

LICE ADVICE



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SEASONS

A farmer's guide to lice control in sheep



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Glossary

Reinfestation period: Length of time treated sheep are protected from reinfestation with lice from contact with untreated lousy sheep. Reinfestation periods appear as a label claim on some products. Note that depending on the mode of action, some chemical families cannot support a reinfestation claim; however this doesn't affect the control of lice. Do not confuse this reinfestation claim with a claim for the control of lice.

Quarantine period: Minimum time after treatment that sheep must not have contact with untreated, lice-free stock. For example, to prevent transfer of lice from ewes to lambs, flat-comb shorn ewes must be treated with most pour-ons at least 6 weeks before lambing. If wool is longer, the period should be extended.

Charging: initial mixing of the product with water at the manufacturer's recommended dilution rate.

Replenishment (topping-up): Addition of chemical and clean water to maintain dipwash concentration and volume.

Reinforcement: Addition of undiluted product to dipwash to maintain chemical concentration while the dipwash reduces in volume at the end of dipping. Is necessary for stripping dips.

Stripping: The act of removing one's clothes seductively. Only joking! Really it's where the active is removed from the dipwash as it passes through the fleece; the concentration in the dipwash dripping off the sheep is lower than that retained in the fleece. To ensure adequate chemical in the dipwash, the dilution ratio is greater for replenishment than charging with stripping dips.

Introduction

Sheep lice are widespread in New Zealand and are of major economic importance.

Lice infestation reduces wool weights, downgrades wool quality and increases the likelihood of flystrike. A heavily lice-infested fleece can return up to 24% less than a normal fleece¹.

Lice also cause sheep a large amount of physical distress. Given the economic and welfare significance of lice, effective treatment and prevention is important. A planned approach to the control of lice in a flock, and careful use of appropriate products, are needed for the successful control of lice.

Lice Species

Three louse species infest sheep in New Zealand:

- Body or biting louse (*Bovicola ovis*)
- Foot or leg sucking louse (*Linognathus pedalis*)
- Face sucking louse (*Linognathus ovillus*)

Body lice (Figure 1) are widespread and the only economically important species. Although they live on the skin, body lice don't suck blood or move freely around the sheep, but tend to remain in preferred sites feeding on skin surface debris. Lice will, however, move up and down the wool staple; this is important for transfer of lice between sheep.



Figure 1: Body louse (*Bovicola ovis*).

Image courtesy of NSW Industry and Investment

Foot lice live on the hairy parts of the legs, scrotum and (in heavy infestations) belly and face of sheep.

Face sucking lice usually remain on the face. They are uncommon in New Zealand and of no significance.

Lice Life Cycle

Body lice complete their entire life cycle on sheep (Figure 2). Under ideal conditions the lifecycle is complete in about 34 days, but this can vary widely depending on environmental conditions.

Each female lays up to two eggs every three days, or about 15-20 eggs in her lifetime. She attaches the eggs firmly onto wool fibres close to the skin. To hatch, the eggs require a specific range of temperature (36-39°C) and humidity (70-75%). Under ideal conditions, the eggs hatch in 10 days. Unhatched eggs die within 2 weeks. Lice cannot therefore remain dormant and protected at the egg stage.

The first nymphal stages emerges from the egg and over the next 21-24 days, these nymphs moult three times before becoming adults. The adult female is ready to mate and lay eggs 3-4 days later and the cycle continues.

Adult lice are about 1.8mm long and 0.6mm wide. They have a broad reddish head and a pale brown abdomen with brown stripes. Nymphs resemble the adult lice, except they are smaller and colourless.

