Introduction
Pole syringes are syringes (with needle attached) mounted on a long pole and used to inject animals from a distance – animals that you can’t or don’t want to get close to. There are automatic versions where the plunger is propelled by a spring or compressed gas, and there are push-operated versions also known as jab sticks (or poke sticks) where the plunger is pushed by the pole (or is a part of the pole).

More farmers are using pole syringes. They are especially convenient for treating free ranging livestock where time-consuming logistical problems of relocating sick and injured animals to a yard with a crush for treatment can be avoided. They do however require practice before using on live animals and they can be very dangerous. Needle stick injuries, exploding syringes and accidental discharges are very real safety concerns.

At around $500 for a spring-loaded device and accessories (a box of syringes and needles), they are a significant investment. They may be acquired with the intention of delivering expensive or dangerous drugs to valuable animals. As it is with many veterinary things, the odds of a successful outcome are greatly increased by some practise, tips from experienced users, and putting some thought into setting-up for success. And so it is with pole syringes - these preparations can make the difference between the tool being a very handy one or very useless, even dangerous.

Because farmers may ask veterinarians for advice on choosing and using a pole syringe, this article provides information to veterinarians so they can advise farmers of the pros, cons and dangers of pole syringes, which model is best for their operation, and how to use it. The models that will be described are the MasterJect and the Westergun, both spring-fired; and the Westergun Mini which is a jab stick (Table 1). These are the models most likely to be recommended to farmers for treating livestock and they are the models the author has used and is most familiar with.

Why pole syringes for farm animals?
There are a number of farm scenarios especially involving cattle, deer and pigs in pens, races or the paddock where treatments might be best administered by pole syringes.

Sometimes the animals are simply too sick, injured or lame to get to yards. In free ranging animals, pole syringes can be used to treat the painful lameness of footrot in the field. It will save a long painful walk to yards and save having to muster fitter animals in the paddock to keep it company and coach it along. They may be used to commence treatment of a sick or injured animal in the paddock with antibiotics and anti-inflammatories until time and resources are available to relocate the animal to better treatment facilities.

Sometimes yards, crushes and head bales are unavailable. For example, on livestock vessels where there are no crushes, pole syringes are the common and highly effective method of treating cattle in pens.

Sometimes animals can’t, won’t or shouldn't go up a race because of the size of their bodies, heads or horns, because of poor temperament or because they are so sick
they may go down. Pole syringes could be used to quickly inject flighty animals where it may be too dangerous to inject using normal hand-held syringing methods. It would also allow these flighty animals to be injected in the neck where injection site damage is of less consequence than the rump.

Farmers with permission to have sedatives (ie xylazine for cattle and deer, azaperone for pigs) might use pole syringes to safely restrain seriously sick or injured animals for close quarter euthanasia with a captive bolt, especially those that are agitated and ambulatory. Pole syringes can also be used to sedate flighty deer for velveting, or aggressive boars for detusking.

A concern with the use of pole syringes is under-dosing with antibiotics, especially heavier animals where farmers may be unable or unwilling to administer the required number of shots to achieve therapeutic concentrations of medication. For example, to treat a 500 kg cow with long acting oxytetracycline at 1 mL/10 kg requires 50 mL which is five shots with the Westergun or Westergun Mini and three shots with the MasterJect. Getting the opportunity to inject a free-ranging animal more than once is unlikely and more than twice is highly unlikely. The only chance of injecting 50 mL into the 500 kg cow is if it was in a small yard or in a race, the danger increasing to man and beast with each shot.

Another concern is injection site damage. The rump and the back of the leg, the two easiest targets are valuable meat cuts that can be ruined by injection scars especially from long acting tetracyclines. Injecting in the back of the leg also has the risk of sciatic nerve injury in lighter weight animals. The neck is the preferred injection site but requires a higher level of skill for accurate placement and it is likely that the animal will be difficult to approach for a second shot.

