

Crop Profile for Cattle (Beef) in West Virginia

Prepared: September, 2000

General Production Information

- West Virginia ranked 39th in cattle and calves production in the United States in 1998 (1).
- Beef cattle inventory in West Virginia totaled 422,000 head, with production totaling 130 million pounds liveweight in 1998 (1).
- The average price per hundredweight was \$46.90 for cattle and \$65.90 for calves in 1998 (1).
- Total production value of beef cattle was \$64.4 million in 1998 (1).
- Gross producer income, including home consumption, totaled \$75.1 million in 1998 (1).

Production Regions

Beef cattle production is mainly concentrated in the southeastern and northeastern regions of the state. In 1999, Greenbrier County took the lead in number of beef cattle (31,400), followed by Pendleton (28,000), Monroe (24,900), Hardy (23,000), Preston (19,700), Hampshire (18,000), and Pocahontas (16,000) counties. The above-mentioned counties carry more than 38% of the total beef cattle in the state (1). In addition, two western counties, Mason and Jackson, each contribute more than 10,000 head of beef cattle.

Cultural Practices

Except under harsh weather conditions, beef cattle stay on pasture all year round. Shelters, hay, and vitamin or mineral supplements also are provided to beef cattle on pasture. In general, the required facilities for pastured beef cattle include feed storage and working facilities. In addition, basic equipment is needed for watering, feeding, hay-making, and manure handling.

Insect Pests

In 1999, flies (stable, horn, face, and house), lice, cattle grubs, and mange mites were the most reported pests of beef cattle in the state (2). Fifty-four percent of the West Virginia s beef cattle producers surveyed ranked flies on pastured cattle as the most difficult pest to control with available pesticides,

followed by lice (17.6 %), cattle grubs (7.8 %), and mange mites (2.1 %) (2). Other pests, not reported in 1999, include ticks, mosquitoes, and horse and deer flies.

Stable Flies (*Stomoxys calcitrans*)

Damage: Stable flies attack animals' legs and bellies, and feed on blood several times a day. They cause painful biting, animal fatigue, and weight loss (3 and 4).

Life cycle: Stable flies breed in wet straw, manure, and other decaying vegetation. A female lays about 200-400 eggs during her lifetime (3-4 weeks). Stable flies overwinter as larvae or pupae in piles of larval breeding material (5). It takes about three weeks to complete a life cycle (3).

Economic threshold: Stable flies are monitored by counting the flies on all four legs of about 15 animals. If the average number of flies exceeds 10 per animal, control measures should be implemented (5).

Cultural control: Traps for adult flies can be useful in stable fly control programs if enough traps are used. Stable flies are attracted to vertical white panels not more than 30 inches above the ground. Once attracted to the trap by a carbon dioxide-producing bait, the flies can be trapped with sticky adhesive or killed with an electrocuting grid. One trap should be installed for every 20 to 30 feet of perimeter of fly breeding area. Recommended placement areas include near building entrances, in alleyways, beneath trees, and around animal sleeping areas and manure piles (5).

Biological control. Parasitic wasps are the most widely used biological control agents for stable flies. A highly recommended parasitic wasp for livestock operations in the northeast is the species *Muscidafurax raptor*.

Horn Flies (*Haematobia irritans*)

Damage: Horn flies cause painful bites; each fly punctures the cow's skin 20 to 40 times a day (6). Horn flies cause severe nervousness and interfere with the animal's feeding and resting, and can cause blood loss and reduced weight gain.

Life cycle: Eggs are deposited in fresh cattle droppings. Maggots hatch in a day, feed on the dung for three to five days, pupate in the soil for five days, and then emerge as adults. They complete their life cycle in 10-20 days (4).

Economic threshold: In general, if the number of horn flies exceeds 50-100 per cow, chemical treatment is recommended (6). In West Virginia, the horn fly is a pest during warmer months, usually April or May through September or October (7).

Cultural control: Since horn and face flies breed in fresh droppings on pasture, normal cultural fly

measures will not significantly impact them. However, because horn flies stay on the animal all the time, they are relatively easy to control with eartags, dust bags, oilers, or nonchemical walk-through traps (7).

Biological control. Biological control of horn fly is limited to organisms that occur naturally in the field. The horn fly's immature stages (eggs, maggots, and pupae) are attacked by predaceous mites, predaceous beetles, and parasitic wasps. Dung beetles also can limit horn fly populations by removing and burying the manure before the fly completes its development (7).

