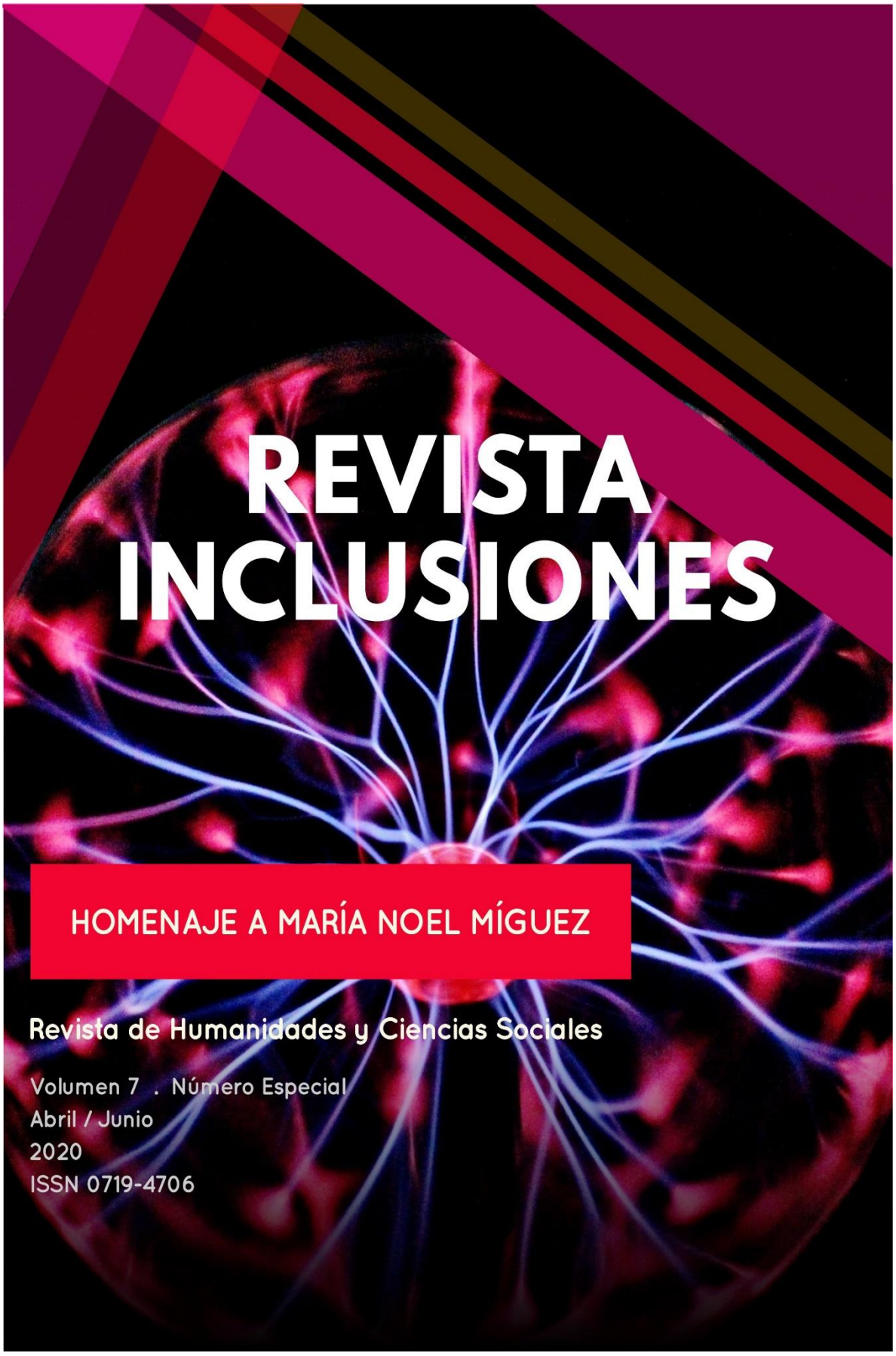

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HOMENAJE A MARÍA NOEL MÍGUEZ

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ANALYSIS OF POTENTIAL AND ELABORATION OF STATE REGULATION MEASURES TO IMPROVE THE EFFICIENCY OF BEEKEEPING (A CASE STUDY OF THE UDMURT REPUBLIC)

