Add value to your cattle with Altosid® IGR.

Altosid® IGR Feed-Through controls horn flies by interrupting their life cycle, rather than through direct toxicity. Based on this mode of action, the EPA considers it to be a biochemical pesticide. Mixed into cattle feed, Altosid IGR passes through the digestive system into the manure, where horn flies lay their eggs. Altosid is not like other feed-through products. It is classified as an insect growth regulator (IGR). The IGR in Altosid IGR mimics naturally occurring insect biochemicals that are responsible for insect development. Through the mimicry, Altosid IGR keeps the horn fly larvae from developing into adult flies that would otherwise emerge from the manure. It is able to exert this effect at very small concentrations. Altosid IGR is therefore an ideal horn fly control choice for today’s environmentally conscious producer.

Effective and Sound.
An extensive toxicological database has been generated to support EPA registrations of products containing (S)-Methoprene. (S)-Methoprene products exhibit a wide margin of safety and no acute handling hazard by any exposure route.

No Effects on Beneficial Insects.
Residual insecticides, such as organophosphates, are toxic to beneficial insects, such as coprophagous flies and beetles, predacious beetles, parasitic wasps and dung beetles. Altosid IGR does not disrupt dung composition and does not harm beneficial insects.

For more information, call 1-800-347-8272 or visit www.AltosidIGR.com.
**Altosid® IGR Feed-Thru** controls horn flies by interrupting their life cycle, rather than through direct toxicity. Based on this mode of action, the EPA considers it to be a biochemical pesticide. Mixed into cattle feed, Altosid IGR passes through the digestive system and into the manure, where horn flies lay their eggs. Altosid IGR is not like other feed-through products; it is classified as an insect growth regulator (IGR). The IGR in Altosid IGR mimics naturally occurring insect biochemicals that are responsible for insect development. Through this mimicry, Altosid IGR keeps the horn fly larvae from developing into adult flies that would otherwise emerge from the manure. It is able to exert this effect at very small concentrations and is therefore an ideal fly control choice for today’s environmentally conscious producer.

### Interrupting the Horn Fly Life Cycle

**Adult horn flies** live 2 to 4 weeks, taking 20 to 50 blood meals per day.

**Female flies** leave the animal for a few seconds to lay eggs in manure less than 5 minutes old.

**Economic Impact of Horn Flies on Cattle**

The horn fly, Haematobia irritans, is an obligate, bloodsucking parasite and one of the most important and economically damaging pests of range cattle in the United States.¹ The economic losses from horn flies cost the North American cattle industry over $1 billion per year.² 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.³ 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.⁴ 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. Current control strategies for horn flies include mechanical, biological and chemical methods. Walk-through flytraps or dragging of pastures to disrupt manure patches can reduce horn fly populations in some environments. Predatory arthropods, such as beetles and mites, can also reduce horn fly populations in some habitats. Chemical control has been the most widely used horn fly control strategy. Techniques for application of insecticides to cattle include oral larvicides in mineral granules, mineral blocks, tubs or controlled-release boluses.

The major disadvantage of some horn fly control methods is that resistant populations of horn flies have developed. Ear tags became available in the late 1970s, and resistance became widespread throughout the U.S. by the mid-1980s and throughout Canada by 1991.⁶ Resistance developed rapidly, due to widespread tagging using a single chemical family, the pyrethroids, against entire adult populations of horn flies. Continuous exposure to a single class of insecticides rapidly selects for flies with an innate tolerance to the insecticide, eventually leading to the failure of the insecticide to provide satisfactory control. Because of the horn fly’s cross-resistance to active ingredients in traditional insecticides, resistance can occur in a single year.

Altosid IGR contains the insect growth regulator (IGR) (S)-Methoprene which breaks the horn fly’s life cycle and inhibits immature flies from developing into adults that bite. The administration of Altosid IGR is an efficient and effective method for helping control horn flies throughout the fly season without worrying about resistance. There has not been a verified case of resistance to (S)-Methoprene since the technology was introduced in 1975.⁷ The level of this ingredient found in the manure of treated cattle has no economic threshold for infestations of horn flies is 200 flies per animal.

### Chemical Characteristics

(S)-Methoprene belongs to the terpenoid class of compounds, as do natural products, such as essential oils and other plant-produced materials.

**CHEMICAL NAME:** Isopropyl (2E,4E,7S)-11-methoxy-3,7,11-trimethyl-2,4-dodecadienoate

**Technical Name:** (S)-Methoprene

**CAS Number:** 65753-516-6

**Empirical Formula:** C₂₅H₄₀O₂

**Properties:**
- Amber Liquid
- Slight Fruity Odor
- Soluble in Organic Solvents

### Environmental Fate

**Persistence and Movement in Soil:** The half-life of (S)-Methoprene under aerobic conditions in sandy loam is approximately ten days when applied at the exaggerated rate of 10,000 g/ha. Most of the applied dose is converted rapidly to CO₂. (S)-Methoprene remains bound in the top few centimeters of the soil even after repeated washings with water. Thus, it should not persist, leach or contaminate ground water.

