai in characteristics of mutton-fat. The average weight of breeding queens at the age of 2.5 year is from 60 to 75 kg, what is in average makes 68 kg. The breed is differing in high earliness and intensive growth. Hogg lambs carcass weighs 20–25 kg by age 6–7. Slaughter yield of adult sheep makes 50-55%. Whereas some rams weigh 135–145 kg and breeding queens – 90–105 kg. Edilbai sheep surpass other Kazakh fat tail breed in wool production too. The average amount of ram's clip is – 3–3.5 kg, breeding queens – 2.3–2.6 kg, and the teg is 0.5-0.6 kg. The wool is heterogeneous and consists of 52–56 % of under hair, 16–19 % of intermediate hair, and 24–28 % of beard hair. Kemp also occurs.

**Kazakh fine-wool breed.** A team headed by V.A. Balmont and A.P. Pshenichnyi over the 1931 to 1946 period developed it. Fat-tailed breeding queens and rams of Precoce breed served as the basis. "Inter se" method was used in breeding hybrids of the first and second generation.

Sheep have big growth and good body composition as well as well adapted to conditions of driving-pasture system of East Kazakhstan. The body weight of breeding queens makes 65 kg, seven-month lamb is 35–36 kg, and adult hogg lambs weigh 37–39 kg that give up to 3.5–4.0 kg of fat. The wool length is 7–8 cm, with the degree of fineness of 64 and 60. The average clip of breeding queens is – 3.5–4.5 kg with the yield recovery

of 50 %. The birth rate is between 105 and 130 lambs to a hundred of breeding queens.

Sheep of this breed are recommended for breeding in the South-East region of Kazakhstan.

## 13 Breeds of pigs zoned in Kazakhstan

Nowadays, more than 200 breeds of pigs are being bred in a world pig-breeding. 31 breeds of homegrown and cross border breeding are spread in the CIS region due to big climate variety, sagination criterion, and other. Every breed of pig in the line of fecundity is relatively classified into three groups. The most numerous group has pigs of universal (mutton-fat) fecundity direction. The second group is presented by beef and bacon fecundity direction. The third group has breeds that are very similar with the first group by meat and fattening characteristics but the fecundity is poor. Pigs must be selected due to their fitness to native natural and climatic conditions as well as feeding conditions when one or another pig's breed is chosen. This guaranties high per cent of profit from the breed animals.

**Breeds of pigs of the first group** these are representatives of the white breed and its offspring (i.e., north Siberian, Ukrainian White Steppe, Lithuanian White, etc).

**Heavy white breed** is the most well known in the CIS. The Large White is changed and improved completely as the result of a long domestic breeding. Over the period of breeding a new domestic breed was received, which exceeds the Large White in many respects. Animals of white colour are beautifully proportional and have good health. The body is broad, long, and deep with a broad back without "ties" behind shoulders. The hock is well finished. Feet are relatively small without sentinel tag and with stable hoofs as well as with short and elastic knuckle bones. The skin is strong, elastic and without wrinkles. The hair is not rough but completely covers body. The weight of adult male pigs is 340–360 kg and breeding pigs weigh 230–260 kg. The length of an adult male pig is 175–185 cm, whereas, breeding pigs are 161–165 cm. The prolificacy is between 10 and 12 piglets with middle-weight of 1.1–10.3 kg each; the live body of farrowing is approximately 48–50 kg on the 21$^{st}$ day. By two months the live weight of each piglet is approximately 16–18 kg. Because of the rapid fattening growing stock have weight of 100 kg at the age of seven months at the outgoing of 4–4.5 of fodder unit by kilogram of gain in the live weight. It is bred in practically every zone and region of the Republic of Kazakhstan and CIS; has good adaptive and yielding features.

**Murom breed** was bred in Vladimir region by mating of animals with Litovsk White and Large White. The pigs are of white marking and strongly built. Distinctive feature of Murom pigs is adaptedness to a big quantity of bulk feed with small quantity of concentrated feedstuff and skim milk in a diet. The weight of adult male pigs is 250–280 kg and

breeding pigs weigh 200–220 kg. The prolificacy is ten pigs from farrowing. Young pigs weigh between 90 and 100 kg in fattening and at the age of between 6 and 7 months at the outgoing of 3.9–4.0 of fodder unit by kilogram of gain in the live weight. The fleshing of youthful carcass makes 57 %. Animals of this breed grow in estations of Vladimir region.

**Semirechinsk pig's breed.** It was bred in Kazakhstan by animal breeding of two breeds such as Kemerovo and Large White with wild boars. Animals are well adapted to native conditions and have strong constitution. In conditions of North Kazakhstan climate this breed exceeds Large White and Kemerovo breeds in fecundity. The live weight of adult male pigs is between 250 and 285 kg, and breeding pigs weigh between 210 and 250 kg; the prolificacy makes between 10 and 11 young pigs. Average daily weight gain is at about 700 grams; the outgoing is between 4.0 and 4.1 of fodder unit by kilogram of gain in the live weight, and the slaughter yield is between 58 and 60 %. The breed is grown in Taldy-Kurgan and Almaty regions.

**Kemerovo** breed was bred in Kemerovo region on the basis of mating domestic Siberian pigs with a boar of Large White, Berkshire, and Large Black. Animals are of black color type with small white spots on body and white marks on feet, tail, and head. It has strong constitution, body is lengthened, chest is deep and wide, and joints completed properly. The live weight of adult male pigs is between 295 and 350 kg, and breeding pigs weigh between 210 and 245 kg; the prolificacy makes between 10 and 11 pigs. Average daily weight gain is between 720 and 740 grams at the outgoing of 3.9–4.0 of fodder unit by kilogram of gain in the live weight. It reaches index of 100 kg at the age of between 190 and 200 days. The breed is spread in Kemerovo and Omsk regions and partially in Kazakhstan too.

**Breeds of pigs of the second group**

The second group of pigs includes landrace and its lines. These pigs are also white but differ in long body, lop-eared, and with well developed joints and chump.

**Landrace breed** appeared in Denmark as a result of mating domestic Danish breed with the Large White. Animals are of white color and have long and narrow body, with big lop-ears as well as with wide well developed joints. Average daily weight gain in fattening is between 700 and 750 grams at the outgoing of 4.0–4.1 of fodder unit by kilogram of gain in the live weight. The beef yield of carcass makes 57–59 %. The prolificacy makes between 10 and 11 pigs. Animals are dainty in keeping conditions and diet. Nevertheless, landrace breed is widely used at the territory of Russia and Kazakhstan.

Pigs have a range of biological and physiological features due to which they can be widely used in increase of world meat and fat production. Pigs convert different fodder into meat and fat better than cattle and sheep. Pig's meat has high nutrition and good eating qualities. Also, pigs differ in high birth rate. Under normal keeping conditions an adult pig can have two farrows a year with the average index of between 9 and 11 pigs in average for one brood. Pigs of contemporary stud breeds and spawns are marked by high rate of birth. Meat-type hog carcass killed at the age of between 6 and 9 months weigh between 80 and 100 kg. Extensive and lame-duck animal breeding industry in our country turned into intensive and profitable for a short period of time. Pig farming is one of the biggest brunches of our animal breeding by its organizational structure. Annually single enterprise farming engrosses hundreds of pigs in zones around large cities and industrial cluster. However, a significant share of consumed pig is still imported as the rate of pig's breeding does not cope with users' needs. Therefore, at present the branch of pig breeding demands further development which include increase in pig breeding and cost reduction. To carry out this task it is necessary to take on the task of differentiation, enlargement, and mechanization of pig's breeding as well as adopt high-technology of keeping and breeding. Stock breeding aimed at increase of yielding and adaptive features as well as proper choice must be considered according to certain conditions.

## 14 Breeds of camels zoned in Kazakhstan

Camels adapted for life in waterless deserts and dry steppes. Animals were able to adapt to such live style particularly to cullus on footsteps that protect. This feature makes it possible to unite camels and lama into a group of tylopoda. Calluses prevent burn when the soil is burnt by the sun as well as secure from injuries by sharp stones. Calluses are elastic and sand-friendly. Some calluses on kneels and other parts of the body touch the ground when the camel lying down.

Camels content with plants such as camelthorn which are inedible for other animals due to lack of food in deserts. They eat eagerly spiky sprouting that can spit shoe sole. Camels have a three-celled stomach that can digest practically every item except for nails. Camels, as well as other ruminant animals, have to fletcherize dry crops. At the same time, camels make do with a little amount of food.

Camels are well adapted to lack of water. They almost do not evaporate in the heat and thick coat save them from overheating. Also, they let sun rays increase their body temperature up to 40.5 degrees Celsius during the day and cooling up to 34–35 degrees at night.

Camel's body can lose 30 % of moisture, which is fatal for almost any creature, while a camel does not have a slight blood thickening. A camel can live without water for 45 days and the first 15 days, it will work normally, and eat a normal portion of dry hay. Consequently, the camel does not need water. He will gulp about 50 liters of water at the first opportunity.

It used to be thought that the stored moisture is kept in the camel's stomach. Later it was disclosed that true «water storages» of a camel are its fat deposits. More than one hundred grams of water can be obtained out of one hundred grams of fat. A fatted camel has massive fat deposits of 110–120 kg, which is in his hump. The better the camels eat, the higher its hump. Hump is not just for beauty. It sticks out on his back and the rest part of the body is freed from fat, and the camel does not experience heat. When animals are without water and food, they begin to use their fat reserves, providing themselves with water.

In general, there are two types of camels such as Asian double-humped or Bactrian and one-humped camel or Arabian camel the ship-of-the-desert. It is unlikely that a person would be able to master the desert, if not for these animals. There are about fifteen million camels in the world of which 90 % are Arabian camels.

