

Crop Profile for Dairy in Minnesota

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General Production Information

Production Facts, 1998 (Percent of U.S. Production)	
Rank:	5 th (5.9 %)
Milk Production:	9275 million pounds (5.9%)
Cows:	541,650 (5.9%)
Operations:	9603 (7.8%)
Statewide Average Per Cow:	16833 pounds
National Average Per Cow:	17192 pounds
Price per Hundredweight:	\$
Value of Production:	\$1,093,657 (5.6%)

Production Statistics:

Minnesota ranks 5th in the United States for milk production and numbers of dairy cows. West central Minnesota and down the west banks of the Mississippi River valley supply the top ten dairy counties of Minnesota. Dairy ranks 4th in Minnesota agricultural commodities (13.2 %).

NASS Ag Statistics for Minnesota

Dairy Facts 1997

Rank	County	Cows	Operations	Dairy Products Sold Value (\$1,000)
1	Stearns	62793	1120	129,312
2	Otter Tail	30344	579	60,178
3	Winona	28559	378	66,475

4	Morrison	27434	550	52,158
5	Goodhue	26602	352	56,466
6	Todd	21757	463	43,566
7	Wabasha	19121	281	41,848
8	Fillmore	16033	282	31,122
9	Wright	14027	235	28,880
10	Carver	13569	226	28,416
Minnesota		541650	9603	1,093,657

Minnesota produces 624 million pounds of cheese, about 8.5 % of US cheese production. Ice cream is also a valuable product with 491.6 million gallons produced, about 4.6 % of US supply.

Dairy Products, 1998 (Percent of U.S. Production)			
Total Hard Cheeses:	616933000 lbs (8%)	Italian Cheese:	54041000 lbs (2%)
American Cheese:	558401000 lbs (17%)	Cheddar Cheese:	535125000 lbs (20%)
Colby, Monterey, and Jack Cheeses:	23276000 lbs (3%)	Butter:	65956000 lbs (6%)
Non-fat Dry Milk for Human Use(combined with Wisconsin):	21412000 lbs (2%)	Dry Buttermilk:	5349000 lbs (10%)
Lactose:	117597000 lbs (25%)	Whey Protein Concentrate (human):	52430000 lbs (21%)
Dry Whey, Human Food:	103730000 lbs (9%)	Dry Whey, Animal Feed:	2742000 lbs (3%)
Ice Cream, Regular, Hard:	41400000 gal (5%)	Lowfat Ice Cream Mix:	21311000 gal (4%)

Cultural Practices

There are six main dairy breeds; the most popular being Holstein-Friesian and Brown Swiss. The others include Jersey, Guernsey, Ayrshire, and Milking Shorthorn. Regardless of the breed of animals, over the

last 40 years many producers have opted to register individual cows or entire herds as a means of improving production and increasing herd value. The registration process, wherein a strict record of breeding and animal health is kept, has been greatly facilitated by the artificial insemination process. Whether registered or not, for cattle beyond their useful productive life (12-15 years), heifers are often raised by the very operation in need of replacements. Offspring born from cows or heifers will be bred at the age of two or three years, and produce a calf, before beginning to produce milk for the herd.

In the Midwest, dairy herds may be kept in barns, loafing sheds, or confined lots during cold weather, but most cows are still grazed on pastures during the summer. Most housing barns are heated only by animal body heat in the winter but have windows and ventilation fans to regulate temperature in the spring and summer. Some barns have walls made from plastic shades that may be automatically rolled up or unrolled, similar to green house systems, for temperature control. Younger calves may be housed in indoor pens or single calf hutches in any season.

There are two main types of milking facilities - one is the parlor and the other is the stanchion barn. In a parlor facility, milking units remain stationary while groups of cows enter by one door to be milked, and then leave by another door to allow the next group entrance. The parlor system can feed grain to cows during milking or all feed can be offered outside after the group is milked. In a stanchion barn, all the cows are brought inside at once. The milking units, of which there may be several, are brought in turn to each cow which is then milked. Since the cows stay inside until the milking process is finished, they are usually fed grain during their stay. Since pests congregate around animals, most premise applications occur in stanchion barns or around young calves housed indoors.