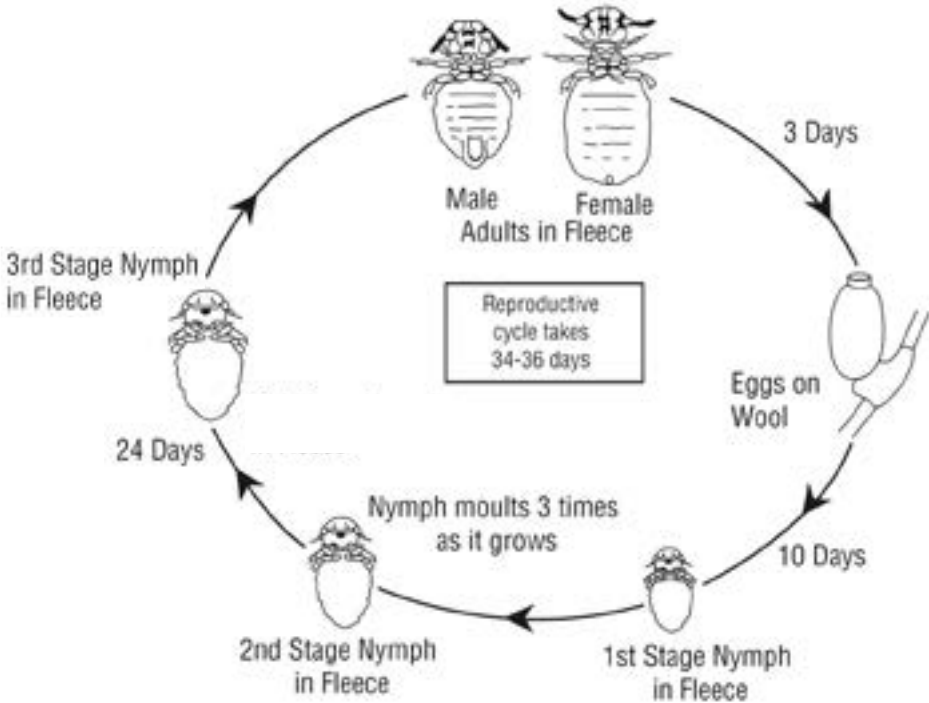


Figure 2: Lifecycle of sheep body louse

Transmission and sources of lice

Lice can't survive for long away from live sheep and are unable to fly or crawl. They are generally only spread from sheep to sheep by close contact, e.g. during yarding, transport or in sheep camps.

Most lice "outbreaks" on farms are due to residual infestation of lice not eradicated at the previous treatment.

These residual infections arise due to inappropriate treatment, inadequate application or transfer of lice from untreated back onto treated sheep once the *reinfestation period* of the dip has passed.

Untreated sheep occur due to incomplete flock treatment, mis-mustering, split shearing and lambs born to ewes treated too close to shearing (within the *quarantine period*).

On farms that have eradicated lice, prevention of new infections is critical.

Precautions should be taken to prevent the spread of lice to these flocks. The main potential sources of new infestations are stray or bought-in sheep. This highlights the importance of well-maintained fencing and careful stock management. Other low-risk sources include shearing sheds, fences, trucks and yards, moccasins and other clothing, and goats².

Population growth on sheep

Lice populations show marked differences in the rate of growth. The rate a lice population grows depends on the initial population size, spread amongst sheep and the rate of louse development on individual sheep.

A few lousy sheep in a mob will not cause rapid or widespread lousiness that is noticeable in the flock, even after a few months. Given shearing and the use of chemical control that is not fully effective, a new infestation may even take years to become obvious. Beyond a certain point of infestation, however, uncontrolled louse populations can multiply rapidly.

The immunity of the sheep, shearing, sunlight and temperature have the greatest influence on lice development. Lice are vulnerable to temperature and humidity changes. Depending on comb height and cleanliness, shearing physically removes up to 66% of lice³. Those that remain are susceptible to environmental changes due to short wool, so a large proportion of these will not survive. Lice numbers are often lowest 30-60 days after shearing.

Shearing more than once a year decreases lice numbers significantly.

Autumn is the most favourable time for lice populations to develop, because:

- sheep immunity can be depressed by decreased feeding
- there is a possible seasonal effect⁴
- higher stocking densities allow sheep-to-sheep transfer
- there are favourable environmental conditions due to reduced solar radiation, and favourable humidity and temperatures
- wool length is often optimal due to spring and early summer shearing

Summer temperatures and high humidity (>90%) will generally reduce lice populations; however, the microclimate at the skin's surface may be favourable enough to allow breeding to continue in full-wool sheep during summer. Heavy rain can drown lice if the fleece is saturated for more than 6 hours.

Bringing sheep into close contact (especially if they are lousy and short-woolled) increases the spread.