**Spring-fired models**

The spring-fired models have cleverly arranged cocking and triggering mechanisms built around a powerful spring and syringe holder with multiple moving parts and associated nuts, bolts, rivets and hinges. This makes them heavier, less wieldy, higher maintenance, noisier and more dangerous than jab sticks. However, their key advantage over jab sticks is the rapid delivery of larger volumes of medication into the animal before it moves away.

All spring-fired models operate on the principle of compressing a high tensile spring and holding it under tension with a trigger connected to a plunger push plate. When the needle on the syringe enters the skin a metal arm extending from a hit-plate pushes and dislodges the trigger. This causes the spring to release and push the plunger of the syringe. The medication in the syringe then flows rapidly into the animal.

The spring-fired pole syringes are dangerous because of the power of the springs. Accidental misfires can cause medication to be squirted long distances at high pressure. Plastic syringes can explode especially if air has inadvertently been drawn into them. The push-operated pole syringes are much safer.

**The MasterJect**

The MasterJect (MJ) (Figures 1 & 2)) is of aluminium and steel construction and can inject volumes from 1 to 20 mL. The MasterJect comes in a zip-up padded bag made of heavy duty polyester with pockets for syringes and needles so it is easy to store and transport.

A screw-in aluminium telescopic handle is fully adjustable and can be locked securely to the length required. With the telescopic handle attached and fully extended the
MasterJect is 1.6 m long (Figure 1) and weighs 1.5 kg. For close-in work such as treating flighty animals in a race or crush the telescopic handle can be detached. The MasterJect comes with four 20 mL Becton Dickinson Plastipak leur lock syringes. Other brands don’t fit. The Plastipak syringes are readily available and cost about $1 each.

**Figure 1. The MasterJect fully extended to 1.6 m by its telescopic aluminium handle**

![Image of MasterJect](https://www.fearing.co.uk)

**Figure 2: The MasterJect with telescopic handle, syringes and needles**

(Source: www.fearing.co.uk)

The head of the MasterJect looks and operates like a caulking gun (Tirbarwn) except the action is reversed - a ratchet action draws fluid into the syringe rather than pushing it out. One very clever part of the design is the function of a trigger-plate-spring which causes the trigger plate to lock on to and stop the push plate rod if an animal pulls away - plunger movement and flow of medication then stop immediately. The undelivered medication is in the syringe ready for injection once you are repositioned for a second shot. Expensive drugs are not wasted and valuable time is not spent reloading the syringe (and finding the animal).

The powerful springs will cause the syringes to explode if the needle is blocked or if the syringes contain even a few mLs of air when the MJ is fired. Medications that are suspensions must be shaken very well (ie penicillin) to break down any clumps which might block the needle. The time of highest safety risk to the operator from exploding syringes is when drawing up medication and the syringe is near the operator’s face. An accidental discharge can occur from pushing down too far on the hit plate and engaging the trigger mechanism. If air has not been removed from the syringe it will explode. Eye protection is recommended.

If air enters the syringe when drawing up medication, it can be removed using the following method (use eye protection):

1. Squeeze the ratchet lever and hold squeezed against the ratchet brace.
2. Push the medication bottle down hard on the hit plate to disengage the trigger plate from the push plate rod.

3. While keeping the trigger plate disengaged (by continuing to press the medication bottle hard down on the hit plate), begin to pump the ratchet lever. Air in the syringe will be slowly expelled with a small number of pumps.

4. Once air is expelled from the syringe release the pressure on the hit plate (ie lift the medication bottle off the needle) then release the squeeze on the ratchet lever.
   - for 20 mL dosages, keep pumping the ratchet lever after the 20mL mark has been reached and air in the syringe will automatically be expelled.

A video showing the technique for removing air from the syringe is available on YouTube (daverobertsable).

