

Crop Profile for Beef Cattle (Pasture and Range) in Kansas

Prepared July, 2000

General Production Information



- **Kansas** ranked 3rd in total number of all cattle and calves (6.55 million) after Texas and Nebraska, accounting for 6.6% of U.S. inventory. Kansas beef cows rank seventh (1.506 million), 1.461 million was valued in 1998.
- **All cattle and calves both on farms and ranches:** 6.55 million heads valued at \$3.34 billion with an average of \$502 per head.
- **All cows and heifers that calved:** 1.59 million accounts for 3.7% U.S. production.

- **Beef cows:** 1.506 million accounts for 4.5% U.S. production.
- **Bulls over 500 Ib:** 85,000.
- **Steers over 500 Ib:** 2.26 million.
- **Beef replacement heifers:** 250,000.
- **Other heifers over 500 Ib:** 1.45 million.
- **Calves under 500 Ib:** 870,000.
- **Calves born in 1998:** 1.45 million, account for 3.8% U.S. production.
- **Cattle slaughtered in 1998:** 7.541 million head with an average of 1,187 Ib live-weight per head.
- **Beef cow farms operated in 1998:** 29,000 farms account for 3.4% U.S. farms.

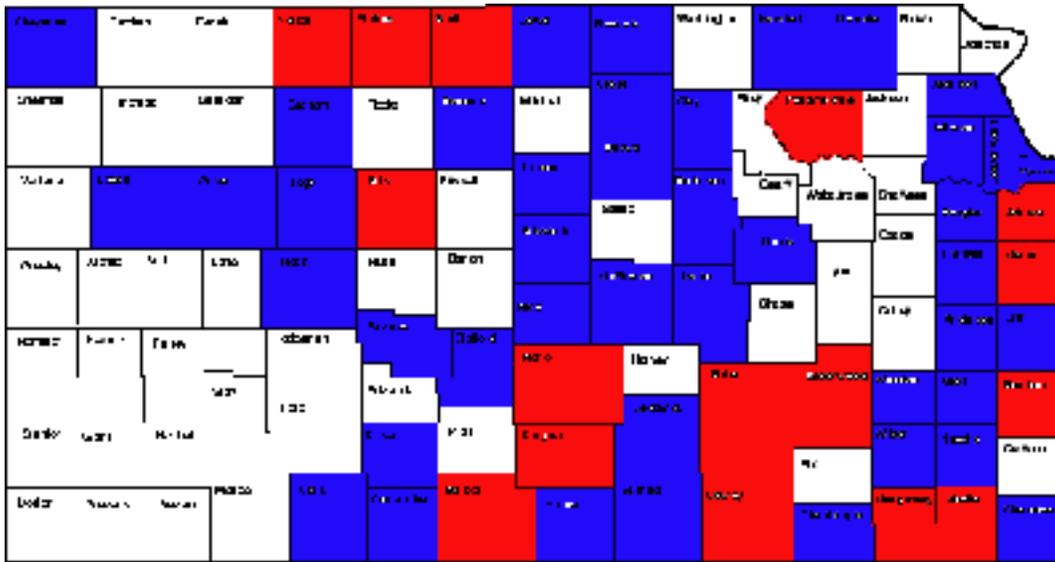


Figure 1. Distribution of Pastured Beef Cows that Have Calved in 1999.

Figure 1 shows the distribution of beef cows that have calved on pastures and native rangeland in Kansas. In 1999, in the southeastern region, Cowley, Greenwood, and Bourbon Counties placed first, second, and fourth with 29,600, 28,600, 25,000 head, respectively. Phillips County from the north central region placed third with 27,300 and Ellis County in the central region placed fifth with 24,700 head. Specific numbers of stocker cattle in counties are unavailable. Up to 2 million stockers are grazed annually in the same parts of the state as cow/calf operations, with the greatest numbers in the Flint Hills region roughly bordered by Morris, Wabaunsee, and Osage Counties on the north and Cowley to Montgomery Counties on the south.

Cultural Practices

The Kansas beef cattle industry is comprised of cow/calf ranches and stocker and backgrounding operations where calves are grown on grass, wheat pasture, or in drylot; feedlots finishing cattle for slaughter, and packing plants that process fed cattle. Pastured beef cattle are concentrated mainly in the eastern and central regions of Kansas. The western part of the state has the lowest number of pastured beef cattle according to 1999 data compiled by the Kansas Department of Agriculture, Division of Statistics. But, much of western Kansas that is too hilly or otherwise unsuited for raising crops is devoted to cow/calf production on native shortgrass range. Significant numbers of cattle are also pastured on annual forage crops in western Kansas, and many stockers are placed on winter wheat for fall and winter grazing near the large beef feedlots.

Cow/Calf Operations:

In this system, the calves run with their dams until weaned. Cows feed on poor quality forages such as corn or sorghum stalks and other crop residues. Year-round native pasture can be utilized with some supplemental protein or alfalfa hay during the winter months. In eastern Kansas, brome and fescue can be used for extended grazing. The cow/calf operation ends at weaning. Calves are sold after weaning in the fall or retained and placed into growing programs during winter and then onto pasture or directly into a feedlot in the spring

Stocker/Feeder Operations:

The main function of this segment of the beef industry is to feed and care for young, lightweight cattle for the purpose of growth rather than fattening. Stockers include both steers and heifers for later placement in feedlots, and heifers for breeding purpose. Normally, stockers are light weight calves that are grazed either on grass or wheat and either backgrounded in a drylot-growing program prior to being used either as replacements in the breeding herd or placed in feedlots. Many stockers are shipped into Kansas after January 1 for spring and summer grazing. Upon arrival, vitamin A shots, vaccines, dewormers, growth implant, and pour-on insecticides are administered. Medium-to high quality hay and a mineral mix are provided.

Although the stocker segment is a significant segment of the beef industry in Kansas, it has not been possible to obtain definitive numbers of cattle involved. The relative short term nature (less than 4 months) of stocker grazing or growing conditions makes it difficult to obtain a census of stocker cattle in Kansas.

The backgrounding phase that runs from 6 to 7 months includes the time lapse between weaning and when the cattle enter the feedlot to be finished for slaughter. Initially, forages are primarily used in the backgrounding diets. Grain levels are gradually increased to accustom the cattle to the higher energy content in finishing rations.

Equipment for Pastured Beef Cattle:

Relatively little equipment is needed for handling pastured beef cattle. Required facilities include buildings, feed storage, corrals, and working facilities. Additionally, feed handling and feeding equipment, watering equipment, manure handling equipment and transportation equipment are required.

Insect Pests

Insects, ticks and mites cause direct and indirect losses to the beef industry. Blood loss, irritation, annoyance, insect contamination of meat are direct losses. In addition, insects transmit many bovine diseases such as bluetongue, pinkeye, epizootic bovine abortion, and anaplasmosis. The USDA estimated that insects and mites cause \$2.2 billion annual loss to the cattle industry in this country

(Mock, 1997). Entomologist, Don Mock, at Kansas State University estimated that insects and mites cause the Kansas beef industry \$130 to \$150 million loss annually.

Note: In reading the following information of chemical control, note that specific products may allow for spray mix concentration different from those provided.

The directions provided here represent typical rates of application. A few products are used for simultaneous control of both endoparasites and ectoparasites. These are known as "endectocides" and are noted as such on the following pages.

Insecticide and miticide classes in the Application Method sections are indicated in parentheses as:

1. **Organophosphate**
2. **Pyrethroid**
3. **Juvenile hormone analog**
4. **Avermectin**
5. **Chlorinated hydrocarbon**
6. **Triazapentadienes**
7. **Macrocyclic lactone**
8. **Benzodioxole (a synergist)**

Following are major pests that cause problems and the control methods recommended for pastured cattle:

Flies:

Flies are the primary insects of concern on pastured cattle. Several types of flies that affect cattle include horn flies, face flies, horse flies, and stable flies.