Effects of lice infestation

Sheep lightly infested with lice usually show no clinical signs. As numbers increase, however, intense irritation develops. Sheep begin to scratch against fences and other objects, and with their feet. They also bite and pull at their wool. This physical trauma, and the immune response triggered by lice, may result in fleece matting, discolouration and damage, which can result in considerable economic loss due to decreased fleece weight and yield of clean wool (Table 1).

Table 1: Effect of lice infestation on wool production, scouring yield and price⁵

	Degree of infestation		
	Light	Medium	Heavy
Number lice/parting	<1	1-5	5-10
% drop in wool production ¹	3	5	9
% drop in scouring yield of clean wool	1	3	6
% drop in price received	2	5	10

A heavily lice-infested fleece can return up to 24% less than a normal fleece. Lice treatments, equipment, labour, management expenses and predisposition to flystrike are additional costs associated with having a lousy flock.



Figure 3: Infested sheep will rub against fences and other objects.

Inspecting sheep for lice

Visual inspection is not always a reliable way of checking if sheep are lice free. In mobs with very light infestations or less than about 6 months' wool, suspect lousy sheep may be impossible to identify and lice difficult to find.

Medium-to-heavy infestations are relatively easy to detect, however. Before shearing, inspect sheep that are showing tufts of bleached wool on their flanks or rubbing and biting sheep. Body lice are usually found along the sides of the sheep, from neck to flank and in the neck folds and shoulder areas. Very few lice are normally found on the top or bottom of the sheep's body.

Examine sheep by parting about 10cm of wool to skin level. It is important to make at least 10 partings per side if no lice are seen at first, because the distribution of body lice over the sheep is uneven and lice can be found in high concentrations in localised colonies. If at least 10 sheep per mob are examined fully, the level of infestation within a mob can be estimated by counting the lice seen and dividing this by the total number of partings made. The expected effect on production of various levels of infestation is shown in Table 1.



Figure 4: Inspect sheep that are showing tufts of bleached wool on their flanks.

Other causes of fleece damage

Biting, rubbing sheep or a ragged, damaged fleece does not always indicate lice. Another condition such as wool-break may be the cause. Only close inspection will determine whether or not lice are involved. Other possible causes include:

- grass seed infestation
- itchmite (an uncommon condition usually seen in fine-wool breeds under nutritional stress)
- flystrike
- fleece rot (bacterial dermatitis, a bacterial infection causing discolouration of wool)
- lumpy wool (mycotic dermatitis, a bacterial skin infection resulting in scabs that cause wool to clump together)

Lice control options

As dipping is no longer compulsory, farms that have eradicated lice (achieved 100% lice kill on all sheep) may choose not to dip for economic and residue reasons. Some farms that appear to be without lice continue to dip in case of undetected infestation. Where dipping is not used, the following will help prevent new lice infestations:

- stock-proof boundary fencing
- discussing handling and return of stray stock with neighbours
- careful monitoring for lice
- thinking critically about possible sources of contamination, e.g. buying replacements from lice-free farms.

As confirmation of lice-free status is difficult, sheep (including rams and stock returned from a neighbour's) should be kept separate until 6 weeks after flat-comb shearing and treatment with either an insect growth regulator (IGR) pour-on or saturation dipping with an IGR or organophosphate (OP) 2-4 weeks later.

Before shearing, a sample should be carefully examined. If lousy, they should be further quarantined until shorn and treated a second time. If internal fences are secure, mobs are not mixed and yards and sheds are spelled between mobs, non-replacement (e.g. store) stock pose little risk of introducing lice.

Although eradication is possible, it is not practical to achieve this on most farms. Therefore, a lice management programme is generally needed.

On farms where lice are present or suspected, a lice management programme is required. Most farms have some degree of lice management programme in place, and usually the aim is to achieve control of lice - that is, to keep lice to below detectable levels and prevent any associated signs. The following are points that must be considered when developing a lice management programme for your farm.

Farmer goals

Farmers aiming for eradication require a concentrated, well-planned effort over a number of years. Farmers content with control require fewer quality inputs, but usually must treat annually.

Facilities and labour

Knowledgeable, trained personnel are required to mix and apply dip products. Correctly set-up, maintained and used equipment is vital for both pour-on and dipping treatments.

