MODELING AND CREATING SOFTWARE FOR THE OPTIMAL MANAGEMENT OF PASTURE RESOURCES IN THE CONTEXT OF THE DIGITAL ECONOMY

Saukhanov Janibek Kazievish
Karakalpak State University, Nukus1, Ch.Abdirov street, Nukus 230100, Uzbekistan
jsaukhanov@mail.ru

Gabbarov Sabit Nietalievich
Distance education system of Nukus Mining institute, Nukus1, Nukus-Tortkul highway, house without number, Nukus 230101, Uzbekistan
gabbarovs@mail.ru

Jaksibaev Rashid Nietalievich
Tashkent institute of irrigation and agricultural mechanization engineers, Tashkent, Uzbekistan
jaqsibaev@mail.ru

Zoya Kalekeva*
Department of Finance, Tashkent State University of Economics, Tashkent, Uzbekistan
zoahalekeeva@gmail.com

ABSTRACT

In this article, the Kungirot region with the largest area in the Republic of Karakalpakstan, the optimal use of the available land and fodder fund for raising livestock in this area, the option of forming its composition, practical and scientific recommendations are given. A comparative analysis of cattle, cows, sheep and goats, horses, camels was evaluated on the basis of a correlation-regression analysis of the efficiency of pasture use by the number of livestock. Using statistical data for 1990-2021, forecasts were developed using the ARIMA model."The Pasture Livestock Efficiency Program" was created to solve the problem of forming the optimal composition of the livestock based on the available opportunities for using pastures using digital technologies.

CCS CONCEPTS

• **Software, optimization, economic efficiency, animal husbandry, pastures and hayfields, land, fodder.**;

ACM Reference Format:
Saukhanov Janibek Kazievish, Gabbarov Sabit Nietalievich, Jaksibaev Rashid Nietalievich, and Zoya Kalekeva. 2022. MODELING AND CREATING SOFTWARE FOR THE OPTIMAL MANAGEMENT OF PASTURE RESOURCES IN THE CONTEXT OF THE DIGITAL ECONOMY. In *The 6th International Conference on Future Networks & Distributed Systems (ICFNDS '22), December 15, 2022, Tashkent, TAS, Uzbekistan.* ACM, New York, NY, USA, 6 pages. https://doi.org/10.1145/3584202.3584286

1 INTRODUCTION

For the development of livestock farming in Kungrat district of the Republic of Karakalpakistan, it is not required to determine promising directions in solving the issues of using the existing pasture fund. For this purpose, taking into account the available opportunities and the specific features of the development of the sector in the region, the development of animal husbandry using information technologies and the optimal use of opportunities are related to the formation of its optimal composition based on the available land and feed stock.

Due to the fact that agriculture is related to many natural factors [1], determining the number and composition of livestock, which land fund to use in which seasons, and determining the appropriate proportions of necessary factors to ensure the development of the field causes complications in making decisions. Therefore, specialists feel the need for reliable, scientifically based forecast indicators in order to reduce their risks [2].

LITERATURE REVIEW

Today, at a time when environmental problems are intensifying, the issues of productive use of pastures are gaining importance. Effective use of pastures and the theoretical and methodological basis of the number of cattle are learned from foreign scientists Varlamova, S.A. [3], Tkachuk S.A. [4], Ya.M. Maul [5]. In the works of local scientists, and first of all, S.S. Gulyamov [6], Narbaev Sh.K. [7] and others in their scientific research, researching the current changes and trends in agriculture, the problems of assessing environmental impacts on agriculture were studied as much as possible. However, the efficient use, composition and dynamics of pastures in agriculture are poorly studied.

2 METHODOLOGY

In the course of the research, the structural structure and operation of the software, the construction of a simplex table, and logical thinking were used.

