

Recommendations for integrated buffalo fly control



WHY HAVE INTEGRATED CONTROL OF BUFFALO FLY?

The aim of an integrated buffalo fly control program is to enable producers to:

- Reduce buffalo fly numbers to acceptable levels for efficient production
- Ensure the welfare of animals
- Reduce reliance on chemicals for control by using non-chemical alternatives
- Prolong the effective lifespan of chemicals used in fly control
- Minimise chemical residue risks

Key points

The following recommendations should be considered in buffalo fly control programs:

1. Use non-chemical control wherever possible

- Do not treat unless flies are building up to numbers that are likely to cause significant welfare or economic problems.
- Control fly levels by non-chemical means such as buffalo fly traps and dung beetles.
- Cull cattle that are hypersensitive to buffalo flies with irritation and skin sores even when fly numbers are low.

2. Delay chemical treatment for as long as possible

- Monitor cattle and only treat with chemicals when there are more than 200 flies per animal (100 on each side of the animal) or when the more susceptible animals such as bulls, show “fly worry”.

3. Only use chemicals that are still clearly effective

- Synthetic pyrethroid (SP) chemicals should provide protection for up to 21 days when flies are not resistant. A few days control after use of a SP indicates fly resistance to the insecticide.
- SP ear tags which contain a potentiator are presently effective against SP resistant flies.

4. Integrate fly control into worm and tick control programs

- Macroyclic lactone (ML) pour-ons control worms, ticks and lice as well as buffalo fly. They are expensive and are best used when it is appropriate to treat for more than one parasite.
- The end of the fly season in autumn and early winter is also an important time to treat for worms and lice. Use of a ML pour-on at this time will control a range of parasites with a single application.

- In North America the use of a ML pour-on at the end of the horn fly season appeared to decrease the level of resistance to other chemical classes in the following fly season.

5. Use self-application methods such as ear tags during the peak fly season

- Back rubbers, dust bags and traps should be operational throughout the whole season when flies are present.

6. Apply treatments at the beginning or end of the fly season if needed

- Sprays or pour-ons can be applied to cattle prior to, or following, the use of ear tag control methods if fly numbers are excessive.

7. Follow manufacturers' instructions

- Mix and apply chemicals according to label instructions to avoid under or overdosing.
- Remove ear tags at the end of their effective lifespan – either 10 or 16 weeks depending on product.

8. Coordinate control programs with neighbours

- When treating beef herds use the same chemicals and treat at the same time as neighbouring properties if possible.

