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VETERINARY AND ZOOTECHNICAL SITUATION IN ARTIFICIAL INSEMINATION AT SWINE FARM UNITS IN VOJVODINA (SERBIA)*

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SUMMARY: The primary conditions for successful pig artificial insemination (AI), are adequate health protection treatment of breeding animals, high hygiene of animals, buildings, equipment and people, and the precise application of modern AI technology measures. The aim of this paper is to establish the veterinary and zootechnological situation at the investigated farm units. Estimated results demonstrate that hygiene, health protection and AI technology, performed at investigated farm units, are not fully in accordance with modern principles of health protection and modern AI technology. The improvement of health protection and AI technology would significantly contribute to improving the health status and reproductive efficiency of breeding animals in the reproductive herds at farm units in Vojvodina.

Key words: *AI, health, zootechnology, farm unit, pig.*

INTRODUCTION

The technology of artificial insemination (AI) is used in domestic animals for over 60 years and is the most important biotechnological method, which has made a huge impact on the development of domestic animals (Foote, 2002). The significance and scope of application of artificial insemination, is well illustrated by the fact that, today, the world's annual production of over 90 million doses of boars semen (Thibier and Wagner, 2002). AI technology is constantly evolving, with the aim to: (a) achieve the maximum degree of fertility of inseminated females, (b) maximize the number of insemination doses per ejaculate, (c) to ensure maximum hygiene application of AI, (d)

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to prevent the spread of infectious diseases, and (e) to achieve maximum economic efficiency of the AI technology (Ponsart et al., 2004; Stančić et al., 2008; Stančić et al., 2010; Stančić et al., 2011). The success of artificial insemination is usually measured by sows farrowing rate (Tomes and Nielsen, 1982; Thompson, 2002). This value is significantly influenced by many factors, such as the quality of ejaculate used for AI (Spronk et al., 1997), and the moment of insemination techniques (Wabersky and Weitz, 1996; Stančić et al., 2010), health status of sows and boars (Hoyt, 1998, Stančić et al., 2011), as well as hygiene of insemination procedure (Flowers, 1992; Stančić, 2004; Stančić, 2006).

The aim of this paper is to obtaine results about veterinary and zootechnical situation on the intesive pig production farms in AP Vojvodin. The results could be used to correct the current situation and defining policies and procedures that would significantly improve the health status of the breeding herd and the efficiency of artificial insemination.

MATERIAL AND METHODS

The survey was conducted during the year 2011, at 8 large pig farms in AP Vojvodina, where artificial insemination (AI) is provide. Based on answers to questions, set up in the survey, the following data, about sanitary and hygienic measures providing on farms, were collected: (1) treatments of primary health care of breeding animals, (2) records of illnesses, that significantly reduce the reproductive efficiency of herds, (3) sanitary-hygienic measures and procedures that are performed in boxes with animals, (4) sanitary and hygienic measures and procedures that are performed throughout the facility, (5) sanitary-hygienic measures and procedures performed in the room (laboratory) for manipulating sperm, (6) sanitary-hygienic measures in the process of taking sperm, (7) measures in the sperm dilution procedure, (8) measures in the formation and storage of AI doses, (9) measures in the insemination procedure of sows and gilts, and (10) measures in the process of handling sows after insemination. Also reviewed are the procedures zootechnological in the VO on the farms.

The survey results are analyzed and presented so as to gain a detailed insight into the true situation regarding the veterinary medical and zootechnical measures, undertaken in the technology of artificial insemination on our farms.

RESULTS AND DISCUSSION

Veterinary (sanitary-hygienic) measures and procedures that are performed on the studied farms, are shown in table 1, and zootechnological aspects of AI procedures on farms, are shown in table 2.