Horn flies (*Haematobia irritans*) are the most important fly species on pastured cattle nationally and occur in damaging numbers throughout Kansas during the summer. The blood sucking horn flies reproduce on fresh cow manure during early spring to late fall. Flies are found on the back of cattle out of reach of the animal's head or tail. During cool weather, they congregate about the base of the horn to rest. They are about half the size of the ordinary house fly. Each fly punctures the cow's skin 20 to 40 times a day. Horn fly infestations cause severe nervousness and reduction in animal weight. Horn flies are a serious problem on pastured cattle but not in feedlot operations. Cattle are treated when the number of horn flies exceeds 50-100 flies per cow.

Non-chemical control:

- Pasture harrowing on a weekly basis to interrupt larval development in the manure pats is a costly operation, and cannot be accomplished on rough terrain.
- Using a walk-through fly trap to control horn flies has been proven to be less than 70% effective.

Application methods of insecticides:

1. **Ear tags:** Pyrethroid, organophosphate, or pyrethroid/organophosphate ear tags have been used on beef cattle. Once the insecticide-impregnated plastic ear tag is attached to the cattle ear, the insecticide will be released over a period of several weeks to control horn flies. Ear tags are put on during the fly season, and take off in the fall to avoid insects from developing resistance. Pyrethroid ear tags were proven to be 95 to 99% effective to control susceptible horn flies in the early 1980's. However, a widespread problem of horn fly resistance to pyrethroids has been reported. Thus, organophosphate-containing ear tags have become popular to replace those with pyrethroids that are no longer effective. Different ear tags should be alternated to reduce resistance to pyrethroids and to prevent horn fly resistance to ear tags containing organophosphates. Kansas State University Entomologists recommend the use of organophosphate ear tags for two consecutive years, a pyrethroid tag the third year, and thus establish a 2-1-2-1 rotation. Following are the recommended ear tags for Kansas beef cattle: (Note: although permethrin (pyrethroid) ear tags under several trade names, and pyrethroid/organophosphate ear tags are used by some Kansas cattle producers, they are not recommended by the Kansas Research and Extension Service and according to a recent survey were not used by enough respondents for the data to be analyzed):

Note: Each insecticide or miticide trade name in this profile is either registered name (®) or trade mark (™).

Pyrethroid ear tags:

1. Cyfluthrin 10% (Cutter Gold, 13.7g tag wt).
2. Lambda-cyhalothrin 10% (Saber Extra, 9.5 g; Excalibur, 9.5g).
3. Zetacypermethrin 10% (PYthon, 9.5g; ZetaGard, 9.5g).

Organophosphate ear tags:

1. Diazinon 20% (Terminator, 15g).
2. Diazinon 21.4% (Optimizer, 15g; Optimizer-Calf, 9.5g).
3. Diazinon 40% (Cutter 1, 15g; Patriot, 15g).
4. Diazinon 30% + Chlorpyrifos 10% (Diaphos Rx, 15g; Warrior, 15g).
5. Ethion 36% (Commando, 15g).
6. Fenthion 20% (Cutter Blue, 13g).
7. Pirimiphos Methyl 20% (Dominator, 9.5g; Rotator, 9.5g).

2. **Sprays:** This method requires corralling and crowding and is a labor-intensive operation. However, it is especially useful if cattle need to be handled for any other management program. Cattle-activated automatic spraying devices loaded with insecticides have been used to spray the

animals without rounding them up. But, such devices have often failed and are not commonly used. Unless otherwise stated, the normal rate of application of insecticides is approximately 1 gal per cow or 0.75 gal per calf of the mixture applied as high-pressure spray. Although labels allow several spray applications per fly season, in actual practice few ranchers spray cattle more than 3 or 4 times per season.

(1) Coumaphos

- **Trade name:** Co-Ral.
- **Use rate:** 1 qt 5.8% Livestock Insecticide Spray or 1 pint Co-Ral 11.6% EIL (Restricted Use Pesticide)/25 gal water; 2 Ib 25% WP, or 1 pint 42% flowable (RUP)/100 gal water.
- **Number of applications:** repeat as needed.
- **Comments:** not used on calves less than 3 months old. No pre-slaughter waiting interval.

(5) Methoxychlor

- **Trade names:** Methoxychlor; Sur-Noxem.
- **Use rate:** 8 Ib 50% WP, or 2 gal 2 EC (25%)/100 gal water.
- **Number of applications:** as needed, but not more often than once every 3 weeks.
- **Comments:** no pre-slaughter waiting interval required after using EC formulation. The WP formulation is not used on animals being finished for slaughter.

(2) Permethrin EC

- **Trade names:** Atroban; Ectiban; Expar; Insectaban; Insectrin; Permethrin; others.
- **Use rate:** 1 qt 5.7% EC, or 1 pint 10% or 11% EC/100 gal water.
- **Number of applications:** as needed, but not more often than once every 2 weeks.
- **Comments:** no pre-slaughter waiting interval.

(2) Permethrin EC

- **Trade names and formulations:** Atroban 42.5% EC; GardStar 40% EC.
- **Use rate:** 4 fl.oz./25 or 50 gal water, apply 1-2 qt of mixture/animal.
- **Number of applications:** as needed, but no more often than once every 2 weeks.
- **Comments:** no pre-slaughter waiting interval.

(2) Permethrin WP

- **Trade name:** Permethrin.
- **Use rate:** 1 Ib 25% WP/50 gal water.
- **Number of applications:** not repeated in less than 3 weeks.
- **Comments:** no pre-slaughter waiting interval.

(2) Permethrin Synergized Pour-On 1% and 7.4%

- **Trade names:** Atroban; Back Side Plus; Expar; Permethrin.
- **Use rate:** undiluted formulations of 1% permethrin, and 7.4% Permethrin 7.4% CDS Pour-On may be applied as low-pressure sprays in very small amounts directly to the cattle.
- **Number of applications:** not more often than once every 2 weeks.
- **Comments:** no pre-slaughter waiting interval.

(1) Phosmet

- **Trade names:** Prolate; Del-Phos; Lintox-HD.
- **Use rate:** 2 qt 11.6%/100 gal water.
- **Number of applications:** not repeated in less than 7 to 10 days.
- **Comments:** calves under 3 months old are not treated. Not applied to cattle when grubs are in critical tissues. Three-day pre-slaughter waiting interval.

(1) Tetrachlorvinphos

- **Trade name:** Rabon.
- **Use rate:** 4 lb 50% WP/75 gal water.
- **Comments:** no pre-slaughter waiting period.

(1) Tetrachlorvinphos/(1) Dichlorvos

- **Trade name:** Ravap.
- **Use rate:** 1 gal 28.7% EC/75 gal water.
- **Number of applications:** no more often than once every 10 days.
- **Comments:** no pre-slaughter waiting period.

3. **Pour-on's and Spot-on's:** Ready-to-Use concentrations of insecticides are applied along the top of the back and top of the head, along the topline in a narrow strip from withers to tailhead, down the backline, and down the face, or over the animal's shoulders. As with spraying, the formulations are seldom used more than a few times per season.

(7) Moxidectin

- **Trade name and formulation:** Cydectin Pour-On for Cattle 5 mg/ml.
- **Use rate:** RTU, apply 1 ml/22 lb body weight along backline from withers to tailhead.
- **Comments:** no pre-slaughter waiting period. Not used on calves to be processed for veal. This is an "endectocide" primarily used to control helminth parasites, scabies, and cattle grubs. Label claims only 7 days of horn fly control.

(4) Eprinomectin

- **Trade name and formulation:** Ivomec Eprinex Pour-On 5 mg/ml.
- **Use rate:** RTU, apply 1 ml/22 lb body weight along backline from withers to tailhead.
- **Comments:** no pre-slaughter waiting period. Not used on calves under 8 weeks of age. This is an "endectocide" primarily used to control helminth parasites, scabies, and cattle grubs. Label claims only 7 days of horn fly control.

(2) Cyfluthrin 1%

- **Trade name:** CyLence.
- **Use rate:** 4 ml/400 lb of body weight.
- **Number of applications:** no more often than every 3 weeks.
- **Comments:** no pre-slaughter waiting period.

(1) Fenthion

- **Trade name:** Lysoff.
- **Use rate:** 8 :1 water to Lysoff, apply 1 oz of mixture/100 lb body weight.
- **Number of applications:** no more often than three times at not less than 14-day intervals.
- **Comments:** calves less than 3 months old are not treated. A twenty-one-day pre-slaughter waiting interval is required after one treatment, or 35 days after the last treatment.

