corrected for when determining the permeability coefficient of cryoprotectants. We also demonstrate a new approach to the analysis of osmotic shock data, which simultaneously determines both the increased fragility due to initial creniation and the membrane permeability coefficient. A comprehensive bibliographic analysis positions our new analysis in the context of previous literature in the field, and we clearly explain its relevance to the characterization and development of CPA [3].

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OBTAINING ROYAL JELLY BY THE METHOD OF INCOMPLETE (PARTIAL) ORPHANAGE

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Introduction. The development of the beekeeping industry is associated not only with the increase in the production of the main types of products – honey, wax, propolis and bee pollen, but also royal jelly. Royal jelly is collected in apiaries in many countries of the world. This significantly increases the profitability of the industry, especially the one with a weak honey plants base. Royal jelly has high biological activity and exhibits biostimulating, anti-inflammatory, adaptogenic, anesthetic, radioprotective effects and is increasingly used in pharmacy, medical practice, cosmetology, etc [1, 2, 3].

The production of royal jelly is established in many bee farms in different natural and climatic zones of Ukraine. One of the main elements of the technological process of obtaining royal jelly is the presence of the required number of nurse bees in the nest, which is determined by the number of

reared brood and the egg-laying capacity of queen bees. It is important to find out how, during the organization of work on the production of royal jelly, a change in approaches to the methods of forming nursing colonies affects the number of accepted larvae and, subsequently, the production of royal jelly [4, 5, 6, 7].

One of the urgent modern problems of beekeeping is the mastery of the modern technologies for the production of beekeeping products, in particular, royal jelly.

The goal of research – to study different methods of obtaining royal jelly and to choose the most optimal one for the conditions of an industrial apiary.

Materials and methods. The study was carried out in the conditions of a commercial honey production apiary in the Kyiv Oblast. The bee colonies met the requirements of the standard of the Ukrainian steppe breed (*Apis mellifera sossimai*), which was confirmed by the results of the exterior assessment [8, 9]. Assessment of bee colonies was carried out according to biological characteristics specific to the Ukrainian steppe breed: the color of the chitinous cover, the behavior during the inspection of the nest, the nature of honey capping, aggression. In addition, the attention was paid to the economically valuable traits: the strength of the bee colony, the absence of gaps in the capped brood, the presence of the diseases.

The bee colonies of the experimental groups were cared for in the same way, according to the generally accepted methods [10].

The research was conducted under the provisions of the "Basic Ethical Principles for the Animal Experiments", adopted at the First National Bioethics Congress [11] and "European Convention for the Protection of Vertebrate Animals used for Experimental and other Scientific Purposes" [12].

The nursery colonies were formed by the method of incomplete (partial) orphanage. The bee colony was divided in half, the queen was isolated behind the solid diaphragm, into which a block of the Hahnemann grid with an area of 120 square cm was incorporated. The indicated area and its location at the bottom of the diaphragm was selected experimentally. So, the physiological conditions to simulate the absence of a queen bee in the colony were created. From the top, above the compartment with queen bee, a feeder was placed, to which a mixture of homogeneous consistency of honey and 5 % of bee pollen was added. The second feeder with the same feeding was placed above the compartment where the bees cared for and fed the grafted larvae. Each nursery colony was given 250 g of the prepared mixture with an interval of 2 days. For the flight of nectar- and honey-gathering bees, the bee-entrance was left open only in the compartment where the queen bee was located.

Three grafting frames with 60 larvae were successfully placed in special "wells" prepared in advance (empty space between the frames with brood of different ages) in the nursery colony. One grafting frame (control) had artificial wax cups into which 12 to 24 hour old larvae were transferred using a grafting putty knife (spatula). Artificial cups with larvae from the Nicot comb were placed on the second grafting frame. The third grafting frame had artificial plastic cups into which the larvae were transferred. In accordance with the conditions of the experiment, capped and open brood was periodically taken from the compartment with a queen bee and rearranged into the compartment with grafting frames during the period of obtaining the royal jelly. In place of the removed frames, rebuilt honeycombs were placed. Royal jelly was collected from the cups after three days, using three-days cycle, when the royal jelly was collected 5 times, but not more, in order to prevent the appearance of the laying worker bees in the nursery colony, or ten times a month, depending on the conditions of experiment.

