PRELIMINARY REPORT OF THE TEXAS CATTLE PRODUCER'S SURVEY: IMPACT OF RED IMPORTED FIRE ANTS ON THE TEXAS CATTLE INDUSTRY

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The Survey of Texas Veterinarians (Barr et al., 1994) quantified red imported fire ant (*Solenopsis invicta* Buren) injuries to livestock, pets, and wildlife. Injuries and deaths were found to be somewhat infrequent, but costly when they do occur. However, many veterinarians indicated that a significant number of animal injuries and deaths are not reported to them by producers. Complaints heard from livestock producers and historical accounts (Lofgren, 1986) concern not only fire ant damage to animals themselves, but also electrical equipment, feed, hay bales, and many types of farm machinery. In addition, fire ants are blamed for reductions in forage and hay quantity, and wildlife populations.

To address these concerns, the Texas Agricultural Extension Service, with the sponsorship of Ciba Geigy Corp. and the assistance of the Texas and Southwestern Cattle Raiser's Association, conducted a survey of fire-ant related impacts on the Texas cattle industry. The overall objective was to gain detailed frequency and economic data on fire ant-related damage from cattle producers themselves. It is hoped that, using this information, methods can be developed to determine an economic injury level so that individual producers can make cost-effective fire ant management decisions.

Materials and Methods

The survey instrument was developed in conjunction with specialists in the areas of entomology, cattle production and pasture management. The survey was printed in an 8-page saddle-stitch format with a cover letter on the front and the entire back page left open for comments. Respondents were assured of confidentiality and no spaces were included for names or addresses, only county.

To help concentrate the survey on "serious" cattle raisers, those who are in closer contact with their herd and who maintain more detailed financial records, the mailing list was provided by the Texas and Southwestern Cattle Raiser's Association (TSCRA). To obtain a geographically thorough distribution, survey recipients were chosen by randomly selecting fire ant-infested counties. Those counties with large urban centers were avoided due to high concentrations of absentee landowners. The list of 72 counties was sent to TSCRA who printed out a list of all members in those counties - a total of 4,521. Survey mailouts included the survey and a postage-paid return envelope in a large manila envelope. To maintain confidentiality of the mailing list, the surveys were transported to a mailing service used by the TSCRA in Fort Worth, Texas where they were addressed and mailed.

Surveys were mailed on or about 1 December 1994. The TSCRA provided 2 reminders in newsletters in mid-December and February. Surveys were opened and given a sequential identification number upon receipt. The last surveys included in tabulations were received on 15 March 1995. To ensure as much uniformity as possible with very non-uniform responses, data were entered into a Paradox 4.5 database *solely* by the senior author who made every attempt to standardize responses for accurate analysis. All comparative agricultural data was obtained from the 1992 Census of Agriculture (U.S. Dept of Agriculture, 1992).

Results and Discussion

Due to the detail of the survey instrument and magnitude of the response, a full analysis of the data is incomplete at this time. Also, it is not possible to cover more than the most concise summary of the results and include detail on the most significant findings here.

I. General Response Statistics. A total of 1,540 surveys were returned, a rate of 34.0% and 1.04% of the total number of farms in Texas (**Table 1**). Of these respondents, 1,090 or 70.7%, reported "Yes", that they have experienced fire ant-related economic losses. Respondents were first asked to list the county(ies) in which they grazed cattle (own or lease) and corresponding acreage. Approximately 20% of respondents listed more than one county. Acreage responses were received from 166 different counties and all but 1 of the targeted counties.

A total of 3,208,998 acres were listed by respondents, accounting for 3.12% of all pastureland in the state of Texas (an area larger than Connecticut) and 4.67% of the land in fire ant-infested counties. Of this total, 1,650,935 acres were reported by "Yes" respondents and 1,558,063 by "No" respondents (**Table 2**). Note that "No" respondents are much larger landholders than those responding "Yes", 3,795 ac. vs 1,515 ac. respectively, due largely to changes in stocking rate and fire ant density as one moves west and south across Texas (**Table 3**). It should also be noted that these results may be skewed by two "No" respondents who reported raising cattle on a total of 300,000 acres.