(4) Ivermectin 5 mg/ml

- **Trade name:** Ivomec Pour-On.
- **Use rate:** 1 ml/22 lb body weight.
- **Comments:** 48-day pre-slaughter waiting intervals. This is an "endectocide" primarily used to control helminth parasites, cattle grubs, and scabies. Label claims 28 days of horn fly control.

(2) Lambda-cyhalothrin 1%

- **Trade name:** Saber Pour-On.
- **Use rate:** 10 ml/animal under 600 lb or 15 ml animal over 600 lb.
- **Number of applications:** no more often than 2 weeks, or four times every 6-month period.
- **Comments:** no pre-slaughter waiting period.

(2) Permethrin EIL

- **Trade name:** Permethrin II.
- **Use rate:** 2 oz. 10% emulsifiable/1 gal diesel fuel or water, apply $\frac{3}{4}$ to 1 cupful mixture/animal.

- **Number of applications:** not re-treated in less than 2 weeks.
- **Comments:** no pre-slaughter waiting period.

(2) Permethrin Pour-On

- **Trade names:** Atroban; Back Side; DeLice; Durasect; Expar, Ectiban; Hard Hitter; Permethrin 1%; Boss 5%; Permethrin CDS 7.4% and CD 10%; Brute 10%.
- **Use rate:** for the 1% formulations apply ½ ml/100 lb body weight; Boss 5%, 3 ml/100 lb body weight; Permethrin CDS 7.4% , 2 ml/100 lb body weight; Brute 10% or Permethrin CD 10%, 1.5 ml/100 lb body weight.
- **Number of applications:** for cattle and calves, no more often than once every 2 weeks.
- **Comments:** no pre-slaughter waiting period.

(2) Permethrin WP

- **Trade name:** Permethrin.
- **Use rate:** 1 lb 25% WP/36 gal water, apply 1 pint mixture/animal.
- **Number of applications:** no more often than once every 3 weeks.

4. **Back Rubber** is a convenient method to control horn flies and face flies. The rubbers can be either free-choice or forced-use back rubbers. The free-choice rubbers are suspended near stations where cattle rest and take water, salt or minerals. For forced-use, salt licks or mineral are enclosed and backrubbers placed in the gateways so that cattle must use them to get to the mineral. Unless otherwise specified on the label, each insecticide is mixed with "livestock grade" mineral oil.

(1) Coumaphos

- **Trade name:** Co-Ral.
- **Use rate:** 1 gal 11.6% EIL or 2 gal 5.8% Livestock Insecticide Spray/13 gal No. 2 furnace oil or No. 2 diesel fuel.
- **Comments:** no pre-slaughter waiting period.

(5) Methoxychlor

- **Trade names:** Methoxychlor; Sur-Noxem.
- **Use rate:** 1 gal 2EC/5 gal stove oil or light grade fuel oil.
- **Comments:** no pre-slaughter waiting period.

(2) Permethrin

- **Trade names:** Atroban; Ectiban; GardStar; Insectaban; Insectrin; Permethrin; others.

- **Use rate:** 1 qt 5.7% EC, or 1 pint 10% E, or 11% EC, or 4 oz 40% EC/10 gal diesel oil.
- **Comments:** no pre-slaughter waiting period. Permethrin backrubbers should be used in rotation with organophosphate backrubber insecticides.

(2) Permethrin Pour-On

- **Trade names:** Permethrin CDS; Gordon's Backrubber and Pour-On.
- **Use rate:** 1 pint 1 % or 64 ml Permethrin CDS Pour-On/1 gal mineral oil.
- **Comments:** permethrin backrubbers should be used in rotation with organophosphate backrubber insecticides.

(1) Phosmet

- **Trade names:** Del-Phos; Lintox-HD; Prolate.
- **Use rate:** 1 pint 11.6%/6.25 gal suitable carrier oil.
- **Comments:** no pre-slaughter waiting period.

(1) Tetrachlorvinphos/(1) Dichlorvos

- **Trade name:** Ravap.
- **Use rate:** 1 qt 28.7% EC/6 gal No. 2 diesel oil.
- **Comments:** no pre-slaughter waiting period.

5. **Dust Bags, Dust Dispensers:** Provide excellent control of horn flies. Free-choice dusters are placed under shelters near mineral or salting stations; in alley -ways, in loafing pens, or in holding sheds where they will be hanged 4 to 6 inches below the top line of cattle. For forced-use, dusters are suspended in gateways that the cattle must use to obtain minerals.

(1) Coumaphos 1%

- **Trade name:** Co-Ral.
- **Comments:** no pre-slaughter waiting period.

(2) Permethrin 0.25%

- **Trade names:** Ectiban; Gordon's Dairy & Livestock Dust; Insectrin; Permethrin.
- **Comments:** although permethrin dust products are registered for horn fly control, they are not reliable for control of horn flies in Kansas. They are registered and effective for face flies. No pre-slaughter waiting period.

(1) Tetrachlorvinphos 3.0%

- **Trade name:** Rabon.
 - **Comments:** no pre-slaughter waiting period. Although not a pyrethroid, it may not control some pyrethroid-resistant horn flies.
6. **Oral Larvicides, Boluses:** Insecticides administered orally through mineral mixes or blocks, or in feed mixes or with a bolus. They kill fly larvae that develop in the manure. They do not protect cattle from adult flies. The success of most oral larvicides depends on the consumption of it by the animals. Salty vegetation in some areas, calves in a cow/calf herd and variability of intake among mature animals generally result in erratic fly control. The feed additives work better on steer or heifer herds than on cow/calf herds.

(3) Methoprene

- **Trade name:** Altosid.
- **Use rate:** see label.
- **Comments:** it is an insect-growth regulator. No pre-slaughter waiting period. It is available in mineral mixes and blocks.

(1) Tetrachlorvinphos

- **Trade name:** Rabon Oral Larvicide.
- **Use rate:** see label.
- **Comments:** available as a premix, loose mineral, or in blocks. No pre-slaughter waiting period.

Face Flies(*Musca autumnalis*) They are annoying and troublesome in eastern Kansas and not so much in western Kansas. Face fly larvae develop in fresh cow dung during spring, summer, and fall. They feed on animal secretions such as tears, saliva, nasal mucus, and blood oozing from wounds. Face flies cause little direct economic loss in cattle production. However, they can spread the pinkeye bacterium in cattle. Females lay eggs in fresh manure where the larvae develop. The life cycle is completed in 15 to 25 days. Several generations may occur from late March through October.

Application methods of insecticides:

1. **Ear tags:** All ear tags used for horn flies are registered for face flies. Although, two ear tags per animal are necessary to be effective against face flies, they usually only provide 50-70% reduction in the number of face flies, yet this is generally more effective than other methods.
2. **Sprays:** Unless otherwise stated, the normal rate of application of insecticides is approximately 1 gal per cow or 0.75 gal per calf of the mixture applied as high-pressure spray. Few people rely on sprays to control face flies on pastured beef cattle as it is inconvenient and no one sprays often enough to achieve good control.

(2) Permethrin EC or EIL

- **Trade names:** Atroban; Ectiban; Expar; Insectaban; Insectrin; Permethrin-10; Permethrin II.
- **Use rate:** 1 qt 5.7% EC, or 1 pint 10% EC/100 gal water; 1 qt 5.7% EC Insectaban, 1 pint 11% EC Atroban or Expar/25 gal water.
- **Number of application:** as needed, but no more often than once every 2 weeks.
- **Comments:** no pre-slaughter waiting period.

(2) Permethrin WP

- **Trade name:** Permethrin.
- **Use rate:** 1 lb 25% WP/50 gal water.
- **Number of applications:** not repeated in less than 3 weeks.
- **Comments:** no pre-slaughter waiting period.

(1) Tetrachlorvinphos

- **Trade name:** Rabon.
- **Use rate:** 4 lb 50% WP/75 gal water.
- **Number of application:** no more often than once every 2 weeks.
- **Comments:** no pre-slaughter waiting period.

(1) Tetrachlorvinphos/(1) Dichlorvos

- **Trade name:** Ravap.
- **Use rate:** 1 gal 28.7% EC/75 gal water.
- **Number of applications:** no more often than once every 10 days.
- **Comments:** no pre-slaughter waiting period.

