

OPPORTUNITY FOR INCREASING THE PRODUCTION OF RUMINANTS, SUCH AS CATTLE, BUFFALOES, SHEEP AND GOATS IN THE FOOT-HILL AND MOUNTAIN REGIONS OF BULGARIA

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Abstract

This paper investigates the current state of production from cattle, buffaloes, sheep and goats in the hilly, foot-hilly and mountain regions of Bulgaria, as well as the opportunities for its increase. Negative trend were observed in the populations of cattle, sheep and goats in the last two decades. 634,466 cattle were raised in Bulgaria in 2001, 371,901 of which were dairy cows. Data for 2020 showed values of 568,700 heads of cattle, 365,500 of which were dairy cows and pregnant heifers. In this period, the number of sheep decreased from 1,571,410 in 2001 to 1,307,800 in 2020, and the decline in goats was even more noticeable, from 675,292 in 2001 to 253,400 in 2020. The decline in the breeding of farm animals led to a decrease in the volume of animal milk and meat products. For the positive development of the volume of agricultural production in the foot-hilly and mountain regions of Bulgaria, decisions are needed to improve the gene pool, health care, feeding, as well as the application of advanced modern technologies. The advantage of mountain and foot-hilly agriculture is in the creation of high-quality food products and for this reason it is necessary to support it through appropriate measures and programs.

Key words: meat, milk, production, ruminants, trends

INTRODUCTION

The natural features of Bulgaria, which include a hilly and mountain relief, as well as centuries-old cultural traditions lead to the fact that a significant part of the population is engaged in raising cattle, buffaloes, sheep and goats. Animal husbandry has a significant role in Bulgarian economy, providing both food and income for households. Ruminants including cattle, buffaloes, sheep and goats are a particularly essential source of meat, milk and wool in the foot-hilly and mountain regions of Bulgaria. However, the production of these animals in these regions is often limited by various challenges such as limited access to markets, poor infrastructure and harsh climatic conditions (Ružić et al., 2002; Markov, 2014) [12, 8].

Despite these challenges, opportunities exist to increase ruminant production in foot-hilly and mountain regions by adopting improved management practices and technologies (Nikolova, 2020) [10]. The gross added value from the agricultural sector in 2020 is in the

amount of 4,205 million BGN at current prices, which is equal to 4%.

The structure of the value of gross production from the agricultural sector shows that animal husbandry occupies 24.61% of it (Agrostatistics - Survey Number of livestock in Bulgaria, 2021) [2].

The aim of the present study is to identify and evaluate the opportunities for increasing the production of ruminant animals, such as cattle, buffaloes, sheep and goats in the foot-hilly and mountain regions of Bulgaria, by proposing improved management practices and technologies.

MATERIALS AND METHODS

The investigation is based on an analysis of scientific developments and concepts related to the number and production obtained from ruminants. As a methodological basis for conducting the study, general scientific research methods, information-logical analysis of scientific and scientific-practical information, as well as materials for marketing research on the market of various

breeds of cattle, buffaloes, sheep and goats were used. Descriptive and retrospective analysis were also applied. To achieve the aim, aggregate data were used concerning Bulgarian, European and worldwide cattle breeding, buffalo breeding, sheep breeding and goat breeding in the period 2001-2021. The information used is mainly referred to publications of FAO, Ministry of Agriculture, Food and Forestry, Customs Agency, Department of Agrostistics, agricultural and marketing reports and market analyses, as well as the paper quotes pieces referred to the research works of Bulgarian and foreign authors. Summaries are made and conclusions

are drawn, and data are presented in a table and a figure.

RESULTS AND DISCUSSIONS

I. State of ruminant animal husbandry in Bulgaria – number and percentage change over a period of 20 years

The data analysis indicated in Table 1 shows permanent tendency for decrease in the number of ruminants, such as cattle, buffaloes, sheep and goats in Bulgaria. A progressive increase is registered only in the buffaloes, which were 6,529 in 2001 and reached 20,200, or an increase of 309.4%.

