Evaluation of the dairy cattle breeding development and the population provision by the dairy products of the region with a continental climate

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Abstract. The article is devoted to the study of the current state of dairy cattle breeding and the provision of milk and dairy products to the population of the Republic of Buryatia, a region with a continental climate. Per capita production of milk and dairy products does not provide a level of per capita consumption. Their actual consumption is below rational norms. The resources of milk and dairy products have declined in recent years compared with 1990 almost 40% due to a significant decrease in the number of cows and their productivity. The largest share of cattle, including cows are concentrated in households when they are reduced in the public sector. Therefore, the volume of production of these products in agricultural organizations decreased by 18 times compared with the pre-reform period.

The answer to big challenges in accordance with the Strategy for scientific and technological development of the Russian Federation [6], is to develop products and services technologies that meet its national interests and are necessary to improve the quality of life of the population. The food supply in the regions of Russia depends primarily on bioclimatic potential (BCP), influencing the volume, structure of production and demand of certain products. BCP is an integral indicator of the biological productivity of land and is determined by the supply of plants, heat, and moisture [8]. BCP determines the ability of the regions to ensure local food and participate in the formation of food funds. In accordance with the differentiation of Russian regions by the level of bioclimatic potential [2], the Republic of Buryatia is included in the soil-climatic zone with extreme natural conditions. Its bioclimatic potential is 48 to 100 – average for Russia. In general, the climate of the region is continental [9].

The territory of the Republic of Buryatia is located in the southern part of Eastern Siberia near lake Baikal. Administratively the Republic is divided into 21 districts, six cities, 12 urban-type settlements. The average population density currently stands at 2.8 people per 1 sq. km. In urban areas, there is 58.9% of the total population of the Republic, the rural population is 41.1%. The indigenous population of the Republic is the Buryats, the Evenks and the Soyots. Buryatia is a multinational Republic: the Russians 64.9%, Buryats - 29.5%, Tatars - 0.7%, the Ukrainians - 0.6%, other nationalities - 4.3 percent.
Milk and dairy products for regions with a continental climate are the most important food products for humans. It is the main source of proteins, fats, minerals, vitamins, enzymes, and other essential nutrients for humans.

One of the strategic goals of ensuring food security in the country and its regions [7] is the formation of a healthy diet based on rational food consumption standards for all population groups. According to the recommendations of the Ministry of Health, milk and dairy products should occupy up to 30-35% in the annual human diet [5]. However, the level of their actual consumption is 38% lower than scientifically based norms and even lower than the consumer basket for this region during the study period by 26-13% [1].

The production of milk and dairy products in the republic does not provide the level of their consumption during the study period (table 1).

**Table 1.** Production and consumption of milk and dairy products per capita, kg.

| Name                | 1990 | 2014 | 2015 | 2016 | 2017 | 2018 | 2018 to 1990, % |
|---------------------|------|------|------|------|------|------|-----------------|
| Production per capita, kg | 241  | 218  | 215  | 186  | 162  | 143  | 59.3           |
| Consumption per capita, kg | 341  | 236  | 230  | 222  | 207  | 201  | 58.9           |

*compiled by the authors according to Buryatstat [1].

It should be noted that in the pre-reform period, the per capita production of milk and dairy products did not provide the level of per capita consumption. This situation has developed, first of all, due to the changes that have taken place in agriculture, in particular in dairy cattle breeding: low level of federal and regional programs implementation, price disparity, shortage or absence of working capital for agricultural producers, high livestock costs and low prices for their products. All these adversely affect the development of dairy farming.

The basis for the formation of food funds is the sphere of agricultural production [3]. The resources of Buryatia milk and dairy products are formed largely according to the data of Buryatstat [1] due to their local production (table 2).

**Table 2.** Milk resources and dairy products development and use, thousand tons.

| Name                | 1990 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---------------------|------|------|------|------|------|------|
| Development, total  | 367.3| 282.0| 276.7| 260.2| 232.8| 223.6|
| Stocks at the beginning of the year | 0.2  | 21.9 | 16.9 | 13.6 | 7.3  | 4.5  |
| Production          | 272.7| 191.7| 188.3| 177.7| 154.0| 135.3|
| Coming-in, including import | 94.4 | 68.4 | 71.5 | 68.9 | 71.5 | 83.8 |
| Usage, total        | 367.3| 282.0| 276.7| 260.2| 232.5| 223.6|
| Production consumption | 41.4 | 21.6 | 30.2 | 30.9 | 22.7 | 20.6 |
| Losses              | -    | 0.1  | 0.0  | 0.0  | 0.0  | -    |
| Coming-out, including export | - | 13.3 | 7.3  | 3.6  | 1.4  | 0.4  |
| Personal consumption | 325.7| 230.1| 225.6| 218.4| 204.2| 198.1|
| End of year stocks  | 0.2  | 16.9 | 13.6 | 7.3  | 4.5  | 4.5  |

*compiled by the authors according to Buryatstat [1].

The resources of milk and dairy products have declined significantly in recent decades. So, in 2018 they have decreased compared to 1990 by almost 40% due to a decrease in production volumes of this type of product by 50.4%. Import of milk and dairy products decreased by 20%, but export was insignificant. Most of the milk’s resources are used for personal consumption, while their volumes have been reduced in recent years.
The decrease in milk production was largely due to a decrease in the number of cattle and cows (table 3).