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Abstract

The paper contains analytics on the dynamics of indicators characterizing the efficiency of management in the beekeeping industry of the Russian Federation as a whole and of the Udmurt Republic in particular. The analysis covers the last 50 years. A downward trend in the number of bee colonies has been revealed: decrease by 1.8 times in the Russian Federation and by 3 times in the Udmurt Republic. At the moment, practically the entire industry is concentrated in the private sector; a very low percentage of bee yards belongs to public households. Analysis of beekeeping development potential in the Udmurt Republic shows that forage resources can ensure 5.6 times more honey products. To change the situation in the region, a reorganization of the industry management is required. Measures to improve the mechanism of state management of the beekeeping industry are proposed. They include establishment of an administrative body, responsible for veterinary and statistical check, and development of regulatory framework – a Beekeeping Act. This will enhance the efficiency of beekeeping management, food security (in the framework of the import substitution program) and living standards.

Keywords

Measures of state regulation – Industry – Bee colonies

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Introduction

In recent years, the beekeeping industry in Russia has undergone significant changes both in number of bee colonies and in technology. Transition from the socialist to commercial form of ownership negatively affected the industry. In 1991-2000 there was a drastic reduction in the number of bee colonies in the country (by 26%), caused by liquidation of bee yards in the public sector[1].

Organizational and managerial factor, namely, the lack of any structure for management, statistics collection and coordination of beekeeping development, had also negatively affected the industry[2]. “Pchelovodprom”, a regulatory body that used to coordinate the activities of beekeepers at country- and regional level, does not exist since 2006. It has been transformed to a federal agency at the Department of Livestock and Breeding of the RF Ministry of Agriculture[3].

At the moment, the beekeeping industry has practically no specialized veterinary attendance, which contributes to the spread of infectious and emerging diseases of bees and also hinders the industry development. Neither mandatory registration of bee colonies and quarantine diseases nor veterinary certificates are required.

Material and methods of research

The research is aimed at analysis of the beekeeping industry and working out the ways of its efficient development in the Udmurt Republic.

In course of the research, the following tasks were carried out:

– comparative analysis of the current state of bee-keeping industry in the Russian Federation and the Udmurt Republic;

– identification of the beekeeping development potential in the Udmurt Republic.

Statistics on the number of bee colonies were obtained from statistical departments of the Russian Federation and the Udmurt Republic. Also, the data given by V. I. Lebedev and Yu. V. Dokukin[4] were used.

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Results and discussion

Analysis results of honey-bee population change in the Russian Federation over 50 years are shown in Table 1.

Indicator	1965	1975	1985	1995	2000	2005	2010	2013	2014
In all household categories	6002	5341	3822	4083	3497	3222	3047	3341	3372
among them, in public households	2629	2521	1882	894	555	342	256	265	258
%	43,8	47,2	49,2	21,9	15,9	10,6	8,4	7,9	7,7
in private households	3373	2820	1940	3189	2992	2880	2791	3076	3114
%	56,2	52,8	50,8	78,1	84,1	84,9	91,6	92,1	92,3

Table 1
Number of bee colonies in the country (in thousand bee colonies)

Regrettably, the analysis of the number of bee colonies in Russia in 1965-2014 demonstrates a strong progressive reduction – from 6002 thousand bee colonies in 1965 to 3372 bee colonies in 2014 (i.e. decrease by 1.8 times). Drastic reduction in the number of bee colonies was observed in 1965-1985. The number of bee colonies reduced practically by one third (by 2180 thousand bee colonies). In 1985-1990, the number of honey-bee colonies increased by 543 thousands, but then, again, a slow decrease was observed. From 1985 till the present, the number of bee colonies varies in negative direction within 12.5 %. This trend also indicates decrease in commodity productivity of honey bees.

Thus, in 1965-2014, the beekeeping industry underwent the radical changes (Fig. 1, 2). If in 1965 most of honey-bees (43,8 %) were kept in the public bee yards, nowadays practically the entire beekeeping industry (up to 93,4 %) is in private ownership. It is evidence that the beekeeping industry is neglected both at the national level and by agro-industrial enterprises. In practice, since 2010 the bee colonies have moved to private farmsteads, and their accurate censuring is difficult.

