ANTIBIOTIC-RESISTANT MICROORGANISMS IN THE SYSTEM ENSURING SAFETY AND QUALITY FOOD AND FEED

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The conducted analysis of Veterinary statistical reporting and reports of the Ministry of Health of Ukraine concerning the resistance of isolated cultures of pathogens of animals and humans to antibiotics shows, that responsible and rational use of antibiotics in the treatment of agricultural animals and poultry are necessary to minimize the potential harm to human health.

Keywords: *microorganisms, antibiotics, antibiotics-growth stimulants (AGS), antibiotic resistance.*

The priority direction of the state policy concerning healthy nutrition of population is to provide food safety. Are taken into account the peculiarities of their composition, because in addition to plastic material and bioactive substances they may contain many contaminants, including mycotoxins, toxic elements, pesticides, polichloric byfenils, dioxins, antibiotics, polycyclic aromatic hydrocarbons and more. Most of them comes to the human body with food.

Antimicrobial / antibiotic drugs are basic medicines in public health care system of humans and animals. Excessive or inappropriate use of antimicrobial / antibiotic drugs led to the spread of antibiotic-resistant forms of microorganisms, which are serious danger to human and animal health.

Scientists studied the factors that may be the cause of presence of antibiotic-resistant bacteria in food and animal feed that could threaten to the effective treatment of infection diseases of humans as well as animals.

Despite some progress in solving problems of formation and spreading of antibiotic-resistant forms of microorganisms, should be noted that today antibiotic

resistance acquired the status of global problem and becomes a challenge to medicine of the XXI century.

The discovery of antibiotics has a long history. Many centuries ago it was noticed that green mold helps in the treatment of serious septic wounds. The first scientific description of the therapeutic action of green mold made in the 70 years of the nineteenth century by the russian scientists V.A.Manassein and A.G. Polotebnov. After that the green mold was forgotten for a few decades, and only in 1929 it became a sensation, which changed the scientific world. Phenomenal quality of this unpleasant living organism studied by A. Fleming professorof University of London [1, 3].

Following the huge breakthrough in the treatment of bacterial infections in human medicine, after the introduction of antibiotics in early 1940, these drugs since 1950, were also introduced in veterinary medicine [1].

After the appearance in 1950 of antibiotics growth promoters (AGP), they have been implemented on a global scale for routine use in industrial breeding of farm animals, regardless of the state of health of animals or a risk of bacterial infections. In many countries, this has led to "explosive" scaling up the use of antibiotics. For example, in the US the use of antibiotics as growth promoters in the period from 1951 to 1978 increased by 50 times (from 110 to 5580 tons), while the scale of the the use of antibiotics for the treatment of diseases in humans and animals medicine has increased only 10 times [5, 10].

During this time, many strains of bacteria isolated from humans and animals, earlier sensitive to antibiotics, become resistant. A similar situation was observed in other countries. For example, in the UK presence among poultry strains of Escherichia coli, resistant microorganisms to tetracycline increased from 3.5% to 63.2% after just four years (1957-1960) of using antibiotics in treatment of poultry [13].

This situation has promoted to the creation (in 1968 in the UK) of Joint Committee concerning the use of antibiotics in industrial animal production and

veterinary, whose policy is the basis for the rational use of antibiotics and the development of relevant legislative acts in many Western countries [14].

However, the global application of ACP continued until 1986, Sweden have banned their use, because researchers have found that the use of antibiotics in farm animals may create risks to human health through the spread of resistance to these drugs through the food chain, also researchers showed, that the use of ACP is a danger to human health through the development and dissemination of cross-resistance to antibiotics which used in human medicine.

Therefore some countries have stopped the registration of certain antibiotics as growth promoters, such as Denmark and Norway in 1995 banned the use of avopartsyn, in accordance since 1997 was stopped use of avopartsyn in the EU.

The threat of development of antibiotic resistance also causes serious reaction from consumers, as evidenced by recommendations for rational use of antibiotics, published by Committee the EU on economic and social policy [11].

Since 1997, the World Health Organization (WHO) considers the problem concerning the risk of using ACP to public health and recommends immediately stop using of . In 2006, on the recommendations of the Scientific Working Committee all been banned for use in the EU [2, 12], but in Europe a number of countries have not banned the use of the ACP.