3 RESULTS AND DISCUSSION

In the development of the forecast indicators of the number and composition of livestock, the problems of the widespread use of modern methods, as well as the comparative analysis of the forecast indicators developed on the basis of various econometric models by the criteria are not sufficiently established, decision-making on

*Corresponding author

ICFNDS '22, December 15, 2022, Tashkent, TAS, Uzbekistan

ACM ISBN 978-1-4503-9905-0/22/12…$15.00
https://doi.org/10.1145/3584202.3584286

the selection of the optimal amount and composition of livestock farmers , has a negative impact on improving the efficiency of the use of existing pastures [10].At the current stage of development, the introduction of digital technologies into all sectors of the economy is growing rapidly. Agriculture, which is the main branch of the economy, is no exception. Therefore, special attention is being paid to the development of the digital economy in the industry in order to ensure the development of the industry, increase efficiency, and produce competitive products. Resolution No. 794 of the Cabinet of Ministers of the Republic of Uzbekistan dated December 17, 2020 "On measures to develop the digitalization system of the agro-industrial complex and agriculture of the Republic of Uzbekistan" and the tasks defined in it justify the importance of the measures taken in this regard.

The fact that many factors influence the process of production in agriculture leads to the formation of a large database. The importance of digital technologies in their processing and research, in search of optimal solutions within the existing possibilities, is increasing more and more. The fact that product manufacturers have to make different decisions and look for solutions during the season increases the need to use information technologies in the field. Because, according to estimates, wrong decisions and deficiencies in planting, cultivation, storage and transportation processes cause 33% of the harvest to die. In such conditions, "smart" or "intelligent agriculture" technologies, which ensure the rational use of existing land, water, material-technical and labor resources, become important.

The fact that many factors influence the process of production in agriculture leads to the formation of a large database. The importance of digital technologies in their processing and research, in search of optimal solutions within the existing possibilities, is increasing more and more. The fact that product manufacturers have to make different decisions and look for solutions during the season increases the need to use information technologies in the field. Because, according to estimates, wrong decisions and deficiencies in planting, cultivation, storage and transportation processes cause 33% of the harvest to die. In such conditions, "smart" or "intelligent agriculture" technologies, which ensure the rational use of existing land, water, material-technical and labor resources, become important .

Taking into account everything which are mentioned above, it was considered to solve the problem of development of livestock breeding in pastures and optimization of the use of available opportunities in each farm. Because, in a competitive market, farmers and businessmen who produce livestock products in agriculture face the problem of making decisions on increasing their income [8]. The use of optimization problems is appropriate in these processes and serves to find optimal solutions for using available opportunities. However, the lack of necessary knowledge and skills among all business managers creates problems in this regard. Therefore, it is necessary to simplify the process of solving this problem to the maximum extent using information technologies.

As a result of the research, it was found that currently a number of software and applications have been created to solve optimization problems, but their use requires some knowledge in this direction, as a result, we witnessed that their use level is not high.

In the formation of the software, the issue of maximizing the income of farms engaged in livestock breeding in the pastures was taken as the objective function, while land area, water resources and labor resources were taken as constraints. That is, the program tells us how much of what type of livestock should be raised on the pastures to get the maximum benefit from the available land, water, and labor resources. It should be noted that it solves the problem of determining the optimal composition of selected types of livestock.

Let's briefly review the software structure and operation procedure. The system was developed using modern vet technologies and HTML, CSS, JavaScript and PHP programming languages were used to create the system [9]. The system is used in two parts, that is, by the client and the server (Figure 1). Any user is required to have internet and information technology tools (smartphone, computer) to use the system. Access to the system is free, there are no barriers, there are no conditions such as registration, that is, anyone can enter the system and use its service at any time. The user connects to the server using information technology tools and the Internet, and the server, in turn, is connected to the developed algorithm for solving the optimization problem.

To solve the optimization problem, the algorithm requires input from the user as well as domain-specific norms and constraints. Therefore, the algorithm works in cooperation with a previously formed database. As a result, feedback is provided between the algorithm and the database, that is, the information entered by the user fills the necessary database and serves to determine the optimal solution using the available information. The obtained optimal solution is sent to the server and then delivered to the user via the Internet.

It is proposed to input into the system the information about the available resources of a farmer or farmer engaged in animal husbandry, and the system solves the problem of forming the composition of livestock that ensures the optimal income of the subject based on the available opportunities, and its algorithm is as follows (Figure 2 and 3).