**A double-humped camel (**Camelus bactrianus) is a large animal with a long neck and two lardaceous humps on a back. The length of its body is

between 250 and 360 cm, the height is between 180 and 210 cm, the tail is between 50 and 58 cm, the body weight is between 450 and 690 kg. In the deserts of Central Asia, it was known for a long time about the existence of a wild two-humped camel in the deserts, while European scientists still doubted the existence of wild camels. N.M. Przhevalsk was the first who brought skin and skeletons of a wild camel in 1878, who repeatedly observed them in Kumtag desert, east of Lake Lobnor. For several decades, it was assumed that the wild camel had disappeared, as there was no evidence about it. However, in 1943 wild camels were noticed again. A few years later, in the same area, the Mongolian operators first took a photograph and shot a short film about a wild camel. Currently, a wild two-humped camel lives in the Zaaltai Gobi (Mongolia). There may be one more range that is located in the region of Lake Lobnor (China). Once Haptagai, the so-called wild camels in Mongolian, was widespread throughout the Gobi and reached Central Asia and Kazakhstan to the westward, where their remains are known due to the kitchen waste 1500–1000 years BC. Nowadays, about 300 wild camels live in the most remote corners of shrubby deserts in summer, preferring wide valleys and small hills. In winter, they migrate 300–600 km to the south and often stay in the mountains that protect them from the wind, or along dry streams. If oasis with variegate-leaved poplars is not occupied by people, camels spend winter and especially autumn near them. Haptagai eats shrubby and semi-shrubby saltwort, like onion and prickly grass, bean caper bush with its juicy large leaves, eat ephedra and browse of saksaul, whereas in the winter period they eat eagerly leaves of poplar and sugar cane. Despite great endurance, wild camels are most affected by a small number of watering places since a person, mastering the desert, primarily occupies open sources. It was the main reason for the reduction of wild camel’s range in the past. Wild camels are characterized by wide migrations during the day, even with plenty of food, in the latter case, large migrations are associated with watering places. According to A. G. Bannikov, who observed the herd, camels get over 80–90 km per day. Most of the night and midday hours Haptagai has a rest, choosing takyr or a flat area near a lonely bush. Camels avoid laying down in dense scrubs, narrow and deep current of water, among stones, in cumulose sands, and other places where the surrounding area is poorly visible and it is easy to sneak up unnoticed. Camels are most active in the morning and evening hours. When Haptagai is disturbed, it always leaves for tens of kilometers without stopping. Camels have very keen eyesight, and, as observations have shown, they notice a moving person more than 1000 meters away. When they see a man, they stop grazing and stretch their necks, looking intensely towards

danger. Camels usually keep in herds of five or six. This herd consists of breeding queens and young. An adult male heads the herd. Often males can be found singly. Camel's female becomes pubescent at the age of three. Males take part in breeding, apparently, not earlier than 5 years of age. Camel’s rut takes place in January and February. During this period, fights between males can happen which sometimes are extremely fierce. Males press one another on the neck trying to knock down the opponent. Seldom they gnaw at each other, strike with their heads and front legs. During the rut, in search of females, wild camels sometimes attack herds of domestic camels, kill males and steal females. A camel’s pregnancy lasts about 13 months (365–440 days), so females give birth in a year. The female gives birth while standing and it is always one camel. The domestic camel feeds the cub with milk for more than a year, giving 4–5 liters of milk per day. Camel milk contains 6.4 percent fat. Wild camel is of exceptional scientific value and must be protected. The domestic two-humped camel, also called Bactrian, named after the ancient state of Central Asia - Bactria, differs little from the wild. Domestic camels have larger humps, a wider foot and well-developed callus on knees of front legs. Also, the proportion of the skull of domestic and wild animals is insignificant but stable. Finally, the color of the hair of domestic camels is quite variable - from light, sandy yellow to dark brown, while wild ones have a constant reddish brownish sand color. Double-humped camels have been domesticated long ago more than 1000 years BC. Camel is widely distributed in Mongolia, Northern China, and Kazakhstan as the animal is resistant to low temperatures. There are several breeds of domestic two-humped camels, for example, Kalmyk, Kazakh, Mongolian, etc.

**One-humped camel** (Camelus dromaderius) or dromedary is classified as a domestic animal. He has taller legs, one hump, shorter and lighter hair. It differs from Bactrian in the structure of its spinous process of the vertebrae and details of the skull structure. Absence of data about the wild one-humped camel and the fact that two humps first form in the embryo of the one-humped camel served as the basis for the assumption that the one-humped camel is just a domestic animal bred from a two-humped by a man. However, it is more likely that the wild ancestor of domestic dromedary extinct long ago. Most likely, he lived on the Arabian Peninsula. Arabs consider the central part of Arabia the cradle of dromedaries. A statuette of a loaded dromedary, whose age is more than 5000 years, was found in Egypt. Drawings depicting one-humped camels on the rocks of Aswan and Sinai must be the same age or older. In literature, both camels have been mentioned 700 or 600 years BC. Herodotus wrote a lot about camels in connection with the great importance

of these animals for wars. The dromedary was domesticated about 4000 BC somewhere in Arabia or North Africa. Dromedaries are common in Africa, Arabia, Asia Minor, India, Turkmenistan, Uzbekistan, and Kazakhstan, imported and are also found in Mexico and Australia. It was widely used in the study and development of the domestic area in Australia. Several breeds of dromedaries are known, including light, high-speed riding Maharis of North Africa, riding Indian Rajputana, heavy packaged Turkmen dromedaries, etc. The lifestyle and behavior of the dromedary are similar to those of Bactrian. Ho Dromedary is more resistant to high temperatures and does not tolerate frost. It can do without water and runs under the saddle in a day up to 80 km, developing a speed of up to 23.5 km/ h up to 10 days. The usual working speed of camels is up to 10 km/h. Dromedaries, as well as Bactrians, travel only 25–30 km per day in caravans, as they need to graze for a long time. Camel's ability not to drink water for a long period is determined not by the water deposit in their stomachs as it was previously considered as well as not by the fact that fat in the humps can decompose, as it was recently suggested. Camels feature is that they can lose up to 25 % of the bodyweight due to the loss of water while retaining moisture in the blood in a much larger amount than other animals. Also, an increase of temperature up to 40 degrees in a camel's body does not cause increased moisture loss, as in other animals. For example, a camel loses water 3 times slower than a donkey under the same conditions. Camels can drink quickly and often. Dromedary can drink up to 130 and 135 liters of water (i.e., 10 buckets). Bactrian drinks almost as much and fast. Dromedaries have estrum in winter but a little bit earlier in comparison to Bactrian. Dromedary female produces 2–2.5 times more milk up to 8–10 liters per day. Dromedaries and Bactrians produce prolific offspring, the so-called hybrids of one-hump and double-hump camel which are superior in stamina and strength to parents. However, when the hybrids are crossed with each other, the offspring is weak.

**Camel husbandry in Kazakhstan.** According to S.M. Terentiyev [1975] and P.V. Kugenev [1982], the range zone of camels is characterized by monotonous desert landscape with an insignificant supply of limnetic basin and a small amount of precipitation. Exotic vegetation of semi-deserts and deserts of Kazakhstan and Central Asia such as saltwort, sagebrush, zhussan, and cauline graminaceous plants, as well as other, derive a large stock of fodder. According to I.K. Dzhumagulov [1963], A. Baimukanov [1991] presence of fodder play in favor of camel's zone spread.

According to FAO/UNEP [1995] and D. A. Baimukanov and A. Baimukanov [2009], thoroughbred Kazakh Bactrians are most valuable

by yielding features and are well adapted to the sharp continental climate of Kazakhstan.

The genetic pool of camels in Kazakhstan is also represented by Kalmyk and Mongolian Bactrians, Turkmen dromedaries of Arvana breed and Kazakh dromedaries. Also, there is a large number of camel hybrids bred using the genetic pool of purebred Kazakh Bactrian.

Yielding camel husbandry develops mainly in the south-western region of Kazakhstan and Almaty region. The genetic pool of camels from the Mangyshlak peninsula is studied less than in comparison with other regions of Kazakhstan. This is primarily due to the difficult natural and climatic conditions of the Mangyshlak peninsula and the difficulty of introducing research into production.

In the conditions of Mangyshlak peninsula such breeds as Kazakh Bactrians of Mangystau population, Turkmen dromedary of Mangystau type, hybrids from crossing camels of Kazakh Bactrian with stallions of Turkmen dromedary, hybrids from crossing camels of Kazakh Bactrian with stallions of Kazakh dromedary are most spread.

**Breeds of camel bred in Kazakhstan.** Bactrians belong to Kalmyk breed. Camels of this breed are the largest in the world, have well-developed musculature, the backbone. Breeding queens weigh between 650 and 800 kg, whereas adult males weigh between 800 and 1000 kg. The main direction is meant and wool production. The taste of camel meat is not inferior to beef meat, the yield is up to 60 %. From camel meat, residents make a national dish such as Beshbarmak.

Animals give high-quality wool. Products made of camel wool are light and soft, very warm and do not pill. The average clip from one head makes eight kilograms; champions in breed give clipping up to twenty kilograms. The valuable economic qualities of Kalmyk Bactrians are explained by favorable living conditions as well as directed selection.

The development of milk production can become a perspective direction in the camel husbandry branch. The milk-yield of camels can reach 2000 liters for a full milk secretion (16–18 months). Camel milk in fat content (up to 6 %) is 3 times more saturated than mares' (2 %). Milk has a high protein content (4 %), milk sugar (5 %); is rich in vitamins C and A, and dietary mineral. Fermented milk product Shubat, which is made of camel milk, has unique nutritional, therapeutic, and prophylactic properties.

Kazakh camel (Kazakh Bactrian) is a breed of yielding production that gives meat, milk, and wool.

The current Kazakh camel is a compact, well-proportioned animal with a good exterior. The chest is wide and deep, the body is a little bit

longer, with widely placed humps. It has good wool coverage. The average clipping of stallions is twelve kilograms and the clip of a camel breeding queen makes 5.7 kilograms. Kazakh camels are bred in a relatively diverse environment of feeding and keeping, and therefore are not identical in size and type: along with large camels, there are small. Thus, camels bred in Kazakhstan belong to different types (offspring) of the Kazakh Bactrian breed of two-humped camels.

**Turkmen «Arvana».** It is a breed of a one-humped camel. The camels are inferior to Kazakh in live weight and productivity. Their wool is curly as astrakhan spitcurl. Camel's color has specific shades from light to dark brown. The wool has less amount of under hair and big quantity of guard hair.

Thoroughbred dromedary has one compact hump that is slightly shifted back and does not cover crest. Thoroughbred dromedary has a straight feature such as wool in the field of shoulder-blade is absent from Bactrian and hybrids (the so-called «epaulettes»); beard and mane are developed only in the upper third of the neck, bangs and «breeches» are absent, the hair on the sides and forearm is very convoluted.