3. **Short-Lived Sprays and Mists:** Chemicals are sprayed directly to the animal's face because sprays directed toward the sides and top line give less control. This method of application is seldom used on beef cattle in Kansas except on "show stock" at fairs.

(1) Dichlorvos

- **Trade name:** Vapona.
- **Use rate:** 5 oz 43.2% concentrate/2 gal water.
- **Number of applications:** if needed, applied daily as fine mist to cows' faces.
- **Comments:** not applied to calves under 6 months old nor to Brahman or Brahman cross cattle. One-day pre-slaughter waiting interval.

4. **Pour-on's:** Face flies are controlled by the 1% permethrin products that are listed under Pour-On

treatments of horn flies. Additionally, they can be controlled by the 5% permethrin (Boss), 1% cyfluthrin (CyLence). The 1% Lambdacyhalothrin (Saber Pour-On) "aid in controls of face flies."

5. **Spot Treatment:** Although a label-permitted use, spot treatments are seldom used on Kansas beef cattle.

(2) Permethrin EC or EIL

- **Trade names:** Ectiban; Insectaban; Permethrin II; Permethrin-10.
- **Use rate:** 2 oz 10% EIL/1 gal diesel fuel or clean water, apply 2-4 oz of this mixture/face; or, 1 pint permethrin-10 or 1 qt Ectiban or Insectaban 5.7% EC/2 ½ gal water and apply 1-2 oz/face per day.
- **Number of applications:** no more often than once every 2 weeks.
- **Comments:** no pre-slaughter waiting interval.

(2) Permethrin WP

- **Trade name:** Permethrin.
- **Use rate:** 1 lb 25% WP/36 gal water, apply 2 to four oz of this mixture/ face.
- **Number of applications:** no more often than once every 3 weeks.
- **Comments:** no pre-slaughter waiting period.

6. **Face Rubbers, Self-Oilers with Face Mops:** Face fly control is enhanced by the use of "mops" or other extensions hanging from the main unit. Commercial lines include Face Flyps® which are flat strips of wick-like material and Fly Bullets® which are absorbent cylinders. Insecticide gets on cattle faces as animals play with such devices.

(1) Coumaphos

- **Trade name:** Co-Ral
- **Use rate:** 1 gal 5.8% livestock Insecticide Spray/ 6.5 gal No. 2 furnace oil or No. 2 diesel fuel, or 1 gal 11.6% ELI/13 gal No. 2 furnace oil or No. 2 diesel fuel.
- **Comments:** no pre-slaughter waiting period.

(2) Permethrin EC

- **Trade names:** Ectiban; Insectrin; Permethrin II.
- **Use rate:** 1 qt 5.7% EC or 1 pint 10% E/10 gal diesel oil.
- **Comments:** no pre-slaughter waiting period.

(1) Tetrachlorvinphos/(1) Dichlorvos

- **Trade name:** Ravap.
 - **Use rate:** 1 qt 28.7% EC/6 gal No. 2 diesel oil.
 - **Comments:** no pre-slaughter waiting period.
6. **Dust Bags, Face Dusters:** Face fly control can be achieved by using commercially made duster-feeder combination devices. Otherwise, dusting devices are placed as described in the section on horn flies.

(1) Coumaphos 1%

- **Trade name:** Co-Ral.
- **Comments:** no pre-slaughter waiting period.

(5) Methoxychlor 3%, 10%, or 11% dust

- **Comments:** no pre-slaughter waiting period.

(2) Permethrin 0.25% dust

- **Trade names:** Ectiban; Gordon's Dairy & Livestock Dust; Insectrin; Permethrin.
- **Comments:** no pre-slaughter waiting period.

(1) Tetrachlorvinphos 3% dust

- **Trade name:** Rabon.
- **Comments:** no pre-slaughter waiting period.

8. **Oral Larvicides, Boluses:** Tetrachlorvinphos (Rabon Oral Larvicide) is registered for control of face fly larvae.

Stable Flies(*Stomoxys calcitrans*) cause over \$20 million annual loss in Kansas rangeland operations. They are abundant on pastured cattle, especially in tall grass regions where rainfall may be abundant. Their fierce biting on animals' feet and legs often drives the cattle to stand for hours in deep water and ponds. Stable flies breed in grass trampled into muddy foot tracks, old manure packs, decaying plant material, and spoiled bottoms of large round hay bales.

Application methods of insecticides:

1. **Sprays:** The permethrin formulations listed in the horn fly section are used to control stable flies. Control is difficult since the insecticide residues cannot be expected to last long on the feet and legs of cattle walking through vegetation and wading creeks.

2. **Backrubbers, Self-Oilers:** Unless the rubber is suspended below the animals' knee level, this application method has little effect on stable fly control. Additionally, this method is unreliable since no insecticide manufacturer's label suggests backrubber/self-oilers application for stable fly control.

Horse Flies (*Tabanus spp.*) and **Deer Flies** (*Chrysops spp.*) are blood sucking flies that annoy and reduce weight-gain rate of beef cattle. The bites of horse flies of large species cause blood to trickle down the animals' sides. Horse flies are effective carriers of blood-borne diseases. Both horse fly and deer fly females lay eggs on vegetation above water, newly hatched larvae drop into water and then burrow into mud. In Kansas, horse flies and deer flies usually cause only minor-to-moderate annoyance to cattle. However, occasionally, heavy outbreaks occur in the eastern half of Kansas from mid-July through early September. The large black horse fly and the slightly smaller, brown-colored autumn horse fly cause most damage to Kansas cattle.

Application methods of insecticides:

1. **Backrubbers, Self-Oilers:**

(2) Permethrin

- **Trade names:** Atroban; GardStar; Permethrin; others.
- **Use rate:** see backrubbers in Horn Fly.

1. **Sprays:** Unless otherwise stated, the normal rate of application of insecticides is approximately 1 gal/cow or 0.75 gal/calf of the mixture applied as high-pressure spray.

(2) Permethrin

- **Trade names:** Atroban; GardStar; Permethrin; Expar; Ectiban; Insectaban.
- **Use rate:** 1 qt Ectiban or Insectaban 5.7% EC, or 1 pint Atroban or Expar 11% EC/25 gal water, or 1 pint Atroban 42.5% EC, Permethrin II EIL, or GardStar 40% EC/100 gal water; or 1 lb Permethrin 25% WP/50 gal water.
- **Number of applications:** emulsifiable or wettable powder formulations are applied no more often than 2 or 3 weeks, respectively.
- **Comments:** no pre-slaughter waiting period.

(2) Permethrin 0.5%

- **Trade names:** Pro-Tech Horse and Stable and Multi-Use Spray.
- **Use rate:** Ready-to-use (RTU), 2 oz./animal.
- **Number of applications:** daily, If necessary
- **Comments:** no pre-slaughter waiting period.

3. Pour-on's:

(2) Permethrin Pour-On

- **Trade names:** Atroban; Back Side; DeLice; Durasect; Expar; Ectiban; Hard-Hitter; Permethrin 1%; Boss 5%; Brute 10%; Permethrin CDS 7.4%; Permethrin CD 10%.
- **Use rate:** Ready-to-Use (RTU). Apply amounts as specified for Horn Fly control.
- **Number of applications:** no more often than once every 2 weeks.
- **Comments:** no pre-slaughter waiting period.

Cattle Grubs (*Hypoderma bovis*, *H. lineatum*) are the larvae of heel flies. Adult heel flies resemble honey bees in size and color. The common cattle grubs (*H. lineatum*) are found most frequently in Kansas. Adults lay eggs on the hairs of the legs of cattle. Eggs hatch in three to six days and the tiny larvae bore through the skin, then migrate through connective tissues between the muscles. Calves and yearlings are more susceptible to cattle grubs than older cattle. Larvae of the common cattle grub spend most of their developmental time in the submucosa of the esophagus. Upon reaching the back, larvae cut breathing holes in the skin and remain under the skin for 35 to 90 days before becoming mature grubs. Fully grown grubs squeeze through the holes, drop to the ground, and pupate in soil or other debris for about four to five weeks before adult heel flies emerge from the puparia. Treatment of cattle for grubs should be at least six weeks before grubs are expected to appear in the back, i.e. from June to October. Normally, only one treatment per year is applied to control cattle grubs.

