control of CATTLE GRUBS

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WARNING

- Recommendations on the use of pesticides are subject to change.
- BEFORE USING ANY PESTICIDES mentioned in this publication, check with your agricultural representative or provincial authority to make sure your proposed use is still recommended.
- This warning applies to ALL pesticides including insecticides, herbicides, fungicides, nematocides, and so on.
- Commercial pesticide products are marketed in a wide range of container sizes and formulations. They are available at garden centers, hardware stores, and pet shops. ALWAYS read labels and follow instructions carefully.

control of

Cattle grubs, the larvae of warble flies, are among the most harmful parasites of cattle. The health and productivity of heavily infested cattle are seriously affected and young animals may die of heavy infestations.

After hatching on the hair of the animal, cattle grubs move through the animal's body for 7 to 9 months before forming warbles in its back. The warble flies complete one life cycle in a year.

The only effective control is to kill the grubs in the animal's body. Treating the cattle with systemic insecticides kills the grubs before they do much damage or form warbles on the animal's back. These insecticides also kill the grubs in the warbles and a few other internal and external parasites of cattle.

Organized programs for the control of cattle grubs benefit stockmen. In certain markets, stockmen have received as much as a half to one cent more per pound for warble-free beef animals during the warble season. Ask for rail-grading of carcasses from animals treated for grubs. Within 2 years or so, organized control of the grubs reduces gadding in cattle and the animals make good use of pasture.

Animal husbandry practices vary in different regions of Canada. Therefore, measures for controlling warbles should be modified somewhat to suit your particular region. The following measures are comprehensive and elastic enough to meet the requirements of every type of herd.

GENERAL CAUTIONS: Systemic insecticides act like drugs, and may cause poisoning or other undesirable effects. Therefore, follow closely all the cautions listed on the insecticide label.

For some of the treatments an interval is required between the last application and slaughtering of beef cattle or milking of dairy cows. The interval varies with the material used. Observe the interval given on the label to avoid residues that would make the meat or milk unfit for sale.

CATTLE GRUBS

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Cattle grubs are the larval stages of warble flies, generally known as the common cattle grub[1] and the northern cattle grub.[2] These two species injure cattle in many ways and cause serious losses to the Canadian cattle industry.

LOSSES

Every stage in the life cycle of the warble fly except the pupa does some damage. When the flies are on the wing, the cattle gad and seek shelter in shade and water instead of grazing on pasture. Gadding causes loss of weight and inefficient use of pasture, slows growth, reduces milk yield in milking cows, induces abortion in pregnant cows, and leads to exhaustion and injury.

The young grubs burrowing through the skin of the animals cause rashes and sore spots that get infected easily. The grubs migrating in the animal's body injure the esophagus, the spinal cord, and other internal organs, and perhaps also produce substances that are harmful to the animal. The swelling and pain in the esophagus interfere with swallowing food and chewing the cud, and so lead to loss in weight and digestive disorders, including bloat. Sometimes the grubs injure the spinal cord and cause paralysis.

When grubs are accidentally crushed in the warbles, they may cause allergic reactions. Beef cattle infected with warbles do not finish well and sell for lower prices than warble-free animals. Warbles damage the flesh and the hide. In 1968, this loss was estimated at $10.03 for each animal infested with 11 or more grubs. The loss is higher now because of increased prices of meat and hides.

[1] *Hypoderma lineatum* (de Vill.).
[2] *H. bovis* (L.).

Sometimes horses, buffaloes, goats, and even humans become infested. In horses, the grubs are found generally in the saddle area, consequently the horses can not be used when they are most needed on the ranch, on the farm, and for pleasure. In humans, the grubs migrate to the upper parts of the body and occasionally cause death.

