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BIOTECHNOLOGY IN THE CONTEXT OF THE 100-YEAR HISTORY OF CZECHOSLOVAKIA: A REVIEW

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ABSTRACT

In the context of Czechoslovak history, permanent institutional and state attention is evident in the possibilities of using biotechnology in industry, agriculture and pharmacy. In the hierarchy of time already in 1924 (28.12.1924) at the founding of the Czechoslovak Academy of Agriculture. In the 1950s of 20th century, an utmost importance in animal breeding was attributed to artificial insemination, as a biotechnique of intensification of the reproductive potential of livestock (cattle, pigs, horses and sheep). The issue of biotechnology in animal production is a permanent part of the research of the Department of Farm Animal Genetics and Reproduction at NPPC-RIAP Nitra. Laboratories of the department are focused on the research in fields of *in vitro* fertilization, molecular genetic analysis, transgenesis, generation of cloned (genetically identical) and chimeric individuals, stem cells and cryopreservation of reproductive cells to create a gene bank and preserve animal genetic diversity.

Key words: Czechoslovakia; biotechnology; history

INTRODUCTION

Biotechnology belongs to the scientific and technological phenomenon of the 21st century, but their roots are connected with human history, especially with the fermentation processes (bread, beer, wine) already 4000-2500 years before Christ.

Biotechnology has a very wide range of definitions, mainly related to the development of knowledge. According to the Organization of United Nations – the "Biological Diversity Agreement", biotechnology means any technology, which uses living organisms or their components to produce or modify products, to breed microorganisms, plants and animals for specific use. This is an official and generally accepted legislative directive.

What is crucial is, that biotechnology is the organic link of life (living organisms and functions; BIO) with technology (level of knowledge in genetics, physics, chemistry and biology in general), with methodology (their practical application) in the creation, change of the use of living organisms for intensive and targeted production of useful resources of the existence of a growing human population.

In the context of our common Czechoslovak history, permanent institutional and state attention is evident in the possibilities of using biotechnology in industry, agriculture and pharmacy. In the hierarchy of time already in 1924 (28.12.1924) at the founding of the Czechoslovak Academy of Agriculture undertaking by Dr. Milan Hodža – later President and Minister of Agriculture of the Czechoslovak Republic and the future Prime Minister of the Czechoslovak Socialist Republic, the 4th CHA Agricultural and industrial department was established, which involved the sugar industry, the starch industry, the distillery,

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the dairy, the miller and others, including the use of waste etc., as a department "Learning and application of biotechnology of agricultural production for general use." Since 1948, this department has resisted and still justified the status of "bio-technique" and "technology" mainly in agriculture. In 1928, Dr. Ing. Jaroslav Kříženecký issued the publication "Animal Farming", in which he considers agriculture as a biological production and as a biotechnique (Bulla *et al*., 2014).

Dr. Kříženecký has done a lot of useful activity for genetics and biotechnology in the Czechoslovakia, particularly within RIAP activity in Viglaš. Moreover, in 1963, he was greatly deserving to build an exhibition of J. G. Mendel in the Moravian Museum in Brno on the occasion of the 150th anniversary of his birth. After the "Lysenko Period" in Czech genetics, Czechoslovakia became the country of its gradual renaissance in the genetic science.

In 1946, the High School of Agricultural and Forestry Engineering in Košice (VŠPLI) was established, which also included the Department of Zootechnics and Biotechnology of Animal Products (mainly feed processing, milk, etc.). In the 1950s of 20th century, an utmost importance in animal breeding was attributed to **artificial insemination**, as a biotechnique of intensification of the reproductive potential of livestock (cattle, pigs, horses and sheep). At the same time, it is a method of preventing some invasive diseases and, in particular, a method that opens up new possibilities in the breeding process. An important role in this process was played by prof. Dr. Ing. Karel Koubek (Professor of the Czech Agricultural University in Prague) as the creator of the concept, its application in science, research and practice.

In Slovakia, an important role in the implementation process was played by Ing. Ján Mozoľa – the director of State breeding companies in the creation of insemination stations and system of training of technicians for the application of this method also among private breeders. The development of biotechnology and, consequently, insemination techniques for individual livestock species has led to improvements in breeding estimation methods, which has enabled the development and implementation of modern long-term selection programs from performance tests, CC methods, BLUP (MOET), AM-model, etc. up to current **genomic selection**.

Significant acceleration in the development of biotechnology occurred after the economic consultation of the RVHP Member States in June 1984, where it was required to prepare a proposal for a comprehensive program of Science and Technology Progress for 15-20 years. The program was approved in December 1985. It consisted of 5 priority directions and one was - the development and application of biotechnology. VÚŽV (RIAP) in Nitra was responsible (for whole ČSSR) for "Development of bio-engineering methods in livestock production to improve the utility and technological characteristics of farm animals". In other areas the coordination was realized by Czech Academy of Sciences. The Research Institute of Animal Production (RIAP) in Nitra was appointed as the Head of Scientific and Technological Development and coordinator of ŠVTP POG "Selected problems of development of the agro-industrial complex" and of the state task POG 529 820 "Biological and technical intensification of livestock production". The whole program, entitled "Long-term Comprehensive Program for the Development and Implementation of Biotechnologies in the Czechoslovak Socialist Republic", was approved by the Government of the Czechoslovak Socialist Republic. Jaromir Obzina the Deputy Prime Minister and Chairman of the State Commission for Scientific, Technical and Investment Development was a coordinator of this program.

One of the implemented steps was the creation of the Soviet-Czechoslovakian Biotechnology Laboratory at the RIAP in Nitra (1986-1995), where 17 scientists from the USSR and three from Poland were co-operating with the staff of the ÚFGŽ CSAV in Liběchov, VÚŽV in Uhříněves, VŠV in Brno, VŠV in Košice and the BAV Institute in Kostinbrod (Bulgaria). In spite of a relative short period of its activity this laboratory has proved its eligibility and relevance mainly in the area of reproductive biotechnology of farm animals. Most of its members have applied to the positions of leading scientists at home and abroad. Research activities continued at the Department of Genetics and Experimental Biology and today at the Department of Genetics and Reproduction of Farm Animals (NPPC–VÚŽV Nitra) in the direction of mapping of milk protein polymorphism in animal genomes,

micromanipulations with embryos, creation of identical individuals, experimental transgenesis and biodiversity research (1994-2002) (Bulla and Chrenek, 2007; Chrenek *et al*., 2011, 2016).

In 2002, the Faculty of Biotechnology and Food Sciences was established at the Slovak Agricultural University in Nitra, which continues the tradition of using modern biological and chemical methods in research and pedagogy for realization in social practice and application on the international scientific scale in close cooperation with RIAP in Nitra.

The issue of biotechnology in animal production is a permanent part of the research of the Department of Farm Animal Genetics and Reproduction at NPPC-RIAP Nitra. Laboratories of the department are focused on the research in fields of *in vitro* fertilization, molecular genetic analysis, transgenesis, generation of cloned (genetically identical) and chimeric individuals, stem cells and cryopreservation of reproductive cells to create a gene bank and preserve animal genetic diversity. An important activity at the NPPC–RIAP Nitra since 2013 is the annual organization of the international scientific conference "Animal Biotechnology", where the latest results from the field of animal biotechnology are presented.

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