There are two principal mechanisms for disposing of waste from animal enclosures. First, if there are sufficient solids to the manure, such as where straw or sawdust has been added to adsorb moisture, the manure may be stockpiled in free-standing mounds. And second, if the manure is mostly a slurry, it is stored in a slurry-store (a pit or open-top silo-like structure). When time and conditions permit, typically in the colder winter months, the farmer spreads it fields as fertilizer. Wastes are removed from the animal environment to maintain sanitation and help control insects.

Insect Pests

The most common pests for cattle are flies, lice, and internal parasites. Depending on the season and location, cattle grubs, mange, and ticks can be problems. Other insects, such as gnats and mosquitoes, can be quite numerous and a severe nuisance, but do not generally cause serious problems with dairy cattle. In addition to their direct effects on cattle, flies are a great nuisance to dairy workers. Sites with heavy fly infestations produce irritable animals, maggots (fly larvae) in feeds and manure, sticky fly excrement covering milking equipment and building surfaces, and an increase in spiders and their webs.

Dust and animal hair adhering to fly excrement and spider webs can find their way into lungs and the milking lines.

Horn flies and face flies are most commonly found in pastures, usually coming into buildings only when on the cows' backs. These flies sit on the face, neck, shoulders, and back of the animal and feed on either their blood or secretions from the nose, mouth, and eyes. Although healthy cows may be able to withstand as many as 200 horn flies without reductions in weight gain, their presence is certainly annoying and can be troublesome to dairy operators. There are other types of flies that are associated with buildings; stable flies and house flies are the most common of these. House flies are more of a nuisance and general sanitation problem than as a direct pest on cattle. Stable flies, along with deer flies and horse flies, feed on blood from the back and legs. Stable flies have a long, bayonet-like proboscis that causes a painful sting, and as few as five stable flies on the legs of cattle has been shown to reduce performance in weight gain. Gnats and mosquitoes are mainly a nuisance and can be kept from buildings by screens and ventilation fans. In addition, flies can spread diseases such as pinkeye. In northern Illinois, Indiana, Ohio and Iowa and across through to Nebraska and north, the fly season lasts from June to early September. In southern Illinois, Indiana, Ohio and through Missouri and Kansas the fly season lasts from early May to mid-October.

Cattle grubs, also known as heel flies, gadflies, or warble flies, are often found at muddy stream crossings. In scattered areas, they can be a serious pest but are not extremely. The adults bite and lay their eggs in the hair of the hocks and legs. When the eggs hatch, the larvae burrow through the skin and, while maturing, migrate through the tissues of the cow. The larvae eventually exit through the skin of the back. Meat quality can be reduced and the hide is scarred by the exit holes.

Mange mites are microscopic insects that live on the skin. Some live on oily secretions while others live on skin cell contents. The irritation from the mites causes animals to rub themselves excessively to relieve the discomfort, often rubbing hair off. One uncommon type of mange, cattle scabies, can produce large, spreading sores and requires quarantine.

Lice are tiny, biting insects that feed on blood. Rather large populations may live on adult cows without major health problems. In severe infestations, the cows may scratch hair off in order to relieve the itchy feeling or develop respiratory infections due to reduced thriftiness. These insects spread easily between animals, especially during winter when animals are housed together for long periods of time. Young calves are most affected and large lice populations may cause death. Calves are stunted in their growth, and become susceptible to secondary infections such as pneumonia.

Internal parasites rob animals of the nutrient value from their digested feed. Roundworms and flukes often attack the organs of both calves and cows. Their eggs pass through the manure and hatch in pastures or weeds alongside of feed lots. Cows become infected when they eat grass that has larvae growing on it. Internal parasites can cause dehydration, coccidiosis, pneumonia, malnutrition, and other secondary diseases of the liver, heart, lungs, stomach, and intestines in cows and calves. If left untreated, the cows show reduced milk production and calves are stunted in growth and may appear gaunt due to

weight loss.

Pests Reported as Problems on Dairy Animals	
Externally Treated	Percentage
scabies	1
deer flies	9
house flies	15
horse flies	12
horn flies	14
stable flies	13
screwworms (blackfly)	5
lice	15
mange	6
ticks	4
Internally Treated	Percentage
flies	3
grubs	1
screwworms (blackfly)	1
ticks	1
other	1

ARTHROPOD PESTS AND INTERNAL PARASITES

There are a variety of pests and weeds that affect cattle production, with the most severe problem varying with the season. During the winter, mites, lice, and grubs become a problem. In the summer months, flies are the most prevalent pest.