LIFE HISTORIES

Warble flies have black, hairy bodies marked with distinct yellow to orange stripes. They look like small bumble bees and are active on sunny days during spring and summer, when they lay their eggs on the hair of cattle. The adult of the common cattle grub is about ½ in. (13 mm) long, and first appears on the wing in April or May. The adult of the northern cattle grub is about ¾ in. (2 cm) long, and first appears on the wing in May or June. They do not bite, sting, or chase cattle in shade or water. The females of both species lay 400 to 800 very small eggs that are barely visible.

Small grubs hatch in 2 to 7 days. They crawl to the roots of the hair and enter the animal's body through the skin. The grubs wander in the animal's body for about 7 to 9 months before reaching its back.

Underside of the skin showing warble infestation

Pour-on treatment with systemic insecticides

The exact route that the grubs take is not known, but at a certain stage of their development the common cattle grub is usually found in the esophagus, and the northern cattle grub in the spinal canal. All the grubs in the animal's body do not appear in the back at the same time. A few grubs appear at first, and the number builds up slowly. In southern Alberta, the first grubs may appear in mid-December and in colder regions, they appear 4 to 6 weeks later.

When the grubs arrive in the animal's back, they cut breathing holes through the animal's skin and continue to develop. They irritate the surrounding tissues, which become inflamed and infected, and are walled off to form the warbles. The grubs may live in the warbles for as long as 10 weeks in winter, or 4 weeks in spring.

The common cattle grubs usually reach the animal's back 4 to 5 weeks earlier (from the third week in December to the fourth week in March) than the northern cattle grubs (from the fourth week in January to the first week in May). The common cattle grubs reach the back in the largest numbers in the second and third weeks of March, and the northern cattle grubs in the second and third weeks of April.

When the grubs complete their development in the animal's back, they crawl out of the warbles through the breathing holes and drop to the ground to pupate. The common cattle grubs may begin to drop out during the second week of March, and the northern cattle grubs about 4 or 5 weeks later. Usually the grubs of both species have left the warbles by the end of June; occasionally a few northern cattle grubs may stay in the warbles until August.

The pupal stage lasts 1 to 3 months.

The adult flies emerge from the pupae, find mates within a few hours, and the life cycle begins again. The adults are not known to feed but live on the energy stored in the earlier stages of their development.

CONTROL

There is no practical method of killing warble flies, preventing them from laying eggs on cattle, or destroying their eggs. But cattle are protected from the flies if they have easy access to bush shelters and shallow water. Range management also helps to control warbles. If possible, the winter ranges where the grubs pupate should be separated from the summer ranges by rivers, mountains, bush, or other natural barriers.

The only practical control of warble flies is to kill the grubs with insecticides or to remove them from the warbles by hand.

INSECTICIDES

Use systemic and contact insecticides (Tables 1 and 2) to kill the grubs.

TABLE 1. TREATMENTS RECOMMENDED FOR CONTROL OF CATTLE GRUBS IN CATTLE

Insecticide	Concentration used, %	Method	Quantity per animal or weight	Number of applications	Time	Duration of louse control, weeks	Animals not to be treated
Coumaphos, Co-Ral wettable powder, 25%	0.5	Spray	1 gal (4.5 litres)	1	Sept. 15 – Nov. 30	18	Dairy cows in milk or due to calve in 14 days; calves under 3 months, or within 10 days of weaning, shipping, dehorning, or exposure to contagious or infectious diseases; and animals sick, convalescent, under stress, or to be slaughtered within 7 days.
Rotenone	0.5	Spray	½ gal (2.3 litres)	3–4	Feb. – May	2–3	Suitable for all classes of animals, including dairy cows in milk.
	0.25	Wash	½ gal (2.3 litres)	3–4	Feb. – May	2–3	
	1.5	Dust	4 oz (113.4 g)	3–4	Feb. – May	2–3	
Crufomate, Ruelene emulsible concentrate, 25%	0.5	Spray	1 gal (4.5 litres)	1	Sept. 15 – Nov. 30*	18	Dairy cows in milk or due to calve within 3 days; animals to be slaughtered within 7 days; or animals removed from rape pastures within preceding 7 days; otherwise, the same as for coumaphos.
	6.25	Pour-on	1 fl oz/100 lb (62.5 ml/100 kg) body weight	1	Sept. 15 – Nov. 30*	2–3	
Crufomate, Ruelene 12R, ready to use	12	Pour-on	½ fl oz/100 lb (31.2 ml/100 kg) body weight	1	Sept. 15 – Nov. 30*	Not known	Same as above. The insecticide is flammable, do not brand animals soon after treatment.
Trichlorfon, Neguvon solution, ready to use	8	Pour-on	½ fl oz/100 lb) (31.2 ml/100 kg) body weight	1	Sept. 15 – Nov. 30*	Not known	Dairy cows in milk or due to calve within 7 days; calves under 3 months, or within 10 days of weaning, shipping, or dehorning; animals sick, convalescent, under stress, or to be slaughtered within 21 days.

