Productive cattle start with ClariFly®.

- Helps control house and stable flies in areas populated by beef and dairy cattle.
- Works as a feed-through, passing into manure where flies lay eggs.
- Can be used in IPM programs in conjunction with parasitoid wasps.

ClariFly® LARVICIDE

For more information, contact your feed dealer, visit www.CentralFlyControl.com or call 1-800-347-8272.

[1] McNeal & Campbell (©1981)
[2] John B. Campbell, *The Economic Significance of the Stable Fly*
[3] *http://www.csress.usda.gov/nea/biotech/pdf/highlights_2002_n03.pdf*
[4] Byford, R.L., Craig, M.E., Crosby, B.L., *A Review of Ectoparasites and Their Effect on Cattle Production,* J. Anim. Sci., 1992, 70:597-602.
[5] Mwangala, F.S., Galloway, T.D., 1993, *Susceptibility of horn flies, Haematobia irritans (L.) (Diptera: Muscidae) to pyrethroids in Manitoba, Can.,* Entomol. 125: 47-53.
[6] John B. Campbell, Duane Rice, *Sanitation for Fly and Disease Management at Confined Livestock Facilities*.

† ClariFly contains Dimilin diflubenzuron manufactured by Chemtura Corporation and/or its affiliates.

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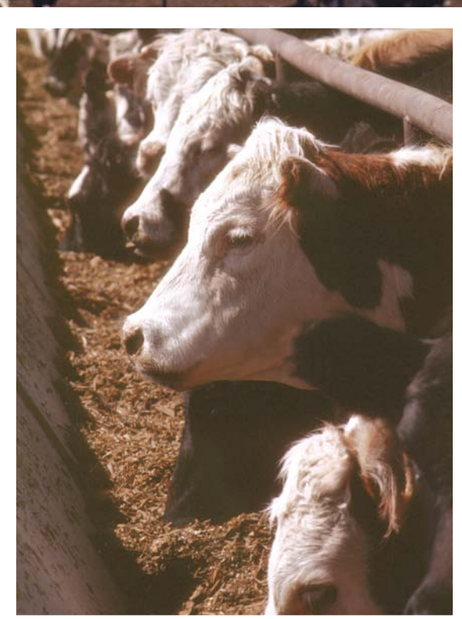
Fly Free & On Feed



ClariFly® LARVICIDE

Productive, fly free cattle start with ClariFly®.

ClariFly® Larvicide is a feed supplement that prevents house flies, stable flies, face flies, and horn flies from developing in and emerging from the manure of treated cattle. Unlike conventional insecticides that attack the nervous system of insects, ClariFly® works by interrupting the fly's life cycle, rather than through direct toxicity. When mixed into cattle feed, ClariFly® passes through the digestive system and into the manure. With only very small concentrations, ClariFly® is able to disrupt the normal molting process of the fly larvae. The mode of action of ClariFly® is specific to insects. It disrupts the production of a substance called chitin, a key component of an insect's exoskeleton that is NOT found in mammals. Without a properly formed exoskeleton, the immature fly cannot survive to adulthood.

Not a Conventional Pesticide

The active ingredient in ClariFly®, Dimilin® brand of Diflubenzuron†, is considered by the Environmental Protection Agency (EPA) to pose a low risk to human health and the environment. Diflubenzuron has the following advantages over existing conventional pesticides:

- Low impact on human health
- Lower toxicity to non-target organisms (birds, fish, plants)
- Low potential for groundwater contamination
- Low use rates
- Compatibility with Integrated Pest Management (IPM) practices

ClariFly® is able to exert its effect with little risk to human health and the environment and is therefore an ideal fly control choice for today's environmentally conscious producer.

Fly Identification and Differences

Know the flies affecting your cattle's productivity

The house fly, *Musca domestica*

House flies are nonmetallic, dull grayish colored flies, approximately 6 - 7 mm in length, with 4 distinct stripes on their thorax. The abdomen of the house fly is usually a pale color with yellowish sides and underside. Female house flies lay 1 mm long, slightly curved, whitish colored eggs that are normally deposited in batches of approximately 150 eggs in animal manure, wet organic matter, spilled feed, compost piles, decaying fruit and various other potential larval development areas.

The larvae of the house fly hatch within 24 hours, are white in color and feed on waste. The larvae will grow and eventually migrate away from the food source to drier areas to pupate. Pupae are dark brown.

The pupal stage will last anywhere from 3 to 10 days depending on temperature. Adults emerge from the puparium and begin feeding within 24 hours with sponging type mouthparts, and the life cycle is repeated.

The stable fly, *Stomoxys calcitrans*

The stable fly is close in size to the house fly and has similar stripes on their thorax; however, stable flies have a distinct "checker-board" pattern on their abdomen. In addition to this, they have distinct piercing type mouthparts that are used to penetrate the skin of their hosts to obtain blood meals. Stable fly eggs are about 1 mm in length and are usually laid in masses of up to 50 eggs. Eggs hatch in 1 to 3 days.

Larvae prefer fecal material that has been mixed with soil, straw, bedding material, silage or grain, but will also develop in decaying wet grass clippings, and poorly managed compost piles. Like house fly larvae, stable fly larvae will migrate to drier areas to pupate.

