MARKET INFORMATION REPORTING SYSTEM FOR CORN AND SOYBEAN COMPOSITION

Final Report
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This is a report on the Market Information Reporting System for corn and soybeans for the two-year period from September 1, 1999 to August 31, 2001. Data collection actually started during the October 9 – 15, 1999 time period and continued through the October 27 – November 11, 2001 period. The objectives of the project were to:

(1) make information on oil and protein contents of soybeans, and oil and starch contents of corn available to all parties at the point of first sale;
(2) generate incentives for farmers and plant breeders to increase the value of the crop;
(3) compare costs with benefits associated with pricing corn and soybeans on the basis of composition;
(4) organize a regular reporting system for the Federal State Market News Service on price, quality, and value differentials for corn and soybeans in the market channel.

PROCEDURES

The procedures and protocol developed by the multidisciplinary, university/industry group were as follows:

1. Added additional elevators to the current base to achieve a minimum of 15 elevators providing information on composition of corn and soybeans. These elevators had whole grain analyzers (NIT) and calibrations for measuring either oil and protein contents of soybeans, or oil, protein and starch contents of corn. The elevators were selected to provide diversity of type as well as geographical distribution throughout the major crop growing areas of Illinois.
2. Data from each elevator was collected at bi-weekly or monthly intervals, summarized into a usable form, and transferred to the Federal State Market News Service at the Illinois Department of Agriculture. Data provided included the range and mean for each location. The Market News Service disseminated the

summary reports over the USDA Federal-State Market News Information System. This communication system moves information instantly to private industry, commercial news media (AP, UPI, Bridge News, Reuters), and private news disseminators (DTN, FarmDayta, Ag-Cast) on a worldwide basis. This report was also posted on the Federal-State Market News worldwide web site.

3. Country elevators were encouraged to provide direct feedback to farmers on each load. The NIT machines were capable of providing printouts of oil and protein contents matched to a certificate to be given to the farmer along with their settlement sheet. This enables evaluation of the true value of different varieties, different fields, (more efficient use of site specific farm management systems) different climatic conditions and other factors that influence true value of the soybeans for use in processing, for meal and oil or for food uses. The University of Illinois worked with the elevator managers on educational programs for their producers and strategies for promoting the concept of component pricing. The first year of activity was primarily educational, while farmers and country elevators became familiar with the concept, techniques, and the value of the information available from NIT measurements. The Market News Service also added estimated processed values (EPV) of oil and meal in the soybeans to their current industry average soybean crush margin market report. This provided an information link between the grower and the processor reflecting differences in value.
4. The University of Illinois implemented a procedure for rapid calculation of the intrinsic value of soybean processed products and made this available to the Market News Service as well as on the web site for country elevators use. The processed value was then used as part of the educational program at the country elevator site to demonstrate the potential for increasing value per acre and value per bushel.
5. Results were published for surveys previously completed in February 1998 and February 1999 for three groups of producers, each having access to different levels of information. A third year follow-up survey in the year 2000 was also completed and results were published. These surveys provided a basis for gauging whether information without incentives is sufficient to alter farmers' perceptions and selection criteria.

ACTIVITIES AND RESULTS

Sample Collection and Elevators

Between October 9, 1999 and November 11, 2001, 16 Illinois elevators participated in this research project by measuring the oil and protein content of soybeans in both inbound deliveries received from producers and outbound deliveries to end users. We especially want to acknowledge and thank the cooperating grain elevators: Assumption Co-op Grain Co.,Palmer; Cargill, Inc. at Florence, Gibson City, Tuscola; Colusa Elevator, Colusa; Donovan Farmers Co-op, Beaverville; Elkart Grain Co., Elkhart;

Grand Prairie, Tolono; Hintzsche Grain Co., Maple Park; Lambert Grain, Bourbonnais; Ludlow Co-op, Paxton; McLean County Service, McLean; Osterbur and Assoc., Quincy; Prairie Central Co-op, Ocoya; Schuyler-Brown FS Inc., Rushville; Sharon Intl., Sharon WI; Taloma Farmers Grain, Delavan; Ursa Farmers Co-op, Meyer. The elevator managers have requested to not have their individual data identified with their facility, so references to elevator data in this report are only by internally-assigned numbers. These elevators provided oil and protein information for a total of 5,806 soybean samples. Figure 1 shows the number of soybean samples contributed over the two-year period for each of the 16 elevators. The elevators are listed as numbers 1 through 20, with elevators 4, 5, 6 and 12 providing too few samples to report.

The objective of the sample collection was to publish Federal Market News Service reports, through collaboration with the Illinois Department of Agriculture, on a periodic basis that would provide current information on the mean and standard deviation of soybean oil and protein contents and estimated processing value (EPV) of soybeans produced and handled in Illinois. A total of 30 reports on soybean component levels and values were published between October 9, 1999 and November 11, 2001 on the website of the Livestock and Grain Market News Branch, Agricultural Marketing Service, U.S. Department of Agriculture. Figure 2 presents the reporting periods, and number of samples represented for each reporting period. As can be seen by the reporting dates, reports were published more frequently during harvest, when many deliveries were made by farmers to elevator locations. The continuous, year-round reports provided information on the levels of oil and protein contents of soybean in the state of Illinois at any given time. Thus, buyers needing information on the end-use value of soybeans could access the site throughout the year and receive current information.

One of the significant challenges of this project was to develop an efficient and feasible method of collecting data from country elevators, given their often limited technological resources, then analyzing the data into the desired mean, range, and EPV calculations, and submitting this information to IDOA for their reporting purposes. A description of the process that led to the final methodology is described below.

Downloading, EPV Analysis and Market News Service Reports

Downloading Information from NIT Analyzers

The Near Infrared Transmission (NIT) analyzers used were the Foss Infratec 1229 whole kernel analyzers. Each unit has an identifying serial number, which is also output with data from that machine in a result.csv file. The operator selects an operation model before grain is put into the NIT unit. This operation model tells the NIT unit which of several possible calibrations to use. For example, SO990922 is a soybean calibration (denoted by the SO prefix). Corn for example may be CO010811, where CO prefix indicates corn. The other numbers usually refer to the date the calibration was made. Appendix Table 1 shows format of a typical result.csv file as output from the hard drive of the NIT unit. Thus, the entries represent the serial number of the NIT unit, calibration

ID, a sample identification given to the sample at the elevator before the sample was placed in the machine, oil % (basis 13% moisture content), protein % (basis 13% moisture content), moisture %, fiber % (basis 13% moisture content), the day, month, year the sample was tested, the time, and a sequence number that increments with each sample. All of this data occurs neatly on one line, then repeats for the next sample.

As this project originally evolved, we used a modem placed at each participating elevator to retrieve this information in form of the result.log file. (An example of a result.log file is shown in Appendix Table 2.) A modem also meant a phone line had to be available. It was usually not cost effective for an elevator to put in a new phone line dedicated to this NIT instrument alone, so the modem often shared a line with a FAX machine or other phones. A modem on a computer at the University of Illinois would call up the elevator modem early in the morning when phone rates were lowest to download data as needed. Technically, this procedure worked. Operationally, it was fraught with opportunity for malfunction and malfunction occurred more often than not. Often the NIT machine was not left on overnight, or the phone line was connected to a FAX machine, or some kind of operator intervention was needed at 3:00 A.M. Thus, as this second phase of the project started we switched away from modems to a floppy disk that an operator would place in the NIT unit and follow a series of commands for the Download Procedure, as shown in the Appendix. We found that two different procedures were needed, one if a prediction disk was used and a second procedure if a prediction disk was not used. Prediction disks were available from Foss if the NIT unit was on Foss's Customer Care program. The program cost about $300 per year and provided check samples periodically so that the elevator could assure their NIT unit was operating correctly. Initially all of the elevators were on Customer Care. Files downloaded with the prediction disk (result.csv) appeared neatly as shown in the Appendix Table 1. In many cases the NIT operator simply attached the file to an email and sent the email to the Identity Preserved Grain (IPG) Lab in Champaign, IL. In other cases they would mail the floppy disk to the IPG lab. When needed, the IPG lab would send out reminders every two weeks or so to the NIT operators about downloading data again. Elevators who did not use the prediction disk, had output that looked like that shown in Appendix Table 2 called result.log file.