*October 30 in southern Alberta south of Highway No. 1 and east of Highway No. 2.

TABLE 2. AMOUNTS OF VARIOUS INSECTICIDES NEEDED TO CONTROL CATTLE GRUBS IN 10 CALVES, EACH WEIGHING 450 – 500 lb (200 – 225 kg)

Insecticide	Formulation	Amount
Coumaphos spray	Co-Ral wettable powder, 25%	2 lb in 10 gal of water (1 kg in 50 litres of water)
Rotenone: dust	Derris powder containing 1.5% rotenone	1 lb 4 oz (567 g)
spray / wash	Derris powder containing 5% rotenone	8 oz in 5 gal of water (200 g in 20 litres of water)
Crufomate: pour-on	Ruelene 25% (emulsible concentrate)	13 fl oz in 1 qt of water (325 ml in 1 litre of water)
pour-on	Ruelene 12R (ready to use)	25 fl oz (710 ml)
spray	Ruelene 25% (emulsible concentrate)	32 fl oz in 10 gal of water (1 litre in 50 litres of water)
Trichlorfon pour-on	Neguvon (ready to use solution)	25 fl oz (710 ml)

SYSTEMIC INSECTICIDES—These are organophosphorus compounds that, regardless of the method of application, are absorbed in the animal's system and kill the grubs living in it. The systemic insecticides commonly used are coumaphos (Co-Ral), crufomate (Ruelene 25E or Ruelene 12R), and trichlorfon (Neguvon).

CONTACT INSECTICIDES—These insecticides are effective when applied directly to the grubs in the warbles. Rotenone is commonly used for this purpose.

METHODS OF APPLICATION

Insecticides may be used as sprays, washes, dusts, and pour-on or back-line applications.

SPRAYING—With SYSTEMIC INSECTICIDES, spray the animal to wet the skin and not just the hair so that as much of the insecticide as possible is absorbed in the animal's body. Spray the neck, brisket, shoulders, back, sides, rump, escutcheon, and thighs.

Spray spring calves, six or seven at a time, in a crowding pen, 12 ft by 15 ft (3.6 m by 4.6 m). As the calves mill around they force the insecticide through their hair so that it wets their skin well. Spray larger animals in chutes that have side rails made from poles or metal pipes instead of boards.

Use a single- or a triple-nozzle gun fitted with 4/64 or 5/64 in. (1.6 or 2 mm) disks at a pressure of 350–400 lb/sq in. (24.6–28.1 kg/cm^2). Check the output of the spray gun to ensure that the animals are properly covered and the insecticide is not wasted.

The output of spray guns, in gallons (litres) per minute, is as follows:

PRESSURE lb/sq in. (kg/cm²)		DISK SIZE in. (mm)	SINGLE-NOZZLE GUN gal/min (litres/min)		TRIPLE-NOZZLE GUN gal/min (litres/min)	
300	(21.1)	4/64 (1.6)	1.5	(6.8)	3.5	(15.9)
		5/64 (2.0)	2.2	(10.0)	6.1	(27.7)
400	(28.1)	4/64 (1.6)	1.6	(7.3)	4.0	(18.2)
		5/64 (2.0)	2.6	(11.7)	7.0	(31.8)
500	(35.1)	4/64 (1.6)	1.8	(8.0)	4.5	(20.5)
		5/64 (2.0)	2.9	(13.0)	7.9	(35.9)

If you do not have a high-pressure sprayer, use one with low pressure. With low-pressure sprayers, use a stiff brush or a curry comb to prevent shingling and matting of the hair so that the insecticide wets the skin. Use the low-pressure treatment only for small herds.