**Improvement of camel breeds in Kazakhstan.** World experience shows that the basis for the successful development of productive livestock is the animal genetic pool adapted to specific climatic conditions and capable of producing the maximum amount of production.

Turkmen breed dromedary arvana is one of the most precious genetic pools of camels in Central Asia. This breed is unique from a biological point of view due to the zone of its spread. In particular, according to A. Amanmamedov, A.Ya. Okorokov Turkmen's dromedary breed is a lump of specialized camel meat and milk breeds and is characterized by great working capacity. Camel husbandry in Turkmenistan, Kazakhstan, and Uzbekistan will remain the main means of developing deserts and semi-deserts regions for the nearest decades. S.M. Terentiyev emphasizes that deserts occupy from 50 to 80 % of agriculturally used areas in Turkmenistan and Kazakhstan.

D. Baimukanov, A. Baimukanov, and B.S. Turumbetov describing the gene pool of camels in Kazakhstan note that in Kazakhstan and neighboring CIS countries, five breeds of camels are bred: Kazakh Bactrian, Kalmyk Bactrian, Mongolian Bactrian, Kazakh Aruana and Turkmen «Arvana». Also, interspecies hybridization of camels is practiced in Kazakhstan.

J. F. Leslie believes that natural selection combined with artificial selection is an integral part of farm animal breeding.

All breeds of camels bred in Kazakhstan and neighboring countries are an integral part of the genetic resources of farm animals that must be preserved in the 21st century.

Stock breeding must be carried out taking into account the breeding and genetic characteristics of each population of the type and line of camels. In general, stock breeding must be aimed at improving and animal breeding of a strong constitution combining basic economic benefits such as high milk yield, optimal live weight, and good wool productivity.

Kazakh breed of Bactrian camels is the main planned breed that specializes in milk and meat-wool productivity. The main method of increasing the milk production of Kazakh Bactrian camels is purebred breeding. According to A. Baimukanov, the most promising are animals corresponding to the following breeding parameters: the bodyweight is between 600 and 650 kg, milk productivity for twelve months of milk secretion is 1000 and 1200 liters of commercial milk with the fat content 5.0–6.0 %.

I. N. Nechayev and Z. M. Musayev consider that is it very difficult to maintain qualities of especially valuable parents because of the tendency to return to average productivity parameters in the offspring of breeding camels. Based on this, it is necessary to practice a single blood flow of Kalmyk Bactrian stallions in the breeding of Kazakh Bactrian.

The introduction of advanced theoretical developments is the basis of breeding development. In particular, maintenance of achieved improvements of the breed remains a current problem. According to N. T. Shevchenko «achieved improvement in the offspring was destroyed by further overlapping by animals of another, less suitable breed». This problem is especially relevant in camel husbandry, in particular, during interspecific hybridization of Kazakh Bactrians and Turkmen dromedary, as well as in the selection of hybrid breeding queens with purebred stallions. In this regard, it is necessary to use camel-stallions with a special genotype.

According to A. Baimukanov and D. A. Baimukanov, Kazakhstan is a center where breeding of both Bactrians and Dromedary is possible, in this regard, hybridization between them has become widespread, that is, various variants of crossbreeding.

Purebred Kazakh Bactrians are improved through targeted selection and choice of animals, and interspecific hybrids through the use of a corrective selection of hybrid breeding queens with purebred stallions. A highly productive genetic pool of purebred and hybrid camels, which has no analogs in the world, was bred due to the above-mentioned activities.

According to A. Baimukanov, D. Baimukanov, B. Turumbetov, and A. Tatibekov breeding of camels with high adaptive properties are biologically justified and efficient in desert and semi-desert zones of Kazakhstan with a total area of more than 210 million hectares. Genetic features are not taken into account in the context of the pure-breeding of Kazakh Bactrians because of poor studies of this issue. In conditions of the South Kazakhstan region, Kazakh Bactrian male camels are characterized by a live weight of 770 kg, female camels have a live weight of 602 kg. Clipping from male camels makes thirteen kilograms; female camels make 6.5 kilograms respectively.

A. Baimukanov and other note that animals of the desired type are superior to improved ones in both live weight and clipping describing the genetic characteristics of purebred Kazakh Bactrians of the desired type.

According to Z. M. Musayev, it is difficult for purebred Kazakh Bactrians to maintain high productivity in a generation. It is necessary to carry out interbreeding of Kazakh and Kalmyk Bactrian to increase Bactrian's heterozygosity.

According to D. A. Baimukanov, Kazakh Bactrians have high repeatability of milk yield such as 0.84–0.92. Therefore, according to the first lactation, it is possible to predict milk yield in the second and subsequent lactations.

Z. M. Musaev and A. Baimukanov believe that camel breeding in Kazakhstan should develop due to an increase in the number of purebred Kazakh Bactrian which differs in exterior and yielding depending on belonging to one or another zonal type. The authors distinguish the following types in Kazakh breed such as Kyzylorda, Ural-Bukeevsk, and South Kazakhstan. Kyzylorda type is the most numerous one.

Mild inbreeding is practiced in the camel husbandry to increase the genetic similarity of offspring with outstanding ancestors. Kazakh Bactrian camel stallions received from the mild inbreeding in the conditions of Suzak district of South-Kazakhstan region have such characteristics as the body weight is 760 kg, the clipping is 13.5 kg, the height is 185 cm between humps, the length of the body is 170 cm, chest girth is 242 cm, and metacarpal girth is 22.5 cm. Female camels have a body weight of 619.5 kg and the clipping is 5.5 kg. Female camels have such body measurements as 182.7–159.6–229.2–20.1 cm; the milk yield for twelve months of milk-secretion makes 1367 liters, which is a genetic potential of milk yield for one milk secretion exceeds 2700 kg.

B. L. Koshan, A. Baimukanov, D.A. Baimukanov believe that selection must be done due to such criteria as exterior, birth rate index, and milkiness on condition of pure-breeding of Kazakh Bactrians.

Ye.T. Turlybaev believes that in the selection of purebred Kazakh Bactrians it is necessary to pay attention to selection by color. In particular, Kazakh Bactrians of white color exceed herdmates with the traditional color by 12 % in the body weight, by 18 % in clipping, and by 3–7 % in body measurements.

According to D.A. Baimukanov, A. Baimukanov, line breeding is the highest step in selective breeding. Line formation begins with the selection of a particularly valuable group of breeding animals originating from a particular outstanding camel stallion. Ancestor plays a great role in line-breeding which is taken as a guide at any stage of work with the line.

A new line of a camel-stallion of Kazakh Bactrian breed of South-Kazakhstan type Kara-bura is received in the conditions of the industrial complex «Sozak» Suzak district, South-Kazakhstan region. Stallions have dark-brown, self-color, between 780 and 850 kg of body weight, and the clipping makes from 13.5 to 18.0 kg.

There is a line of camel-stallions of Kazakh Bactrian breed Sary-Almas under the conditions of PLC «Taushyk» Tupkaragansk region. All stallions have homogeneous claybank, body weight between 700 and 810 kg, and clipping makes from 10.0 to 14.0 kg.

The method of mild inbreeding in degree III x III must be used to ensure selection traits in offsprings of camels of Kazakh Bactrian breed under conditions of interline breeding.

B. S. Turumbetov and others recommend using inbreeding in degree III x IV in the breeding of camels of the Kazakh Bactrian breed. This allows fixing the best parents' yielding features in offspring.

According to A. Baimukanov, B. Turumbetov, and D.A. Baimukanov, it is necessary to practice an intensive selection of stallions to increase the breed improvement rate. This provides commercial milk yield from daughters with one-time milking of 3–4 liters.

N. Alibaev and D.A. Baimukanov developed a unique scheme for converting meat-wool and meat-and-milk Kazakh Bactrians of the South Kazakhstan type into the milk direction. Camels of meat and dairy and meat and wool productivity are mated with bura stallions of a dairy herd that has high milk mothers in the pedigree.

In the conditions of the Kyzylorda region, female camels of Kazakh Bactrian are characterized by high milk productivity, due to the uniformity of milk production throughout the entire period of active milk secretion.

According to B.S. Turumbetov cross-species hybridization of camels is one of the stores of milk yield increase.

Thus, the amount of milk yield depends on the species, blood relation, pasture, and feed conditions as well as keeping technology and others.

B. S. Turumbetov found that with an increase in blood relation of dromedary milk production increases, and vice versa, with an increase in blood relation with Bactrian milk productivity decreases. Moreover, a decline in milk productivity in the interval between three and six months of milk-secretion directly depends on pasture conditions and camels' growth.

Reduction to practice camel breeding of Kazakh Bactrian by milk yield, additional assessment, and selection by milk yield coefficient allows increasing milk production by 15–20 % and body weight by 7.5–10 % in comparison with the traditional selection method.

To increase the content of milk fat and protein in milk allows the use of stallions of Kazakh Bactrian of the western population in crossbreeding with hybrid breeding queens.

The three-way cross is widely used to create a collectible herd of hybrid camels. The use of Kazakh dromedary in interspecific crossing allows increasing the absolute fat content in milk by 12 % in comparison with Turkmen dromedary. Therefore, the breeding of hybrids by the three-way cross of interspecific crossbreeding is one of the promising areas in milk camel husbandry. That is, the best options for selecting parental pairs of camels are selection using hybrid female camels and stallions of Kazakh dromedary.

According to B. S. Turumbetov, thoroughbred Kazakh Bactrians of South-Kazakhstan, Ural-Bukeevsk, and Kyzylorda types are of special interest as well as two breeding population such as West and Mangystau that are of special value from the point of production increase both camels' meat and milk.

A. Akhmediyev defined the beneficial effect of interspecific hybridization of Kazakh Bactrian's breeding queens with stallions of Turkmen dromedary. Therefore, to increase meat production it is necessary to breed hybrid camels characterized by high growth.

A. Baimranov and D. A. Baimranov focus on the problem of maintaining interspecific heterosis in the further breeding of female hybrid camels.

Scientifically based system of fattening taking into account the age and sex of animals is one of the reserves that allow an increase in camels' meat efficiency.

Fattening efficiency, meat, and fat yield distinguish meat productivity of camels.

