

## ANALYSIS OF APPLIED BIOSECURITY MEASURES IN BOARS SPERM PRODUCTION

**B. Stanković<sup>1</sup>, S. Hristov<sup>1</sup>, T. Petrujkic<sup>2</sup>, J. Bojkovski<sup>2</sup>, N. Maksimović<sup>3</sup>, N. Delić<sup>3</sup>**

<sup>1</sup>Faculty of Agriculture, Nemanjina 6, 11080, Belgrade-Zemun, Republic of Serbia

<sup>2</sup>Faculty of Veterinary Medicine, Bulevar Oslobođenja 18, 11000, Belgrade, Republic of Serbia

<sup>3</sup>Institute for Animal Husbandry, Autoput 16, 11080, Belgrade-Zemun, Republic of Serbia

Corresponding author: [baxton@agrif.bg.ac.rs](mailto:baxton@agrif.bg.ac.rs)

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**Abstract:** This paper gives a detailed analysis of the applied biosecurity measures in the production of boar sperm at a swine reproduction center. Biosecurity indicators (existence of a written biosecurity plan, isolation, introduction of newly acquired animals into the herd, herd health, assessment of the personnel attitude towards equipment, traffic control, attitude towards visitors, feeding and watering control, manure management, disposal of dead animal carcasses, attitude towards other animals, rodents and birds control, sanitation) were viewed and evaluated by rating scale: (5) - excellent, (4) - very good, (3) - good, (2) - sufficient, (1) - insufficient, there are resources for improvement (0) - insufficient, with no resources for improvement. Obtained data were analyzed in the SWOT process, taking into account all the strengths, weaknesses, threats and opportunities for improving the biosecurity level. The situation in the center is rated as very good, with an average rating of 4.15. However, one disadvantage is serious and related to the boar facilities isolation possibilities, taking into account their location and the presence of two types of male breeding animals (boars and bulls) in the same location. Newly acquired breeding animals are purchased from various sources, but with a rigorous regime of control and not at the same time.

**Key words:** analysis, biosecurity measures, boars, sperm production

### Introduction

Artificial insemination (A.I.) is the routine technological procedure in contemporary swine breeding technology and important biosecurity measure as well. Fresh semen collected from healthy boars necessitates premeditated and correct treatment in order to prevent afterward contamination (*Stanković et al., 2005*).

In epidemiologic terms, sperm is considered to be intermediary source of infection, becoming secondary source after being packed in single doses. Many viruses could be detected in boar semen, primarily during viremic phase of infection, and some of them, like Foot and Mouth disease virus, PRRS virus, Vesicular Disease virus, Parvovirus, Picornaviruses, Adenoviruses, Japanese Encephalitis virus type B, Aujeszky virus and Reoviruses have great importance. Therefore, quality monitoring of boars before introducing them into herd and during being in reproduction center is essential (*Stanković et al., 2007a*).

The amount of predicted biosecurity measures have to be defined by protected operation price, but preservation of certain biosecurity level is multifunctional. Primarily, it is essential part of farm programme of food safety. Furthermore, sophisticated and efficient biosecurity measures application leads to better herd health and their higher productivity, which means higher efficacy and profitability, and finally environment protection (*Uhlenhoop, 2007*). An assessment of all critical spots in technology chain of boar semen collecting, processing and storage, and the most important measures for semen preservation in order to achieve reproductive results were given in this paper.

## Materials and Methods

During presented investigations, the effect of applied biosecurity measures in one reproductive center was evaluated, and failures and threats to biological quality of semen were analysed, as well as possibilities to improve present biosecurity level in operation facilities.

There were 75 breeding boars of different breeds (Large White, German, Sweden and Dutch Landrace, Pietrain and Durock), as well as 82 Simmental breeding bulls.

