

**RESULTS FROM THE TEXAS VETERINARIAN SURVEY:
IMPACT OF RED IMPORTED FIRE ANTS ON ANIMAL HEALTH**

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The red imported fire ant (*Solenopsis invicta* Buren) is recognized as a major nuisance pest in the southeastern United States. With tens of millions of infested acres, there has also been a great deal of concern and anecdotal evidence about the ants' negative impact on livestock, pets and wildlife. However, very little scientific data is available in regards to frequency and economic impact on animal health. With current fire ant suppression methods estimated to cost \$10 per acre per year (Drees & Vinson 1993), there is a great need to justify the cost of these treatments in agricultural and ecological systems.

The red imported fire ant can cause temporary blindness (Joyce 1983) and occasionally death (Lofgren 1986) in calves and reportedly cause problems during hay harvesting because the tall, hardened mounds destroy machinery and the ants invade hay bales (Lofgren 1986). However, ant predation also suppresses ticks and related problems (Harris & Burns 1972, Fleetwood et al. 1984). Ants also prey on the immature stages of horse flies (Johnson & Hays 1973, Drees 1987) and other insects (Lofgren 1986).

To document fire ant related losses to the Texas animal industry, the Texas Agricultural Extension Service, in cooperation with the Texas Veterinary Medical Association, Texas A&M College of Veterinary Medicine, the Texas Veterinary Medical Diagnostic Laboratory and the Texas Agricultural Experiment Station, conducted a survey of the veterinarians in the state of Texas. Direct funding was provided by the American Cyanamid Corporation and program support funding was provided by Ciba-Geigy. The survey was designed to assess the frequency, severity, and economic losses associated with fire ant activity in relation to animal health.

The impact of fire ants on livestock production systems involves many factors including effects on animal and human health, equipment damage, possible forage loss and degradation, and increased labor costs. Eventually, it is hoped that an economic injury level can be developed, but to do so, a cost must be determined for each factor. Losses reported by veterinarians in this survey document **only a part** of the impact of fire ants in livestock production systems.

Materials and Methods

Specialists in entomology, agronomy, livestock production, agricultural economics, large animal veterinary medicine, veterinary toxicology and general veterinary medicine developed the survey. A mailing list was provided by the Texas Veterinary Medical Association. Surveys were mailed the week of 15 August 1993 to **all** listed members in postage-paid return envelopes. No attempt

was made to exclude certain specialties, practice types or areas of the state. All surveys received on or before 15 December were included in the analysis.

A spreadsheet program, using SuperCalc 5.0, was developed to tabulate the survey results. In order to prepare the survey data for computer entry, all surveys were examined and results converted by hand to a standard format, when necessary. Each survey was given a reference number and all data from surveys reporting fire ant injury were entered into the spreadsheet. Those surveys reporting no fire ant related injuries had county(ies) of origin and written comments recorded, but no data entered into the spreadsheet.

Using the results of the Texas Veterinary Survey and statewide statistical information, an attempt was made to calculate the impact of fire ant related animal health problems to Texas. Methods of extrapolation are presented in Barr, et. al. (1994). We have focused on cattle as an example, but similar methods can be applied to other animal groups. The major assumption in this calculation is that those veterinarians not responding to the survey experienced similar ant related problems as did respondents. No effort was made to contact these individuals to determine the reasons for not responding.

Results and Discussion

Over 90 percent of the counties in the state were included in the service areas of the respondents. Some veterinarians reported problems with fire ants in counties not known to be infested with red imported fire ants. However, they were not asked to report incidence by county so it is likely that their service areas included both infested and uninfested counties.

The number of surveys completed and returned was one of the most striking results of this survey: a total of 837 out of 2,499 for a return rate of 33.5 percent. On a detailed survey of this type, 15 percent is often considered adequate. Given the hectic nature and long hours of a veterinary practice, a response of this magnitude is indicative of the great interest in fire ants within the animal health community and, most likely, the general population. Of the surveys returned (837) nearly two-thirds (522) were marked as "Yes," the veterinarians having treated animals for fire ant injury. The results reported in the sections below were obtained only from the 522 surveys on which veterinarians responded "Yes" to treating or witnessing fire ant related animal health problems.

I. Frequency and economic impact of ant related injuries and mortality. The frequency of fire ant related animal injuries, by species or animal group, is summarized in **Table 1**. With a total of 7,204 cases reported annually, the average number of fire ant related cases per respondent per year was 5.2. Of the animals affected by fire ants, small animals and pets accounted for more than half of all reported injuries. Next was injuries to cattle, 17.5 percent, and then wildlife, 12.1 percent. Considering the enormous areas that are not routinely contacted by man, and the difficulty in spotting an injured fawn or bird, fire ant impact on wildlife may be more significant than the survey indicates. If nothing else, these survey results document a need for further scientific research on fire ant damage to wildlife.

