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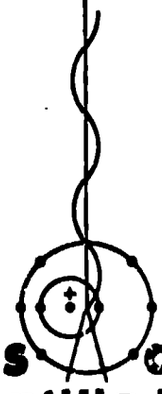

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ADP AND BRUCELLOSIS INDEMNITY SYSTEMS DEVELOPMENT[†]

by

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Wm. Mort Sanders and Barbara L. Harlan

INTRODUCTION

The U. S. Department of Agriculture (USDA) has a brucellosis eradication program which partially indemnifies the owner of an infected animal if certain conditions are met. Some of these conditions are: 1) the diseased animal must be sold with the intent that it will be slaughtered, 2) the seller must cooperate with a complete herd-testing program, 3) the infected animal must be branded on the jaw and a tag placed in its ear, and 4) the seller should be the original owner. Since the number of infected herds and therefore the number of infected animals in Texas was very large, it became more and more difficult to determine if an animal qualified for indemnity. The number of documents became very large, and it was very difficult to correlate the herd-test data, claim data, slaughter data, and pay status for each reactor. This correlation was further complicated by the fact that about one-half of the reactors are sold through a livestock market to a slaughter plant, rather than directly from the ranch to a slaughter plant. Therefore, the reactors from a single herd test may be permitted to several different slaughter plants on several 1-27 forms (a standard form for shipping diseased animals). Records were frequently incomplete and in error. The problem was further aggravated by the large backlog of claims that had developed. Much opposition had developed towards the program and corrective measures were sought.

A meeting was arranged between Los Alamos Scientific Laboratory (LASL) scientists, the Texas Animal Health Commission (TAHC), and personnel from the USDA, Animal and Plant Health Inspection Service (APHIS) office in Austin, TX. The purpose of this meeting was to study the ongoing USDA/TAHC Brucellosis Indemnity Program and to learn about the problems that are associated with disease control and eradication programs.

Information had been recorded on computer cards from many of the documents. This information was from the 4-33 herd-test forms, the 1-23 and 1-23A claim forms, and various slaughter documents. The slaughter documents are used to trace the animals through commerce and to obtain verification that an infected animal has been slaughtered.

It was apparent that these cards were compatible with computer systems and that the information they contained would be helpful it it were properly combined and sorted. The USDA/TAHC personnel in Austin were very cooperative and allowed us to copy these cards onto a magnetic tape at the University of Texas Computation Center. The tape was then sent to Los Alamos where the information was sorted and combined. Lists of the sorted and merged data were sent to the Austin office to assist them with the payment of indemnity claims.

Subsequent updates of this initial information has resulted in information on about 15,000 master herds (individual owner) and about 110,000 infected animals. The information on the Texas Brucellosis Indemnity Program is updated monthly and is indexed for rapid access. USDA/APHIS and TAHC personnel can remotely access the information that is stored at Los Alamos from a computer keyboard terminal that is

located in the Austin office. The information that is needed to answer inquiries from ranchers can be obtained rapidly and efficiently.

Programs are being developed to apply computer technologies to other areas of USDA/APHIS disease control programs. The next area studied will be related to administrative control over infected herds.

DISCUSSION

The success of the Brucellosis Eradication Program in Texas was being measured by the number of pending indemnity claims. The status of the program on May 2, 1975, and on May 31, 1976, is shown in Table I. The program had been in progress for about ten months when we first studied it during May 1975.

Table I reflects the status of the data that were available in the computer system on the dates shown and not the status of the program as it exists today for the same time periods. There is usually a significant delay for entering data from the documents into the system. Data today indicates that there was a total of about 44,500 reactors tagged and branded by May 2, 1975. This corresponds to a one to one and one-half month delay for entering data into the system. The ranchers had been paid indemnity on less than 4,000 of these animals, and they were becoming reluctant to cooperate with the program.

The program as it existed approximately one year later is shown at the right of Table I. About 98,000 animals have been tagged and branded. Indemnity has been paid on about 60,000 of these animals. No claim has been received on about 15,000 of the remaining 37,600 animals that appear to be eligible for indemnity.

TABLE I

Texas Brucellosis Data

Date	5-2-75	5-31-76
No Claim Received	9,204	15,284
Claim Received and Pending	24,275	22,294
Claim Paid	3,893	59,421
TOTAL	37,372	97,999

Initially, computer codes were written to determine what the problems were and then computer codes were written to correct these problems. Many of the problems that had developed with the Texas Brucellosis Indemnity Program have now been corrected.