Once the data came in to the IPG lab, Ms. Sandy Harrison from the IPG lab sent the result.csv or result.log file to Dr. Mukti Bajaj, Research Associate in Agricultural Engineering. She took the data in the form of the result.log and imported it into Excel using delimiting and commas, as shown in Appendix Table 3. Note that one sample's data still appears on 4 lines. From this data she used auto filter in Excel to pull out all of the oil data and then the protein data, and then the moisture and starch or fiber data to obtain output as it appears in Appendix Table 4.

New data was always checked to be sure it was from the correct reporting time period. Sometimes old data was retrieved, which had to be removed to avoid duplication. Then she assigned the correct number to each elevator and appended individual elevator data to a new worksheet. The data collection procedure was a very important part of this study and it evolved as a better email access became available at the elevators. We felt that at

the end of the project the data collection procedure was working very well and that the data collection procedure was one of the significant developments of the study.

EPV Analysis and Market News Service Reports

After data were checked and correctly represented, the SPROC program of Brumm and Hurburgh, Jr. (1991) version 2.4x was used to calculate Estimated Process Value (EPV) for the soybeans (Brumm and Hurburgh, Jr., 1990). The inputs to this model in addition to percentages of oil and protein, were average price of soybean oil and the average price of soybean meal (taken as average of the bids (high and low) as quoted in the USDA-IL Department of Agriculture Market News, Central Illinois Soybean Processor report (www.ams.usda.gov/mnreports/gx-gr117.txt). The price of soybean hulls was assumed to be $0.01 /lb. The worksheet was saved as a *.prn (space delimited text file). The SPROC program was run with the following default values:

Current processing variables for System A (Soybean Preparation):
Percent of soybeans removed as hulls: 10
Percent moisture in the hulls: 12
Percent protein in the hulls: 12
Percent oil in the hulls: 1.5
Percent fiber in the hulls: 35
Percent dry matter loss (% of incoming): 0

Current processing variables for System B (Oil Extraction):
Percent moisture of flakes leaving extraction: 13
Percent oil of flakes leaving extraction: .5
Percent dry matter loss of spent flakes in oil: 0

Then the output file from SPROC was checked and the minimums, maximums, and averages for soybean oil, protein, and EPV were calculated.

From here the data were placed into the following file (as shown in the Appendix) and emailed to Mr. Jim Epstein at the Illinois Department of Agriculture for uploading to their websites and information releases.

Data results

Oil

The percentages of oil measured (13% moisture basis) are shown in Figure 3 for each elevator, averaged over the two-year period. For the entire period, the mean oil content for all of the elevators was 18.7%. The mean oil percentages among different elevators over the two-year period ranged from a low of 17.9% to a high of 19.6%. Recall that each elevator provided different total number of samples, and no elevator provided samples for each time period. The elevators provided samples only during periods when they received or shipped soybeans, and while some elevators were able to take samples

from every load, others were only able to take samples at less frequent intervals. The 19.6% mean oil percentage is from an elevator that provided very few samples, and the samples represent only one time period. However, several elevators that provided more samples covering more time periods, had mean oil contents of 19.0%. Standard deviations about the mean for oil content ranged from 0.2 to 1.8% for the elevators. The average minimum oil content for any elevator, over the two-year period was 14.7% (Figure 4), while the maximum average oil content was 23.1%.

The mean percentages of oil are shown in Figure 5 for each reporting period averaged over all 16 elevators. Mean oil percentages, by period, ranged from 17.83 to 19.07 over the two-year period.

Protein

The percentages of protein measured (13% moisture basis) are shown in Figure 6 for each elevator, averaged over the two-year period. Mean protein was 35.5% for all of the elevators. For individual elevators, mean protein percentages ranged from 34.2 to 39.5% over the two-year period. Again, the 39.5% protein represents an elevator that only provided samples for one time period. The next highest mean protein was 36.4%. Standard deviations about the mean for protein content ranged from 0.6 to 3.0% for the elevators. Figure 7 shows that the minimum protein, averaged over all elevators for each period, was 29.8% while maximum protein was 45.8%.

The mean percentages of protein are shown in Figure 8, for each reporting period averaged over all 16 elevators. Mean oil percentages ranged from 33.6 to 36.9 over the two-year period.

Use of oil and protein data

One of the potential uses of the oil and protein data collected is to improve upon the information currently reported on soybean quality. For instance, each year the ASA develops a report on U.S. soybean quality for presentation at trade visits to Asia. The data from the 2001 report indicates that the average protein content of 2001 crop soybeans in Illinois was 34.94 percent, while the average oil content was 19.57 percent. A total of 228 samples were used in these calculations. However, using the data collected from this research project, over 1300 samples were tested during the 2001 crop year. The average protein content of soybeans in Illinois, using this project data, was 36.41 percent, while the average oil content was 18.41 percent. Thus, the average level of protein in Illinois soybeans is being understated by 1 ½ percent, and oil content is overstated by 1 percent - based on our larger sample size - in the information being provided to our foreign customers in Asia. In addition, the standard deviation for both Illinois oil and protein contents is smaller with the samples collected through this project, than for the samples collected for the ASA report.

Estimated Process Value

The estimated process value (EPV) of each soybean sample that was measured was computed as described previously. EPV is usually based on current protein meal and soybean oil prices occurring at the time the computation is made. The soybean meal and oil prices used for each reporting period are shown in Figure 9. When presenting comparisons in EPV that reflect only variability in soybean oil and protein contents, and do not incorporate price variability, we used a two-year average soybean meal and oil price of $168.80 /ton and $0.15 /lb, respectively.

The EPV for soybeans based on current prices for each period is shown in Figure 10. Mean EPV based on current prices, ranged from a low of $5.21 per bushel to a high of $5.37 per bushel. Standard deviations ranged from less than $0.10/bu. to about $1.30/bu. Figure 11 shows the maximum and minimum EPV values for each elevator over the two-year period. A range of $1.35/bu. is deteremined when comparing the maximum average EPV of $5.51 /bu for elevator #17, with the average minimum EPV of $4.16 /bu. for elevator #10. For a given elevator, the largest range between average minimum and maximum EPV was $1.30/bushel.

EPV, using current period prices, varied considerably over the two-year period (Figure 12). EPV ranged from a low of $4.79 /bu during October 23-29, 1999 to a high of $5.58 /bu.in March 2001. This represents a difference in EPV of almost 80 cents/bushel.

EPV for soybeans for individual elevators, based on one average price for the entire period, is shown in Figure 13. This allows for comparison based only on variability in oil and protein content, since constant prices are used in the calculations. Average EPV ranged from a low of $5.02 per bushel for elevator #8 to a high of $5.59 per bushel for elevator #2. Figure 14 shows the average minimum and maximum EPV for each elevator, averaged over the two-year period. For example, for elevator 2 (which had the highest average EPV of $5.59/bushed), the minimum EPV was $4.77 /bu while the maximum EPV was $6.02 per bushel. This results in a difference of $1.25/bu, based solely on differences in oil and protein content of soybeans either received or shipped. What this suggests is that there is significant variability in the level of oil and protein contents received and/or delivered by individual elevators, that could allow differentiation of soybeans to be matched to the needs of different end-users.

Corn Samples

Numerous corn samples, predominately high oil corn, were tested for protein, oil and starch content, expressed at 0% MC or dry basis. Participating elevators sampled mostly high oil corn since the NIT machines were used as part of the high oil corn program. Numbers of corn samples tested are shown in Figure 15 for each of the elevators. The average level of protein over the two-year period for all elevators was 9.0 % with a low of 6.55 % and a high of 17.37 %. Among elevators, mean protein ranged from a low of 8.44 % to a high of 9.58 %.

The mean level of oil over the two-year period for all elevators was 7.03 % with an individual sample low of 2.93 % and a high of 10.77 %, as shown in Figure 16. Among elevators mean oil contents ranged from a low of 4.12 % to a high of 7.94 %. The mean

level of starch content over the two-year period for all elevators was 68.9 % with an individual sample low of 63.71 % and a high of 76.58 %. Among elevators mean starch contents ranged from a low of 67.67 % to a high of 72.24%.