9. Rotate chemical groups

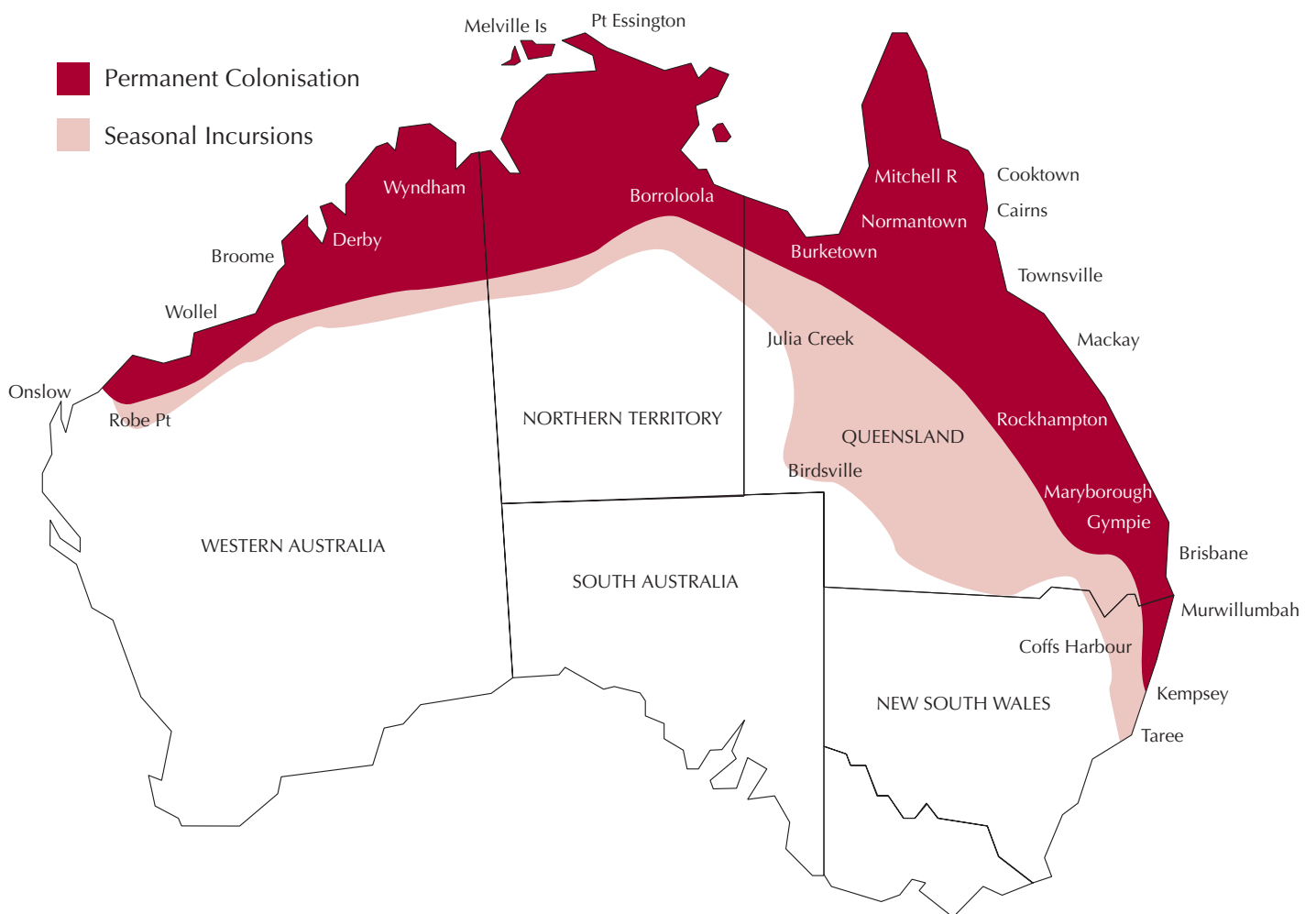
- To prolong the effectiveness of the chemical groups available for fly control do not use the same chemical year in year out.
- Do not use organophosphates (OPs) for more than two seasons in a row.
- Do not use SPs continuously for more than one year.

Distribution

The buffalo fly is a parasite of cattle and buffalo in northern Australia. This small biting fly (*Haematobia irritans exigua*) was accidentally introduced into northern Australia from Asia in the mid-nineteenth century. Since that time they have slowly spread through the Northern Territory, northern Western Australia and Queensland.

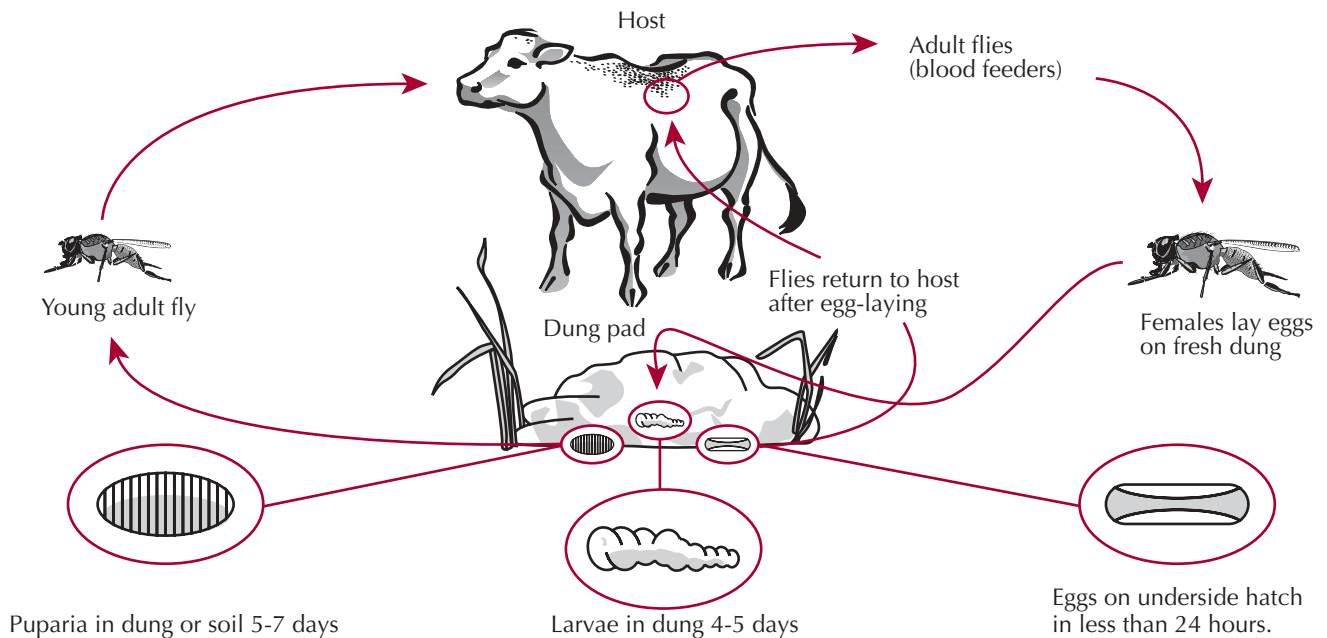
By 1977 they had moved down the east coast of Queensland as far as the Brisbane Valley, and in 1978 crossed into north eastern NSW. By autumn 2000 infestations were seen as far south as the Manning Valley on the mid north coast of NSW.

