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**Antimicrobial activity of silver nanoparticle inhibits against *Proteus mirabilis* isolated from fresh boar semen**

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**Abstract:**

**Background/Objective:** Currently, artificial insemination (AI) is an important technology that helps increase productivity in swine industries. However, bacterial contamination is a major problem when using contaminated fresh semen for AI. *Proteus mirabilis* is the main contaminating bacterial which is isolated from boar semen. *Proteus mirabilis* reduces the quality of sperm such as sperm motility and increases abnormal forms of sperm. Therefore, an antibiotic supplementation is necessary to control bacteria in semen extender. Nevertheless, the problem after using antibiotics in an extender for a long time is antimicrobial-resistant bacteria which have been increasing every year. Silver nanoparticles (AgNPs) have been widely used as an effective antimicrobial agent rapidly against bacteria, viral, and fungi. Therefore, this study aimed to test the efficiency of silver against the growth of *Proteus mirabilis* isolated from fresh boar semen.

**Methods:** The agar well diffusion method assessed the antimicrobial activity which was evaluated from the presence of the zone (ZOI) around wells. The minimum inhibitory concentration (MIC) test was performed to test the lowest concentration that can inhibit bacteria. The lowest concentration which kills 99.9% of bacteria was tested by the minimum bactericidal concentration (MBC) test.

**Results:** The study showed that the ZOI of the *Proteus mirabilis* test with AgNP were 16.44±0.1 mm. The MIC of AgNPs were 3.125 µg/ml and MBC were 6.25 µg/ml. The result obtained from this study showed that AgNPs couldinhibit and kill *Proteus mirabilis* isolated from fresh boar semen.

**Conclusion:** AgNPs have distinct multi-targeting bactericidal mechanisms, including adhering to the cell wall of bacteria, uncoupling the respiratory chain, damaging cellular biomolecules, and disrupting cell signals. Therefore, AgNPs can be used as an alternative antibiotic in boar semen extenders. Until now, the information on using AgNPs in boar semen extenders is scarce. Therefore, using AgNPs in semen extenders has to study the efficacy and any negative effects on semen quality before implementation in pig industry.

**Keywords:** Alternative antimicrobial agent, boar semen, *Proteus mirabilis*, silver nanoparticle (AgNPs)