Crop Profile for Beef Cattle Production in US (North Central Region)

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General Production Information

The North Central States are a major beef producing region. Six states rank in the nations' top ten for number of beef animals produced. In 1997 this region produced 38% US beef cattle and calves and 41% of the US meat production. Meat, tallow, and bloodmeal are some of the consumable animal products sold, while other products include leather and animal by-products.

The principal reason for such a large number of beef operations being located in the upper Midwest is the readily available supply of feed grains and forage. Not only do beef cattle provide the Midwestern farmer with a means of adding value to corn and alfalfa produced on the farm, but it also means that feedlot operations have few trucking or transportation fees to pay to access high protein feed.

Herd sizes in the Midwest range from 35 to 184 head with a mean herd size of 87 (1997 Census of Agriculture). This number will include both cows and calves. Larger herds are predominantly found west of the Mississippi while smaller herds are more typical of production facilities east of the Mississippi.

Beyond the size of the herd, there are also differences in some production practices between these regions. East of the Mississippi, producers more commonly utilize beef as part of a diversified production practice with other livestock and commodities. These smaller herds are maintained more often on improved pastures during the summer and in enclosed buildings during cold weather. West of the Mississippi, beef production is a more fundamental part of the operation and calves are more likely to have been started on open range and finished at feedlots prior to slaughter. Nationally, about 75 percent of the market beef is from feedlot-fed cattle.

General Production:

Beef cattle for slaughter are produced either as yearlings started on pasture and finished on feedlots or as calves fed on lots from time of weaning. At the time of this writing feed lot production was evenly divided between these methods when evaluated over the entire North Central Region. Feed grains are fed prior to slaughter to increase the rate of gain and to make the beef more palatable. Feed grains also help producers to provide top grade beef to the market throughout the year without the market gluts or shortages that would occur from range or forage fed beef alone. Typically, grains are fed to yearling cattle as the predominant feed for about four months, while calves may be fed for about seven months from time of weaning. However, the current trend is for more calf fed production. The estimates which follow offer a general starting point for understanding feed consumption.

The average beef animal on a feed lot consumes 2500 pounds of feed grain (high carbohydrate sources) during its life. Of all cattle finished on feedlots about 35 percent of their final weight can be attributed to feed grains. However, some producers will find other sources for carbohydrates. For the largest feedlots, almost all feed by-products such as (potato residue, corn cannery residue, sugar beet pulp, grain screenings, oil seed residues, brewers "grains" and millers residues. For feed lots feeding by-products, these sources may make up to 50 percent of the daily intake of carbohydrates.

In addition to feed grains, baled hay or ensiled alfalfa and mineral supplements are usually fed to maintain herd health. Calves fed from weaning will consume up to 600 pounds of alfalfa or other hays during their life. It is difficult to predict the amount of forage eaten by yearlings but estimates may go up to 2000 pounds for cattle produced as winter stockers (not on feed lots). Beef animals also consume approximately 20,000 gallons of water during their life.

Excessively cold weather will cause beef cattle to use stored energy to keep warm. Depending on the availability of natural windbreaks, barns and pole sheds may be provided to alleviate some of winter's stress on animals and reduce the need for excessive amounts of feed. http://www.beef.org/library/handbook/environment.htm

Production Statistics:

		Cattle and	Meat	Value of		
		Inventory	(Cattle	Calves		Steer/bull
Rank	**State**	**(1,000)**	**Calves)**	**($1000)**	**Operatio**	**Raised**
1	Texas	14,532,814	13,028,67	7,252,079	144,354	4,915,101
2	**Nebraska**	**6,732,637**	**7,143,061**	**4,953,935**	**29,298**	**2,645,580**
3	**Kansas**	**6,506,089**	**8,271,113**	**5,456,072**	**36,244**	**2,932,010**
4	Oklahoma	5,321,161	4,346,420	2,311,232	58,023	1,994,975
5	California	4,968,679	3,107,562	1,411,055	17,335	1,183,658
6	**Missouri**	**4,312,716**	**2,494,869**	**1,130,653**	**67,198**	**1,101,367**
7	**S. Dakota**	**3,723,271**	**2,448,551**	**1,332,772**	**20,502**	**1,050,831**
8	**Iowa**	**3,647,129**	**2,881,122**	**1,850,796**	**38,435**	**1,369,683**
9	**Wisconsin**	**3,440,300**	**1,547,935**	**670,528**	**39,593**	**678,517**
10	Colorado	3,307,301	3,751,788	2,537,589	15,592	1,287,136
13	**Minnesota**	**2,395,456**	**1,339,902**	**742,357**	**30,913**	**735,165**
16	**N.Dakota**	**1,810,409**	**1,055,343**	**497,884**	**14,232**	**431,286**
26	**Illinois**	**1,437,697**	**949,478**	**546,901**	**24,452**	**457,320**
27	**Ohio**	**1,282,546**	**7,11,149**	**344,743**	**28,244**	**354,934**
31	**Michigan**	**1,025,702**	**537,681**	**276,971**	**15,468**	**286,846**

32	**Indiana**	**976,701**	**667,846**	**331,134**	**23,025**	**288,776**
United	**States**	**98,989,244**	**74,089,04**	**40,524,83**	**1,046,86**	**28,838,49**

General Pest Control Information:

As mentioned in the above section, production practices are often different between the eastern and western portions of the North Central Region. As would be expected with animals in larger herds, cattle from the western portion of the region will self-administer insecticides to a greater degree via back scratchers, oilers, and through feed additives. Whereas, in the eastern portion of the North Central Region, pesticides are applied more often by direct human intervention, through the use of pour-ons and sprays.

Insecticide formulations:

Many different formulations of active ingredients are available for use against lice, mites, internal parasites and flies. Some formulations are restricted to immature animals or to lots or premises. Widely used formulations include topical pour-ons and sprays, slow-release ear tags, residual premise sprays, and knockdown aerosols. Some ingredients can also be delivered internally through injection or as feed additives.

The most widely used barn and space sprays contain short lived pyrethrins, organophosphates (stirophos, dichlorvos) , and synergists (PBO). Some organophosphates (coumaphos, dichlorvos) and one of the pyrethroids (permethrin) are formulated for topical use, whereas others are used as premise sprays (stirophos, cyfluthrin). The most recently developed class of compounds is the avermectins (ivermectin, doramectin, eprinomectin), which have a broad spectrum of activity against lice, mites and internal parasites.

Ear tags are mostly impregnated with pyrethroids and organophosphates. Permethrins have been used for over fifty years and several pyrethrin-based pesticides are becoming ineffective due to tolerance. Flies are also obtaining higher levels of tolerance, or resistance, to organophosphates. Many dusts and oils are used on the cattle through rubbers and oilers where the animals may scratch. Feed additives help in curbing larval growth. Injectables may be used to combat internal worms without affecting meat production or flavor.

Insecticide Applications:

A recent survey of pesticide use on beef in the North Central Region indicated that avermectins were the most widely used insecticides. Approximately 56 % of all beef animals were treated with this class of compounds, the majority of which (39% of all treatments) were applied as pour-ons. The remaining amounts were applied through injection. The next most widely used class of compounds was the organophosphates. A total of 36% of all beef animals received treatments from this group of compounds. The greatest use of a single compound within this class was famphur pour-on treatment of 17% of all animals. Except for fenthion use on 6% of the animals all other organophosphate uses remained under 3%. The use of pyrethroids totaled approximately 15 percent of all animals. Of all pyrethroids, permethrin was used most widely (7.8% of all animals) in body sprays and as pour-ons.

Selection of a pesticide for a given pest problem is not always a simple choice. Where comparable, effective products are available, a beef producer is probably more likely to choose an avermectin than an organophosphate product because of lower product toxicity. Ease of application is probably more important in beef operations than dairy, since the animals are frequently not confined. However, famphur seems to be a favorite because of the wide spectrum of pests it is effective against and its persistence (plus, as a pour-on, it is also easy to apply). Dust bags have the advantage of ease of application since the animals "treat" themselves as they walk under the bag at the exit of a pasture. However, in the western "range" states, such use is not very likely. Pyrethrin sprays are probably little used on beef herds due to the fact that the daily application of such sprays or aerosols is labor intensive and requires that the cattle be gathered in on frequent basis.