Figure 1: Distribution of buffalo flies in Australia



Lifecycle

Figure 2: Lifecycle of the Buffalo Fly



Adult buffalo flies live for 10–20 days on a cattle host, sucking blood 10 to 40 times per day. Females leave briefly to lay their eggs in fresh cattle dung before returning to a host, as they can only survive for one or two days away from an animal.

Fly eggs hatch in the dung pat within 24 hours. Fly larvae live in the dung pat and develop into young adult flies

which emerge nine to 40 days later, depending on temperature. Development is most rapid in hot humid weather. Young flies emerge from the dung pats at night and can fly up to eight kilometres to find a cattle host. The buffalo fly life cycle, from egg to egg, takes only 14 days under optimal conditions.

Effect on cattle

Buffalo flies are blood-sucking insects and heavy infestations cause severe irritation to cattle. The constant irritation of painful fly bites causes distress and disrupts grazing time. Hide damage results from constant rubbing as cattle try to relieve fly irritation. Buffalo flies can also transmit a small parasitic worm, *Stephanofilaria*, which causes sores around the inner corners of the eyes and on the neck, face, shoulders and underline. These sores can vary from small, hairless areas to saucer-sized, raw ulcerated lesions.

Some cattle are “allergic” to buffalo fly bites and are intensely irritated by only a few flies, leading to excessive rubbing that also results in raw ulcerated lesions. Most cattle tolerate much larger fly numbers. Bulls, older cattle and those in poor condition usually carry the heaviest fly burdens. Dark coated cattle seem to attract more flies than those with lighter coat colour. The prevalence of skin sores is higher in bulls than steers and lowest in cows.

Economic effect

Buffalo flies can cause production losses due to lowered weight gain, lowered milk yield and permanent hide damage.

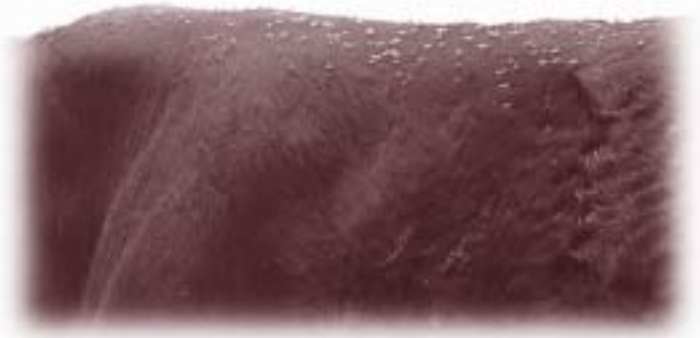
One Queensland study showed that steers protected from buffalo flies had a 14% increase in live weight gain over a 13-month period compared to unprotected steers. Another Australian study investigated weight gain over 21-weeks. Cattle that were protected from buffalo flies gained an additional 33kg compared to unprotected animals.

In dairy cattle, estimates suggest that a moderate level of buffalo fly infestation can result in losses in milk yield of approximately 0.5 litres/cow/day. This loss is also important in lactating beef cattle. North American studies into the control of a very similar parasite, the horn fly, have shown significant increases in calf weaning weight and milk production when cows were protected from horn flies. Horn flies also lower sexual libido in bulls resulting in reduced reproductive efficiency.

