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*Review scientific paper*

## ASSESSMENT OF BIOSECURITY MEASURES ON COMMERCIAL PIG FARMS<sup>1\*2\*</sup>

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*The report is intended for pig breeders*

**Abstract:** Biosecurity, welfare, good manufacturing practice and risk analysis at critical control points are very important elements for intensive pig production. Planned application of biosecurity measures is crucial for the protection of pig health and production success. In order to have an ongoing active relationship with the existing threats it is recommended to influence the employees' awareness of the real need to protect production as a whole. The key to achieving these goals are prepared biosecurity plans for each specific situation, or a specific pig farm.

**Key words:** pigs, commercial farm, assessment, biosecurity

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## INTRODUCTION

When considering the state of the biosecurity at the farm level, at the same time, we need to bear in mind the related, but to some extent different, concepts: biosecurity plans, risk assessment at critical control points and plans for emergency situations. Biosecurity plans are key to disease prevention, the prevention of unwanted situations and the improvement of business (Stanković et al. 2007, 2008, 2009, Valčić, 2007, Hristov i sar, 2011). Intensive pig production involves a large concentration of animals in a relatively small area, which requires certain measures to be taken in order to preserve the health of herd, prevent the introduction and spread of diseases in and preserve production (Hristov et al., 2008). The work on formulating and implementing biosecurity plans implies ongoing activity on the creation and preservation of a satisfactory environment for the life of animals and their production, above all in terms of preventing the introduction and spread of infectious pathogens, and it gets more important as the pig meat

market increasingly gains international character (Uhlenhoop, 2007a, b).

Many solutions applied to industrial farms in order to improve profitability, increase efficiency and production safety often cause discomfort, pain and stress or distress of animals while preventing their natural instinctive behavior, which is largely reflected in the economic output of production. In addition, it should be kept in mind that in most cases it is about pigs of different age categories, often of different geographical and health backgrounds, collected in a limited area, and early maturing pigs highly sensitive to stress, which inevitably leads to the creation of conditions for the emergence of infectious diseases (Uzelac and Vasiljević 2011, Vidović et al. 2011, Bojkovski et al. 2014). Omissions and mistakes in maintaining the required level of biosecurity usually lead to the onset of disease, reduction in production volume, death, and loss of earnings, thus endangering the survival of the herd (Bojkovski i sar, 2005, 2015).

### THE CONCEPT OF BIOSECURITY IMPLIES THREE MAIN FACTORS.

1. isolation, which prevents the contact of individuals from a controlled environment and environment, and relates to newly-acquired animals, contacts between existing groups of pigs-divided by age and / or production groups, as production operations that are repeated in several groups of animals,

such as feeding, loading and so on;

2. control of traffic, which implies the control of the movement of vehicles, people and all animals from and to a farm in order to prevent or minimize contamination of food, herd and equipment;

3. sanitation, which refers to the disinfection of materials and equipment entering the farm and the hygiene of people and equipment on the farm.

### ASSESSMENT OF BIOSECURITY LEVEL ON FARMS

There is no single biosecurity plan for all farms. Achieving the necessary level of biosecurity on pig farms is a plan that is the result of planning and timely action in a specific environment and epidemiological situation. Numerous limiting factors make it difficult to reach the required level of health protection and production success. The size of the herd and the volume of production understandably largely limits the scope and quality of the measures taken, which can also be said for the intensity of production. This practically means that economic viability must play a decisive role in determining the goals to be achieved by applying a vision of a biosecurity plan, or at least some biosecurity measures expressed in the form of good breeding practice, good veterinary practice (Radojicic i sar, 2002 Bojkovski i sar, 2009).

Isolation as an element of biosecurity on the farm

The farm's location is a key element of a sustainable biosafety plan. Isolation of growing facilities in relation to potential sources of pathogenic microorganisms is an important measure of protection, especially when it comes to aerogenic infections. However, it should be kept in mind that viruses of foot- and –mouth disease, aujeszky's disease, enzootic pneumonia, and reproductive and respiratory syndrome (PRRS) can be

transmitted over long distances. Classical swine fever (KKS), African swine fever (AKS), transmissible gastroenteritis (TGE), atrophic rhinitis (AR), dysentery, pleuropneumonia or leptospirosis can be found within the farm up to 100 m from the original disease hotspot (Šamanc, 2009, Lipej 2015) . The significance of the location of the farm and its distance from other potential threats has been highlighted. The following risks are particularly prominent: the risk of nearby neighborhood farms, the density of population, the distance of the roads, the proximity of other animal species, the type of farms that are nearby and other possible sources of pollution such as slaughterhouses, landfills, wastewater treatment plants (Uzelac and Vasiljevic, 2011; Boykovski, 2015).