Survey Results

Information on end use value made available to buyer and sellers will eventually result in price differentials based on the value of each load. Farmers anticipating or realizing benefits from varieties selected on criteria other than yield will have an incentive for selecting different varieties where composition can be changed without sacrificing yield or where total value per acre can be increased. The inability of the current market system to communicate preferences to those who have control of composition inhibits, discourages, and often precludes and imporvement in the value of the crop. If farmers have an incentive to select for composition, then plant breeders will have an incentive to select genetically superior strains or genotypes.

Illinois producers were surveyed annually from 1998-2000 to identify the criteria they use to select soybean varieties. One of the objectives of this survey was to identify the importance of various criteria, including end use properties, in producer decision-making, and to identify if the importance changed during the three-year period. Three different producer groups were surveyed: (1) FRI panelists, who served as the control group representing the general farm population; (2) the CCSP group, which received information on oil and protein contents of individual loads when they delivered to their local elevator; and (3) the IQS group, which was involved in continuing educational programs concerning end use value. Results, not suprisingly, indicate that yield and agronomic factors are the most important factors in determining which soybean seed producers will select. When comparing the ranking of oil and protein content in selecting soybean varieties, the FRI panelist group did show a slight increase in the importance of oil and protein content across the three years, although the difference was not statistically significant. There was also no difference across the three years for the CCSP group. However, the importance of oil and protein content in selecting soybean varieties increased substantially for the IQS group. In 1998, the rating for oil/protein contents was only 1.8, but this rating increased to 2.5 in 1999, and rose to 3.1 in 2000. This result may suggest that with increased educational programs, producer may become more aware of the opportunity to select soybean varieties for both agronomic characteristics and end use value components.

Detailed information on the project results can be found in the following reports “Illinois Farmers’ Selection Criteria for Soybean Varieties, 2000”, “Illinois Farmers’ Selection Criteria for Soybean Varieties, 1999”, and “Illinois Farmers’ Selection Criteria for Soybean Varieties, 1998”.

Market Developments

In Illinois, while processors are not paying for higher oil and protein contents, there has been at least one proprietary contract for high protein soybeans. Under this contract,

premiums were paid for a specific variety of soybeans, which were delivered to designated elevators in Illinois. These elevators then exported the soybeans to Japan for use in tofu and miso products.

Although Illinois processors are not currently paying for higher oil and protein contents, there is a U.S. processor that has begun paying premiums for these characteristics. In 1999, AGP began paying premiums for soybean components. Their premium schedule for the 2001 crops is provided in Appendix Table 5. In addition, according to June/July 2001 AGP News, AGP and Monsanto have agreed to work together in expanding varieties that have higher levels of protein and oil content with no yield drag to producers. [AGP website, http://www.agp.com/news/2001/0607/].

While the current opportunities in Illinois to receive premiums for oil and/or protein content in soybeans remain limited, there is continued movement toward differentiated markets. The success of a component pricing program such as AGP has developed, which is implemented in some locations in Iowa, can lead to similar opportunities in Illinois through both competitive pressures and new market opportunities.

SUMMARY AND FUTURE DIRECTIONS

This project has provided successful development and implementation of timely collection of soybean oil and protein contents, and corn oil, protein, and starch contents, from elevators in Illinois. An improved methodology was established to collect this data, provide computations of estimated processed value for soybeans, and to make this data available to the Agricultural Marketing Service. Over the course of the 2-year project, 30 reports were published by the Federal Market News Service. These reports occurred bi-weekly during harvest, and monthly otherwise, providing current information on the levels and value of soybeans being received by, or delivered from, elevators throughout the state of Illinois. In addition, the composition levels measured at elevator locations could be made available to farmers by providing a simple printout. The Market News Service reports for soybeans included the mean and range for oil and protein contents, paired with an estimated processed value, which describes the true value of the soybeans to end users. An estimated processed value is not yet available for corn, due to the complexity of multiple markets for corn components (e.g. starch, gluten feed, gluten meal and other co products) and the limited availability of yields and prices for these components.

Sixteen elevators throughout the state collaborated in this effort, and allowed us to significantly improve the methodology used to collect information from often remote elevator locations. The primary constraint for including additional elevators was the lack of NIT equipment. In fact, during the course of the project, availability of elevators with NIT equipment became even more limited, as many elevators were using their NIT's primarily for use with high oil corn contracts. As the high oil corn market in Illinois contracted, some elevators no longer had NIT equipment available for use in our project.

Although this project has focused on the collection, computation and reporting of soybean oil and protein contents, as well as estimated processed value, the methodology could be easily adapted for other quality attributes of soybeans or corn, or for commodities such as wheat.

This is the only known project for any state where year-round information on the levels of soybean components and estimated processed value are provided on a statewide basis. Providing information on both the mean and range allow for differentiation of specific attributes (i.e. oil or protein content) that meet the needs of diverse end users. Expansion of the data reporting is dependent on the ability of elevators to access NIT equipment, so that information could be provided on both regional, as well as statewide basis. Additional opportunities may exist for individual elevators who want to market any or all of their current inventory, and could provide information on the current levels of oil and protein content available for immediate or future delivery.

Over this project period, interest in near infrared spectroscopy has continued to increase. Through biotechnology soybean breeders are working toward stackable traits of improved amino acid and fatty acid profiles in addition to herbicide resistance. There is interest in finding ways to reduce the carbohydrate fraction in soybeans to improve the protein quality and amino acid profiles and maintain nutritive properties. Instrumentation methods that can provide rapid measurement of proteins, oils, and other factors such as isoflavones and sugars will be in demand.

RESEARCH REPORTS

Bekric, A., L. Hill, K. Bender and T. Doehring. 1999. "Illinois Farmers' Selection Criteria for Soybean Varieties, 1999", Department of Agricultural and Consumer Economics, Office of Research/Illinois Agricultural Experiment Station, College of Agricultural, Consumer and Environmental Sciences, University of Illinois at Urbana-Champaign. AE-4730.

Brumm, T.J. and C.R. Hurburgh, Jr. 1990. Estimating the processed value of soybeans. JOACS. 67(5): 302-307.

Hill, L., K. Bender, T. Doehring, and B. St. Bonnett. 1998. "Farmers' Selection Criteria for Soybean Varieties, 1999", Department of Agricultural and Consumer Economics, Agricultural Experiment Station, College of Agricultural, Consumer and Environmental Sciences, University of Illinois at Urbana-Champaign. AE-4724.

Hill, L., K. Bender, T. Doehring, and A. Bekric. 2001. "Illinois Farmers' Selection Criteria for Soybean Varieties, 2000", Department of Agricultural and Consumer Economics, Office of Research/Illinois Agricultural Experiment Station, College of Agricultural, Consumer and Environmental Sciences, University of Illinois at Urbana-Champaign. AE-4742.