Wool length

Treating for lice in anything but short-wool sheep makes lice eradication more or less impossible and control more difficult, so should not be done routinely. Consider long-wool treatments an 'emergency treatment' only. Any sheep treated for lice in long wool should be re-treated after the next shearing with a product from a different chemical family from the long-wool treatment.

Shearing pattern

Lice control is easier when shearing is in summer, done more than once a year, and where flat combs are used. Lice are killed by exposure to the elements and dipping options are not limited by cold winter weather. Conversely, pre-lamb shearing with snow combs or blades removes fewer lice, leaves them in a more favourable environment, and limits options for application methods.

Degree of lice infestation

The greater the initial proportion of sheep infested and the greater the lice population on infested sheep, the harder control is.

Immunity

Well-fed, good-conditioned stock have superior immunity against lice.

Farm type

On some extensive properties, boundary integrity and complete musters are difficult.

Breed

Lice control is more difficult in finer wool breeds. This is often compounded by management factors such as shearing pattern and feeding.

Timing of lambing

For [quarantine](#) and health reasons, lice treatment (and shearing) should not be performed less than 6 weeks before lambing. If shearing after weaning, ideally shear lambs and treat all stock at the same time.

Correct dip

There are many sheep lousicides available in New Zealand. Ensure both the active and the method of application are backed by strong scientific evidence. If sheep are wet or rain is imminent, check the label or contact the manufacturer for advice as each product has different application requirements.

Chemical resistance

Synthetic pyrethroid-resistant strains of lice have been reported in New Zealand⁶. While the actual prevalence has not been measured, anecdotally this is thought to be widespread. There are no published cases of resistance to the other active families in New Zealand.

To help prevent the development of resistant lice, it is recommended to rotate chemical families for consecutive treatments, particularly after a long-wool treatment has been used.

Other ectoparasites

Many producers try to treat for lice and fly at the same time, but this can jeopardise lice control. Optimum lice control is always achieved in short wool (off-shears for pour-ons) which is generally too short to achieve good fly control. Flies are a temporary problem and should be dealt with separately.

If both fly and lice are to be treated at once, shower or plunge dip no later than 8 weeks (fine wool) or 12 weeks (strong wool) off shears, or use a pour-on with a long-wool lice claim.

For the control of other ectoparasites such as keds, itchmite and mange, discuss with the manufacturer or a well-informed animal health adviser.

Lice control methods

The aim is to place clean chemical over the entire skin surface at a concentration lethal to lice on 100% of animals. Furthermore this must be achieved with minimal impact on people, stock and the environment.

As the fleece is a large, oily waterproof coat and lice live only on sheep, the key factor to success is timing of application to ensure short wool. The time of year is not so important.

Short wool minimises the 'dilution effect', increasing the chemical concentration where lice live and feed - the skin surface. Application is also easiest, lice numbers are lowest, and lice are under the most environmental stress on recently shorn sheep. Furthermore, it is less costly and stressful on stock and results in the least chemical residue in the fleece at the next shearing.

Read all labels and use products in accordance with the manufacturer's recommendations. Maintain a dip diary of dates, mob details, wool length, chemical and rates. It is very useful for reference for withholding times and dip failure investigations.

Pour-on

Pour-ons are ready-to-use products applied by hand on to the back of each animal. The high concentration of applied active spreads around the body in the layer of grease that coats the surface of the skin and wool. It can take several days to weeks for a pour-on to disperse around the animal, even in products claiming immediate 'knock-down' effects^{7,8}.

Pour-ons are popular because of:

- ease of use
- low capital outlay
- low sheep stress
- off-shears application (hence no re-muster)

The main differences between pour-ons are found in the active, the concentration and volume of active ingredient and the type of formulation (aqueous or solvent).

An aqueous formulation (e.g. COOPERS MAGNUM) which either suspends or dissolves the active in water, tends to be less irritating to the skin and eyes and produces less vapour.

Solvent-based pour-ons dissolve the active to form a solution. Solvent-based products can be an irritant to people and can react with certain plastics (e.g. incompatible drench guns, water-proof over-trousers).

Timing

Regardless of label claims, all pour-on products are best used within 24 hours of shearing. In addition to the short wool advantages, sheep markedly increase grease production within 24 hours of shearing⁹. Active binds more readily and lice preferentially feed on this fresh grease. The use of long wool pour-ons should only be considered an emergency treatment, never part of a routine lice control programme.