Beef Animal Pesticide Use by Class:

Pesticide Class	**% of Animals Treated**
Growth Regulators(GR)	**1.4**
Avermectins(AV)	**55.6**
Benzimidazoles(BZ)	**2.7**
Acetylcholine mimics Imidothiazoles, Pyrimidines	**0.5**
Pyrethroids(PY)	**15.1**
Organophosphates(OP)	**36.1**
Chlorinated Hydrocarbons(CH)	**1.1**
Other	**2.2**
Multiple Products	**30.0**
No Pesticide Applications	**6.5**

Top five active ingredients used on beef in the North Central Region:

Rank	**Active Ingredient**	**% of Animals**	**Classification of Active Ingredients**
1	ivermectin	34.4 %	Avermectin
2	famphur	17.2 %	Organophosphate
3	doramectin	16.8 %	Avermectin
4	permethrin	7.8 %	Pyrethroid
5	fenthion	6.8 %	Organophosphate

Beef Herd Pesticide Application Method Summary:

	% of Animals
Sprays and Aerosols	3.4
Dusts and Dust bags	1.5
Pour-ons	73.0
Dip	0.1
Ear tags	7.1
Oilers / Scratchers	4.9
Oral	2.8
Feed / Mineral Additives	2.7
Bolus	0.1
Injections	18.1

Pest resistance issues:

House flies developed resistance to DDT within the first five years of commercial use in the late 1940s, and this species is known to have developed resistance to organophosphates and more recently, the pyrethroids. Horn fly shows spotty resistance to pyrethroids, primarily due to ear tag use.

Synthetic chemical free production:

Although small herd beef production without pesticides is possible it can raise issues of sanitation, animal health, and humane treatment. Beyond this, the challenge to producers who wish to maintain large herds without pesticides can be considerable. As the size of the herd increases pest problems can multiply and the simple sanitation methods employed for smaller herds become less effective.

Worker exposure issues:

Of all application methods, pour-ons were the most widely used with over 73% of all animals receiving such a treatment. Injections were the next most used method of application at about 18 percent of all animals so treated. Sprays and aerosols made up only 3.4 percent of all applications to beef. Insecticides are typically applied to animals as they pass through a chute or confined access-way. Pour-on insecticides are applied to the back of the animals with the use of

a dipper provided by the product manufacturer. Most workers will wear rubber gloves, aprons and eye protection when treating cattle with pour-ons and in dips. In spite of such protective equipment some incidental exposure to the face and exposed flesh of the arms remains likely.

Handlers:

Dehorning, castration, and pharmaceutical injections are a few of the activities that can bring handlers in contact with treated cattle. These activities are typically one-time events during a year and seldom would extend handler exposure to treated animals beyond 8 to 16 hours within a year. These operations also tend to take place during the spring or fall when insect populations are low and insecticide use is minimal.

Environmental exposure issues:

There are few environmental issues associated with insecticide applications on beef cattle. One possible concern might be localized areas of contamination near sites where pour-ons, whole body sprays, or animal dips are used and around dust bags. These sites can be of particular concern if wells are nearby or if the runoff from these sites wash into ponds or streams that provide a source of drinking water for cattle.

Registration and Critical Alternative issues:

Consistent pest control for beef animals rests on three classes of compounds: avermectins, pyrethroids, and organophosphates.

Need some comment here on what pests these groups target and how the alternatives match up. Are there critical uses? If so what pest and pesticide combinations are critical?

However, in the absence of a specific pest resistance problem or invasive insect, organophosphate insecticides are considered of Level C significance to production. Permethrins and avermectins as independent groups of insecticides could be considered of Level B significance. Their loss at this point in time, would cause significant shifts in production practices, probably with an increase in the use of organophosphates for coat sprays. No single compound can be classified as of Level A significance, and with the exception of pyrethrin, which is a Level B, most are Level C.