A. Baimukanov and other researchers have established utilization effectiveness of various breeding methods in the breeding of camels of Kazakh Bactrian South-Kazakhstan type of meat and wool productivity to increase slaughter yield and meat ratio. The use of inbreeding in degree

IV×IV allows providing a slaughter yield in young animals over two and a half years not less than 57.0 %; similar results were obtained with inbreeding-line crossbreeding – 57.0 %.

Outbreeding provides a slaughter yield of 56.5 %, top crossbreeding 55.0 % and bottom crossbreeding 56.4 %.

Hybrid animals of the first generation of Nara are significantly superior to individuals of purebred Kazakh Bactrian in meat productivity. The inheritance of these characters in hybrids of the second and third generations is on the paternal side.

The main problem of wool-and-meat camel husbandry is the production of high-quality camel meat.

The quality of the camel, as shown by numerous studies, depends on the breed of the camel, the age, sex, and fatness. Fatness depends, first of all, on the precocity of animals, applied keeping and feeding technology.

Studies on a comparative study of the productivity and exterior indicators of Bactrian camels and hybrid uterus of different generations show that hybrid animals of all generations are superior to Bactrian in about all the main body measurements are taken, which is very noticeable in the chest girth of animals.

According to I. K. Dzhumagulov, A. Tastanov and other researches, hybrid animals have a large and powerful physique, increased vitality and adaptability to breeding conditions.

A comparative analysis of the productivity of hybrid animals according to literature source showed that the action of dominant genes in hybrids is combined with over domination. The inheritance of milk productivity is intermediate, and in terms of live weight, hybrids exceed Bactrian up to 12.1 %.

Compatibility determines the conformity degree of the genetic pool of one breed to the genetic pool of another breed. In camel husbandry, at the interspecific crossing, the genetic pool of camel breeds is used, which significantly differ from each other in external forms, physiological characteristics, and analytical structure. Numerous studies have shown that interspecific crossbreeding of Kazakh Bactrians with Turkmen dromedaries leads to an increase in the endurance of the offspring in comparison with the original parental forms, i.e., a heterosis effect is observed.

Not every crossbreeding allows you to get offspring with the desired productive qualities. Only well-selected breeds with certain combinations can transmit valuable qualities to offspring by interspecific breeding.

Two hybridization methods are distinguished depending on initial parental forms: Kazakh when crossing female Bactrian with male Dromedary and Turkmen - crossing female Dromedar with male Bactrian.

Received hybrids of the first and subsequent generations have different names.

According to D. Baimukanov, P.V. Kugenev, hybrids of one and two-humped camels (dromedary and Bactrian) are well developed with a clear manifestation of heterosis in both prenatal and postnatal periods. The development of hybrids of the second and third generation is determined by the compatibility of parental pairs.

Young cattle retain heterosis at alternate mating.

Comparative analysis of body measurements showed that hybrid camels have a high growth degree.

Animal productivity depends on the quantity and quality of consumed feed.

**Camel husbandry yield**

**Camel milk.** Camel milk is a traditional product of eastern countries (Central Asia, the Middle East, the Arab countries of the Arabian Peninsula, it is included in children's diets in schools and kindergartens of the UAE). It is daily consumed and it is used at the production of cheese, ice-cream, cocoa, and others. In Kazakhstan and Turkmenistan, people cook national dishes and a beverage that is called shubat on a base of camel milk.

This milk has a sweeter and slightly salty taste compared to cow's milk due to the high content of the trape constituent. It is very useful. It contains calcium, phosphorus, iron, sulfur and many other useful trape constituents, camel milk contains much more sugar lactose and amino acids, and less casein protein. Among the health claims of camel milk is resistance to such chronic illness as an allergy.

You should get used to camel milk, gradually increasing its use.

**Shubat (or chal) (in the Kazakh language шұбат)** is a sour milk drink made of camel milk. It is a traditional Kazakh beverage. The Turkmen have a similar beverage that is called chal. In Kazakhstan, the beverage is drunk in the summer period and is called Shubat. Shubat has higher fat content (up to 8 %) in comparison with kumis. Chal must not be exported due to safety requirements. Fermented cream – agaran – is gathered from the surface of the beverage.

It is useful in asthma, tuberculosis, hepatitis, diabetes, and psoriasis. Vitamin content of C and D is three times more than in cow’s milk.

**The cooking method.** Fresh camel milk is poured into a wooden vat, preliminary adding ferment, then it is fastened or bottled up and leaving to clabber for one day. Shubat, unlike kumis, does not shake but mix before serving at the table. Shubat is thicker, unlike kumis and has a white color.

A feature of shubat preparation is also its preparation in a natural environment, which serves as a serious obstacle to the distribution of this drink. Shubat is prepared in 6-8 hours, the term of storage is limited because it clabbers every other day. The only possible way to prolong its storage is to place it in conditions with a temperature of no higher than 5 ° C, which is impossible without a refrigerator.

Table 1 – Some aspects of Shubat

| Performance | Camel milk | «Shubat (Chal)» |
|---|---|---|
| Acidity | 18 ° | 28 ° |
| Fatness | 4.3 % | 4.3 % |
| Lactose | 2.75 % | 1.3% |
| Dry matter, except fat | 8.2 % | 6.6 % |
| Minerals | 0.86 % | 0.7% |
| Ethanol | -- | 1.1 % |
| Ascorbic acid | 5.6 mg/% | 4,8 mg/% |

**Camel meat.** Camel meat resembles veal but a little harsh and has a sweetish flavor.

The first mention of camel meat dates back to biblical times. Moses' laws forbade the use of camel meat although people drank it and continue drinking. Camel meat was the basis of traditional nomadic cooking. Nomadic tribes could use only long-term storage products or eat the meat of animals that they carried with them: usually, these animals were camels. Nomadic tribes exchanged camel meat for other products and objects. So, camel spread around the world.

Camel meat was considered a delicacy in ancient Rome and Persia. In Mongolia, valuable fat was melted from camel meat. Camel is widely distributed in North Africa, the Middle East, and Central Asia. For Russia, camel meat is still rare; the closest place where people can get it is Kazakhstan.

Camel, without internal fat, is considered a dietary product.

Camel meat is considered an excellent remedy to increase potency in Arabic countries.

Many parts of a camel are eaten: from fleshy tongue to whip-like tail. Camel meat resembles beef to taste and the younger it is, the more valuable

and tastier it. Camel meat, like other meat, can fry, boil, and stew. Stews, pastes, barbecue, burgers, shawarma, and belyash can be prepared too.

Camel meat is easily cooked in both large and small pieces. The best meat is considered from the camel's hump it is usually fried with spices or stew. The meat from the thigh is cut into minced meat and meat balls baking them in the marinade. Soft feet are fried over an open fire, seasoned with plenty of spices. The stomach and heart are usually stewed with vegetables.

Tender camel meat is part of a famous Moroccan dish - tajine. It is easy to cook: meat is mixed with vegetables and baked in a traditional clay pot.

The meat of an adult camel must be cooked for 4 hours. If you want to fry meat of shallow corrugation it is necessary to marinate it in vinegar for three hours, in advance after that it will soften significantly and will taste better. It is better to use a thin end of a young animal or a sirloin for frying.

Features

Camel meat is useful for the skin health and jelly coat, nerve and digestive systems. Microelements that are a part of meat regulate the level of sugar in the blood. Camel meat has anti-oxidant.

Composition

Camel meat is endowed with phosphorus, potassium, iron, vitamins B1, B2, B9, PP, C, E, and A. It does not have an internal fat layer and is supposed to be dietary.

Cooking time of camel meat

A kilogram piece of camel meat must be cooked for 45–55 minutes.

Calorie content and nutritional value of camel

The caloric capacity of camel meat is 160.2 kcal

Nutrition value of camel meat: protein substance is 18.9 gram, fat is 9.4 gram, and carbohydrate is 0 gram.

**Camel's wool.** Camel's wool is extremely soft, smooth, light, and of good quality. The best wool in order of merit obtains from young camels. The thickness of its fibers is 16–18 microns.

Wool fiber thickness is of twenty microns and the length is 43.5–45.5 microns from young camels (at the age of one to three years). Camels over three-year-old have wool fiber thickness of twenty-four microns at length 44.5–45.5 microns. Camel wool is distinguished in three colors:

- white (the color of baked – wool of this color is more expensive than the wool of other colors) ;
- beige;
- chestnut or brown.

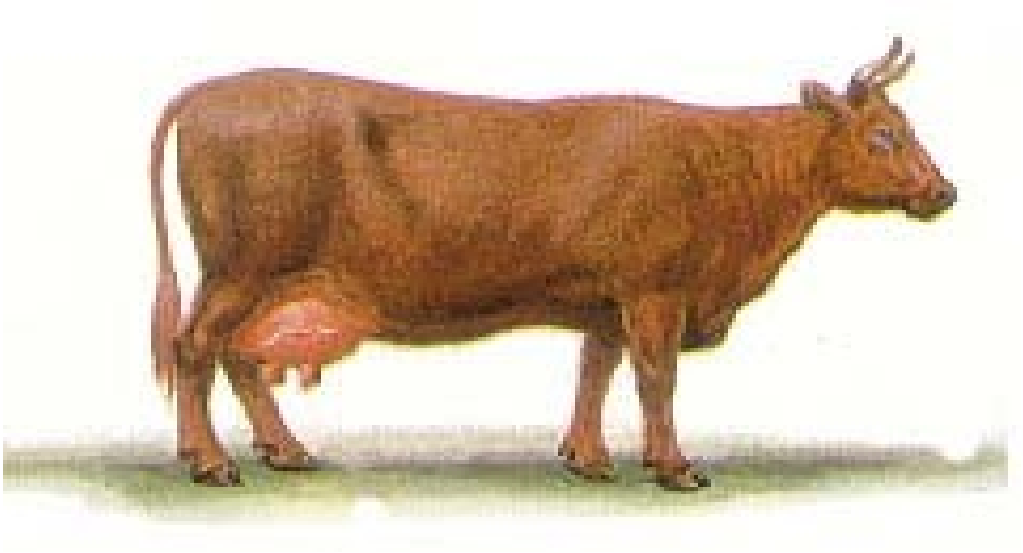
Items made from camel wool are usually left unpainted or painted in darker beige tones due to the color beauty and not to lose valuable wool features. Wool features allow making the best yarn to knit various garments from them. Camel wool is very popular in the global market and the textile industry.

