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Topic II: Secure communications and data confidentiality

**DESIGNING A SECURE DATA COLLECTION, SUMMARY, AND PUBLICATION SYSTEM
FOR ONE-HOUR TURNAROUND**

Contributed paper

Submitted by the National Agricultural Statistics Service, United States¹

Summary

Introduction

1. In the past 2 years, in response to a new law, the Livestock and Grain Market News Branch of the Agricultural Marketing Service (AMS) of the United States Department of Agriculture designed and implemented a Mandatory Price Reporting system which requires large livestock slaughter plant sites to report all transactions within designated time periods and the AMS to summarize and quickly release reports, with many reports required 1 hour after the data are received. This paper will discuss the market conditions which led to such strict requirements and outline the basic AMS approach to fully implement the new law.

Background

2. The impetus for the new law was growing concerns about the effect of concentration of companies buying from producers. By 2000, over 90 percent of the Federally inspected slaughter of cattle, hogs, and sheep in the country was performed in approximately 114 slaughter plants. Many of the 114 plants were owned by 4 companies, which slaughtered about 80 percent of all fed cattle, 55 percent of all hogs, and about 80 percent of all lambs. Livestock packers increasingly entered into private marketing arrangements with producers. Those arrangements such as formula pricing, forward contracting, and other incentive agreements usually offered some premium to operators who could produce a consistent supply of desired quality animals. Small operators felt that they were not privy to true price information.

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Basic System Requirements

3. Some of the data integrity, confidentiality, and full time availability features needed by AMS were found in electronic banking and financial stock market systems. However, those systems did not have all features needed in the mandatory reporting system and it was concluded that no off-the-shelf system was presently available. Since there were no existing government facilities and systems which could meet the unique needs of this new program, it was necessary to use competitive contract procurement for the required communication systems, hardware, and programming.

The Operating System

4. The system uses the Internet functionality for internal communications and for effective transmission of reports from the system. A browser-enabled application has been established on a commercially acquired, redundant NT platform. All system accesses are through specific Public Key Infrastructure certificate security implementation. Users are granted rights only to those files and features of the system appropriate for their functions. User accesses to the system are also controlled through the use of unique identification numbers and passwords. Companies can submit data through direct data entry or by uploading files using File Transfer Protocol over a Secure Hypertext Transfer Protocol connection. All transmitted data are encrypted for added security assurance.

Data Handling

5. One key feature is that three types of databases are employed in order to meet the 1-hour turnaround requirement. Data from companies are loaded into what has been named the quarantine Web server database and archived. Data remain in that database until reviewed by reporters for consistency and accuracy. When a data set for a particular report has been accepted, reporters begin the report generation. Routines in the report subsystem extract the needed data items to create the current report for publication. All original and corrected data files are stored in a permanent database. This is needed since companies must retain all reported data for at least 2 years for possible audit purposes and to provide a base for further analyses of this dynamic industry.

System Performance

6. As with many major computer application systems, it took longer to implement the system than originally hoped. Only one problem has occurred with the new program. A wrong assumption in the testing of the most complicated report of the system (which calculates carcass level equivalent value from the prices of various meat cuts) resulted in incorrect calculations when the system was implemented. When the error was noted, AMS quickly fixed the formulas and issued a corrected set of data.

Confidentiality

7. One aspect of the system that may be of particular interest to statisticians is the confidentiality handling of the new program. The law required AMS to ensure that the identity of reporting firms was held confidential as well as the proprietary data being reported. One step that AMS has taken to provide extra confidentiality is to never indicate how many firms are included in any total which is published. AMS started with a very strict 3/60 rule for each reporting period requiring at least 3 firms to be reporting, with no firm having more than 60 percent of any aggregate that was to be reported. This meant that many data cells had to be suppressed within reports that were released and some reports could not be issued at all.

8. Analysis of reported data from the first 60 days of operation of the new system demonstrated that reporting patterns in most regions were very random. This led to proposing an intriguing new confidentiality rule referred to as 3/70/20. This rule allows publication of data if an average of at least 3 companies had been active daily in the past 60 days, no company had 70 percent or more of the volume of purchases during that time, and, if days had occurred in which only one company purchased, that no specific company would have been exposed more than 20 percent of the time. This rule was widely discussed with the industry and presented to major U. S. statistical agencies for their information before it was implemented. Using this approach has reduced the percentage of hog reports not issued from about 30 percent to less than 3 percent and all cattle reports have been able to be issued except for daily forward contract sales.