Table 1. State of animal husbandry in Bulgaria

Year	Cattle	Buffaloes	Sheep	Goats
2001	634,466	6,529	1,571,410	675,292
Percentage change compared to 2001	100%	100%	100%	100%
2005	621,797	7,973	1,602,255	608,426
Percentage change compared 2001	98%	122.1%	102.0%	90.1%
2008	564,904	8,968	1,474,845	429,834
Percentage change compared 2001	89%	137.4%	93.9%	63.7%
2014	552,807	9,555	1,109,047	292,644
Percentage change compared 2001	87.1%	146.3 %	70.6 %	43.3 %
2017	540,115	12,809	1,316,784	256,967
Percentage change compared to 2001	85.1%	196.2%	83.8%	38.1
2020	568,700	20,200	1,307,800	253,400
Percentage change compared to 2001	89.6%	309.4%	83.2%	37.5%

Source: Agrostistical reference book 2000 – 2017, Agrostistics Department - Survey Number of livestock in Bulgaria as of 1st November 2020 [1].

The decrease for the twenty-year period in cattle was by 65,766 heads or 10.4%, in sheep it was by 153,610 or 16.8%, and in goats – by 421,892 or 62.5%. 5%.

II. Breeds

Intensive dairy cattle breeding necessitates the use of new breeds for Bulgaria. Nowadays, the share of Bulgarian Black-and-White cattle is about 55%. Montbeliarde and Simmental breeds are also used in dairy cattle breeding, and to lesser extent Bulgarian Rhodopean Cattle, Bulgarian Brown cattle, Brown American cattle, Ayrshire and Normande cattle. The following meat-producing breeds are bred: Aberdeen Angus, Hornless Hereford Limousin, Blonde d'Aquitaine, Galloway and Gascon cattle. There are found 100,000 purebred beef cattle, while the raised meat crossings range from 25,000 to 35,000. The indigenous breeds, such as Bulgarian Gray

Cattle and Rhodopean Short-horned Cattle are also bred (Markov, 2014) [8].

Bulgarian Murra breed is the only representative breed of buffaloes (Angelov et al., 2007) [4].

The following sheep breeds are taken into consideration in dairy sheep breeding: Asaf, Lacaune, Awassi, Black-headed Plevan sheep and Synthetic population Bulgarian dairy sheep, and in meat sheep breeding the following: Ile de France and Mouton-Charollais. The specific breeds of Tsigai, Rhodope Tsigai and Romanov sheep are bred in the mountain and foot-hilly regions. There are also represented 16 local indigenous sheep breeds (Tyankov et al., 2002) [15].

Dairy goat breeding is represented by Bulgarian White Dairy goat, Togenbur goat and Anglo-Nubian goat. Meat goat farming is represented by Boer breed. Kalofer long-

haired autochthonous goats are also bred (Tyankov et al., 2002) [15].

III. Climate, relief, pastures and grass communities

The climate in Bulgaria is moderately continental. The terrain is mostly hilly and mountainous. The total area of pastures in the world represents 26% of the land area. According to data from the Department of Agrostatistics in Bulgaria, over 1,000,000 ha of herbaceous areas are available in plains and foot-hills of the country, and about 130,000 ha in mountain regions (Agrostatistics Department, Survey of land cover and land use in Bulgaria (BANCİK), 2018) [3]. Grass communities (herbaceous) are an important forage resource but they are still undeveloped. Grass stands are natural, secondary formed on the site of abandoned cultivated areas, and they depend on their origin, while the artificial grass stands are created for the purpose of intensive use.

Grazing is a practical measure to restore the biological balance. Pasture load is a measure of the amount of vegetation being grazed by a given number of animals. Mowing and trimming are management methods and the corresponding grass communities are used for hay production. It concerns certain steps such as: mowing period, mowing range, mowing frequency, obtained mass as a result (Tsonev& Gusev, 2017) [16].

