

Plunge dipping

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Plunge dipping is the most effective method for eradicating lice because it ensures total saturation of the fleece - provided that it is done correctly.

The length of swim and method of dunking are critical factors affecting thorough wetting.

Advantages

- Simple low maintenance system compared with shower dipping.
- Some products kill lice within 24 hours.
- Treatment can be fitted in at a convenient time after shearing, provided it is within six weeks.

Disadvantages

- Higher initial cost of equipment compared with backline treatment.
- High labour requirement to dip sheep correctly.
- Sheep must be remustered a few weeks after shearing, with increased labour input.
- Greater stress on sheep than other methods.
- Risk of wound infection or deaths from cold exposure.
- Wastage of chemical at the end of the day.
- Need to dispose of large volume of used dip wash.

Dip preparation

The dip must be pumped out and thoroughly cleaned before use.

The dip capacity must be calculated and the dip calibrated to ensure the correct concentration of dip wash.

The simplest method of measuring the volume is to fill the dip from a container of known volume. Mark graduations, e.g. every 500 litres, on the wall of the dip or on a dipstick. If a 200 litre drum is used, calibrate that first because they often do not actually contain 200 litres.

Alternatively the capacity can be calculated using the dimensions of the dip. 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 specifically for that tank.

The dip and draining pens should be cleaned before dipping and between mobs of sheep to avoid contamination in the dip.

Yards and rails should be checked for sharp objects that can cause cuts and result in infections. Take particular care on the dip entry and slides.

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. Most dipping chemicals are in a form that does not readily disperse if poured directly into a large volume of water. Pre-mixing will disperse it in a form that will mix more readily in the dip.

Mix the chemicals thoroughly with a paddle before the first sheep are dipped. Do the same after any break of an hour or longer because the mixture may settle on standing.

Factors affecting wetting

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.

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

Make sure that all 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.

Sheep that may be difficult to wet should be given more time and attention in the dip.

Dunking

It is best to use a dunking tool specifically designed for that purpose. These have a rounded section at the bottom that minimises damage to the sheep.

Press down across the shoulders, not on the head so the whole body is pushed down and the head is only just under the surface.

Ensure that every sheep is dunked twice, in addition to entry.

Time in the dip

The dip should have a swim length of 9 metres or more.

A minimum of a 20 second swim with two head dunks is required. The two dunks are in addition to the initial splash entry.

Dunk the sheep by pushing them backwards as well as downwards.

In short dips the sheep may need to be actively held back to keep them in the dip long enough to be properly wet.

The flow of sheep into the dip must be regulated. If sheep pile up in the dip it slows down the whole operation and prevents some sheep from being dunked correctly. Some stay on top of other sheep and do not swim the full distance, while those underneath may drown.

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 but leaves a lower concentration for those later in the run. This effect is referred to as stripping and the products to which it applies are 'stripping dips'. Stripping is affected by the type of chemical, wool length, and dip fouling.

The dip sludge may also remove chemical so that it is not available to the sheep.

Replenishment

Replenishment, or topping up, is the replacement of the chemical and water mixture to return the dip to the original volume and concentration. The dip 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. This is essential with 'stripping dips' to maintain a high enough concentration for all sheep.

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

Constant replenishment

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

A supply tank next to the dip runs fresh wash in at a constant rate. 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.
- It is a more efficient use of chemical because the replenishment and reinforcement method requires that the concentration is often higher than necessary at the start to ensure that it will be sufficient when the concentration falls before the next reinforcement.

Dipping out

The dip wash becomes contaminated as sheep are dipped so the dip must be emptied regularly, discarding all dip wash. Do this after dipping one sheep for each 2 litres of initial dip volume. For example, if the dip holds 4000 litres then clean it after every 2000 sheep or more often if it becomes fouled.

Dipping out involves allowing the dip level to fall without topping up, when the last sheep are being dipped, or before cleaning out the dip.

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 dip to half its initial volume. Keep the dip at full volume until that number of sheep remain, then begin dipping out.

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

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

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

The dip should never be low enough to allow the sheep to walk in the dip and not become properly wet.

Dipping hygiene

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

- Do not dip more than one sheep per 2 litres of initial dip volume without cleaning.
- Stop dipping when the dip is half its initial volume. Pump out and discard the remainder.
- Yard sheep off of feed overnight to allow them to empty out.
- The lead-in to the dip should be clean.
- If the sheep have muddy feet, dip less sheep before cleaning out.
- Have a dirt trap for wash returning to the dip. Clean dirt traps regularly during dipping.
- Do not leave dip mix in the dip for more than one day. Some chemicals will bind more strongly to sludge on standing.

