

measure the concentration of nitrogen by electron paramagnetic resonance in the human body. This is also important for medicine because nitrogen deficiency or lack can cause pathological effects on the central nervous system. This method is also used to study chemical reactions in biological tissues and cells.

The EPR method is used in magneto-optics in the design and selection of new materials. For example, in one of the Russian institutes, thanks to EPR, flexible crystals were discovered. These crystals, based on the free radicals of the cobalt compound, react to light. If you look under an atomic force microscope, you can see that the crystals consist of elongated grains. EPR studies have shown that the substance contained in these grains can be in two phases that differ, chemically, in the number of unpaired electrons, and in physical volume of the molecules. In the formation of a crystal, grains with a lack of the first or second phase may be uneven in thickness. When the crystal is illuminated by light from a light bulb, the grains react to it differently, as a result the crystal bends in the same way as a metal plate bends when heated. The effect of flexible crystals can be used to create new magneto-optical materials, and here, as in biology, many opportunities open up.

EPR spectroscopy is used in radiation chemistry, photochemistry, catalysis, in the study of oxidation and combustion processes. A detailed study of the EPR spectra of paramagnetic ions allows us to find the symmetry of the crystal field, to quantitatively study the kinetics and thermodynamics of multistage processes of ion complexation.

In printing industry, EPR is used for spectral analysis and colorimetry. Spectrophotometers have recently become widespread in printing industry to control the International Color Consortium (ICC), profiles used on most monitors in modern instruments.

**Conclusions.** EPR is the most effective and sometimes the only one for studying reactions in biological tissues. With this method, you can measure the concentration and index paramagnetic particles in any physical state, which is important for studying the kinetics and mechanism of processes occurring with their participation. EPR is a physical phenomenon that consists in the selective absorption of electromagnetic waves by a paramagnetic substance that is placed in an external magnetic field.

The method is based on a physical phenomenon, which consists in the selective absorption of electromagnetic waves by a paramagnetic substance.

The EPR method is very powerful, it is practically irreplaceable in the study of radiation changes in structures, including biological ones, which is important for industrial pharmacy.

The advantages are lower energy consumption and power other than NMR, it is almost indispensable in the study of radiation changes in structures, including biological ones.

## USE OF ULTRASOUND IN MEDICINE

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**Introduction.** It's hard to imagine a medical diagnosis without a method like ultrasound. The ultrasound scanners, which appeared in the middle of the last century, have revolutionized medicine. Ultrasound diagnostics continue to thrive. Ultrasound is an acoustic wave in the frequency range 16 kHz - 100 MHz. Ultrasound is not dangerous radiation. The human ear cannot perceive ultrasonic frequencies.

**Aim.** To systematize the main directions of research of organs and systems using ultrasound.

**Materials and methods.** The ultrasonic complex consists of a generator, a transducer (like a probe) and a computer. The transducer is directed to the area of the body that encompasses the internal organs to be scanned. It is through the transducer that ultrasonic waves are emitted at frequencies from 1 to 10 MHz. In turn, the ultrasonic waves are returned back to the transducer after they are reflected from the organ-target. Computer analyzes the intensity and speed of the echo - signal. These data are converted into electronic images, which are displayed on the monitor of the complex.

**Results and discussion.** In medicine, ultrasound is used to treat and diagnose a number of diseases:

– *ultrasound therapy.* UZ (ultrasound) therapy is based on human exposure to sonic oscillations in range from 22 Hz to 3 kHz. They can be supplied both continuously and in impulses, depending on the nature of the therapy. The ultrasound has physical-chemical, mechanical and small thermal effects. The most important is the mechanical factor caused by the acoustic pressure that makes it possible to microvibrate the tissues and massage them at the cellular level. The thermal action of ultrasound promotes the expansion of lymphatic and blood vessels and improves microcirculation of liquids in the body. As a result, tissue metabolism is increased. Physico-chemical effects increase the intensity of oxidative-reducing processes and the synthesis of biologically active compounds such as serotonin, histamine and heparin. Ultrasound therapy is often used in cases of lesions of peripheral nerves with sensory impairment, inflammation of the sciatic nerve, as well as various neurologies.

– *cleaning and sterilization of surgical instruments.* Ultrasound can be used to clean surgical instruments, more effectively than traditional washing. It also removes pollution, radioactive waste that's on the lab equipment. By ultrasound can even be sterilized.

– *medical procedures.* Surgical operations with an ultrasonic scalpel. Medical procedures are also performed - ultrasonic massage, treatment of fractures.