Tabele 1. Veterinary (sanitary-hygienic) measures and procedures

Measures and procedures		No. of farms that performing
1. Primary health care		
Vaccination	*Escherichia coli*	0,0% (0/8)B 50% (4/8)S 75% (6/8)G
	Mycoplasme hyopneumoniae	0,0% (0/8)
	Morbus Aujecky (MA)	50% (4/8)
	Erysepelotrix rhusiopathiae	75% (6/8)
Anti ecto an endoparasitic boars tretment		100% (8/8), 2 time per year
Bors status for stress sensitivity is known (PPS)		0,0% (0/8)
Postoji tačna evidencija zdravstveni status vašeg zapata, u vezi sa:	*PPV*	25,0% (2/8)B 37,5% (3/8)S 37,5% (3/8)G
	PRRS	75,0% (6/8) 50,0% (4/8) 50,0% (4/8)
	PCV-2	37,5% (3/8) 37,5% (3/8) 50,0% (4/8)
	MA	50,0% (4/8) 37,5% (3/8) 37,5% (3/8)
	Brucelozom	62,5% (5/8) 50,0% (4/8) 50,0% (4/8)
	Leptospirozom	62,5% (5/8) 50,0% (4/8) 50,0% (4/8)
2. Disease that influence herds reproductive efficiency		
Male reprod. system (in ≥ 20% animals)		0,0% (0/8)
Endometritis (in ≥ 10% animals)		25,0% (2/8)S 25,0% (2/8)G
Pyometritis (in ≥ 5% animals)		37,5% (3/8) 0,0 (0/8)
Vulvovaginitis (in ≥ 20% animals)		12,5% (1/8) 0,0 (0/8)
Mastitis (in ≥ 10% animals)		12,5% (1/8) 12,5% (1/8)
Hypogalactia (in ≥ 10% animals)		25,0% (2/8) 12,5% (1/8)
Agalactia (in ≥ 5% animals)		12,5% (1/8) 12,5% (1/8)
MMA – syndroma (in ≥ 3% animals)		12,5% (1/8) 0,0 (0/8)
3. Sanitary-hygienic measures and procedures that are performed in boxes with animals		
Cleaning once per day		75,0%B 75,0%S 100,0%G
Cleaning and washing by water once per day		25,0% 12,5% 12,5%
Desinfection, once per week		25,0% 25,0% 25,0%
4. Sanitary-hygienic measures and procedures that are performed throughout the facility		
Cleaning and washing by water, once per month		87,5%B 87,5%S 87,5%G
Desinfection, once per month		87,5% 87,5% 87,5%
5. Sanitary-hygienic measures and procedures that are performed in the room (lab) to manipulation of sperm		
Cleaning and washing by water once per day		85,7%
Desinfection one per day		25,0%
Separated entrance in AI laboratory (deso-bariera)		62,5%
Workers in the laboratory not in direct contact with animals and otherworkers which is in contact with animals		25%
Workers in the AI laboratory implement regulatory measures of personal hygiene and a prescribed work clothes and shoes		50%
6. Sanitary-hygienic measures in the process of taking sperm from boars		
Mechanical (manual) to remove impurities, washing the foreskin with plain water, disinfection and drying of the foreskin with a clean cloth		25%
Sperm is collected manually, so it catches the penis clean and disinfected with the hand, of sterile polyethylene gloves.		50% (4/8)
To collect the semen, original factory equipment are used (disposable sermen collector, filter, gauze, plastic bags)		12,5% (1/8)

7. Sanitary-hygienic measures in the semen dilution procedure	
Original factory extenders are used for semen dilution	100%
Factory original redsetilated water are used for extender dilution	25%
The sanitation of own distillate aparate and quality control of distilled water are perform	25%
8. Sanitary-hygienic measures in the formation and storage of AI doses	
AI dose are preserv in original disposable plastic bottles	100%
9. Sanitary-hygienic measures in the insemination of sows and gilts	
Immediately before AI, only mechanically (by hand or with a dry cloth) removal of contaminants from the vulva	62,5%
Sows are AI in his own individual boxes	62,5%
Gilts AI are performe in the group boxes	75%
Original sterilized disposable AI ctheters are use	62,5%
Gilts AI are performe with special disposable ctheters for gilts	37,5%
Adequate therapy are perfome in sows with vulval discharge 14 to 18 days after AI	75% (6/8)
10. Sanitary-hygienic measures in the females after AI	
After AI, females are in the individual boxes for 30 days	87,5%

[B] Boars; [S] Sows; [G] Gilts.

Table 2. Zootechnological procedures in the AI process

Procedures		No. of farms that performing
Ejaculate frequency obtaine pr boar	Every day	50%
	If necessary, at irregular intervals	50%
For each ejaculate volume, progressive motility and total sperm count are recorded		25%
Method of sperm counting:	Hemocitometry	25%
	Digital photometry	25%
Number of AI doses from each ejaculate are counted according to total sperm number and percentage of progressive motility		25%
Average number of progressive motile sperm per AI dose (x109)		5
Average doses number per ejaculate		10 (9-12)
AI doses are preserv at + 17oC from formation to using		100%
Period from formation to using AI doses	< 12 hours	25%
	1 day	37,5%
	2 days	25%
	3 days	12,5%
Ultrasound pregnancy controll within 30 days after AI		25%
Rebreeding (return tu estrus) after AI, are performing once per day with full boar contact		87,5%
Separate facilities for boar housing		50%
Boars facilities with open area for walking		0,0%