The processing of camel wool into final products is a complex process that requires time and skill. Shepherds gather camel's hair. Animals are combed by hand during the spring when animals cast their coat. Then, the camel's wool goes under other processing stages. These are gradation and fabric weaving or knitting.

**Breeds of farm animals bred in Kazakhstan**

Picture 1 – The black-and-white breed

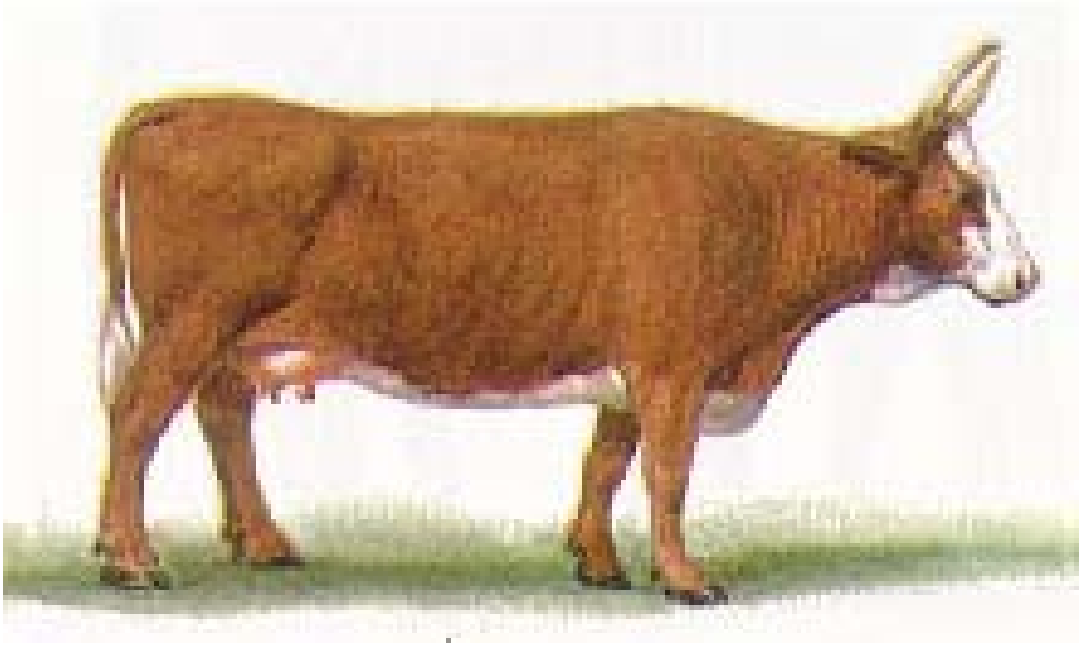
Picture 2 – Simmental breed



Picture 3 – The red-steppe breed

Picture 4 – A stud-bull of Hereford breed

Picture 5 – A stud-bull of Aberdeen-Angus breed



Picture 6 – Kalmyk breed

Picture 7 – A stud-bull of Kazakh white-head breed

Picture 8 – A stud-bull of Auliekol breed

**Horse breeds bred in Kazakhstan:**

Picture 9 – Mugalzhar breed

Picture 10 – Kustanai breed

Picture 11 – Horses of Bestau industrial type of Kazakh zhabe breed out at grass

Picture 12 – A stallion of Kushum breed

**Sheep breeds zoned in Kazakhstan**

**N** Picture 13 – North Kazakh Merino

Picture 14 – Sheep breed етти-merino

Picture 15 – A ram of Edilbai breed

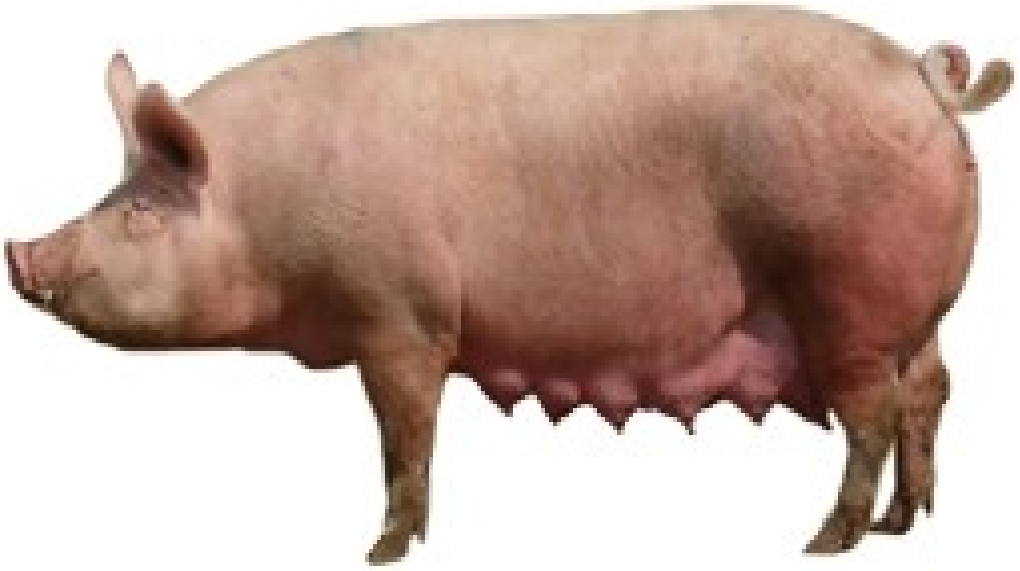
Picture 16 – Kazakh fat-rumped sheep of coarse wool breed

**Camels breeds bred in Kazakhstan**

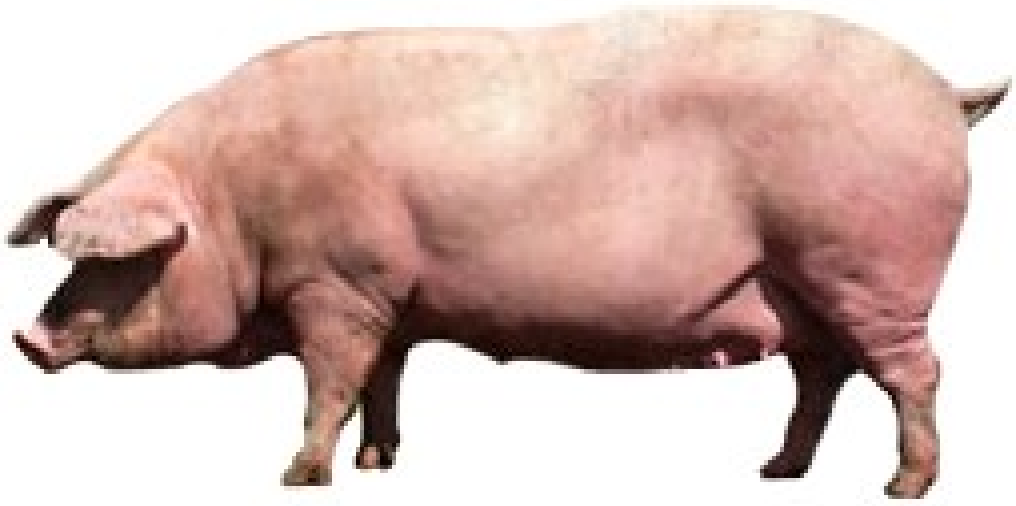
Picture 17 – One-humped camel – dromedary

Picture 18 – Two-humped camel - Bactrian

**Pigs breeds zoned in Kazakhstan**

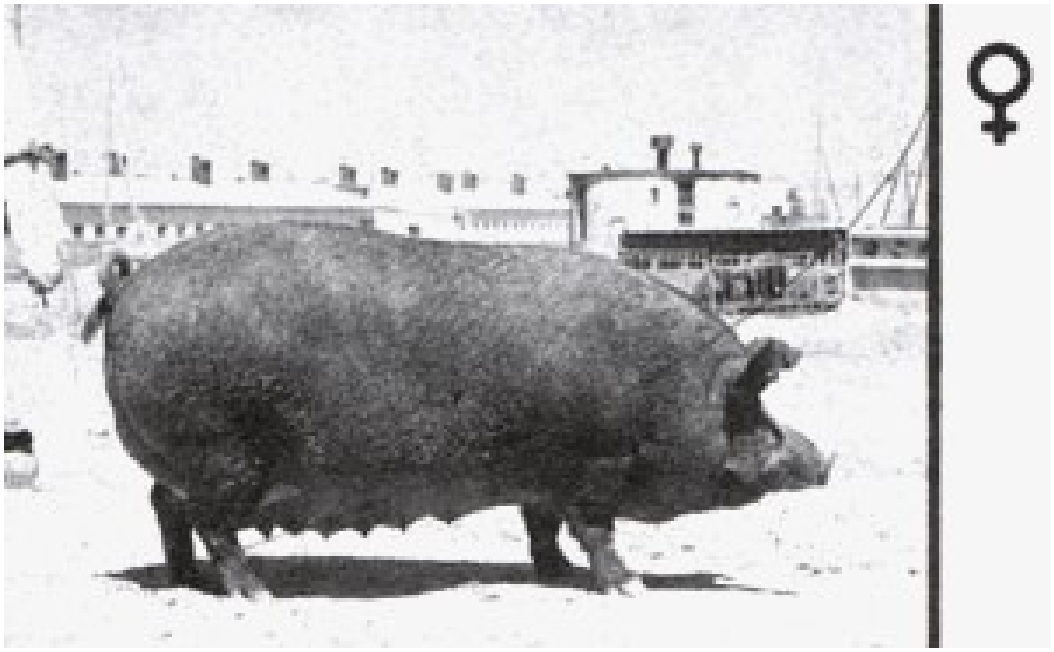


Picture 19 – A White-Large pig breed



Picture 20 – A sow of Landrace breed

Picture 21 – A sow of Kemerovo breed



Picture 22 – Semirechensk pig breed

## Test questions

**1. What is the breed?**

A) a big group of animals created by human labor that has common origins that transfers valuable economic traits by inheritance and that is characterized by a specific type and developed following the economic requirements of the period;

B) a numerous group of animals, created by human labor, of the common genetic root and adapted to certain conditions but that does not transmit qualitative signs to offspring fast;

C) sufficient group of animals that has a certain distribution area without a common genetic root and possessing good reproductive and adaptive qualities;

D) a group of animals created by human labor that has one linear stallion, firmly conveying useful economic traits to offspring and which is characterized by a certain type of constitution and exterior;

E) a breed is a group of animals that produce meat, milk, fur and other types of products.