**Fate in Plants:** When applied at the rate of 1000 g/ha of (S)-Methoprene has a half-life of less than two days and less than one day on rice. It is metabolized rapidly, yielding products that are further degraded to normal plant nutrients.

**Fate in the Food Chain:** In a model ecosystem study, it was shown that (S)-Methoprene does not accumulate in the food chain. It was demonstrated that biodeterioration and lack of persistence characterize methoprene in the environment.

**Persistence in Water:** In the field, (S)-Methoprene degradation products in milk and blood unchanged or metabolized quickly and eliminated via the gastrointestinal tract. The NOEL for maternal and embryotoxicity in rabbits was 500 ppm. The NOEL for reproductive effects in rats was 500 ppm.

**Mutagenicity**

(S)-Methoprene is not a mutagenic compound.

### Acute, Subchronic and Chronic Toxicity of (S)-Methoprene in Animals:

<table>
<thead>
<tr>
<th>Species</th>
<th>Study Type</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rat</td>
<td>Oral LD₅₀</td>
<td>&gt; 54.600 mg/kg</td>
</tr>
<tr>
<td>Dog</td>
<td>Oral LD₅₀</td>
<td>&gt; 5.000 mg/kg</td>
</tr>
<tr>
<td>Rabbit</td>
<td>Dermal LD₅₀</td>
<td>&gt; 3.000 mg/kg</td>
</tr>
<tr>
<td>Rat</td>
<td>Inhalation LD₅₀</td>
<td>&gt; 210 mg/kg</td>
</tr>
<tr>
<td>Dog</td>
<td>Inhalation LD₅₀</td>
<td>No effect at &gt;20-50 mg/kg</td>
</tr>
<tr>
<td>Rabbit</td>
<td>Ocular irritation</td>
<td>Non-irritating</td>
</tr>
<tr>
<td>Rat</td>
<td>90-day feeding</td>
<td>NOEL = 1,000 ppm</td>
</tr>
<tr>
<td>Dog</td>
<td>90-day feeding</td>
<td>NOEL = 1,000 ppm</td>
</tr>
<tr>
<td>Rabbit</td>
<td>30-day dermal</td>
<td>NOEL = 0.1 mg/kg/day</td>
</tr>
<tr>
<td>Rat</td>
<td>21-day inhalation</td>
<td>NOEL = 20 mg/l (2,000 ppm)</td>
</tr>
<tr>
<td>Dog</td>
<td>28-day inhalation</td>
<td>NOEL = 0.0025 mg/kg/day</td>
</tr>
<tr>
<td>Rat</td>
<td>Chronic feeding (2-year)</td>
<td>NOEL = 5,000 ppm</td>
</tr>
<tr>
<td>Mouse</td>
<td>Chronic feeding (2-year)</td>
<td>NOEL &gt; 2,500 ppm</td>
</tr>
</tbody>
</table>

### Metabolism in Cattle

Extensive laboratory and field experiments have shown that (S)-Methoprene is rapidly degraded by mammalian metabolic systems and readily converted to natural body constituents. When steers or cows are treated orally with (S)-Methoprene, the compound is excreted either unchanged or metabolized quickly and eliminated via urine, feces and expired breath. Chemical identification of (S)-Methoprene degradation products in milk and blood one week after the oral administration of radiolabeled (S)-Methoprene to a cow revealed that it was metabolized to simple acetates that are mostly incorporated into fatty acids, lactate and cholesterol. (S)-Methoprene metabolites were not detected in tissues. In a cow and growing steer, unmetabolized (S)-Methoprene was mainly excreted through feces, whereas up to 19.8% of the orally administered dose was excreted in urine as a few seconds to lay eggs in manure less than 5 minutes old.
Effects on Beneficial Insects
Residual insecticides, such as organophosphates, are toxic to beneficial insects, such as coprophagous flies and beetles, predaceous beetles, parasitic wasps and dung beetles. Altosid® IGR does not disrupt dung composition and does not harm beneficial insects.

Effects on Horses
Horses (1/dose group) have been experimentally dosed with (S)-Methoprene, as follows, without adverse clinical signs or loss of appetite. Accidental exposure to (S)-Methoprene via cattle feed would not be anticipated to pose any toxicological risk.