To place the system on the Internet, the leip.uz domain was registered in the uz domain zone of the Republic of Uzbekistan, and the application was placed on a special server. The application can be used by users of any category. There are no restrictions on its use. Also, in order to ensure the safety of users, the connection is provided through the https protocol and an SSL certificate is installed.

The main information about the system is displayed on the home page of the information system. The menu bar is located at the top of the system and the menu is designed for navigation in the system. This page contains initial information displayed to users visiting the system. The appearance of the page is as follows (Figure 4).

As mentioned above, it is possible to go to another page through the system menus, each of which contains important information required for users. One such piece of information is provided on the Livestock Information page, an initial view of which is shown in the figure below (Figure 5).

The system contained information about the most common livestock in the region. During this research, 5 types of livestock were selected and they are as follows:

1. Camels.
2. Cows.

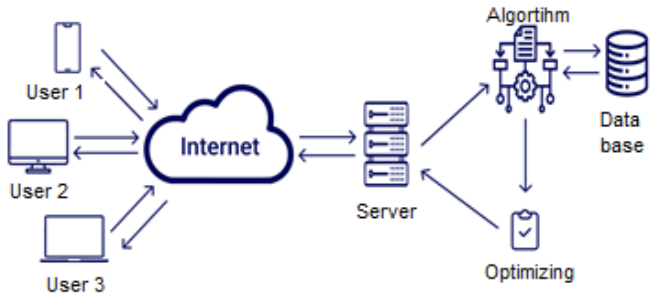

Figure 1: Main components of the system and operation procedure

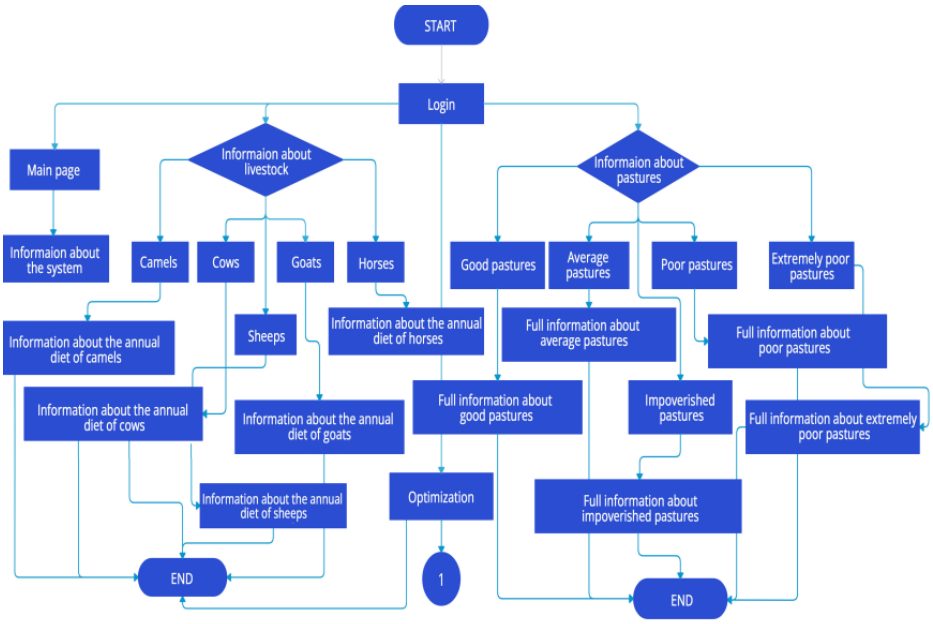

Figure 2: Livestock efficiency in pasture system algorithm

3. Sheep.
4. Goats.
5. Horses.

To get information about each type of animal, left-click on the image of the animal. As a result, in the following pop-up window, the information about the annual ration used to feed this animal is displayed in the form of a table, Figure 5.

Since the system is dedicated to the development of cattle breeding in pastures, the ration is formulated accordingly. The annual fodder ration of camels consists of the main products such as hay, dry matter, protein, soft fodder, pasture grass, and the consumption of each of them is placed on the appropriate page of the system (Figure 6).

