Г. Ж. Бекназарова
ассистент кафедры прикладной математики и информатики,
Каракалпакский государственный университет имени Бердаха
Республика Каракалпакстан, Нукус
G. J. Beknazarova
assistant at the Department of Applied Mathematics and Informatics,
Karakalpak State University named after Berdakh
Republic of Karakalpakstan, Nukus

MODELING OF LIVESTOCK HERD COMPOSITION

Аннотация: В целях дальнейшего увеличения объемов производства мясомолочной продукции в животноводческих фермах в статье представлены проблемы математического моделирования состава поголовья скота и получения оптимальных результатов с использованием компьютерных технологий. Полученные результаты проанализированы экономически.

Abstract: In order to further increase the volume of production of meat and dairy products in livestock farms, the article presents the problems of mathematical modeling of livestock herd composition and obtaining optimal results using computer technologies. The obtained results were analyzed economically.

Ключевые слова: продукция животноводства, состав стада, группы крупного рогатого скота по полу и возрасту, математическое моделирование, бизнес-план.

Key words: livestock products, herd composition, groups of cattle by gender and age, mathematical modeling, business plan.

Introduction. In the sustainable development of our country's economy, the implementation of modern technologies and scientific achievements in the livestock industry, which is considered one of the most important areas of

agriculture, is of great importance in increasing the economic efficiency and competitiveness of the entire livestock industry.

One of the most important tasks is to meet the demand of the population of our growing country for livestock products, to further increase the volume of production of meat and dairy products in the domestic consumer markets, and to ensure the stability of their prices.[1]

One of the important issues in the development of the production of livestock products is the improvement of herd movement of cattle in agricultural enterprises specialized in cattle breeding, on farms.

It is important to comply with the standards and requirements set by the science of zootechnics, regardless of the form of the management mechanism in the livestock sector. Therefore, it is required that the composition of the herd of livestock, the composition of their sex-age groups, should be balanced.[2,3]

In the composition of the herd, the movement of livestock by sex-age groups can be symbolically expressed as follows.

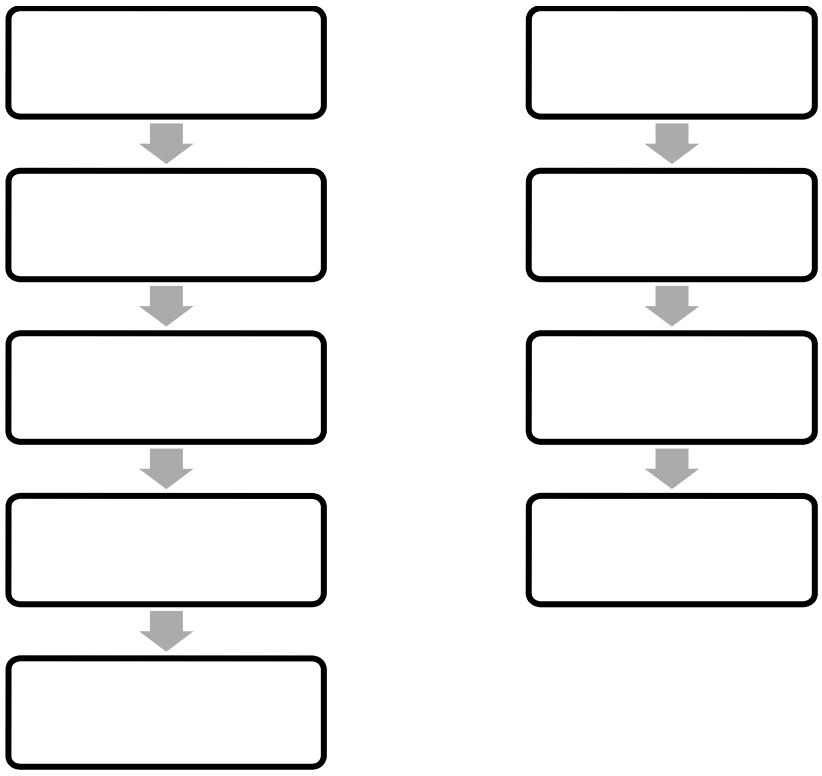

Figure 1. Herd composition and movement of livestock

[1] Maksudov I., Joraev J. and others. “Shorvachilik asoslari”. Tashkent 2012.

Livestock farms can mainly specialize in: beef production, meat production, dairy production. The effective development of the network will directly depend on the performance of the main production indicators according to the number of cattle in the herd, and the provision of expanded reproduction.

In optimizing the movement and composition of livestock, the problem is as follows: it is required to find such an optimal annual herd movement of livestock that, taking into account the end of the planned year, the number of cattle by each gender and age group is determined. As a result of solving the problem of optimization of herd movement and composition of livestock: cattle by each gender-age group: to be written off or realized; transferred from one group to another; The goal is to determine the number of cattle and indicators of milk and meat production at the end of the year. Maximization of milk or meat production is taken as the criterion of optimality of the problem.

With the help of economic-mathematical models and methods, it is desirable to have the following initial data when determining the annual movement of the livestock herd:

- information on the write-off of cattle on the farm during the year;
- normative indicators on the number of heads of cattle to be written off or realized and on the indicators of losses;
- cattle data by gender and age for the following groups: breeding bulls, dairy cows, heifers, carcasses, weanlings over one year old, female calves over one year old, male calves over one year old, newborn male calves and newborn female calves head count;
- livestock farm specialization direction;
- indicators of the amount of milk obtained in a year for dairy cows;
- indicators of live weight according to the composition of cattle on the farm.