Face Flies (*Musca autumnalis*)

Damage: Face flies cause extreme annoyance to cattle on pasture all summer. They feed on animal secretions such as tears, saliva, nasal mucus, and blood oozing from wounds (6). They also may serve as vectors of eye diseases and parasites such as pinkeye and eye worms (3 and 4).

Life cycle: Females lay eggs in fresh cattle droppings. Maggots develop on cow manure, then pupate in the soil. Face flies are active from early spring through late autumn, but do not enter buildings during the summer (8). In the fall, face flies enter buildings to hibernate (3 and 4). The entire life cycle takes about two to three weeks

Economic threshold: Face fly populations of 5, 13, and >20 per animal are considered low, moderate, and heavy, respectively. Moderate to heavy fly infestation will result in a decrease in grazing by about one hour per day (8).

Cultural control: Face flies are more difficult to control than horn flies because they spend less time on the animals than do horn flies. Walk-through fly traps designed for control of the horn fly may trap face flies; however, this method is not totally reliable. An effective control method is the use of dust bags placed where cattle are forced to use them, such as on a mineral feeder or gateway. The dust bag should be placed low enough so that the cow must lift it up with its head (8).

House Flies (*Mucosa domestica*)

Damage: House flies irritate beef cattle, and assist in transmitting diseases and parasites. House flies are active in the Northeast from May through October with the largest populations occurring during July, August, and September (9).

Life cycle: House flies breed in animal droppings and other organic matter. Each female lays 150-200 eggs in patches at three- to four-day intervals. It takes about 10 days to complete a life cycle, from egg to adult (3).

Economic threshold: House flies are monitored with baited traps, sticky ribbons, or spot cards (3 X 5-inch white index cards attached to fly resting surfaces). A count of 100 or more fecal or vomit spots per card per week indicates a high level of fly activity and a need for control (9).

Cultural control: Removal of the maggots' food source is the first step in a pest management program. Since the house fly can complete its life cycle in as little as seven days, removal of wet manure at least twice a week is necessary to break the breeding cycle. The manure can be spread to dry or added to a liquid manure pit (9).

House flies are attracted to white surfaces and to baits that give off odors. Traps for adult flies can be useful in house fly control programs if enough traps are used and are placed correctly. Cone- or pyramid-shaped traps covered with white freezer paper and coated with sticky adhesive usually are effective. Such traps can be baited with a mixture of molasses, water, grain, and milk. Outdoors, one trap should be installed for every 20 to 30 feet of perimeter of fly breeding area (9).

Biological control: At present, parasitic wasps are the most widely used biological control agents for house flies. A highly recommended parasitic wasp for livestock operations in the Northeast is the species *Muscidafurax raptor*. Parasitic wasps, however, should not be used as the sole method of control. Their use should be combined with a program of manure management and trapping. Also, safe insecticides, such as pyrethrin, may be used along with a fly management program, if needed (9).

Fly Control Measures

Chemical control: In 1999, West Virginia beef producers reported using the following pesticides to control flies on pastured cattle (2).

Spray:

- **Malathion 5%:** Used by 1.6% of state farmers
- **Permethrin (Permethrin II) 10% EC:** Used by 7.3% of state farmers
- **Permethrin (Atroban) 11% EC:** Used by 2.4% of state farmers

Backrubbers:

- ***Coumaphos (Co-Ral):** Used by 7.6% of state farmers; applied as backrubber or self-oiler in a mix of 2 qt. 5.8% EC or 4 qt. 11.6% EC in 13 gal. of mineral, No.2 fuel or diesel oil (10)
- **Malathion:** Used by 3.0% of state farmers
- **Methoxychlor (Marlate):** Used by 2.3% of state farmers
- **Permethrin (Ectiban):** Used by 2.3% of state farmers
- **Permethrin (Permethrin II):** Used by 8.4% of state farmers

* Restricted use

Ear Tags:

- **Atroban:** Used by 10.4% of state farmers; applied with the Allflex tagging system at first appearance of flies in spring (2 ear tags/head).
- **Permethrin:** Used by 7.2% of state farmers
- **Ectrin:** Used by 2.4% of state farmers Other ear tag brands: Cutter Blue, Optimizer, Cutter Gold, Double Barrel, Warrior, and Patriot

Oral Formulation:

- **Rabon Oral Larvicide 7.76%:** Used by 1% of state farmers; given as a feed additive in concentrates, or protein and mineral supplements at 70 mg. a.i. /100 lbs. body weight per month

General Fly Management

- Cultural control practices: Sanitation is the key to fly control. Proper soil drainage, spreading manure thinly on pasture to kill fly eggs and larvae, use of sticky tapes, paper, and ribbons also are effective techniques in managing small to moderate fly populations.
- Alternatives: Use a combination of formulations such as baits, residual sprays, and larvicides. Treatment alternations help in reducing the buildup of pesticide resistance.
- Biological controls: Parasitic wasps, beetles and, mites are the main natural enemies of fly eggs and larvae that can take a heavy toll on fly (house and stable) populations.