<table>
<thead>
<tr>
<th>Dose*</th>
<th>Route</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 5 mg AI/kg</td>
<td>Oral feed supplement</td>
<td>14 days</td>
</tr>
<tr>
<td>6 and 12 mg AI/kg</td>
<td>Oral feed supplement</td>
<td>1 day</td>
</tr>
<tr>
<td>6 mg AI/kg</td>
<td>Oral feed supplement</td>
<td>7 days</td>
</tr>
<tr>
<td>12 mg AI/kg</td>
<td>Oral feed supplement</td>
<td>7 days</td>
</tr>
</tbody>
</table>

Regulatory Status of Altosid IGR Feed-Thru
The following excerpt from the 2005 Feed Additive Compendium summarizes the regulatory status of the use of (S)-Methoprene in cattle feed.

FDA Status: No feed mill license required. Product is a food additive. 40 CFR 180.1033 (EPA) (S)-Methoprene is exempt from the requirement of a tolerance in or on all food commodities when used to control insect larvae. 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 (S)-Methoprene is an EPA-registered product.

Regulatory Status of (S)-Methoprene
(S)-Methoprene is an insect growth regulator (IGR) with activity against flies, mosquitoes, horn flies, ants, scarid flies and stored product pests.

The active ingredient, (S)-Methoprene, was first registered by the EPA in 1975. (S)-Methoprene was classified as the first biochemical pesticide and therefore is currently regulated by the Biopesticide Division of the EPA.

FEED ADDITIVES THAT CONTROL IMMATURE HORN FLIES IN CATTLE MANURE

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>Active Ingredient</th>
<th>% Active in Concentrate</th>
<th>Mode of Action</th>
<th>Activity</th>
<th>Product Forms</th>
<th>Dosage</th>
<th>Cattle Age Restrictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altosid® IGR Feed-Thru</td>
<td>(S)-Methoprene</td>
<td>0.4, 1.0, 2.0, 10.5</td>
<td>Insect Growth Regulator</td>
<td>Kills larvae</td>
<td>Dry powder, meal, liquid micro-emulsion</td>
<td>0.8-1.5 mg active/100 lbs of body weight</td>
<td>None</td>
</tr>
<tr>
<td>Rabon® Oral Larvicide</td>
<td>Tetrachlorvinphos</td>
<td>7.76, 97.3</td>
<td>Cholinesterase inhibitor</td>
<td>Kills larvae</td>
<td>Granulated material, meal</td>
<td>70 mg of active/100 lbs of body weight</td>
<td>None</td>
</tr>
</tbody>
</table>

Efficacy Summaries
Horn fly control by feeding of Altosid IGR to cattle was evaluated in Illinois, Kentucky, North & South Carolina and Texas. A number of cattle supplements containing 0.02%, 0.01% and 0.005% Altosid were administered on a free-choice basis to evaluate inhibitory effects on the development of adult horn flies in fecal pats.

Illinois
(Figure 1) The chart to the right represents the average number of adult horn flies per side when animals were fed 0.02% Altosid IGR Mineral.

South Carolina
Adult horn fly counts remained fairly constant throughout the treatment period on treated cattle (Figure 2), while counts on untreated cattle steadily increased.

Texas
A custom liquid feed formulated using Altosid IGR 1% Liquid to provide 0.00125% (S)-Methoprene was offered to cattle. Within four weeks of the start of the trial, the horn fly population was greatly reduced and remained below the economic threshold through the conclusion of the study.

Kentucky
(Figure 2) The chart below represents the average number of adult horn flies per side when cattle received a 0.02% Altosid IGR Granular Cattle Supplement.

North Carolina
(Figure 5) The chart to the right represents the average number of adult horn flies per side when animals were fed a 0.01% Altosid IGR Mineral Block.

Cattle Age Restrictions
None
Horn flies are a serious threat to beef cattle — and your bottom line. To find out just how much of a threat, fill out the worksheets below. You’ll see the advantages of adding Altosid IGR Feed-Thru for horn fly prevention and the kind of return you can expect on your Altosid IGR Feed-Thru investment.

**WEANING WEIGHTS (COW/CALF)**

Weaning weights of calves on cows with an Altosid IGR horn fly control program are higher by an average of 1.4 lbs., or 4.3 percent**, due to increased availability of cow’s milk.