Use about 1 gal (4.5 litres) of the spraying fluid for each calf with light winter hair and weighing 450–500 lb (203–225 kg). Increase or decrease this quantity in proportion to the size of the animal and the length and thickness of hair.

With CONTACT INSECTICIDES, spray at a pressure of 400 lb/sq in. (28.1 kg/cm²), keeping the nozzle 12–18 in. (31–46 cm) from the warbles. Use a single-nozzle gun fitted with a 5/64-in. (2-mm) disk. Spray in a chute, and preferably stand on a catwalk so that you can handle the spray gun easily. Spray about ½ gal (2.3 litres) of the fluid on the back of each animal.

If you have to use a low-pressure spray, scrub the animal's back at the same time with a stiff brush or a curry comb to remove the scabs from the breathing holes. This allows the insecticide to enter the warbles.

DUSTING—In cold weather, when wetting the animals may not be advisable, apply rotenone dust all over the back and rub it into the warble holes with a stiff brush.

POUR-ON OR BACK-LINE APPLICATION—A simple method of treating animals is a pour-on or back-line application of trichlorfon or crufomate. Pour measured amounts (Tables 1 and 2) of the insecticide along the spine in a thin stream. The insecticide penetrates readily through the hair. Trichlorfon solution and Ruelene 12R, a formulation of crufomate, are ready to use and should not be diluted with water.

TIMING OF APPLICATIONS

Treat after September 15 and before November 30 with trichlorfon, coumaphos, or crufomate. The deadline for treatment with trichlorfon and crufomate is November 30, but there is no deadline for spraying with coumaphos formulated as Co-Ral 25% wettable powder. In southern Alberta, south of Highway No. 1 and east of Highway No. 2, treat between September 15 and October 30. Early applications reduce the damage from the migrating larvae,

and it is easier to kill the larvae when they are young. Late applications kill the grubs but increase the risks of undesirable effects of the insecticide and chill after spraying.

Young calves are usually sprayed after weaning, but, if practical, they may be sprayed 2 or 3 weeks before weaning. If possible, spray the animals before they grow heavy winter hair. Coumaphos sprayed in June, July, or August on the back and sides of cattle, including spring calves, will control cattle grubs and will protect the animals to some extent against other insects as well. For summer treatments, increase the concentration of coumaphos in the spraying fluid to 1% or 2%, but reduce the amount of fluid sprayed on cattle proportionately to ½ to ¼ gal (2.3 to 1.1 litres) per animal so that the dose of coumaphos remains unchanged.

One treatment properly applied kills all the grubs in the animal's body.

Apply contact insecticides before the larvae drop to the ground to pupate. Preferably make the first application on a sunny day in the middle of March in southern Alberta, and 2–4 weeks later in colder regions. One treatment with coumaphos spray applied in March will kill the grubs in the warbles as well as in the bodies of the cattle. Spring treatment with trichlorfon or crufomate is also effective for this purpose.

Because the contact insecticides do not prevent new grubs from reaching the animal's back, repeat the applications two or three times at intervals of 1 month in winter and 3 weeks in spring.

REMOVING THE GRUBS BY HAND

In small herds, particularly in milking dairy cows, the grubs may be squeezed out through the breathing holes with gentle pressure around the bases of the warbles. After the grubs have been removed, the sores in the back will heal without medication.

Do not crush the grubs in warbles, because they may cause an allergic reaction. The lesions heal slowly when crushed grubs are not removed.