Issues regarding retention of a specific pesticide or group of pesticides are given a rating of A, B, or C according to their level of significance to the commodity. It is recognized that for some commodities, non-chemical or organic methods of pest management may be employed. However, our intent is to focus on commercial agriculture, which generally involves conventional pesticides.

Level A: product critical, no acceptable alternatives, loss of product would cause regular and drastic changes in production, safety, or commodity price.

Level B: product essential, alternatives limited in application, loss of product would cause significant changes in production, safety or commodity price.

Level C: product fundamental, alternatives exist, loss of product would cause few changes in production, safety, or commodity price.

Pipeline products:

No new pipeline products are known at the time of this writing.

Co-occurrence:

There are no detailed records indicating what insecticides are used in combination or in sequential applications. However, the greatest opportunity for sequential uses would be with the aerosols and sprays and the pour-ons. This suggests that sequential uses are primarily those occurring with some formulation of a pyrethrin being used followed by other pyrethrins (of the same or different formulation). Although dichlorvos is also used as an aerosol the few cattle treated would not indicate much use preceding or following a insecticidal compound from another class.

Insect Pests

Prominent wintertime pests on cattle are lice and mites. Lice include three blood sucking species and one chewing species. Moderate densities of lice cause their hosts to scratch and rub, which leads to dermatitis, hair loss, and decline in animal production efficiency. Dermatitis can also be caused by three species of skin inhabiting mites that stimulate dermal hypersensitivity. Both lice and mites are permanent ectoparasites that spread solely through contact between infested and naive animals; lice and mites do not fly or jump, and off-host reservoirs such as bedding in vacant pens are of minor epidemiological consequence. Fortunately, the problematic species on beef cattle (and dairy cattle) do not occur on other domesticated animals, wildlife, or birds. Consequently, if a herd is closed to contact with other dairy or beef herds, it is feasible to eradicate lice and mites from the subject herd, and to maintain parasite-free status if bio-security is adequate. A variety of formulations of insecticides and acaricides are available to combat lice and mites, and pesticide resistance is not yet widespread. No vaccines or other biological methods are available to control lice and mites, and there are no cultural methods that are practical and effective on a commercial scale.

Summertime pests include different kinds of parasitic, gastrointestinal worms that can cause clinical and subclinical disease. These worms reduce digestion efficiency and growth. The worms are transmitted by the ingestion of infective larvae on herbage in fecally contaminated pasture forages. Cattle housed in dry-lots or indoors are much less exposed to infection. Abomasal worms are also transmitted by the ingestion of contaminated forage, but wintertime expression of disease in confined settings is greater than with the other gastrointestinal parasites, because of potential for carryover from the previous grazing season. Anthelmintics can reduce internal parasite burdens, and in turn reduce rate of pasture contamination. If coupled strategically with pasture rotation, it is possible to minimize disease caused by these pasture borne parasites.

Tapeworms are transmitted when cattle ingest feed that is contaminated with an oribatid mite that is the intermediate host for the immature tapeworms. The oribatid mite occurs in all styles of housing. Cattle are also intermediate hosts for

other tapeworms that occur in muscle, and can lead to condemnation at slaughter. Prevalence of tapeworms and effects on cattle health in the North Central region are not well documented. Cattle flukes can occur in animals that graze in marshy areas. Fluke eggs are shed in feces, larvae infect and develop in snails, and then exit to grass where they encyst before being ingested by grazing cattle. Flukes have a significant impact on cattle growth and productivity. Transmission is prevented if cattle are prevented from grazing on marsh grass.

Many kinds of free living flies attack beef cattle in the North Central region. The most common ones are the stable fly and the house fly, both of which develop as larvae in decomposing organic debris such as rotting feed, soiled bedding and accumulated animal manure. Accordingly, stable flies and house flies are most abundant around confined cattle. Nonetheless, stable flies will disperse readily from confinement breeding sites to surrounding areas, so they occur on pastured stock, too. Stable flies visit their hosts just long enough to obtain a blood meal; nonfeeding and fed ones are on adjacent "resting" sites. Stable fly attacks cause noticeable irritation (leg stamping, tail switching and bunching) and measurable reductions in growth rate and feed conversion. House flies, in contrast, are known to annoy workers and nearby residents, but they have not been shown to affect animal performance. Residual premise sprays and space fogs can be useful, but are a supplement to, and not a substitute for, breeding site (debris) management. Resistance to pesticides in stable flies has yet to be detected, but resistance in house flies to some organophosphate and pyrethroid insecticides is common.