Results on the frequency and type of fire ant injuries and the average cost for treatment are summarized in **Table 2**. The average cost for treatment was \$53.87, resulting in an annual total treatment cost of \$726,904.53 in treating over 13,000 fire ant injuries. Dermatitis accounted for almost half of these reported cases with many instances of multiple injuries.

Only 110 respondents answered the section about animal mortality (21.1 percent of 522). A total of 2,649 animals were reported to have died from fire ant related injuries annually (**Table 3**), for a total loss of \$3,486,047. Cattle, presumably mostly newborn calves, made up the largest group; 1,387 or 52.4 percent. It is difficult to establish a cause and effect relationship between fire ants and animal death since many animals are found only after they have been lying dead or incapacitated for an unknown length of time. Small animals and pets, while accounting for half the injuries, accounted for only 16 percent of the deaths. It is possible that time between human observation is a major factor in both determining and preventing fire ant related mortality. Results here are from those incidents where a veterinarian became involved. Undoubtedly, many, if not most, cases go unreported so these results are likely a very conservative estimate of mortality.

Ratites, flightless birds including ostriches, emus, and rheas, accounted for only 2.8 percent of the reported injuries and 8.0 percent of the deaths. However, ratite deaths accounted for over \$2.1 million in losses, 61.6 percent of the total. This imbalance is the result of the value of these birds. The average cost of a single ratite loss was calculated at over \$10,000. The cause of most losses is unclear, though. Despite the susceptibility of bird eggs to fire ant attack in the wild (Drees 1992), ratites are usually raised under almost sterile conditions. According to several reports, adult birds exhibited shock-like symptoms after fire ant stings.

Over 76 percent of all injuries were reported in the months April-September, supporting suggestions for fire ant management in livestock operations (Drees and Vinson 1993). Results should also encourage animal caretakers to pay particular attention to fire ant suppression during warmer months or reduce the potential of ant related health problems by scheduling birthing for the cooler months.

II. Opinions and perceptions. We felt it was important to know the prevailing attitudes of the veterinarians about fire ants and their control as well as their actual experiences. One concern is how much people think it costs to treat for fire ants and how much they think it should cost. The perceived annual cost per acre for fire ant treatment was an average of \$13.87 per acre per year. The average economically justifiable cost was calculated at \$4.42 per acre per year. Comparing the two averages, there exists a gap of \$9.45. In other words, veterinarians think the cost of treatment is over three times as expensive as it should be.

Potential cost is not the only factor involved in deciding to manage fire ants. In many instances, perceptions of the threat caused by the ants' presence play an equal or more important role. Over 69.5 percent felt that fire ants were a significant threat to domestic animal health. Over 81 percent felt that they were a threat to livestock health and a surprising 83 percent felt that fire ants might cause economic loss in livestock production. Over 59 percent of respondents felt it was not economically feasible to treat large areas such as pastures and rangeland, though 31 percent reported they were unsure. Over 46 percent reported that "calving pastures" were economically

feasible. Over 77.4 percent felt it was feasible to suppress ants around feed storage areas, electrical equipment and stock tanks.

III. Composition and Caseload. This section compared the frequency of fire ant related problems to the average practice caseload. In an average day the "average" veterinarian treats: 15 to 16 dogs and cats; 1 or 2 exotic small animals or birds; 7 to 8 cows; about 4 horses; about 1 sheep, goat, or pig; about 1 exotic large animal or ratite; only 1 or 2 fowl per week; and the occasional reptile, fish or other animal.

The percentage of fire ant related cases can now be estimated. For instance, if an average veterinarian sees 2,737 cattle per year (7.5 cattle per day x 365 days) and sees 6 cases of fire ant related animal health problems requiring treatment per year, only 0.22 percent of the cattle cases seen are fire ant related. **Table 4** lists a similar breakdown of injury frequency for all species.

IV. Extrapolation of Survey Results. Values calculated from the extrapolation of cattle losses to Texas are summarized in **Table 5** (Barr et.al 1994). Assuming similar results from non-responding veterinarians, the total statewide loss to cattle from fire ant related injuries and death is estimated at about \$2.2 million or \$0.07 per grazed acre. Though this amount is minor by itself, it is only a small part of the potential impact of fire ants on the cattle industry. The methodology used in the extrapolation can be applied to other species and animal groups with sufficient supporting economic data.

Conclusions

- Based on the rate and distribution of returns and question responses, there is considerable interest in and concern over the impact of fire ants on animal health in Texas.
- Small animals and pets are, by far, the most frequently treated type of animal for fire ant related health problems, with cattle second and wildlife a close third.
- This survey documented a conservative cost of \$750,000 per year to treat fire ant injuries with over 7,200 animals treated, most with multiple injuries.
- Fire ants cause three-fourths of their yearly injuries from April through September.
- This survey documented nearly \$4.5 million in death losses blamed on fire ants.
- The ratite industry suffered over \$2.1 million in losses, alone.
- The respondents felt, overwhelmingly, that fire ants pose a significant threat to animal health and livestock production economic loss.
- The respondents felt that fire ant treatments are more than three times as expensive than is necessary to make them economically feasible in a livestock operation.
- Few respondents felt it was economically feasible to treat large acreages, though many felt it feasible to treat "calving pastures" and most facilities.
- Though fire ant associated animal health losses are substantial and of great concern, they are relatively minor compared to the size of the livestock and pet industries.
- This survey documented only cases seen by veterinarians. It is likely that many more animals are affected, but are not taken for medical care.