This means that the location is determined by a set of related factors, the distance can be most easily measured, but it also includes the type and size of the farm, dominant winds, air humidity, etc. The significance of the green belt, which has only decorative character on the farms (Uzelac and Vasiljević 2011), is regularly neglected. New pigs must be placed in isolation because of their health status confirmation and acclimatization to new accommodation conditions, taking into account the location of the appropriate stable and the length of the isolation period. The duration of

isolation is inversely proportional to the health status of the domestic herd, which means that if it's higher then the control

has to be more stringent, it usually lasts for four weeks, but it is more advisable to take six weeks (Bojkovski, 2015).

## HERD HEALTH STATUS

Sustainable health protection and successful production are only possible if there are no causative agents of infectious diseases and factors that lead to the emergence of technopathy in a herd. The manner of use, storage, maintenance and handling of therapeutic agents, instruments, seeds, and the use of disposable products certainly influence the achievement of a satisfactory health status of all categories of pigs.

Health is not synonymous with health status. The term health status is much wider and it implies health, whether the animals are clinically healthy or not, whether herd is clear or free of some contagious diseases, but also the application of a series of biotechnological measures in order to maintain production. It is possible that animals are of low health status (the presence of some latent infections) and that they are clinically healthy and productive. This occurs under conditions of good management when the immunity is in balance with possible serious pathogens that may be present without manifesting the disease, that is, when there are subclinical forms of illness or latent infection (Plonait and Bickhardt, 1988; Taylor, 1999; Straw, 1999). On the other hand, it is possible that the animals are in a high health status, but that the conditions of management, the

way of keeping, care and nutrition of animals are inadequate and that clinical manifestations of some diseases are found in such conditions (Gagrčin i sar, 2002). Such conditions may lead to a drop in production. Regardless of their different pathogenicity, and therefore a different morbidity and mortality rate, many of these diseases can be suppressed or even eliminated from the facility by applying adequate measures of health care.

The disease is essentially the absence of health, ie the deviation from the harmonious functioning of some organs or organisms that can then be clearly manifested by certain symptoms or signs, which is also termed the clinical form of the disease. However, very often, some diseases are present in subclinical or latent form, when they can be detected only by one of the serodiagnosis methods, and the best and safest way is to identify the causative agent or to observe some parameters indicating a decline in production. The number of such diseases is not negligible (pneumonia, intestinal adenomatosis, leptospirosis, parvovirus, PRRS, (Ivetić et al., 2000; Gagrcin et al., 2002; Bojkovski et al., 2008, 2015, Štukelj, 2017.) There are significant differences between subclinical form of a disease and latent infections. An example of this

is the PRRS that can be latently present for a long time in the herd and observed only after a decline in production and / or a disease of leptospirosis, which may be endemic for several months without clinical manifestation. (Radojičić i sar., 2002; Štukelj, 2017). Accordingly, all agreed and prescribed conditions (nutrition, keeping and care) must be met in a herd and good animal health status must be promoted. This generally implies the absence of some contagious diseases, which is achieved by enhanced control of animal health. Also, the possibility of latent infection that is expressed through the fall in production (increased number of stillbirths, fetal mummification and increased mortality of breastfeeding piglets in the first two days without apparent clinical symptoms) must be excluded. This can be carried out using serodiagnostic tests (Šamanc, 2009).

The high health status implies the precise establishment of specific criteria clearly defined by the veterinary service, which is increasingly based on the preventive health protection of pigs in intensive breeding (Avakumović, 2006, Valčić 2007).