**The Westergun**
The Westergun (WG) (Figure 3 & 4) is constructed mainly from light aluminium with some steel components and can inject volumes from 1 to 10 mL. It is designed to fit 10 mL centric tip syringes. Special 10 mL indestructible nylon syringes are available for the WG that won’t explode even when full of air. They are expensive ($20.00) but last a long time.

*Figure 3: The Westergun with handle in collapsed position*

*(Source: www.fearing.co.uk)*

*Figure 4: Close up of the head of the Westergun showing the syringe housing and hit plate*

*(Source: www.fearing.co.uk)*

The WG has an extendable handle – spring buttons lock the handle in the collapsed or extended positions but not intermediate positions. Medication is loaded into the syringe by drawing on the plunger with fingers. The plunger push plate must then be manually positioned against the base of the syringe plunger. The edge of the plunger push plate is then locked into position by the teeth of a trigger bar while cocking the WG by folding back a cocking lever against the shaft to compress the large spring surrounding the shaft.

Accidental discharges tend to occur with the WG when the teeth of the trigger bar become worn with use – the teeth hold the plunger push plate under tension when the WG is cocked. The time of highest risk is when bending the cocking lever back along the shaft after having drawn medication into the syringe. Operators must take care that the WG is not pointed at anyone, especially during cocking.
Some inexperienced operators press the end of the handle of the WG into the ground when pulling back the cocking lever. The considerable leverage required to cock the strong spring can force the end of the handle to suddenly slip sideways. This can cause the trigger bar to slip off the push plate and the medication can be discharged at high pressure into the operator’s face. If the medication was xylazine and some was swallowed, or it was tilmicosin (Micotil) and some was injected, then death is a possibility.

When pulling back the cocking lever of the WG it is best to brace the middle of the handle against one’s hip rather than press the end of the handle into the ground. This prevents the handle from bending (the WG telescopic handle is only made of light aluminium) and the risk of accidental discharge from a sideways slip.

**Jab sticks**

There are numerous commercially made jab sticks available and many designs for home-made models. They are mainly used for wildlife capture or injecting fractious small animals in cages. They are generally only suitable for administering smaller volumes up to about 5 mL. Unlike automatic pole syringes, especially the spring-fired versions, they are relatively noiseless, simple to use and their light weight makes them easy to place accurately. They are much safer to use than spring-fired versions.

To inject volumes larger than 5 mL, greater push force in the form of a strong fast jab is necessary to inject the medication before the animal moves away. A fast jab also reduces the amount of medication injected along the needle track before the needle reaches full depth. The greater force can injure thin-skinned animals if the needle hub is not cushioned. A rubber vacutainer stopper pushed over the needle and up against the hub will usually provide adequate cushioning.

Broken needles and breaking-off of the nozzle tip of the syringe with needle attached are common problems. The syringe and attached needle cannot tolerate much sideways pressure without something giving. This is especially when the plunger is fully drawn up leaving only a short length of plunger inside the barrel to support it. This is the case with many jab stick designs and is what makes them unsuitable for farm use where larger volumes requiring larger force on moving targets are the norm.

**The Westergun Mini**

The Westergun Mini (Figure 5) is made from a lightweight aluminium tent pole to which is attached a special 10 mL nylon syringe (the same one recommended for the Westergun). The plunger of the syringe is hollow allowing it to slide tightly over the end of the pole and is the feature that makes the Westergun Mini more resistant to sideways pressure than many other larger-volume jab stick models.

*Figure 5: The Westergun Mini with handle collapsed and plastic needle disinfection sleeve attached.*

(Source: www.fearing.co.uk)

One of the problems with the Westergun Mini is separation of the plunger from the syringe barrel after the shot if the needle “sticks” in the animal as it moves away. Unlike disposable plastic syringes there is no retaining ridge inside the barrel of these nylon syringes to stop the plunger coming completely out. This is a manageable
problem if only single shots are administered, but frustrating if multiple injections are required.

