

Shower dipping for lice eradication

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Shower dipping can be an effective method of eradicating lice but it is difficult to get everything right so that every sheep is thoroughly treated. Studies have shown that few shower dips achieve thorough wetting of the sheep. Pump performance and spray patterns are often inadequate, particularly with older, tractor driven pumps.

Advantages

- Some products kill lice within 24 hours.
- The chemicals used are usually cheaper than those for backline application.
- Treatment can be fitted in at a convenient time after shearing, provided it is within six weeks.
- A smaller labour force is required to put sheep through a shower dip than a plunge dip, although more than required for backline treatment.

Disadvantages

- High initial cost of equipment.
- Difficult to maintain a shower dip in top working order.
- It can be difficult to detect equipment problems that result in some sheep not being fully wet.
- Sheep must be remustered a few weeks after shearing, with increased chance of missing sheep and extra labour input.
- Sheep that miss remuster and treatment cannot be readily identified.
- Risk of wound infection or deaths from cold exposure.
- High safety risk due to spray from the dip.

Dip preparation

Check all nozzles, pipes, valves and sieves to make sure they are clean and working.

The sump capacity must be calculated and the sump calibrated to allow the correct concentration of dip wash to be maintained.

The simplest method of measuring the volume is to fill the tank or sump from a container of known volume. Then mark graduations, e.g. every 200 litres, on the wall of the sump or on a dipstick. If a 200 litre drum is used, then calibrate that first because they are often not actually 200 litres.

Alternatively the capacity can be calculated using the dimensions of the sump. If all measures are in metres then the volume will be in cubic metres. There are 1000 litres in a cubic metre so multiply the result by 1000.

With a constant replenishment system, the supply tank should be calibrated and marked on the tank or a dipstick prepared for that tank.

Mixing chemicals

Safety

Most dip chemicals are moderately toxic, particularly when concentrated. Strictly follow the safety direction on the label. Wear all the protective clothing recommended.

Pre-mix

Read the label and accurately measure the correct amount of chemical. Pre-mix the concentrate in a bucket of water. Many dipping chemicals are in a form that does not readily disperse if poured directly into a large volume of water so the concentrate may just fall to the bottom. Pre-mixing will disperse it in a form that will mix more readily in the tank.

Mix the chemicals thoroughly by running the shower without sheep for at least three minutes before dipping begins. Do the same after any break of an hour or longer because some mixtures may settle on standing.

Shower dip operation

Pump pressure

The most important factor affecting sheep wetting is the volume of dip wash delivered from the nozzles. This is determined by pump pressure, the diameter of delivery pipes and the spray nozzles. The pump should supply at least 142 kPa, maintaining high flow rate to the nozzles at this pressure. Some producers have modified their shower dips with higher diameter pipes to increase the volume of dip wash delivered.

Nozzles must be clean and checked regularly for blockages during dipping.

Overhead nozzles should spray to the side walls at just above sheep head height. If the spray does not reach evenly up the walls of a circular dip then the pivoting point of the spray may be off-centre.

The rotation speed of the top arm should be about 5 revolutions per minute (rpm). High speeds, above 12 rpm, do not wet sheep thoroughly.

Check the flow rate and pump pressure. A bucket placed anywhere on the floor of the dip should be filled at a rate of 2 litres/minute.

Common causes of low pressure are worn impellers in the pump or low pump speed.

A rough guide to correct pressure is that the bottom spray should reach 30 to 40 cm above the top of the dip when run alone. However, during full operation the bottom sprays are not very important.

Wetting the sheep

Lice live close to the skin and will only be killed if the sheep are saturated to skin level. Lice eradication depends on wetting every sheep thoroughly.

Wool length

Sheep with more than six weeks wool are very difficult to wet properly. Aim to dip sheep two weeks after shearing. This enables good wetting and allows time for any shearing cuts to heal.

More open wool is easier to wet than tight fine wool.

Make sure sheep are wet in the neck folds and rams are wet under the horns.

Tufts of wool left on poorly shorn sheep are hard to wet.

Consider drafting off sheep that will be hard to wet so they can be dipped separately, giving them more time and attention so they are thoroughly saturated.

Time in the dip

Studies have shown that sheep need about 12 minutes with the top nozzles running to be thoroughly wet. The top sprays do most of the wetting and should be run for most of the time.

The bottom nozzles may help to move the sheep around so they do not stay in one position. Do not run the top and bottom nozzles together because this reduces spray pressure.

Loading the dip

Do not pack the sheep too tightly. They must be touching but still have room to move.