**2. A constituent of the pedigree:**

A) a breed consists of the interbreed and plant types as well as lines and families;

B) a breed consists of zonal types and several lines;

C) a breed consists of offspring, breed and interbreeds types, lines and families;

D) a breed consists of offspring, lines and several families;

E) a breed consists of a large number of animals that are related to each other.

**3. Breed constancy:**

A) is a stable number of animals in the breed;

B) is a constant transmission of traits (qualitative and substandard) to offspring;

C) is a constant transmission of good parental qualities to offspring;

D) is a constant transmission of separate substandard qualities to offspring;

E) is plasticity or variability of the breed depending on the direction of the selection.

**4. The breed line:**

A) is a group of animals originated from one outstanding ancestor joined among themselves by the mother line in several generations and productive qualities that exceed the average index of the breed;

B) is a sufficient group of animals originated from high productive stallions and breeding queens that exceed the average index of the breed by the productive qualities;

C) is a group of animals originated from one high productive stallion that constantly transmits its qualities to offsprings;

D) is a group of highly productive animals received with the help of the crossbreeding of unrelated breeds that belong to different families;

E) is a group of highly productive animals received with the help of the crossbreeding of animals of different breeds.

**5. Selection based on the phenotype feature:**

A) is due to the individual qualities and signs such as exterior, efficiency, and reproductive qualities;

B) is due to color, gender, and species;

C) is due to the origin and offspring quality;
D) is due to the exterior and body features as well as offspring quality.

**6. Selection based on the genotype feature:**
A) is due to the body features, exterior and offspring quality;
B) is due to the exterior efficiency and reproductive qualities;
C) is due to the origin and offspring quality;
D) is due to the reproductive features;
E) is due to the origin of the animal.

**7. The Heterosis is:**
A) a quality of hybrids of the first generation to show certain qualities to a greater extent than the parental forms;
B) a quality of hybrids of the second generation to show certain qualities to a greater extent than the parental forms;
C) a quality of the hybrids of the third generation to show certain qualities to a greater extent than the parental forms;
D) a quality of hybrids of the fourth generation to show certain qualities to a greater extent than the parental forms;
E) a quality of hybrids not to show qualitative signs of parents in the offspring.

**8. The breed zoning is:**
A) a distribution of animal breeds in certain areas of the region due to their high productivity;
B) a distribution of animal breeds and breed groups of animals in different regions due to their adaptive qualities to the climatic and forage conditions of a particular region;
C) distribution of the breeds, breed groups of animals due to their high productivity, economic efficiency, and adaptability to the conditions of a given region or zone;
D) a distribution of the breeds, breeds group of animals of combined productivity in one or another zone of the animal breeding;
E) the breed zoning is breeding of farm animals received by the way of the crossing of several breeds among themselves.

**9. Breeds of the cattle zoned in Pavlodar region**
A) Simmental, the red steppe, Kazakh White-Large, Hereford, brown Latvian, black-and-white, Auliekol;

B) Kazakh White-Large, Hereford, Schwyd, Alatau, Simmental, and red steppe;

C) Simmental, red steppe, Kazakh White-Large, Aberdeen - Angus, brown Latvian, Black-and-white;

D) Kazakh White-Large, Simmental, red steppe, Kalmyk;

E) Zebu, Black-and-white, red steppe, Kazakh White-Large, Hereford, Kalmyk.

**10. The plan of selection and breeding work includes:**

A)seven section (list);

B) six section (list);

C) five section (list);

D) four section (list);

E) three main section (list);

**11. The pure breeding it:**

A) is the mating of animals within the same breed, animals belonging to different breeds, but related to each other, animals of the 4th generation of hybrids;

B) is the mating of animals of several factory breeds among themselves;

C) is the mating of animals only within one breed;

D) is the mating of animals of different breeds among themselves;

E) is the mating of animals of two lines belonging to different breeds;

**12. The animal crossbreeding it:**

A) is the mating of animals within the same breed;

B) is the mating of animals belonging to different breeds and species;

C) is the clash of two stallions for owing a dam;

D) is the mating of animals of two families and lines belonging to the same breed;

E) is the mating of animals of different breeds up to 5 - 4 generations among themselves.

**13. The hereditary capacity it:**

A) is a special individual power of heredity allowing to repeat in the offspring more positive qualities of the stallion;

B) is the phenomenon leading manufacturers to impotence;

C) is a phenomenon that encourages manufacturers to show particular sexual activity;

D) is a phenomenon that allows you to get heterogeneous offspring in nature that is not similar to each other in type, exterior and productivity;

E) is the power of heredity allowing to get homogeneous heirs of similar productivity in the offsprings.

**14. The selection differential it:**

A) is the difference between the average value of the trait of the breeding group of animals and the average value of the trait of the main herd;

B) is a mathematical treatment of breeding achievements in breeding work with the herd;

C) is a change of the breeding traits with an appropriate organization of selection and matching;

D) is the age interval of generations of farm animals;

E) is a selection effect due to the proper organization of animal breeding.

**15. The breed testing it:**

A) is the explanation of features of animal growth and development as well as the formation of productivity of young animals under certain climatic and fodder conditions of the breeding zone;

B) is the breed testing for labor and productive quality;

C) is the testing of farm animals in transport and traction operations;

D) is a generalization and analysis of materials for the appraisal of breeding livestock;

E) is the evaluation of adult animals of the tested breeds by body weight, slaughter yield, constitution, and exterior.

**16. Evaluation criteria for tested animal breeds.**

A) is high productivity, payments for food by-products, reproductive qualities and economic efficiency;

B) is high productivity, payments for food by-products, adaptive qualities;

C) is high productivity, payments for food by-products, typicality of the breed;

D) is high milk productivity, good adaptive qualities of the tested animals, strong habitués and good exterior;

E) is high meat productivity, adaptability to the area of living, good payments.

**17. Most effective breeding results are achieved doing the breeding in the area or region:**

A) with no more than 2 breeds of one animal species;

B) with no more than 4 breeds of one animal species;
C) five breeds of the same species;
D) with no more than 3 breeds of one animal species;
E) six breeds of one animal species;

**18. Organizations that deal with the breed testing in the regions are:**

A) regional institutes, experimental stations, specialists of agricultural industry and farms;
B) heads of agricultural units and zoo vets specialists;
C) ministry of Agriculture of the Republic, district and regional departments of agriculture;
D) research institutes, specialists of regional departments of agriculture;
E) regional experimental stations.

**19. To provide the comparative assessment the following breeds are chosen:**

A) breeds that were previously recommended by the plan of the region breeding as well as the breeds that are not included in the plan but used in separate farm zones;
B) animals recommended by the breed zoning plan;
C) animal breeds not recommended by the breed zoning plan;
D) breeds of cattle imported from abroad without a preliminary analysis of their qualitative data;
E) breeds of animals not included in the breed zoning plan and that had not previously been bred in this area.

**20. The number of sheep of the tested breed should be:**

A) not less than 100 heads;
B) not less than 150–200 heads;
C) not less than 300 heads;
D) not less than 1000 heads;
E) not less than 2000 heads;

**21. The number of tested native horse breeds should be:**

A) not less than 10 heads;
B) not less than 20 heads;
C) not less than 50 heads;
D) not less than 100 heads;
E) not less than 200 heads;

**22. The number of tested breed of the selected cattle should be:**

A) not less than 10 heads;
B) not less than 20 heads;
C) not less than 50 heads;
D) not less than 100 heads;
E) not less than 200 heads;

**23. For a reliable assessment of the species, large animals are selected at the age of:**

A) 0,5–1,5 years;
B) 1,5–2 years;
C) 2–3 years;
D) 1–5 years;
E) 10 years;

**24. The duration of the breed tests of animals:**

A) 1–2 years;
B) 2–3 years;
C) 3–4 years;
D) 4–5 years;
E) 10 years;

**25. Breeding methods of the tested animal breeds:**

A) the purebred, hybrids ‘in themselves’
B) the reproductive mating;
C) the absorption crossbreeding;
D) the alternating crossbreeding;
E) the industrial crossbreeding.

**26. What is the classification of the horse breeds by Franko-Nering**

A) local and industrial;
B) east and west;
C) south and north;
D) fast and slow;
E) plateau, forest, and steppe.

**27. What is the classification of the horse breeds by Yuarta**

A) local and industrial;
B) east and west;

C) south and north;
D) fast and slow;
E) plateau, forest, and steppe.

**28. What is the classification of the horse breeds by Brunner**
A) local and industrial;
B) east and west;
C) south and north;
D) fast and slow;
E) plateau, forest, and steppe.

**29. What is the classification of the horse breeds by Middendorf**
A) local and industrial;
B) east and west;
C) south and north;
D) fast and slow;
E) plateau, forest, and steppe.

**30. What is the zootechnical classification of horse breeds?**
A) local and industrial;
B) east and west;
C) south and north;
D) fast and slow;
E) plateau, forest, and steppe.

**31. The main aim of animal selection:**
A) is a process of breed improvement;
B) is a constant improvement of useful signs of animals;
C) is a compilation of the best parenting pairs to produce the offspring of the desired type;
D) is a transfer of individual qualities of an outstanding ancestor to a group of animals and their distribution in the breed;
E) is a creation of highly productive descendants from an outstanding ancestor.

**32. What appraisal of farm animals is?**
A) An extensive assessment of animals based on attributes and their distribution into classes;
B) purebred breeding, interbreeding, hybridization;
C) related breeding of livestock;
D) unrelated breeding of livestock;

E) mating of animals belonging to different breeds.

**33. Methods of livestock breeding:**
A) factory and commercial;
B) purebred, interbreeding, hybridization;
C) related breeding of animals;
D) unrelated breeding of farm animals;
E) mating of animals belonging to different breeds.

**34. What inbreeding is:**
A) animal assessment due to its efficiency;
B) purebred breeding, interbreeding, hybridization;
C) related breeding;
D) unrelated breeding;
E) mating of animals belonging to different breeds.

**35. What outbreeding is?**
A) animal assessment due to its efficiency;
B) purebred breeding, interbreeding, hybridization;
C) related breeding of animals;
D) unrelated breeding of animals;
E) mating of animals belonging to different breeds.

