MANAGEMENT OF STABLE FLIES IN CATTLE FEEDLOTS WITH RELEASES OF PARASITIC WASPS

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Summary

During 1992, adult stable fly populations were sampled in 25 Kansas feedlots. A native stable fly parasitic wasp, *Spalangia nigroaenea*, was released in 19 of these feedlots. Stable fly populations were reduced up to 48% and parasite emergence was increased 21% when compared with feedlots where *S. nigroaenea* was not released. The percentage of total parasites that were *S. nigroaenea* nearly doubled in the release feedlots, compared to the nonrelease feedlots. This parasitic wasp has shown considerable promise for stable fly control in cattle feedlots. Overall, sampling and parasite costs averaged 32 cents per animal for the season.

(Key Words: Stable Fly, Pteromalidae, *Spalangia nigroaenea*, Cattle Feedlots, Fly Management.)

Introduction

Certain species of wasps lay their eggs in fly pupae. That kills the fly pupae and allows reproduction of the parasitic wasps. The use of these fly parasites to reduce stable flies in cattle feedlots has been a common practice in Kansas. How beneficial are these parasitic wasp releases? To answer that question, we previously sampled over a dozen feedlots where commercial parasites were released and found *S. nigroaenea* to be the major species retrieved from stable fly pupae regardless of the species being released. From 1987 to 1991, six season-long releases were made in feedlots using *S. nigroaenea*. As a result, the number of stable flies was reduced, whereas the percentage of fly pupae producing parasites increased. With those promising results, a large-scale demonstration-research project was conducted in 1992. The objective of this study was to determine the effectiveness of the wasp, *S. nigroaenea*, in various feedlot environments before recommending it as a stable fly control measure. Additional objectives were to develop an economical, integrated pest management system for stable fly reduction, develop a fly population estimation system, and establish a better basis for parasite release numbers. The 1992 results for fly reduction, parasite increase, and the economics of parasite release and sampling are presented.

Experimental Procedures

There were 25 cooperating Kansas cattle feedlots in this study during 1992. Adult stable fly populations were sampled with four Alsynite sticky traps placed at the margins of each feedlot, except for larger yards where up to eight traps were used. Each week, the number of stable flies trapped was recorded, and the sticky covering on the Alsynite traps was replaced. Samples of naturally occurring stable fly pupae were collected weekly from each feedlot and held in the laboratory to determine the species and number of emerging flies and parasitic wasps.

Generally, *S. nigroaenea* was released weekly at 19 feedlots from the middle of May through the end of September. Parasite emergence from the 19 release lots was compared with that from six nonrelease lots, of

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which three used commercial parasite releases and three had no releases. Stable fly pupae emergence records were kept from all releases on each of the 19 lots. Such records were not kept on the three lots where commercial releases occurred, because we were not privilege to the parasite species, emergence rate, or parasite release rate.

Data from the feedlots were divided according to the number of stable flies collected from Alsynite traps. Feedlots that fit the low fly population category generally had good manure sanitation with regular pen cleaning and did not stockpile manure on their premises. Feedlots that fit the high stable fly population category generally had poor sanitation, did not clean pens regularly, and usually stockpiled wet manure on their premises. Feedlots that were in the moderate category generally practiced sanitation between these two extremes.

Results and Discussion

The cool, wet conditions during the summer of 1992 resulted in more stable flies than previous years. Their continued presence from June into September had not been witnessed before, and the irritation to cattle was greater than previously observed. In feedlots with low stable fly populations (Table 1), local precipitation patterns and physical characteristics of the feedlots, in addition to the parasitic wasp releases, helped to further reduce stable flies. Some of these feedlots were along the western border of Kansas where conditions were drier, whereas other feedlots were built with excellent slopes and good drainage. Fly reduction in the release lots averaged about 47% compared with nonrelease lots in the low stable fly category.

The feedlots with medium fly level contained several conditions attractive for stable fly development. Although some lots were relatively clean, they generally had one major fly breeding area. For example, runoff areas that accumulated manure in or around the perimeter were found to breed an excessive number of stable flies. Other lots had stockpiled wet manure or had manure in pens or along fencelines and water standing in pens, a breeding situation that produced millions of stable flies! Fly reduction on these release lots averaged 42% compared with nonrelease lots.

Feedlots with high numbers of stable flies all had manure piled on the premises, in addition to the excellent fly breeding conditions found in the medium fly level feedlots. These breeding areas produced stable flies all summer. Some of these feedlots still had to apply insecticides to reduce stable flies because they were producing more flies than economical releases of parasites could handle. Fly reduction on these release lots averaged 35% compared to nonrelease lots.

In most cases, the number of stable flies in the parasitic wasp release lots was a third to one-half lower than that in nonrelease lots. In fact, one feedlot discontinued parasite releases in early July, and the stable fly population increased to above the nonrelease feedlot level 10 days later, demonstrating that parasite releases had provided effective control.

Parasitism levels of stable fly pupae in the release feedlots were about double those in the commercial or nonrelease feedlots (Table 2). The percent parasitism in the non-release feedlots was about half that recorded during previous years, perhaps as a result of higher stable fly populations during 1992. Of the total parasite emergence in the 19 release lots, the number of *S. nigroaenea* was nearly double that in the nonrelease feedlots and 14.3% more than that in the commercial release feedlots.

Just as sanitation level influenced stable fly abundance, it also affected the quantity and cost of parasite releases. The cost of sampling and parasites per animal varied from $.09 to $1.34 among feedlots, a 15-fold difference. Feedlots with low fly populations had average costs of $0.37 per head for the season (Table 1). Costs for feedlots with medium fly levels averaged $0.24 per animal, whereas those for feedlots with high fly populations averaged $0.54 per animal for the season. The medium group of feedlots had a lower cost per head because of larger cattle numbers per feedlot. Overall, sampling and parasite costs for the 19 feedlots in the study averaged $0.32 per head for 1992.

Table 1. Costs of Cattle Feedlot Stable Fly Management with Parasites in 1992

Fly level	No. of feedlots	No. of cattle/lot (1000's)	Cost, $ per head		
			Parasites	Sampling	Total
Low	5	9.64	.26	.11	.37
(49-53)[a]		(2.2 to 22)			
	(.27 to .52)				
Med	9	36.93	.1.8	.06	.24
(107-138)		(4.5 to 100)			
	(.09 to 1.15)				
High	5	22.20	.42	.12	.54
(184-253)		(7 to 37)			(.32 to 1.34)
Average		25.88	.24	.08	.32

[a]Numbers in parentheses are the ranges from low to high.

Table 2. Stable Fly Pupal Parasite Collections from Cattle Feedlots in Southwest Kansas during 1992

Feedlot Group	Stable Fly Pupae % Emergence	
	Total Parasites[a]	*S. nigroaenea*[b]
Low Fly	50.7	80.5
Med. Fly	35.8	72.2
High Fly	38.9	71.7
Average	39.0	73.9
Commercial	21.9	59.6
Non-release	18.2	38.6

[a]100 minus these numbers = percentage of live fly emergence.
[b]100 minus these numbers = percentage of all other parasite species emerging.