MAJOR PESTS

Cattle lice A complex of lice which feed on cattle

(Borcola + Linognathus + Solenopotes + Haematopinus spp.)

Lice occur every year and affect cattle throughout the year, but are most commonly observed in the

winter when cattle are housed or corralled together (the lice reproduction rate increases with the onset of cold weather). Low or moderate infestations do not have a significant effect on meat production -- most animals can withstand moderate populations of lice before suffering a decrease in weight gain. However, lice infested cattle are more susceptible to disease, particularly respiratory problems. High infestations on individual animals will reduce weight gain and may indicate sickness or internal parasites⁶. Infestations of all lice in this complex are treated with the same insecticides.

Mange mites^{1,8}

Mites are tiny, eight-legged arthropods which feed on skin or blood. There are several species of mites, each of which causes a different kind of mange. The irritation they cause in the animal's skin is due to either their burrowing through the skin or their feeding, and to the presence of their waste products in/on the skin. Blood feeders pierce the skin and feed on blood; Skin feeders pierce skin cells, inject saliva, and ingest the digested cell contents. Infestations, when present, are most severe in the winter when cows are housed indoors in close proximity. Mange problems have been greatly reduced since systemic endectocides (such as ivermectin) have become available.

Burrowing mites (Skin feeders)

Demodex bovis; *Sarcoptes scabiei*)

Demodectic mange mites burrow into the hair follicles of cattle where they feed on the oily secretions there. Their presence causes irritation and hair loss.

Cattle scabies is caused by sarcoptic mange mites. It causes cows extreme discomfort and hair loss due to the large, spreading lesions it produces. As mites burrow in and begin to feed, small lesions form. Cattle rub themselves to relieve the irritation from the mites and the mites move outward and continue to feed. As the skin becomes thicker and encrusted in the middle of the lesions and the cattle rub them, often hard enough to remove the hair, the mites keep moving to the edge and the lesion grows. If the infestation is severe or the cows left untreated, the lesions may eventually cover most of the animal. When cattle scabies are found within a herd, all animals are quarantined until they have been treated and cured; Severely infested animals are destroyed. Scabies is quite uncommon in the Midwest now.

Sucking mites (Non-burrowing, blood feeders)

Chorioptes bovis

Chorioptic mange is the most common and least severe mite-related disorder in cattle and occurs every year. Lesions spread slowly and most damage is to the hide, caused by the animals rubbing the affected areas.

Psoroptes ovis var. *bovis*

Bites cause discomfort and irritation in cattle, which may lead to excessive scratching. In case of severe infestation, they may produce debilitation in the cattle and possibly even death. Symptoms in severe cases resemble somewhat those of cattle scabies.

Pasture flies - Horn and Face flies

Horn and face flies will not enter buildings or sheds in search of cattle, though they can remain on them when the cattle come indoors from the pasture. Attacks from these flies can be reduced by keeping cattle indoors, if this is an option.

Horn flies (*Haematobia irritans*)

Horn flies are blood feeding flies which normally rest on the shoulders, back, neck, and head of cattle, though in the heat of the day, they often move to the belly. Cattle can withstand as many as 100-200 horn flies at any given time, but their presence in larger numbers may lead to reduced weight gain.

Face flies (*Musca autumnalis*)

Female face flies sit on the face and feed on secretions from the eyes, nose, and mouth of cattle. They may carry pinkeye though pinkeye outbreaks can also occur in the absence of face flies due to other vectors. Therefore, controlling face flies does not guarantee an absence of pinkeye. There are no estimates of how many face flies cause a reduction in the rates of production or growth.

Stable flies (*Stomoxys calcitrans*)

Stable flies are persistent pests of cattle and have been found more than 100 miles from their hatching site. They have a long, bayonet-like proboscis that causes a painful sting and as few as five stable flies on the legs of cattle has been shown to reduce cattle performance. Since they usually choose to feed on the front legs of cattle, cows will often stand in circles with shoulders touching to deter stable fly attacks. They are a major problem in the summer for confined cattle (feedlots and dairies). Deterring attacks from stable flies is difficult since they live in and will readily enter buildings. Chemical sprays directed at the animals' legs may slow attacks but will not provide long-term control, especially in wet years when vegetation "washes" the pesticide off. Manure management and good sanitation are the best weapons against stable flies.