Method

Sheep must be cleanly shorn and have no skin disease. Retention of belly wool, the use of snow combs or blades, or patchy wool after shearing due to cotting, matting or poor shearing technique make pour-on treatments less effective.

Pour-ons must be applied in a broad continuous midline band (about 10 cm wide) from the poll (area between the ears) to the tail on all animals. This can be achieved with a single application or the dose can be split and applied from the head to the middle of the back and then from the tail to meet the first in the middle of the back.



Figure 5: Proper pour-on application technique, showing continuous midline band from poll to tail.

Be careful to stay on the midline, so that product is applied either side of the spine. Deviating from the midline can result in product dispersing down one side of the animal only, leaving the opposing side untreated (see photo below).



Figure 6: Deviating from the midline will leave the opposing side untreated

Depending on brand, products are 'sprayed' using a nozzle or 'poured' using a T-bar. All COOPERS pour-on products should be applied using a COOPERS T-bar applicator.

To prevent under-dosing, base the volume for a mob on the heaviest, longest-woolled or finest-breed sheep, whichever is appropriate. Consider the label dose volume a minimum. If correct application cannot be achieved, adjust the volume upwards until it is.

Before use, calibrate the gun by setting the dose volume to, say, 10mL and squeezing 10 doses into a graduated measuring cylinder. Check that 100mL has been delivered.

Wet dipping

Wet dipping is the application of diluted dip products by either saturation (plunge or shower) or jetting (hand or jetting races).

The keys to success with wet dipping are:

- correct concentration
- clean dipwash
- short wool
- wetting the entire skin surface of all sheep.

The aim (with the exception of plunge dipping) is to deliver large droplets of dipwash, in high volumes, vertically to the back. The dipwash penetrates between the wool fibres to the skin and runs around the body at skin level to drip off the belly. Fluid hitting the fleece at an angle or as an aerosol (due to small nozzles/excessive pressure) is deflected and does not penetrate to the skin.



Figure 7: Checking wool is wet to skin level

Use an indelible pencil to check the degree of saturation after dipping - if the colour runs when applied to the skin, wetting to skin level has been achieved. Follow the label dilution ratios during *charging* and *replenishment* of sumps and supply tanks.

Always mix thoroughly, initially with a paddle, then by either recirculating jetting equipment, running the top sprays in an empty shower dip for 3 minutes, or by dipping 20-30 sheep in a plunge dip. Note these sheep should be re-dipped later. Dipwash may settle, so remix if left for even a few hours.

Most dips are compatible with zinc sulphate and bacteriostats, but always check the label. Copper sulphate stains wool and must not be used. Wetting agents should not be added because they alter the stripping rate.

Ideally, dip shouldn't be left unused overnight. If dip is held, a bacteriostat should be added to clean dipwash before dipping any sheep.

Automatic jetting races

As automatic jetting races don't wet all sheep to skin level, they are not currently recommended for the eradication or optimum control of lice. If they conform to minimum standards that can achieve an absolute minimum of 1.5L per sheep off-shears, and are used off-shears, control of lice may be achieved¹⁰. A much larger volume of water is required for long wool.

Hand-jetting

Eradication of lice is rarely achieved with hand-jetting, which is mainly used as an emergency treatment in long-woolled sheep to control lice. The skin is thoroughly wet by combing the multiple nozzles of a jetting wand through the fleece in a band about 25cm wide from poll to tail and on the sides of the neck (Figure 8). A minimum of 0.5 litres of dipwash per month of wool growth per sheep is recommended.

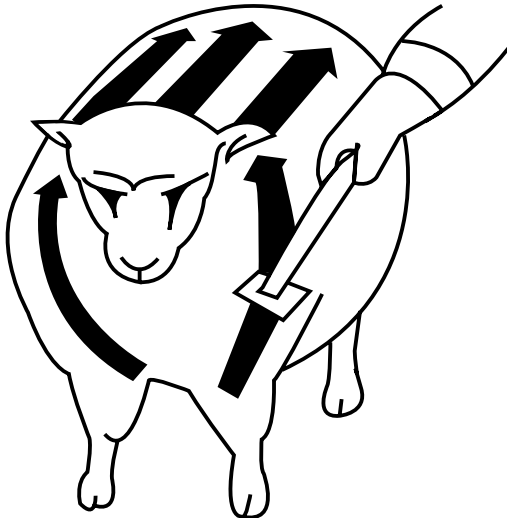


Figure 8: Hand jetting technique.