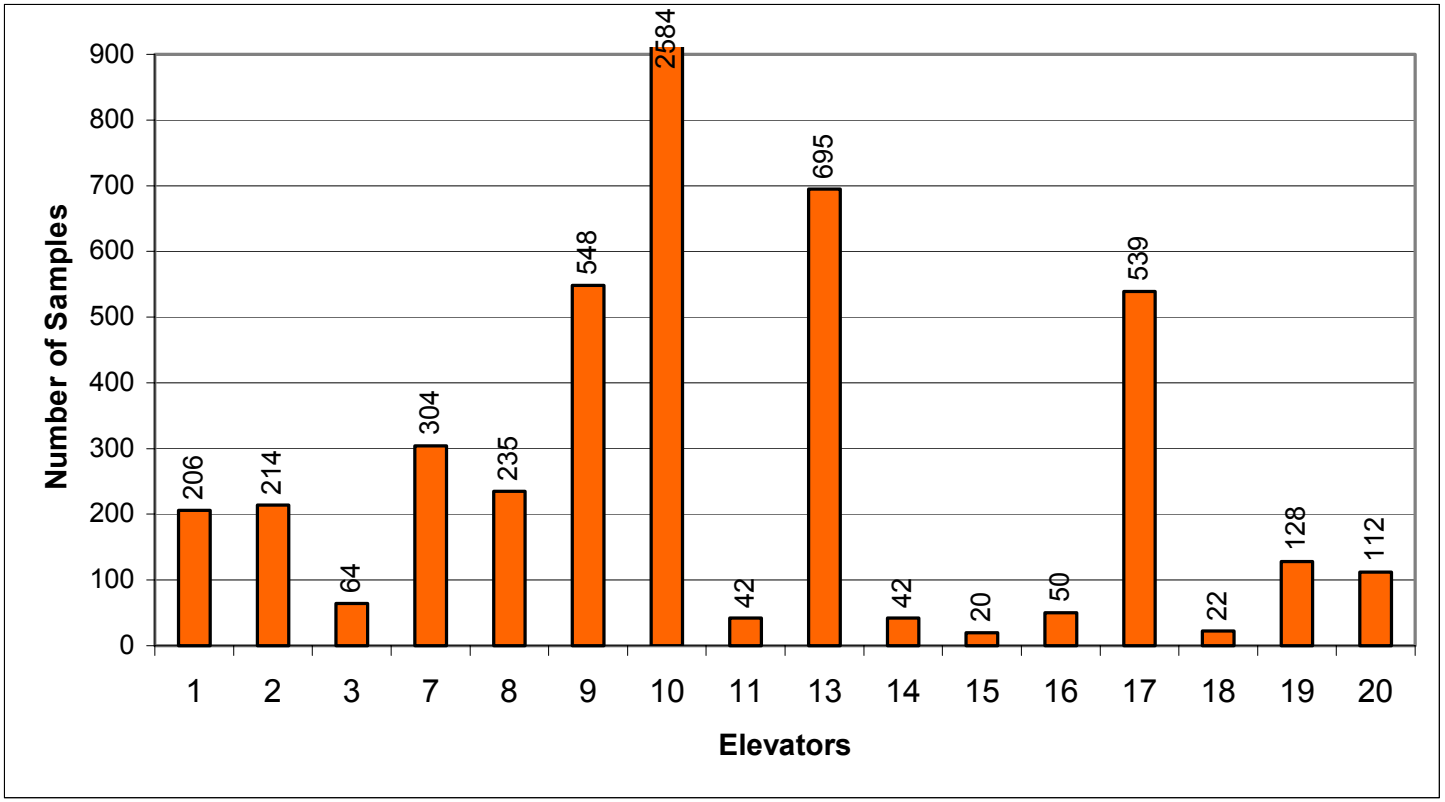

Figure 1. Total number of soybean samples tested, by elevator, October 1999 to November 2001.

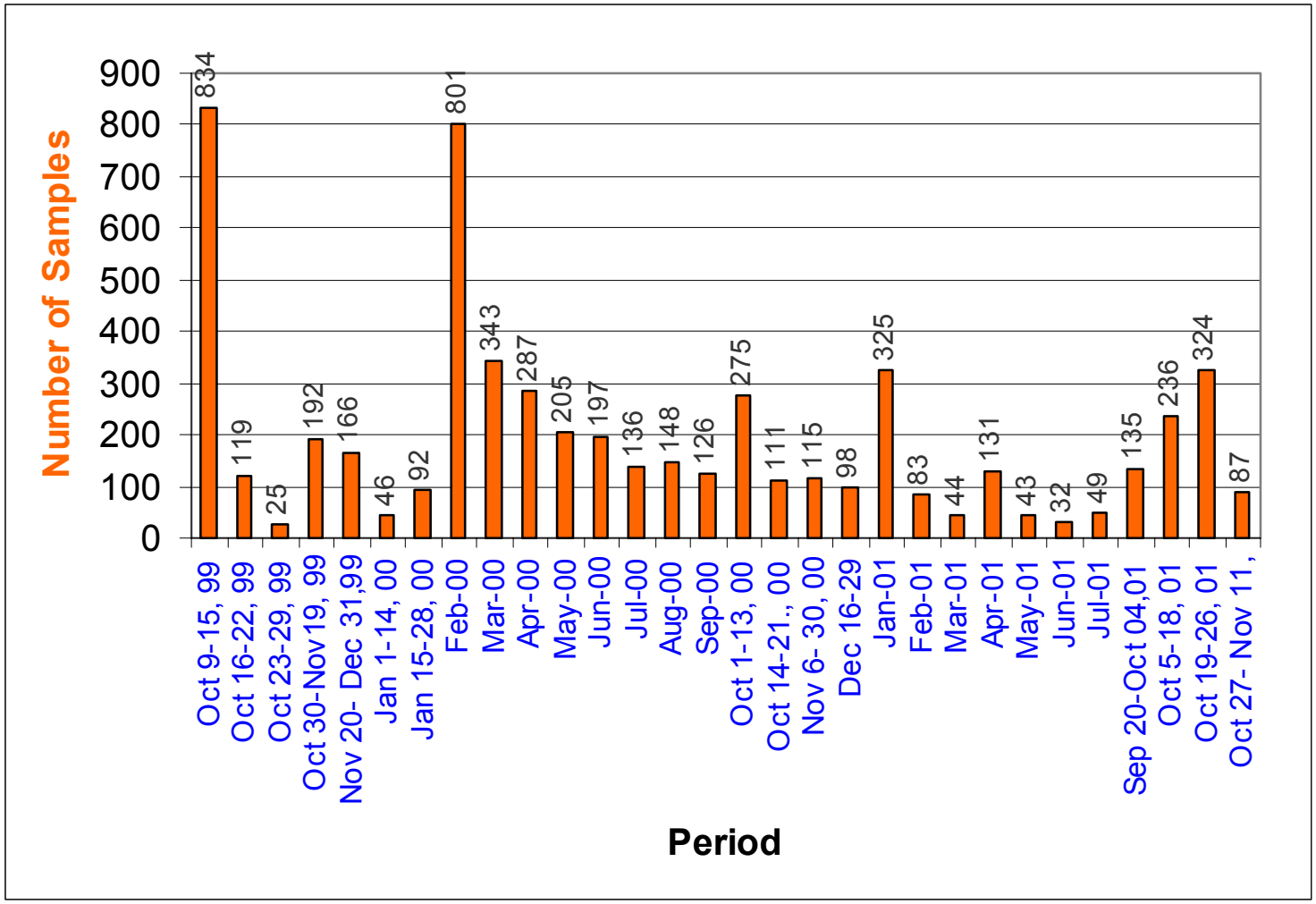

Figure 2. Total number of soybean samples tested, by reporting period, October 1999 to November 2001.