Depending on the temperature, new adults will emerge for these pupae in 6 to 26 days. The entire life cycle takes 3 to 4 weeks.

Fly Identification and Differences (continued)

The face fly, *Musca autumnalis*

Face flies resemble the house fly, but may be slightly larger and grayish in color. Face flies have 4 stripes on their thorax and sponging type mouth parts like the house fly. Females look very similar to the house fly, while male face flies have abdomens that are yellowish-orange in color. Female face flies lay eggs only on fresh, undisturbed cattle manure and are primarily considered a pastured cattle pest.

Larvae hatch from the eggs and feed under the dung crust. Once fully developed, the larvae disperse in surrounding soil to pupate. Adult face flies feed on secretions around the eyes, nose and mouth of cattle.

In the fall, newly emerged adults, stimulated by shortened days and cooler temperatures, go into diapause to delay reproduction until the following spring when temperatures are more favorable to survival of immatures. Often times, diapausing face fly adults are found in large numbers in attics of buildings and are referred to as cluster flies.

The horn fly, *Haematobia irritans*

Horn flies are small biting flies about half the size of house and stable flies. They have piercing type mouthparts like the stable fly which they use to take up to 40 blood meals per day. They are grayish in color with 2 stripes on their thorax and are usually found congregating on the backs of cattle, only leaving to lay eggs in freshly deposited cow pats. Eggs are reddish-brown that hatch and feed in the manure pat and pupate underneath or in the surrounding soil around the pat. Pupae are brown and require 6 to 8 days to pupate depending on environmental conditions.

The Economic Impact of Flies on Cattle

The house fly, *Musca domestica*

House flies are the most abundant of the flies and most common around livestock operations. While house flies do not suck blood or bite, they do spread disease. The housefly has been implicated in the transmission of 65 disease organisms. The transmission may simply be the mechanical transfer of the disease agent from the fly mouthparts or body of the fly to the animal host.[6] They breed prolifically in manure and other organic material. House flies have tremendous potential for reproduction. This potential causes fly populations to burst out of control in a short period of time. House flies can create complaints and potentially fines from neighboring communities if left untreated. In addition, the economic threat associated with flies are nuisance lawsuits which could require the closing of the facility.[6]

The stable fly, *Stomoxys calcitrans*

Stable flies are considered by some as the most serious insect pest affecting feedlot and confined dairy cattle in the U.S. during summer months.[1] The stable fly has one of the most painful bites of any bloodsucking insect. Its jagged, piercing mouthparts saw into flesh and draw blood. This obligate blood-feeder mainly bites the legs and flanks of cattle and is active only during the day. Along with its painful bite, this fly is also known to carry disease. The economic injury level for feeder cattle is when the stable fly population reaches an average of about five flies per front leg.[1]

The economic threshold of just five flies per animal showed a reduction in feed efficiency that resulted in an average loss of $8.51 per animal per season.[2] At higher infestations, cattle demonstrated even greater reduction in average daily gains. The economic threshold is defined as the level of flies in which the economic loss is equal to the cost of controlling the pest. Additional evaluations indicated that the threshold would only be an average of 1.19 stable flies per front leg per animal.[2]

Females lay hundreds of eggs in manure, wet hay and other decaying organic matter.

The face fly, *Musca autumnalis*

The effects of face flies can be both direct and indirect. The mouthparts of the face fly have rough, spiny teeth which can damage the eye tissue of cattle. In addition to this, face flies have been implicated in the transmission of *Moraxella bovis*, a bacterium that is the primary causative agent of infectious bovine keratoconjunctivitis (pinkeye).

Face flies are an excellent vector of this disease agent since it repeatedly feeds on eye fluids and frequently moves from one animal to another. In addition to this, face flies are known to vector eyeworms in the species Thelazia, which can infect cattle and horses. Annual economic losses due to face fly infestations are estimated to exceed $123 million.

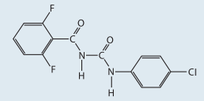
The horn fly, *Haematobia irritans*

The horn fly is an obligate, bloodsucking parasite that affects range cattle in the United States. The economic losses from horn flies cost the North American cattle industry over $1 billion per year.[3] These losses can be attributed to reduced weight gains, decreased feed efficiency and decreased milk yields caused by loss of blood and excessive energy expenditure to dislodge the flies. Implications are that total energy balance is altered when an animal is exposed to horn fly infestations, thereby resulting in decreased productivity.[4]

The economic threshold for horn fly infestation is defined as the number of horn flies per animal at which the value of the damage caused is equal to the cost of control.[5] Based upon studies evaluating these production losses, the generally accepted economic threshold for infestations of horn flies is 200 flies per animal.[5] When adult horn fly counts reach this level, it is generally considered economically advantageous to begin a control program.