In countries with developed management and therefore developed pig production, high health status must be met in the herd. This essentially means "freedom" from some infectious viral and / or bacterial diseases such as, for example, classical swine fever, Aujeszky's disease, leptospirosis and some other contagious diseases. In

some herds of pigs, a high health status is not always achieved. It is in correlation with high production only if the conditions of management are fully met by the recommendation of current biotechnological concepts in the process of establishing and maintaining elite reproductive and productive herds (Tzika et al., 2015). However, it is possible to maintain production according to the desired concept. in conditions of poorer management, but without the presence of certain virulent microorganisms, or with a small percentage of morbidity and mortality, especially of breastfeeding piglets. Conversely, if the conditions of biotechnological requirements are at a high level, it is possible to maintain production in the presence of some pathogens, due to a harmonious relationship (good balance) between the immunity and virulence of a pathogen, with no manifestation of the infection or some other disorders, and therefore without a significant decline in production (Radojičić et al., 2002).

Implementing the "stamping out" method as radical can be applied in high production countries, where other measures have been regulated, for example, compensation for economic damage resulting from such eradication measures (Radojičić and sar, 2002). It is known that some diseases occur only at a certain age, that is, when moving from one product category to another. Particularly sensitive or critical period is the first 24-48 hours after farrowing, the first 7 to 10 days after it, and 10

to 14 days after a sow rejected piglets (Radojičić, 2002).

Farrowing, as well as early puerperium and the first two days after farrowing are particularly sensitive or critical periods in pig production, for both the pig and piglets. Sows, especially those farrowing for the first time can be germ carriers for many diseases that do not occur in themselves, but that the disease is transferred to the piglets that are insufficiently resistant to the conditions that they encounter in the early neonatal period. Therefore, the preparation of sows for a farrowing and taking a series of measures (monitoring of farrowing, inducing labor if necessary, acceptance and special care of each piglet, placing a primipara between two multipara sows) must be done in a timely manner. Placing primipara sow between two multipara sows confirmed to be a good way of setting the barrier, ie preventing colibacillosis, which is more common in piglets delivered by primipara sows. Piglets delivered by multipara sows receive solid protection through colostrum while this is not the case with piglets delivered by primipara sows. Sow feeding requires good nutrition and water supply (Avakumović, 2006).

Only healthy sows are able to consume sufficient amounts of food needed for high milk production, which depends on the number of raised piglets in the litter. However, despite all these precautionary measures, some diseases and disorders that are mainly related to the genital apparatus and the function of the

mammary gland may still occur. These are primarily sow hypo and agalactia, endometritis, mastitis, but often also mastitis-metritis-agalactia syndrom (MMA). MMA syndrome is expressed in a varying percentage, 1-37% on different farms, but it can be prevented by certain preventive measures and therapeutic treatments, where the role of a veterinarian-specialist is the most important (Šamanc i sar, 2002; Lipej, 2015). There are numerous experiences regarding the mentioned puerperium disorder and are usually reduced to several procedures such as regular and mandatory thermometry (critical temperature is 39.2 oC) deprivation of meals the day before partus, giving laxative two to three days before and two to three days after farrowing, placing foaming tablets into the uterus after with the mandatory control of the birth canal, they successfully resolve the occurrence of MMA and thus provide lactation; that is taking of colostrum from their mothers, which is of special importance for the vitality of breastfeeding pigs and the further course of the growing period, and finally, for the success of production. Regarding the disease and the causes of mortality in the first two days after birth which are linked to the condition of the sows, there are contusions, hypoglycaemia, and peracute course of coli diarrhea.

Anemia in piglets is avoided by preventive administration of iron dextran preparations in the first two to three days after the birth. The

latest recommendations is an oral administration of iron preparations to pregnant mothers (Šamanc, 2009). In addition to contusions, hypoglycaemia, and anemia of piglets, neonatal scour (eng). which is essentially the appearance of diarrhea of different etiology is most common (Waters and Sellwood, 1982). Clearly expressed diarrhea and subsequent dehydration, i.e. loss of body weight and slower growth of piglets, require immediate rehydration, either via oral and / or intraperitoneal route, and application of antimicrobial agents, using antibiogram (Straw, 1999, Tzika

and sar, 2015). During this period, some other illnesses may appear in a different percentage of morbidity and mortality, which may then be more or less successfully treated with medication.

Dysentery or bloody diarrhoea caused by *Brachyspira hyodysenteriae* is a persistent illness of all categories of pigs, which can seriously endanger the production of pigs. However, dysentery is the most common in piglets between 25 to 60 kg body weight. Commercial-type farms must work on the eradication of dysentery (Šamanc, 2009).

