

EFFICIENT FUNCTIONING CONDITIONS OF BEEKEEPING INDUSTRY

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Cherkasy region plays an important role in development of beekeeping in Central Ukraine and forest-steppe climatic zones, given that most bee colonies are met in forest-steppe and steppe Ukraine. Cherkasy region owes 4.0-3.5% in the national gross production of honey with 5.5% of bee colonies. The analysis of dynamics of beekeeping industry indicates that for the period of 1990 till 2011 the number of bee colonies in all farm categories of Cherkasy region decreased by 37.5%, and in turn, in agricultural enterprises by 87.9%. Regional development indicators fully reflect state ones. Unprofitable level of honey production, lack of effective state programs to support the industry, inadequate functioning of the product, low consumption by the population, imbalance of rational relationships with other branches of agricultural production – this is a range of problems that hinder the development of beekeeping industry.

Some issues of development and enhancement of functioning of beekeeping industry are outlined in research of Bodnarchuk L.I., Yemets K.I., Khrystenko O.A., Chekhov S.A., Yatsenko O.M. The importance and urgency of these issues solution in the field of beekeeping farms resulted in selection of subjects of the research.

Research methodology. The purpose of the article is research aimed at ensuring the effective functioning of beekeeping industry, through the optimal combination with other branches of agricultural production. Achievements of national researchers are the base of theoretical and methodological developments. Methodological basis is presented by a set of methods, techniques and methods of analysis, including methods of analysis and synthesis, induction and deduction, statistical methods and economic and mathematical modeling.

Research results. National scientists developed a number of recommendations that will help to improve functioning profitability of beekeeping industry. It is offered to create specialized industrial enterprises in Ukraine, given that they have clear advantages over small apiaries and farms. They are provided with appropriate feeding grounds, receive a significant amount of marketable honey, wax and other bee products. Large farms have more opportunities for the application of high technology and machinery, advanced technology for bees care, and the use of effective marketing tools for sales [6, P.368].

Taking into consideration the experience of many countries, where income from bee pollination is 90% of all profits, it is necessary to develop and implement a mechanism of crop deduction on the development of beekeeping industry with the profits derived from increased productivity of entomophilic crops through their pollination by bees. Such contributions to the field of beekeeping will stimulate its development, which, in turn, will be a key to further yield increase of entomophilic

crops and crop profitability. One of the effective methods to promote the beekeeping industry would be a partial deduction from profits crop [3].

None of animal production is connected so closely with natural conditions and specific fodder as beekeeping. A complex of cultivated and wild honey plants is forage for bees, which are the basis of effective management of beekeeping. Therefore, research and identify new areas of honey, their development and rational use is essential. The development of beekeeping, the direction of specialization and determination of the optimal size of bee farms depend on the potential power of honey base, its accessibility for development [2]. For the proper functioning of bee colonies and collection profits from deduction, in Ukraine should be increased not only the areas under sunflower, but also honey crop areas, like sainfoin, alfalfa, clover, honey, etc. However, these plants are sown for the needs of cattle breeding, which is on the verge of destruction (generally neglected or absent at all), and therefore the crop areas of these forage crops are very small [1, P. 64].

Over the period of 2004-2011, according to the results of beekeeping farms, agricultural enterprises of Cherkasy region showed unprofitability of honey and bee industry as a whole at 13.4 – 15.3%, with the highest loss ratio observed in 2007 – 41.2%. The results of honey producers of agricultural enterprises for 2011 indicate that only 62.5% of enterprises provided break-even production. Unprofitable level of beekeeping industry functioning in agricultural enterprises of the region is not local, but is inherent to other regions of forest-steppe and steppe Ukraine, which are estimated by specialists as favorable for development of beekeeping because of considerable fodder base of agricultural pollinating crops.

To identify the relationship between the level of profitability and concentration of honey bee colonies per 100 hectares of agricultural land there were data gathered on the performance of agricultural enterprises of Cherkasy region who keep apiaries, for the period 2008-2011, data are generated on average for leveling influence of natural factors, which gave an opportunity to obtain the following results. Among the entire set of business entities, the total number of which is 102, 76.5% provide a concentration of bee colonies on the level of 5.0 colonies per 100 hectares of agricultural land, the average production cost per 1 bee colony in these enterprises is 362.36 UAH.

Unprofitable production level is observed in the group with concentration of 5 to 10 bee colonies at 19.8%, the production cost per bee colony is 292.05 UAH. Increased concentration of more than 10 bee colonies provided enterprises quantity of which is 5.9% of their total number, cost-effective manufacturing at 7.9% and reduction of costs by 254.01 UAH. The proof of this are the indicators of JV Dobrobut, Khrystynivka district, at concentration of bee colonies in 2011 at 33 colonies, the level of profitability is 7.1%, and the Institute of pomology named after L.P. Symyrenko of National Academy of Agrarian Sciences of Ukraine of Gorodyshche district at concentration of 14 bee colonies, with profitability at 41.3%.