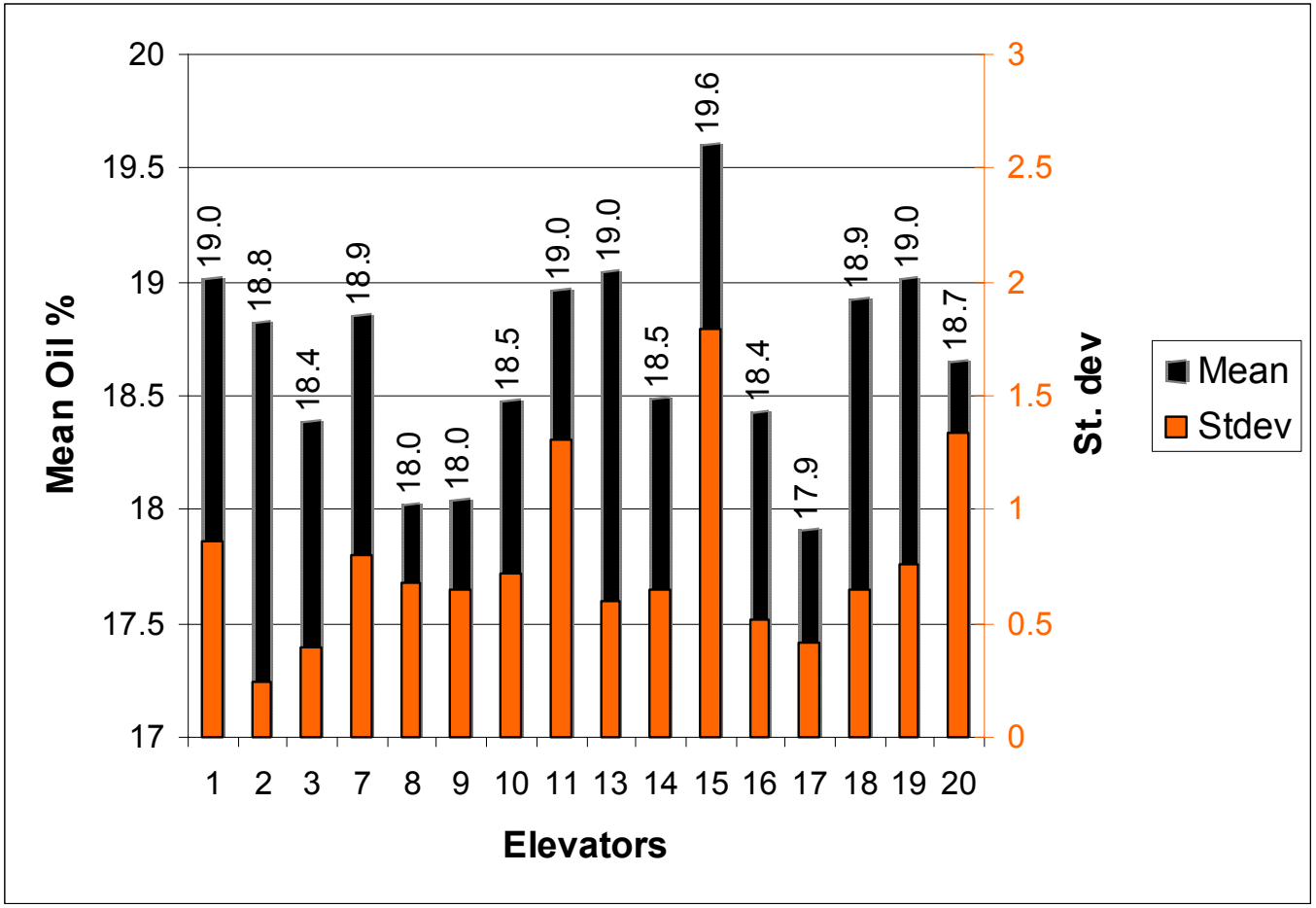

Figure 3. Mean oil content (13% MC basis) and standard deviation, by elevator, for October 1999 to November 2001.

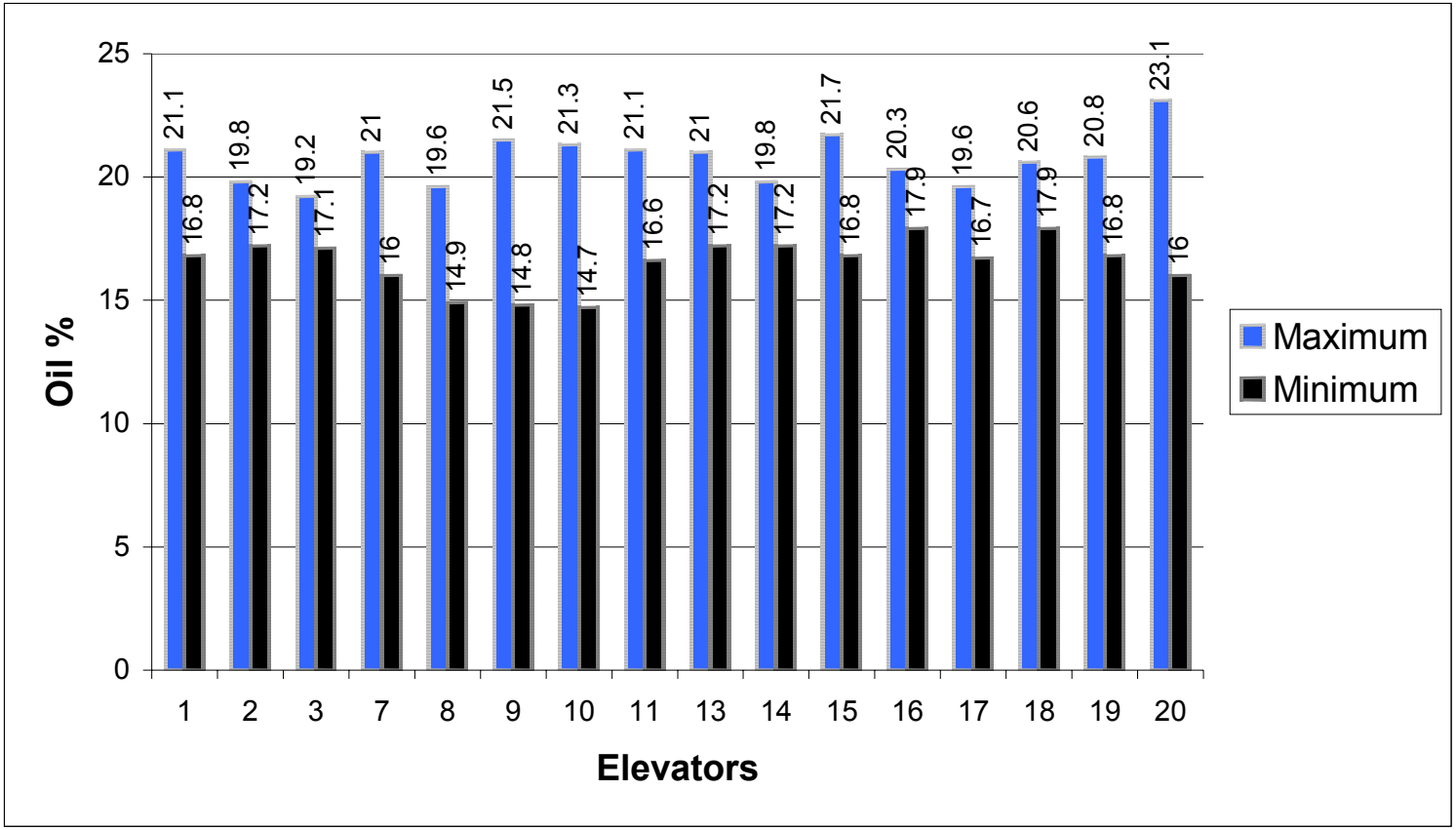

Figure 4. Average maximum and minimum oil content, by elevator, for October 1999 to November 2001.