Slaughter Plants

It was thought that one of the main problems for the low indemnity payment rate was related to the absence of slaughter verification. Therefore, one of our first tasks was to determine why there appeared to be problems with slaughter verification and then to correct these problems.

The level of participation of the slaughter plants in the program was determined based on the fraction of the reactors sent (with a 1-27 permit) to that slaughter plant and which verified slaughtered. Those reactors that were listed on more than one permit, or verified slaughtered at more than one plant, were treated as different animals in these initial studies. These data indicated that slaughter verification was not being

received from some plants while others were participating quite well. Most of these problems have been corrected. The slaughter verification rate on tagged and branded reactors is presently about 95%.

Each slaughter plant is identified by a four-character code in the data system. Data in the system indicates that about 290 plants have slaughtered reactors. Only 61 of these plants could be identified from the Federal Meat and Poultry Inspection Program (MPIP) directory, while 186 of the plants could be identified from the current TAHC directory. The remaining plants were either out-of-state plants or were no longer in business. There were instances where a state plant and a federal plant were using the same code. This problem was solved by suffixing each code with an F for a federal plant or an S for a state plant.

Early studies indicated that verification of Texas animals that are slaughtered out-of-state is about 50%. This compares to an overall slaughter verification rate of about 90%.

Livestock Markets

Approximately one-half of the brucellosis reactors in Texas are sold through livestock markets to a slaughter plant. Therefore, the participation of the livestock markets is important for the successful operation of the program and could have a strong influence on subsequent slaughter verification. To evaluate this effect, we attempted to rate the individual livestock markets. Performance data for a single livestock market is shown in Table II.

For these calculations, only the slaughter data from the 1-27 forms have been used. The ratio of the number of slaughter verified reactors

to the total number of reactors that were handled by the market is calculated to give an overall indication of the market-slaughter plant performance. For the market data shown in Table II, 89 (80.2%) of the 111 reactors that were sold through market "004" were verified as slaughtered.

TABLE II

Market Performance - Market Number 004*

$$\frac{\text{Number slaughter verified reactors}}{\text{Total number reactors}} = \frac{89}{111} = 0.802$$

Slaughter Plant Code	Number Reactors	Slaughter Plant Average	Predicted Number Verified
BLNK	5	0.000	0.00
A03Y	27	0.729	19.68
0B60	17	0.861	14.64
B200	10	0.655	6.65
2305	2	0.617	1.23
1406	3	0.464	1.39
3412	1	0.500	0.50
760A	19	0.936	17.78
8675	4	0.139	0.56
986H	1	0.082	0.08
2897	5	0.313	1.56
562C	17	0.753	12.80
	111		76.87

$$\text{Market Rating} = \frac{\text{Number slaughter reactors verified}}{\text{Predicted number verified}} = \frac{89}{76.87} = 1.158$$

*These results are calculated from 1-27 data only.

The 111 reactors that were sold through this market were shipped to 11 different slaughter plants with 5 animals going to unknown slaughter plants. The fraction of the total reactors from all sources that were verified at each slaughter plant had been calculated previously. Using this fraction as the verification probability for the individual slaughter plant, the number of slaughter verifications can be predicted for the reactors shipped from a market to that slaughter plant. The sum of the predicted numbers for each slaughter plant indicates the number of reactors that were sold through that market that should have been verified. The ratio of the actual number of animals verified to the predicted number of animals verified, gives an indication of the performance of the livestock market. Market "004" received a rating of 1.158, which indicates that it performed slightly better than would have been expected.

TAHC Area Evaluations

A scheme was devised to rate the various TAHC areas based on their performance in the program. The TAHC areas were then ranked from 1 through 15, with 1 corresponding to the best area. These calculations showed that the best performing areas were those with the most reactors, and the worst areas were those with the fewest reactors. Slaughter verification was better and there were fewer problems in the TAHC areas with the largest number of reactors. A few of the statistics obtained from data in the file as the information existed on May 2, 1975, are shown in Table III.

