Retrospective of Clinical Pathology of Herd Pigs in Extensive and Intensive Breeding

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Abstract
The main characteristic of the herd of pigs in extensive and intensive breeding is the presence of breeding diseases of different aetiology. The research aimed to monitor the frequency of breeding diseases and organize the implementation of prophylactic measures. As part of the health control of the herd of pigs, we took biological material and sent it to laboratories for analysis. The suckling pig category is dominated by enteric diseases caused by different serotypes of E. coli in over 50% of cases. Coccidiosis is becoming an increasingly topical problem and is considered one of the main causes of diarrhoea in piglets aged 5 to 10 days. The percentage of stillborn piglets is highly variable for each pig herd. The biggest piglet losses are during the lactation period and range up to 20% on average. Losses of piglets in rearing amounted to 18%. The losers exceeded 5% on average. Deaths in pig herds are the result of inadequate breeding, nutrition, and the inability to implement rational therapy. Of respiratory diseases, the primary agent is *Mycoplasma hyopneumoniae*, *Actinobacilus pleuroipneumoniae,* with a frequency of over 50%. In the majority of pig herds, the presence of PRRS was diagnosed in over 50%. On all pig farms, with controlled health care. We implemented increasing zoohygiene measures, recommended the introduction of vaccines, and raised biosecurity measures to a higher level. A characteristic of extensive breeding is a small percentage of piglets per sow. Different proportions of deaths in all categories. As a result of the mentioned facts, we have a small percentage of fatteners per sow. A characteristic of intensive farming is the presence of circovirus infections, PRRS. We raised the zoohygiene measures to a higher level on all pig farms. The evaluation of biosecurity measures and the implementation of vaccination gave positive results.

Keywords: breeding, clinical pathology, pigs

1. Introduction

In farm pig breeding, several valid parameters can be used to show the success or profitability of production, such as: number of live births or piglets, daily gain, duration of fattening, and number of non-productive days of sows. Today, it is customary to present pig production on farms by the number of piglets raised, i.e., fattening pigs delivered per sow during the calendar year. This production parameter differs significantly between countries with more or less developed pig production [1,2]. To be able to work on improving pig production on the farm, it is important to ensure the good health of sows and piglets in the first days after harrowing [3]. Flexible cooperation of farm owners with professional services, with respect and implementation of professional knowledge, and the application of a series of

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biotechnical measures and emphasis on disease prevention to promote the good health of pigs, it is possible to improve the well-being of pigs and the production itself [4,5].
The goal of this review is to present our multi-year research related to solving health and reproductive problems on industrial pig farms.

2. Pig health care on the farm

Swine pathology is a very dynamic discipline. For this reason, health control and health care are an integral part of any pig production development program. The occurrence of livestock diseases is determined by three elements: the pathogen, the animal, and the environment. In intensive, organized pig production, where animals are reared and kept in large agglomerations and a limited, mostly confined space, all three factors are potentiated. Therefore, health care in organized pig farming includes the entire herd as a basic epizootiological unit, because there is a greater possibility of spreading various infections, and certain microorganisms due to forced breeding and keeping lead to so-called production or technological diseases [6,7]. Development programs in pig farming are aimed at the creation of so-called MD (minimal disease) agglomerations, in which the minimal occurrence of certain less important breeding diseases is tolerated. Such agglomerations can be created using health monitoring, which becomes an integral part of management and is based on dynamic and permanent laboratory analysis. Today, the world is slowly abandoning the system of preventive chemo-pharmaceutical programs, but the use of the most modern laboratory analytics will enable the most rational use of immunoprophylactic preparations to achieve the optimal quality of pork meat for the protection of the population's health [8].
The swine health protection program includes three interconnected links: diagnostics, immune-prophylaxis, and meta-phylaxis (gradually abandoned), and includes all classical (diffuse infectious diseases that persist in the Republic of Serbia). Diagnostic procedures and immunoprophylactic measures are known for these diseases. It is very important to approach industrial or technological diseases, whose detection and suppression are not a legal obligation, but an economic necessity. Whether a farm will suppress colibacillosis, clostridiosis, or another disease depends on the epizootic situation on the farm, but sometimes also on the producer's assessment of how much damage a certain disease causes him [9]. The health care program in organized husbandry should also include regular parasitological control, because parasitic infections significantly affect the health status of animals, so parasite diagnostics must be included in the regular monitoring of the health status of pigs [10-13].
The term health status is much broader and includes health, i.e., whether the animals are clinically healthy or not, whether the herd is free from infectious diseases, but also the application of a series of biotechnological measures to maintain production. In commercial pig production, regardless of the size of the herd, several valid parameters can determine the profitability of production (number of piglets born, number of piglets weaned, daily gain, i.e., the duration of fattening, feed conversion). However, the simplest way to express pig production is by the number of piglets reared, i.e., the number of piglets delivered per sow during the calendar year. To improve pig production, it is essential to ensure the good health of sows and piglets in the first days after farrowing. Pig production on commercial farms is heavily burdened by piglet diseases. The pathology of piglets is a very dynamic discipline within the whole herd as an epizootiological unit, in which, due to the large agglomeration of animals in a limited space, horizontal and vertical transmission of infections occurs easily, and certain microorganisms, due to forced breeding and keeping, lead to the appearance of production and technological diseases [14]. Great importance is attached to the variation of pathogenic microorganisms in piglets, not only in the manifestation of drug resistance, but also in the occurrence of genetic recombination, which affect the clinical picture and the course of the disease, making it difficult to establish a diagnosis and to carry out therapy and prophylaxis [3,5]. On our commercial pig farms, which were part of the project research, the following are present: Neonatal colibacillosis, Oedema disease, Necrotic enteritis, circovirus infection, spirochaetal colitis, enterohemorrhagic syndrome, dysentery, and a complex of respiratory diseases. In recent years, in the world and on our pig farms, there has been a