Application methods of insecticides:

1. **Sprays:** High-pressure spray is used to apply insecticides until skin is thoroughly wet. Unless otherwise stated, the normal rate of application of insecticides is approximately 1 gal per cow or 0.75 gal per calf of the mixture.

(1) Coumaphos

- **Trade name:** Co-Ral.
- **Use rate:** 12 lb 25% WP or 6 gal 5.8% Livestock Insecticide Spray/100 gal water, or 3 gal 11.6% EIL/100 gal water.
- **Comments:** no pre-slaughter waiting period.

(1) Phosmet

- **Trade name:** GX-118.
- **Use rate:** 1 gal 11.6% emulsifiable/49 gal water.
- **Comments:** 21-day pre-slaughter waiting intervals.

2. **Dips** are not currently used in Kansas, but the following dip treatments are permitted:

(1) Coumaphos

- **Trade name:** Co-Ral.
- **Use rate:** 8 lb 25% WP/100 gal water.
- **Comments:** no pre-slaughter waiting period.

(1) Phosmet

- **Trade name:** GX-118.
- **Use rate:** 1 gal 11.6% emulsifiable/60 gal water. To control the pH and ensure vat stability, add 100 lb triple superphosphate /1,000 gal vat solution.
- **Comments:** 21-day pre-slaughter waiting intervals.

3. **Pour-on's and Spot-on's:**

(4) Doramectin 0.5% Pour-On

- **Trade name and formulation:** Dectomax Pour-On 5 mg/ml.
- **Use rate:** RTU, apply 1 ml/22 lb body weight along backline from withers to tailhead.
- **Comments:** not used on calves to be processed for veal. Forty-five-day pre-slaughter waiting period for beef cattle. Doramectin is an endectocide.

(7) Moxidectin

- **Trade name and formulation:** Cydectin Pour-On for Cattle 5 mg/ml.
- **Use rate:** RTU, apply 1 ml/22 lb body weight along backline from withers to tailhead.
- **Comments:** no pre-slaughter waiting period. Not used on calves to be processed for veal. Moxidectin is an endectocide.

(4) Eprinomectin

- **Trade name and formulation:** Ivomec Eprinex Pour-On 5 mg/ml.
- **Use rate:** RTU, apply 1 ml/22 lb body weight along backline from withers to tailhead.
- **Comments:** no pre-slaughter waiting period. Not used on calves under 8 weeks of age. Eprinomectin is an endectocide.

(4) Doramectin 0.5% Pour-On

- **Trade name:** Dectomax Pour-On.

- **Use rate:** RTU, apply 1 ml/22 Ib body weight along topline from withers to tailhead.
- **Comments:** not used on veal calves. Forty- five days pre-slaughter waiting period. Doramectin is an endectocide.

(1) Famphur 13.2%

- **Trade name:** Warbex.
- **Use rate:** RTU, apply ½ fluid ounces/100 Ib weight.
- **Comments:** only 4 oz is used per animal larger than 800 Ib. Thirty-five -day pre-slaughter waiting intervals.

(1) Fenthion 20%

- **Trade name:** Spotton.
- **Use rate:** RTU, apply 8 cc/300 to 600 Ib animal, or 12 cc/600 to 900 Ib animal.
- **Comments:** 45-day pre-slaughter waiting intervals.

(1) Fenthion 3%

- **Trade name:** Tiguvon.
- **Use rate:** RTU, apply ½ fl.oz./100 Ib animal weight.
- **Comments:** 35-day pre-slaughter waiting intervals.

(4) Ivermectin 5 mg/ml

- **Trade name:** Ivomec Pour-on.
- **Use rate:** RTU, apply 1 ml/22 Ib animal weight.
- **Comments:** 48-day pre-slaughter waiting intervals. Ivermectin is an endectocide.

(1) Phosmet 4%

- **Trade name:** GX-118.
- **Use rate:** one part 11.6%: two parts water, apply 1 oz/100 Ib animal weight, but not more than 8 oz per animal.
- **Comments:** 21-day pre-slaughter waiting intervals.

3. Injection:

(4) Doramectin 1%

- **Trade name:** Dectomax.

- **Use rate:** 1 cc/110 lb animal weight
- **Comments:** 35-day pre-slaughter waiting intervals. Doramectin is an endectocide.

(4) Ivermectin 1% injection

- **Trade name:** Ivomec.
- **Use rate:** 1 cc 1%/110 animal weight.
- **Comments:** 35-day pre-slaughter waiting intervals. Ivermectin is an endectocide.

3. Bolus:

(4) Ivermectin 1.72 gm/bolus

- **Trade name:** Ivomec SR Bolus.
- **Comments:** only used on calves between 275 and 660 lb. Treated calves should not be slaughtered within 180 days after bolus treatment. Ivermectin is an endectocide.

Cattle Lice are small but they can cause economic losses to every cattle operation. They can cause calves and feeders to lose weight. 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. Lice lay eggs on animal hair, and the young resemble the adults. Lice are even found on the heads and necks of day-old calves. Cattle can harbor lice infestations the year around. It is important to control lice early in the winter before infestations have caused serious damage. The three blood sucking species that are common in Kansas include the short-nosed louse (*Haematopinus eurysternus*) found in and on the ears, along the dewlap and brisket of mature cattle; the long-nosed cattle louse (*Linognathus vituli*) found on young animals and dairy breeds, and the little blue louse (*Solenopotes capillatus*) that is harder to control. The only biting (chewing) species of lice common on cattle is the cattle biting louse (*Bovicola bovis*) that feed on skin cells. Because most of the insecticides have little effect on louse eggs, it is important to treat the animals two to three weeks after the first treatment to kill the newly hatched lice before they can mature and lay eggs. In practice, most cattle in Kansas are treated for cattle grubs and lice at the same time --one or two treatments in the autumn.

Application methods of insecticides:

1. Sprays:

(6) Amitraz

- **Trade name:** Taktic.
- **Use rate:** 1 qt 12.5% EC/100 gal water, use 2 gal/fully grown animal.
- **Comments:** no pre-slaughter waiting interval.

(1) Coumaphos

- **Trade name:** Co-Ral.
- **Use rate:** 4 qt 5.8% Livestock Insecticide Spray ; 1 to 2 Ib 25% WP, or 1 to 2 qt 11.6% EIL, or 1 pint 42% F/100 gal water.
- **Comments:** Co-Ral products are not used on animals under 3 months of age. No pre-slaughter waiting interval.

(5) Methoxychlor

- **Use rate:** 8 Ib 50% WP or 2 gal 2 EC (25%)/100 gal water.
- **Comments:** no pre-slaughter waiting interval.

(2) Permethrin

- **Trade names:** Atroban; Ectiban; Expar; Insectaban; Insectrin; Permethrin; others.
- **Use rate:** 1 qt Ectiban 5.7% EC, or 1 pint Permethrin II 10% E, or 2 Ib Permethrin 25% WP/100 gal water; 1 pint Atroban 11% EC or 1 qt Insectaban 5.7% EC/25 gal water.
- **Comments:** no pre-slaughter waiting interval.

(2) Permethrin EC

- **Trade names:** Atroban; GardStar.
- **Use rate:** 1 pint Gardstar 40% EC or Atroban 42.5% EC/100 gal water.
- **Number of applications:** no more often than at 2-week intervals.
- **Comments:** no pre-slaughter waiting interval.

(2) Permethrin Synergized Pour-On 1% and 7.4%

- **Trade names:** Atroban; Back Side Plus; Expar; Permethrin.
- **Use rate:** undiluted, applied as low-pressure sprays.
- **Number of applications:** no more often than once every 2 weeks.
- **Comments:** no pre-slaughter waiting interval.

(1) Phosmet

- **Trade names:** Prolate; GX-118; Del-Phos; Lintox-HD.
- **Use rate:** 1 gal Prolate, Del-Phos, or Lintox-HD 11.6%/150 gal water; or 1 gal GX-118 11.6%/49 gal water.
- **Comments:** not used on animals under 3 months of age. The GX-118 mixtures require a 32-day pre-slaughter waiting interval, while Prolate, Del-Phos, or Lintox-HD mixtures require only 3-

day pre-slaughter waiting intervals.

