Population Survey of *Haematobia irritans* (Diptera: Muscidae) on Cattle in Sale Barn in Navasota, Texas

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Abstract: Livestock pests, if left uncontrolled, are capable of impacting the health and productivity of the animals. This leads to disruption of the economy based around livestock and the goods produced. In order for a control program to be applied, the target pest species needs to be identified. The purpose of this experiment was to determine which species of pests infested cattle within the Navasota area through a population survey. The specimens were collected directly from the cattle and preserved for identification. The survey results depicted *Haematobia irritans* (L.) (Diptera: Muscidae) as the main pest associated with cattle in the study location. Of the 64 collected specimens, all were found to be *H. irritans*, and an average of 206 horn flies was observed on each individual. The potential economic losses associated with the findings of this study indicated a need for an integrated horn fly management strategy within the area.

Kewords: livestock pests, cattle health, economic impact, *Haematobia irritans*, horn fly

There are a myriad of livestock pests, many of which that have been studied in depth. When present, pests can cause detrimental effects to livestock hosts. These pests include lice, mites, ticks, mosquitos, and other flies. Flies are major pests to cattle, and within the number that target livestock are horse flies, stable flies, and horn flies (Baldacchino et al. 2014, Grisi et al. 2014).

Horn flies, *Haematobia irritans* (L.) (Diptera: Muscidae), are the most widespread external livestock parasites in the southern United States (Byford, Craig, and Crosby 1992). They are responsible for substantial economic losses due to their damaging impact on cattle health and productivity (Younger 2011). In the United States alone, the annual losses approach one billion dollars and an additional $60 million per year is spent on pesticides to manage outbreaks (Fitzpatrick and Kaufman 2012, Byford et al. 1992). The established economic thresholds for horn fly infestation on cattle are more than 200 per beef cow and more than 100 per lactating dairy cow (Kaufman and Weeks 2012). If the horn fly number for each individual bypasses these thresholds, then the cattle will exhibit decreased productivity as they attempt to avoid the bits of the horn flies.

Horn flies blood feed an average of 20 times per day by inserting their proboscis into the hides of cattle. The pain inflicted by their bites and their mere presence produce defensive reactions in the host (Foil and Hogsette 1994). Movements, such as walking, tail switching, and head tossing, are taken to rid themselves of horn flies and result in decreased weight gain and production as such movements deplete the stored energy reserves of the cattle (Boland et al. 2008). Large infestations of horn flies, which tend to occur from early spring to mid-summer, can also result in significant

blood loss and wounds that can lead to secondary infections and damaged hides (Kaufman et al. 2013). As with many blood-feeding arthropods, there is also the threat of disease transmission. Horn flies are known vectors for pathogens that cause skin disorders in cattle and are also suspected in the transmission of anthrax, anaplasmosis, and other diseases between herds (Fitzpatrick and Kaufman 2012).

With the dairy and beef cattle industry valued at $12 billion in the state of Texas, horn flies, along with other livestock pests, pose a significant economic threat (Swiger 2012). The objective of this field study was to determine the species of flies present on cattle in the Navasota, Texas area by identifying ectoparasites collected from cattle housed in a sale barn located in Navasota, Texas.

Materials and Methods

The specimens were collected from the Navasota Auction Barn in Navasota, Texas which houses and auctions livestock animals including cattle, horses, and goats. The sale barn was situated in a pasture on the property. The facility contained a set of pens that concentrated the cattle in a confined space, of which half were covered and the remaining half were outdoors. It was at this location that the ectoparasites were collected. The specimens were collected once per week over a three week period directly from the backs and withers of 9 cows representing three different breeds of cattle, Angus, Braford, and Hereford Cross, with a styrofoam cup (Dart, Waxahachie, TX). The collection dates were March 22, March 29, and April 5, 2014. The specimens were preserved in an 80% Ethanol (Decon Labs, King of Prussia, PA) for further study. An estimate of the number of flies present on each cow was determined by comparison of observed flies to a graphic estimation method (Kaufman and Weeks, 2012). After the collection was completed, a total of 64 specimens were brought to the lab for identification. The specimens were identified in lab using a SZ61stereo microscope (Olympus, Center Valley, PA). Key features, such as, long maxillary palps and the absence of bristols on the meron were used to identify the specimens.

Results

The field survey of ectoparasites showed that *H. irritans* was the most common species that infested the three different cattle breeds at the survey location. The number of specimens collected from each breed is listed below (Table 1). A total of 64 specimens were collected from the three cattle breeds, and all of those were identified as *H. irritans*.

Although only 64 specimens of *H. irritans* were collected, an estimated 1,855 flies were observed over the three week survey period. 800 flies were observed on the Angus, 625 on the Braford, and 430 on the Hereford Cross (Fig. 1). An average of 206 flies per cow was found.