Vaccination against the main infectious diseases is not performed on all farms. The relatively small number of farms has a record of the presence of infectious diseases (PPV, PRRS, PCV-2, MA, Brucellosis and Leptospirosis), that causing significant disruption of reproduction. The emergence reproductive system diseases of sows and gilts, to an significant extent, is recorded on a relatively small number of investigated

farms (between 0 and 37.5%, depending on the disease, Tab. 1). Sanitary and hygienic measures carried out in facilities for the animals, the animals themselves, equipment, people, and in the process of artificial insemination, are not at a satisfactory level. This, in particular, relates to the hygiene of boar just before semen taking, hygiene of sperm collection and storage, insemination hygiene, hygiene of workers, who are in direct contact with animals, to the laboratory for semen manipulation, which are not completely isolated from other objects with the animals, that may result in transmission of infectious diseases in breeding animals (Table 1). On the farms do not apply all the principles of modern AI technology. For example, only 25% of the farms formed insemination doses based on the established progressive motile spermatozoa number in the ejaculate. Digital photometry for sperm counting, is used at only 25% of the total number of investigated farms. One ejaculate Relatively small number of AI doses (mean 10) is made per ejaculate, with an unnecessary large number of sperm in a dose (4 to $5x10^9$) (Table 2).

Infectious diseases, especially of viral and bacterial etiology, leading to a significant reduction in reproductive efficiency of the breeding herd (Bondurant, 1991; Hoyt, 1998; Stančić et al., 2010; Stančić et al., 2011). Uterine infections, viral and bacterial agents, is the main reproductive desease in the precticl conditions (Meredith, 1994). This has resulted in significant disruption of reproduction, which is most often clinically manifested as irregular returns to estrus (as a consequence of embryonic and fetal mortality), the birth of the dead, avital and mumifid piglets, in significant decrease of piglets born per litter, increased number of pseudopregnant sows and gilts, as well as in increase number of temporary or permanent subfertile or sterile females (Bondurant, 1991; Floss and Tubbs, 1993; Baysinger and Cooper, 1997; Hoyt, 1998; Stančić et al., 2010; Stančić et al., 2011). Therefore it is important, in our large pig farms, to significantly improve veterinary measures of general health care of breeding animals, to improve sanitary-hygienic measures in the process of artificial insemination, and to strictly comply with the implementation of all principles of modern technology of artificial insemination of swine. This would be: (a) significantly increased the degree of control the spread and eradication of infectious diseases in herds, and (b) increased success of artificial insemination, measured by the achieved level of fertility (farrowing rate and litter size) in the inseminated sows and gilts. In the zootechnological aspects, better sanitary and hygienic measures of facilities, animals, equipment, people, and the process of insemination, mast be implemented. Strict application of the principles and measures of AI technology, is the primary factor in the success of AI (Wabersky and Weitz, 1996; Stančić and Šahinović, 1998; Stančić, 2005). Therefore, according to obtained result in the present study, to improve the zootechnological aspect of AI, it is necessary to: (1) use the disposable equipment (catheters, spermcollectors, plastic bottles for the insemination dose, gloves, etc.), (2) to perform detailed quality control of each ejaculate, using contemporary method (digital photometry) and (3) control of early pregnancy diagnosis using ultrasound method. Improved health care, sanitation and hygiene measures and the implementation of all principles of modern technology in the swine AI, would significantly increase the level of reproductive efficiency of our swine herd, both in its zootechnological, veterinary, and economic terms.

CONCLUSION

Based on the results obtained in the present study, at the pig farm units in AP Vojvodina, it can be concluded:

1) Sanitary-hygienic measures of breeding animals is not performed in the scope and manner, that can significantly increased efficiency of control and eradicate the major diseases that impact reproduction in our swine herds.
2) Sanitar and zootechnical measures, performed in the process of artificial insemination, is not in accordance with modern AI principles and practices.
3) Improving of sanitary-hygienic, health protection and AI technology measures, as well as higher education of workers, would significantly improve the health and reproductive efficiency of breeding herds on farms in AP Vojvodina.

REFERENCES

BAYSINGER, A., COOPER, L.V.: Porcine Reproductive and Respirytory Syndrome (PRRS) Virus. Neg.Guide, Educ., G96-1286-A, pp. 1-5, 1997.

BONDURANT, H.R.: Influence of Infectious Deseases on Reproduction. In: Reproduction of Domestic Animals (P.T. Cupps, ed.). Acad. Press, INC, San Diego, 1991.

FLOSS, J.L., TUBBS, R.C.: Infectious Causes of Infertility in Sows. Agric. Public, G2315, pp. 1-6, 1993.

FLOWERS, W.L.: Artificial insemination in swine. Agri-Practice, 13:36-40, 1992.

FOOTE, H.R.: The history of artificial insemination: Selected notes and notables. Amer. Soc. Anim. Sci., 1-10, 2002.