One of the large farms with 252 head of cattle in the Republic of Karakalpakstan was selected as a research object, and an economic-mathematical model and a matrix model were developed based on the information about livestock in it, and the results were obtained using standard computer programs. Maximization of milk and meat production was taken as the optimality criterion of the problem. According to the optimal solution obtained by the computer, according to the meat production plan, the number of cattle at the end of the year is 196 quintals and the number of cattle at the end of the year is 268, i.e. 16 heads, according to the milk production plan, the number of cattle at the end of the year is 5376 quintals, and the number of cattle at the end of the year is 282, that is 30 per head.

Result. The results obtained when the annual optimal herd movement and composition of cattle on the farm by gender and age are solved for the maximization of meat production (option 1) and the maximization of milk production (option 2) are presented in Table 1.

Composition of groups of cattle by gender and age	The number of black goods at the beginning of the year, head	Come on, head			Expenditure, head								The number of black goods at the end of the year, head	
		a new breed	switch from small groups		transition to large groups			write off						
								Head		live weight of one head of cattle, ts	total, q			
			Option 1	Option 2	Option 1	Option 2		Option 1	Option 2		Option 1	Option 2	Option 1	Option 2
Pedigree bulls	4		2	0	-	-		2	0	5,9	11,8	0	4	4
Cows	100		31	32	-	-		15	8	4,6	69	36,8	116	124
Heifers	32		17	19	31	32		1	0	3,6	3,6	0	17	18
Bulls	20		28	30	17	19		3	1	3,5	10,5	3,5	28	30
Stirks over a year old	24		27	27	2	0		22	24	2,8	61,6	67,2	27	27

Female calves under one year of age	36		39	41	28	30		8	7	1,8	14,4	12,6	39	42
Male calves under one year of age	36		37	37	27	27		9	9	1,8	16,2	16,2	37	37
New born female calves	-	46	-	-	39	41	1	6	3	0,6	3,6	1,8		
Newborn male calves	-	46	-	-	37	37		9	9	0,6	5,4	5,4		
Total	252	92	181	186	181	186		75	61	-	196,1	143,5	268	282

Table 1. Annual optimal herd movement and composition of cattle on the farm by gender and age

Now we will analyze the issue of livestock herd movement, the results obtained to maximize meat production.

The contents of the business plan for the annual herd movement of livestock on the farm by sex and age are as follows:

1) 2 of the existing 4 breeding bulls are removed from the farm account. Accordingly, 2 heads are transferred to this group at the expense of calves over one year old. As a result, the number of breeding bulls at the end of the year will be 4 heads.

2) 15 of the available 100 head of cows at the beginning of the year will be written off. From a group of heifers to a group of 31 head cows as a result of addition, the number of cows at the end of the year is 116 heads.

3) 1 of the 32 heifers available at the beginning of the year is yearling will be written off, 31 heads will be transferred to the group of dairy cows. Year During the year, 17 heifers were transferred to the group of heifers, and the number of heifers at the end of the year was 17.

4) At the beginning of the year, 3 of the 20 head of cows available on the farm

head is written off, the remaining 17 heads are transferred to the heifer group. 28 heads from the group of under-one-year-old female calves are transferred to the female group, resulting in a total of 28 heads at the end of the year.

5) 22 of the 24 over-one-year-old bulls will be written off during the year, and 2 will be transferred to the breeding bull group. From the male calves born before the end of the year, 27 were transferred to the group of calves over one year old, as a result, their number at the end of the year is 27.

6) 36 heads at the beginning of the year are removed from the account of 8 heads of female calves under one year of age, and 28 heads are transferred to the body group during the year. 39 female calves are transferred to this group. As a result, the number of female calves under one year will be increased to 39 at the end of the year.

7) 36 heads will be removed from the account of 9 heads of male calves under one year old, 27 heads should be transferred to the group of calves over one year old. Their place will be filled by a group of 37 newborn male calves.

8) 46 female calves born during the year are removed from the account of 6 heads, 39 heads are transferred to the group of female calves under one year of age (counted as 1 head loss).

9) During the year, 46 newborn male calves are removed from 9 heads, 37 heads are transferred to the group of male calves under one year of age.

According to the farm, out of 252 heads of cattle at the beginning of the year, 75 heads are written off during the year (loss of 1 head), the number of cattle at the end of the year is 268 heads due to 92 head of newborns. During the year, it would be appropriate for the number of cattle to be transferred from small groups to large groups by age and gender to be 181 heads.

Conclusion.

The obtained results and analysis, the solution of economic-mathematical modeling of herd behavior, show the advantage of this method over traditional methods.

In conclusion, it should be noted that the modeling of production and economic processes in agriculture, which is adapted to the prevailing natural and climatic conditions, allows agricultural producers to justify their development strategy. The use of economic-mathematical methods and computers significantly increases the efficiency of planned economic work, makes it possible not only to significantly reduce the time of calculations, but also to ensure optimal results. However, applying economic and mathematical models and high technologies, it is necessary to know deeply and in detail the processes in the economy, production and technological parameters, as well as cause-and-effect relationships of the elements of the modeled system.

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