massive occurrence of respiratory disease complex (PRDC), which is becoming a serious health problem in all technological stages of production. Swine respiratory disease complex is a simultaneous infection of the lung tissue with several respiratory pathogens and is a common term for pneumonias in pigs that have a multifactorial aetiology. Isolated pathogens vary between and within production zones [3,8]. Controlling complex respiratory diseases is complicated. The significance of the complex of respiratory diseases rests on the interaction of respiratory pathogens. Knowledge of the mutual interaction of respiratory pathogens must be taken into account to implement effective control measures. Respiratory diseases of pigs occur if living agents are present in their immediate surroundings or if, due to some cause unknown to us, the response of the defence mechanism of the respiratory system weakens.

3. High health status

The term high health status implies the precise establishment of special criteria clearly defined by the veterinary service, which is increasingly based on preventive health protection of pigs in intensive breeding [9]. In countries where pig production is high, the health status of the pig must be high. This essentially means "freedom from some diseases of bacterial or viral aetiology". In some pig herds, a high health status is not always achieved. A high health status correlates with high production only when the management conditions are fully met according to the recommendations of modern biotechnological concepts in the process of establishing and maintaining elite reproductive and production herds. However, it is possible that in conditions of inadequate management but without the presence of certain virulent microorganisms, i.e., when a small percentage of morbidity and mortality, especially in suckling piglets, occurs, production according to the required concept. Conversely, if the conditions of biotechnological requirements are at a high level, it is possible to maintain production even in the presence of some pathogens, due to the harmonious relationship (good balance) between immunity and virulence of pathogens, and that there is no emergence of infections or some other disorders, and therefore there is no significant decrease in production. The implementation of the "stamping out" method as a radical method can be applied in countries with high production, where other measures are also regulated, such as compensation for economic damage caused after eradication measures. In some other countries that do not meet such conditions, in addition to the application of the stamping out method and immune-prophylaxis measures are resorted to. As for the frequency of occurrence of some other diseases that can also threaten the production of pigs in a certain percentage, they are presented in this lecture by production or age categories. It is known that some diseases can occur only at a certain age, that is, when moving from one production category to the next. Particularly sensitive are the period of farrowing itself, and the first 48-72 hours after farrowing, the first 7-10 days after farrowing, and 10-14 days after piglets have been weaned or weaned. Sows, especially gilts, can be germ carriers for many diseases that do not manifest themselves, but the disease is transmitted to piglets that, in the first few hours after coming into the world, are insufficiently resistant to the conditions encountered in the early neonatal period. That is why the preparation of the sow for farrowing and taking a series of measures (monitoring the act of farrowing itself, if necessary, induction of labour, acceptance, and special care of the piglet itself, placement of the sows so that they are between two multiparous sows) must be done promptly. Placing the first farrow between two multiparous sows is initially a good way of setting up a barrier, i.e. preventing colibacillosis, which is more common in piglets originating from first farrows. Piglets that come from multiple piglets receive solid protection through colostrum, while this is not the case with piglets that come from first piglets. The nutrition of the sow in the farrowing house requires quality nutrition (sufficient amounts of hygienically correct, high-quality food in a specially controlled regimen and sufficient amounts of correct drinking water). Only a healthy sow can consume a sufficient amount of food for high milk production, which also depends on the favourable number of piglets reared in the litter. However, despite all these precautions, sows can develop some diseases and disorders, mainly related to the genital apparatus and the function of the mammary glands. These are mainly hypo- and agalactia, endometritis, mastitis, but not infrequently the MMA syndrome (mastitis,