The most obvious thing about the overall results are their sheer numbers. A return rate of 34% for such a long and very detailed survey is truly remarkable. The survey contained space for 250 possible answers, mostly fill-in-the-blank. Fifty to 100 questions were commonly answered by "Yes" respondents. Also remarkable was the geographic coverage of returns. Of the 167 infested counties (according to TAEX entomological records), 144 had responses while 22 uninfested counties reported.

The main area of non-reporting counties was along the extreme eastern edge of the state and a few counties on the Gulf Coast. Curiously, this area of East Texas is the same that failed to respond to the veterinary survey. It is also the area that has been infested with fire ants the longest in Texas. One can only guess the reasons as to why both veterinarians and cattle producers failed to respond. Perhaps they have just learned to live with fire ants. Perhaps they just don't like to answer surveys.

II. Impacts in Hay Production. Of the 1,090 "Yes" responses, 580 in 92 counties indicated that they had experienced ant-related problems with hay production, 312 with storage problems (multiple responses allowed) and 224 with no problems associated with hay. Of those 580 "Yes" responses, 545 included acreage figures for a total of 73,004 acres, 2.02% of the state's hay pasture total. The average hay pasture size was 134 acres, compared to 46 acres for the state. This figure may be large due to the size of the landholdings and since some of the larger responses were totals from custom baling operators who hay others' pastures.

Respondents were asked to provide details about their hay production and per bale profit per cutting. Many respondents who did not report having fire ant problems filled in this section anyway for a total of 453 responses. Those producing large round bales accounted for 84% of the responses with an average yield for a first cutting of 3.5 large round bales per acre and a profit of $11.96 per bale.

A total of 140 respondents (24.1% of those reporting some hay-related losses) answered the question regarding purchase of new machinery as a result of fire ant activity, reporting a total expenditure of $835,425 or $5,967 per respondent. For the analysis of costs associated with repair of damaged machinery, care was taken to ask the respondents about both material and labor costs and how often these costs were incurred. In summary, 267 respondents filled out all 3 parts of the question - cost of parts, cost of labor, and frequency of these amounts. Total costs amounted to $270,407 or an average of $1,012.76 per respondent per year. These same respondents reported hayed acreage of 40,557 (1.31% of total hay acreage in infested counties) or **$6.67 per acre per year.**

Ranchers were asked to estimate the number of times they stop during a cutting to unclog fire ant-caused jams and for how long per stop. They were also asked to estimate their hourly labor and machine-time costs. A total of 247 respondents completed the 3 parts of this question - number of times stopped during a cutting, how many minutes per stop, and the hourly cost of this time including machine time and labor. They stated that they stopped an average of 27 times per cutting for an average of almost 17 minutes each time. They also stated that their hourly costs were $24.92. This group reported a total of 34,380 acres or 144 acres per respondent. All of this averages out to **$0.88 per acre.** Some respondents commented that this number of stops only occurs during the first cutting of a season when mounds are more numerous, freshly built, and muddy.

As a result of so much damage and so many stops, many producers raise the hay cutter bar to avoid fire ant mounds. There are two ways this is done: raising it a few inches over the entire field and/or adjusting it continuously to avoid individual mounds. Cutter bars were raised over the entire field an average of 3.5 inches as reported by 184 respondents. Of these, 173 accounted for 24,370 total acres. Only 52 respondents reported adjusting cutter bars continuously, but raised them a much greater average of 5.4 inches.

The respondents were then asked to estimate how much hay production raising the cutter cost them. Due to a wide variety of units in response, determining an exact dollar value was quite difficult. Nevertheless, results from about 50 respondents indicate that avoiding mounds by either

means causes a production loss of about 0.5 large round bales per acre, on the order of 15%. Using the production figures, that loss translates to about **$6.00 per acre** on at least one cutting.

