Reduced Pesticide Fly Control to Conserve Dung Beetles and Benefit Beef and Sheep

SARE PROJECT FNC14-977 | **Measure, Treat, Measure Again** | **Linda Simmons**

Walk Through Horn Fly Trap works on South Dakota Ranch

Low counts in fecal samples showed few parasites. Healthy ecosystem?

RESULTS OF THE PROJECT: The project was a demonstration and a simple trial but did show that non-chemical control can match or exceed the success of pesticide based control of both horn flies and parasites on beef cattle in north eastern South Dakota which is in the **North Central Region** of **SARE**.

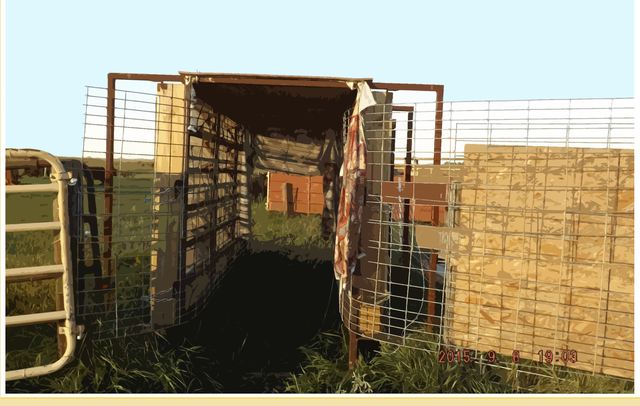
Previous to the SARE project Linda's beef operation suffered a sudden loss of over $ 50 dollars per head due to horn flies, face flies and resulting pink eye infections. Feed through larvicide which had seemed to control flies well for about 2 years obviously failed in the third year and both horn fly and face fly populations exploded. Additional pesticides did not rescue the pastured cows and calves in this case. Additional pesticides, antibiotics and eye treatment brought cows and calves back to an acceptable production standard but horn flies and face flies were still present at levels that caused the cows to occasional yard up. Also before the project the adjacent land owner lost two ewes to blow fly infestation of their wounds in spite of X daily applications of insecticides. All of these fly populations were showing resistance to pesticides.

The SARE grant allowed the beef operation to add better timed and much more extensive pasture rotational grazing, testing of a University of Missouri designed walk through horn fly trap, eliminate systemic fly control pesticides, use a new class of topical insecticide on resistant horn flies, reduce topical pesticides with the goal of preventing the same build up and explosion of pest populations. NZI fly traps were built for the stable flies and blow flies found in the sheep operation. These well researched traps did attract and catch those species, stable flies especially, with only the colors of pthalo blue and black as attractants. Both traps showed potential. This amazing color attractant system was developed in part by Steve Mihok, PhD and has been tested on 3 continents and several important pest flies.

The results for the Walk Through Horn Fly Trap experiment aligned closely with the Missouri Extension results. No trial of the Missouri trap was on record since 1990, before resistance to many fly control products had been encountered and before the sensitivity of beneficial dung dwelling insects was well known. It appears that a future, statistically valid research trial of the Walk Through Horn Fly Trap in the North Central SARE Region might provide proof that the trap is an effective addition to reduced pesticide control of horn flies and possibly face flies. The beef operation in the project will never giver up the Walk Through Horn Fly Trap because of it's effectiveness and low cost of operation.

The savings in labor using the trap have continued to be of great benefit, using 20-30 minutes of one person per treatment instead of 4 hours for two people plus the cost of pesticide. Because resistance to pesticides is not created the long term savings will be even greater.

The financial benefits from saving beneficial insects must also be counted. It was not possible to measure dung disappearance to the extent that increased fertility could be calculated but practical methods were developed that could be used by ranchers to monitor their own land.



FROM LITERATURE REVIEWED FOR THE PROJECT:
Dung beetles physically tear apart dung pats by nesting, burying and consuming dung. The broken pats are less suitable breeding grounds for both manure flies and internal parasites.

DUNG BEETLES ARE VULNERABLE BECAUSE...
Adults fly and mate in native grassland.
The life cycle of some dung beetles is 3 years and for many species it's unknown how long they need to complete a generation. Systemic pesticides, including wormers and lice control chemicals are made to pass through livestock tissues over a period of days or weeks or months, thoroughly contaminating manure. The research of the effects of these pass residues is limited but still shows that non target species like dung beetles can be impacted. Many components remain in manure pats for months. Some of the most commonly used pesticides that have low toxicity to mammals are deadly for arthropods like dung beetles. Parasites and fly pests have proven their ability to develop impressive resistance to chemical controls while resistance in beneficial insects is not even suspected. The life cycles of pests are fundamentally very successful , that's what makes them pests. The fast turn over of generations and large broods of pests also helps them become resistant to chemical control . Beneficial insects do not have that advantage.