FURTHER CAUTIONS

Do not excite the animals too much before, during, or after applying an insecticide. Do not handle them roughly or make them run or stampede. Do not spray hot, tired animals immediately after they have been herded into corrals.

On milking cows, use rotenone. Do not use coumaphos, trichlorfon, or crufomate in any form.

Protect yourself. Take care not to get any insecticide on your skin or to inhale the dust or the vapor. If you handle several insecticides, they may interact in your body and be much more toxic than any of them alone. Use waterproof clothing and face masks with adequate filters. Change your clothes immediately after you finish applying the insecticide, and launder them before you wear them again.

COUMAPHOS SPRAYS

1. Before mixing the insecticide in the spray tank, put on protective clothing: overalls, rubber gloves and boots, and a face mask suitable for protection against coumaphos. Check the filters in the mask and change them often.

2. Do not spray animals late in the afternoon. The sprayed animals should be dry before sunset or they may chill during the night. They may then be more readily affected by the insecticide and by respiratory and other diseases.

3. Do not spray milking cows, cows that will calve within 14 days, animals under 3 months old, animals to be slaughtered within 7 days, tired or sick animals, or animals within 10 days of weaning, shipping, dehorning, or exposure to contagious or infectious diseases. Allow the sprayed animals easy access to water and feed as usual.

4. For 48 hours after spraying, watch the animals, particularly young calves, for any signs of poisoning. The first signs are a humped back; a stiff gait; difficulty in movements; shivering; running from the mouth, nose, and eyes; bloat; loss of appetite; and raised tailhead with upper part of the tail turned slightly to one side.

5. If an animal becomes sick, consult your veterinarian. If a treated animal has bloat, relieve the gas by puncturing the rumen but not by passing a hose.

6. After you finish spraying, clean the equipment and wash yourself. Bury the empty coumaphos cartons, but save one label. You may have to refer to it for instructions on aftercare of the sprayed animals.

TRICHLORFON POUR-ON

1. Wear overalls, rubber gloves, and rubber boots to protect yourself.

2. Do not treat milking dairy cows or cows that will calve within 7 days; animals to be slaughtered within 21 days; calves under 3 months old or within 10 days of weaning, shipping, dehorning, or exposure to contagious or infectious diseases; or animals sick or convalescing.

3. Follow cautions 4 to 6 given under coumaphos sprays.

CRUFOMATE SPRAYS

1. Follow all the cautions for coumaphos sprays, but do not spray cows that will calve within 3 days or animals that will be slaughtered within 7 days.

2. Do not keep crufomate formulations near heat or open flame.

3. Bury empty crufomate containers.

CRUFOMATE POUR-ON

1. Follow the cautions given for crufomate sprays.

2. Keep the treated animals in a pen for ½ to 1 hour. The insecticide irritates some animals so that they become restless and switch their tails. If they are not enclosed, they may run until they are exhausted and thus become more susceptible to the adverse effects of the insecticide.

3. Scurf may appear on the backs of some animals 1 or 2 weeks after treatment, and persist for 5 or 6 weeks. The dandrufflike condition, however, does not cause loss of hair in the treated areas. Brush out the scurf in show animals.

4. Follow caution 1 under crufomate sprays.

ROTENONE

If swallowed, rotenone is toxic to humans and hogs. Do not crush the larvae in the warbles while brushing the animals with insecticidal washes or dusts.

SELECTING A TREATMENT

Select the insecticide that is best suited for your needs. Base your choice on weather, labor, size of the herd, type of operation (ranching, feedlot, mixed, or dairy), equipment and facilities needed to treat animals, and presence of lice.

For the uses permitted, systemic insecticides are the best. *The effectiveness of the treatment depends a great deal on the timing and the method of application.* One treatment, applied properly, kills the grubs in an early stage of development, before they reach the host's back. Systemics used to control grubs also control a few other parasites such as cattle lice for varying periods of time, depending on the method of application.

Spraying once with coumaphos is safe and effective. One application also protects against lice for winter and spring.