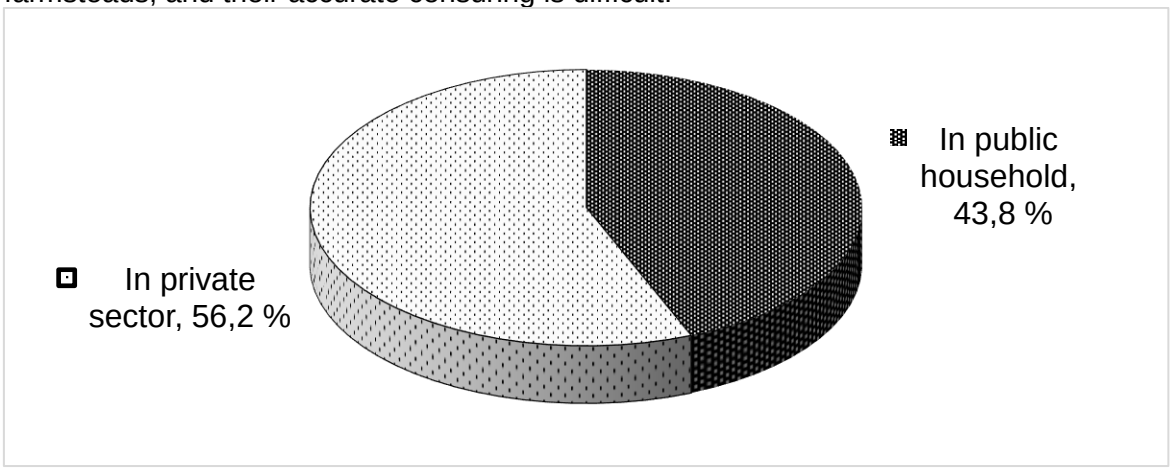

Figure 1
Percentage of bee colonies in public and private sectors in 1965

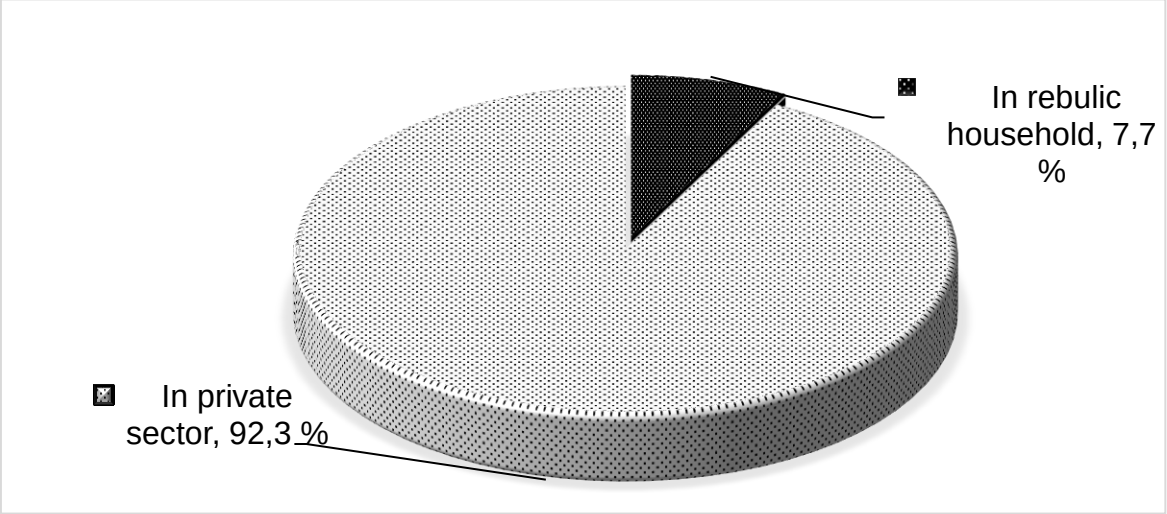

Figure 2
Percentage of bee colonies in public and private sectors in 2014

Population dynamics of bee colonies and their productivity in 2014-2016 is given according to the data of the Federal State Statistics Service (Tables 2-4).