(1) Tetrachlorvinphos

- **Trade name:** Rabon.
- **Use rate:** 4 lb 50 WP/75 gal water.
- **Comments:** no pre-slaughter waiting interval.

(1) Tetrachlorvinphos/(1) Dichlorvos

- **Trade name:** Ravap.
- **Use rate:** 1 gal 28.7% EC/75 gal water.
- **Comments:** no pre-slaughter waiting interval.

2. Pour-on's for Lice:

(4) Eprinomectin

- **Trade name and formulation:** Ivomec Eprinex Pour-On 5 mg/ml.
- **Use rate:** RTU, apply 1 ml/22 lb body weight along backline from withers to tailhead.
- **Comments:** no pre-slaughter waiting period. Not used on calves under 8 weeks of age. Eprinomectin is an endectocide.

(7) Moxidectin

- **Trade name and formulation:** Cydectin Pour-On for Cattle 5 mg/ml.
- **Use rate:** RTU, apply 1 ml/22 lb body weight along backline from withers to tailhead.
- **Comments:** no pre-slaughter waiting period. Not used on calves to be processed for veal. Moxidectin is an endectocide.

(1) Fenthion

- **Trade names:** Lysoff; Lice-Chek.
- **Use rate:** 1 qt 7.6%/8 parts water, add 1 oz of mixture/100 lb body weight.
- **Comments:** not used on animals under 3 months of age. A 21-day or 35-day pre-slaughter waiting intervals after one or two treatments, respectively.

(1) Permethrin Pour-On

- **Trade names:** Back Side; DeLice; Durasect; Expar; Ectiban; Hard-Hitter; Permetrin all in 1%;

Boss 5%; Permethrin CDS 7.4% and Permethrin CD 10%; Brute 10%.

- **Use rate:** for 1% formulation, apply ½ ml/100 lb animal weight and not more than 5 fl. oz./ animal along back and down face, except for Durasect, apply in two strips along each side of midline from shoulders to tailhead. Boss 5%, 3 ml/100 lb body weight; Permethrin CDS 7.4% , 2 ml/100 lb body weight; Brute 10 % or Permethrin CD 10%, 1.5 ml/100 lb body weight.
- **Number of applications:** not more often than once every 2 weeks.
- **Comments:** no pre-slaughter waiting interval.

3. **Grubocidal Pour-on's, Injections:** The following insecticides with grubocidal action also are registered for control of cattle lice (see section on Cattle Grubs for rates.): Doramectin (Dectomax), famphur (Warbex), fenthion (Tiguvon, Spotton), phosmet (GX-118), ivermectin (Ivomec and Ivomec Pour-On), eprinomectin (Ivomec Eprimex), and moxidectin (Cydectin). Ivomec SR Bolus is registered for control of two species of sucking lice, excluding the short-nosed cattle louse that is the greatest problem on beef cattle. Dectomax, Cydectin, Ivomec, and Ivomec Eprimex Pour-On formulations control all cattle lice. Injectable formulations of Dectomax and Ivomec control sucking lice but not chewing lice.
4. **Dust Bags, Back Rubbers:** Only help prevent lice infestations from becoming severe and do not provide complete control of lice. Most of the insecticides used in dust bags and back rubbers for horn fly control are registered for cattle lice.

Ticks (*Ixodidae* family). Except for Gulf Coast ticks, ticks are most numerous in brushy, tree-infested pastures where rodents and deer also are abundant. The hard-bodied common ticks on cattle in Kansas are the American dog tick (*Dermacentor variabilis*), which is found throughout the state, the lone star tick (*Amblyomma americanum*) in eastern Kansas, and the Gulf Coast tick in south central and eastern Kansas. Ticks not only withdraw blood, but they may transmit bovine anaplasmosis as well as a number of diseases of man.

Non-Chemical control methods:

- Eliminate the habitat for rodents and ticks by eliminating trees and shrubs.
- Burn fescue and brome pastures in early March and native tallgrass pastures in April.

Chemical control methods: There is no chemical tick control registered in Kansas for direct application to pastures. However, using the following chemicals, applied directly to cattle as sprays, may control cattle ticks:

(6)Amitraz

- **Trade name:** Taktic.
- **Use rate:** 1 qt 12.5% EC/100 gal water, apply up to 2 gal/fully grown animal to the skin until run-off.
- **Comments:** no pre-slaughter waiting interval.

(1) Coumaphos

- **Trade name:** Co-Ral.
- **Use rate:** for spray, mix 2 gal 5.8% Livestock Insecticide Spray, 4 Ib 25% WP, or 1 gal 11.6% ELI or 1 to 2 qt 42% F/100 gal water.
- **Comments:** no pre-slaughter waiting interval. Co-Ral products are not used for calves under 3 months old.

(2) Permethrin

- **Trade names:** Atroban; Ectiban; Expar; GardStar; Insectaban; Insectrin; Permethrin.
- **Use rate:** spray 2 qt Atroban or Expar 11% EC/100 gal water, no more often than once every 10 days; 1 qt Ectiban, Insectaban or Insectrin 5.7% EC, or 1 pint to 1 qt Permethrin II 10% EIL, or 1 pint GardStar 40% EC or Atroban 42.5% EC/100 gal water, no more often than once every 2 weeks; 2 Ib Permethrin 25% WP/100 gal water, no more often than once every 3 weeks
- **Comments:** no pre-slaughter waiting interval.

(1) Phosmet

- **Trade names:** GX-118; Prolate; Del-Phos; Lintox-HD.
- **Use rate:** spray 1 gal of Prolate, Del-Phos, or Lintox-HD 11.6% E/100 gal water; or 1 gal GX-118/49 gal water
- **Number of applications:** no more often than once every 7 to 10 days.
- **Comments:** all mixtures have 3-day pre-slaughter waiting intervals except the GX-118 mixture has a 21-day waiting period.

(1) Tetrachlorvinphos

- **Trade names:** Stirofos; Rabon.
- **Use rate:** mix 8 Ib 50% WP/100 gal water.
- **Comments:** no pre-slaughter waiting interval.

(1) Tetrachlorvinphos/(1) Dichlorvos

- **Trade name:** Ravap.
- **Use rate:** 1 gal 28.7% EC/50 gal water.
- **Comments:** registered for control of lone star ticks only. No pre-slaughter waiting interval.

Pour-on's: See Permethrin Pour-Ons used to control Horn Flies.

Bolus: The only tick species that Ivomec SR Bolus is registered for control of is the lone star

tick. This bolus may be used only for calves between 275 and 660 pounds. A 180-day pre-slaughter waiting period is required.

Gulf Coast Tick, Spinose Ear Tick, and Lone Star Tick in Ears: The adults of the hard-bodied Gulf Coast ticks feed on the cattle of south central and eastern Kansas during March through June. Large numbers sometimes cluster in the outer ear of cattle, causing intense soreness. Under severe infestations the muscles of the ears become weakened, resulting in a flop-eared condition known as "gotch ear".

Spinose ear ticks, a soft-bodied species, occur sparsely across southern and far western Kansas, but are found more frequently in cattle from southwestern states. The larval and nymphal stages of the spinose ear tick attach deep within the ear canal of cattle causing intense pain as they puncture the skin and suck blood. Intensive infestations cause a condition known as "ear canker".

Lone star ticks are common in eastern Kansas. Ticks infest the entire body but sometimes concentrate in the ears and may cause a condition known as "cupping", which is a deformity of ears of young cattle.

Chemical control: Two pyrethroid insecticidal ear tags per animal for several weeks will bring infestation under control and keep it at a low level. The following insecticides may be used in sprays to treat the head, ears, or shoulder areas of cattle:

(6) Amitraz

- **Trade name:** Taktic.
- **Use rate:** 1 pint 12.5% EC/50 gal water.
- **Comments:** no pre-slaughter waiting interval.

(2) Permethrin

- **Trade names:** Ectiban; Insectaban; Permethrin.
- **Use rate:** 2 oz Permethrin II 10% EIL/1 gal diesel fuel or clean water, apply ½ oz into each ear; 1 qt Ectiban or Insectaban 5.7% EC/2½ gal water, apply ½ to 1 oz into each ear; 1/3 lb Permethrin 25% WP/12 gal water, apply ½ oz into ear.
- **Number of applications:** no more often than once every 3 weeks for permethrin 25% mixture, or once every 2 weeks for the other mixtures.
- **Comments:** no pre-slaughter waiting interval.

