# MARKET INFORMATION SYSTEMS: AN ONLINE AGRICULTURAL MARKET NEWS RETRIEVAL SYSTEM

**John J. VanSickle and Thomas J. Stevens**

**Abstract**

A minicomputer online information retrieval program is described that is designed to facilitate timely distribution of agricultural market news to state and county research and extension faculty. These faculty have designed programs that extend this information to clientele in their areas. An evaluation indicates that users find great value in this network. Usage has grown rapidly over the period the network has been available. This program is available and can be used by other states and clientele.

*Key words*: market news, information, computers, marketing, efficiency.

This article describes a minicomputer online information retrieval program which was designed to facilitate timely distribution of agricultural market news to state and county research and extension personnel. These agricultural market news data are published by USDA Agricultural Marketing Service and the Florida Crop and Livestock Reporting Service. This system was developed to improve the dissemination of agricultural market news through the state's agricultural extension computer network and thus encourage a more competitive economic environment by reducing informational asymmetries between buyers and sellers of agricultural commodities.

## REVIEW OF LITERATURE

Access to information is one of the central assumptions in the functioning of an efficient market system. Information may be defined as any message or signal which, when communicated, relates some fact or knowledge about the state of the world. In this context, it is important to distinguish between the terms "data" and "information." Data are empirical measures of reality. Data do not become information until they are compiled, processed, and organized so that they can have value to a decision maker (Riemenschneider). The competitive market model assumes all information is free and known to all market participants. This assumption is required for an efficient marketing system (Grossman and Stiglitz).

One indicator often used as a measure of efficiency in marketing is instantaneous price dispersion for identical goods. Stigler wrote that price dispersion was a manifestation of and even a measure of market ignorance. This implies that those markets with the greatest price dispersion are the most inefficient and have the most market ignorance. Empirical research in this area began in equity markets. The efficient market hypothesis, EMH, was an outgrowth of this research (Fama). The EMH states that a market is efficient if economic agents are unable to use information to gain excess profits from their investments. Thus efficiency requires that prices reflect all information in the marketplace instantaneously with differences in prices explained only by differences in product characteristics or risk.

There are four basic factors that affect the value of information to decision makers: timeliness, accuracy, accessibility, and efficiency (VanSickle and Stevens). Timeliness plays an especially important role in maintaining the value of information for operational decision-making purposes in the dynamic markets typical of most agricultural commodities. Accuracy is a vital characteristic of value in information. Inaccurate data can have negative impacts on profits and welfare. There are two important components to accessibility. Data must be collected, compiled, and disseminated in order to

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be available or accessible for use in decision-making processes. In addition, disseminated information must be of a medium and/or organization that will permit agents to acquire and use it effectively for their individual purposes. With respect to efficiency, information is in many respects a commodity and should be processed and distributed by the same rules that guide the efficient allocation of any other resource in a free market economy so that profits or utility will be maximized from its use.

Because information as a commodity has many properties of a public good, there have been significant advantages to government intervention in its collection, processing, and dissemination. The USDA Agricultural Marketing Service (AMS) has traditionally played an important role in this respect for the agricultural sector. AMS has more than 130 market news field offices that collect market data on a daily basis. Many of these offices are operated cooperatively with state departments of agriculture. Data collected by these agencies include various combinations of prices, volumes, movements, qualities, and market tones (strength of market indicators) on more than 150 different commodities in spot, direct, and futures markets. Once collected, these data are compiled and transmitted over a satellite-based communications network. This network is available to private subscribers on a receive-only basis. Private subscribers are free to use the data distributed on this network within their own organizations and to distribute it to others free or for a fee. Currently, approximately 30 individuals and organizations subscribe to USDA market news data in this manner. The vast majority of agents who use AMS market news services do so either directly via voice telephone inquiries and AMS printed, mailed reports or indirectly through a variety of value-added distributors ranging from local newspapers to online electronic information retrieval services.