The comments section provided tremendous insight into how fire ants affect hay production. Several respondents stated that it was necessary to move bales, particularly square bales, out of the field before nightfall or a large portion of them would be infested before morning. Some baling crews will not handle square bales from heavily infested pastures out of concerns for worker safety. Still other comments from ranchers who do not bale their own hay indicate that custom balers have increased prices 10-15% solely because of the extra time and trouble associated with fire ant infestations. Still more comments indicated that there are serious losses in time because equipment must be driven more slowly across fire ant-infested fields. To alleviate problems, other respondents reported dragging their fields to knock down mounds at reported costs of up to $10 per acre.

Therefore, not counting costs of new machinery, which would be depreciated over several years, off-ground storage costs, or the other factors for which there is insufficient data, fire ant-caused losses to these hay production are as follows:

Repairs and lost labor due to breakage	$6.67
Stops to unclog jams (assume per year)	$0.88
Raised cutter bar/lost production (once)	$5.98
	$13.53 per acre per year

The responses to the section on hay production were, by far, the most complete and detailed of the entire survey. Though the response was great, there were perhaps an equal number of ranchers who have their hay cut and bailed by others and could not give such specific information. The outcome of this section, a per acre per year cost of $13.55, was both surprising yet logical when the problem is broken down into its components.

Take, for example, the figures on cleaning out jams in hay machinery. Stopping 26 times per cutting may sound like a lot, but not when the average pasture size is 144 acres. That is only one stop per 5.5 acres. Similarly, 17 minutes to clean out a clog is quite reasonable. Tools must be on hand, panels removed, the clog untangled, and the whole thing reassembled - this with the area covered in angry fire ants. Many times were in the 30-45 minute range with comments that the equipment had to be taken back to the workshop to, if nothing else, avoid working in a fire ant-infested field.

The question also arises as to whether these various economic losses are counter-indicative. In other words, if a rancher buys a disc-type cutter and raises it 4 inches, will he still suffer losses from breakdowns and jams? A review of individual surveys and a knowledge of hay production suggests that the answer is, to a large degree, yes. Even if a disc-type cutter knocks down the mounds without breakage, they still require more frequent tooth sharpening and replacement than would a sickle-bar cutter because of these repeated impacts. By the time the hay is dry days later, the mounds are rebuilt enough to jam the baler just as often and that 4 inches of forage is still lost.

Perhaps the most obvious question that arises from these results is whether these economic losses occur in every hay pasture in the fire ant infested area of Texas? Obviously not. Losses depend greatly on the size and character of the mounds which depends on soil type, rainfall and density. Nevertheless, these numbers are averages from about 250 respondents. Some ranchers are experiencing *worse* losses, while others, none. These losses are not occurring everywhere, but they are occurring and there are producers suffering serious economic losses.

A $13.55 per acre per year, assuming that it does occur, can justify treatment of hay pastures with a chemically-based fire ant suppression program. Using currently labeled baits and ground application equipment, it is estimated to cost $10-12 per acre per year to satisfactorily suppress fire ants (Drees and Vinson, 1993). Easy equipment modification allows bait application simultaneous with other agronomic practices such as fertilization (unpublished data). This virtually eliminates the labor involved and brings the cost down to $8-10 per acre. Recently developed skip-swath application methods with fenoxycarb bait, though not approved for pasture use at the present time, can cut material costs in half. (Drees, et. al., 1993)

III. Other Causes of Economic Loss. **Table 4** details a brief summary of all economic responses that were either reported directly or that could be calculated reliably from information given. Respondents in this and other sections usually rounded off their answers to even tens or hundreds of dollar. There were, however, respondents who obviously went into their computers or record books and extracted values to the penny. These two sets of values were well within range of each other. Responses that were far out of range, such as the man who valued his time at $200 per hour, were not included in final tabulations.