Two kinds of flies that occur mainly on pastured cattle are the horn fly and the face fly. Both of these flies develop in isolated dung pats on pastures, and not in accumulated debris. Horn flies reside continuously on their host animals. Their frequent biting reduces comfort and growth rate of growing stock. Face flies are physically on their hosts just long enough to feed on facial secretions. They do cause irritation, but effects of moderate numbers of flies on growth and production have been too weak to measure. Face flies are, however, important as vectors of bacteria and worms that cause eye diseases. Topical insecticides are generally effective against horn flies, although resistance to pyrethroids (delivered widely with ear tags) is widespread in the North Central region. In contrast, none of the available control methods are very effective against face flies. Feed-through insecticides (aimed at the dung feeding larvae) are partially effective at controlling both of the pasture flies, as are non-chemical walk-through traps that trap flies that are physically on animals as they walk through such traps.

Beef cattle are also exposed to attack by a wide variety of blood feeding, aquatic biting flies. These biting flies include many species of horse flies and deer flies (Tabanidae), biting midges (Ceratopogonidae), mosquitoes (Culicidae), and blackflies (Simuliidae). Flies in the first three families develop as larvae in mud or shallow, still water, whereas the blackflies develop in flowing water (creeks, streams and rivers). Source reduction is generally impractical. Topical insecticides and repellents can provide temporary relief, but are impractical on a commercial scale. The tabanids and blackflies are reluctant to enter buildings, so cattle can be protected if given access to shelter.

Cattle grubs were once common in growing stock housed outdoors during summer. Adult grubs lay eggs on outdoor cattle during the heel fly season (early summer), and then the larvae burrow sub-dermally for the next 9-10 months, eventually erupting from the animals' backlines the next spring. Cattle grubs once caused substantial losses due to slaughter condemnation and hide injury. However, their prevalence has been greatly reduced through use of systemic insecticides administered in the fall.

Beef cattle in the southern tier of the North Central region can be attacked by ticks. Important species are the lone star tick, the American dog tick, and the black legged tick. Lone star ticks can reduce rate of gain in growing stock, and all are

potential vectors of blood-borne pathogens. These three species are 3-host ticks that first feed on rodents. Consequently, exposure to ticks can be minimized by restricting grazing to cleared, brush free pastures, which are less suitable as habitat for the ticks' rodent hosts. Area-wide or topical applications of acaricides can provide temporary reductions in tick infested habitats, but it is unclear if these practices would be economical for dairy producers

Need comments on the above insects regarding their economic threshold level or range of infestation levels. For example, what is the maximum annual per animal cost of treatment that an average producer would have invested in controlling this insect at its worst infestation level over the last 5 years? Identifying the exact cost here is not as important as indicating the relative severity among pests. If, for example, you indicate that producers would spend $20 per year for grub control and only $10 per year for tick control the implication is that grubs are approximately twice the concern that ticks are. Although we give some indication of pest severity in a Table below it would also be useful to have input as to the regularity of occurrence of these pests. (Are they present and a serious concern every year, or just every third year? Etc)

Table A. Insect Pests Reported as Problems on Beef Animals (data from 1998 North Central Region)

Pest	% of farms reporting
Lice	67.3
Horn fly	31.1
Flies (unspecified)	13.8
Blowflies	11.4
Ticks	10.5
House fly	9.6
Mange mites	9.6
Stable fly	9.0
Horse fly	8.3
Worms (Internal parasites)	6.2
Deer fly	6.1
Grubs	4.7
Other	7.1

Table B. Pesticide Products Applied to Beef Herd Animals (data from 1998 North Central Region)

Class	Active Ingredient	Products	Method	A.I Rate (Total g/ head)	# Uses per season	% Animals Treated