Buffalo fly costs producers up to \$30 per head each year in lost production if cattle are not effectively treated. It is estimated that Australian cattle producers spend at least \$4–6 million annually on chemicals to control buffalo fly

and this does not include mustering costs. The total cost of this pest to the industry is at least \$20–30 million each year.

Most cattle in a herd can tolerate a certain level of buffalo fly infestation without significant production losses occurring. The economic threshold, above which treatment is recommended, has been estimated to be 200 flies per animal. Treatment is also indicated when cattle show unacceptable fly irritation.



Treatment can be delayed until 200 flies (100 each side) are present.

Producer surveys

Buffalo fly was rated as the most important animal health issue affecting beef cattle profitability by 68% of 2,165 cattle producers in a 1990 Queensland survey. A survey of 199 Queensland dairy farmers in 1997 also identified buffalo fly as a major concern, with 55% of farms having a significant fly problem. The main areas of concern in respect to buffalo fly were animal welfare (42%) and lost production (40%). A 1997 Queensland Department of Primary Industry survey reported that 98% of beef herds were affected by buffalo fly and two-thirds of producers used buffalo fly treatments. All dairies in the survey treated their cattle for this pest.

Surveys of over 200 producers in northern coastal NSW in 1992/3 also identified buffalo fly and its control as a significant issue. The major reasons for treating included animal welfare, skin sores and production losses.

These surveys also revealed widespread chemical misuse. Areas of concern included the use of chemicals that were not registered for cattle or for buffalo fly control, incorrect application of registered chemicals and incorrect treatment intervals. Insecticide impregnated ear tags were often not removed as recommended at the end of their effective lifespan. Chemical misuse can lead to meat or milk residues and hasten the development of fly resistance to insecticides.

Control of buffalo fly

Control of buffalo fly in Australia has relied primarily on chemical insecticides. Historically, spraying, pour-ons and dips were the most popular methods of fly control. In the early 1990s the first insecticide impregnated ear tag system was launched onto the Australian market. Ear tags now dominate the buffalo fly control market.

Unfortunately fly resistance to some insecticides has developed. Chemical use also increases the risk of residues in meat and milk for both the domestic and export markets.

An integrated control program using non-chemical control methods in conjunction with strategic chemical treatments only if required is now recommended.

Non-chemical control options

A variety of non-chemical control strategies are available:

1. Buffalo fly traps

Two types of buffalo fly traps are now available:

a) The buffalo fly tunnel trap consists of a short darkened tunnel through which cattle pass regularly. Due to changes in the light level on entering the tunnel, flies leave the animals and are subsequently caught in cages attached to the tunnel sides. The trap is simple to build and can reduce fly numbers on cattle by 60–70%.

Traps are ideal for beef cattle properties and dairy farms where access to water or supplements can be controlled. Cattle easily learn to use the tunnel as it has no internal obstructions, especially once they discover the relief of fly control.

Buffalo fly tunnel traps are built from a demountable steel frame with the sides and roof covered with black plywood panels. A window is cut into each side panel and a fly trap cage made from aluminium fly screen over an aluminium frame completely covers each window. Other building materials are currently being evaluated.

The cost of purchasing a tunnel trap varies from \$1,000 to \$1,500 depending on materials. This can be reduced if built on-farm. Savings in labour and chemical expenses should make the trap economically worthwhile over a five year lifespan, especially for herds greater than 50 head.

For more information and designs for the buffalo fly tunnel trap, go to <http://www.dpi.qld.gov.au/beef/11925.html>.

b) The buffalo fly brush trap consists of a clear plastic tent. Flies are brushed off as the cattle move through the tent and become trapped inside a solar heated dome where they quickly die of dehydration. These traps can remove up to 90% of flies each time cattle pass through. Provided cattle walk through the trap every 1 to 2 days, sufficient fly control is often achieved without the need for insecticides.

Brush traps cost around \$3,800 to install. They are available through rural merchandising stores or from Range Motor Trimming on (07) 5499 9066.