Table 1 – Horn Fly Specimens Collected from Cattle at the Sale Barn

Date	No. on Angus	No. on Braford	No. on Hereford Cross	Total
22-III-14	9	8	4	21
29-III-14	12	7	6	25
5-IV-14	10	6	2	18

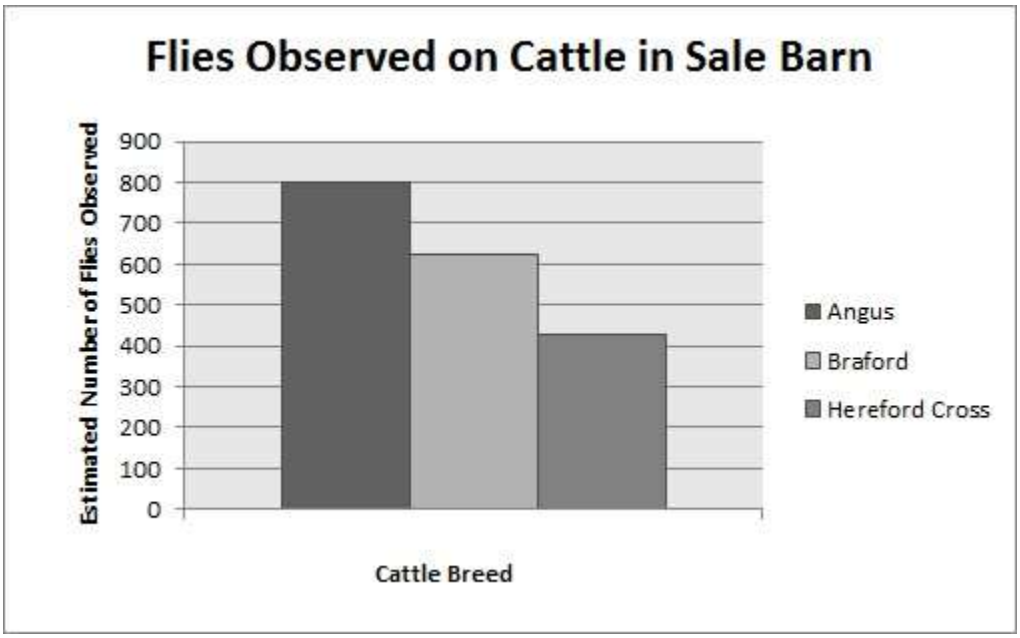

Fig. 1. The total number of Horn Flies estimated on three cattle breeds at the Navasota Sale Barn over a three week period.

Discussion

Haematobia irritans was the lone ectoparasite observed, collected, and identified during the three week survey period. The average number of horn flies observed per cow in this population survey was 206. This result is significant in that it exceeds the economic threshold for both dairy and beef cows and indicates a horn fly control problem at the Navasota Auction facility. It is interesting to note that the observed numbers of horn flies present on the Hereford Cross breed were consistently less than those of the other two breeds and remained under the economic threshold for each of the three collection dates. This could be due to location within the sale barn. If all of the breeds are grouped together with the pens, then where the Hereford Crosses are kept may not be as ideal a location for horn flies as the other areas. Regardless, further study of the Hereford Cross breed with regards to populations of horn flies may be warranted in the future.

Alongside more breed-specific studies, other surveys could be performed to compensate for this one's small sample size. Only nine cows were sampled from, and only on three separate occasions. Another survey could be performed, including more individual cattle, higher sample numbers, and greater frequency of sampling. Multiple samples per day could also be taken, in order to increase the chances of finding variation, as insect pests can vary in the time of day or night that they are active. In this way, there is the potential to sample other livestock pests that could have detrimental effects on cattle.

As with many other external pests, horn flies have an appreciable negative impact on livestock. Studies of horn fly infestation of cattle under laboratory conditions found that horn fly densities of 100 and 500 flies per animal led to increased physiological stress in comparison to horn fly free cattle (Woolley, 2013). Cattle with high horn fly densities also had significantly higher heart rates, higher respiration rates, and higher blood cortisol concentrations (Woolley, 2013). These symptoms can be attributed to the presence and feeding of horn flies. Greater concentration of horn flies leads to bovine agitation due to the annoyance and pain associated with fly feeding which disturbs cattle from their routine life cycle. Cattle can also lose up to 1.5 lbs daily due to increased energy expenditure in ridding themselves of the pests (Kaufman and Weeks, 2012). Not only do horn flies annoy cattle, but horn flies are also vectors of several pathogens such as bovine anaplasmosis, and a mastitis-causing agent, *Staphylococcus aureus.*

As a prevalent and abundant parasite, horn flies have a significant economic impact on agricultural production. The feeding process of horn flies in numbers that exceed the economic threshold degrade the value of cattle hides, decrease their weight gain, and decrease their milk production (Swiger and Tomberlin, 2011). In Florida alone, the economic impact due solely to horn flies nears $36 million annually; it approaches $1 billion annually in the United States (Kaufman and Weeks, 2012). The impact on rural communities such as Navasota is significantly large because agricultural communities like Navasota depend heavily on livestock production for income. Considering the potentially devastating economic impact on these communities, horn fly management should be a priority within the Navasota area and the cattle industry.