Biting flies

Horse flies (*Tabanus* spp.)

Deer flies (*Chrysops* spp., *Haematopota* spp., *Silvius* spp., *Pangonia* spp.)

Biting flies severely annoy cattle and can reduce the rate of weight gain. Control is difficult since the female fly lands on an animal, slashes the skin, takes a blood meal, and flies away to rest. This can be repeated up to 10 times before the female is satiated and leaves. Placing cattle in barns or sheds will keep horse and deer flies away since neither will enter buildings, but this may not be a viable option in states where range and pasture are the main sources of feed. It is possible to deter the feeding female with applications of Permethrin, but this is a short-term control. There are no satisfactory long-term chemical controls for horse or deer flies.

Cattle grubs / Warble flies / Heel flies (Gad flies)

(*Hypoderma bovis*, *H. lineatum*)

Warble flies are extremely damaging and animal tolerance for them is low. The mere presence of these flies upsets cattle, which reduces feeding, and animals sometimes injure themselves trying to avoid them. Adult flies lay eggs on hairs of animals in areas where it is difficult for the animal to dislodge them, such as the hocks of the hind legs or the front, ventral area. After hatching, the larvae then burrow under the skin and migrate towards the epidermal fat of the spinal column (*H. bovis*) or towards the submucosa of the esophagus (*H. lineatum*), where they overwinter and molt once. In early spring, the larvae migrate to the animal's back and form a "warble". Here, they molt again, chew breathing holes in the skin, and feed. Some time during the spring, they emerge from the hole, drop to the ground, and pupate into adults. Damage from the grubs occurs in two ways. In the winter, if a large number of larvae die while near the spinal cord or esophagus, anaphylaxis, hindquarter paralysis, bloat, or death can occur. This is the reason for the seasonal limitations on pesticide treatments for cattle grubs. When the larvae are burrowing through the muscle and skin in the back, they produce holes. This renders the meat there unusable, increasing trim losses, and severely reduces the quality of the hide.¹ Warble flies are present most every year but, as a result of control measures which have been used for many years, the infestations today are generally small. Adults have about a 9 mile migration range, so local quarantine and eradication are possible.

MINOR PESTS

Mosquitoes⁸

(*Aedes* spp.)

Mosquitoes are mostly just an annoyance to cattle. To avoid them, cattle will often bunch together, in or near buildings (if available) or in dry corners of pastures, and grazing may be reduced. Mosquitoes develop in shallow water - standing or slow-moving -- so filling in low areas that may hold water can help decrease the mosquito population. Chemical treatment of such ponded water areas is an option but must be done very carefully to avoid contaminating streams and other water sources. Treating the cattle directly with insecticides provides some brief relief, but repeated applications are not economical so many owners often do not treat their livestock only for mosquitoes.

Ticks

(Ixodidae family)⁸

Ticks rarely cause economic damage in the northern parts of the U.S. but are most often a problem when cattle graze in brushy or wooded areas. They occur every year and some animals can tolerate a large number of ticks. Treating cattle for ticks reduces the likelihood of blood-borne disease and makes animals more comfortable.

INTERNAL PARASITES¹

Coccidians

(*Eimeria zuernii*; *E. bovis*)

These worms cause coccidiosis in young calves. The result is diarrhea which can lead to severe dehydration. If left untreated, weakness and emaciation occur and weight gains are erased.

Nematodes and Flukes

(*Strongyloides* spp., *Ostertagia ostertagia*, *Trichostrongylus* spp., *Cooperia* spp., *Trichuris* spp., *Oesophagostomus* spp.)

There are many internal roundworms and flatworms, each with their own "target" organ in body. Most are blood feeders and may cause anemia and general unthriftiness, though some live off nutrients in the digestive system. In severe cases or if left untreated, they can kill the animal. In beef cattle, they are most likely found in animals on pasture since animals become infected by eating fresh grass which has worm larvae on it. Then, as the cattle graze through the pasture, eggs are excreted in their manure. When the weather is favorable, the eggs hatch and develop into infective larval stages which move up grass blades and wait to be eaten -- and the cycle repeats. Infection can also easily occur with cow-calf pairs. In cattle on feedlots, worms are much less common.