**Table 3. Cattle numbers, thousand heads a.**

| Name                              | Years       | 2018 to 1990, % |
|-----------------------------------|-------------|-----------------|
|                                  | 1990  | 2014  | 2015  | 2016  | 2017  | 2018  |          |
| Farms of all categories          |       |       |       |       |       |       |          |
| Cattle - total                   | 559.1 | 380.2 | 377.1 | 377.2 | 329.4 | 329.6 | 58.9     |
| including cows                   | 184.9 | 159.1 | 156.2 | 16.3  | 143.8 | 142.7 | 77.2     |
| Agricultural organizations       |       |       |       |       |       |       |          |
| Cattle - total                   | 378   | 56.8  | 54.6  | 54.5  | 51.0  | 47.0  | 12.4     |
| including cows                   | 112.8 | 22.4  | 22.2  | 23.2  | 22.9  | 20.5  | 18.2     |
| Households                       | 180.5 | 279.7 | 278.7 | 282.5 | 235.8 | 233.9 | 129.6    |
| Cattle - total                   | 72.1  | 118.0 | 115.1 | 118.1 | 100.8 | 98.8  | 137.0    |
| including cows                   | 0.1   | 43.6  | 43.9  | 40.2  | 42.8  | 48.0  | -        |
| Peasant (farmer) households      |       |       |       |       |       |       |          |
| Cattle - total                   | 1     | 43.6  | 43.9  | 40.2  | 42.8  | 48.0  | -        |
| including cows                   | -     | 18.7  | 18.8  | 19.0  | 20.3  | 21.4  | -        |

a compiled by the authors according to Buryatstat [1].

From 1990 to 2018 the number of cattle decreased by 41% (229.5 thousand heads), including cows - almost 23% (42.2 thousand heads). At the same time, the largest share of cattle, including cows, is concentrated in the households (table 4).

**Table 4. The structure of the livestock of cattle, % a.**

| Name                              | Years       |
|-----------------------------------|-------------|
|                                  | 1990  | 2014  | 2015  | 2016  | 2017  | 2018  |
| Agricultural organizations       |       |       |       |       |       |       |
| Cattle - total                   | 67.6  | 14.5  | 14.4  | 14.4  | 15.5  | 15.5  |
| including cows                   | 61.0  | 14.3  | 14.5  | 14.5  | 15.9  | 16.0  |
| Households                       | 32.3  | 73.9  | 74.9  | 74.9  | 71.6  | 70.4  |
| Cattle - total                   | 39.0  | 73.7  | 73.7  | 73.7  | 70.1  | 69.4  |
| including cows                   | 0.1   | 11.6  | 10.7  | 10.6  | 13.0  | 14.1  |
| Peasant (farmer) households      |       |       |       |       |       |       |
| Cattle - total                   | 0.1   | 12.0  | 11.8  | 11.8  | 14.1  | 14.6  |

a compiled by the authors according to Buryatstat [1].

In the pre-reform period, the situation was the opposite. So, in 1990 the main share of cattle was concentrated in agricultural organizations (67.6%, including cows 61%).

Due to a significant reduction in the number of cattle in agricultural organizations, the volume of milk production in the republic decreased significantly (table 5).

**Table 5. Gross milk production by categories of farms, thousand tons a.**

| Name                              | Years       | 2018 to 1990, % |
|-----------------------------------|-------------|-----------------|
|                                  | 1990  | 2014  | 2015  | 2016  | 2017  | 2018  |
| Agricultural organizations       | 165.4 | 15.2  | 12.0  | 12.3  | 9.8   | 9.1   | 5.5    |
| Households                       | 95.8  | 187.0 | 187.0 | 159.3 | 138.0 | 120.0 | 125.3  |
| Peasant (farmer) households      | 0.2   | 6.5   | 6.7   | 6.0   | 6.1   | 6.3   | -      |
| Total                            | 261.4 | 208.7 | 205.6 | 177.6 | 154.0 | 135.4 | 51.8   |

a compiled by the authors according to Buryatstat [1].
In 2018 gross milk production in all categories of farms in the republic was lower by 19.3 thousand tons compared to 1990. In agricultural organizations, milk production decreased by 18 times, in households increased by 20%. Along with a reduction in livestock, a decrease in cow productivity was also reflected in milk production. So, in 2018 productivity decreased by 14% and amounted to 1980 kg per cow in comparison with 1990.

The decrease in productivity was the result of insufficient and unbalanced feeding of animals (table 6).

Table 6. Feed consumption for livestock and poultry in farms of all categories.a

| Name                                              | 2014  | 2015  | 2016  | 2017  | 2018  |
|---------------------------------------------------|-------|-------|-------|-------|-------|
| Total feed in terms of feed units, thousand tons  | 924   | 843   | 851   | 848   | 781   |
| including concentrated feed                       | 168   | 146   | 154   | 132   | 123   |
| Feed consumption per 1 conditional head of cattle, c feed, units | 22.1  | 20.2  | 21.28 | 22.55 | 21.81 |

a compiled by the authors according to Buryatstat [1].

Thus, a reduction in the number of cattle, including cows, and a decrease in their productivity, as well as milk production, have led to a reduction in the resources of milk and dairy products and their provision with the population of the Republic of Buryatia.

In general, the dairy industry is in a difficult economic situation. Many livestock buildings were destroyed, the level of mechanization of the remaining farms decreased, and the industry was “thrown back” many years ago in terms of production volume and degree of technical equipment. The current critical situation in the republic's dairy industry requires special state attention [4]. It is necessary to take effective measures to increase milk production, increase its efficiency and provide the population with milk and dairy products.

References

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