Buffalo fly tunnel trap

2. Culling allergic cattle

A small number of cattle in a herd become intensely irritated by buffalo flies and have severe skin lesions caused by rubbing activity. Treatment of the whole herd is often based on the severe response exhibited by these few cattle. By culling sensitive animals, treatment need not be given until fly numbers build up and the herd as a whole is starting to show “fly worry”.

3. Dung beetles

Buffalo flies breed only in cattle dung, laying eggs in freshly dropped dung pats. Dung beetles break down and bury the dung pats in order to feed their larvae, which live in underground burrows. Buffalo fly larvae cannot survive in buried dung and starve and die if the remaining dung becomes too dry.

Trials in Queensland have suggested that when dung beetle numbers were high their activity lowered buffalo fly emergence almost four-fold compared to that of beetle free pats. However in dry seasons or cool weather beetle numbers were reduced and had little impact on buffalo fly numbers. In a study in NSW there did not appear to be effective control, as fly numbers were just as high on farms with dung beetles as those without. Overall it appears that dung beetles may aid in the control of buffalo fly but the level of control varies between and within seasons.

Dung beetles can be harvested from areas where they are well established and released into other areas to increase overall beetle activity. To achieve maximum dung burial from spring to autumn, it is desirable to have four or five different species of dung beetle complimenting each other's activities.

Some synthetic pyrethroid insecticides and macrocyclic lactone chemicals can make cattle dung toxic to dung beetles or their larvae. The use of these chemicals should therefore take into consideration the need to protect dung beetle populations. Dung beetle populations are particularly sensitive to chemical usage in early spring, as most beetle activity occurs in the spring after rain. Beetle activity continues at variable rates through to autumn, depending on rainfall. Treatments that affect dung beetles should be avoided during these times. The insecticides in ear tags are unlikely to affect dung beetles, as little chemical is excreted in dung, although no studies have been conducted to confirm this. Further information on the insecticidal activity of chemical residues in dung is provided in Table 2.

Further information on dung beetles is available in the CSIRO publication *Common Dung Beetles in Pastures of South-eastern Australia* – call 1800 645 051 to order. Live dung beetles can be purchased from John Feenan (02) 6248 0376.



Cattle affected by fly worry

Chemical control options

There are four major chemical groups used in buffalo control programs:

- Synthetic pyrethroids (SPs)
- Organophosphates (OPs)
- Macrocyclic lactones (MLs)
- Carbamates

Combination OP and SP sprays are also available.

These chemicals are available in a variety of forms including insecticide impregnated ear tags, pour-ons, sprays, dips, dust bags and back or side rubbers.

Below is a suggested program of treatments and when they should be applied. Table 2 contains a complete list of the products available. These should be used in conjunction with non-chemical control options.

Spring	Summer	Autumn	Winter
BACK RUBBERS or DUST BAGS or FLY TRAPS			
OP SPRAY (if flies are a problem early in the season)	EAR TAGS for 10 or 16 weeks when fly numbers exceed acceptable levels (Use OP tags for 2 years – then a SP tag for 1 year)	OP or SP SPRAY* – or ML POUR-ON (if flies remain a problem after tag removal) * Use OP spray after SP tags or SP spray after OP tags	

Ear tags

Insecticide impregnated plastic ear tags are the most widely used method of buffalo fly control in Australia. The tags slowly release OP or SP insecticides over a defined period. Cattle grooming and interaction deposits chemical from the tags onto the shoulders, back and flanks of treated animals. All cattle in a mob should be tagged correctly. Tags must be removed as recommended by the manufacturer (after 10 or 16 weeks) to avoid flies being exposed to sub-lethal concentrations of the chemical. Ear tag manufacturers often pay a rebate for the return of used tags that have been removed at the correct time after application.

Sprays

OP and SP chemicals can be applied as backline or full body sprays. The chemicals are relatively cheap however multiple treatments are required throughout the season. Sprays must be mixed and applied correctly in order to obtain effective chemical levels on the cattle. Failure to apply adequate amounts of insecticide will lead to poor fly control and may hasten the development of resistance to the chemical. Cattle should be treated in a race rather than in a holding yard to ensure each animal gets the correct dosage. A single spray application at yarding (eg weaning) will only have a temporary effect and is unlikely to improve overall fly control. Misting spray over a yard full of cattle is not effective, leading to poor fly control, and possible promotion of resistance.