In contrast to medicine, where individual use of antibiotics is the rule, young farm animals such as pigs and broiler chickens, quite often receiving antibiotics by the group method. Accordingly, the contact with antibiotics with these animals occur much more often than men. This especially concerns to the countries where antibiotics used as growth promoters because most farm animals receiving antibiotics for most of his life.

Food of animal origin is often contaminated by bacteria, resulting formed the main route of transmission of resistant bacteria and resistance genes from farm animals to humans. But in this process can be important direct contact with animals or people from surrounding objects, depending on the type of bacteria, transfer

factors can also be such foods as fruits or vegetables contaminated by feces of animals, pet food or dirty water .

Pathogens of zoonoses, associated with food infections can contaminate food at different stages of the food chain. Typically, these sources of bacteria are farm animals - "healthy carriers". For example, the use at farm animals ftorhinol drug of enrofloxacin led to the development at bacteria families of Salmonella and Campylobacter resistance to ciprofloxacin - a drug used to treat people [9, 7, 15, 6].

Indirect threats occur when genes of resistance are transferred in animals from resistant bacteria such as E. coli or representatives of the

genus Enterococcus, to bacteria which are pathogenic to humans. Resistance genes can be transferred easily from one bacteria to other microorganism that live in terrestrial animals, fish and humans. Moreover, such a transfer can take place in various environments such as kitchens, in rooms for keeping animals or in water.

In this way, resistance to antibiotics of different classes steadily growing in various types of bacteria, and different environmental conditions.

WHO has prepared a list of antibiotics, "critically important" for medicine. Priority antibiotics, which urgently need to implement risk reduction strategies include fluoroquinolones, cephalosporins third and fourth generations and macrolides.

Therefore, the aim of our research was to study the current situation concerning the antibiotic resistance of microorganisms in Ukraine.

Materials and methods of research. Research conducted by the State Research Institute of Laboratory Diagnostics and Veterinary Examination in 2013 by order of the State Veterinary and Phytosanitary Service of Ukraine. Research materials were data analysis of statistical reporting and reports of the Ministry of Health of Ukraine on resistance of isolated cultures pathogens of animals and humans to antibiotics. In work uses statistical and analytical method for document review.

Results and discussion. Statistical data of the Ministry of Health for 2013 concerning the research of multiresistant strains of crops conventionally pathogenic

microorganisms, likely pathogens inside the hospital infections are shown in Figure 1.