### ATTITUDES OF STAFF TOWARDS EQUIPMENT

Causes of infectious diseases can also be transmitted indirectly through equipment. In order to reduce the spread of agents by equipment, the following must be done: washing hands before each entry into the farm and after working with diseased animals,

wearing protective gloves for assisting in farrowing, separate use of food and manure equipment, use of disposable needles, sterilization of the instruments for castration and marking and washing working clothes with detergents and hypochlorites (Bojkovski i sar, 2013).

### MOVEMENT AND TRAFFIC CONTROL

Control of the movement of vehicles, people and animals from the farm and towards it must be an integral part of the production technology and must be designed in such a way as to prevent or minimize the contamination of herd, food and equipment. In practice, some important elements of movement control are often ignored, such as; the condition of the fence and disinfection barriers and the procedure for the entry of vehicles and other people on the farm, although all this is foreseen by the farm

project. Barrier washers are regularly uncovered, exposed to atmospheric and surface waters, and the solution does not change as often as required by traffic frequencies (Relić et al., 2002; Gagarcin et al., 2002). In order to reduce the possibility of contamination spreading, visitors and drivers are informed about the methods of protection and asked to cooperate in minimizing the possibility of contamination. The entry of visitors into breeding and feeding facilities is not allowed, "No entry" sign with the

telephone contact number is placed at the farm entrance. Contact between pigs and visitors should be avoided and the use of clean clothes and rubber boots or PVC footwear for shoes is indispensable (Hristov et al., 2009).

### **FOOD AND FEEDING EQUIPMENT CONTROL**

By proper storage, food is protected from contamination and the development of mycotoxins is prevented. Foods for different categories and systems should be labeled and sorted in order to avoid mistakes. If food is supplied from elsewhere, it is best to buy it from producers with a controlled production, quality and biological safety regime (Avakumović, 2006).

### **MANURE MANAGEMENT**

The location of manure within the farm and the assessment of manure management provide a great deal of information on the level of biosecurity on the farm and the awareness of employees. For now, there is no strict legal obligation to treat manure, but digestion and any other acceptable form of biological degradation is considered desirable and raises the level of biosecurity on the farm (Stanković et al., 2007).

### **REMOVAL OF ANIMALS REMAINS**

It is very important for all corpses of dead animals to be removed as soon as possible (Uzelac and Vasiljevic, 2011).

### **RELATIONSHIP WITH OTHER ANIMALS ON THE FARM**

Although it is not desirable, sometimes cattlemen have a desire to have dogs, cats or horses on the farm. In that sense, they should be denied access to some parts of the farm and contact with pigs, pigs should be dehelminthised vaccinated against rabies and illnesses common in the farm environment (Stanković et al., 2008).

### **BIRD CONTROL**

Birds (pigeons, sparrows, squirrels and possessions) may be carriers of infectious material on the feet or in the digestive system. Therefore, it is recommended to close holes suitable for making nests; laying grids on windows and ventilation openings, closing the openings on the silos and covering the edges under the roof and roofs suitable for nesting and laying (Uzelac and Vasiljević, 2011).

The control of rodent populations is a compulsory part of every biosecurity plan, so the following is undertaken for this purpose: construction of facilities in which rodents can not penetrate,

closure of safe hiding places, elimination of feeding possibilities and destruction of existing populations by poisoning, smuggling and traps (Đedović isar, 2015).

### SANITATION

The term sanitation refers to the maintenance of hygiene, cleaning and disinfection of materials, people and equipment that enters the farm and the hygiene of people and equipment on the farm.

The occasional replacement of the preparations was justified while simple sanitation ,which did not destroy the entire microbial population with the

appearance of consequent resistance of the remaining species ,was used. Contemporary carefully composed preparations of the synergistically combined ingredients do not have to be changed for a long time because they have a broad germicidal spectrum, they are stable due to the presence of buffers and with a longer residual effect (Zdravković et al., 2013).

### CONCLUSION

The following points should be kept in mind: Employees' awareness on the real need to protect the production as a whole and the constant work on

removing the threats to biosecurity is a key to the success of designing and implementing biosecurity plans for each particular situation and the pig farm.

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