The proliferation of powerful yet inexpensive computer and communications equipment in the last 10 years has increased the demand for and utilization of online database and information retrieval services. The number of public access online databases has grown from just 600 in 1980 to 3,893 in 1988 (Meadow). Online services have advantages of instantaneous dissemination, enhanced availability, combined high speed and sophisticated data search and retrieval, and flexible report formatting.

VanSickle et al. (1983) reported from a survey of the produce industry that AMS market news was of only marginal value to buyers, shippers, and growers of fruit and vegetable products. The primary reason given for this low valuation of AMS market news was that printed, mailed reports were considered to be too old when received to be of value in current marketing decisions. A more recent study of the AMS market news network (VanSickle et al., 1987) revealed that AMS and private users of its information services would benefit significantly if disseminated market data were more precisely formatted and selectively retrievable. An online information retrieval system was developed on a departmental minicomputer to address these issues and criticisms for the state of Florida.

## DESCRIPTION OF SOFTWARE

The Market Information System (MIS) software was developed to promote timely distribution of relevant market news. MIS is a menu-driven, full-text data base. It allows users to select specific reports from any of the 130 market news offices located throughout the United States. It also allows users to access selected reports published by the Crop and Livestock Reporting Service.

The MIS software was originally developed in 1984 as a simple system that provided electronic access to the *Florida Watermelon Report* published by the Winter Park, Florida, market news field office. The database has since been expanded to include data from all 130 market news field offices for fruits and vegetables, livestock and grain, dairy, cotton, tobacco, and poultry. Most of the data in these reports remain in the formats in which they are disseminated by AMS. Specific commodity data

TABLE 1. USER SATISFACTION OF THE MIS SYSTEM, 1985

| | Number |
|---|---|
| Total Surveyed | 66 |
| Have used MIS | 33 |
| Found value in MIS | 31 |
| Have not used MIS | 33 |
| Desired to use MIS | 29 |
| Desired other information (specified) | |
| Livestock | 17 |
| Grain | 4 |
| Other | 6 |

are being extracted and compiled for 65 different fruits and vegetables.

The MIS software is hosted on a Digital Equipment Corporation VAX minicomputer network. Access to this network is available free of charge to all state and county Agricultural Research and Extension personnel in Florida over regular telephone networks and WATS lines. WATS-line access is restricted to 20 minutes within any contiguous four-hour period between 8 a.m. and 5 p.m. Because of this time constraint, an automatic retrieval program was created so that users could retrieve pre-selected market news reports without going through multiple MIS menus.

County extension faculty have been the primary users of MIS. County faculty access data provided by MIS and then disseminate that data to the private sector by a variety of services. Private users have traditionally relied on county extension faculty to provide them with timely market news on items important to their operations. MIS improves the ability of county extension faculty to identify data important to their area, retrieve them, and disseminate them in a timely and efficient manner.

The main menu of MIS (Figure 1) reflects the original emphasis of the program on fruit and vegetable data. Fruit and vegetable data reported by AMS are processed and filed into several data base categories. Terminal market and f.o.b. shipping point prices are further processed into city and commodity files so that users can retrieve data from selected cities or on selected commodities (Figures 2 and 3). Similar options, although not as complete, are provided for the other commodities reported by MIS.

## EVALUATION

A survey of county extension faculty was completed in 1985 to determine the level of user satisfaction with MIS as it performed at that time. Prior to this period, only fruit and vegetable data was available on the system. A total of 66 responses was received in the survey (Table 1). The results showed that of the respondents, 33 (50 percent) had used MIS previously. Of those who had used the system, 31 (94 percent) had found great value in the data contained in the reports. Additionally, 17 (24 percent) of the respondents indicated a desire to receive data on livestock. These results led to the expansion of the system to include other commodity groups.

The MIS began monitoring usage of the network in August, 1986. Table 2 shows the monthly usage (number of accesses) of the system from August, 1986, through July, 1988. MIS has demonstrated a growth in usage over the time period reported. Comparison of usage for the periods August, 1986, to July, 1987, and August, 1987, to July, 1988, shows a 62.4 percent increase in usage (Table 2). County extension agents have been the primary users of MIS.