Region	Number of bee colonies			
	2014	2015	2016	Reporting year to basis year ratio (in %)
The Russian Federation	3371,8	3349,6	3350	99,4
Volga Federal District	1250	1238,3	1180,4	94,4
The Udmurt Republic	59,8	58,7	54,9	91,8

Table 2
Comparative analysis of the number of bee colonies in the Russian Federation and the Udmurt Republic (in thousand bee colonies)

Analysis of the population dynamics of bee colonies for the last 3 years shows similar trends countrywide and in the Udmurt Republic, that is, reduction in the number of bee colonies by 0,6 % and 9.2 % respectively. According to statistics, there were 3350 thousand bee colonies in the Russian Federation in 2016; the population of honey bees in the Udmurt Republic was 1.6 % of total population in the country.

To estimate the productivity of bee colonies, we need to analyze the gross yield of honey in the Russian Federation (Table 3).

Indicators	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Year 2013 to year 2004 ratio (in %)
Gross yield of honey in all household categories (in tons)	52964	52469	55678	53670	57440	53598	51535	60010	64898	68446	1,29

among them, in agricultural organizations	3291	2903	2921	2705	2642	2200	1749	1642	1459	1462	0,44
in private households	48094	48062	51118	49144	52869	49605	48063	55855	60553	64046	1,33
in peasant farm enterprises (private farm households) and by private entrepreneurs	1579	1504	1640	1821	1928	1792	1723	2514	2886	2938	1,86

Table 3
Gross yield of honey (in tons)

Thus, over 10 years, the gross yield of honey in Russia has increased by about 29 % (by 15 482 tons). This suggests that growth rate of the gross yield of honey outruns the growth rate of bee population, which means that the amount of honey per bee colony in 2013 is greater than in 2004, i.e. the productivity of bee colonies has increased. The cause of that may be correct zoning of bee breeds, favorable natural and climatic conditions, good plant cultivation basis for pollination, etc. For the period under review, private households increased their honey yield by 33 %, peasant farm enterprises (private farm households) and private entrepreneurs – by 86 %, whereas, in contrast, agricultural organizations reduced the gross yield of honey by 56 %, as the number of their bee colonies decreased by 58 %.

Region	Commercial honey yield (in tons)			
	2014	2015	2016	Reporting year to basis year ratio (in %)
The Russian Federation	73518,7	66507,4	69764,3	94,9
Volga Federal District	26773,3	23849,2	23594,8	88,1
The Udmurt Republic	1028	614	994	96,7

Table 4
Commercial honey production (in tons)

Detailed information on the productivity of bee colonies is set out in Tables 4 and 5 (on a per bee colony basis).

Indicators	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Year 2013 to year 2004 ratio (in %)
Productivity in all household categories (in kg)	16,06	16,25	18,19	17,33	19,30	17,59	16,90	18,46	19,76	20,48	1,28
among them, in agricultural organizations	11,56	11,68	13,20	13,68	15,95	14,51	12,75	11,96	11,94	12,29	1,06
in private households	16,46	16,66	18,63	17,56	19,50	17,84	17,22	18,84	20,19	20,82	1,26

in peasant farm enterprises (private farm households) and by private entrepreneurs	17,32	15,75	17,32	18,15	19,51	15,64	14,25	16,93	17,77	20,12	1,16

Table 5
Productivity of bee colonies (in kg / bee colony) (the Russian Federation)

On the whole, the productivity of bee colonies for the period under review increased by 20 %, or by 4.42 kg per bee colony. It should be noted, that increase in productivity was observed in all household categories. The highest rate of growth in productivity of bee colonies falls to private households, in which the productivity increased by 4.36 kg (28 %) per bee colony. This is due to the fact that private households take more thorough approach to beekeeping. The lowest growth rate was demonstrated by agricultural organizations (by 6 % in 2013 as against 2004) (tab. 6). This suggests that, for agricultural organizations, the beekeeping is not so much a core business as an amateur activity, so little efforts were made to it.

Region	Commercial honey yield (in tons)			
	2014	2015	2016	Reporting year to basis year ratio (in %)
The Russian Federation	21,8	19,9	20,8	95,5
Volga Federal District	21,4	19,3	20,0	93,3
The Udmurt Republic	17,2	10,5	18,1	105,3

Table 6
Productivity of bee colonies (in kg / bee colony)

On the whole, analysis of productivity of the bee colonies in the Russian Federation in 2004-2016 shows increase in commodity productivity by 29.5 %. When analyzing the dynamics of bee colonies productivity in the Udmurt Republic, it is important to note, that over the last three years the commercial honey yield in the republic increased by 5.3 %, whereas countrywide a decrease by 4.5 % was observed. However, in 2015, the productivity of bee colonies fell to 10.5 kg due to climate conditions, unfavorable to honey gathering.