TABLE III

TAHC Area Evaluations

Area	Number Reactors	Number Verified	Fraction Verified	Problems	Rate	Rank
1	2018	1526	0.756	923	0.410	6
2	793	467	0.589	532	0.194	14
3	2007	1573	0.784	829	0.460	5
4	4498	3645	0.810	1831	0.480	4
5	6552	5349	0.816	2558	0.498	2
6	293	141	0.481	202	0.150	15
7	1652	1216	0.736	850	0.358	9
8	3293	2304	0.700	1458	0.390	8
9	4847	3948	0.814	1956	0.485	3
10	6696	5464	0.816	2186	0.550	1
11	3137	2317	0.739	1415	0.406	7
12	1324	780	0.589	767	0.248	13
13	2551	1679	0.658	1348	0.310	12
14	2696	1786	0.662	1326	0.336	10
15	3728	2632	0.706	2025	0.323	11
	45650	34827	0.763	20206	0.425	

Texas Brucellosis Data 5-2-75

Data Management

The data management scheme is shown in Fig. 1. New information is received monthly from the Austin office and is merged into the "big file." This information can be divided into 4 categories:

1) Herd Test

Information from the herd test 4-33 forms received during the previous month are recorded on cards. This information includes the county, master-herd number, name, reactor-tag number (RTN), date branded, sex, veterinarian responsible for the test, test date and codes for the type of test.

2) Slaughter Information

Information from the 1-27 forms, post mortems, 4-54 test form, and other pertinent documents are being processed to obtain slaughter information. Slaughter information may consist of market number, document number, slaughter plant number, RTN, sex, document date, slaughter date and/or a code to designate the document type.

3) Claim Information

After the 1-23 claim form is received in the Austin office, data from it is recorded on cards. These data are then merged by RTN into the "big file."

4) Coded Status Card From Texas

After indemnity is paid on a reactor, the status card that was sent to Texas is coded with the date paid, the transmittal number, and whether the animal was paid as a grade or as a registered animal. This information is used to update the paid status on those reactor-tag numbers that were paid during the previous month.

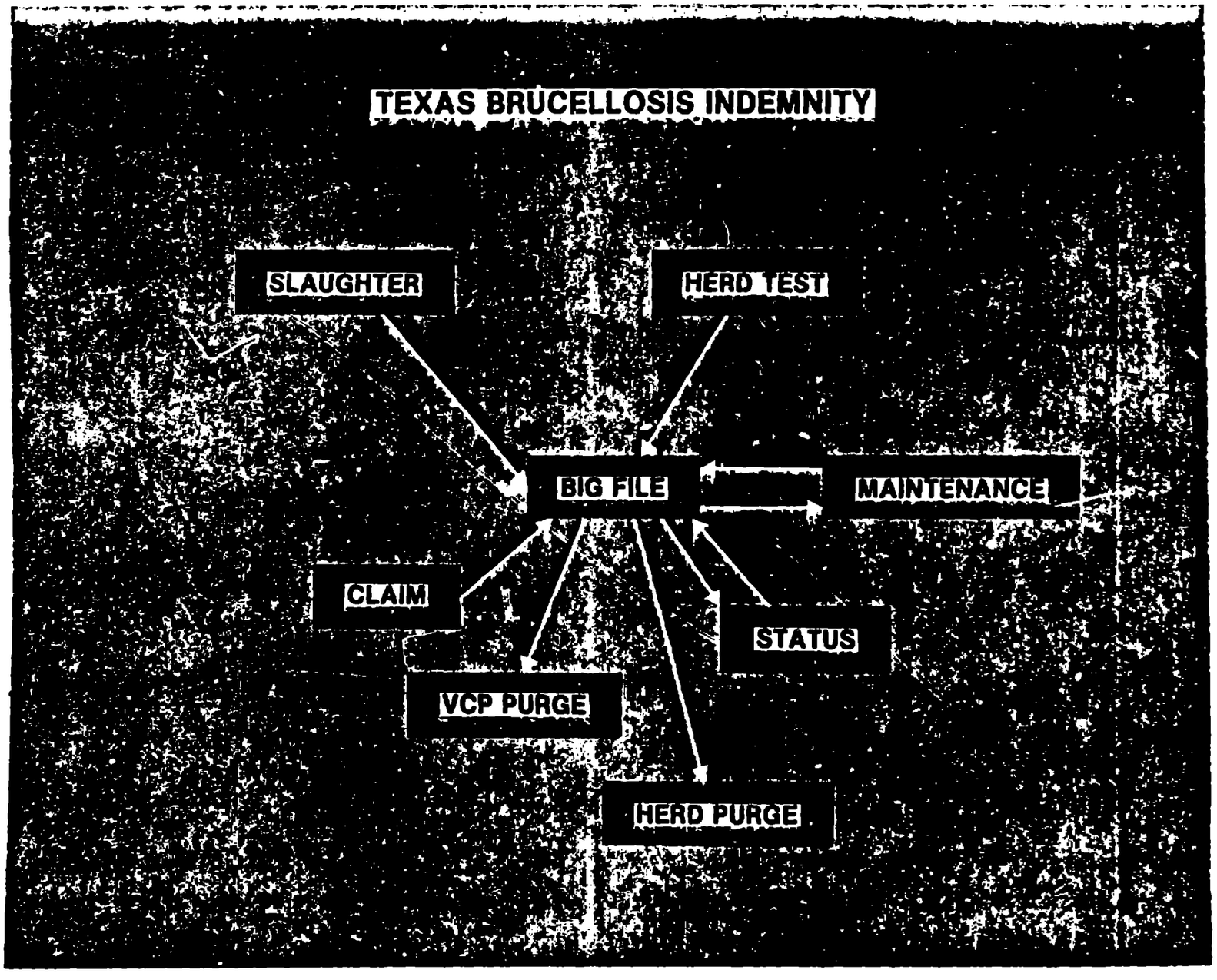
TEXAS BRUCELLOSIS INDEMNITY
SLAUGHTER
HERD TEST
BIG FILE
MAINTENANCE
CLAIM
STATUS
VCP PURGE
HERD PURGE