Cattle Grubs, common (*Hypoderma lineatum*), and Northern (*H. Bovis*)

Damage: Two species, the northern cattle grub and the common cattle grub, are pests in the northeastern United States. Adults of the common and northern cattle grubs are known as the "heel fly" and "bomb fly," respectively (11). Cattle grubs damage the animal's tissues, further reducing the carcass's value. They affect the animal's ability to graze efficiently, and reduce weight gain.

Life cycle: The cattle grub females attach their eggs (about 600) to the hairs of the cow's legs and lower body regions. Larvae emerge after four to seven days and burrow into the skin, cause considerable irritation, and then migrate through the animal's connective tissues. During winter, grubs migrate again, this time into the animal's back where they form a warble (swelling) between the hide layers. After two months, the grubs emerge, drop to the ground, and pupate in pasture litter and soil for two to eight weeks before adult flies emerge (11).

Chemical control: Cattle should be treated for grubs at least six weeks before grubs are expected to appear in the back (6). Proper timing for beef cattle treatment (after adult fly activity ceases and before the migrating grubs reach the esophagus or spinal cord) is essential. Treatment should be administered while the larvae are migrating through the connective tissue, normally July through September in West Virginia (11). **Ivermectin (Ivomec):** Used by 24.6% of state farmers **Famphur (Warbex):** Used by

10.5% of state farmers ***Coumaphos (Co-Ral)** 11.6% EC: Recommended, but not reported used by West Virginia s farmers in 1999 **Fenthion (Tiguvon)** 3%: Recommended, but not reported used by West Virginia s farmers in 1999

* Restricted use

Alternatives: Participate in an area-wide program for treating all beef cattle with systemic pesticide to reduce fly activity the following year.

Cultural control practices: Since heel flies and bomb flies lay eggs only in the daytime and do not enter stables, a practical control solution is to provide darkened sheds or shelters into which cows can retreat as the flies approach (11).

Lice, Chewing (*Bovicola bovis*), Sucking (*Linognathus vituli*), (*Haematopinus eurysternus*), and (*Solenopotes capillatus*)..

Damage: All types of lice cause extreme annoyance, hair loss, reduced feed conversion efficiency, and general unthriftiness. Cattle damage fences and bruise or scrape themselves as they rub to relieve the itching caused by thousands of lice on their bodies. Blood loss from sucking lice is sometimes severe enough to cause anemia (6).

Life cycle: Females attach their eggs to the animal s hair with glue. Nymphs (young lice) emerge after 10 to 14 days, complete their development in a few weeks, and spend their entire lives on the host animal.

Chemical control: Cattle should be treated for lice early in the winter before infestations have caused serious damage. In 1999, the following pesticides have been used as sprays or pour-on for louse or mite control on beef cattle in West Virginia (2).

- **Ivermectin (Ivomec):** Used by 24.6% of state farmers
- **Permethrin (Permethrin):** Used by 3.7% of state farmers
- **Permethrin (Ectiban):** Used by 2.3% of state farmers
- **Permethrin (Atroban):** Used by 1.5% of state farmers
- **Pyrethrin (Pyrenone):** Used by 0.8% of state farmers
- **Dichlorvos (Vapona):** Used by 0.8% of state farmers

Cultural control practices: Animals should be isolated and carefully inspected for lice before being allowed to mingle with the herd. Housing calves in hutches will reduce infestations by 90% without any pesticide treatments.

Mange Mites, Chorioptic (*Chorioptes bovis*) and Sarcoptic (*Sarcoptes scabiei*)

Damage: Mange mites cause dermatitis, hair loss, and scabbiness.

Life cycle: In late fall, development from eggs to adult mites takes about two weeks.

Chemical control:

- **Ivermectin (Ivomec):** Used by 24.6% of state farmers

Cultural control practices: Be cautious when buying or introducing new animals. Inspect for visible skin that appears to be abnormally itchy or agitated. Segregate all newly purchased animals from the rest of the herd for several weeks, and keep them under observation.