There is a plastic sleeve that fits to the barrel of the syringe meant for cotton wool and spirits to disinfect the needle between uses (Figure 6). However it is fragile, poorly attached and difficult to reattach. It is usually tolerated for the first few shots or it breaks, then is discarded.

**Figure 6: Close up view of the head of the Westergun Mini with syringe and plastic disinfectant sleeve attached**

(Source: www.fearing.co.uk)

There is a marketing claim that the syringe contents cannot be released until the needle is inserted to its maximum depth. This is incorrect. There is also an ambitious claim that the pole is telescopic – it can only be locked in the fully extended position (which gives an overall length of 135 cm with the plastic sleeve attached) or the fully collapsed position (giving an overall length of 88 cm). Unlike the MasterJect, the handle cannot be locked to intermediate lengths.

**Table 1: Comparative features of the MasterJect, Westergun and Westergun Mini**

<table>
<thead>
<tr>
<th>Feature</th>
<th>MasterJect</th>
<th>Westergun</th>
<th>Westergun Mini</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating system</td>
<td>Automatic spring-fired</td>
<td>Automatic spring-fired</td>
<td>Push-operated</td>
</tr>
<tr>
<td>Dose delivered</td>
<td>1-20 mL</td>
<td>1-10 mL</td>
<td>1-10 mL</td>
</tr>
<tr>
<td>Construction</td>
<td>Aluminium &amp; steel</td>
<td>Aluminium &amp; steel componentry</td>
<td>Aluminium</td>
</tr>
<tr>
<td>Weight</td>
<td>1.5 kg</td>
<td>1.1 kg</td>
<td>0.3 kg</td>
</tr>
<tr>
<td>Length</td>
<td>Extended 160 cm</td>
<td>Extended 142 cm</td>
<td>Extended 135 cm, collapsed 88 cm</td>
</tr>
<tr>
<td>Cost inc GST</td>
<td>$434.50</td>
<td>$467.50</td>
<td>$225</td>
</tr>
<tr>
<td>Syringes</td>
<td>20 mL BD Plastipak leurolk</td>
<td>10 mL nylon with centric tip</td>
<td>10 mL nylon with centric tip</td>
</tr>
<tr>
<td>Needles</td>
<td>IM 14 g x 38 mm (1 ½&quot;) SC 14 g x 25 mm (1&quot;)</td>
<td>IM 14 g x 38 mm (1 ½&quot;) SC 14 g x 25 mm (1&quot;)</td>
<td>IM 14 g x 38 mm (1 ½&quot;) SC 14 g x 20 mm (3/4&quot;)</td>
</tr>
<tr>
<td>Supplier</td>
<td>Think Livestock Pty Ltd <a href="http://www.thinklivestock.com">www.thinklivestock.com</a></td>
<td>Think Livestock Pty Ltd <a href="http://www.thinklivestock.com">www.thinklivestock.com</a></td>
<td>Shoof International (Australia) Pty Ltd <a href="http://www.shoof.com.au">www.shoof.com.au</a></td>
</tr>
</tbody>
</table>

The author’s favourite pole syringe is the MasterJect because it is quick and easy to load, can inject up to 20 mL (whereas the other models are 10 mL maximum) and has a slightly longer reach than the other models. It is however heavier than the other models and new users often have problems with breaking the plastic syringes until they learn how to remove air from them.

**How to use pole syringes**

*Practise*
It is highly recommended to practise using a pole syringe before injecting into animals. Otherwise accidental discharges and broken syringes and needles will occur, valuable medication will be wasted and a sick animal may go untreated. A rolled-up towel on the floor pushed up against a wall makes an excellent target to practice injecting water into. It provides a similar feeling to injecting through skin and into muscle and it will soak up the injected water. Practise extending and shortening the handles, loading and unloading syringes, changing needles, and drawing up and injecting medication using cheap bottles of sterile water. The water can be coloured with food dye for a bit of realism when training staff.