metritis, agalactia). There are many experiences related to the above-mentioned puerperal disorder, and they are mainly reduced to a few procedures such as regular and obligatory thermometry of the sows (critical temperature is 39.2°C), withholding food one day before farrowing, giving laxatives two to three days before and two to three days after farrowing. Putting effervescent tablets into the uterus after farrowing with obligatory control of the birth canal. Such procedures successfully solve the occurrence of MMA syndrome and thus ensure lactation, i.e., the intake of colostrum, which is particularly important for the vitality of piglets at the teat and the further course of the breeding period of the piglets themselves [9, 15].

4. The first 7-10 days after farrowing

In addition to bruising, hypoglycaemia, leg swelling, and anaemia in piglets, diarrhoea of bacterial or viral aetiology is most common in teat-feeding piglets. Severe diarrhoea and frequent dehydration, i.e., loss of body mass, slower growth of piglets. They require immediate rehydration, which can be performed orally or intraperitoneally, and the use of antimicrobial drugs.

5. A period of 10-14 days after piglet weaning

It represents a sensitive period called the weaning period of the sow or the weaning period of the piglet. From the point of view of the influence of stressful factors (separation from the mother, new facility, cohabitation with other animals, intensified feeding). In this category, there are breeding diseases that follow the mentioned production phase.

6. Suckling period

The course of farrowing, the first seven days after farrowing, represents the most critical moment for piglets at the teats. The attitude towards freshly pollinated piglets consists of wiping each piglet with a dry, clean cloth, disinfecting the navel with iodine, and then placing it under an infrared lamp. Namely, it is generally known that piglets that are kept at a temperature lower than 25°C have impaired gut motility. The passage of pathogenic bacteria and harmful antibodies through the intestinal lumen is slowed down. This condition causes an increase in pathogenic *E. coli* in the intestinal system and the appearance of a more severe form of diarrhoea. As one of the mandatory procedures, cutting or trimming of the teeth is done. It is an obligation to do this carefully to avoid icing the gingival area and opening the dental pulp [2].

7. Care for suckling pigs

The period immediately after farrowing and the first week after farrowing are critical to the health of farrowed piglets. Half of all piglet losses at the teat occur in the first few days after farrowing. Piglet mortality during this period is a result of starvation, piglet crushing, and infections of various aetiologies. After farrowing, it is necessary to take each piglet and wipe it with a clean, dry cloth, disinfect the navel with iodine and place it under a heat lamp (heat lamps also play a role in keeping piglets away from the sow to prevent them from being crushed in the first days of life), i.e. a warm nest with a temperature of 34ºC. Due to the insufficient development of the thermoregulatory system in newborn piglets, the optimal ambient temperature is ensured by the use of heat lamps, floor heating, and warm mats [2].

It is necessary to provide colostrum to a freshly inseminated piglet in the first few hours of life because the immune system of a freshly inseminated piglet is not yet ready to defend the organism against infectious agents. For this reason, nutrition, i.e., the administration of colostrum, is necessary. It is now known that the piglet's ability to absorb antibodies from colostrum decreases by an average of 50% every three hours after birth. Immediately before first suckling, it is necessary to check the functionality of each teat and to leave as many piglets in the litter as there are functional teats. Colostrum has two functions. The first function is protective - the intake of colostrum in the first 36 hours of life of piglets leads to the establishment of a passive immunity, which does not last long, but allows them to be protected against infections in the first weeks of life. It has been found that colostrum-derived immunoglobulins can provide satisfactory protection until at most the second week of life. The second role is nutritional - it provides freshly fertilized piglets with much-needed carbohydrates, fats, proteins, micro- and macro elements [9]. In the first week of life, it is necessary to carry out the following prophylactic and technological procedures: one-time application of preparations