TABLE 2. MONTHLY USAGE OF MIS BY STATE AND COUNTY AGRICULTURAL RESEARCH PERSONNEL, FLORIDA, AUGUST 1986–JULY 1988

| Month/Year | Total |
|---|---|
| August/1986 | 26 |
| September | 34 |
| October | 69 |
| November | 54 |
| December | 58 |
| January/1987 | 35 |
| February | 43 |
| March | 36 |
| April | 39 |
| May | 108 |
| June | 254 |
| July | 95 |
| August | 49 |
| September | 71 |
| October | 79 |
| November | 100 |
| December | 93 |
| January/1988 | 87 |
| February | 124 |
| March | 61 |
| April | 121 |
| May | 182 |
| June | 264 |
| July | 151 |
| Total August, 1986, to July, 1987 | 851 |
| Total August, 1987, to July, 1988 | 1382 |

Another survey was completed in 1988 to determine the types of data being retrieved and to evaluate the qualities of the system to users. A total of 37 users responded to the survey (Table 3). These users rated the qualities of the system on a scale of 0 to 10 (0 of no value, 10 of high value). The users rated the overall value of the system at 7.16. The rating of individual characteristics ranged from 6.34 for reliability to a high of 7.9 for usefulness. Reliability and timeliness were the lowest rated qualities, most

TABLE 3. USER EVALUATIONS OF MIS, 1988.

| Evaluation Criteria | Rating |
|---|---|
| Ease of use | 7.69 |
| Timeliness | 6.48 |
| Usefulness | 7.90 |
| Support | 7.07 |
| Accessibility | 6.74 |
| Completeness | 6.74 |
| Reliability | 6.34 |
| Overall | 7.15 |

Note: on a scale of 0–10 (0 of no value, 10 of high value).

likely because of frequent computer and communications problems encountered prior to the survey.

Also of interest are the relatively higher ratings for ease of use and usefulness. Users have found the MIS to be simple to use, with many stating that the operating manual was not necessary. The high rating of the usefulness quality indicates that the county extension staff have found value in the service provided. It is interesting to note that users rated usefulness of MIS high in both the 1985 and 1988 surveys.

While the survey indicated that fruits and vegetables were the commodity group of primary interest among users, more than 40 percent indicated interest in either livestock, grain, dairy or cotton market news (Table 4).

The value of operating a market information system can be approximated by estimating the cost of operating a system similar to MIS and weighing these costs against the benefits derived from the system. The costs of operating MIS include overhead (fixed) costs of maintaining the MIS and direct (variable) access costs for retrieving market news during a session.

The annual overhead cost of operating MIS includes personnel, computing resources, and market news acquisition costs. The personnel required to monitor and enhance MIS was estimated to be a half-time research assistant. A half-time research assistant can monitor the system and fix any small problems that surface in the daily operation of the software and can also devote time to modifying the system based on feedback from users. A half-time research assistant was valued at $12,500.

MIS currently operates on a Digital Equipment Corporation VAX minicomputer. The computing resources used in operating MIS in-

TABLE 4. COMMODITY GROUPS FOR WHICH USERS RETRIEVE MARKET NEWS

| Commodity group | Number |
|---|---|
| Fruits & Vegetables | 35 |
| Grains | 9 |
| Dairy | 2 |
| Cotton | 2 |
| Livestock | 17 |

**MARKET INFORMATION SYSTEMS**

COURTESY OF IFAS, USDA-AMS MARKET NEWS, & USDA CROP & LIVESTOCK REPORT. SERV.

| FED-STATE MARKET NEWS REPORT TYPES FOR FRUITS & VEGETABLES | FED-STATE MARKET NEWS REPORTS FOR OTHER COMMODITIES |
|---|---|
| (C) 1. Terminal Market—Fruit | 11. Livestock |
| (C) 2. Terminal Market—Vegetables | 12. Grain |
| 3. Arrivals | 13. Poultry |
| (C) 4. FOB Ship. Pt. Fruit | 14. Dairy |
| (C) 5. FOB Ship. Pt. Vegetables | 15. Tobacco |
| 6. Trends (weekly) | 16. Cotton |
| 7. Shipments | 17. Futures Markets |
| 8. Ornamentals | |
| 9. Washington Summary | |
| 10. MIS Watermelon Report | 18. USDA Crop & Weather Reports |
| 19. | UTILITIES 21. Create "Auto-Retrieve" file |
| 20. Help Menu | 22. Run "Auto-Retrieve" file |