Drugs used for worm control consist of orally administered or subdermally injected anthelmintics. The actual drug used will depend on the type of worm and the stage - larval or adult -- of the worm life cycle that is the target. Class I drugs only kill adult worms; Class II kill both larval and adult stages.

Pesticides:

Minnesota Summary of Pesticides Applied to Dairy Animals

Class	Active Ingredient	Percent of Animals Treated
Avermectins	eprinomectin	25
	ivermectin	8
Acetylcholine Mimics	morantel tartrate	5
Pyrethroids	cyfluthrin	3
	permethrin	13
	pyrethrins	4
Organophosphates	stirophos	4
All Others		8

Please read [text](#) for a description of insecticide methods of application.

Please read [text](#) for a description of insecticide active ingredients, product names, target pests, and restrictions.

Please view [table](#) for information on insecticide use rates based upon North Central Region dairy averages.

Please view [table](#) for comparing active ingredient methods of application based upon North Central Region dairy averages.

Please view [table](#) for comparing popularity of different methods based upon North Central Region dairy averages.

Please view [table](#) for state comparisons of active ingredient use.

Weeds

There are a number of weeds that can cause problems for cattle. The affects of weeds on cattle fall into three general categories; those that are poisonous or cause photosensitization, those that reduce feed consumption and forage quality, and those that impart an off-flavor to milk and meat. Included among plants that are poisonous or result in photosensitization of livestock are; corn cockle (*Agrostemma*

githago), pigweeds (*Amaranthus* spp), hemp dogbane (*Apocynum cannabinum*), marihuana (*Cannabis sativa*), water hemlock (*Cicuta maculata*), jimsonweed (*Datura stramonium*), horsetail (*Equisetum arvense*), white snakeroot (*Eupatorium rugosum*), white sweet clover (*Melilotus alba*), yellow sweet clover (*Melilotus officinalis*), poke (*Phytolacca americana*), buttercups (*Ranunculus* spp), nightshades and bull nettles (*Solanum* spp), Johnsongrass and sorghums (*Sorghum* spp), cocklebur (*Xanthium* spp), and red, white and alsike clovers (*Trifolium* spp). The toxic principals of these weeds includes production of hydroquinones, alkaloids, thiaminase, and glucosides. For some weeds the toxic principal is accumulation of nitrates (pigweeds) or the formation of prussic acid (sorghum spp). Depending on the amount consumed and other stress factors the livestock may experience the effects may range from minor to fatal.

All weeds reduce forage quality to some extent. By their very nature most weeds grow faster than the grass, legume, or grain crop in which they are found and will mature before the crop, resulting in coarse and less palatable forage at the time of harvest. Although some weeds, such as pigweeds and dandelions (*Taraxacum* spp), are touted at very palatable forage, their protein content is considerably less than that of a clover or alfalfa stand. Such weeds, when found in great numbers, will reduce the production efficiency of livestock fed such forage. Weeds can also reduce feed consumption through other means. Thistles (*Cirsium* spp) and other weeds which produce sharp spines or burs significantly reduce the palatability of hay and fodder fed to the animals and may reduce uptake of forage by injuring their tongue and mouth.

A number of weeds, when eaten by livestock, can cause off-flavors to be imparted to milk or meat. Most notable among such plants are wild garlic, (*Allium vineale*), wormwood (*Artemisia* spp), and yarrow (*Achillea millefolium*). Although cattle will typically avoid such plants when grazing adequate pasture, they may very well consume these plants when other forage species are limited. This is also true of contaminated ensiled or baled forage when fed to cattle without alternatives. When milk is contaminated by off-flavor components it may be rejected by processors, resulting in significant loss to the dairy producer. Although the source of meat which has an off-flavor may be difficult to trace, once identified it may tarnish the reputation of the producer for some time and greatly restrict his ability to market animals.

Although a discussion of weed control will be left to the reports on alfalfa, wheat, pasture or whatever crop contains the weed, it is worth noting that the presence of weeds is so pervasive that it is nearly impossible to prevent some incidental consumption. Producers must therefore pay close attention to the quality of pastures and harvested forages, and strive to reduce the likelihood of animals receiving toxic doses. Prudent approaches will often necessitate the use of cultural, mechanical, and chemical means of control to effect minimal exposure.

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Minnesota Agricultural Statistics Service

Minnesota Department of Agriculture

Minnesota Farm Bureau Federation

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