(1) Phosmet

- **Trade name:** Del-Phos.
- **Use rate:** one part 11.6% Emulsifiable Liquid/100 parts water.
- **Comments:** labeled for Gulf Coast ticks. Three-day pre-slaughter waiting period.

(1) Tetrachlorvinphos/(1) Dichlorvos

- **Trade name:** Ravap.
- **Use rate:** 1 gal 28.7% EC/50 gal water.
- **Comments:** labeled for Lone Star tick only. No pre-slaughter waiting interval.

Blow Fly larvae: Although screwworm flies have been eradicated from the United States, animal wounds are occasionally infested with blow fly larvae of other species. Infested wounds and surrounding skin areas should be thoroughly treated. Treatment is repeated as needed following the label instructions.

(1) Coumaphos

- **Trade name:** Co-Ral.
- **Use rate:** available as 5% dust in squeeze bottle, 3% spray in pressurized cans, or 3% spray foam in pressurized cans.
- **Comments:** no pre-slaughter waiting interval.

(5) Lindane 3%

- **Comments:** three percent Lindane in pressurized spray cans is available under several brand names. Not used on calves younger than 3 months old. No pre-slaughter waiting interval.

Pesticide Usage, 1999

Kansas producers in 1999, used several pesticides on pastured cattle and facilities according to a survey conducted in March, 2000 by the Kansas Agricultural Statistics (KAS). Data on following pages (Tables 1-10 and Figures 2-5) are extracted from the Kansas Agricultural Chemical Usage, 1999 Cattle Pesticide Summary publication (MF-2467).

The most commonly used active ingredient for cow/calf cattle was ivermectin. Over 395,000 cattle were treated with 210 pounds ivermectin, with 200 pounds of the total applied as pour-on's. Permethrin and coumaphos were the next two most frequently used active ingredients on cow/calf cattle with 169,000 and 168,400 cattle were treated with 640 and 4,160 pounds of permethrin and coumaphos, respectively. Most of the permethrin was applied in pour-on's, while most of the coumaphos was used as spray.

Ivermectin was also the most commonly used active ingredient for stocker/feeder beef cattle. Over 53% of cattle were treated with 70 pounds of ivermectin; 60 pounds of the total was applied in pour-on's. The next most used active ingredient was doramectin followed by moxidectin. As pour-on's, over 19% and 11% of cattle were treated with doramectin and moxidectin, respectively.

Diazinon-treated ear tags were the most commonly used treated ear tags. Over 66,000 cow/calf were tagged to control ear ticks, confinement flies, pasture flies, and lice. The synergist, piperonyl butoxide (a

benzodioxole) was the most commonly used active ingredient for stocker/feeder cattle; over 25,000 cattle were tagged with piperonyl butoxide-treated ear tags.

The main pests that were reported as causing problems to pastured beef cattle were flies followed by lice then grubs. Burning and manure management practices were the two most used non-chemical methods reported for pastured cattle.

Pesticides were also applied in or around cattle facilities. Facilities for cow/calf cattle were treated mostly with methoxychlor. For stocker/feeder facilities, the most used active ingredient was tetrachlorvinphos.

Table 1. Total Pesticide Usage on Cow/Calf Beef Cattle by Application Methods

Class & Pesticide (a.i.)^a	Target pests	Method	Head treated (1,000)	Quantity used (lb)
Avermectin				
Doramectin	Grubs, Lice, Pasture Flies	Pour-On	102.7	60
Eprinomectin	Grubs, Lice, Pasture Flies	Pour-On	29.1	10
Ivermectin	Grubs, Lice, Pasture Flies	Injection	26.1	10
	Grubs, Lice, Pasture Flies	Pour-On	369.5	200
Benzodioxole				
Piperonyl Butoxide	Lice, Pasture Flies, Ticks	Pour-On	31.8	40
Chlorinated Hydrocarbon				
Methoxychlor	Flies, Lice, Ticks	Dust	6.0	470
Juvenile hormone analog				
Methoprene	Flies, Lice, Ticks	Feed/Mineral	34.8	60
Macrocyclic lactone				
Moxidectin	Grubs, Lice, Pasture Flies	Pour-On	87.5	50

Organophosphate				
Coumaphos	Flies ^b , Grubs, Lice			
	Flies, Grubs, Lice	Dust	86.7	650
	Lice, Pasture	Pour-On	19.5	160
	Flies, Ticks	Rubbing Device	10.6	630
	Lice, Pasture	Spray	51.6	2,720
	Flies, Ticks			
Organophosphate				
Crotoxyphos	Lice, Grubs, Pasture Flies	Rubbing Device	12.0	20
	Lice, Pasture	Spray	3.5	10
	Flies			
Dichlorvos	Flies, Grubs, Lice	Spray	22.6	50
	Grubs, Lice, Pasture Flies	Rubbing Device	13.5	10
Famphur	Grubs, Lice, Pasture Flies	Pour-On	12.6	400
Fenthion	Grubs, Lice, Pasture Flies	Pour-On	86.8	1,190
Malathion	Lice, Pasture Flies	Dust	6.8	60
Phosmet	Lice, Grubs, Pasture Flies	Rubbing Device	6.1	40
Tetrachlorvinphos	Lice, pasture Flies		4.5	40
	Flies, Grubs, Lice	Dust	18.1	190
	Flies	Spray Feed/Mineral	12.3	5,180
Trichlorfon	Grubs, Lice, Pasture Flies	Pour-On	1.76	160
Pyrethroid				
Cyfluthrin	Flies, Grubs, Lice	Pour-On	33.6	20

Permethrin	Grubs, Lice, Pasture Flies	Pour-On	108.2	320
	Flies, Grubs, Lice	Rubbing Device	34.0	140
	Flies	Dust	4.5	10
	Flies, Grubs, Lice	Spray	22.3	170

^aAlthough chlorpyrifos, pyrethrins, fenvalerate, and lambda-cyhalothrin were used, insufficient data are available to report.

^bConfinement and pasture flies were reported.

Table 2. Total Pesticide Usage on Stocker/ Feeder Beef Cattle by Application Methods

Class & Pesticide (a.i.)^a	Target pests	Method	Head treated (1,000)	Quantity used (lb)
Avermectin				
Doramectin	Grubs, Lice, Flies ^b	Pour-On	56.3	70
	Grubs, Lice, Pasture Flies	Injection	50.1	10
Ivermectin	Grubs, Lice, Pasture Flies	Injection	89.2	10
	Grubs, Lice, Pasture Flies	Pour-On	206.8	60
Macrocylic lactone				
Moxidectin	Grubs, Lice, Pasture Flies	Pour-On	61.7	30
Organophosphate				
Coumaphos	Lice, Pasture Flies, Ticks	Dust	20.2	70
Fenthion	Grubs, Lice, Pasture Flies	Pour-On	17.1	230
Pyrethroid				

Permethrin	Grubs, Lice, Pasture Flies	Pour-On	13.3	20
	Pasture Flies, Ticks	Rubbing Device	5.9	10
	Pasture Flies	Spray	31.2	200

^aAlthough coumaphos as pour-on, rubbing device and spray, crotoxyphos, cyfluthrin, dichlorvos, eprinomectin, famphur, methoxychlor, piperonyl butoxide, tetrachlorvinphos, and trichlorfon were used, insufficient data are available to report.

^bConfinement and Pasture Flies were reported.