containing iron in the amount of 200 mg. Iron can be applied: in powder (piglets eat it directly from the floor), *per os* in the form of paste and gel, and by injection (exclusively in the muscles of the neck). Tail trimming, as a preventive measure, is done to prevent the occurrence of cannibalism. In some countries, this procedure is prohibited, while in others it is allowed to cut only half of the tail. Shortening can be done with sterile surgical tools (scalpel, scissors, emasculator), however, to prevent bleeding, the use of thermocautery is recommended. Castration of males intended for fattening is performed to prevent the unpleasant smell of meat originating from sex hormones. In piglets older than 7 days, castration must be performed under anaesthesia, and the use of analgesics is mandatory. Castration is performed using a sterile scalpel and an emasculator. Piglets are born with 8 sharp teeth that can cause pain to sows and create lesions on the mammary complexes, with the possibility of infection. In any of the above cases, due to pain and irritation, sows withhold breastfeeding, that is, they refuse access to the newborn piglets. It is recommended to grind your teeth. Cutting teeth with pliers can lead to tooth cracking, gum damage, and bleeding, which is an entrance door for pathogenic microorganisms [9].

8. Care the weaned piglets

It is generally known that piglets are exposed to numerous stressogenic factors in the first ten days after weaning. The most prevalent is emotional stress. Emotional stress is caused by separation from the sow (mother), change of residence, and mixing with piglets from other groups. Then, by not getting an antidote from milk and a wildly developed fermentation system. Another important moment is that the piglets adapt to the diet for the second time in their lives, and the kind that is given to them. They do not have the opportunity to choose food. It takes place at a time when the capacity of the alimentary tube and its fermentation system is not sufficiently developed. The next important moment is that piglets are exposed to new microorganisms from the environment and food for the second time in their lives. In practice, it is also mentioned that unbalanced meals and bad microclimate are important elements in the formation of emotional stress [2].

9. Stress

The phenomenon of stress is also a serious problem in commercial farms. Farms that are just developing their management have a greater problem with stress than farms that have fully organized production. The requirements of modern pig production today have reduced stress to the lowest possible level and ensured maximum comfort for the animals (welfare). In this sense, it is very important to know and understand the mechanisms of adaptation syndrome and stress reactions and to provide the animals with the most appropriate living conditions so that their productivity is at the expected and desired level. A high level of corticosteroids in the blood of animals exposed to stress reduces their resistance, making them highly susceptible to various infections. Therefore, it is very important to improve the welfare of animals in farm conditions through the development and improvement of human consciousness in the direction of respect, care, and responsibility towards animals, as well as through the application of technical and technological solutions in direct production that will provide maximum comfort and convenience to animals [16].

10. Nutrition

The technology of feeding farm animals also occupies an important place in the prevention of stress and is a very important factor in maintaining a high health and reproductive status. Fattened sows, e.g., which bear a large number of fruits, and in addition consume a large amount of food in facilities where humidity and temperature are increased, are more susceptible to stress and show signs of respiratory distress. This is one of the reasons for the introduction of recommendations related to the way of feeding by production stages and categories of animals. It is precise, e.g. a defined feeding curve for breeding sows in each stage of production to enable the earliest possible entry into oestrus after piglet weaning, the greatest number of ovulated and implanted embryos, the greatest number of live-born, vital piglets, the greatest amount of milk produced during lactation, while preserving the good condition and health of sows so that the life and production life is longer and the use of medications as little as possible. Thanks to this approach, today it is not new that we have commercial farms with 35 or more weaned piglets per sow per year [17].

11. Preparing sows for farrowing

According to the usual protocols, the preparation of the sow for farrowing is done by freeing the sows from ecto- and endo-parasites ten days before entering the farrowing pen. It is necessary to prepare each sow for farrowing by washing the mammary complexes and peri-genital region with warm water using soap and a mild disinfectant before transferring to the farrowing pen. It is necessary to pay attention to the period of transferring sows, usually it is 5 to 7 days before farrowing, to expose the sows to the bacterial flora that reigns in the farrowing area and to get them used to the new environment. The next procedure is to reduce the rations in the farrowing house, so that on the day of farrowing, the sows do not get anything except water. It is recommended to add one spoonful of bitter salt per day to the reduced rations. If the cyst is present, and after dusting, continue with the administration of laxatives until the condition normalizes. It is recommended that seven days before the expected farrowing and five days after farrowing, additives are used in the rations due to the implementation of preventive measures related to puerperal pathology of the sow and perinatal disease of the litter. The selection of additives is carried out based on the presence of the incriminating bacterial flora and the sensitivity of the additives to medications. On the day of farrowing, monitor the course and length of farrowing. The next day after farrowing, gradually increase the ration so that on the fifth to sixth day after farrowing, the maximum amount of concentrate that the sow can consume at will is reached. During the lactation period, sows can fart at will. Namely, it is common knowledge that sows have a poor appetite after farrowing. If too much food is given in the first week after farrowing, there is a possibility of loss of appetite, resulting in agalactia. At the moment when sows consume a large amount of feed during the lactation period, the feed must be hygienically correct. According to its chemical composition, it must meet the needs of the sow. For the first three days after farrowing, the sows' temperature should be measured regularly. In case the temperature is over 39.3^{o} C, look for a solution in the appropriate therapy [2,15].