Lambs should be dipped separately from older sheep to be properly wetted and avoid trampling.

Sheep tend to crowd at the exit gate, unless this is covered in the same way as the walls of the dip. Covering the gate while the dip is operating is safer for the sheep and improves wetting.

Dip type

Square dips do not usually wet all sheep unless care is taken that the sheep move around often during dipping. Sheep that stay in the corners will rarely be wet thoroughly.

Maintaining the right concentration

Stripping

Many chemicals used in dips are more soluble in wool grease than in water. As a result, the chemical is removed faster than the dip wash, which gradually decreases in concentration as dipping proceeds. This gives a high concentration of pesticide on the first sheep through but may not leave much for the next group of sheep to be dipped. This effect is referred to as stripping and the products to which it applies are 'stripping dips'. The dip sludge may also remove chemical so that it is not available to the sheep.

The rate of stripping is affected by the type of chemical, wool length, dip fouling and the time sheep stay in the dip.

Replenishment

Replenishment, or topping up, is the replacement of the chemical and water mixture to return the sump to the original volume. The sump should not fall below three-quarters full, except when dipping out (see later).

Reinforcement

Reinforcement replaces the chemical lost from the dip wash because of stripping. This requires adding more chemical but not extra water to the dip or sump. This is essential with 'stripping dips' to maintain a high enough concentration to properly treat all sheep.

Pre-mixing of dip concentrate in a bucket of water and adequate mixing in the sump is required for replenishment and reinforcement, as for the initial mix.

Constant replenishment

A constant (or continuous) replenishment system aims to maintain a constant level and concentration throughout dipping and is the best method for 'stripping dips'.

A supply tank next to the sump runs fresh wash in at a constant rate. The sump is run at a lower, constant volume. The concentration in the supply tank is usually required to be at a higher concentration than the initial dip concentration because it allows for replenishment and reinforcement at the same time.

Advantages of constant replenishment

- There is reduced fluctuation in the concentration of dip wash.
- There is no interruption of dipping to replenish and reinforce the dip.
- The smaller sump volume, replaced from the tank, stays cleaner and there is less waste and contamination when pumping out.
- Small mobs can be dipped without a large volume of initial charge.
- It gives the most economical and efficient use of chemical.

Dipping out

The dip wash becomes contaminated due to recycling of the mixture so the sump must be emptied regularly, discarding all dip wash. Do this after dipping one sheep for each 2 litres of initial sump volume. For example, if the sump holds 1000 litres then clean it after every 500 sheep.

Dipping out involves allowing the sump level to fall without topping up as usual when the last group of sheep are being dipped, or before cleaning out the sump. The wash remaining after dipping out must be discarded.

To determine when to start dipping out, estimate the rate at which wash is being removed from the dip. Calculate how many sheep will take the sump to half its initial volume. Keep the sump at full volume until that number of sheep remains, then begin dipping out.

When the sump falls to three-quarters of its initial volume, then reinforce the dip. Do not add water.

Continue to dip out until the sump reaches half its initial volume then stop dipping and clean the sump.

A shower dip sump must not fall below half of the initial level even when dipping out.

Dipping hygiene

The dip wash must be kept reasonably clean. Chemicals bind to soil and faeces in fouled dips and adding more chemical will not overcome this problem.

- Do not dip more than one sheep per 2 litres of sump initial volume without cleaning.
- Stop dipping when the sump is half its initial volume. Pump out and discard the remainder.
- Yard sheep overnight before dipping to reduce faecal contamination.
- The lead-in to the dip should be clean to keep their feet clean.
- If the sheep do have muddy feet, then dip less sheep before cleaning out.
- Clean dirt traps regularly during dipping.
- Do not leave dip mix in the sump for more than one day. Some chemicals will bind more strongly to sludge on standing.

Handling sheep for dipping

Avoid dipping sheep on very hot days or in wet or very windy conditions. The sheep may be chilled severely by winds and will not dry out quickly in wet conditions.

Start early in the day and finish early enough to allow the sheep to dry before nightfall.

Dip sheep with two to six weeks wool. Two weeks off-shears is ideal, allowing time for shearing cuts to heal. Ten days off-shears is the minimum time that should be allowed. Sheep with more than six weeks wool may not be thoroughly wet, will take longer to dry out and are more prone to fleece-rot, dermo and death from cold stress.

Dipping off-shears is not recommended due to the high risk of infection in shearing cuts. If cuts are a problem at the time of dipping then a disinfectant should be added to the dip and close attention given to keeping the sump clean.