Saturation dipping (shower or plunge)

The eradication of lice is possible if saturation dipping is used correctly. However, due to contamination of dipwash, errors in dilution, or inadequate performance, this is not achieved on many farms.

Sheep should be saturation dipped within 3-4 weeks of shearing. The minimum interval off-shears is 2 weeks (this gives shearing cuts a chance to heal). The maximum interval off-shears is 8 weeks for fine wool and 12 weeks for strong wool.

Because there is initially no suint (the water-soluble fraction of wool grease) in the dipwash, the first few batches of sheep are harder to wet. It is therefore recommended that the first two or three batches be re-dipped.

To minimise dipwash contamination, ensure:

- dips are covered when not in use
- races leading to the dip entry are of rough concrete or slats to remove dirt from the feet
- filter screens, dip enclosures, forcing draining pens are cleaned before and during dipping
- sheep are dag free and yarded overnight with access to water only.

Sumps should be emptied and cleaned after one sheep for every 2L of the volume of the sump has been dipped. For example, a 4,000L plunge dip = 2,000 sheep, or 1,000L shower sump = 500 sheep dipped before cleaning out.

Under very dirty conditions, e.g. muddy yards, fewer sheep per volume of dipwash can be dipped before cleaning out is necessary. Plunge dips are dirtier than shower dips as the dipwash doesn't pass through dirt traps and filter screens.



Shower dipping

Shower dipping is the dilution and pumping of dipwash from a sump through an overhead boom and (possibly) bottom spray nozzles. Ensure dipwash is sprayed evenly on the backs of all sheep from the top spray nozzles (the most important). Bottom sprays don't wet the sheep any better than using the top sprays alone and are a major cause of spray drift, so their use is no longer recommended¹¹.

There is no 'correct' time for sheep to spend in a shower dip. Research with short-wool Merinos suggests 12 minutes/pen is required¹². The time should be adjusted, depending on wool length, body size, breed and the efficiency of the shower, until sheep are wet to skin level. Once a suitable time is established, use a timer for consistency. Sheep in the dip should be of uniform size, and able to move freely.



Figure 9: Sheep should be wet to skin level during shower dipping.

Plunge dipping

In addition to the general guidelines to saturation dipping above, sheep should swim at least 9m and remain in the dip for at least 60 seconds. This can be an issue in some mobile swim dips. Sheep should be dunked (ideally backward) at least twice, not including the 'splash' entry. One of the dunkings can be replaced by a spray bar or nozzle. Use constant replenishment, in preference to traditional intermittent replenishment and *reinforcement*.

Stock health

Mustering, holding and shearing sheep increases the risk of conditions such as smothering, pneumonia, pregnancy toxæmia (sleepy sickness), clostridial disease and cold stress. Wetting the fleece and holding wet sheep increases the risk of lumpy wool, fleece rot and cheesy gland. Saturation (in particular plunge) dipping presents the further risk of drowning and post-dipping lameness.

Reduce the risk of bacteria spreading by:

- dipping lambs first and chronically infected sheep last
- using disinfectants
- leaving draining pen gates open
- allowing sheep to move slowly back to their paddock, avoiding close contact before they dry.

Minimise the risk of poisoning by not dipping thirsty sheep and preventing dogs and other animals from drinking dipwash.



Lice control chemicals

Insect growth regulators (IGRs)

Insect growth regulators kill immature insects by interfering with moulting. Immature lice are killed as IGRs affect their moulting process (indicated by the red crosses in Figure 10). Adult lice are not affected, and die of 'old age' over about 14 weeks. However, after a few weeks, adult female lice appear unable to produce viable offspring.

IGRs pose little risk to humans or animals and are not classified as acutely toxic. Four IGR actives are available in pour-on or saturation products in New Zealand (Table 2).