Pesticides and Economical Impact:

Different criteria to determine when to apply insecticides have been reported by beef cattle producers in the state. Approximately 25 percent of West Virginia producers surveyed indicated that the presence of pest is the number-one criteria for decision-making on when to use pesticides (Table 1) (2). The dollar amount spent on cattle external parasite control also reflects the economic impact of pests on West Virginia beef cattle operations (Table 2).

Table 1. Criteria used to determine when to apply pesticides to cattle (1999)

Criteria	Percent Responses
Presence of pests	24.89 20.00
Treat on routine schedule	15.56
Animal discomfort	12.00
Reduced cattle performance	10.67
Suggestion from a vet or others	8.00
Suggestion from Extension specialist	4.89
Advice of other farmers	2.22
Personal discomfort	1.33
Suggestion of chemical salesperson	0.44
Complaints from neighbors	-----
Total	100.00

Table 2. Money spent on external parasite control in West Virginia (1999)

\$ Dollar/ Year	Percent Responses
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None	24.75
50-99	11.88
100-299	31.68
300-499	9.90
500-700	12.8
over 700	1.98
Total	100.00

Critically Needed Pesticides

The following pesticides were reported as critically needed for beef cattle insect/mite control: Ivermectin (Ivomec), Famphur (Warbex), Permethrin (Permethrin), Methoxychlor (Marlate) 50% WP, and Coumaphos (Co-Ral) 5.8% EC, and 11.6% EC, for control of fly and lice on pastured animals (2). Also, diazinon, fenthion, lambdacyhalothrin, and cyfluthrin are needed as active ingredients in ear tags, which are widely used by beef producers for fly control on pastured animals.

Registration date and EPA number of pesticide formulations for cattle insect pest control in West Virginia.

Material and Formulation	Registration Date	EPA Registration #
fenthion (Tiguvon) 3%	1-1-2000	11556-34
trichlorfon (Neguvon) 8%	1-1-2000	11552-32
permethrin (Ectiban, Insectrin) 5.7% EC	1-8-2000	10350-41
(Atroban, Expar) 11% EC	1-1-2000	773-59
(GardStar) 40% EC	1-15-99	432-786-39039
(Permethrin II, Insectrin X) 10% EC	3-23-99	4691-108-11770
(Brute) 10%	5-25-2000	39039-7
piperonyl butoxide (Python) 20%	1-8-2000	4822-363

Source: West Virginia Department of Agriculture (Sept. 7-2000).

Note: Pesticides will not be listed as registered in the state unless the chemical company registered or renewed their registration and paid the fee for their products.

Suggested, but not registered pesticides for cattle pest control in the state.

Material and Formulation	Material and Formulation
amitraz (Taktic) 12.5% EC coumaphous (Co-Ral) 11.6% EC and 25% WP (Zipcide) 1% cyfluthrin (Cutter Gold) 10% (Cylence) 1% diazinon (New Z Diazinon) 18% diazinon (Terminator) 20% (Bova Guard, Optimizer, Optimizer-Calf) 21.4% (Patriot) 40% diazinon 30% and chlorpyrifos 10% (Warrior) diflubenzuorn (Vigilante) 9.7% famphur (Warbex) 13.2% fenthion 20% plus piperonyl butoxide 15% (Cutter Blue) fenthion (Spotton) 20% (Lysoff) 7.6%	ivemectrin (Ivomec) 5 mg/ml, 1% lambdacyhalothrin (Excalibur, Saber) 10% lambdacyhalothrin 6.8% and pirimiphos methyl 14% (Double Barrel) methoprene (Altosid, Moorman's IGR) 0.02% methoxychlor (Marlate) 50% WP Permethrin (Delice, Expar, Har-Hitter, Permectin) 1% phosmet (Prolate, GX-118) 11.6% EC tetrachlorvinophos (Rabon) 3% tetrachlorvinophos and dichlorvos (Ravap) 28.7% EC

Source: Lyon, 1995 (Ref. #10).

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Survey questionnaires were sent to 850 beef cattle operators in West Virginia. Survey responses were received from 137 (16.1%) beef operators. Ninety-six responses were usable with pesticide data; twenty-nine were usable without pesticide data; and 12 responses had no data and were not used in the summary. Results were summarized and tabulated in collaboration with West Virginia Agricultural Statistics Services.