Sheep heavily infested with grass seeds are more prone to infection.

Muster the sheep the day before dipping and let them rest overnight with access to water but not feed. Do not dip hot or thirsty sheep.

Heavily pregnant ewes, weaners or sheep in poor condition are more susceptible to stress and should be dipped early in the day.

Lambs should be drafted from ewes to avoid being trampled in the dip.

Be careful with weaners to avoid panicking and smothering in the dip.

Young sheep are more susceptible to infections and should be dipped first when the dip wash is cleanest.

Draft off diseased sheep, such as any with dermo, pink eye or open abscesses and dip these last before cleaning out the sump.

Chemical groups

Organophosphates (OP)

OPs have been used as dips for many years but the use of OPs for dipping is being phased out due to health concerns about workers exposed to splash and spray from dip wash. They are nerve poisons that affect humans as well as lice.

The active ingredient is usually diazinon or propetamphos and examples are Topclip, Jetdip and Seraphos.

Insect growth regulators (IGR)

The IGRs kill lice when they moult. Lice only moult when growing so the products do not kill adult lice although they will prevent eggs hatching.

Adult lice live an average of a month after their last moult so small numbers of lice may be seen one or two months after treatment. However, the number of these survivors will be low and there will not be enough to cause wool damage and they do not indicate resistance.

The IGRs break down very slowly so they remain at relatively high concentrations for months after treatment. This may give some protection against reinfestation shortly after treatment. However, it will not protect sheep until the next shearing, so the period of protection is not sufficient to reduce management practices to avoid new infestations on the property.

There are several known cases of resistance to IGRs but the effect of resistance on the effectiveness of dipping is presently unclear.

IGRs are not stripping dips.

The active ingredient is diflubenzuron and examples are Fleececare and Strike.

Synthetic pyrethroids (SP)

These chemicals kill adult and young lice on contact. Grenade and Supreme were used in the past but at present there are no SP dips registered for lice eradication. There is a very high risk to the environment if surplus wash from SP dips reaches streams or rivers.

Spinosyns

Extinosad has been available as a dip for a few years, with the active ingredient Spinosad. Lice are killed on contact with the pesticide. It has low toxicity to humans and is safe for the environment due to its rapid rate of breakdown.

Other products

Two products, Flockmaster Mk II and Splash, which contain magnesium fluoro silicate, rotenone and sulphur are available. These are relatively safe for both humans and the environment.

Safety

Read the safety directions on the label before opening the container.

Be particularly careful when handling the concentrate when mixing the dip.

Wash hands, arms and face with water after contact with pesticides and especially before eating or drinking.

Change wet clothing as soon as possible.

Spray drift is a common problem with shower dips. Often aerosol droplets that are not easily seen but are readily inhaled are formed.

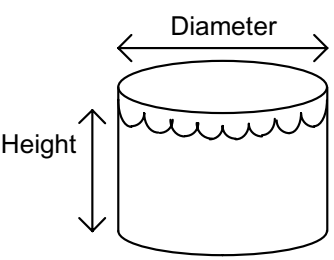
Operators should wear overalls, gloves, waterproof boots and a washable hat.

Increasing the height of the side panels is recommended, at least on the side where the operator stands or where valves must be operated during dipping.

Know your sump and tank capacities

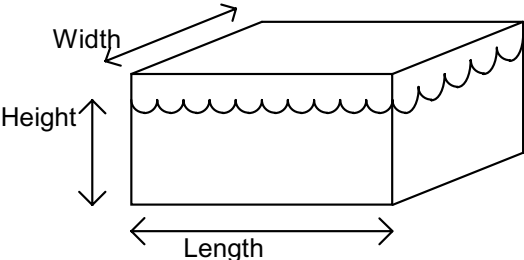
Take all measurements at the waterline in **metres**. Volumes are in **litres**.

Volume of Sump and Tanks



Volume
 = Diameter x Diameter x Height x 785

Example
 Diameter 1.2 m, Height 1 m
 Volume = 1.2 x 1.2 x 1 x 785
 = 1130 litres



Volume
 = Length x Width x Height x 1000

Example
 Length 1.9 m, Width 1.6 m, Height 1.25 m
 Volume = 1.9 x 1.6 x 1.25 x 1000
 = 3800 litres

Example of calculation of chemical used

For a chemical with an initial charge of 500 ml per 1000 litres
 reinforcement at 650 ml per 500 litres
 topping up at 250 ml per 500 litres
 continuous replenishment at 1000 ml per 1000 litres