However, the concentration of bee colonies per 100 ha of agricultural enterprises shows only the total amount, excluding the provision of bee colonies to pollinate agricultural crops. Also, the structure of crops and their distance from the apiaries should be taken into consideration. The density of bee colonies in all

enterprise categories of Cherkasy region decreased by 47.4% over the period of 2001-2011. (Fig. 1). The lowest level among above mentioned enterprises is observed in agricultural enterprises: 0.8 – 2.2 bee colonies.

1. Grouping of agricultural enterprises of Cherkasy region according to bee colonies concentration, 2008-2011.*

Indicators	Groups as to bee colonies concentration per 100 ha of agricultural land, colonies			
	up to 5	5.1-10	more than 10	total
Number of enterprises in a group	78	18	6	102
Sales price of 1 kg of honey, UAH	16.74	17.43	15.20	16.81
Production of honey per 1 bee colony, kg	17.2	14.9	14.2	16.3
Production costs per 1 bee colony, UAH	362.36	292.05	254.01	332.96
Total cost of 1 kg of honey, UAH	23.68	21.74	14.07	22.75
Production cost of 1 kg of honey, UAH	21.75	19.99	12.34	20,87
Income (loss) from sales of 1 kg, UAH	-6.93	-4.32	1.13	-5.94
Gross profit (loss-making) of honey production, %	-29.3	-19.8	7.9	-26.11

* Calculated by the author according to statistical reports f. 50 a.

To provide additional harvest increase due to qualitative bee polling and productivity increase of bee colonies, complete forage base, formed by given crops, it is possible to provide a cost-effective functioning of beekeeping industry and increase profits from agricultural production.

In particular, technological factors of keeping bee colonies and pollination of crops should be taken into account. Technological, economic and institutional factors specific to beekeeping industry and agriculture, formed the basis of research of the optimal structure of production and development of agricultural industries that have an impact on the development of beekeeping.

In research of optimal proportion of beekeeping industry with other sectors of agricultural production, an economic-mathematical model of the problem has been developed. The matrix model has dimensions of 43 x 51 and is designed based on information for 2007-2011 period of LLC Agricultural Company Dobro of Uman district Cherkasy region. This enterprise is selected as typical among agricultural enterprises of Cherkasy region with the industries represented: beekeeping, animal husbandry and horticulture. The problem solution was carried out using the software package linear programming LPX 88 for problems solution (similar results were obtained by information processing using Microsoft Excel –Finding solutions add-in), which made it possible to establish the optimal structure of horticulture in relation to various branches of animal husbandry and beekeeping, and to determine

the optimal feed rations for animals and derived products of beekeeping. Herewith, the maximum profit from production financial activity was calculated for a given production capacity.