IV. Milk production

In 2020, a total of 975,810 l of milk was produced in Bulgaria. That includes cow milk – 856,081 l, buffalo milk – 15,435 l, sheep milk – 73,897 l and goat milk – 30,397 l. Compared to 2001, when a total of 1,016,565 l was produced in the country, which is negative difference of -40,755.5 l. That includes: cow milk – 826,901 l, or positive difference of +29,281 l; buffalo milk 32,246 l, or negative difference of 16,811 l; sheep milk – 69,614 l or positive difference of +4,238 l; and goat milk – 87,804 l, or negative difference of -57,406 l. Such data can be explained by the progressive decrease in the number of animals and the slowly increasing average productivity (Agrostatistical reference book 2000 – 2017, 2018) [1].

V. Meat production

In 2020, 8,403.4 t of ruminant meat was produced in Bulgaria. That includes: beef – 6,236.8 t, buffalo meat – 113.4 t, sheep meat – 2014.8 t and goat meat – 38.4 t. Compared to 2001, when 153,590 t of meat were produced, which is negative difference of -145,186.6 t. That includes: beef 21,451 t, or negative difference of -15,213.2 t; buffalo meat 11 t, or positive difference of +102.4 t; mutton 69,614 t, or negative difference of -62,819 t and goat meat with 32,246 t, or negative difference of -7,028 t. The obtained data can be explained by the tendency of decreasing the number of animals, and hence also the quantities of meat produced (Agrostatistics - Survey Number of livestock in Bulgaria, 2021) [2].

VI. Improved management practices and technologies

Raising ruminants in mountain regions is challenging because of the rugged terrain and harsh environmental conditions. Such areas can provide opportunities for increasing the amount of production as the animals are grazing on natural pastures and are in a natural environment. The specific challenges and opportunities for producing ruminant products in the foot-hilly and mountain regions of Bulgaria depend on a number of factors, such as the availability of financial and feed resources, local market demand, and specific constraints and opportunities of the region (Angelov et al., 2007) [4].

The dominant ruminant production systems in the foot-hilly and mountain regions of Bulgaria are extensive and semi-intensive. The extensive systems involve the use of large grazing areas, with minimal use of fodder and other inputs. Semi-intensive systems involve the use of smaller pasture areas with additional inputs, such as fodder, housing and veterinary care. Both systems face significant challenges, including limited access to markets and poor infrastructure that make difficult selling livestock products and access raw materials. Moreover, these systems are dependent on harsh climatic conditions, such as extreme temperatures and limited water availability (FAO, 2015) [5].

It is necessary to address some of these challenges in order to improve the sustainability and efficiency of ruminant

products in these regions. For example, investments in infrastructure and transport lead to improved market access and increased profitability of production. Improving access to inputs such as fodder and veterinary care increases the productivity and health status of animals (Nikolova, 2022) [10]. There are opportunities to increase ruminant products in the foot-hilly and mountain

regions of Bulgaria by adopting improved management practices and technologies. These opportunities include: breeding and genetics, nutrition and fodder management, health management, upgrading feeding systems and improving infrastructure (Figure 1).