**36. What crossbreeding of farm animals is:**
A) hybridization of farm animals;
B) purebred breeding;
C) related breeding;
D) unrelated breeding;
E) mating of animals belonging to different breeds.

**37. Goals and aims of industrial crossbreeding:**

A) mating of representatives of 2 or more breeds with the subsequent breeding of the hybrid of the desired type «in itself»;

B) improvement of individual qualities of animals of any breed without significant changes in their type and basic properties;

C) to change an unproductive breed by subsequent mating of dams of each new generation with stallions of the highly productive breed;

D) crossbreeding of animals different in body type and origin as well as the subsequent cultivation of hybrids of the first;

E) receiving of hybrids and their subsequent, alternate, in each generation, crossing with stallions of two or more breeds.

**38. Goals and aims of alternate crossing:**

A) mating of representatives of 2 or more breeds with the subsequent breeding of the hybrid of the desired type «in itself»;

B) improvement of individual qualities of animals of any breed without significant changes in their type and basic properties;

C) to change an unproductive breed by subsequent mating of dams of each new generation with stallions of the highly productive breed;

D). crossbreeding of animals different in body type and origin as well as the subsequent cultivation of hybrids of the first;

E) receiving of hybrids and their subsequent, alternate, in each generation, crossing with stallions of two or more breeds.

**39. Choose the ratio of close inbreeding:**

A) II-I, I-II, II-II, III-II;

B) II-II, II-III and III-II;

C) III-III,III-IV,IV-III and IV-IV;

D) III-V,IV-V,V-IV and V-V;

E) III-IV and IV-III.

**40. The system of large-scale selection means:**

A) it is a system of interrelated activities that ensure the improvement of the hereditary qualities of animals in a large array of livestock;

B) growth, assessment and selection of duplicate stallions due to the development, exterior, reproductive and adaptive capacity;

C) stallion assessment due to the quality of offsprings;

D) creation of a system for collecting, accumulating and processing data of breeding records by breed using genetic and mathematical methods;

E) immunogenetic certification of the origin of breeding animals, cytogenetic assessment of stallions, embryo transplantation.

**41. The breeding data bank due to the breeds includes:**

A) information about mothers of stallions including data about the productivity and breeding value of the stallions themselves, and their ancestors;

B) information about the producers, including data about the productivity and breeding value of the stallions themselves and their ancestors;

C) information about stallions' daughters;

D) selection and genetic, zoo-technical, and economic parameters characterizing the entire breed population;

E) automated Information System (AIS).

**42. Heterosis is an …**

A) effect obtained by purebred breeding of animals of different lines;

B) effect obtained by crossing animals of two or more breeds in the third generation;

C) effect obtained by crossing animals of two or more breeds in the first generation;

D) effect obtained by crossing animals of two or more breeds in the second generation;

E) effect obtained by crossing animals of two or more breeds in the fourth generation.

**43. What are the methods of purebred breeding**

A) absorbing, introductory;

B) outbreeding, inbreeding;

C) variable, industrial;

D) two-and multi-breed;

E) plant, introductory.

**44. The structural compound of the breed:**

A) Offspring, interbreed type, line, family, plant;

C) Line, a family, interbreed type and plan types;

D) Families and lines;

E) highly proficient stallions and dams of different lines and families.

**45. The main goals of the breed testing:**

A) Identification of breeds, breed groups and interbreed factory types most suitable for breeding in these specific conditions and giving maximum production with minimal costs for its production;

B) Compilation of genetic and phenotype characteristics of breeds as well as groups to provide the breeding work to provide productivity at the given natural and climatic conditions;

C) Identification of the best stallions from the number of compared breeds and the establishment of more profitable options for crossing different breeds with each other;

D) Identification of the best dams of the compared breeds for crossing;

E) Compilation of the phenotype characteristics of breeds to provide the breeding work on improvement of their productivity at the given natural and climatic conditions.

**46. The primitive breeds are:**

A) the breeds formed under the influence of the natural and climatic as well as fodder conditions;

B) the breeds formed under the influence of human labor;

C) the breeds formed under the influence of fodder conditions;

D) the breeds formed under the influence of economic and natural and climatic conditions;

E) the breeds formed under the influence of the aimed selective farm work.

**47. The plant breeds are:**

A. the breeds formed under the influence of the natural and climatic as well as fodder conditions

B. the breeds formed under the influence of human labor

C. the breeds formed under the influence of fodder conditions

D. the breeds formed under the influence of economic and natural and climatic conditions

E. the breeds formed under the influence of the aimed selective farm work and human labor.

**48. The transitional breeds:**

A) the breeds formed under the influence of the natural and climatic as well as fodder conditions;

B) the breeds received at the crossbreeding of two and more breeds;

C) the breeds transported from one ecological zone to another;

D. the breeds formed under the influence of economic and natural and climatic conditions;

E) the breeds that take an intermediate position between the factory and primitive breeds.

**49. What sheep breed was received by the way of hybridization?**

A) fine-fleeced;

B) Karakul;

C) Arharomerinos;

D) Edilbai;

E) semi fine-fleeced.

**50. Selection type of animal can be:**

A) simple and complicated;
B) single and diverse;
C) superficial and deep;
D) individual and group;
E) fast and gradual.

**51. Livestock breeds on the fact of productivity are divided into:**
A) Milk;
B) Meat;
C) Combined;
D) Low – milk;
E) Labour.

**52. The breeds of pigs on the fact of productivity are divided into:**
A) Greasy;
B) Meat and fat;
C) Meat;
D) Boar;
E) Piglet.

**53. Acclimatization of the breed it:**
A) is an animal adaptation to new environment conditions;
B) is breed flexibility;
C) is breed degeneration;
D) is breed rebirth;
C) is breed constancy and resistance.

**54. Factors of the breed formation:**
A) socio-economic, climatic, and fodder;
B) natural and climatic;
C) pasture and winter pasture;
D) social;
E) economical.

**55. What breeds participated in the creation of thoroughbred riding horse**
A) Arab, Barbaric, Turkish;
B) Kazakh, Russian Don, Streletsk, Orlov-rostopchinsk, thoroughbred riding;
C) Kazakh, thoroughbred riding, half-blood riding, Orlov and Russian trotters;

D) Arab, Danish, and Dutch;
E) Local harness, Brabancons.

**56. What breeds participated in the creation of Kostanay breed**

A) Arab, Barbaric, and Turkish;
B) Kazakh, Russian Don, Streletsk, Orlov-rostopchinsk, thoroughbred riding;
C) Kazakh, thoroughbred riding, half-blood riding, Orlov, and Russian trotters;
D) Arab, Danish, and Dutch;
E) Local harness, Brabancons.

**57. What breeds participated in the creation of Kushumskaya breed**

A) Arab, Barbaric, and Turkish;
B) Kazakh, Russian Don, Streletsk, Orlov-Rostopchinsk, thoroughbred riding;
C) Kazakh, thoroughbred riding, half-blood riding, Orlov, and Russian trotters;
D) Arab, Danish, and Dutch;
E) Local harness, Brabancons.

**58. What breeds participated in the creation of Soviet heavyweight breed**

A) Arab, Barbaric, and Turkish;
B) Kazakh, Russian Don, Streletsk, Orlov-Rostopchinsk, thoroughbred riding;
C) Kazakh, thoroughbred riding, half-blood riding, Orlov, and Russian trotters;
D) Arab, Danish, and Dutch;
E) Local harness, Brabancons.

**59. What breeds were received with the participation of the Kazakh horse breed**

A) Russian Don, Karabakh, Karabay;r
B) Thoroughbred, riding, Orlov, Tver;
C) Budenov, Kustanai, Novokirgiz, Ukrainian;
D) Russian trotter, Kushum;
E) Kushum, Kustanai, Mugalzhar.

**60. In what century did the concept of “breed” appear?**

A) 7-8th centuries;
B) 13-14th centuries;
C) 12th century;
D) 11th century BC;
E). 20 century.

**61. The type of selection of animals can be:**
A) simple and complicated;
B) single and multiple;
C) superficial and deep;
D) individual and group;
E) fast and gradual.

**62. The underdevelopment of the offspring in the postembryonic period is called?**
A) Infantilism;
B) Correlation;
C) Phylogenesis;
D) Embrionality;
E) Ontogenesis.

**63. For how many years make up a plan of breeding work with the breed, which determines the main direction of the breeding work, depending on the tasks?**
A) from 1 year to 5 years and more;
B) from 3–20 years and more;
C) 5–10 years;
D) 10–15 years;
E) 15–20 years.

**64. A type of crossing in which unproductive dam of one breed is crossed with highly productive stallions of another breed in a number of generations?**
A) reproductive;
B) absorbing ;
C) introductory;
D) variable;
E) industrial.

**65. A type of crossing, the essence of which is the creation of high productive herds to practice the heterosis effect at the practice?**

A) reproductive;
B) absorbing ;
C) introductory;
D) variable;
E) industrial.

**66. A type of crossing, the purpose of which creation of a new, qualitatively better breed which is based on two or several initial breeds?**

A) reproductive;
B) absorbing ;
C) introductory;
D) variable;
E) industrial.

**67. What are the two groups buffaloes divided into?**

A) Asian, European;
B) African, Asian;
C) European, African;
D) Caucasian, Asian;
E) Caucasian, European.

**68. What type of bulls do the breeds of banteng, gaur, and gayal belong to?**

A) South African;
B) North African;
C) West Asian;
D) South Asian forehead;
E) North Asian.

**69. What breed was received in the USA with the participation of zebu bulls?**

A) Santa Claus;
B) Santa Cruz;
C) Santa Maria;
D) Santa Barbara;
E) Santa Gertrude.

**70. The gestation period for mares is?**

A)114 days;
B) 340 days;

C) 285 days;
D) 30 days;
E)150 days.

**71. Mating of animals belonging to different breeds is called?**
A) Interbreed;
B) Inbreeding;
C) Crossbreeding;
D) Blood freshening;
E) Hybridization.

**72. The mating system of animals of one breed is called?**
A) Thoroughbred;
B) Crossbreeding;
C) Interbreed;
D) Matching;
E) Selection.