In recent years, the beekeeping industry in the Udmurt Republic has also undergone significant changes for the worse. Honey-bee population has decreased; quality control has become much weaker; veterinary check practically does not exist; breeding has been brought to nought. As a result, there prevail crossbred bees in the region; varroosis, ascospherosis, nosematosis, American foulbrood, and other diseases are not uncommon. Up to now, the beekeepers of the republic have to combat these and many other problems all by themselves. The Udmurt beekeeping agency has ceased to exist since 2006, as its funding was not included in the budget. Therefore, there is no unified center for coordination and support of beekeepers activities.

Analysis of the number of bee colonies in the Udmurt Republic indicates a similar downtrend in bee population: 150 thousand bee colonies in 1969 against 49.5 thousands in 2013 (according to the data of General Veterinary Authority on all household categories); 98.4 % of them were kept in private households (Fig. 3).

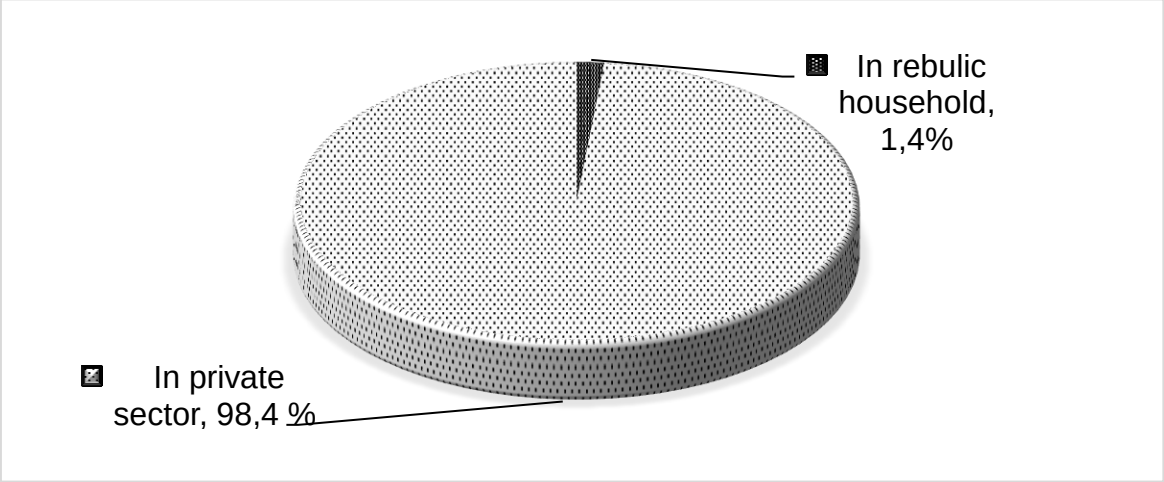

Figure 3
Percentage of bee colonies in public and private sectors of the Udmurt Republic in 2016

Thus, for the last 50 years, the beekeeping industry has undergone major changes for the worse, namely, the bee population has reduced dramatically both in the Udmurt Republic and countrywide. This indicates a cutback in production of biologically valuable honey products and affects the yield of plant industry.

However, analysis of the beekeeping potential of the Udmurt Republic reveals a trend of future growth upon condition of the appropriate state support and control.

Total theoretical honey stock of the Udmurt Republic is set out in Table 7.

Name of acreage	Area (thousand ha)	Honey stock (tons)
Agricultural lands	940.7	64147.4
Forest lands	1976.2	40137.0
Total	2916.9	104284.4

Table 7
Bee plant acreage in the Udmurt Republic

The total honey stock of the forests and the agricultural lands is 104 284.4 tons, where the forest lands account for 38,5 % (with the occupied area of 1976.2 thousand ha) and the agricultural lands – for 61.5 % (940.7 thousand ha).

Estimation of the amount of honey stock in the region facilitates better usage of available bee plant productivity and rational distribution of bee colonies across the republic (Fig. 4).