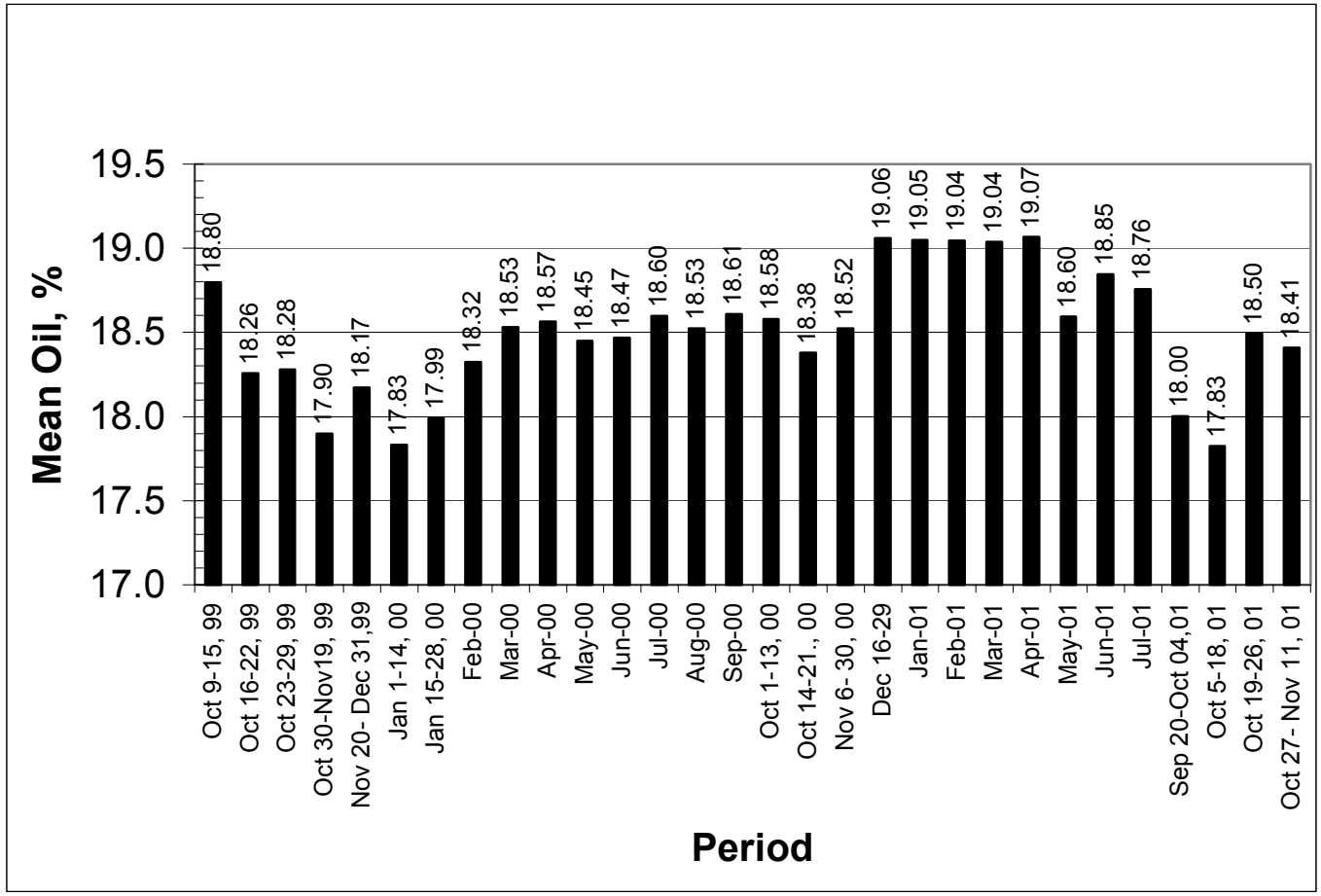

Figure 5. Mean oil content, by reporting period, for October 1999 to November 2001.

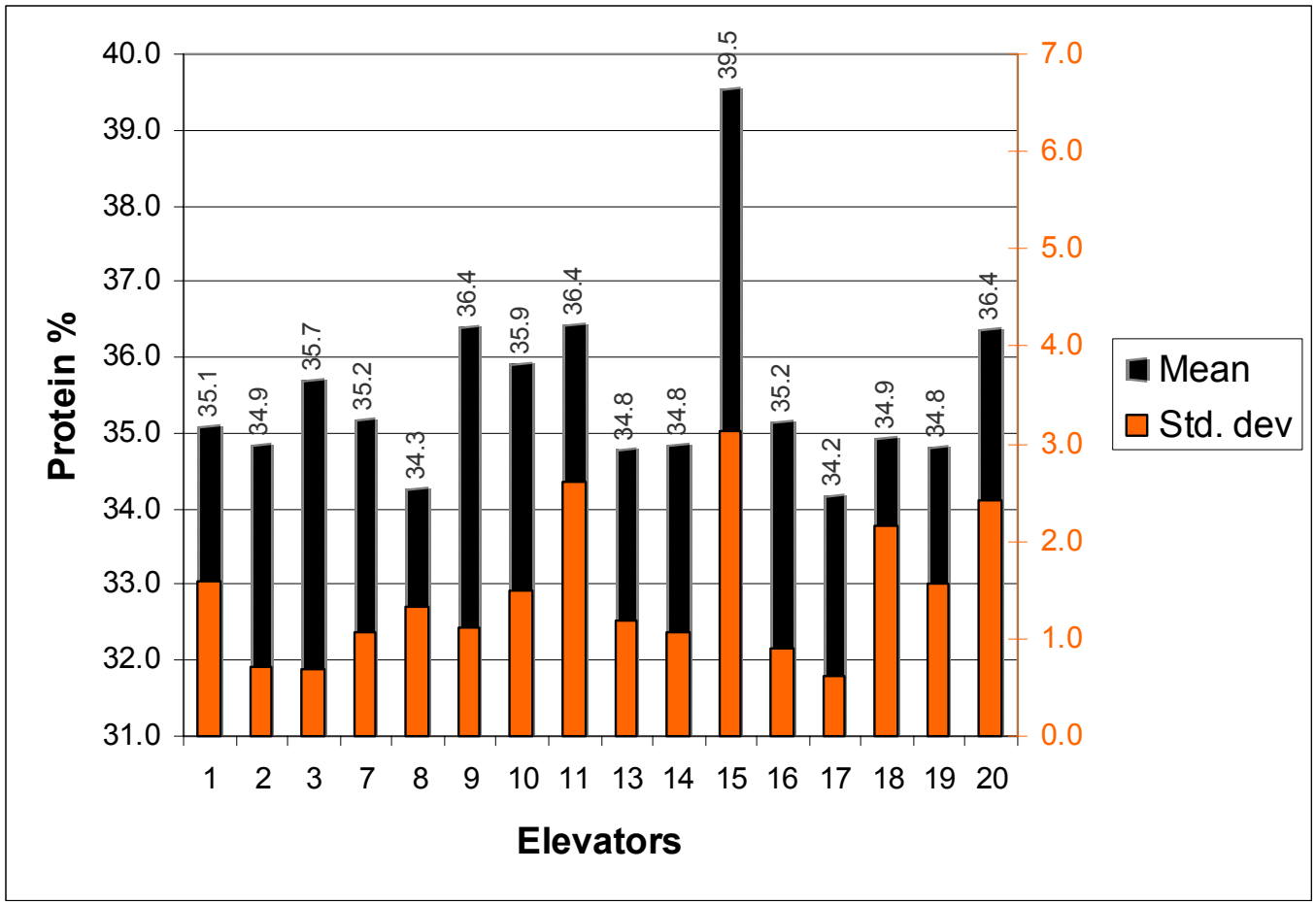

Figure 6. Mean protein content (13% MC basis) and standard deviation, by elevator, for October 1999 to November 2001.

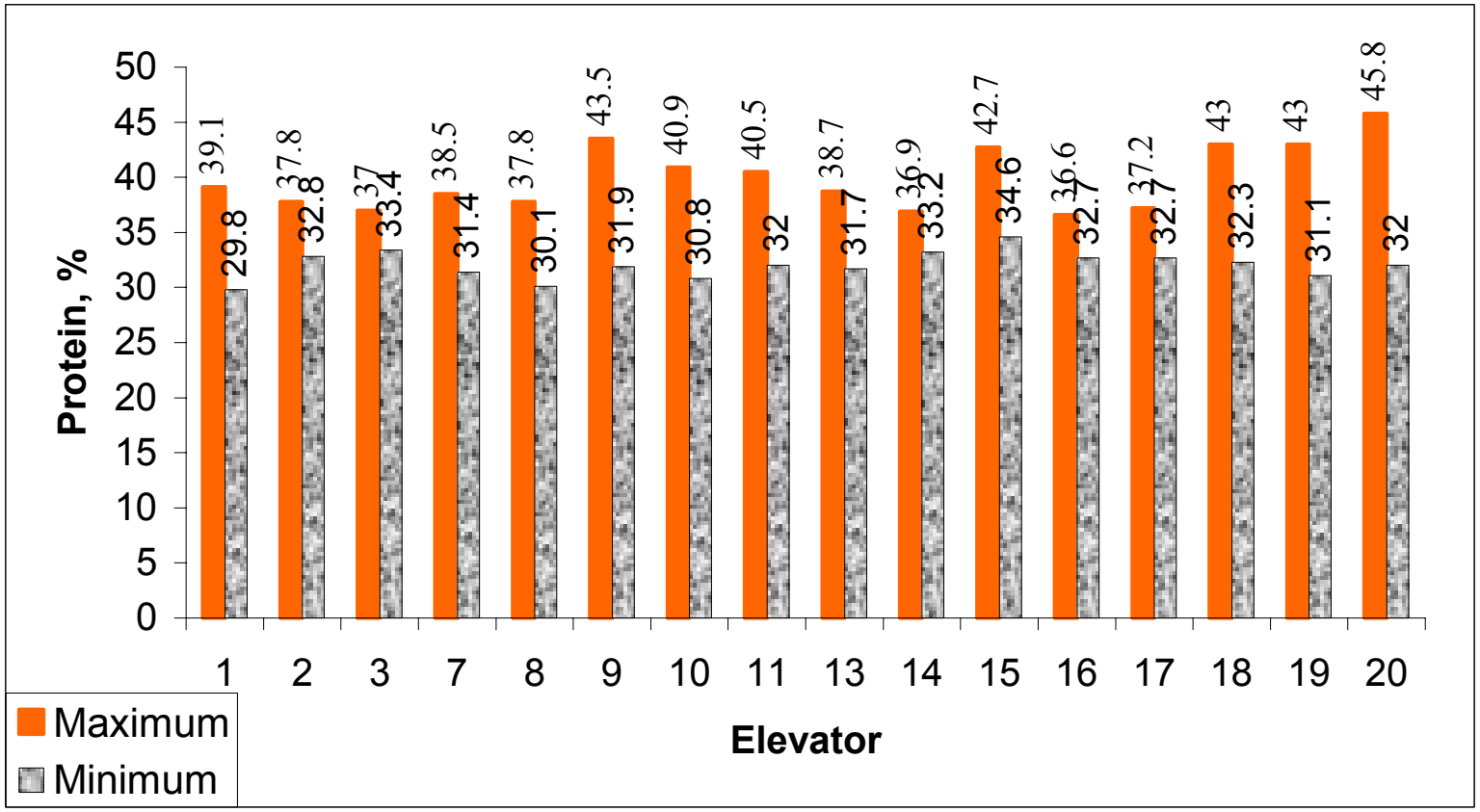

Figure 7. Average maximum and minimum protein content, by elevator, for October 1999 to November 2001.