Throughout the entire period of the experiment, during the removal of grafted frames from the hive, the nest of the nursery colony was inspected, and rebuilt fistulous queen cells were removed.

Results and discussion. One of the important aspects of the technology of obtaining royal jelly, regardless of the chosen method, is the selection of the optimal time interval between the grafting of larvae and removal of the royal jelly from the queen cell, table 1.

Table 1 – **The dynamics of royal jelly production (M±m, n=12)**

Characteristics	Interval between the grafting of larvae and removal of the royal jelly, days

	1	1,5	2	2,5	3	3,5	4
Mass of royal jelly in one queen cup, mg	27,3±3,8	185±5,6	246±11,3	288±5,7	285±12,7	174±13,1	160±8,0
Mass of the larva, mg	0,8±0,02	1±0,12	4±0,64	19±5,53	25±3,75	211±2,86	302±4,65

Based on the conducted research, we found that the most optimal time interval was 48-72 hours after grafting of larvae aged 12-24 hours. Thus, 1 day after grafting the mass of royal jelly in the queen cell was 27 ± 3 mg, after 2 days - 246 ± 11,3 mg, after 3 days – 285 ± 12,7 mg. In the future, the amount of royal jelly becomes relatively smaller compared to the increase in the live weight of the larva. The largest supply of royal jelly is observed near 3-day old larvae. Before capping the queen cells, its amount decreases, as the larvae grow intensively, the mass of the larvae increases and they consume more feed.

Nurse bees produce the maximum amount of royal jelly into cups without transferring larvae, table 2.

Table 2 **– Production of royal jelly by various technological methods (n=12)**

Characteristics	Method of obtaining royal jelly		
	With transferring larvae into wax cups	Without transferring larvae (Nicot system)	With transferring larvae into plastic (artificial) cups
Percentage of accepted larvae,%	53,5±6,38	72,1±6,44	30,2±5,65
The yield of royal jelly from one queen cell, mg	214,3±25,50	268,0±27,88	196,8±20,06

An increase in the amount of royal jelly production has been proven when using the Nicot system honeycomb. The mass of royal jelly in one cup was equal to 268 mg on the average, which significantly exceeds the mass of royal jelly in plastic (artificial) cups with the transfer of larvae by 26,8% and in wax cups with the transfer of larvae by an average of 23,5%.

Conclusions:

1. Removal of royal jelly from queen cells should be carried out 48-72 hours after grafting of larvae aged 12-24 hours, since the amount of royal jelly in the queen cell is the largest during this period. Both earlier and later removal are impractical, as the supply of royal jelly in the queen cell does not reach its maximum value at these times (P> 0,99).

2. Bees produce the maximum amount of royal jelly when using the method without transferring larvae.

3. Royal jelly should be obtained during the period of growth and development of bee colonies, when they reach their maximum strength and are able to receive a high percentage of larvae for queen rearing, and also have a large number of young bees with well-developed hypopharyngeal glands capable of producing royal jelly.

For a simplified technology for obtaining royal jelly, it is recommended to use the Nicot system.

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STUDY OF PATHOLOGY MORPHOLOGICAL CHANGES IN BABESIOS OF CARNIVORES

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Introduction. Recently, there has been a trend of growth of blood-parasitic diseases among small non-productive animals, as well as expansion of the range of the vector, intermediate hosts and the causative agents of parasitic diseases. At the same time, not only carnivores can serve as a reservoir of the causative agent, but also tick populations themselves, in which the causative agent is stored due to transavarial and transfaral transmission. The share of such animals among homeless dogs and cats is especially high.