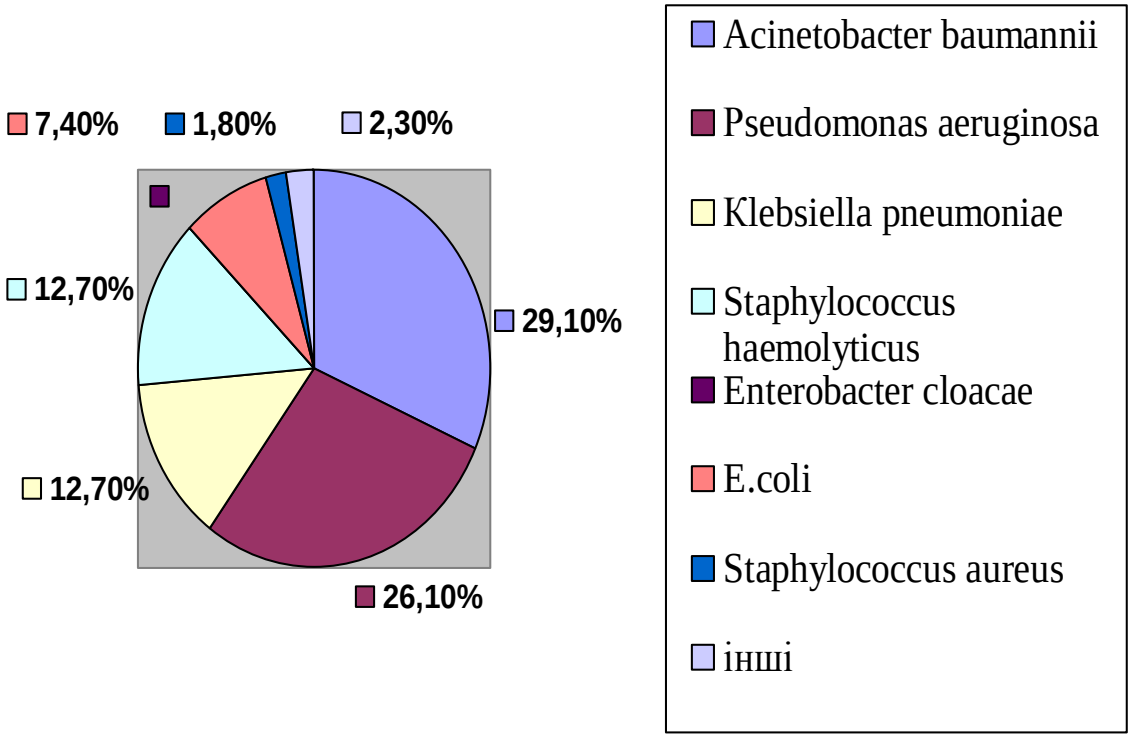

Fig. 1 The results of researches of multiresistant strains of crops conventionally pathogenic microorganisms, likely pathogens inside hospital infections

Analyzing the statistical data of the Ministry of Health for 2013, found that specialists of State institution "Ukrainian Centre for Disease Control and monitoring of the Ministry of Health of Ukraine" was researched 165 strains of multiresistant cultures conventionally pathogenic microorganisms, likely pathogens inside hospital infections , percentage composition of them: Acinetobacter baumannii - 29,1%, Rseudomonas aeruginosa - 26,1%, Klebsiella pneumoniae - 12,7%, Staphylococcus haemolyticus - 12,7%, Enterobacter cloacae - 7,9%, E.coli - 7,4%, Staphylococcus aureus - 1,8%, other - 2.3%.

Accordingly, 64% Pseudomonas aeruginosa, isolated from the wounds were resistant to tseftazidimu, 75% - to tsefepiminu, 80% - to ciprofloxacin, 92% - to colistin.

Strains Pseudomonas aeruginosa, isolated from blood, had 100% resistance to kotrimoksazolu , tsyprfloksatsynu and in 50% of cases - to piperacillin, tseftazidimu, tsefepeminu, amikacin, gentamicin, tobramycin. Strains of Staphylococcus aureus, isolated from the wounds in 100% of cases were resistant to oxacillin and penicillin.

Obtained data of analysis of veterinary statistical reporting from the state veterinary medicine laboratories of Ukraine on resistance of isolated cultures of animal pathogens to antibiotics indicate that most animals in Ukraine registered diseases such as colibacillosis, stafilokokoz, salmonellosis, streptococcosis.

According pathogens of these diseases are often resistance to antibiotics. So, from 552 E. coli cultures were 252 (46%) resistant to gentamicin, to enrofloxacin - 239 (43%) to doxycycline - 119 (22%) to amoksitsylinu - 111 (20%) (Fig. 2) and with

187 cultures of Staphylococcus aureus were resistant to gentamicin 120

(64%) to ofloxacin - 101 (54%) to amoksitsylinu - 79 (42%) to ciprofloxacin - 53 (28%) (Fig. 3), and all 18 selected crops Clostridium perfringens - to gentamicin.

