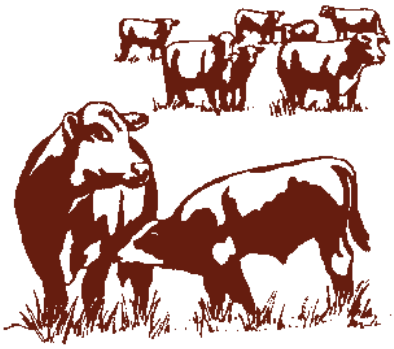
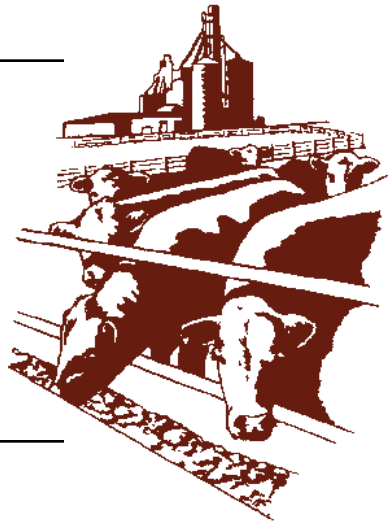


# Beef Cattle Handbook



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## Biological Control of Flies in Cattle Feedlots

G.L. Greene, Kansas State University, Southwest Research-Extension Center, Garden City, Kansas

The stable fly and house fly are the major insect pests associated with cattle feedlots. The stable fly irritates cattle by biting and feeding on blood, causing cattle to gain less weight. The house fly is more of a nuisance, that causes irritation to people at or near the facility. Reduced animal weight gain attributable to house flies has not been recorded. In the Midwest, stable flies are abundant from June to mid-summer; temperatures over 100° F greatly reduce their abundance. Reports from Iowa, Kansas, Missouri, Nebraska, and Oklahoma show June as the month with high stable fly populations, whereas Illinois and New Jersey have high populations in August and September. Further south in the US, peak populations occur from March to June, with Texas reporting spring and fall peaks. Population peaks vary and depend on damp conditions required for fly development, in such materials as animal waste mixed in straw, hay, or other plant fibers. In the Midwest, house fly numbers increase from July until cool weather in the fall. These flies thrive during the hotter summer time.

Fly reduction measures should begin with sanitation or cleaning and removal of manure, spilled feed (particularly plant material mixed with animal waste), and standing water. After the facility is cleaned, a few fly breeding areas may remain. Those areas are where biological control agents are most likely to be successful.

The only biological control agents currently available for controlling flies in confined livestock facilities are pteromalid wasps. Other types of biological control organisms include pathogens and predators. Three groups of beetles (staphylinids, histers, and scarabs) have been studied for fly control, but none are currently available for commercial use. Staphylinid and hister beetles are predators that are common in cattle feedlots, and scarab beetles, or dung beetles, which bury cattle dung as food for their young, are more prevalent and effective in pastures.

Fungal pathogens have been observed attacking flies. However, research has not demonstrated methods to make them effective for fly reduction in livestock environments.

Pteromalid wasps are widely used and sold for fly control. The tiny wasp parasite lays an egg on a fly pupa. The wasp larva then feeds on the fly developing inside the reddish-brown pupal case. Parasitism by the wasp prevents fly development even when a parasite does not emerge. Because wasps kill flies in the pupal stage, they reduce the number of flies in the pestiferous adult stage without disrupting the beneficial aspect of fly maggots or larvae—helping to break down the animal waste in the feedlot.

Fly parasites are about 1/16 inch long and can work their way through animal waste searching for fly pupae to sting. A parasite will live 10-30 days and produce 30-60 eggs. Cooler temperatures extend their life period. Tests show that 15-30 flies are killed by a single female *Spalangia nigroaenea*. The parasites stay in the manure searching for fly pupae in which to lay their eggs. When a pupa is found, the female wasp taps its antennae on the surface, then inserts her ovipositor through the pupa case and deposits an egg on the surface of the fly developing inside. The parasite egg hatches, and the larva feeds on the fly. Female parasites may form a feeding tube in the pupa from which they feed on the fly blood

as it oozes out the tube. That is probably the only nutrition for most species of parasites. Their feeding or ovipositon activity kills the developing fly.

Several species of pteromalid wasps have been produced and sold commercially for fly control. Early research demonstrated success using *Spalangia endius* and *Nasonia vitripennis* in poultry houses. These species and others have been sold for fly control in Midwest cattle feedlots. But in some studies, they were not recovered from fly pupae collected from the feedlots where they were distributed. This demonstrated that *Spalangia endius* and *Nasonia vitripennis* were ineffective in controlling flies at cattle feedlots. Another species, *Spalangia nigroaenea*, was recovered commonly from stable fly pupae at feedlots. *Muscidifurax zaraptor* was common from house fly pupae. Thus, these species have been considered to have a greater impact on fly numbers in cattle feedlots. Mixtures of wasp species have been marketed, but proven adapted species should be used.

Based on samples from cattle feedlots that have been cleaned, the release of *Spalangia nigroaenea* has reduced stable fly numbers. Reductions ranging from 25 percent-50 percent, have greatly decreased the irritation to cattle from biting flies. Delaying the early increase of stable flies by 30 days decreases the total period of irritation to cattle. That time delay, along with reduction of the peak fly numbers, greatly benefits cattle gain and requires only a small investment.

Fly parasite releases have been based on the number of cattle present. This method is the best available but must be improved. The fly breeding area is far more indicative of the fly population than are cattle numbers. Research has shown that fly population estimates made by feedlot scouts are less than the number actually present. During studies, samples of fly breeding material examined weekly for three years produced four fly larvae for every one estimated by experienced feedlot scouts. The number of parasites (as parasitized pupae) to release can be determined by using estimations of fly pupae present then multiplying by four (1/4 being estimated) and dividing by 15 (the average number of fly pupae killed by one parasite). Other factors must be considered when estimating the number of parasites to release in the High Plains states, and they are probably applicable in other areas:

1. Are conditions dry and hot, or wet and cool?
2. Are fly breeding conditions changing toward larger or smaller numbers of flies?
3. Is the feedlot clean or being cleaned, or drained, or are cattle being removed?
4. How many fly pupae will each parasite kill; what percentage will emerge as females; and how long will they live?
5. Is there scientific proof that the parasite species being released is effective?
6. Is there a dependable source of parasite species adapted to your region?
7. Are insecticide procedures being used that will reduce parasite populations, i.e., spraying directly on feedlot manure where parasites live?
8. What is the degree of sanitation in the feedlot?
9. What percentage of the feedlot area supports fly development?
10. Which fly species is abundant?
11. Can the feedlot afford parasite releases or should it spend money on cleanup?

My results suggest that most parasitism occurs two weeks following release, and weekly parasite releases have had positive results. Less frequent releases result in periods with few parasites present during hot weather when parasites are active for only about one week. Weekly releases during the fly season have been necessary, because one period of releases has not maintained parasite populations during the following weeks.

Several parasite release methods have been used. Placing the emerging parasites directly in the location of fly pupae and covering with an inch or more soil has worked well. The fly pupae from which parasites are emerging should be placed on damp soil or manure, so they do not dry out quickly or reach high temperatures with the summer heat. Placing the parasites out of the sun and away from areas that will be trampled by cattle, or removed and spread during manure cleanup, is mandatory for successful fly parasite use.

Author:
G.L. Greene, Kansas State University, Southwest Research-Extension Center, Garden City, Kansas

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