12. Preparing the sow for weaning

Two days before farrowing, sows' feed is halved. On the day itself, only water is given. Today, it is recommended that the most effective way to stop milk secretion is full nutrition at will, after deciding. With the cessation of sucking, milk accumulates in the mammary gland, which leads to an increase in intramammary pressure with the consequent rapid cessation of milk secretion. If the technology of restrictive feeding is accepted two days before the decision, from the next day onwards, the sows are fed as they please, abundantly to enter oestrus as soon as possible. It is recommended to add about 300 g of sugar to the fodder mixture for gilts, so that they enter oestrus earlier [2,15].

13. Reproductive problems on a pig farm

In intensive pig production, herd reproduction control is a primary task. It is well known that pigs have a very high reproductive potential compared to other domestic animals, due to their early sexual maturity, high ovulation rate, relatively short gestation and lactation periods, and rapid pregnancy establishment after the previous litter. From an economic standpoint, proper and regular reproductive activity in pigs is of great importance. Whether the reproductive efficiency of a herd is satisfactory is usually assessed based on the age of the heifers at first farrowing, the duration of their reproductive use, the length of the interval between each farrowing, and the size of the litter at weaning. The reproductive activity of pigs is influenced by several factors, among which are very important: hereditary factors, endogenous factors (hormones, immunoglobulins, enzymes), environmental influences, the presence of pathogens, as well as management and production technology [2]. Reproductive efficiency is also influenced by: husbandry, feed, season, location of the farm, microclimate, implementation of biosecurity measures, herd size, herd health (presence of breeding, parasitic and infectious diseases), body condition, method of artificial insemination [14,15].

Infertility is one of the most common problems on commercial farms. The causes of infertility are varied and numerous. The current problem of most of our farms is the occurrence of seasonal infertility, which is present during the summer

months and represents a serious obstacle for producers who want to maximize the reproductive efficiency of their herd [15]. In this sense, in today's intensive pig production, great attention is paid to the optimization of microclimatic conditions in pig housing facilities through the use of computerized systems for ventilation, cooling, lighting, feeding, fertilization, etc., with the possibility of programming the desired parameters at specific time intervals, which creates the most favourable conditions for the animals to maximally express their genetic potential, achieve high productivity, and significantly reduce stress.

Adequate health care of farm animals, a high level of hygiene of animals, equipment, and people, as well as precise application of all procedures in artificial insemination technology, are primary conditions for high reproductive efficiency of breeding animals [12]. Conventional assessment of boar seed quality, as a segment of artificial insemination technology, is widely practiced on our commercial farms. Classical assessment of seed characteristics under commercial conditions recognizes ejaculates with low fertilization potential, but it does not have high efficiency in predicting fertility parameters in the field [18]. Therefore, to suppress infertility and control the reproductive efficiency of pigs, laboratory methods such as motility assessment using a computer analyser (CASA), automatic sperm morphology analysis (ASMA), determination of chromatin integrity via flow cytometry, HOS test, etc., are successfully applied today in cooperation with the Institutes. In this way, the fertility of the boars can be continuously monitored, and a timely response can be made in immediate production. The technology of preparing heterospermic insemination doses that include sperm of two or more boars of terminal breeds has also found application in artificial insemination on our commercial farms to produce a greater number of piglets per sow [19].

The use of frozen semen is also used in industrial pig farms around the world. The advantage of frozen semen is that it preserves genetic material for a longer period and significantly reduces the risk of introducing diseases into the herd [19]. However, deep freezing has not been widely practiced because the technology of deep freezing has not been satisfactorily solved and the percentage of survival is low, and the size of the litter is also smaller [12].