In order to limit economic loss, the horn fly population at the sale barn site should be limited. A wide variety of control methods

should be applied to reduce the population of horn flies in communities that depend on livestock (Barros, 2004). The aforementioned variety of control methods should be implemented because horn flies develop resistance to many of the insecticides found in ear tag formulations (Kaufman and Weeks, 2012, Hoelscher et al., 2012). An integrated chemical, cultural, mechanical and biological approach should be considered (Kaufman and Rutz, 2000). One recommended and proven chemical method is to attack the population during the larval stage by introducing insect growth regulating compounds (IGRs) which inhibit the growth of the larval stages (Bay and Harris, 1988). Cultural modifications such as spreading manure to hasten its drying have been used to effectively reduce horn fly populations by creating an inhospitable environment for eggs and larva development (Hoelscher et al., 2012). Walk through horn fly traps offer a mechanical means of ridding cattle of the parasites (Hall, 1996). The introduction of biological agents such as coprophagous beetles and predator fire ants are also viable options (Barros, 2004). Although these methods are proven to be effective to varying degrees, different approaches should continue to be sought and applied to ensure that horn flies do not become resistant to any one form of pest management.

References Cited

Baldacchino F, Gardes L, De Stordeur E, Jay-Robert P, Garros C. 2013. Blood-feeding patterns of horse flies in the French Pyrenees. Vet Parasitol 199:283–288

Barros, T. 2004. General aspects of horn fly control and insecticide resistance with emphasis in Latin America. Redectopar, Conferencia Eletrónica 2004, Documentos. (http://web.andinet.com/redectopar)

Bay, D. E., and R. L. Harris. 1988. Introduction to veterinary entomology: a guide to livestock insects. Stonefly Publishing, Bryan, TX.

Boland, H. T., G. Scaglia, and K. Umemura. 2008. Case study: impact of horn flies, Haematobia irritans (L.) (Diptera: Muscidae), on the behavior of beef steers. Prof. Anim. Scientist 24: 656–660.

Byford, R. L., M. E. Craig, and B. L. Crosby. 1992. A review of ectoparasites and their effect on cattle production. J. Anim. Sci. 70:597–602.

Fitzpatrick, D. and P. E. Kaufman. 2012. Horn fly *Haematobia irritans irritans* (Linnaeus) (Insecta: Diptera: Muscidae).

Foil, L. D. and J. A. Hogsette. 1994. Biology and control of tabanids, stable flies and horn flies. Rev. Sci. Tech. 13:1125–1158.

Grisi, L., R. Leite, J. Martins, A. De Barros, R. Andreotti, P. Cancado, A. De Leon, J. Pereira, and H. Villela. 2014. "Reassessment of the Potential Economic Impact of Cattle Parasites in Brazil." *REVISTA BRASILEIRA DE PARASITOLOGIA VETERINARIA* 23 : 150-56.

Hall, R. D. 1996. Walk-through trap to control horn flies on cattle. Econ. Entomol. 82:530–534.

Hoelscher, C. L., C. D. Patrick, and J. V. Robinson. 2012. Managing external parasites of Texas livestock and poultry.

Kaufman, P. E., P. G. Koehler, and J. F. Butler. 2013. External parasites on beef cattle.

Kaufman, P. E. and D. A. Rutz. 2000. Common pest flies found in the urban/rural environment and their biological control agents. Cornell University, Extension Service.

Kaufman, P. E., and E. N. I. Weeks. 2012. Horn fly management.

Swiger, S. L. 2012. Managing external parasites of Texas cattle. Texas A&M AgriLife Communications, College Station, TX.

Swiger, S. L. and J. K. Tomberlin. 2011. Protecting cattle from horn flies. Texas A&M AgriLife Communications, College Station, TX.

Woolley, C. 2013. Attack intensity of pest flies and the behavioural responses of pastured dairy cows. M.S. thesis, University of Guelph, Guelph, Ontario, Canada.

Younger, C. 2011. A study of horn fly, *Haematobia irritans* (L.) (Diptera: Muscidae), target-site, sensitivity, susceptibility, and resistance management at selected sites in Louisiana. Ph.D. dissertation, Louisiana State University, Baton Rouge.