Chemical Characteristics

Diflubenzuron is a benzamine chitin inhibitor.
Chemical Family = substituted urea

CHEMICAL NAME:	N-[[(4-chlorophenyl) amino] carbonyl] -2, 6-difluoro-benzamide
Technical Name:	Diflubenzuron
CAS Number:	65367-38-5
Chemical Structure:	
Empirical Formula:	$C_{14}H_9Cl\,F_2N_2O_2$
Properties:	White crystalline solid Soluble in Organic Solvents No Odor

Environmental And Ecological Fate

Persistence and Movement in the Environment

Diflubenzuron appears to be relatively non-persistent and immobile in the environment. It rapidly binds with soil particles and organic matter and is quickly broken down by soil biota. The half-life is approximately 2 days in aerobic soil. Diflubenzuron is stable to hydrolysis and photolysis. Available data indicate that it is unlikely that Diflubenzuron will contaminate ground or surface water.

Fate in Plants

When foliarly applied at the rate registered or proposed for use on citrus, soybeans and cotton, Diflubenzuron undergoes very little, if any translocation from treated areas.

Acute, Subchronic and Chronic Toxicity of Diflubenzuron in Animals

Diflubenzuron is practically non-toxic to birds, small mammals, freshwater fish and marine/estuarine fish. It is non-toxic to honey bees. It is very toxic to aquatic invertebrates.

Development/Reproductive Toxicity Teratogenicity Mutagenicity

The EPA has determined that Diflubenzuron is not a carcinogen. The NOEL for maternal and fetal toxicity in rats and rabbits was >1000 mg/kg/day. The NOEL for reproductive effects in rats was 250 mg/kg/day. Diflubenzuron is not a mutagenic compound.

Safety Studies

Sufficient data has been reviewed to support EPA registrations of products containing Diflubenzuron and to establish acceptable tolerances. Established residue levels for Diflubenzuron in or on the following commodities: cottonseed, pasture, grass, soybeans, soybean hulls, milk, eggs and the meat, fat, and meat by-products of cattle, goats, hogs, horses, sheep and poultry have been set.

Metabolism in Cattle

The metabolism of Diflubenzuron in cattle has been extensively studied in beef and dairy cattle. The EPA has established tolerances for milk, animal fat, meat and meat by-products at 0.05 ppm. Metabolism studies in dairy cows showed no detectable levels of Diflubenzuron residues in milk when dosed for up to 28 days. In studies of beef cattle and dairy cows, very low levels of residues were occasionally seen in liver, kidney, fat and muscle.

Effects on Horses

Accidental exposure of horses to ClariFly® via cattle feed would not be anticipated to pose any toxicological risk. While another formulation of Diflubenzuron is approved for equine use, ClariFly® is not labeled for feeding to horses and it is a violation of Federal law to use a product for a use that is not on the label.

Regulatory Status of Diflubenzuron

Diflubenzuron is a larvicide with activity against flies (house, stable, face, and horn) and many leaf eating larvae of insect feeding on agricultural, forest and ornamental plants (gypsy moths and rust mites). The active ingredient, Diflubenzuron, was first registered by the EPA in 1976. Diflubenzuron has completed an extensive reregistration process, resulting in the publication by the EPA of the Reregistration Eligibility Document (RED) in 1997.

Regulatory Status of ClariFly®

ClariFly® was recently registered by the EPA in 2006 as the first Diflubenzuron cattle product for use in feed. The following excerpt from the 2007 Feed Additive Compendium summarizes the regulatory status of the use of Diflubenzuron in cattle feed. "*FDA Status: No feed mill license required. When used in medicated feeds, medicated feed application requirement is determined by regulatory status of the drug. EPA Status: Product is a pesticide when used in non-medicated feeds. EPA registration is required for feeds offered for sale except when custom-blended per the provisions of 40 CFR 167.3. In medicated feeds, the product is a food additive and no EPA registration is required when the source of Diflubenzuron is an EPA-registered product.*"

An Integrated Fly Control Program

ClariFly® should be used as part of an Integrated Pest Management program aimed at reducing fly populations in the cattle's environment. Adult house and stable flies can breed in manure and decaying organic matter or silage. Good sanitation practices, such as cleaning up spilled feed and preventing manure build up around barns and fences or under feed bunks, will help in reducing breeding sites for these flies.

Adult flies can also migrate from other areas. In these situations, supplemental fly control measures may be needed in and around barns, calf pens, and dry lots to help control these insects. On-animal and premise insecticide applications and/or the use of traps and baits are additional tools to control these migrating adult flies.

Feeding Recommendations

Begin feeding ClariFly® early in the spring before flies begin to appear, and continue feeding though the summer and into the fall, until cold weather reduces or ends fly activity. The actual feeding period will depend on the regional climate. Starting a program during the fly season requires the use of other fly control measures that may reduce the existing adult fly populations. ClariFly® prevents the emergence of house flies, stable flies, face flies, and horn flies from the manure of treated cattle. It has no effect on existing adult fly populations.

To control manure-breeding flies, all cattle on the premises need to consume adequate quantities of ClariFly® every day. The feeding level for this product is 0.10 mg of Diflubenzuron per kg of bodyweight per day. Daily consumption of ClariFly® by individual animals may vary. However, fly control will not be affected.

Feeds and supplements containing ClariFly® may be fed up to slaughter and to lactating dairy cows without withholding the milk from market during or after treatment.