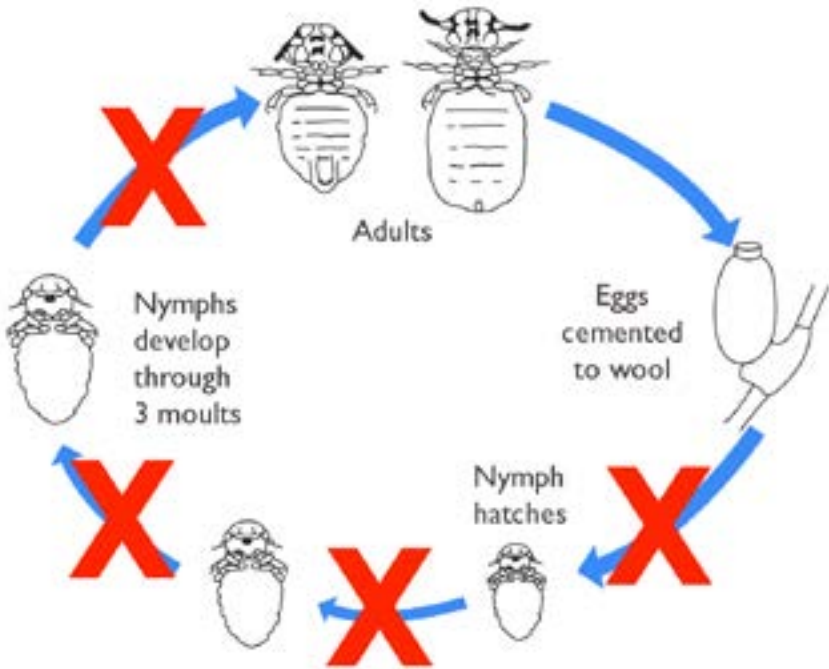


Figure 10: Action of IGRs against stages of sheep body louse lifecycle.

Two IGR actives (diflubenzuron and triflumuron) are effective in both the control of lice and the prevention of flystrike. The other two (cyromazine and dicyclanil) are active against fly larvae only.

Table 2: Insect growth regulators

IGR 'Family'	IGR Active	Lice Control	Fly Control
Benzoyl Phenyl Ureas	Diflubenzuron	✓	✓
	Triflumuron	✓	✓
Triazine derivatives	Dicyclanil	X	✓
	Cyromazine	X	✓

Synthetic Pyrethroids (SPs)

SPs kill adult and juvenile parasites by acting on the nervous system. SPs also present minimal risk to animals and people, although some people suffer skin and eye irritation if they come in direct contact. Most SPs are available in pour-on products.

Organophosphates (OPs)

OPs rapidly kill juvenile and adult parasites by inhibiting enzymes within the nervous system. The OPs came into use on sheep in the 1950s¹³ and are still commonly used for lice in some areas, although the introduction of safer products has seen a decline in their use for lice control. The OPs are poisonous to humans, either through swallowing or absorption through the skin. Nevertheless, following personal safety recommendations will minimise the risks.

Macrocyclic Lactones (MLs)

MLs rapidly kill adult and juvenile parasites by acting on the nervous system. Primarily used in drenches, when MLs are applied topically they control flystrike and lice, and effectively treat active strike. MLs produce low wool residues and pose little risk to humans.

Newer chemical families

Recently, two actives from 'newer' chemical families have become commercially available for the control of lice:

- Spinosad, a spinosyn, kills adult and juvenile parasites by acting on the nervous system. Spinosyns are useful to treat animals with lice and active flystrike (but provide only short-term flystrike prevention), and produce low residues in meat and wool
- The neonicotinoid, imidacloprid, interferes with the nervous system, killing adult and juvenile parasites

Both of these actives pose little safety risks to humans or other animals.

Operator safety

Handle all chemicals with care. Although an active ingredient may be considered low risk, other components of the formulation may not be. Read the label and SDS (Safety Data Sheet) carefully.

Users are responsible for safe transport, storage, dilution, application and disposal of dip, dipwash and used containers. They are also responsible for the prevention of human exposure to treated sheep following application.

Avoid insecticide contact with skin, eyes or mouth. Wear and maintain appropriate protective clothing (as recommended on the label) when handling chemical, dipping or dipped sheep. Don't rub your face, smoke, eat or drink during dipping. Wash your hands, arms and face thoroughly with soap and water after handling insecticides, especially before eating, drinking or smoking. Wash all clothing (including gloves and leggings) separately from other clothing.