To retrieve reports by location enter the number of your choice. To retrieve reports by commodity precede indicated #'s with a "C." Enter "99" to exit? 2

Figure 1. MIS Main Menu.

**MARKET INFORMATION SYSTEMS—FRUITS & VEGETABLES**

LOCATION SUB-MENU FOR FED-STATE MARKET NEWS FRUIT & VEGETABLE REPORTS
REPORT TYPE = Terminal Market Veg.

(***) 1. ATLANTA GA
( ) 2. AUSTIN TX
( ) 3. BAKERSFIELD CA
(***) 4. BALTIMORE MD
(***) 5. BOSTON MA
(***) 6. BUFFALO NY
(***) 7. CHICAGO IL
(***) 8. CINCINNATI OH
(***) 9. COLUMBIA SC
(***) 10. DALLAS TX
(***) 11. DENVER CO
(***) 12. DETROIT MI
( ) 13. EL CENTRO CA
( ) 14. FRESNO CA
( ) 15. IDAHO FALLS ID
( ) 16. INDIANAPOLIS IN
(***) 17. LOS ANGELES CA
(***) 18. MIAMI FL
( **) 19. MONTREAL CAN
(***) 20. NEW ORLEANS LA
(***) 21. NEW YORK NY
( ) 22. NOGALES AZ
(***) 23. PITTSBURGH PA
(***) 24. PHILADELPHIA PA
( ) 25. PHOENIX AR
( ) 26. POMPANO BEACH FL
( ) 27. RALEIGH NC
( ) 28. SALINAS CA
(***) 29. SAN FRANCISCO CA
(***) 30. ST. LOUIS MO
( ) 31. THOMASVILLE GA
( ) 32. WESLACO TX
( ) 33. WINTERPARK FL
( ) 34. YAKIMA WA

**AVAILABILITY SCHEME**

(* ) = CURRENT REPORT
( * ) = PREVIOUS REPORT
( *) = NEXT PREVIOUS

ENTER NUMBER FOR DESIRED REPORT LOCATION. FOR PREVIOUS UPDATE FILE ENTER NUMBER PLUS 100 OR 200, e.g. ENTER 111 FOR PREVIOUS UPDATE OF DENVER REPORT. ENTER A ZERO, (0) TO RETURN TO MAIN MENU, OR (99) TO EXIT. ? 0

Figure 2. MIS Sub-Menu for Retrieving Terminal Market Vegetable Reports by Location.

**MARKET INFORMATION SYSTEMS—FRUITS & VEGETABLES**

COMMODITY SUB-MENU FOR FED-STATE MARKET NEWS FRUIT & VEGETABLE

| Terminal Market VEGETABLES | | | Terminal Market FRUITS | |
|---|---|---|---|---|
| 1. ARTICHOKE | 15. CUCUMBER | 29. PEAS | 43. APPLE | 57. ORANGES |
| 2. ASPARAGUS | 16. EGGPLANT | 30. PEPPERS | 44. APRICOT | 58. PAPAYA |
| 3. BEANS | 17. ENDIVE | 31. POTATOES | 45. AVOCADO | 59. PEACH |
| 4. BEETS | 18. ESCAROLE | 32. RADISH | 46. BANANA | 60. PEARS |
| 5. BOK CHOY | 19. GARLIC | 33. RED LEAF | 47. BLU BERR | 61. PINEAPPL |
| 6. BROCCOLI | 20. GREENS | 34. RUTABAGA | 48. CANTALOP | 62. PLANTAIN |
| 7. BRUS SPT | 21. LEEKS | 35. SPINACH | 49. CHERRIES | 63. PLUMS |
| 8. CABBAGE | 22. LETTUCE | 36. SQUASH | 50. GRP/GRPF | 64. STRABRY |
| 9. CARROTS | 23. MINTS | 37. SWT POTA | 51. HNY DEW | 65. TNGLO/RI |
| 10. CAULIFLWR | 24. MUSHROOM | 38. TOMATOES | 52. KIWI FT | 66. TEMPLE |
| 11. CELERY | 25. MUSTARD | 39. TURNIPS | 53. LEMONS | 67. WATERML |
| 12. C TOMATO | 26. OKRA | 40. MISC VEG | 54. LIMES | 68. MISC FRT |
| 13. CHIN CABB | 27. ONIONS | | 55. MANGO | |
| 14. CORN | 28. PRSL/PRSN | | 56. NECTARIN | |