Fig. 1

The formats that are being used on these cards are the same as those that were being used when we taped the original data. We tried to accommodate the system as it existed and minimize the number of changes until after the original problems were solved. This has given us the opportunity to study the problems and to simultaneously produce positive results.

Various codes have been written to manage the data and prepare reports that are useful to the program. For example, listings of the paid RTNs have been made with the information sorted by: 1) transmittal number, 2) herd number, and 3) RTN. These listings have been used to check for payment errors. Duplicate RTNs are routinely listed in an effort to correct and minimize these discrepancies.

An RTN that does not have slaughter verification, a test date, a herd number, is a duplicate, or has no TAHC area assigned is marked so that they can be easily sorted and listed. These RTNs are referred to as having the trouble flag set.

A status card is punched at Los Alamos for each reactor tag number when it satisfies the following criteria in the "big file": 1) there is slaughter verification, 2) a claim has been received, 3) a test date is present, 4) the RTN is not a duplicate, 5) the RTN has not been previously paid, 6) a status card has not been previously punched, and 7) the RTN has not been marked as nonpayable.

The Austin office must then check the following criteria before the indemnity can be paid: 1) the animal's registration status, 2) the slaughter date, 3) mortgage information, 4) the herd-test status, 5) the cleaning/disinfecting waiver status, and 6) correlation of the

claimant's name and the person signing the 4-33 test form. The status card is returned to Los Alamos to update the "big file" where it is coded as payable or nonpayable.

RESULTS

During March 1976, the USDA-APHIS office in Austin paid indemnity on about 11,000 reactors. This increased payment rate was due primarily to the initiation of the status card system. The total number of animals with an indemnity claim and the number of animals paid for the duration of the program is shown in Fig. 2. The old system seemed to be limited to paying for about 1700 indemnified animals each month. This rate was less than one-half the rate that claims were being received.

The initial listings of combined and sorted test-slaughter information were sent to Texas during August 1975. These listings enabled the payment rate to increase to a "stay-even-rate" of about 4500 reactors each month. The payment rate then decreased back to the old rate as a higher priority was placed on correcting discrepancies.

The status card system was set up during February 1976. This has allowed the indemnity payments to be made at a rate about 3 times higher than claims are being received. These results show that computer technology can be successfully used to solve USDA data management problems.

An improved relationship between the Texas ranchers and the USDA has resulted. Fewer hours are being spent answering inquiries from ranchers.