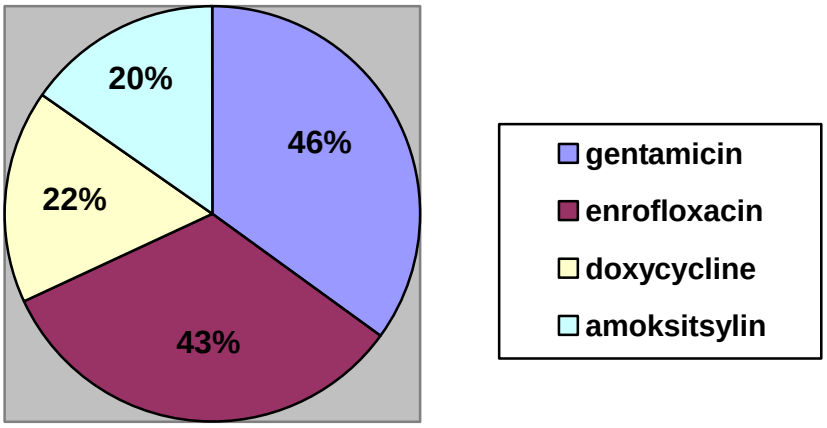

Fig. 2 Resistance of isolated cultures of E. Coli to antibiotics

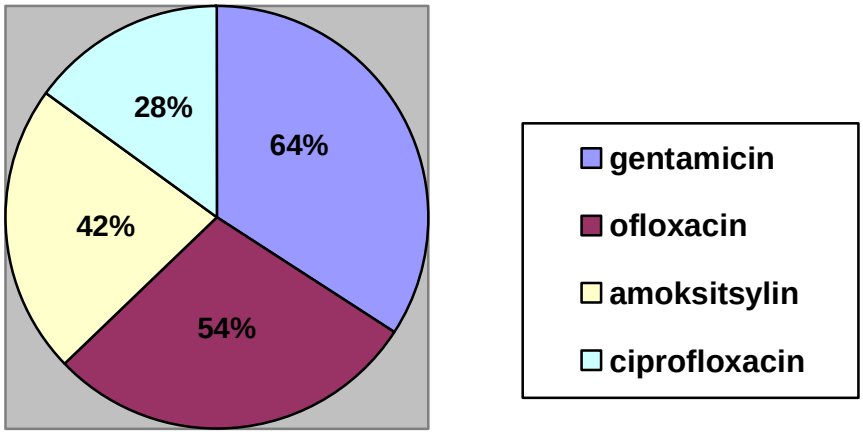

Fig. 2 Resistance of isolated cultures of Staphylococcus aureus to antibiotics

Conclusions

1. The responsible and rational use of antibiotics in the treatment of farm animals and poultry are necessary to minimize the potential harm to human health,
2. The use of antibiotics as growth promoters should be excluded.
3. Antibiotics can be applied to agricultural animals and poultry only in cases where they are intended by veterinary doctor for therapeutic purposes and their use should be based on the results of the study of sensitivity of isolated cultures of microorganisms to antibiotics.
4. At the national level need to use international recommendations for the rational use of antibiotics adapted to the specific conditions of each country.
5. For monitoring of tendencies of the spread of antibiotic-resistant forms of microorganisms is necessary to establish an inter-agency exchange of information between the medical and veterinary competent authorities and to create in Ukraine a national monitoring program for antibiotic resistance, using specific list of species of bacteria transmitted through food.

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АНТИБІОТИКОРЕЗИСТЕНТНІСТЬ МІКРООРГАНІЗМІВ У СИСТЕМІ ЗАБЕЗПЕЧЕННЯ БЕЗПЕЧНОСТІ ТА ЯКОСТІ ХАРЧОВИХ ПРОДУКТІВ І КОРМІВ

МЕЖЕНСЬКА Н. А.

Проведений аналіз ветеринарної статистичної звітності та звітності Міністерства охорони здоров'я України щодо резистентності виділених культур збудників захворювань тварин і людей до антибактеріальних препаратів свідчить, що відповідальне і раціональне застосування антибіотиків при лікуванні сільськогосподарських тварин і птиці є необхідним для мінімізації потенційної шкоди здоров'ю людей.

Ключові слова: *мікроорганізми, антибіотики, антибіотики-стимулятори росту (АСР), антибіотикоризестентність*

АНТИБИОТИКОРЕЗИСТЕНТНОСТЬ МИКРООРГАНИЗМОВ В СИСТЕМЕ ОБЕСПЕЧЕНИЯ БЕЗОПАСНОСТИ И КАЧЕСТВА ПИЩЕВЫХ ПРОДУКТОВ И КОРМОВ

МЕЖЕНСКАЯ Н. А.

Проведенный анализ ветеринарной статистической отчетности и отчетности Министерства здравоохранения Украины относительно резистентности выделенных культур возбудителей заболеваний животных и людей к антибактериальным препаратам свидетельствует, что ответственное и рациональное применение антибиотиков при лечении сельскохозяйственных животных и птицы необходимо для минимизации потенциального вреда здоровью людей.

Ключевые слова: *микроорганизмы, антибиотики, антибиотики-стимуляторы роста (АСР), антибиотикоризестентнисть*