14. Genetics on a pig farm

In modern pig production, genetics aims to improve the production capabilities of existing breeds that are used on industrial-type farms by creating new forms of higher-quality breeds with greater genetic potential and with purebred breeding or crossbreeding for commercial purposes. One part of our research was focused on research on changes in the karyotype of pigs in intensive rearing. We found that karyotype changes can occur under the influence of chemical substances, which can be found in food, water, or in general in the environment where the examined animals live [20]. We recommend that industrial-type farms and centres for reproduction and artificial insemination apply the results of cytogenetic methods, which enable the detection of carriers of hereditary anomalies. Their inclusion in the biosecurity plans of pig farms can have a positive effect on the health of pigs and improve production results [21].

15. Environmental problems on commercial pig farms

For a long period, large commercial pig farms have suffered from the presence of chemical environmental pollutants (heavy metals) and their impact on the health of the animals. Heavy metals, which react with organic molecules and change their structure and function, pose a special danger to living systems. Heavy metals enter the body through the respiratory, digestive, and skin organs. The results of several years of research have indicated the danger of contamination of animal feed with heavy metals and their deposition in the body of animals, with consequences for the health condition and reproductive capacity of domestic animals.

Heavy metal toxicity generally leads to the formation of free radicals, inhibiting the activity of antioxidant defence enzymes as well as glutathione oxidation, and the formation of malonyl-dialdehyde (MDA) as a marker of oxidative stress. Their toxicity stems from the tendency to create covalent bonds with sulfhydryl groups of biomacromolecules or displace certain cofactors, thus inhibiting the activity of certain enzymes [22].

Our recommendation for industrial-type farms is to act to reduce the risk of exposure to heavy metals, work on the introduction of multi-level

monitoring of the quality of raw materials and finished products, as well as the application of adequate protectors against the toxic effects of these agents [20].

16. Biosecurity on commercial pig farms

Biosecurity plans are crucial for disease prevention, the avoidance of undesirable situations, and the orderliness of the business [12, 23]. The global goal in modern pig production in developed countries is to prevent disease from entering the herd, i.e., to prevent pigs from coming into contact with infectious agents from the environment as much as possible, and to prevent or minimize the transfer of pathogens within the herd, between certain categories of animals. For this reason, particular importance is attached to technical solutions that allow the pig herd to be protected and isolated from harmful external influences, such as: the construction of a quarantine area for newly acquired animals, the creation of a special area for the delivery of animals, as well as an entrance area for personnel with prescribed hygiene measures and behavioural protocol. All measures aimed at protecting the herd from infection are called biosecurity measures and include external and internal biosecurity measures defined by the biosecurity protocol. The purpose of external biosecurity is to prevent the transmission of infectious agents from the environment and other flocks in the region. It includes: multi-site housing system, control of access to the farm (people, feed, equipment, raw materials, seeds for artificial insemination), control of vehicle movement around and inside the farm, control of rodents, insects and birds, employee access protocol, animal delivery control, procedures for handling dead animals, quarantine for newly acquired animals. Internal biosecurity includes the procedure for entry and behaviour of employees inside the farm (showering, farm clothes and shoes, movement of people and animals through the farm, use of working tools and accessories), the principle of "everything inside - everything outside", cleaning, washing and disinfection protocol, as well as infection control through the program of preventive and curative animal health care [2,5,24].

17. Conclusion

On pig farms, individual animal health care is becoming less and less important. In today's conditions, where there is a large concentration of animals in a relatively small area, such a situation requires health care at the level of the entire farm. The presence of various breeding diseases of bacterial, viral, or parasitic aetiology leads to a decrease in production results and requires additional efforts of the farm's employees with increased consumption of medicines, which consequently reduces the farm's economic profit. Implementing health measures requires knowledge of the health status of pigs. One of the most common risk factors is the purchase of boars, gilts or weaners of unknown health status. In addition to the measures already mentioned, vaccination programs also contribute to stabilizing the health status of pigs. The promotion of the good health of pigs on farms includes the application of a system of prophylactic measures, in addition to a good selection of the breed, the design of the size of the litter, and how biotechnological measures in the production process. We recommend that industrial farms and centres for reproduction and artificial insemination introduce cytogenetic methods allowing for the detection of carriers of hereditary anomalies. To reduce the risk of the effects of chemical pollutants, it is necessary to work on the introduction of multilevel monitoring of the quality of raw materials and finished products, as well as on the application of adequate protective measures against the toxic effects of these agents.

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