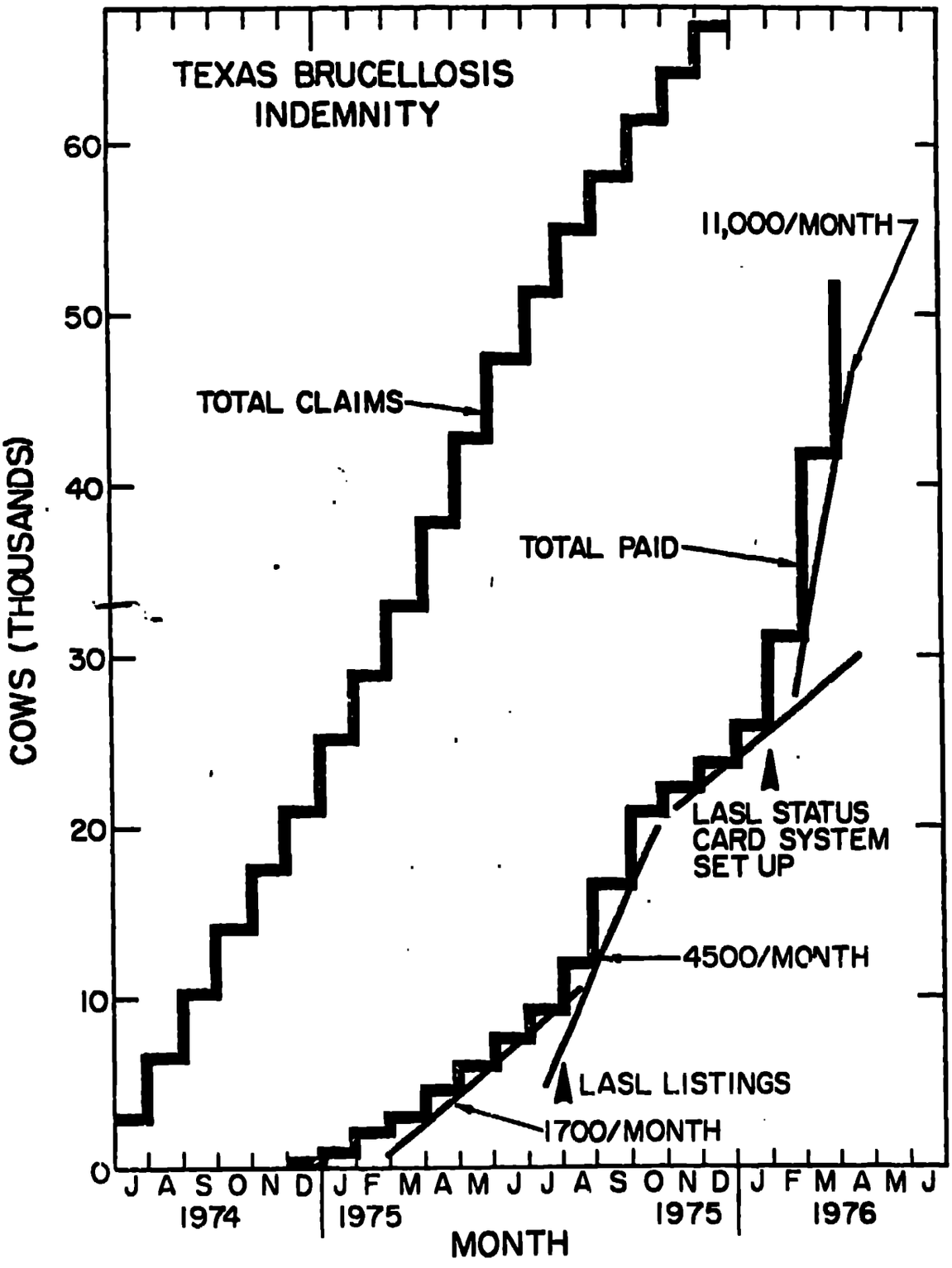
TEXAS BRUCELLOSIS
INDEMNITY
11,000/MONTH
TOTAL CLAIMS
TOTAL PAID
LASL STATUS
CARD SYSTEM
SET UP
4500/MONTH
LASL LISTINGS
1700/MONTH
COWS (THOUSANDS)
0
10
20
30
40
50
60
J A S O N D J F M A M J J A S O N D J F M A M J
1974
1975
1975
1976
MONTH

Fig. 2

CONCLUSIONS

Our initial study of the USDA/TAHC Brucellosis Indemnity Program in Texas has shown that both the efficiency and rate of claim payments can be increased by the application of present day computer technologies. Two main factors contribute to these increases: 1) the number of discrepancies that are caused by poor penmanship, transposition of numbers, and other human errors can be monitored and minimized; and 2) the documented information can be indexed, sorted, and searched faster, more efficiently, and without human error.

The overall flow of documentation that is used to control the movement of infected or exposed animals through commerce should be studied. A new system should be designed that fully utilizes present day computer and electronic technologies.

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TABLES

FIGURES