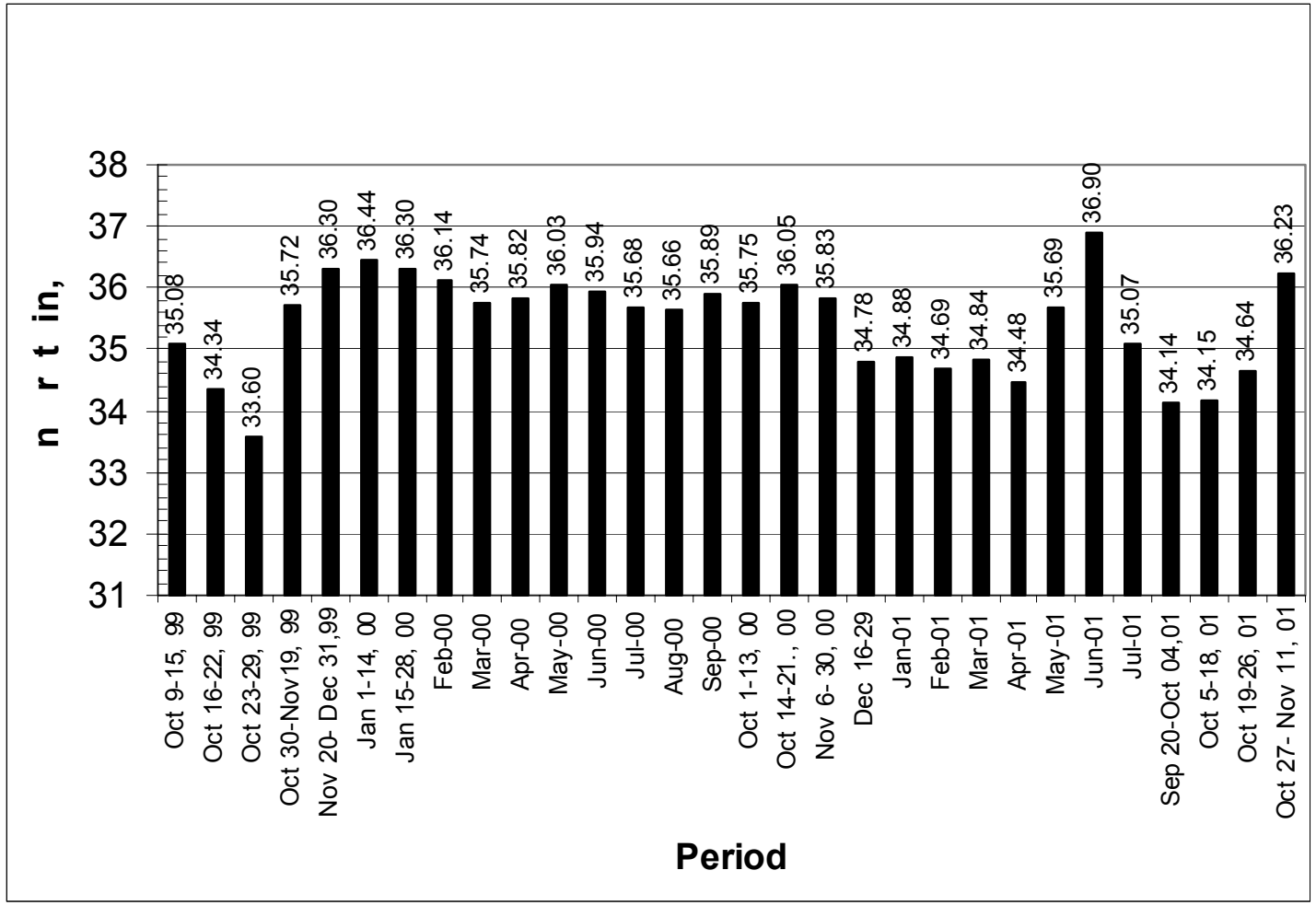

Figure 8. Mean protein content, by reporting period, for October 1999 to November 2001.

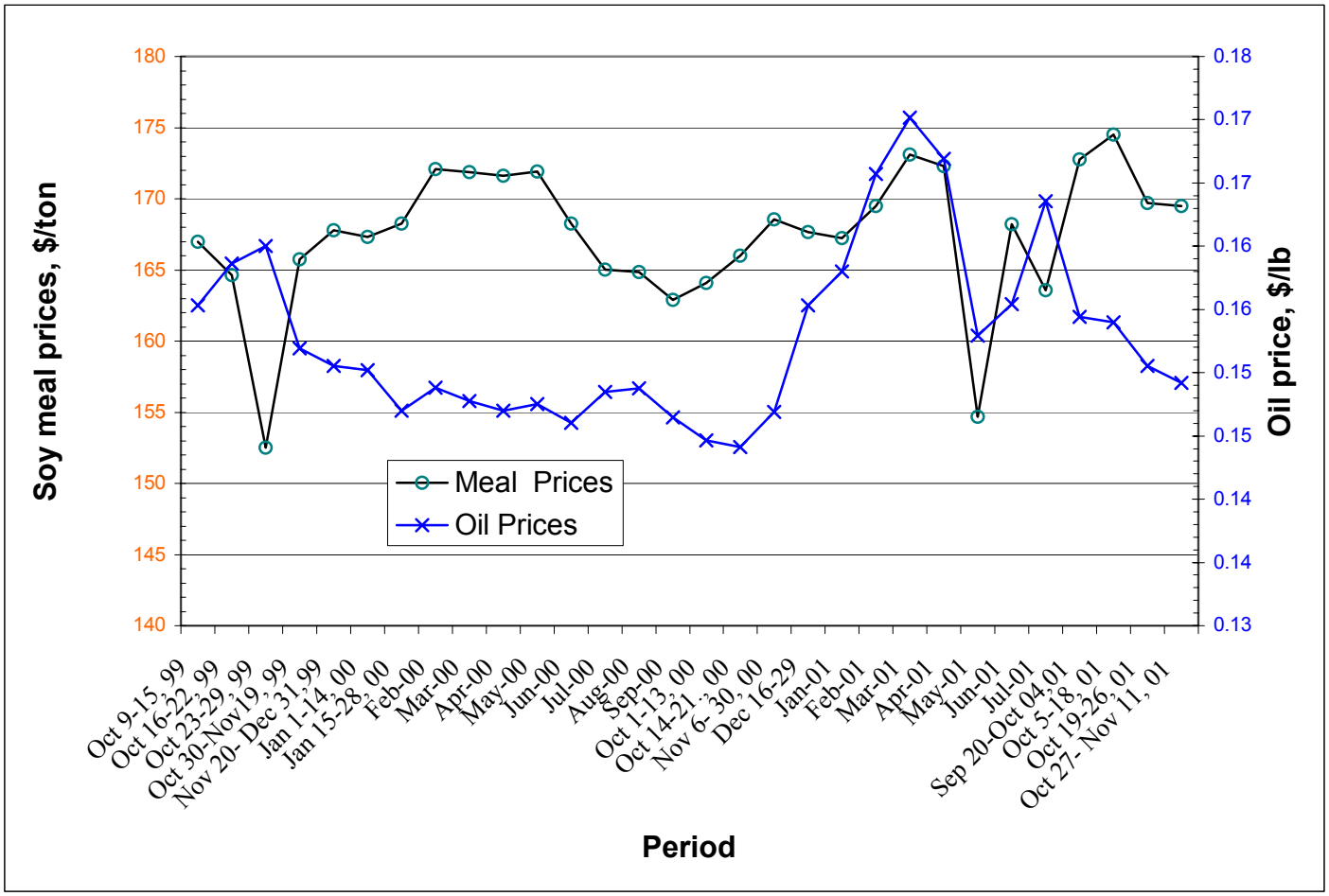

Figure 9. Soybean meal and oil prices used for each reporting period.