ENTER NUMBER FOR DESIRED COMMODITY. FOR PREVIOUS UPDATE FILE ENTER THE NUMBER PLUS 100 OR 200, e.g. ENTER 103 FOR PREVIOUS UPDATE OF BEANS FILE. ENTER A ZERO, (0) TO RETURN TO MAIN MENU, OR (99) TO EXIT ? 0

Figure 3. MIS Sub-Menu for Retrieving F.O.B. Shipping Point Reports by Commodity.

cluded 2514 computer processing unit (cpu) seconds per day on the VAX minicomputer. Allocated costs for cpu's on VAX minicomputers were calculated at $0.0014 per cpu. Total overhead computing costs for operating MIS based on these cost factors equaled $3.62 per day, or approximately $941 per year based on 260 working days per year.

MIS acquires market news from the USDA satellite communications network. Hardware and communications cost for bringing the market news into the minicomputer equals approximately $2,400 per year. This pays for network access charges, telephone charges, and hardware required to bring the data into the minicomputer.

The total estimated overhead cost of MIS equals $15,841 per year. These resources are used to make market news available to extension personnel. These resources also are used to make data available for research purposes. Most market news data are not recorded in forms conducive to research needs. MIS allows operating personnel to develop programs for recording market news data so that it can be easily used for research purposes.

The direct costs of accessing market news were estimated by simulating a typical session for retrieving two market news reports from MIS. An average of 20 cpu seconds was required to retrieve two market news reports from MIS. At the normal charge rates for computing resources, a typical session in MIS costs $0.0288 in computing resources.

In addition to computing resources, communications charges are incurred when retrieving market news. A typical session takes approximately three minutes in MIS. Using WATS line services, a minute of access time to MIS during peak hours costs $0.35. At these rates a typical session in MIS costs $1.05 in communications costs. The total direct costs (variable costs) for each session were estimated to equal $1.0788.

The benefits to distributing market news through the MIS are difficult to measure. County agents rated the usefulness of MIS in their programs at 7.90 on a scale of 10, indicating they place a relatively high value on MIS. There is little data to approximate the value of MIS in economic returns. However, one documented use of market news resulted in watermelon growers deriving an additional three cents per pound for their watermelons during peak harvest season because they used market news distributed through MIS to negotiate higher prices. Based on volumes marketed during that season, those higher prices resulted in more than $3 million being added to growers' revenues. That success story indicates the potential benefits of improved information. Those returns far outweigh the costs of providing the service.

## SYSTEM REQUIREMENTS

The MIS software package consists of a user's manual (Stevens and VanSickle), a demonstration diskette, and software hosted on the VAX minicomputer. The demonstration software and the VAX MIS software are written in BASIC. The demonstration program will run on any IBM PC series microcomputer or compatible having at least one floppy disk drive, 256 kilobytes of memory, and DOS 2.0 or higher. The minicomputer software package is transferable to other minicomputers which run BASIC. The operating manual and demonstration diskette may be ordered from: IFAS Software Distribution, Department of Agricultural Engineering, University of Florida, Gainesville, FL 32611. The cost of the manual and demonstration diskette is $25. Use of the VAX minicomputer software may be negotiated by contacting the authors.

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