A pour-on application of trichlorfon is safe and effective, and the ready-to-use formulation is convenient to use.

Crufomate sprays are just as effective against cattle grubs and lice as coumaphos sprays.

Crufomate poured on the animal's back is easy to apply against cattle grubs and lice, but it controls the lice for only 2 or 3 weeks. The animals need very little handling and there is no risk of chilling them during the winter.

If lice are not a serious problem in your herd, it may be best to market habitually lousy animals, or "carriers," and to control both grubs and lice with a simple treatment such as a pour-on.

High-pressure sprays are quick and effective; low-pressure sprays are slow and laborious, and are recommended only for small herds. High-pressure spraying, however, requires expensive equipment and trained operators. These requirements can be met economically by

organizing cattle-spraying associations. There are several of these associations in Alberta and, when needed, they also spray cattle and barns during summer for horn flies, house flies, and other parasites.

AFTEREFFECTS OF TREATMENT

The recommended treatments are safe for careful application. However, as an extra precaution in detecting adverse effects of treatment, keep the treated animals under observation for 48 hours. Adverse effects seldom occur, but when they do they usually result from accidental overdosage, a reduced tolerance for insecticides in cattle with certain physiological and nutritional deficiencies, or the sudden destruction of a large number of grubs arriving earlier than usual in vital organs.

Consult a veterinarian about the treatment of sick animals. If an animal has bloat, relieve gas in severe cases by rumen puncture, but do not pass a hose or probang down its esophagus. If the animal becomes paralyzed, turn it often from side to side. In some cases an intramuscular injection of one million units of quick-acting formulation of vitamin A may hasten recovery from paralysis.

CONVERSION FACTORS FOR METRIC SYSTEM

Imperial units	Approximate conversion factor	Results in	
LINEAR			
inch	x 25	millimetre	(mm)
foot	x 30	centimetre	(cm)
yard	x 0.9	metre	(m)
mile	x 1.6	kilometre	(km)
AREA			
square inch	x 6.5	square centimetre	(cm^2)
square foot	x 0.09	square metre	(m^2)
acre	x 0.40	hectare	(ha)
VOLUME			
cubic inch	x 16	cubic centimetre	(cm^3)
cubic foot	x 28	cubic decimetre	(dm^3)
cubic yard	x 0.8	cubic metre	(m^3)
fluid ounce	x 28	millilitre	(ml)
pint	x 0.57	litre	(ℓ)
quart	x 1.1	litre	(ℓ)
gallon	x 4 5	litre	(ℓ)
bushel	x 0.36	hectolitre	(hl)
WEIGHT			
ounce	x 28	gram	(g)
pound	x 0.45	kilogram	(kg)
short ton (2000 lb)	x 0 9	tonne	(t)
TEMPERATURE			
degrees Fahrenheit	(°F-32) x 0.56 or (°F-32) x 5/9	degrees Celsius	(°C)
PRESSURE			
pounds per square inch	x 6.9	kilopascal	(kPa)
POWER			
horsepower	x 746	watt	(W)
	x 0.75	kilowatt	(kW)
SPEED			
feet per second	x 0.30	metres per second	(m/s)
miles per hour	x 1.6	kilometres per hour	(km/h)
AGRICULTURE			
gallons per acre	x 11.23	litres per hectare	(ℓ/ha)
quarts per acre	x 2.8	litres per hectare	(ℓ/ha)
pints per acre	x 1.4	litres per hectare	(ℓ/ha)
fluid ounces per acre	x 70	millilitres per hectare	(ml/ha)
tons per acre	x 2.24	tonnes per hectare	(t/ha)
pounds per acre	x 1.12	kilograms per hectare	(kg/ha)
ounces per acre	x 70	grams per hectare	(g/ha)
plants per acre	x 2.47	plants per hectare	(plants/ha)

Examples 2 miles x 1.6 = 3.2 km, 15 bu/ac x 0.90 = 13.5 hl/ha