Table 3. Percent of Cow/Calf Cattle Treated by Application Methods

Application method	Head treated (%)
Pour-On	72
Dust	9
Spray	9
Rubbing Device	6
Feeding/Mineral	4
Injection	3

Table 4. Percent of Cow/Calf Cattle Treated with Five Most Frequently Used Pesticides

Class	Pesticide (a. i.)	Head treated (%)	Quantity used (lb)
Avermectin	Ivermectin	31.1	210
Pyrethroid	Permethrin	13.3	640
Organophosphate	Coumaphos	13.3	4,160
Avermectin	Doramectin	8.1	60
Macrocyclic lactone	Moxidectin	6.9	50

Table 5. Percent of Stocker/Feeder Cattle Treated by Application Methods

Application method	Head treated (%)
Pour-On	64
Injection	25
Spray	6
Dust	4
Rubbing Device	1

Table 6. Percent of Stocker/Feeder Treated with Four Most Frequently Used Pesticides

Class	Pesticide (a.i.)	Head treated (%)	Quantity used (lb)
Avermectin	Ivermectin	53.6	70
	Doramectin	19.3	80
Macrocyclic lactone	Moxidectin	11.2	30
Pyrethroid	Permethrin	9.1	230

Table 7. Total Quantity of Pesticides Used on Facilities and Cow/Calf Beef Cattle

		Quantity on facilities	Quantity on cattle
Class	Pesticide (a.i.)	(lb)	
Avermectin	Doramectin	10 ^a	60
	Eprinomectin	0	10
	Ivermectin	0	210
Benzodioxole	Piperonyl Butoxide	180	280
Chlorinated Hydrocarbon	Methoxychlor	750	470

Juvenile hormone analog	Methoprene	0	60
Macrocyclic lactone	Moxidectin	0	50
Organophosphate	Chlorpyrifos	70	50
	Coumaphos	0	4,160
	Crotoxyphos	0	30
	Diazinon	0	930
	Dichlorvos	60	60
	Ethion	0	120
	Famphur	0	400
	Fenthion	10	1,420
	Malathion	380	60
	Phosmet	0	40
	Pirimiphos Methyl	0	130
	Tetrachlorvinphos	260	5,410
	Trichlorfon	10	160
	Pyrethroid	Cyfluthrin	0
Fenvalerate		0	40
Lambda-cyhalothrin		0	50
Permethrin		20	690
Pyrethrin		20	0
Pyrethroid	Zetacypermethrin	0	10

^aAny use of doramectin on facilities is unlikely. This entry probably reflects error in gathering or interpreting information.

Table 8. Total Quantity of Pesticides Used on Facilities and Stocker/Feeder Cattle

		Quantity on Facilities	Quantity on cattle
Class	Pesticide (a.i.)	(Ib)	
Avermectin	Doramectin	0	80

	Ivermectin	0	70
Benzodioxole	Piperonyl Butoxide	30	110
Macrocyclic lactone	Moxidectin	0	30
Organophosphate	Coumaphos	330	70
	Diazinon	0	150
	Ethion	60 ^a	0
	Fenthion	0	370
	Pirimiphos Methyl	0	50
	Tetrachlorvinphos	2,420	0
Pyrethroid	Cyfluthrin	10	60
	Permethrin	20	230

^aAny use of ethion on facilities is unlikely. This entry probably reflects error in gathering or interpreting information.

Table 9. Chemically Treated Ear Tag Usage on Cow/Calf Beef Cattle

Class	Pesticide (a.i) ^a	Target pests	Head treated (1,000)	Quantity used (lb)
Benzodioxole	Piperonyl Butoxide (synergist)	Ear Ticks, Flies, Lice	46.6	240
Organophosphate	Chlorpyrifos	Flies ^b	10.3	50
	Diazinon	Ear Ticks, Flies, Lice	66.7	930
	Ethion	Ear Ticks, Pasture Flies	9.4	120
	Fenthion	Lice, Flies	28.3	230
	Pirimiphos Methyl	Ear Ticks, Pasture Flies, Lice	29.4	130
Pyrethroid	Cyfluthrin	Ear Ticks, Flies, Lice	27.6	90

Fenvalerate	Ear Ticks, Flies	21.4	40
Lambda-cyhalothrin	Ear Ticks, Pasture Flies, Lice	19.3	50
Permethrin	Ear Ticks, Pasture Flies	15.3	50
Zetacypermethrin	Pasture Flies	2.6	10

^aAlthough tetrachlorvinphos was used, insufficient data are available to report.

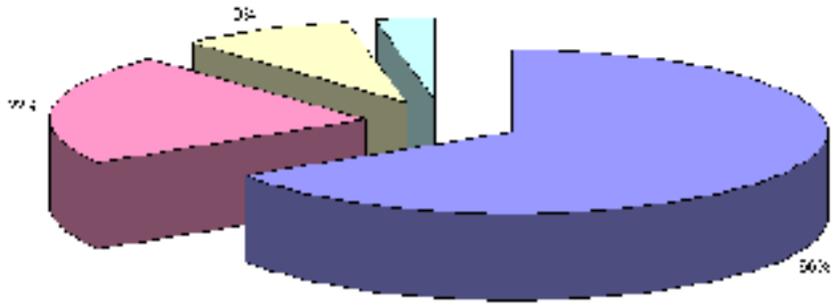
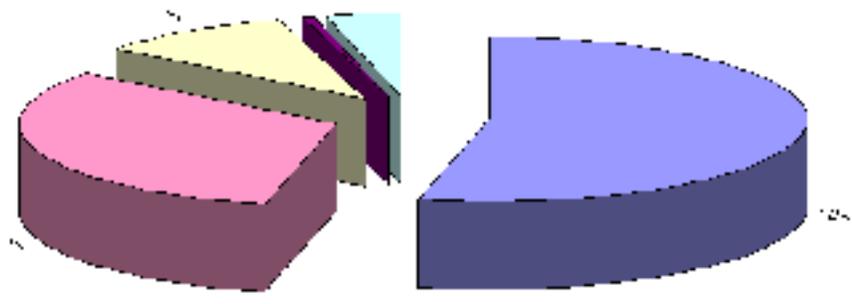
^bConfinement and Pasture Flies were reported.

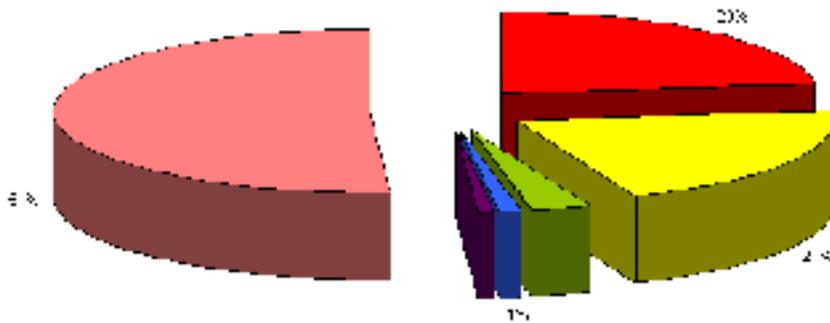
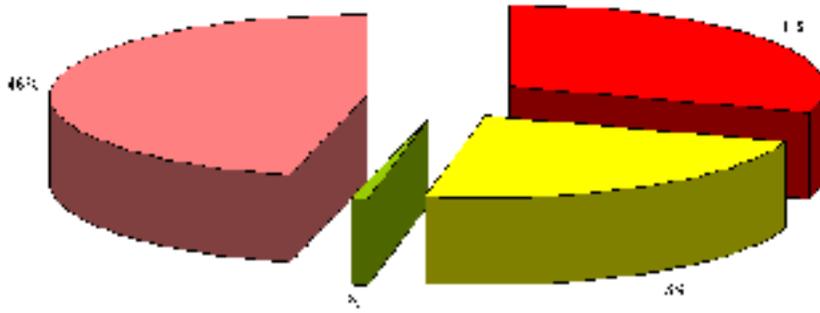
Table 10. Chemically Treated Ear Tag Usage on Stocker/Feeder Beef Cattle

Class	Pesticide (a.i.)^a	Target pests	Head treated (1,000)	Quantity used (lb)
Benzodioxole	Piperonyl Butoxide	Ear tick, Flies	25.2	110
Organophosphate	Diazinon	Pasture Flies	15.0	150
	Fenthion	Flies ^b , Ear Ticks	23.2	140
	Pirimiphos Methyl	Lice, Flies	7.8	50
Pyrethroid	Cyfluthrin	Lice, Pasture Flies	11.9	60

^aAlthough chlorpyrifos, ethion, fenvalerate, lambda-cyhalothrin, permethrin, and zetacypermethrin were used, insufficient data are available to report.

^bConfinement and Pasture Flies were reported.





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