Losses due to cattle injuries and deaths are relatively minor compared to the size of the cattle industry as a whole - unless it's your cow. An average of $1,850 per lost animal is substantial, particularly for a small operation. We suspect that this number is somewhat inflated, probably by the natural tendency of respondents to report "memorable" losses, such as carefully bred calves and registered breeds. They may have also reported sale prices had the animal gone to market rather than net profits.

The section on equipment and material losses yielded several surprises. The first was the frequency at which these incidents occur. Over 78% of all "Yes" respondents reported something in this category with fully two-thirds reporting damage to electrical equipment, many indicating that these losses occur annually. Secondly, these losses are relatively unrelated to the size of individual operations. A $300 water pump can burn out due to fire ants on a 10 acre ranch just as easily and frequently as on a 10,000 acre ranch. The difference is that the owner of the 10 acre ranch can realistically and economically treat his entire place for ants, preventing such damage. The same does not hold true for the entire 10,000 acres.

The total dollar value of equipment and material losses came to about $0.84 per reported acre. Again, losses cannot be spread over acreage. A more accurate representation is the average loss per operation. Unfortunately, this can't be determined with great accuracy because not every respondent listed losses in every category. However, dividing the total loss by the number of producers that responded to at least one of the questions is a good approximation - $1,367. For a

10 or 100 acre ranch, losses of this magnitude can justify treatment costs. For a 1,000 acre ranch, cost is prohibitive.

Expenses related to pesticide treatment of fire ants totaled only about $400,000. When extrapolated to the total number of ranches in the infested areas, this comes to about $20 million. A substantial sum, but small compared to the state's $8 billion cattle industry. The interesting feature is the distribution of pesticide use. Almost every respondent replied to this question. Pesticide use around the home was reported by over 80% with the percentage decreasing steadily as the value of the site decreases. Unimproved rangeland received treatments by only 61 respondents. The cost of such treatments, however, did not follow such a pattern. Home use averaged $250 per respondent, but these people (most respondents used pesticides in both areas) used only $97 worth of chemicals around barns and outbuildings. Those who did treat their production land spent from $117 to $212. It is important to note that these figures are not per year or per acre.

Conclusions

Since the purpose of this survey was to gather data towards the development of economic injury levels on a per acre basis, the simple thing to do is to divide the reported losses by the reported acreage. Therefore, the figure for those respondents listing some economic loss equals **$2.06 per acre**. Extrapolating that figure to the "problem" areas of the state, the loss comes to $67 million. A large number, but still only 0.99% of the states 6.8 billion dollar beef cattle industry.

However accurate $67 million may be, its derivation is unrealistic. The survey shows that fire ant problems are not evenly distributed, even within a single county or a few square miles. It must be emphasized that this is an operation-by-operation phenomenon where treatment decisions must be made by each producer after analysis of his or her particular problem. One conclusion is clear, if fire ant damage occurs, it is usually significant to the individual, but the circumstances cannot be applied to his neighbors.

Without a doubt, fire ants are still an issue of major concern to Texas cattle producers. Though this impression is firmly supported by the return rate and geographic distribution it can only be fully appreciated by reading the voluminous comments included on the surveys. About 40% wrote something and many respondents filled the back page, several attaching extra sheets. Many respondents provided their names and addresses even though the confidentiality of their membership was of utmost concern to the TSCRA. Many respondents gave detailed descriptions of their location versus the location of the nearest fire ants or when they were first invaded, giving us an irreplaceable historical record of the fire ant's westward expansion. One gentleman even sent photos.

Survey results and comments point out a paradox that would seem to be peculiar to fire ants among other pests of agriculture - perceptions and opinions versus reality. Many respondents listed virtually no economic impact while reporting hundreds of dollars spent on control. Others listed thousands of dollars in losses, particularly regarding hay production, yet spent almost

nothing on pesticides. What many respondents mentioned was the need for an eradication program similar to that conducted on the screw worm - a cheap, one-shot, government-sponsored effort that solves the problem.