– *echocardiography.* Ultrasound examination of the heart (echocardiography) allows estimation of the valve apparatus of the heart, the heart cavity (right and left ventricles, right and left atrium), the contraction of the myocardial activity of the left ventricle. Can determine: heart defects (congenital and acquired), cardiomyopathy, myocarditis, endocarditis, pericarditis, ventricular hypertrophy, impaired local myocardial contraction of the left ventricle, complications of myocardial infarctions, additional formation (tumors, clots) pulmonary hypertension.

– *diagnosis of diseases using the Doppler effect.* To diagnose diseases like varicose, aneurysm, thrombosis, they use the Doppler effect. This method allows blood flow through blood vessels to be reflected. The principle of the effect is that, from moving objects, ultrasonic waves are reflected with a modified frequency. If the movement is directed towards the sensor, the frequency increases if away from the sensor, the frequency decreases.

– *pregnancy scan.* Ultrasound devices can be used for a wide range of different tasks, the main one being pregnancy scanning. During this scan, a doctor who conducts an ultrasound study can determine the fetus' position and age, see how the fetus develops and whether there are any irregularities. Some additional scans that can be performed with ultrasound equipment include pelvic, abdominal and propulsive apparatus. Ultrasound diagnostic methods continue to be actively developed. For example, the fantastic function 5D reconstructs nine projections of the fetal heart with simultaneous mapping of the blood flow. The data obtained make it possible to assess the heart in greater detail for congenital pathologies.

– *other types of scanning.* Some additional scans that can be performed with an ultrasound device include scans of the abdominal organs, bones of the musculoskeletal system, etc.

**Conclusions.** Thus, over several decades, the use of ultrasound in medicine has undergone tremendous changes, particularly in obstetrics: from simple measurement of the size of the fetus to a

detailed assessment of its blood flow and internal organs. What was technically impossible only recently is now becoming a routine part of ultrasound research.

**ANALYSIS OF THE MARKET OF BIOPREPARATIONS FOR RABBIT BREEDING IN ORDER TO ASSESS MARKET CAPACITY AND CALCULATE PROFITABILITY OF BRINGING NEW PRODUCTS OF THE FEED GROUP TO THE MARKET BASED ON THE SALES OF A CONVENTIONAL DISTRIBUTION COMPANY.**

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**Introduction.** Nowadays rabbit breeding is one of the most common industries in Ukraine. But assessing the capacity of such a market for a conventional distribution company is quite a difficult task because most households are not officially registered. The solution of this problem is to calculate the sales of biopreparations for a specified group of animals of an imaginary company to understand the coverage of this company in the market in whole.

**Aim.** Evaluate the rabbit market in order to calculate market capacity.

**Materials and methods.** The calculation of the market's capacity consisted of several parts, namely: official data of GOVKOMSTAT on a conditional date, calculation of the expected offspring of livestock, based on the sales data of a conventional distribution company (CDC).

The market of crawling on a conditional date for the previous period in Ukraine according to GOVKOMSTAT by region is divided as follows:

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Table №1

	RabbitYiv -all this			During the rabbit		
	Previous Period	Current Period	Current period in % to previous	Previous Period	Current Period	Current period in % to previous
Ukraine	133,3	174,2	130,7	25,7	28,9	112,5
Volyn	–	–	–	–	–	–
Sumskaya	–	–	–	–	–	–
Ternopil	–	–	–	–	–	–
Chernivtsi	–	1,5	–	–	0,5	–
Chernihiv	–	–	–	–	–	–
Cherkasy	41,6	65,5	157,5	8,3	12,5	150,6
Kyiv	31,9	26,1	81,8	4,8	4,3	89,6
Zakarpacie	24,5	19,4	79,2	5,2	2,6	50,0
Dnipropetrovsk	8,1	12,5	154,3	2,0	2,1	105,0
Kharkiv	6,9	8,1	117,4	1,5	1,4	93,3
Lviv	5,9	5,6	94,9	0,8	0,6	75,0
Autonomous Republic of Crimea	3,7	0,5	13,5	0,9	0,5	55,6
Vinnitsya	3,4	5,4	158,8	0,6	0,8	133,3
Poltava	2,4	2,6	108,3	0,7	0,3	42,9
Luhansk	1,4	4,2	300,0	0,2	0,7	350,0
Kirovohrad	1,2	1,0	83,3	0,2	0,2	100,0