**The approach**

It’s important when approaching the target animal that one doesn’t look it in the eye or display predatory body language otherwise it will know it is the target and will perform evasive action. One needs to use peripheral vision and act as though interested in something else. Injecting animals while they are distracted by feed is recommended. This often allows administration of multiple injections. If multiple injections are required for an animal in a group, note identifying features such as horn stumps, hair colour patterns or frame size so that the animal can quickly be located again.

In a paddock, spread a trail of grain in a circle. The group of cattle will then form a circle with heads in and down, and rumps out. The target animal can then be injected in the rump without seeing the operator. If feed to distract the animal is unavailable, the shot is difficult unless the animal is very quiet, sick or lame.

In a pen situation you will usually need to enter the pen. This will allow you to get behind cattle as they are lined up in a row feeding from troughs. They can see you as they raise their heads between mouthfuls but they can’t easily move forward or sideways to escape. It is important not to look them in the eye and to time the injections for when their head is down in the trough. Rump shots are easy, neck shots are difficult until skill and experience develop. If feed is unavailable work the target into a corner with a few other animals with their heads in the corner and rumps out.

In a race, the animal can be injected between or over the rails in the neck or rump. Some skill is required to predict the movement of the animal backwards or forwards to time the shot. This will prevent the needle bending or even breaking. Extending the telescopic handle is usually unnecessary for race shots – it can even be detached.

Subcutaneous injections can be administered by using shorter needles and or injecting at an angle into the neck. Some operators administer subcutaneous injections by injecting short needles perpendicularly into the flank fold of cattle.

**Other tips**

Sometime a chemical reaction between medications mixed in a syringe will cause the rubber of the plunger to corrode. This occurs especially when antibiotics and anti-inflammatories are mixed. It is recommended to carry bottles of sterile water to rinse the syringe between different types of medication. To rinse, simply draw up a syringe full of sterile water and discharge it on the ground.

The hit plates of the MasterJect and Westergun get dirty from repeatedly hitting the hair coats of animals. This can cause contamination of the rubber bottle caps as they are lowered over the needle for medication to be drawn up. The contamination can be prevented by using a finger as a separator between the hit plate and bottle cap when drawing up medication. This finger separation technique also allows careful positioning of the end of the needle in the bottle to empty the last few mL of medication.
In the field, a haversack slung over one’s shoulder is ideal for carrying medications, sterile water, spare syringes, needles, pliers (for removing needles), a small sharps container and disinfectant wipes for keeping rubber bottle tops and hit plates clean.

It is strongly recommended when using pole syringes, especially spring-fired models, to wear safety glasses, protective long-sleeve shirts, trousers and gloves, keep ones mouth shut and to minimise the number of people working nearby.

Managing needles
The recommended needle width for use with pole syringes is 14 g which is wide enough to allow fast flow of the medication but narrow enough so that medication does not leak out the puncture hole. The 14 g needles work well even for the thicker antibiotics such as the 300 mg/mL long acting oxytetracycline preparations.

The recommended needle lengths are 38 mm (1.5") for intramuscular injections and 24 mm (1") for subcutaneous injections. Full needle shaft penetration is not achieved in the spring-fired models - penetration is reduced by about 6 mm (1/4"). because of the width of the hit plate and front end of the syringe housing.

Fully stainless steel needles are the strongest - they won’t break off – and are the most expensive (~$2.00 ea). The DTN needles with aluminium hubs and stainless steel shafts are not as strong and will break off if reused too often, especially after having been bent - but they are cheaper (~80c ea).

Needles should be changed between animals if there is a risk that blood borne diseases such as EBL, or the tick fevers might be transferred. Otherwise needles should be changed as soon as they become blunt or burred, at the end of each day, or after every 10 injections, whichever comes first.

There is a tendency for operators to lean pole syringes up against a wall or rail with needles attached during rest breaks. This creates the risk of needle stick injuries to others who are not aware of the presence of the needle. Needles should be removed when the pole-syringes are not in use. Some operators push a cork on the end of the needle.

References