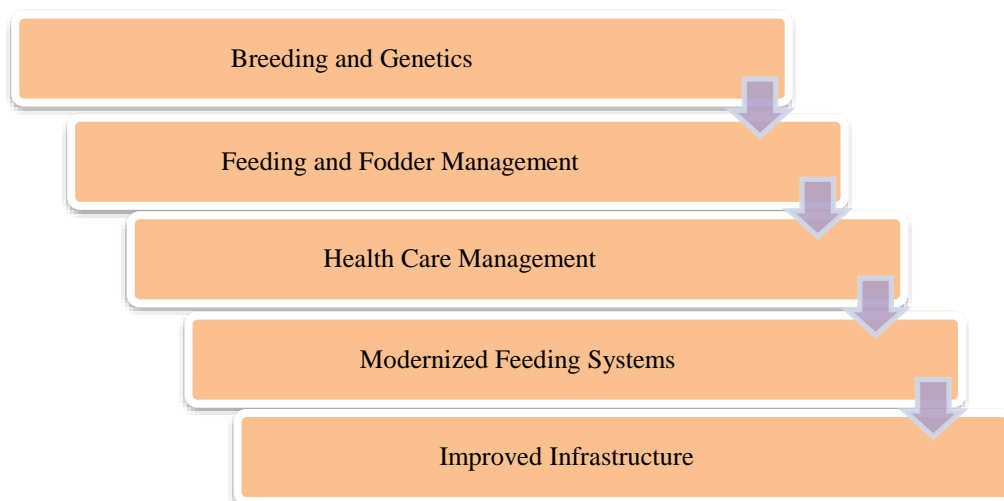


Fig. 1. Improved management practices and technologies
Source: Information summarized by author

Breeding and Genetics

The introduction of modern breeds for breeding, through artificial insemination and embryo transfer, improves the genetic potential of ruminant herds. This results in higher productivity, both in terms of meat and milk, and is associated with increased resistance to disease and other stressing factors (Ružičet al., 2002) [12]. Improving the genetics of ruminant herds through artificial insemination and embryo transfer has a number of advantages. Artificial insemination is a method of reproduction in which sperm from a selected male sire is artificially introduced into the female reproductive tract. This can be more efficient and cost-effective way of introducing new genetics into the herd, as it allows producers to use high-quality breeding material from wider range of animals. Embryo transfer from one female to another allows breeders to use the genetics of a high-quality female, even in case of impossibility to produce offspring itself (Hossainet et al., 2021) [7]. The application of

these technologies is complex and requires specialized training and equipment, but they are an effective way to improve the genetic potential of ruminant herds and increase their productivity. It is important carefully to consider the specific goals and limitations of the herd when deciding whether and how to use these technologies, and to work in cooperation with specialists, such as livestock engineers and veterinarians to ensure their safe and effective application (Gergovska & Panayotova, 2016) [6].

Feeding and Fodder Management

Optimizing the use of available local roughage resources by implementing feeding systems that promote nutrient utilization can improve the efficiency of producing ruminants. This results in higher productivity and reduced costs. Improving feeding and fodder management is an important factor in optimizing the efficiency and sustainability of producing ruminants. By careful selection and management of locally available fodder resources, farmers optimize nutrient

utilization by their animals and improve their productivity.

There are a number of strategies that producers can use to improve feeding and fodder management, including identifying the specific nutritional needs of animals based on factors such as their age, stage of production and activity level, and Selecting fodders that are suitable for the local climate and environment and that provide the necessary nutrients in an efficient and cost-effective manner.

It is important to determine the specific nutritional needs of animals based on factors such as their age, production stage and activity level. This helps to ensure that animals receive the right balance of nutrients to support their growth and development as well as their overall health and well-being. For example, young animals have different nutritional needs in comparison with adults because they are still growing and developing. They require higher levels of protein, energy and certain minerals and vitamins to support their growth. Likewise, ruminants at different stages of development, such as pregnant or lactating animals, have different nutritional needs (Okumuşoğlu et al., 2010) [11].

It is important to select fodders that are suitable for the local climate and environment and that provide the necessary nutrients in an efficient and cost-effective manner. Various fodders may have different nutritional profiles, and it is necessary to select those which meet the specific nutritional needs of ruminants based on factors such as their age, stage of production and activity level (Mohiuddinet al., 2019) [9].

The following factors impact the choice of fodders:

- Nutrient content: chosen fodder provides the necessary nutrients in the appropriate balance for the specific needs of the animals;
- Feeding habits: used fodders are palatable to animals, as they are more likely to consume them;
- Costs: fodder costs incurred and the overall economics of animal nutrition should be considered;

-Availability: lots are selected that are readily available and can be easily stored and transported;

-Environmental impact: the impact of the fodder effects on the environment, and any potential impact on the local ecosystem is considered.