Plunge dips should be cleaned out and the wash discarded if they become excessively fouled or after the period specified on the label.

If dip wash is held overnight, add sufficient chemical for the next day, and a disinfectant, but do not add water until the next morning. The higher concentration of chemicals and disinfectant will help control bacteria in the dip wash. Do not keep used dip wash over a second night.

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.

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.

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

Only dip sheep with between two and 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 but will take longer to dry out and are more prone to 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 dip clean.

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

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

Pregnant ewes and sheep in poor condition may be unable to climb out of the dip.

Lambs should be drafted from ewes to avoid being trampled or drowned 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. Do not dip any other sheep after these before cleaning out the dip.

After releasing sheep from the draining pens, give them room to spread out. Close contact while wet will spread mycotic dermatitis. Give them time to recover before driving them any distance. If they have lambs at foot, allow time for both groups to get back together and mother-up.

Chemical groups

Organophosphates (OP)

OPs are nerve poisons that affect humans as well as lice. OPs have been used as dips for many years but are being phased out due to health concerns about workers exposed to splash from dip wash. The active ingredient is usually diazinon and examples are Topclip and Jetdip.

Insect growth regulators (IGR)

IGRs kill lice when they moult and may prevent the eggs from treated females from hatching. They do not kill adult lice, which may persist for some time after treatment. However, the number of these survivors will be low and they do not indicate resistance.

IGRs break down very slowly so they remain at relatively high concentrations for months after treatment. This may give some protection against reinfestation but protection will not last throughout the year and management to prevent new infestations is still necessary.

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'.

Take special care not to contaminate waterways with discarded IGR dip-wash.

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.

*Mention of trade names does not imply endorsement of any product and they are given only as examples.
See Product lists for a complete list of available products.*

Safety

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

Take extra care when handling the concentrate and 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.

Be careful of dip splash as the sheep enter the dip or are dunked.

Avoid standing in the exit area where sheep will shake and spray dip wash as they leave.

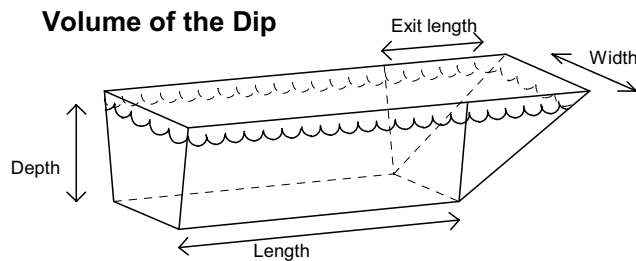
Operators should wear overalls, gloves, waterproof boots and a washable hat.

Waterproof trousers are recommended for those working on the dip, to avoid splashing as sheep enter and are dunked.

If the chemical is swallowed or contacts the eyes then call the Poisons Information Centre.

Calculate your dip capacity accurately

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



Volume of Main section	= Length x Width x Depth x 1000 litres
Volume of Exit	= Exit Length x Width x Depth x 500 litres
Total Volume in litres	= Main section + Exit section

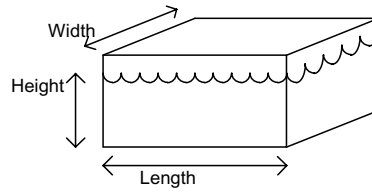
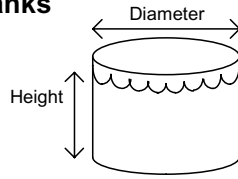
This is an approximation, ignoring sloping sides for ease of calculation.

Example

Length of main section 8 m, Width 0.75 m, Depth 1.2 m, Length of exit 2 m

$$\begin{aligned}
 \text{Volume} &= 8 \times 0.75 \times 1.2 \times 1000 & + & 2 \times 0.75 \times 1.2 \times 500 \\
 &= 8100 & + & 900 \\
 &= 9000 \text{ litres total volume}
 \end{aligned}$$

Volume of Tanks



Volume

= Diameter x Diameter x Height x 785

Volume

= Length x Width x Height x 1000

Example

Diameter 2 m, Height 1.2 m

Length 1.8 m, Width 1.2 m, Height 1.1 m

Volume = 2 x 2 x 1.2 x 785
= 3768 litres

Volume = 1.8 x 1.2 x 1.1 x 1000
= 2376 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

Dip volume 9000 litres, replenishment tank 3800 litres

Initial charge = 9000 x 500 ÷ 1000 = 4500 ml (4.5 litres) chemical in the dip.

plus either - constant replenishment = 3800 x 1000 ÷ 1000 = 3800 ml (3.8 litres) chemical in the tank.

Maintain the dip 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 dip falls 500 litres, reinforce the dip with 650 ml chemical, then top up from the tank.

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