



## Needle-Free Injection Systems

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### Introduction

Needle-free injection techniques can be used to administer vaccines and medications in the pork industry. Needle-free injection offers a fast, effective route of administration. There are hazards that must be addressed to safeguard employees who utilize needle-free injection systems; therefore, an enforced education program is crucial to the success of using needle-free injection in any pork operation.

### Objective

To review needle vs. needle-free injection systems and describe the different types of needle-free injection systems.

### Needle vs. Needle-free Injection

#### Cost Efficiency

Needle-free injection systems can potentially reduce medical costs for the pork producer because the chance of injury to an employee from inadvertent needle sticks is eliminated. Needle-free systems also eliminate the purchase of needles. Needle breaks, which can damage tissue and cause a decrease in overall yield and profitability, are also therefore eliminated. However, the start-up costs associated with needle-free injection systems can be large. Pork producers should weigh the costs and benefits to these systems before adapting new technology.

#### Worker Safety:

Safety is a key ingredient to any pork operation. Employees must be properly trained on the use and maintenance of all equipment. Needle injection can be dangerous due to inadvertent needle sticks or cuts. However, needle-free injection is not 100% safe. Needle-free systems are designed for a high force dose to be administered very quickly and should only be used with proper training. These systems do offer a limited amount of risk to the operator, if properly trained, and exclude the possibility of needle sticks and cuts.

#### Sterility

Sterility is a key factor to proper vaccination and drug delivery. Sterility can be affected by human error. For example, the same needle may be used on multiple animals. Workers may forget to change needles when drawing vaccine from a bottle. Needle-free injection takes the needle out of the equation, and due to the high powered dosing mechanism, there is a little to no chance of cross contamination.

## Pork Safety

The use of needles, along with human error, may also cause pork carcass defects. If needles are disposed of correctly or dropped after use there is always a possibility of an animal ingesting the needle or being stuck in an unassuming place. Needle-free injection systems eliminate residual needles and needle fragments from pork carcasses.<sup>1</sup> The Pork Quality Assurance (PQA) Plus program recommends that all producers have a broken needle policy in place.<sup>2</sup>

## Proper Dosage

Injection site is a crucial element in making sure that a proper dosage is received by the animal. A needle injection provides many unknown variables that can prevent proper dosing and in turn create havoc in your vaccination program. Proper dosing is highly dependent on many factors. Among these factors are the size and age of the pig and the recommended route of administration. Different methods of administration such as subcutaneous (SQ) or intramuscular (IM) are very important in guaranteeing quality vaccination. If a vaccine or drug is not administered accordingly the effectiveness of the drug and the withdrawal time are altered. Incorrect injection sites in both needle and needle-free injection can impair pork safety.<sup>3</sup>

## Injection Methods

Subcutaneous injections in small pigs should be given by pulling loose skin in the elbow or flank area. This technique is called tenting. In sows, the area just behind the ear is an acceptable sight for SQ injection. Intramuscular injection is conventionally administered in the neck just behind the ear. IM injection anywhere else is not acceptable because it will compromise pork safety and it should never be injected in the loin or ham muscles.

### Types of Needle-free Injection Systems

Needle-free injection systems are not a new development. The earliest systems were developed in the 1930s and have been used in a wide variety of medical areas over the years.<sup>4</sup> Through innovation and technology there have been modifications and variations that allow for needle-free injection systems to be more widely available and effective to consumers.

## Spring-load jet injector

The spring-loaded jet injector uses a spring mechanism that is drawn back. A trigger is then hit which release the spring creating a "jet stream" of vaccine or drug through the dermal layers of the skin. It is capable of subcutaneous, intramuscular or transdermal delivery. Each time the spring-load is activated the spring must then be manually redrawn to dose the next animal.

## Battery-powered jet injector

The battery powered jet injector uses a small rechargeable battery pack to retract the dosing device. The dosing device has an electrical piston that is automatically redrawn after dosing. It is good for continuous use and minimizes worker fatigue. It is release by a small trigger. The injector resembles a battery powered hand drill. The battery powered system administers subcutaneous, intramuscular or transdermal dosage depending on the recommended method.

## Gas-powered jet injector

This type of injecting system was one of the first developed. It uses an air/gas cartridge attached to the gun either directly or indirectly through a tubing system to deliver power to the injector piston. When the trigger is activated it releases the piston and creates a jet stream of vaccine or drug subcutaneously, intramuscularly or transdermally.

## Summary

Needle-free injection systems have potential to improve efficiencies. Major advantages of needle-free systems are the elimination of broken needles, a more constant delivery of vaccines and drugs, and decreased worker safety risk. Needle-free injection systems are customizable to each operation and can be modified to optimize productivity. However, implementing a needle-free system can be challenging. Workers require training and education regarding any new technique. Start-up and training costs may also affect the interest in this technology for some pork producers.

## FAQs:

Q: Is a needle-free injection system cost efficient?

A: There are many factors to consider when analyzing cost efficiency. Costs include initial purchase price, worker safety training, and equipment maintenance. Potential savings include needle cost and reduced worker injuries. These factors are should be assessed for each operation.

Q: Are needle-less injection systems a new development?

A: No. Needle-less injections systems were developed in the 1930s. They have been improved through the years but have been widely available for many decades.

Q: Is it important to implement an education program for workers using needle-less injection systems?

A: Safety strongly depends on how well educated workers are on the operation of the needleless system. Better knowledge of the equipment needed for needle-less injection systems will reduce the risk of worker injury.

## References

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