If we compare the feed ration of the cow shown in Picture 7 with that of a camel, the amount of hay required for a cow is 1.8, the amount of dry matter is 1.7, the amount of protein is 1.4, the amount of forage is 6.9 times, and the amount of pasture grass is 1 , is 3 times less.

The difference in the food unit is 1.6 times. The fact that each unit in the ration differs in different amounts justifies the need to form livestock composition based on the type of pasture. The main difference here is between dry matter and hay. In the formation of the database of the system, when the standards were developed, livestock species were transferred to a conditional unit. In this case, one cattle for ten sheep, in other words, ten sheep were taken as a conditional unit. Taking this into account, we will carry out a basic comparative analysis of the data on the annual ration of sheep (Figure 8).

According to the results of our accounting books, all units in the sheep ration differ by less than ten times compared to the cattle ration. It was found that hay differs by 6.4, dry matter by 6, protein by 6, roughage by 6, and grass by 3.1. It was found that sheep

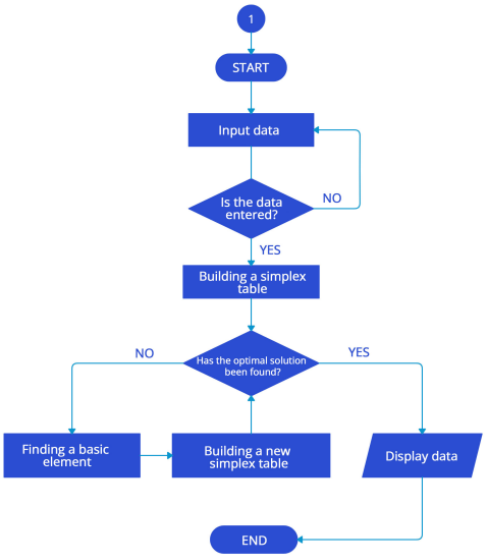

Figure 3: Livestock efficiency in pasture system algorithm

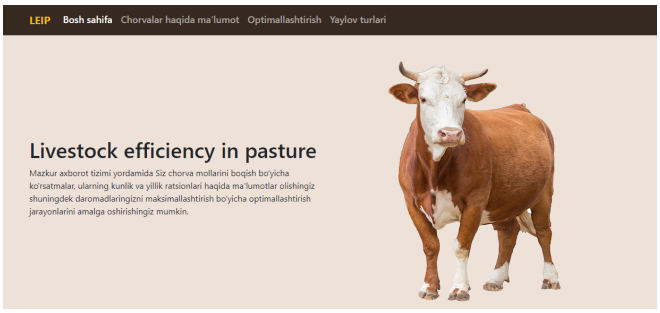

Figure 4: Home page of the information system

Figure 5: Livestock Information Page

require more fodder per conventional head unit according to the ration without taking into account other factors.

In addition to sheep, a table has also been developed for goats, and it can be seen that the amount required in the ration is almost the same as that of sheep, only slightly less. However, theoretically,

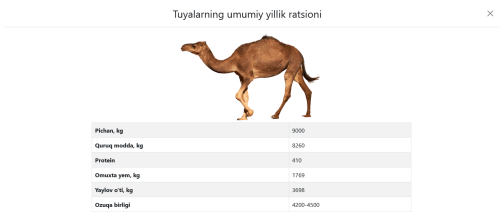

Figure 6: Publication of annual rations for camels on the web page

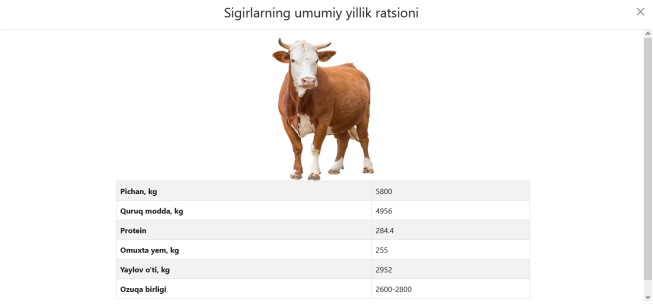

Figure 7: Publication of the annual ration for cows on the page

Figure 8: Publication of the annual ration for sheep on the page

when engaged in sheep farming in pastures, it is required to have goats in its composition at the specified standard level. For this reason, goats are considered as an important species in the formation of livestock composition.