**73. Red steppe breed is a breed, what kind of animals does it belong to?**
A) Pigs;
B) Horses;
C) Sheep;
D) Livestock;
E) Birds.

**74. Acclimatization of the breed it**
A) is the variability of the breed depending on the direction of selection;
B) is fastness in transmitting posterity signs;
C) is the adaptation of animals to new living conditions (climate, feed and housing conditions);
D) is a short description of climatic and fodder conditions;
E) is breeding of test groups of thoroughbred hybrids.

75. **When breeding sheep breeds, accounting and evaluation are subjects of:**
A) animal selection, animal diet, feeding conditions, and evaluation results;
B) evaluation of feed intake, live weight, breed test;

C) determination of milk production, breeding efficiency, payments for food by-products, and evaluation;

D) fertility, average hair length, and live weight;

E) wool clip and quality, individual evaluation results, survival rate, live weight, payment for food by-products, milk production of dams, and reproductive qualities.

**76. What is the selection?**

A) this is a set of biological processes;

B) this is the choice of the best parental pairs for mating;

C) this is a change in the genetic structure;

D) this is the emergence of fundamentally new signs;

E) this is selective permission to breeding.

**77. According to the quantity and quality of labor, spent on the formation of breeds what are three-group farm animals divided into?**

A) interzonal, zonal and local;

B) aboriginal, plant, and transitional;

C) aboriginal, interzonal, and transitional;

D) plant, transitional, and local;

E) transitional, zonal, and aboriginal.

**78. What are the basic principles of breed zoning**

A) low productivity, unsuitability of the breed to climatic conditions, poor reproductive qualities, economic inefficiency in terms of value;

B) low fertility, low productivity, inability to climatic conditions, low live weight, low quality of the products obtained;

C) the unsuitability of breeds and breed groups for zoning to specific conditions, high cost of feed per unit of production, low quality of products, economic inefficiency in terms of value;

D) guarantee of high productivity of the breed at a low cost of labor and resources, payments for food by-products, high reproductive qualities, economic efficiency in terms of value;

E) average reproductive qualities, costs of material resources, good adaptive qualities to the conditions of detention, low payments for food by-products.

**79. The sperm of wild ram argali was used when breeding the breed.**

A) saxon Merino;

B) american ramboule;

C) spanish merino;
D) soviet merino;
E) kazakh arharomerinos.

**80. Evaluation of the animal due to the genotype is made:**
A) by origin and quality of offspring;
B) on the exterior;
C) by animal color;
D) according to the behavior of the animal in the herd;
E) by animal age.

**81. The underdevelopment of the fetus in the prenatal period is called?**
A) infantilism;
B) correlation;
C) phylogenesis;
D) fetalism;
E) ontogenesis.

**82. For how many days does the insurance of feed in the winter period for horse herds can be calculated?**
A) 15;
B) 30;
C) 10;
D) 17;
E) 20.

**83. Blood flow is the second name of ..?**
A) reproductive crossbreeding;
B) interval crossbreeding;
C) industrial crossbreeding;
D) absorbing crossbreeding;
E) introductory crossbreeding.

**84. Due to which breeding method can inbreeding arise?**
A) hybridization;
B) thoroughbred;
C) reproductive;
D) alternating;
E) introductory;

**85. The sequence in reproductive crossbreeding is the following**:
A) transformation – fixation – completion;
B) completion – fixation – transformation;
C) completion – transformation – completion;
D) transformation – completion – fixation;
E) fixation – completion – transformation.

**86. What method of linear animal breeding is called crossing?**
A) mating of animals of different lines;
B) top-crossing;
C) in-crossing;
D) hybridization;
E) reproduction.

**87. Comprehensive animal evaluation it is:**
A) animal evaluation by the exterior;
B) assessment by results of the evaluation;
C) evaluation by the type of constitution;
D) evaluation by the signs of heterosis;
E) evaluation by the selection features.

**88. Purebred breeding it is:**
A) mating of animals of different breeds;
B) mating of animals within the same breed;
C) reproductive;
D) industrial;
E) hybridization.

**89**. **A group of animals originating from one outstanding ancestor and steadily transmitted valuable qualities to offspring**
A) family;
B) evaluation;
C) line;
D) breed;
E) selection.

**90. Simple mating of inbred stallions of one line with the dams of another**
A) top-crossing;
B) bot-crossing;

C) in-crossing;
D) angrossing;
E) inbreeding.

**91. What time is the best to measure animals?**
A) in the morning before feeding or 3 hours later;
B) in the evening after feeding;
C) any time of the day;
D) in the morning after feeding;
E) in the evening before feeding or 3 hours later.

**92. Crossbreeding, in which for several generations the worst breed is transformed into the best is called?**
A) industrial;
B) absorbing;
C) alternative;
D) introductive;
E) inbreeding.

**93. What science is the theoretical basis for breeding?**
A) genetics;
Б) physiology;
C) evaluation;
D) hybridization;
E) tribal selection.

**94. Branch of the economy that is aimed at providing the population with food and production of raw materials for some structural units of the industry**?
A) Forestry;
B) Industrial economy;
C) Bred livestock farm;
D) Agriculture;
E) Productive economy.

**95. What determines the live weight of piglets at birth?**
A) Prolificacy;
B) Milking capacity;
C) A fetus of a large size;
D) A fetus of a middle size;
E) Equalization of the nest.

**96. Mating animals of different species is called?**

A) purebred;
B) crossbreeding;
C) interbreed;
D) selection;
E) hybridization.

**97. What is the name of the individual development of the body?**

A) phylogenesis;
B) differentiation;
C) fatalism;
D) ontogenesis;
E) adaptation.

**98. Special individual strength of heredity is achieved by**

A) evaluation;
B) enhanced body growth;
C) hereditary capacity;
D) phylogenesis;
E) differentiation.

**99. Which selection contributes to the continuous change of the selected trait in the demanded direction ...**

A) artificial selection;
B) stabilizing selection;
C) natural selection;
D) moving selection;
E) disruptive selection.

**100. The exterior of the animal it is …**

A) The overall composition of the animal body;
B) animal appearance in connection with the anatomical and physiological state of the body ;
C) Animal evaluation;
D) constitutionally distinctive articles;
E) increase in animal weight over a certain period.

**Answer key**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | A | 26 | B | 51 | A,B,C | 76 | B |
| 2 | C | 27 | C | 52 | A,B | 77 | D |
| 3 | B | 28 | D | 53 | A | 78 | D |
| 4 | C | 29 | E | 54 | A | 79 | E |
| 5 | A | 30 | A | 55 | A | 80 | A |
| 6 | C | 31 | C | 56 | B | 81 | D |
| 7 | A | 32 | A | 57 | C | 82 | C |
| 8 | C | 33 | B | 58 | E | 83 | E |
| 9 | A | 34 | C | 59 | E | 84 | B |
| 10 | A | 35 | D | 60 | C | 85 | A |
| 11 | C | 36 | E | 61 | D | 86 | A |
| 12 | B | 37 | D | 62 | A | 87 | B |
| 13 | A | 38 | E | 63 | A | 88 | B |
| 14 | A | 39 | A | 64 | A | 89 | A |
| 15 | A | 40 | D | 65 | E | 90 | C |
| 16 | A | 41 | A,B,C,D,E | 66 | A | 91 | A |
| 17 | A | 42 | C | 67 | B | 92 | B |
| 18 | A | 43 | B | 68 | D | 93 | A |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 19 | A | 44 | A | 69 | E | 94 | D |
| 20 | D | 45 | A | 70 | B | 95 | A |
| 21 | E | 46 | A | 71 | C | 96 | E |
| 22 | A | 47 | E | 72 | A | 97 | D |
| 23 | A | 48 | E | 73 | D | 98 | C |
| 24 | C | 49 | C | 74 | C | 99 | B |
| 25 | A | 50 | D | 75 | E | 100 | B |

## Glossary

Black-and-white – черно-пестрая порода крупнорогатого скота молочного направления.

Red cattle – красная порода скота.

Red German – красная немецкая порода крупного рогатого скота мясо-молочного направления.

Red Steppe Breed – красная степная порода.

Grade – новая улучшенная порода, улучшать породу путем скрещивания.

Improvement plan – план улучшения породы.

Line crossbreeding – скрещивание линий одной или нескольких пород.

Mongrelize – скрещивание животных разных пород.

Heavy breed – крупная порода.

Kazakh Whiteheaded – казахская белоголовая порода.

Whiteface – герефордская порода скота.

Large White – английская крупная белая порода свиней мясо-сального направления.

Large Black – английская крупная черная порода свиней мясо-сального направления.

Beef-cattle enterprise – хозяйство занимающееся выращиванием крупного рогатого скота мясного направления.

Beef-breeding herd – мясная овца.

Carcass trait – мясное качество.

## Literature


1 Асанбаев Т. Ш. Улучшение продуктивности казахской породы лошадей путем скрещивания с жеребцами новоалтайской породы в условиях северо-востока Казахстана : монография / Т. К. Бексеитов, Ж. Ж. Уахитов. – Павлодар : Кереку, 2015 – 111 с.

2 Аятханулы М. Дикий верблюд-кабтыгай : монография / Павлодар : Кереку, 2007 – С. 79.

3 Волкопялов Б. П. Свиноводство : учебник. – Ленинград : Колос, 1968. – С. 15–64.

4 Мусаев З. М. Түйе шаруашылығы : учебник. – Алматы : Бастау, 2007 – 136 б.

5 Нечаев И. Казахская лошадь. Прошлое, настоящее и будущее : учебник / А. Тореханов, А. Жумагул, Н. Кикебаев и др. – Алматы : ТОО Эдельвейс, 2005 –208 с.

6 Рзабаев С. С. Мугалжарская порода лошадей : монография. – Актобе, 2007 – 153 с.

7 Рзабаев Т. С. Кушумская порода лошадей : монография. – Актобе, 2011 – 137 с.

8 Садыкулов Т. С. Разведение и селекция сельскохозяйственных животных : учебник / Алматы, 2003. – 376 с.

9 Эрэнэцогг Н. Генофонд сельскохозяйственных животных и результаты использования их в селекции / Б. Минжигдорж, М. Оланбаяр // Проблемы стабилизации и развития сельского хозяйства Казахстана, Сибири, Монголии : Тезисы доклада. Часть 1. – Алматы, 2000. – С. 41–42.

**Content**