GORDON, I.: Controlled Reproduction in Pigs. CAB International, Oxon, UK, 1997.

HOYT, G.P.: Swine theriogenology. Swine Thery, Course, 5326, pp.1-30, 1998.

MEREDITH, M.J.: Uterine Infections in Swine. Proc. 7th Int. Meeting on Animal Reprod., Murcia, Spein, pp.28-29, 1994.

PONSART, C., GÉRARD, O., CAPLIN, S.: Insemination: development and actual trends in animals. Gynéacologie, Obstétrique and Fretilité, 32(10)880-886, 2004.

SPRONK, G.D., KERKAERT, B.R., BOBB, J.D., KENNEDY, G.F. (1997): Managing the breeeding herd. Int. Pig Topics, 12(7)7-11, 1997.

STANČIĆ, B., GAGRČIN, M., STANČIĆ JELENA, STEVANČEVIĆ, O., POTKONJAK, A.: Infective and noninfective etiology of sows infertility. Contemporary Agriculture, 59(1-2)180-193,2010.

STANČIĆ, B., RADOVIĆ, I., STANČIĆ, I., DRAGIN, S., BOŽIĆ, A., GVOZDIĆ, D.: Fertility of sows after intracervical or intrauterine insemination with different spermatozoa number in reduced volumen doses. Acta veterinaria (Beograd), 60(2-3)257-262, 2010.

STANČIĆ, B.: Our results of biotechnological methods application in control of swine reproductive function. Proc. Int. Conf. on Sustainable Agriculture and European Integration Processes. Novi Sad, 19-24. Sept., 2004. Pp.38.

STANČIĆ, B.: Tehnologija veštačkog osemenjavanja svinja (monografija). Univerzitet u Novom Sadu, Poljoprivredni fakultet, Novi Sad, 2006.

STANČIĆ, B., GAGRČIN, M., RADOVIĆ, I., STANČIĆ, I.: Sows fertility after transcervical intrauterine insemination (the summarize of ours results). International Sym-

posium Anim. Prod., May, 29 – 30, Temisoara (Romania). Lucrari stiintifice Zootehnie si Biotehnologii, 41(2)624-628, 2008.
STANČIĆ, I., STANČIĆ JELENA, APIĆ, I.: Poremećaji reprodukcije krmača infektivne etiologije. XVI Savetovanje o biotehnologiji. Čačak, 4. – 5. mart, 2011. Zbornik radova, 16(18)255-260, 2011.
STANČIĆ, L.B., ŠAHINOVIĆ, H.R.: Biotehnologija u reprodukciji svinja (monografija). Univerzitet u Novom Sadu, Poljoprivredni fakultet, Institut za stočarstvo,Novi Sad, 1998.
STANČIĆ, L.B.: Reprodukcija svinja (monografija). Univerzitet u Novom Sadu, Poljoprivredni fakultet, Novi Sad, 2005.
THIBIER, M. and WAGNER, H.-G.: World statistics for artificial insemination in cattle. Livestock Production Science, 74: 203–212, 2002.
THOMPSON, H.L.: Managing swine reproduction. University of Illinois, Circular 1190:1-32.
TOMES, J.G., NIELSEN, H.E.: Factors affecting reproductive efficiency of the breeding herd. Butterworths, London, pp. 527.540, 1982.
WABERSKY, D., WEITZE, K.F.: Correct Timing of Artificial Insemination in Pigs. Reprod. Dom. Anim., 31:527-530, 1996.

VETERINARSKA I ZOOTEHNOLOŠKA SITUACIJA U VEŠTAČKOM OSEMENJAVANJU SVINJA NA VOJVOĐANSKIM FARMAMA

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Izvod

Primarni uslovi za uspešno veštačko osemenjavanje (VO) svinja su: adekvatna zadravstvena zaštita priplodnih životinja, visoka higijena životinja, objekata, opreme i ljudi, kao i precizna primena svih postupaka u tehnologiji VO. Cilj ovog rada je da se, putem ankete sprovedene na 8 intenzivnih vojvođanskih farmi svinja, ustanovi veterinarska i zootehnološka situacija na ispitivanim farmama. Dobijeni rezultati pokazuju da mere higijene, zdratvene zaštite i tehnologije VO, koje se izvode na ispitivanim farmama, nisu potpuno u skladu sa savremenim principima u tehnologiji veštačkog osemenjavanja. Njihovim unapređenjem, značajno bi se doprinelo poboljšanju zdravstvenog statusa i reproduktivne efikasnosti priplodnih životinja u zapatima vojvođanskih farmi.

Ključne reči: VO, zdravlje, zootehnologija, farma, svinja.

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