Pour-ons

Pour-on products containing SP or ML chemicals help to control buffalo fly. ML pour-ons also control worms, ticks and lice. Cattle must be weighed prior to treatment to determine the correct dose, which should be applied through the recommended applicator in a long strip down the middle of the backbone. Application guns should be calibrated and checked prior to and during use to ensure the correct dose volume is being applied. The whole mob should be treated to ensure effective control is achieved. This is an expensive method of control if used for buffalo flies alone.

Plunge dips

The use of plunge dips for fly control is decreasing due to the expense of maintaining dips and producer preference for pour-on products for tick control. Combination OP/SP products are usually used in plunge dips. Dip chemicals must be maintained at an adequate concentration at all times to maintain effectiveness.

Back rubbers/ side rubbers/ rubbing posts

These devices allow self-application of OP chemicals when cattle rub against them as they try to gain relief from fly irritation. They usually consist of absorbent material soaked in a mixture of insecticide and oil fed from a reservoir. The reservoirs should be checked regularly to ensure that the chemical and oil mix does not run out.

The success of rubbers depends on the frequency with which they are used by the animals. They are economical and suitable for sites where cattle congregate such as watering points, cattle camps, cattle pads or supplementary feeding points.



Dust bags

Dust bags contain a carbamate insecticide and rely on the regular passage of cattle under the bag. As the cattle brush the underside of the bag, chemical dust is automatically released. The bags can be used in areas where forced passage is usual such as dairies, feedlots or gateways to water. Alternatively they can be used in paddock situations in areas where cattle gather, such as cattle camps, under shade trees, at watering points, on paths

or in laneways. Cattle tend to educate themselves over time that rubbing against the bag will keep fly numbers down. Dust bags require regular use for effective control. Fly control may not be apparent for one to two weeks after cattle begin to use the bag, as it takes 7–10 days of repeated use for the dust to reach an effective concentration on the coat.

Recommendations for integrated buffalo fly control

Table 1: Advantages and disadvantages of different application methods

APPLICATION METHOD	ADVANTAGES	DISADVANTAGES
Ear tags	<ul style="list-style-type: none"> • Effective for 8 or 16 weeks • Cattle usually only need to be tagged once each season • Nil withholding period (WHP) and export slaughter interval (ESI) 	<ul style="list-style-type: none"> • Labour intensive to apply • Tags must be removed 10 or 16 weeks after insertion • Tags must be removed before slaughter • Failure to remove tags may promote resistance
Sprays	<ul style="list-style-type: none"> • Relatively cheap 	<ul style="list-style-type: none"> • Multiple treatments required throughout the season • Up to 21 day ESI for some products • Chemicals must be mixed and applied correctly • Many SP's toxic to dung beetles
Pour-ons	<ul style="list-style-type: none"> • Easy to apply • Can be used for integrated parasite control as many pour-ons also treat worms, ticks and lice 	<ul style="list-style-type: none"> • Long ESI for most products • Repeated treatments required • Some products expensive • Some products may be toxic to dung beetles if applied at times of the year when immature beetles are present
Back rubbers	<ul style="list-style-type: none"> • Low cost • Self treatment 	<ul style="list-style-type: none"> • No control over dose per animal • 10 day ESI • Must use clean oil
Dust bags	<ul style="list-style-type: none"> • Low cost • Self treatment • Nil WHP and ESI 	<ul style="list-style-type: none"> • Daily application needed • Suitable hanging site essential for effective control • Fly control may not occur for 1–2 weeks after cattle begin using bag as insecticide concentration must build up on coat

Chemical residues

Australian beef currently has a “clean” image worldwide with regard to chemical residues and contaminants. Australia exports 77% of its beef, veal and buffalo production. These beef exports were valued at \$3.15 billion in 2000/01. It is vital that residues are not found in exported meat as this could have devastating effects on trade and tarnish the Australian meat industry’s proud record of supplying “clean” food.

Producers who use chemicals in the control of buffalo flies must follow manufacturers’ instructions. There are two sets of requirements for use of buffalo fly control chemicals:

1. A legally set **Withholding Period (WHP)** which applies to each chemical registered for use in or on livestock in Australia. The WHP between treatment and slaughter safeguards consumers against chemical residues that may affect human health.

2. The **Export Slaughter Interval (ESI)** is the recommended time period between treatment and slaughter to ensure compliance with export standards, as other countries may have a lesser or zero tolerance for chemicals used in Australia.