Growth Regulators	**ALL**				**1.4**
methoprene	Total				1.4
	Moorman's IGR	Feed additive	1.18	4.1 mo	0.9
Avermectins	**ALL**				**55.7**
doramectin	Total				16.8
	Dectomax	Pour-on	0.17	1.0	13.9
		Injection	0.07	1.1	2.9
eprinomectin	Eprinex	Pour-on	0.29	1.0	3.3
ivermectin	Total				34.4
	Ivomec	Pour-on	0.18	1.1	20.1
		Injection	0.04	1.2	14.1
moxidectin	Cydectin	Pour-on	0.18	1.0	1.2
Benzimidazoles	**ALL**				**2.7**
albendazole	Valbazen	Oral	4.34	1.2	1.8
fenbendazole	Panacur Safeguard	Oral	2.11	1.1	0.5
oxfendazole	Synanthic	Oral	1.12	1.0	0.3
Acetylcholine mimics	**ALL**				**0.7**
levamisole	Levasole Tramisol	Injection	1.55	1.0	0.6
Pyrethroids	**ALL**				**14.7**
cyfluthrin	Total				3.7
	Cylence	Pour-on	0.18	1.3	3.1
cypermethrin	Max-Con	Ear tag			
fenvalerate	Ectrin	Ear tag	1.05	1.0	0.4
lambda-cyhalothrin	Total				2.6
	Saber	Pour-on	0.13	1.3	1.5
	Double Barrel Excalibur Saber Extra	Ear tag	1.09	1.0	1.1
permethrin	Total				7.8

	Atroban Backside Durasect Ectiban Gardstar Hard Hitter Insectrin Insectrin X Permaban Permectrin Permectrin II Synergized Delice	Body Spray	2.38	3.0	1.2
	ALL Pour-ons		1.29	1.4	5.0
	Boss	Pour-on	1.78	1.1	0.4
	DeLice	Pour-on	1.13	1.4	1.2
	Durasect	Pour-on	1.26	1.4	1.0
	Expar	Pour-on	1.37	1.4	0.5
	Permectrin	Pour-on	1.18	1.3	0.5
	Permectrin CD	Pour-on	1.34	1.3	0.3
	Permectrin	Pour-on	1.18	1.3	0.5
	Synergized Delice	Pour-on	1.42	1.4	1.2
	Total	Ear tag	1.27	1.0	0.1
	Total	Oiler/scratcher	3.56	2.9	1.3
	Permectrin II	Oiler/scratcher	2.39	2.7	0.9
	Atroban Brute DeLice Ectiban Expar Insectaban Insectrin Permaban Permectrin CD Synergized Delice	Oiler/scratcher			0.3
pyrethrins (synergized)	Various	Aqueous Coat Sprays and Aerosols	0.61	10.1	0.1

Organophosphates	**ALL**				**36.1**
chlorpyrifos	Dursban 44	Pour-on	19.61	1.1	0.2
	Diaphos Rx Max-Con Warrior	Ear tag	1.48	1.0	0.2
clorsulon	Ivomec Plus	Injection	0.40	1.0	0.4
coumaphos	Total				2.5
	Co-Ral	Body spray	7.44	1.8	0.8
	Co-Ral Zipcide	Dust	1.94	2.7	0.3
	Co-Ral Zipcide	Dust bag	1.31	2.4	0.8
	Co-Ral	Pour-on	3.89	1.2	0.1
	Co-Ral	Oiler/scratcher	3.76	3.5	0.6
diazinon	Total	Ear tags	4.30	1.0	1.2
	Terminator	Ear tag	3.38	1.0	0.6
dichlorvos	Ravap Vapona	Coat Sprays and Aerosols	5.49	7.4	0.3
	Ravap	Oiler/scratcher	0.64	4.9	1.0
ethion	Commando	Ear tag	3.74	1.0	0.3
famphur	Warbex	Pour-on	14.0	1.1	17.2
fenthion	Total	Pour-ons	2.46	1.2	6.3
	Lysoff	Pour-on	1.87	1.2	2.6
	Spotton	Pour-on	2.37	1.0	2.8
	Tiguvon	Pour-on	4.62	1.4	0.8
	Cutter Blue	Ear tag	3.35	1.0	0.6
malathion	Total	Sprays Dusts Oiler			1.0
	Malathion	Oiler/Scratcher	19.9	2.5	0.6
phosmet	Total				0.7
	Del-Phos Prolate	Body Spray	1.90	2.6	0.5