Results indicate, among many other things, that there is tremendous confusion about fire ants and treatment options and a general condemnation of treatment costs and effectiveness. They also showed that there is an almost desperate need for education in the areas of impact and cost analysis, management options, and pesticide use. Based on this survey, the veterinary survey, and numerous fire ant control field experiments, the Texas Agricultural Extension Service is well on its way towards the development of an economic injury level for fire ants in individual cattle operations.

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Table 1. Response statistics to the Texas Cattle Producer's Survey.

Number mailed	4,521	Counties in Texas	254
Number undelivered	3	Infested Counties	167
Number returned	1,540	"Targeted" Counties	72
Return rate	34.0%	Counties w/responses	166
"Yes" responses	1,090	Infested w/responses	142
"No" responses	450	Non-infested w/resp.	22

Table 2. Breakdown of acreage responses to the Texas Cattle Producer's Survey.

Total Texas pastureland	102,805,890	(61% of total land area)
RIFA infested pastureland (by county)	55,838,986	(54.3% of pastureland)
Acreage of targeted counties	28,613,193	(51% of infested area)
Total acreage listed on surveys	3,208,998	(3.1% of Texas total)
Acreage from infested counties	2,610,172	(4.7% of infested counties)
Acreage with "Yes" responses	1,650,935	(2.96% of infested area)

Table 3. Acreage, cattle and stocking rate characteristics of respondents.

	Avg. acreage	Cattle	Avg./Respondent
All respondents	2,083.8	299,282	-
"Yes" respondents	1,514.3	218,238	211
"No" respondents	3,795.3	81,044	206

Average stocking rate for Texas	7.76 acres/head
Average "Yes" respondent* stocking rate	7.58 acres/head
Average "No" respondent** stocking rate	19.22 acres/head

* Respondent indicating economic losses due to fire ants.
** Respondent indicating no economic losses due to fire ants.

Table 4. Summary of losses and expenses reported from the Texas Cattle Producer's Survey, 1994.

Item		Responses	Total loss	Avg./resp. reporting loss[1]	Avg./"Yes" respondent[2]
Cattle Losses					
Injuries (# cows=1544)		378	$ 34,757	$121.10	$ 31.89
Deaths (# cows=793)		278	514,449	1,850.54	471.97
Sub-total			**549,206**		**503.86**
Equipment and Material Losses					
Ruined feed	material	359	155,386	432.83	142.56
	labor	219	22,975	104.91	21.08
Ruined hay	material	416	197,486	474.73	181.18
	labor	246	54,045	294.70	49.58
Shredder dmg.	material	304	155,242	510.66	142.42
	labor	243	71,620	294.73	65.71
Elect. equip.	material	687	259,719	378.05	238.27
	labor	504	96,678	191.82	88.70
Other	material	75	53,959	719.45	49.50
	labor	60	22,721	378.68	20.84
Sub-total			**1,089,831**		**999.84**
Hay Production					
New Equipment		140	835,425	5,967.32	766.44
Equipment Repairs		267	279,010	1,044.98	255.97
Jam Removal		247	45,027	182.30	41.31
Sub-total (not incl. lost production)			**1,159,462**		**1063.72**
Pesticide Use					
Home/living quarters		828	207,596	250.72	190.46
Outbuildings		686	66,138	96.41	60.67
Hay storage		562	54,635	97.22	50.12
Calving Pastures		206	19,748	95.86	18.12
Hay Meadows		111	18,755	168.96	17.21
Improved pastures		109	23,062	211.58	21.16
Unimp. pasture/range		61	8,541	140.02	7.84
Sub-total			**398,475**		**365.58**
Other Animal Injuries and Deaths (Including horses, sheep, goats, swine, working dogs, pets of any type, food fowl, ratites, and other exotics)					
Sub-total			**203,583**		**186.77**
TOTAL Direct Reported Losses			**$3,400,557**		**$3,119.77**

[1] Total losses in category/number of respondents reporting losses in that category only.
[2] Total losses in category/total number of surveys with "Yes" response in any category (1,090).