Modernized Feeding Systems

Feed management systems allow ruminants to self-regulate their intake and can also be used to optimize nutrient utilization. These systems typically involve the access of animals to a range of fodders and allow them to choose the types and amounts they consume based on their individual nutritional needs. They can be particularly useful in situations that animals have different nutritional requirements or available fodders have different nutritional profiles (Nikolova, 2022) [10]. Implementation of feeding systems that optimize nutrient utilization can be an important part of increasing ruminant production. There are several approaches for optimization of nutrient uptake, including balanced rations and feeding management systems that allow animals to regulate their intake by themselves (Selvaggietet al., 2019) [13]. Balanced rations meet the specific nutritional needs of animals based on factors such as their age, stage of development and activity level. They are designed to provide the necessary nutrients in the right balance and proportions, and can feed both as complete fodder and in combination with other fodders. Balanced rations can be achieved by a variety of fodders, including grains, fodder, protein supplements and minerals and vitamins. Careful management of fodder resources minimizes waste and ensures that animals have access to fresh, high-quality fodders. Fodder resource management is a significant part of optimizing the breeding of ruminants. This includes minimizing waste and ensuring that animals have access to fresh, high-quality forage.

Health Care Management – Health Care

The implementation of vaccination, deworming and parasite control programs reduces the incidence of disease and parasitosis in ruminant herds and results in improved productivity and reduced costs.

Improved health management can be an important part of increasing ruminant production (Sharma et al., 2019) [14]. Vaccination is a tool to prevent disease in ruminants. Vaccines could stimulate the immune system of animals to produce antibodies against specific diseases, which can help protect them from infection. It is decisive to follow a vaccination schedule that is appropriate for the specific animal needs and the diseases that occur in the area (Markov, 2014) [8].

Deworming is another key aspect of ruminant health management. Parasites can cause a variety of health problems, including weight loss, reduced appetite and reduced productivity. By applying dewormers, it is possible to control and eliminate larvae, which can help improve animals' health and productivity. Skin parasite control is also a distinctive part of ruminant health management. Ticks and lice cause a variety of health problems, including skin irritation, anemia and reduced productivity (Tyankov et al., 2002) [15]. By implementing control measures, such as insecticides or using resistant breeds, it is possible to reduce the spread of parasites and improve animal health. Improved health management is a considerable part of increasing the breeding of ruminants (Gergovska & Panayotova, 2016) [6].

Improved Infrastructure

Infrastructure investments such as the construction of roads, barns, warehouses, fodder kitchens and other facilities that support the movement and marketing of animal products improve the accessibility and competitiveness of ruminant breeding in foot-hilly and mountain regions. Improved infrastructure is a major part of increasing the ruminant breeding in the foot-hilly and mountain regions of Bulgaria. Road construction can improve the accessibility of these regions and facilitate the transport of cattle, buffaloes, sheep and goats and animal products to markets, and increase the competitiveness of their production by reducing transport costs and facilitating the delivery of products to market.

Building barns, storage facilities and other infrastructure can improve the quality and value of animal products. The construction of cold storage facilities can preserve the quality of perishable products such as milk and meat, and the construction of processing and packaging facilities for animal products such as butter and cheese will help add value to the products and increase their competitiveness in the market.

In general, infrastructure investments can play a significant role in increasing the breeding of ruminants in the foot-hilly and mountain regions of Bulgaria. It is possible to create a sustainable and profitable industry that can provide a source of income and improve food safety for local communities by improving the accessibility and competitiveness of these regions (Nikolova, 2022) [10].

CONCLUSIONS

Ruminant livestock constitutes a major share of the total agricultural production of the foot-hilly and mountain regions and must be based on its own resources for feeding. Cattle, buffaloes, sheep and goats in these regions are grazing natural or sown pastures. This process is related to the improvement of the grass stand and its proper use, through rotational grazing.

The potential of the foot-hilly and mountain regions must be oriented towards obtaining products of ruminants which are of high quality and specified geographical region.

Practical application of the proposed management practices and technologies is possible with the support of states, regulatory instruments such as subsidies, premiums, programs, strategies, etc.

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