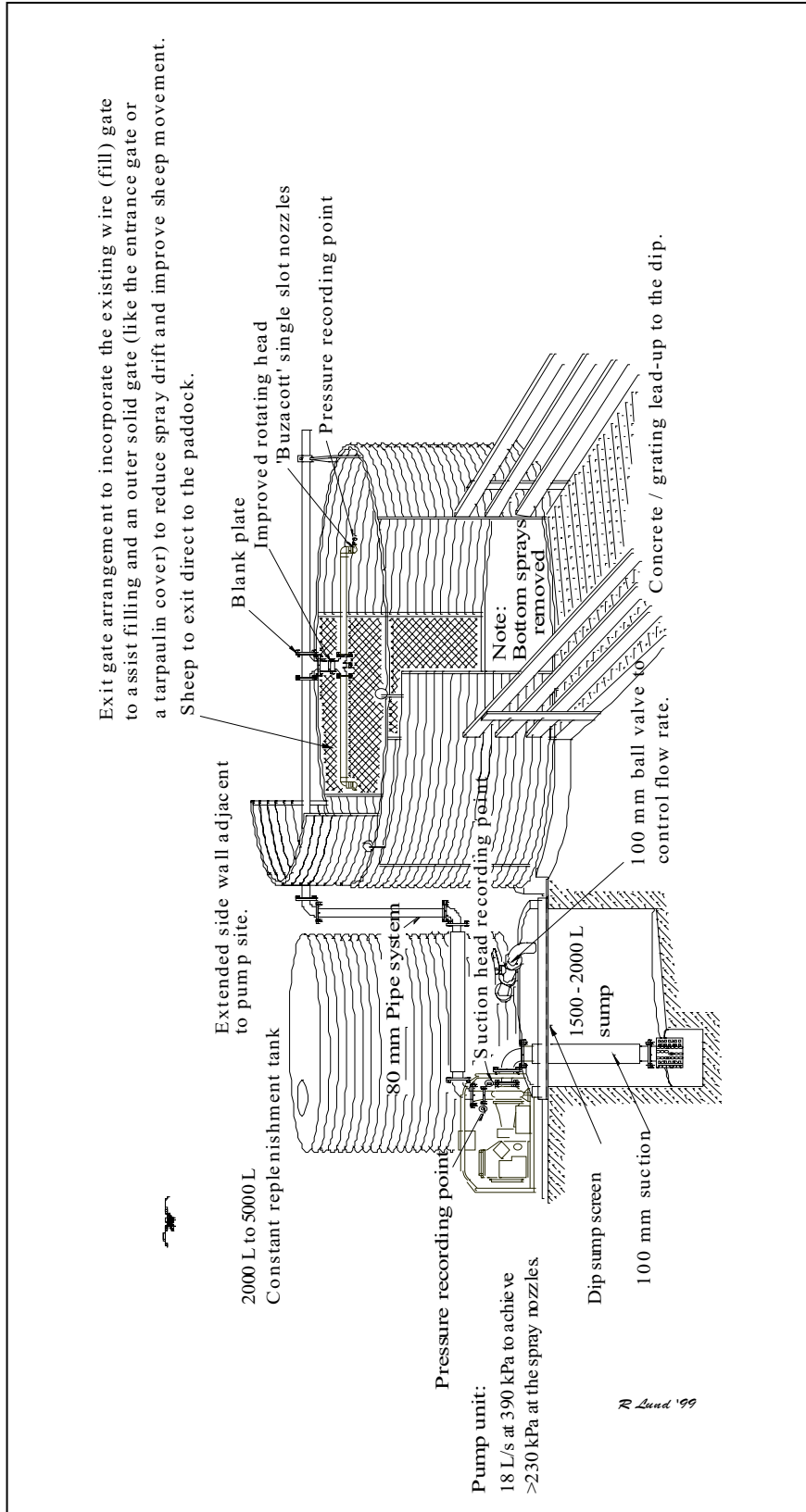
Sump volume 1130 litres, replenishment tank 3800 litres

Initial charge = 1130 x 500 ÷ 1000 = 565 ml (0.57 litres) chemical in the sump.
 either constant replenishment = 3800 x 1000 ÷ 1000 = 3800 ml (3.8 litres) chemical in the tank.
 Maintain the sump level by constant flow from the tank.

or periodic topping up = 3800 x 250 ÷ 500 = 1900 ml (1.9 litres) chemical in the tank.
 when the level in the sump falls 500 litres, reinforce the sump with 650 ml chemical, then top up from the tank.

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Preferred dip design – from Lund & Levot, FLICS (2001) p191-196.

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