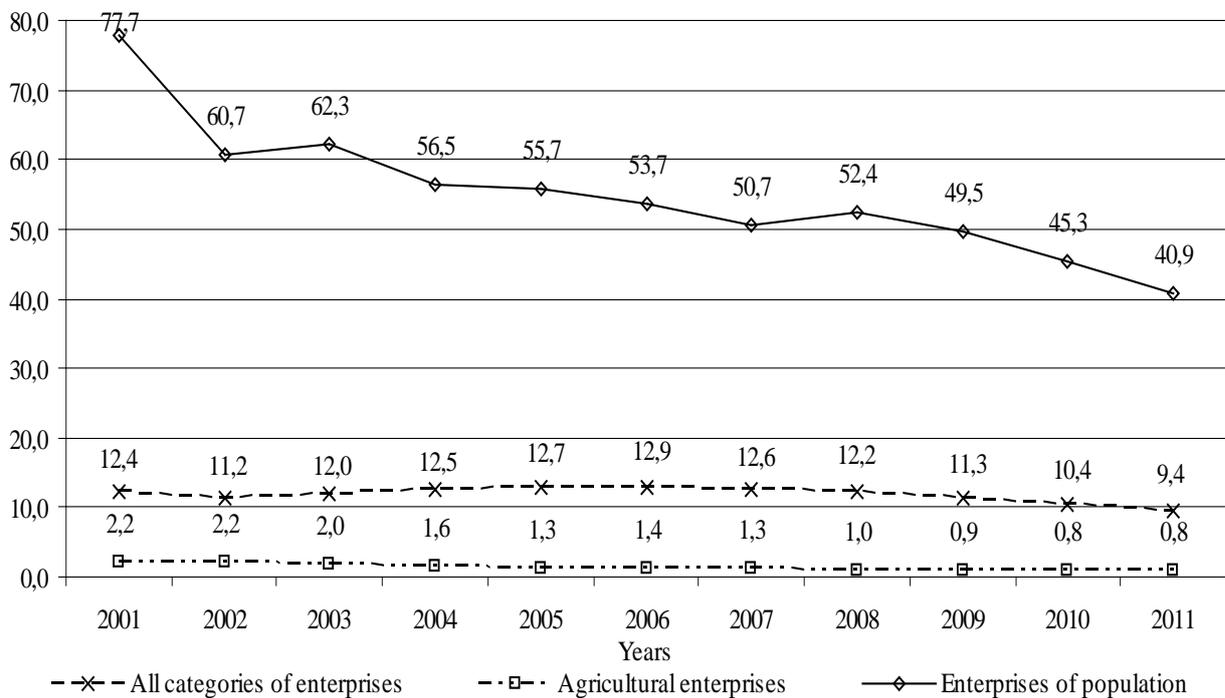


Figure.1. Dynamics of bee colonies density per 100 ha of agricultural land according to enterprise categories of Cherkasy region, colonies *

* Calculated by the author according to a statistical report [4]

The calculations indicate that to meet the goals the following conditions must be observed, in particular to ensure balanced rations for animals and get other marketable horticulture production, as well as to provide beekeeping industry with sufficient feeding base, thus the optimal development plan envisages the following structure of the area sown (Fig.2).

An optimal development plan provides that 51.8% of the crop area should be under grains, which is on 5.7 percentage points less compared with the existing structure of crops in all enterprise categories of Cherkasy region. Mostly changes require expansion of areas occupied by forage crops by 16.8 percentage points in regard to an existing structure of crops for 2000- 2011. The structure of acreage of forage crops should include sainfoin, sweet clover, clover, alfalfa not less than 14.9%, which in turn makes it possible to provide animal husbandry with forage and form a considerable honey reserve for beekeeping development. Industrial crops (rape, sunflower) play an important role for the formation of honey reserve, specific gravity of these crops in the crop area structure shall be not less than 13.1 and 6.4%, respectively. Also, it should be recommended for early spring bee colonies to use bee colonies on pollination garden area which should be not less than 0.4% of agricultural land in the structure of the entity. It is advisable to make full use of honey reserve of shelter belts of linden, acacia and other bee plants.

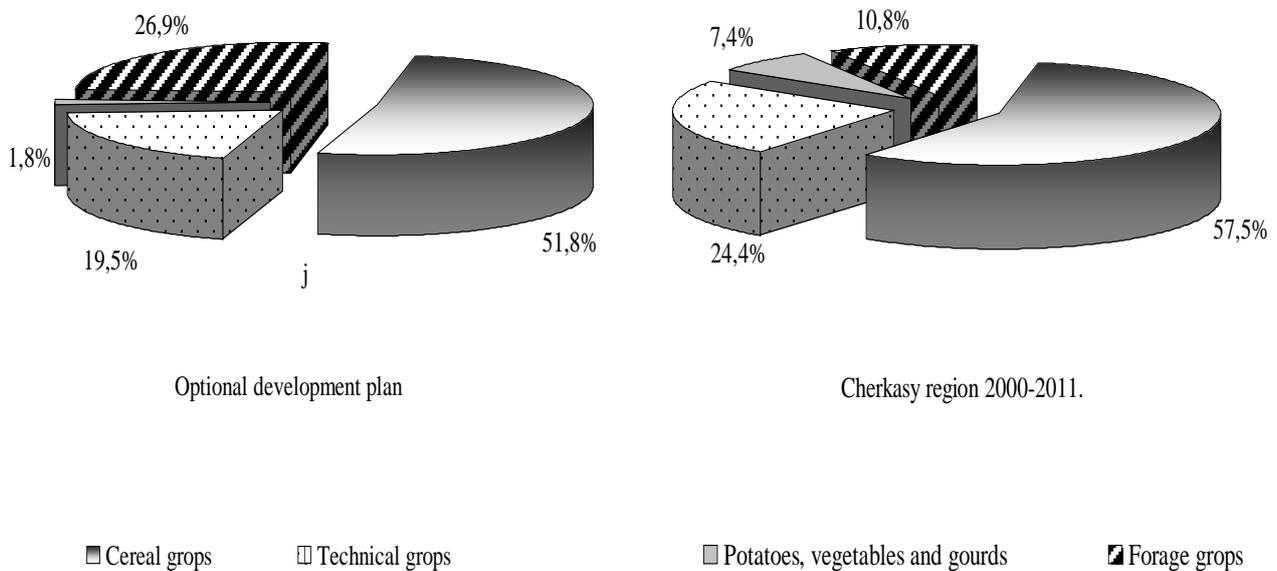


Figure 2. Comparison of acreage under optimal development plan available in all categories of Cherkasy region *

* Calculated by the author

Optimal development plan in the ratio of different branches of agricultural production to obtain maximum profit from business activities include: concentration of bee colonies in the farms must be at least 17 bee colonies per 100 hectares of farmland. For full use of honey base and good pollination of crops it is advisable to have at least 75% of strong bee colonies. Honey reserve formed by buckwheat, sunflower, spring and winter rape, sainfoin, sweet clover, clover, alfalfa, calculated in accordance with the structure of crops and recommended setting standards for bee colonies for pollination, provide an opportunity to create a honey productivity of land at the rate of 87 kg per 1 bee colony.