	Del-Phos Lintox HD Prolate	Oiler/Scratcher	3.98	4.0	0.2
pirimiphos methyl	Total	Ear tags	2.10	1.0	1.3
	Dominator	Ear tag	2.36	1.0	0.6
	Double Barrel	Ear tag	1.89	1.0	0.7
stiropho (tetrachlor-vinphos)	Total				2.6
	Ravap	Body Spray	5.23	3.0	0.2
	Rabon	Dust Dust Bag	1.64	2.0	0.2
	Ravap	Oiler/Scratcher	0.64	4.9	1.0
	Rabon Minerals Rabon Cattle Mix	Oral /Feed Additive	191.7	4.0 mo	1.2
trichlorfon	Neguvon	Pour-on	8.85	1.1	0.6

Table C. Summary of Application Methods for Pesticides Applied to Beef Animals (data from 1998 North Central Region)
(% of total active ingredient applied ; * = <0.1%)

				External								Internal			
Active Ingredient	Spray	Powder	Aerosol	Pour on	Dust Bag	Dip	Ear tag	Oiler/scratcher		Liquid	Powder	Paste	Feed Add	Bolus	Injection
growth regulators															
methoprene													100		
diflubenzuron														100	
avermectins															
doramectin				83											17
eprinomectin				100											
ivermectin				59										*	41
moxidectin				100											
benzimidazoles															
albendazole										42		58			
fenbendazole										59	10	19	11		
oxfendazole										66		34			

thiabendazole									100			
acetylcholine mimics												
levamisole			24				2	1		10	63	
pyrethroids												
cyfluthrin			85		15							
fenvalerate					100							
flucythrinate					100							
lambdacyhalothrin			58		42							
permethrin	13		54	1	1	2	28					
pyrethrins		100										
zeta-cypermethrin					100							
organophosphates												
chlorpyrifos			46		54							
clorsulon											100	
coumaphos	16	10	2	45		28						
diazinon					100							
dichlorvos	17	1				83						
dioxathion	100											
ethion					100							
famphur			100									
fenthion			91		9							
malathion	25	1		2		72						
phosmet	30		1			69						
pirimiphos-methyl					100							
stirophos	7	5	7		*				44			
trichlorfon			100									
other												
amitraz	100											
methoxychlor	100											
Unknown	3	1	19	10	42	13	5	1	3		3	

Weeds

Weeds affect livestock by reducing production efficiency and causing health problems. Although herbicides are neither directly nor indirectly applied to livestock, the loss of herbicides for weed control in forages or pastures may have significant implications for beef production. A thorough treatment of the role of herbicides in pastures, forages and rangeland is saved for crop profiles of those commodities. We present below only a summary of some of the weeds which are the more important causative factors in poor herd health or production efficiency.

The effects of weeds fall into three general categories; those which are poisonous or cause photosensitization, those which reduce feed consumption and forage quality, and those which impart an off-flavor to the meat. Included among plants which 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 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 as 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 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. 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.

Herbicide applications:

The herbicides most commonly used on pasture and rangeland in the Midwest include 2,4-D, dicamba, and clopyralid. Glyphosate is widely used across the region but its use is often relegated to spot applications or to pasture areas being renovated far in advance of cattle being exposed to such areas. Herbicide use on alfalfa and other hays is documented in the profiles for those crops.

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3. Rick Weinzierl University of Illinois. S-318 Turner Hall 1102 S. Goodwin, Urbana, IL 61801

4. David R. Pike , PIAP state liaison for Illinois, ph. # (217/352-6405)

5. University of Minnesota
   Roger Moon , Livestock entomologist for Minnesota, ph. # (612/624/2209)

6. University of Nebraska-Lincoln
   Steven R. Skoda, ph. # (402/437/5267)