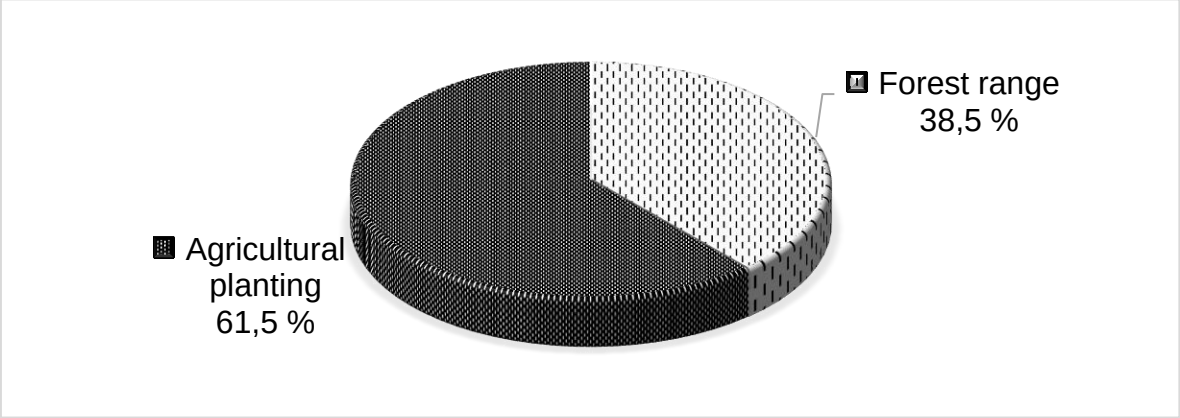

Figure 4
Honey stock structure of the region

Natural conditions, including climatic factors and forage resources, have a strong impact on sustainability of production. As it follows from the analysis of bee colonies productivity and potential of its usage, the honey stock of the Udmurt Republic is not used to the full extent; a number of bee colonies can be increased.

According to statistics, each bee colony consumes, on the average, up to 90 kg of honey a year. It is also planned to obtain 30 kg of commercial honey from each bee colony. Therefore, each colony should have about 120 kg honey reserves. However, it should be kept in mind that bees do not use the honey reserves completely because of poor weather conditions, condition of bee colonies and other reasons. It is customary to assume that bee colonies can efficiently use about 1/3 of the honey reserves of the region, which in our case equals to 104284.4 : 3 = 34761,5 tons.

To determine, how many bee colonies can be kept in the study area, we should divide 34 761 500 kg by 120 kg (total food requirement of each bee colony plus commercial honey yield). It follows that in the Western Pre-Urals region, with honey reserves in the amount of 34 761.5 tons available for bee colonies, it is possible to keep 289.7 thousand bee colonies. In reality, about 50 thousand bee colonies are kept in the study area. Therefore, the study area has reserves to increase the number of bee colonies and their productivity.

Conclusion

For proper use of reserves, it is necessary to ensure accurate recording and monitoring of bee colonies in various regions of the republic. To this end, a beekeeping act should be developed and introduced into effect at the regional level, as well as an administrative body with precise list of duties and responsibilities should also be re-established.

The administrative body of the beekeeping industry should implement the following tasks:

– to render assistance to households of various forms of ownership in diagnostics, prevention and treatment of bee diseases; in particular, to grant benefits for purchasing medical drugs for each bee colony;

– to implement measures of state support for bee yards to ramp up of apicultural production, including support for acquisition of necessary equipment and appliances;

– to improve production according to high standards; develop international cooperation in the field of beekeeping;

– to support research activities in the field of beekeeping;

– to support activities on promotion the beekeeping and its products across the population;

– to hold training workshops for experts and those wishing to engage in the beekeeping industry;

– to coordinate selection and breeding;

– to promote pure bee-breeding;

– to provide state support to the beekeeping industry, including bee yards funding.

In this way, the current situation in the region requires reorganization of the beekeeping industry management. Establishment of an administrative body, responsible for veterinary and statistical check, and development of regulatory framework – a Beekeeping Act – will improve situation in the industry and stop the decline in number of bee colonies.

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Vorobyova, S.; Vasilyeva, M.; Yakimov, D. y Tronina, A. Influence of biostimulating supplement on economically useful abilities of bees in the udmurt republic. Proceedings of the International Scientific and Practical Conference (ISPC 2019) «Digital agriculture - development strategy». "Advances in Intelligent Systems Research" (2019): 250-253.

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