Recommendations

- Given the great interest, particularly in areas not infested with the red imported fire ant, there needs to be increased targeting of information regarding effective fire ant management programs to veterinarians and livestock producers.
- Animal health professionals and the public need to be made aware of the seasonality of fire ant injury and educated on ways to take advantage of it with methods such as scheduled breeding and timing of fire ant treatments.
- With wildlife being third in the number of reported fire ant related cases treated by veterinarians, further research needs to be conducted to determine the impact of fire ants on wildlife, particularly deer.
- The ratite industry urgently needs a targeted program on fire ant management methods and pesticide label additions or clarifications regarding use in and around ratite facilities.
- Manufacturers and researchers will need to develop new chemicals and/or application methods to reduce fire ant treatment costs to make their use economically feasible in livestock operations.
- More surveys on economic loss need to be conducted among livestock producers and ranchers to help confirm the results found here and to justify the costs invested in fire ant treatments.

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Table 1. Number and percent of fire ant injuries occurring annually by species or animal group.

<u>Species</u>	<u>No. responses (% of tot.)</u>	<u>No. cases (% of tot.)</u>	<u>Avg. cases/respondent</u>
Small Animal	489 (35.3%)	3,715 (51.6%)	7.6
Bovine	225 (16.3%)	1,260 (17.5%)	6.0
Equine	213 (15.4%)	622 (8.6%)	2.9
Poultry	149 (10.8%)	335 (4.7%)	2.2
Wildlife	215 (15.5%)	872 (12.1%)	4.1
Ratites	56 (4.0%)	205 (2.8%)	3.7
Other Exotic	31 (2.3%)	182 (2.5%)	5.9
Other	5 (0.4%)	13 (0.2%)	2.6
Total	1383 (100%)	7,204 (100%)	5.2

Table 2. Incidence of fire ant injury type and associated costs.

<u>Injury Type</u>	<u>No. responses</u>	<u>No. cases</u>	<u>Avg. cost</u>	<u>Total Cost</u>
Blindness	209	2,717 (20.1%)	\$67.59	\$183,642.03
Dermatitis	453	6,688 (49.6%)	\$52.24	\$349,381.12
Secondary infection	249	1,948 (14.4%)	\$44.54	\$86,763.92
Gastritis	76	440 (3.3%)	\$54.16	\$23,830.40
Injury to convalescent animals	159	1,658 (12.3%)	\$48.39	\$80,230.62
Other	12	43 (0.3%)	\$71.08	\$3,056.44
Total		13,494	\$53.87	\$726,904.53

Table 3. Frequency and economic loss associated with animal mortality.

<u>No. Animals (% of total)</u>	<u>Avg. Loss/Animal</u>	<u>Total Loss (% of total)</u>
Bovine 1,387 (52.4%)	\$474.17	\$657,670 (18.9%)
Equine 83 (3.1%)	\$1,649.75	\$136,930 (3.9%)
Poultry 381 (14.4%)	\$44.17	\$16,830 (0.5%)
Small/Animal 423 (16.0%)	\$488.59	\$206,675 (5.9%)
Ratite 214 (8.0%)	\$10,029.42	\$2,146,295 (61.6%)
Other Exotic 161 (6.1%)	\$1,997.81	\$321,647 (9.2%)
Total 2,649	\$1,315.99	\$3,486,047

Table 4. Composition and caseload analysis of respondent practices.

	<u>Number of responses</u>	<u>No. of cases</u>	<u>Average cases per respondent</u>	<u>Fire ant related percent of caseload</u>
Small animal				
Dog/Cat	462	7,092	15.4	0.19%
Avian/exotic	281	455	1.6	N/A
Large Animal				
Bovine	206	1,502	7.3	0.32%
Equine	215	903	4.2	0.27%
Poultry	106	34	0.32	2.64%
Sheep/Goat/Swine	154	124	0.81	N/A
Exotic	133	120	0.91	1.56%
Other	24	22	0.92	N/A

Table 5. Extrapolation from responses to statewide cattle losses.

0.069%	Percent cattle estimated to be treated for ant injury in Texas
0.076%	Percent cattle estimated to be lost due to ant related mortality in Texas
\$203,736.34	Statewide value of cattle treated due to fire ant related health problems
\$1,963,063.80	Statewide value of cattle lost due to fire ants
\$2,166,800.00	Estimated statewide economic impact of fire ants on livestock health
\$0.01	Per acre cost of fire ant related treatments to cattle in Texas
\$0.06	Per acre cost of fire ant related death to cattle in Texas
\$0.07	Total extrapolated per acre impact of fire ants of cattle health