Investigation was performed using combining methods of interview and observation in respect of biosecurity indicators (existence of a written biosecurity plan, isolation, introduction of newly acquired animals into the herd, herd health, assessment of the personnel attitude towards equipment, traffic control, attitude towards visitors, feeding and watering control, manure management, disposal of dead animal carcasses, attitude towards other animals, rodents and birds control, sanitation), which were evaluated according to numerous parameters and other elements. In order to evaluate them, grades were defined: (5) - excellent, (4) - very good, (3) - good, (2) - sufficient, (1) - insufficient, there are resources for improvement (0) - insufficient, with no resources for improvement, and rating scale: 0-1,99 insufficient, 2,00-2,49 sufficient, 2,5-3,49 good, 3,5 – 4,49 very good and 4,5 – 5,00 excellent, were defined. Obtained data were analyzed in the SWOT process, taking into account all the strengths, weaknesses, threats and opportunities for improving the biosecurity level.

## Results and Discussion

Results of analysis biosecurity measures application in reproductive center are given in table 1. Biosecurity level was evaluated as very good, with average grade 4.15. Nevertheless, it should be emphasized that this grade is fragile, since there are few severe failures which could threaten the very existence of the center. In the further text will be analysed only those results which were differentiated from optimal values.

There were no written biosecurity plan neither in reproduction center, nor in any previously scrutinized livestock production unit, but only in fragments, concerning certain technological operations and unwritten technological, hygienic or sanitary procedures, as well as semen dilution and conservation technology which were correctly and regularly performed, so this indicator was rated as "good" (3). Furthermore, in spite of international regulations (e.g. EU Directive 90/429/EEC 1990, Directive 92/65/EEC 1992 and Decision 95/176/EC 1995), that in reproduction center may exist only one species male animals, both bulls and boars are present on analysed location, although strictly separated (*Stanković et al., 2005*).

**Table 1. Results of analysis biosecurity measures application in reproduction center**

1.	EXISTENCE OF WRITTEN BIOSECURITY PLAN	3
2.	Isolation of entire reproduction center and separate technological segments and operations	2
3.	Introduction of newly acquired animals in herd	3
4.	Herd health status	3
5.	Personnel attitude to equipment	5
6.	Traffic control	3
7.	Visitors policy	5
8.	Control of feeding and watering	5
9.	Manure management	5
10.	Carcases disposal	5
11.	Attitude towards other animals on the farm	5
12.	Rodents and birds control	5
13.	Sanitation	5
Final rate		4,15

Of course, in this type of the highest technology level production units certain procedures and protocols are in use, concerning visitors policy and especially protocols of sanitation, recommended by manufacturers of sanitation products, as standardized procedures (*Buhman et al., 2005*).

It must be emphasized that all data concerning acquisitions of animals, exploitation, treatment and diagnostic results and all the other important issues are recorded regularly and systematically, which makes easier to scrutinize and anticipate possible risks and their elimination and prevention (*Stanković et al., 2010*).

Preservation of desired herd health level is the most important aspect of wanted biosecurity level protection as well as successful production and welfare of boars, consider a line of biosecurity measures as necessary part of technology, including good rearing conditions, good and responsible treatment of boars, and application of prophylactic measures (*Stanković et al., 2007c*). On the other hand, existence of written biosecurity plan shows how professionals on the farm see and understand potential threats to the production, as well as how can predicted measures answer these changing threats from close and distance environment (*Stanković et al., 2008*).

Fortunately, according to competences of the professionals in this facility, it could be understood that they clearly see need to provide necessary biosecurity level and the goals to fulfil by undertaking biosecurity measures, which are key for success of production in respect of conserved boar semen quality (*Hristov and Stanković, 2009a*).

On the other hand, center personnel has no obligation neither not to have animals of their own which may be infected by pathogens common for the boars in the facility, nor not to have contact with swine out of the center, which is not good. Isolation of entire facility or its segments is rated as sufficient (2). Although center has compact organisation, quality perimeters and excellent green protective line, since foundation, its location became questionable because of intensive house building, close heavy used road and international railroad, as well as fodder factory. It can be concluded that this must be corrected, meaning dislocation of center on two separated safer locations for each species (*Seaman and Fangman, 2001, Amass, 2006*).

It is necessary that new animals acquisition has to be performed under serious veterinary surveillance, from herds with higher or at least same health status level (*Stanković et al., 2005*). Although new breeding boars are introduced under strict health and sanitary conditions, this indicator is rated as good (3), namely because there is several herds of origin. It should be emphasized that there is permanent risk of introduction of infection into the herd, especially for reproductive transmissible viruses (*Seaman and Fangman, 2001; Stanković et al., 2007c*).