DUNG BEETLES INCREASE PRODUCTION by...
The economic impact of killing beneficial insects is compounded by pesticide resistance of biting flies. Pesticides and wormers alone are not enough to control these pests, obviously horn flies and face flies and internal parasites are still stealing pounds from livestock in the North Central region in spite of pesticides being affordable for 30 years. Both organic producers and conventional producers need non chemical methods to keep these major pests at reasonable levels for profitability and animal welfare. Producers also need fertile grazing land and all depend on the recycling of nutrients in manure/dung. Enhancing the ecosystem services of dung beetles both improves fertility and reduces pests. The level of service can be so high that it can be measured in tests of parasite loads, horn fly pressure and grass production. Hopefully scientific research and producer demonstration can bring more acres into high quality dung beetle habitat.

SOMETIMES, as in the case of this project, enhancing the habitat by a major reduction in systemic fly and parasite pesticides and a substantial reduction in topical pesticides can allow dung beetles and other beneficial insects to reduce the pest levels to below what was average in the pesticide based system.

Our Beef Operation

- Used fly COUNTS and fecal sample parasite egg COUNTS to confirm that parasites and flies were being adequately controlled without traditional pesticide use.
- SHOWED other producers that non-chemical control is viable.
- SAVED labor by substituting the Walk Through Horn Fly Trap which is operated by one person for traditional pesticide spraying or ear tagging which takes 2 people
- SAVED money by purchasing only appropriate wormer and lice control pesticides year round.
- INCREASED dung beetles and golden dung flies
- DECREASED horn flies and face flies by using the fly trap and one targeted application of pesticide for flies the first year and only Walk Through Trap the second season. Fly pop is still going down.
- DECREASED internal parasites of cattle according to fecal sample analysis
- CARED for the land and livestock using pest control that can be used indefinitely without creating resistance in pests.
- LOWERED RISK by reducing pesticide use and residue at pasture by 4/5ths in two years and by year 3 even more.

Non chemical control outperformed pesticides.


http://www.nadsdiptera.org/FFP/horn.htm


http://www.nadsdiptera.org/FFP/face.htm

Dung beetles and predators of pests are abundant in HEALTHY ECOSYSTEMS. GRAZING LIVESTOCK depend on the ecosystem for food and a clean environment. Unseen damage can be caused by pesticides , especially systemic insecticides and wormers which leave harmful residues. DUNG BEETLES CANNOT SURVIVE WITHOUT SAFE DUNG; LARVAE ONLY DEVELOP IN DUNG; ADULTS ONLY FEED in DUNG PATS; EVEN WINTERING PROBABLY OCCURS under or in PATS. COMMON SYSTEMIC PESTICIDES that were previously used on the project land included WORMERS that can LEAVE RESIDUE IN MANURE OVER 160 DAYS.

LARVA REQUIRE MANURE PATS to DEVELOP THEN EMERGE ON GRASS. Example: A major parasitic disease of beef calves , Coccidiosis is caused by Elmira spp found widely. Reducing the level of spores consumed by calves at pasture they are stressed at weaning and succumb to the disease is the main form of control. But the labeled chemicals are impractical at pasture. A healthy ecosystem where manure is recycled quickly and animals are rotationally grazed showed a very low count of this parasite in fecal samples during this project.

Update on parasites,
Recommendations based on research to help produce assess their animal's real parasite load and the effectiveness of parasite control programs are becoming more accessible. **Chemical control below 98% may indicate resistance** and the only way to determine that is through testing, usually from fecal samples. Here is an example of frank discussion of the state of chemical control of parasites in the cattle industry and how to use testing to evaluate infection rates: https://www.bovinevetonline.com/article/evolving-best-practices-parasite-control. In the project, fecal samples showed some extremely low infection rates of common parasites in the pasture with best practices and dung beetles but high rates of infection in the pasture where chemical wormers had been used the most and dung beetles weren't even seen. This may be showing how practices make a difference.
Chemical control is not even available for every common parasite.

DUNG PATS FLAT BROKE DOWN

If producers are able to use methods shown in the project to check their livestock's pest burden they can use the methods again after treatments or practices. They could better estimate the success of practices, both pesticide and ecosystem based. The failure of pest control could be detected before losses occur, the successful and sustainable practices could be continued with confidence.

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