The last type of livestock listed on the page is yearlings, and their annual ration is also placed on a special page of the information system. The page view is shown in the image below (Figure 9).

The amount of units in the ration of horses is also much higher than that of cattle, and is almost the same value as the ration formulated for camels. This information also serves to provide information to livestock producers and serves as a guide for keeping each type of livestock.

The third unit in the menu line is called optimization, and if you go to this entry and click the left mouse button, the window shown in figure 10 will appear. In this window, the user is asked to enter three pieces of information, that is, the amount of pasture

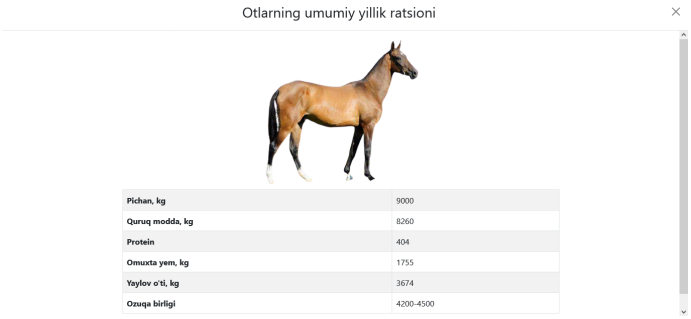

Figure 9: Publication of the annual ration for the horses on the page

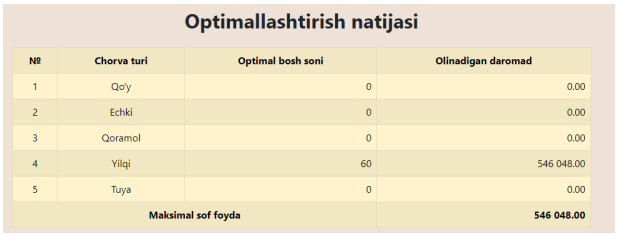

Figure 10: Optimization result table obtained from the system

Figure 11: Result of expenses

at the disposal of the house in hectares, the number of workers in people, and the amount of water. The main function of the system is optimization, based on the existing conditions in the region, land area, water amount and number of workers are taken as the main constraints [10]. If the user enters the requested information, the program will determine which type of animal to feed in how many units will maximize its profit. That is, the window in Picture 11 appears, and the table in it consists of four columns, the first column is numbered, the second column is the name of the animal, the third column is the number of heads, and the fourth column is the amount of income from each type of animal. The end is the maximum profit that can be obtained within the existing capabilities of the farm.

All results obtained with the help of the program are reflected in two tables, and the second table is called expenses. It shows the level of use of restrictions entered by the user. That is, it shows which resource is being fully used, which resource is in excess or which resource is deficient in the economy.

Fig. 11 below shows a view of the second table, in which, according to the identified indicators, the lack of labor prevents the full use of other resources. That is, the amount of available land and water in the farm is not fully used.

4 CONCLUSION

According to the results of the conducted research, the proposed program is different from other programs in its simplicity and simplicity to ensure optimal use of available resources in livestock development. In this, the user is required to enter three simple data and his optimal livestock composition is calculated. Also, the results obtained with the help of the program can be used to determine promising areas of economic activity and draw conclusions on which resources should be increased to further increase income. In our opinion, the use of this program is important in the development of livestock breeding in the Republic of Karakalpakistan.