Surveillance over boars health in center is rigorous, and it could be said that it overcomes norms predicted by law. Still, herd health status is rated as good (3), although noticed failures does not compromise process of collecting, processing and preserving of boar semen, but may affect boars health and shortening their exploitation. Rearing conditions are far from ideal, concerning boars' needs, which

could be considered as technological compromise of boars welfare (*Hristov and Stanković, 2009b*). It is primarily related to concrete floors on which boar lives, hard and discomfort, and slippery when is wet. Injuries of hooves and joints on this slippery floor happen sometimes, followed by pain during walking, and unwilling to mount the phantom, excluding that boar from production for some time, or even permanently (*Kunavongkrit et al., 2005*).

Lack of adequate air conditioning or at least cooling during hot season significantly affects both libido and spermatogenesis, decreasing yield and quality of sperm. Having in mind duration of spermatogenesis of 40 to 60 days (*Dobranić and Samardžija, 2010*), it is obvious that microclimate conditions improvement in boars facilities (*Suriyasomboon et al., 2005*) is more than justified.

It was notified that technicians who collect semen often do not use single use gloves, although they are familiar with this necessity, because it is difficult to fix *glans penis* with them on. This makes invitation to banal infections, which may contaminate semen and make it less viable (*Stanković et al., 2007c*).

Finally, although separation of present operations (*Stanković et al., 2007b*) was performed in the best possible manner, some crossing of their routes, primarily of those for collecting boar semen and bringing bulls, could not be avoided. This is main reason that makes this indicator rate just good (3).

## Conclusion

According to the results and analysis of application biosecurity measures in the production of boar sperm at a reproduction center it can be concluded:

As a result of the application of biosecurity measures, current level of biosecurity could be rated as very good, with a mean score of 4,15;

A number of shortcomings were observed, some of them could be a serious threat to semen, especially the possibility of facilities isolation, taking into account its location and the presence of two species of male breeding animals (boars and bulls);

Newly acquired boars were brought to the center from different herds, but under strict regime of control and not in the same time;

Dislocation of boars facilities to the safer location is complex but priority task, which would remove serious threats to sperm production.

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## **Analiza primenjenih biosigurnosnih mera u proizvodnji sperme nerastova**

*B. Stanković, S. Hristov, T. Petrujkić, J. Bojkovski, N. Maksimović, N. Delić*

### **Rezime**

U radu je detaljno analizirana primena biosigurnosnih mera u proizvodnji sperme nerastova u jednom centru za veštačko osemenjavanje svinja. Sagledani su i procenjeni svi indikatori biosigurnosti (postojanje pisanog plana biosigurnosti, izolacija, uvođenje novonabavljenih životinja u zapat, zdravstveni status zapata, ocena odnosa osoblja prema opremi, kontrola kretanja i prometa, odnos prema posetiocima, kontrola ishrane i vodosnabdevanja, izdubavanje, uklanjanje leševa uginulih životinja, odnos prema drugim životinjama na farmi, kontrola populacija glodara i ptica, sanitacija), i ocenjeni prema skali ocena: (5) – odličan, (4) – vrlo dobar, (3) – dobar, (2) – dovoljan, (1) – nedovoljan, ima resursa za poboljšanje, (0) nedovoljan, nema resursa za poboljšanje. U razmatranju rezultata primenjena je SWOT analiza i utvrđene prednosti, nedostaci, rizici i mogućnosti za podizanje nivoa biosigurnosti. Stanje u centru je ocenjeno kao vrlo dobro, uz prosečnu ocenu 4,15. Međutim, jedan nedostatak je veoma ozbiljan i odnosi se na mogućnost izolacije objekata, uzimajući u obzir njegovu lokaciju i prisustvo dve vrste muških priplodnih životinja (nerastova i bikova) na istoj lokaciji. Nove priplodne životinje se nabavljaju iz različitih izvora, ali uz rigorozan režim kontrole i ne u isto vreme. Svakako, izmeštanje objekata za držanje priplodnih nerastova na drugu bezbednu lokaciju predstavlja složen ali prioritetan zadatak, kojim bi se otklonile brojne pretnje po proizvodnju sperme.

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