Taking into account technological features of keeping bees, including the provision of fodder honey reserves, an optimal development plan provides an opportunity to obtain 22.5 kg of marketable honey per bee colony. Production costs per 1 bee colony amount to 320 UAH, which is 16.9% lower than in 2011. Proceeds from sale of products (honey, wax) will be 498 UAH per 1 bee colony which will ensure profitability of bee industry at 55.6%. At the optimal development plan, the price of honey should be between 2 thousand per 1 centner, which is 8.7% lower than the average realizable price of honey farms of Cherkasy region in 2011.

An optimal development plan provides increase of gross beekeeping production to 1235.70 UAH per bee colony which is 33.8 times higher than the current level of production compared to 2011(Fig.3).

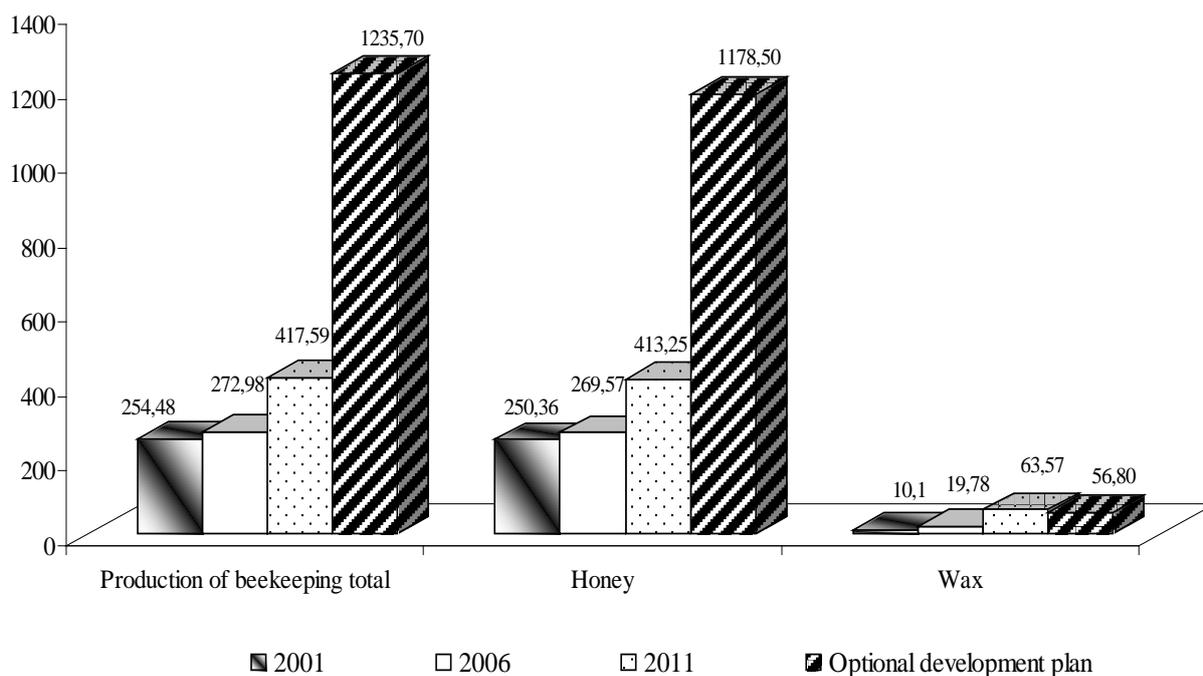


Figure. 3. Gross beekeeping production in agricultural enterprises of Cherkasy, UAH per bee colony *

* Calculated by the author according to a statistical report [5]

Additional yield obtained as a result of bee polling, gives an opportunity to increase the amount of grain (buckwheat, rape, sunflower) and maintain 32 heads of cattle, including 14 cows per 100 hectares of agricultural land, and 16 pigs per 100 ha of arable land, which in its turn is possible due increase of forage crops (entomophilic).

Conclusions. Provision of effective functioning of beekeeping industry and increasing the volume of production are possible with an optimal combination with other branches of agricultural production. According to the economic and mathematical model calculated by the author, due to the recommended crop structure, proper concentration of bee colonies and their qualitative composition, with bee colonies strength included, it may provide a cost-effective functioning of beekeeping industry at 55.6%. The development plan provides getting profit in the amount of 355.9 thousand UAH per 100 hectares of agricultural land and ensuring the total profitability of 66.9%.

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