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Life beyond needles

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Life beyond needles

Needleless injectors seem to offer many advantages over conventional injection methods, especially because they completely remove the risk of broken needles. They are easier for staff than using a syringe and are safer because there is no risk of accidental injury from needles, says veterinarian Karine Talbot, with HyLife (formerly Hytek) of La Broquerie, Manitoba. In addition, she points out, they provide improved welfare for the pigs. Although there are some disadvantages such as the high initial cost and the need for a compressor and other additional equipment in the barn, needleless injectors have been working well within the HyLife system and 315,000 injections are now carried out each month. Talbot reviews the needleless injection system, its advantages and disadvantages and how it has been working at HyLife.

Mode of action

“The concept of the needle-free device is to accelerate a jet of fluid, and nowadays even powder, at a speed high enough to give it penetrative power,” explains Talbot. “This power is provided by an energy source such as a spring, gas or a battery and is used to drive a plunger or a piston into the drug, accelerating it through a fine diameter nozzle. The drug then penetrates the skin and reaches various depths of tissue - sub-cutaneous, intra-dermal and/or intramuscular - depending on the pressure applied and the type of device.”

Two types of unit are used in the Canadian pig industry: one is a battery-powered injector (Acushot) and the other one is gas-powered (Pulse). The advantages and disadvantages listed below apply to both types of device.

Advantages

“The reasons to use needle-free injectors in pigs are numerous and the advantages are considerable,” Talbot believes. “First, the risk of having a consumer finding a needle in pork is not acceptable and such a finding would negatively impact the whole industry. The use of a needle-free device eliminates this risk and ensures a safer product to consumers.”

One of the concerns about the needle-free injectors is the increase in neck and head abscesses at the slaughter plant, but studies have shown that the incidence of carcass defects is the same as with conventional needles, Talbot points out.

“Needle-free injectors are also more worker-friendly than needles,” she continues. “Their use eliminates the risk of needle stick injury and also reduces injuries caused by repetitive movements when injecting with a conventional syringe. Their use also eliminates the need for needle disposal.”

Some recent research has also demonstrated a reduction in transmission of some diseases like PRRS, Talbot notes. The conventional needle, when used from pig to pig, has the potential to transfer blood and pathogens. The needleless device, even if it does not eliminate this risk, reduces it greatly.

“Another important advantage of these units is the consistency of the amount of drug delivered,” Talbot adds.

Disadvantages

Talbot believes that the disadvantages of the needle-free injectors could explain its low implementation rate in food animal production, notably in the pig industry. “These include the cost of the injector as well as the cost for maintenance of the unit,” she explains. “In addition to this, some of the devices may require special installation and additional cost for equipment such as a CO2 tank, air compressor or carts.”

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“For the needle-free injector to function properly, regular maintenance and cleaning of the unit is required,” Talbot stresses. “Moreover, people performing those tasks need some training in order to use the device safely and efficiently.”

Depending on the amount of drug administered and the way mass vaccination is performed – for example picking up every pig vs. using a board to crowd them – the needleless injector might be slower and increase the time required to perform the task.

“The device and all its components are also heavy if they are worn when injecting,” Talbot notes. “However, alternative methods can be used such as a special cart or a tray that holds

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Table 1: Advantages and disadvantages of needle-free technology

Advantages	Disadvantages
Eliminates the risk of broken needles	Cost (device and maintenance)
Eliminates the risk of needle sticks	May require new equipment (compressed air, CO2)
Eliminates multiple-use injuries (e.g. carpal tunnel)	Higher requirement for maintenance
Reduces the transmission of diseases	Higher requirement for training
Elimination of needle disposal	Slower speed of injection
Easy to use	Weight of the unit
Consistent vaccine delivery	Not practical for individual treatment

everything needed to inject. The user then only needs to hold the handle piece which is very light.”

Needle-free injectors are difficult to use for individual treatment of pigs. “Also, drugs like penicillin cannot be used in some needle-free devices as the components of the drug separate in the injection process under the high pressure required for injecting,” she points out.

Even if some of these disadvantages are significant, they can be overcome, Talbot believes. The disadvantages need to be considered when thinking of purchasing a needle-free injector, however, they should not stop anybody from making this change,” she says. “The advantages of the system, mainly the elimination of broken needles, can certainly overcome most of the disadvantages.” Moreover, she notes, the Province of Manitoba has a financial incentive for every producer to buy one of these needle-free devices.

Efficacy

Among the different vaccines tested in pigs are Mycoplasma hyopneumoniae, Swine influenza, pseudorabies, APP and PRRS. These studies have shown that needle-free injections are as good as or better than injections with needles.

Needle-free injectors can also be used with other medications in addition to vaccines, for example iron for piglets, Talbot notes. “In one study the growth, performance and haematological values of piglets that received iron through a needle-free injection were the same as those for piglets that were injected with a conventional needle.”

HyLife’s experience

In 2008, HyLife started a trial in a research barn with needle-free injectors to investigate if the use of such a device was practical in a pig barn. “It did not take much time to realize that this technology was really promising and even though we had some small challenges, it was possible to implement it in the entire system,” comments Talbot. “In 2009, when the Federal-Provincial Growing Forward program was announced, this was the final incentive that HyLife needed to make the decision to go ahead and use needle-free injection in all of the barns.”

“As a fully integrated company owning a slaughter plant, HyLife decided to be completely needle-free, from birth to slaughter,” Talbot explains. “This includes the injection of vaccines, iron and any treatment with antibiotics. Needles are still used for sows as the risk of broken needles was judged to be very low and they are not slaughtered at the Springhill plant.”

“A person was hired as a full time needle-less injection technician and trained to use and repair the injectors,” continues Talbot. “His job was to implement the technology in



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all the barns, starting in June 2010. As of November 2010, all nurseries and sow barns were using the needle-less injector and the last needles were removed from the barns in December.”

“The transition to this new technology went much better than expected and was well accepted by the employees”

The transition to this new technology went much better than expected and was well accepted by the employees, Talbot says. She notes that some modifications were made to the barns; pipes for compressed air with many drops throughout the barns were installed, special carts were designed so the user did not have to bear the weight of the unit and special trays were designed to hold small air tanks for individual treatments.

“The devices are working well and as long as the basic maintenance is done regularly almost no problems have been experienced,” Talbot notes. “Except for some damage caused by human error, the units have been very resilient considering the number of injections and the environment in which they are used: some barns inject up to 5000-6000 pigs a week and in the whole HyLife system about 315,000 needle-free injections are done monthly. This represents a huge number of needles that HyLife does not need to buy anymore, and also a huge number of needles that do not have to be disposed of.”

Up to now, most of the small technical problems have been fixed in the barn by the employees themselves, Talbot explains. “If ever they have questions, or if they encounter a bigger problem, the needle-less technician or a maintenance employee that has also been trained to repair the device can always help, and the needle-less company itself offers a very good service,” she says.

Since the needle-free injectors are very expensive, it was not economically

feasible to have a unit at every finishing site, Talbot points out. The solution to giving individual treatments was to use a drench gun similar to the one used in sows or cattle and administer medication orally.

Conclusion

Overall, the transition to the needle-free injectors within the HyLife system has

gone very well, indeed much better than expected, according to Talbot. “The risk of broken needles in the pigs from birth to slaughter is eliminated, the injection seems less painful and less stressful on pigs and, most of all, staff like this new technology,” she concludes. “One would now have a hard time to convince an employee to go back to using needles!”

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