Use well-designed facilities that minimise chemical fumes, spray drift, splashing and contact with wet sheep. Ensure dipping is the last procedure if sheep are to be handled a number of times.

Disposal of used containers and dipwash

All modern chemicals bind readily to soil and break down rapidly. However, they are all potentially harmful to non-target insects, especially aquatic invertebrates. Every effort must be made to prevent contamination of waterways with the product or empty container. If a potential environmental emergency occurs with a COOPERS dip concentrate or dipwash, specialist advice can be sought by phoning: 0800 CHEMCALL (0800 243 622).

Used containers should be triple-rinsed or pressure-washed with water. Add the rinsings to the used dipwash.

Cleaned empty containers should be punctured and taken to your local AgRecovery collection site, or to a suitable landfill. Products belonging to the AgRecovery programme, including all COOPERS products, can be recycled free. Unused or expired product can be dispensed of through Agrecovery Chemicals Recovery. To locate your nearest AgRecovery collection site, visit www.agrecovery.co.nz or phone 0800 247 346. Empty containers should not be burnt.

Dipwash and sump sludge is best deposited onto flat ground high in organic matter and away from dwellings, dams, ponds and waterways. The site should have a deep layer of old silage or hay and be surrounded by a low soil bund about 15cm high. Stock or people should be excluded from the area. If applied to pasture, apply at a maximum of 5000 litres per hectare, preferably to recently cultivated land high in organic matter. Stock must not graze the area for at least 28 days. Do not allow puddles to form, as these may lead to ground or surface water contamination.

Withholding periods

Meat

Meat withholding periods (WHP) are rigorously reviewed by the Ministry for Primary Industries and reflect the importance of preventing chemical residues in meat. It is an offence to cause residues exceeding the relevant Maximum Residue Limit in the New Zealand Food Standards; therefore all withholding periods on product labels should be strictly adhered to.

Wool residues

Wool harvest intervals are generally not reviewed by regulatory authorities and most products have a recommended period of 60 days on the label. If treating sheep with longer wool, the following wool harvest intervals are recommended:

- 60 days for crossbreds (strong wool)
- 100 days for mid-micron (medium wool)
- 180 days for fine wool breeds

While these standards are generally effective, some residue may remain. The rate at which insecticide residues break down in wool depends on the product applied, the breed of sheep, wool length and application method. Residues are removed during scouring. However if the remaining scour effluent (which contains most of the residues) is not fully treated, there is a potential to contaminate waterways and the environment¹⁴. Concerns about the environmental impact of insecticides in raw wool and wool scour affect the marketing of New Zealand wool. Wool harvest intervals apply to fleece wool following shearing, not to crutchings or fellmongered wool.



COOPERS lice products

COOPERS offers a range of lice control products.

MAGNUM®

Available in 2.5L and 20L packs

- Safer, water-based IGR pour-on
- Contains the active ingredient diflubenzuron
- Nil meat withholding period
- Prevents flystrike and controls lice
- COOPERS Guarantee lice control when the 10 Point Lice Management Plan is followed

The convenient choice. The only water-based IGR pour-on with a nil meat withhold that prevents flystrike and controls lice.

When you treat your sheep with COOPERS MAGNUM, following the COOPERS 10 Point Lice Management Plan, you can rest assured that lice will be controlled in your flock.

We're so confident MAGNUM will work, that if it doesn't deliver - we'll replace the product free of charge. That's our promise to you.

Visit www.coopersonline.co.nz for information on the COOPERS 10 Point Lice Guarantee



ZENITH® Concentrate

Available in 5L and 10L packs

- Safer, water-based IGR saturation dip
- Contains the active ingredient diflubenzuron
- Nil meat withholding period
- Prevents flystrike and controls lice

The dipper's choice. A safer IGR saturation dip with a nil meat withhold that prevents flystrike and controls lice.



VANQUISH®

Available in 10L packs

- Powerful SP pour-on for the control of lice in long wool
- Contains the active ingredient alpha-cypermethrin
- 7-day meat withholding period
- Control of lice in up to 10 months wool growth, in any breed



The long-wool lice solution.

WIPE-OUT®

Available in 1L and 11L packs

- Trusted SP pour-on
- Contains the active ingredient deltamethrin
- 3-day meat withholding period



The trusted SP lice solution.

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