REFERENCES

[1] Khayer, Abul & Hasan, Mohibul & Khairul, Md & Biplob, Bashar & Chowdhury, Rabiul & Anwar Ul Alam, Mohammad & Chowdhury, A.B.M.. (2019). Factors Affecting Agriculture in Response to Climate Change in Bangladesh: Effects of Climate Change on Agriculture in Bangladesh. Middle East Journal of Scientific Research. 27. 106-113. 10.5829/idosi.mejsr.2019.106.113.
[2] Tatarintsev M., Korchagin S., Nikitin P., Gorokhova R.,Bystrenina I., Serdechnyy D. Analysis of the Forecast Price as a Factor of Sustainable Development of Agriculture. Agronomy 2021, 11, 1235. https://doi.org/10.3390/ agronomy11061235
[3] Varlamova, S.A. Management of land resources. - M.: GUZ, 2005. -240 p.;
[4] Tkachuk S.A. Management of land resources. - Tselinograd, 1986. - 92 p.;
[5] Maul Ya.M. Economics and ecology of land use. - Alma-Ata: Kaynar, 1989. - 216 p.;
[6] Gulyamov S.S. i dr. Systemic analysis of production efficiency and market conditions. - T.: Mekhnat, 1992. - 220 p.;
[7] Narbaev Sh.K. Substantiation of the size of production cooperatives of pasture users. Journal "Irrigation and melioration". No. 2(8). 2017. P. 63-65;
[8] Saukhanov J.K. Soil saltation as an external factor to increase transaction costs in the agricultural sector of Uzbekistan economy. // Journal of Advanced Research in Dynamical and Control Systems. Volume 12, Issue 4 Special Issue, 2020, Pages 479-489.
[9] Gabbarov S.N., Using the possibilities of a relational database to calculate the optimal use of resources and obtain maximum profit by livestock farms on pastures // Journal "Economics and Entrepreneurship" (INTERECONOM Publishing), №4 (141) 2022, ISSN 1999-2300, Pages 1448-1453.
[10] G. Juraev and K. Rakhimberdiev, Mathematical Modeling of Credit Scoring System Based on the Monge-Kantorovich Problem, 2022 IEEE International IOT, Electronics and Mechatronics Conference, IEMTRONICS 2022 Proceedings.
[11] G. Juraev and K. Rakhimberdiev, Modeling the decision-making process of lenders based on blockchain technology, International Conference on Information Science and Communications Technologies: Applications, Trends and Opportunities, ICISCT 2021, pp. 1-5.
[12] G. Juraev and K. Rakhimberdiev, Prospects of application of blockchain technology in the banking, International Conference on Information Science and Communications Technologies: Applications, Trends and Opportunities, ICISCT 2022, pp. 1-5.
[13] K. Rakhimberdiev, M. Karimov, J.Arzieva Development of Approaches and Schemes for Proactive Information Protection in Computer Networks, International Conference on Information Science and Communications Technologies: Applications, Trends and Opportunities, ICISCT 2022, pp. 1-5.

[14] K. Rakhimberdiev, K.Tashev, J. Arzieva, A. Arziev Method authentication of objects information communication systems, International Conference on Information Science and Communications Technologies: Applications, Trends and Opportunities, ICISCT 2022, pp. 1-5.
[15] K. Rakhimberdiev, J. Arzieva, A. Arziev Application of random number generators in solving the problem of user authentication in blockchain systems, International Conference on Information Science and Communications Technologies: Applications, Trends and Opportunities, ICISCT 2022, pp. 1-5.
[16] T.Abdullaev, G. Juraev, "Application three-valued logic in symmetric block encryption algorithms," Journal of Physics: Conference Series, 2021, 2131(2), 022082, pp. 1-9.
[17] T.Abdullaev, G. Juraev, "Selection of the optimal type of the gamming function for symmetric encryption algorithms," AIP Conference Proceedings, 2021, 2365, 020004, pp. 1-7.
[18] T. Abdullaev, G. Juraev, "Development of a method for generating substitution tables for binary and ternary number systems," AIP Conference Proceedings, 2021, 2365, 020003, pp. 1-10.
[19] Juraev, G., Musurmonova, M., "An Algorithm for Solving the Problem of Radial Expansion of a Spherical Cavity Supported by a Thin Spherical Shell in an Elastic-Porous Fluid-Saturated Medium",AIP Conference Proceedingsthis link is disabled, 2022, 2432, 030109.
[20] Ikramov, A., Juraev, G., "The Complexity of Testing Cryptographic Devices on Input Faults" Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 2021, 13041 LNCS, стр. 202–209.