**Figure the value of weaning weight loss due to horn flies**

A. Fill in your average adjusted weaning weight per head ........................................____________ lbs.
B. Potential weight loss per head per season ................................................. 0.043 x A =____________ lbs.
C. Fill in the total number of head weaned per year in your herd ........................................____________
D. Potential weight loss per season for your herd .......................................... B x C =____________ lbs.
E. Fill in the sale price of weaned calves in $/hundredweight ...........................................$____________
F. Total value of herd weight loss ............................................................................ 0.01 x D x E =$____________

**Figuring the return from using Altosid IGR**

G. Number of cows in your herd (from line C) .................................................
H. Herd cost per day to use Altosid IGR ................................................. 0.04 x G =$____________

(Average cost of Altosid IGR is 3 to 5 cents per head per day)
I. Fill in the number of days cows will be on Altosid IGR ...........................................
J. Your Altosid IGR horn fly control program cost per season ...........................................H x I =$____________

K. Return on investment in Altosid IGR per season .................................................F - J =$____________ ROI

**Net herd season savings**

$____________

**STOCKER CATTLE**

Studies have shown stocker cattle can incur a 14 percent* reduction in average daily gain over a 120-day fly period. That can translate into a reduction in average daily gain of 0.2 lb per day.

**Figuring the value of stocker cattle weight loss due to horn flies**

A. Fill in your average stocker weight per head at season end .....................................____________ lbs.
B. Potential weight loss per head per season .............................................................................. 0.14 x A =____________ lbs.
C. Fill in the total number of head in your stocker cattle herd ........................................____________
D. Potential weight loss per season for your herd .............................................................. B x C =____________ lbs.
E. Fill in the sale price of stocker cattle in $/hundredweight .................................................$____________
F. Total value of herd weight loss ............................................................................ 0.01 x D x E =$____________

**Figuring the return from using Altosid IGR**

G. Number of cows in your herd (from line C) .................................................................
H. Herd cost per day to use Altosid IGR ................................................. 0.04 x G =$____________

(Average cost of Altosid IGR is 3 to 5 cents per head per day)
I. Altosid IGR horn fly control program cost per 120-day fly season ...........................................120 x H =$____________
J. Return on investment in Altosid IGR per season .................................................F - I =$____________

**Net herd season savings**

$____________

**Altosid IGR PRODUCTS FOR HORN FLY CONTROL**

**ANIMAL**

- Cattle (beef and dairy)

**INSECT GROWTH REGULATOR**

- (S)-Methoprene

**USE LEVEL**

- 1.13 mg/cwt/day Insect growth regulator for continuous feeding during the fly season to prevent the breeding of horn flies in the manure of treated cattle

**INDICATIONS FOR USE**

- For mixing into EPA-registered products, such as Altosid IGR 0.4% Premix or Altosid IGR 0.005% Tubs

**MANUFACTURING USE PRODUCTS**

- **% (S)-METHOPRENE**
  - Altosid IGR CP-10 EPA Reg. #2724-367 10.5 For mixing into EPA-registered products, such as Altosid IGR 0.4% Premix or Altosid IGR 0.005% Tubs
  - Altosid IGR 2% MUP EPA Reg. #2724-502 2.0 For mixing into EPA-registered products, such as Altosid IGR 0.02% or 0.01% Granules or Blocks

**USE LEVEL REGISTERED PRODUCTS**

- **% (S)-METHOPRENE**
  - Altosid IGR Premix EPA Reg. #2724-174 0.4 Feed concentrate to mix with free-choice-fed minerals or mixed ration feeds, custom blending.
  - Altosid IGR Granules EPA Reg. #2724-372 0.02 EPA-registered granules fed at a consumption rate of 2 oz per 1000 lb. animal per day
  - Altosid IGR Block EPA Reg. #2724-373 0.02 EPA-registered mineral or protein blocks fed at a consumption rate of 2 oz per 1000 lb. animal per day
  - Altosid IGR Block EPA Reg. #2724-492 0.01 EPA-registered mineral or protein blocks fed at a consumption rate of 4 oz per 1000 lb. animal per day
  - Altosid IGR Granules EPA Reg. #2724-494 0.01 EPA-registered granules fed at a consumption rate of 4 oz per 1000 lb. animal per day
  - Altosid IGR Tub or Block EPA Reg. #2724-495 0.005 EPA-registered tubs or blocks for mineral or protein supplementation at a consumption rate of 8 oz per 1000 lb. animal per day
  - Altosid IGR Tub or Block EPA Reg. #2724-787 0.0025 EPA-registered tubs or blocks for mineral or protein supplementation at a consumption rate of 16 oz per 1000 lb. animal per day

**CUSTOM BLENDING PRODUCTS**

- **% (S)-METHOPRENE**
  - Altosid IGR Custom Blending Premix EPA Reg. #2724-473 10.5 For mixing into custom-blended medicated feeds or custom-blended pesticide feeds, per EPA guidelines (blend on order; no floor stocking)
  - Altosid IGR Custom 2% EPA Reg. #2724-503 2.0 For mixing into custom-blended medicated feeds or custom-blended pesticide feeds, per EPA guidelines (blend on order; no floor stocking)
  - Altosid IGR 1% Liquid EPA Reg. #2724-505 1.0 Intended for custom blending into liquid cattle feed supplements