Producers must by law obey the WHP stated on a product label. ESIs are voluntary guidelines, however it is highly recommended that producers comply with the ESI as their cattle may be processed for the domestic market, the export market or both. The WHPs and ESIs for products used in buffalo fly control are listed in Table 2.

Chemical treatments

The following table helps to identify the products in different chemical groups:

Table 2: Buffalo fly treatments

CHEMICAL GROUP	PRODUCT NAME	MEAT WITHHOLDING PERIOD (DAYS)	EXPORT SLAUGHTER INTERVAL (DAYS)	INSECTICIDAL ACTIVITY IN DUNG
SP (SYNTHETIC PYRETHROID)				
Ear tags#	Python	0	0	Probably not
Sprays	Cypafly+	3	3*	Yes
	Sumifly	0	0	Yes
	Supershield (contains natural pyrethrins)	0	Not determined	No information
Pour-ons	Coopafly	0	21	Yes
	Demize	14	28	No information
OP (ORGANOPHOSPHATE)				
Ear tags#	Optimizer	0	0	Probably not
	Spike	0	0	Probably not
	Warrior	0	0	Probably not
	Patriot	0	0	Probably not
Sprays	Nucidol 200 EC	3	3	No information
	Supona BF+	0	0	No information
	Di-Jet	3	3	No information
Backrubbers	Di-Jet	3	10	No information
	Nucidol 200 EC	3	10	No information
	Supona BF+	0	10	No information
SP/OP COMBINATIONS				
Sprays	Barricade S+	8	21	Yes
	Blockade S Dip & Spray+	8	21	Yes
	Tixafly+	0	21	Yes
ML (MACROCYCLIC LACTONE)				
Pour-ons	Baymec Pour-on+	42	42	Yes
	Dectomax Pour-on+	42	42	Yes
	Eprinex Pour-on	0	0	Yes
	Ivomec Pour-on+	42	42	Yes
	Paramax Pour-on	42	42	Yes
	Virbamec Pour-on+	35	42	Yes
	Virbamec LV Pour-on	42	42	Yes
	Genesis Pour-on	21	21	Yes
	Dairymec Pour-on	42	42	Yes
	Beefmec Pour-on	42	42	Yes
	Virbamax Pour-on	42	42	Yes
	Ecomectin Pour-on+	42	Not determined	Yes
	Noromectin Pour-on	42	Not determined	Yes
	Paramectin Pour-on	35	42	Yes
CARBAMATE				
Dust bags	Ficam Gold	0	0	No information

†Adapted from Wardhaugh KG (CSIRO Contracted Report No. 56). The significance on dung beetle populations of chemical residues in manure varies, depending on the time and frequency of treatment and the percentage of the herd treated.

Remove ear tags before slaughter to prevent possible contamination.
+ Do not use in lactating dairy cows.

* The ESI is based on the correct re-treatment interval being applied.

Chemical resistance

Parasites including buffalo flies can become resistant to insecticides. If the chemical dose is insufficient to kill all the population, the strong survivors breed and multiply. This leads to a gradual build-up of resistant strains of flies. Chemical resistance is usually seen in the field as a reduced protection period.

SPs were the first class of insecticide to which resistance developed in buffalo flies. OP resistance has been reported in some areas of Australia and has emerged in the USA in the closely related horn fly. The more frequently a chemical is used, the more quickly resistance will develop to that chemical. The use of sub-lethal levels of chemicals also promotes the development of resistance. This can occur when chemicals are mixed or applied at lower than

recommended concentrations or dose rates, or when insecticidal ear tags are not removed at recommended times.

Field surveys of chemical resistance in buffalo flies in NSW and Queensland were carried out in 1994/5, 2000 and 2001. The most recent survey revealed that there is widespread resistance to SPs in NSW and Queensland. Resistance to the OP chemicals, diazinon and chlorfenvinphos, was present at low levels in northern NSW in the 2000 survey. However by 2001 there was no apparent resistance to diazinon in the same area. One explanation was that the diazinon resistant flies might not have survived the harsh climatic conditions experienced in northern NSW in mid to late 2000.

Acknowledgements

Photos are courtesy of Bill Farnsworth, Agrisearch Services and the Queensland Department of Primary Industries.



Key contacts

For more information about this program or to order a free copy of the full report detailing the survey results, call the MLA producer hotline on freecall **1800 155 900**.



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