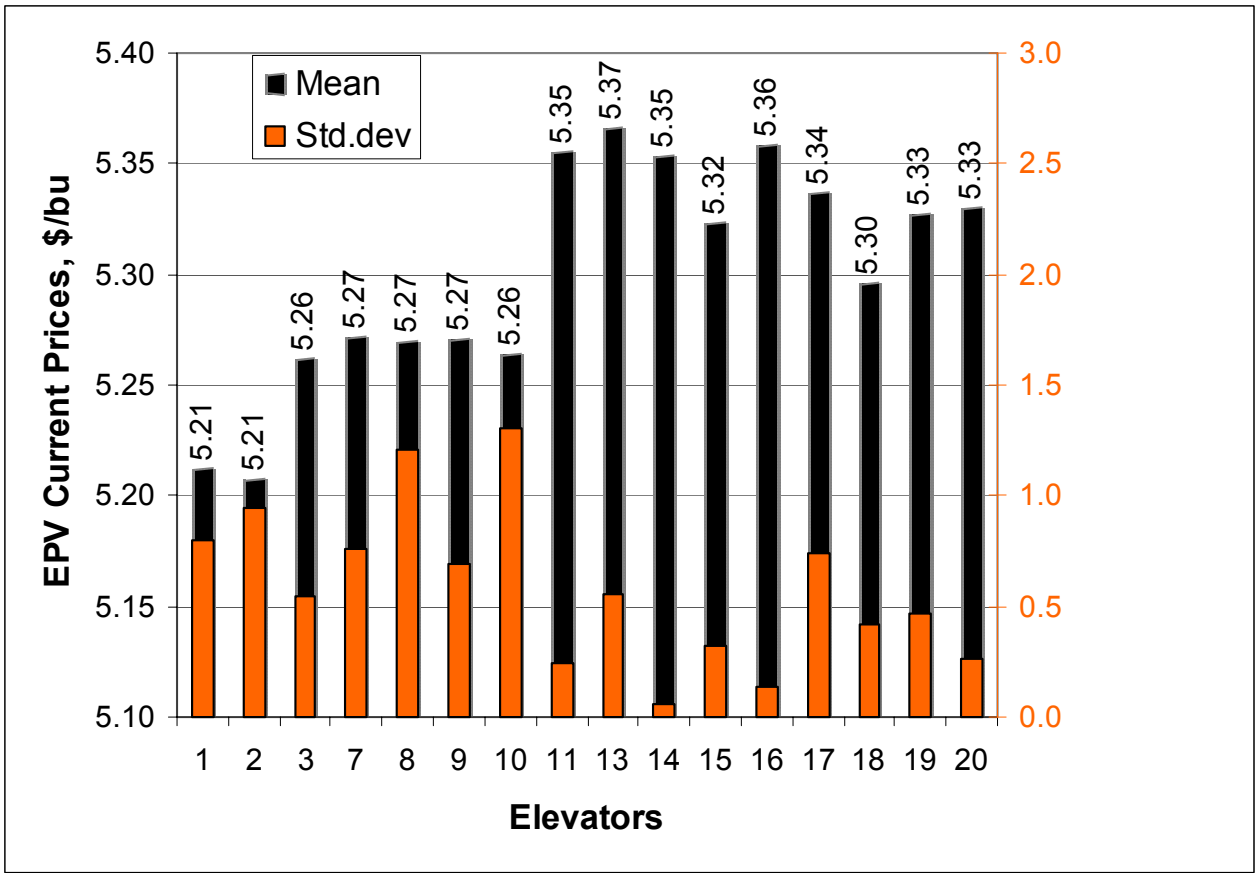

Figure 10. Average estimated process value (EPV) using current prices and standard deviation, by elevator, for October 1999 to November 2001.

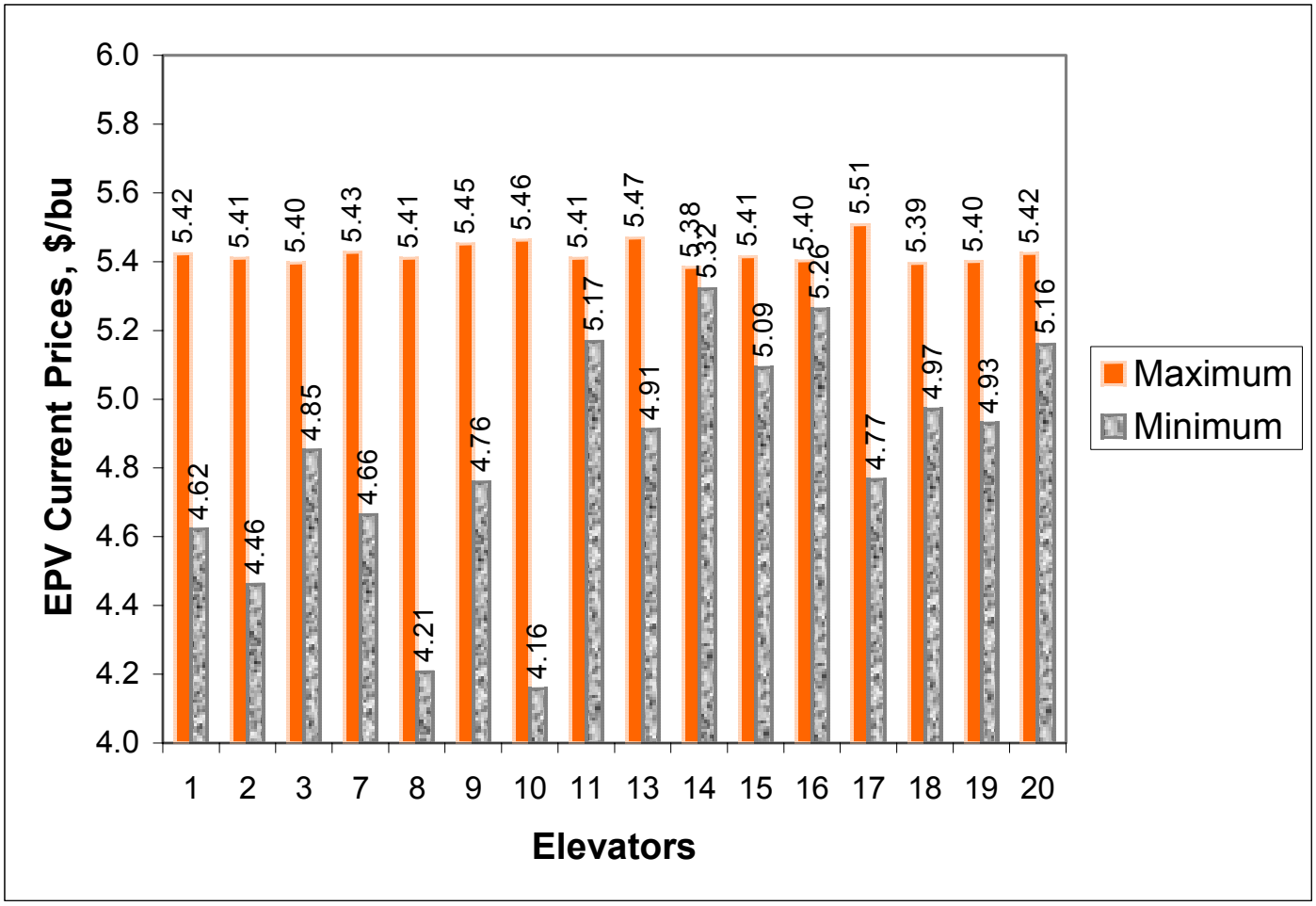

Figure11: Average maximum and minimum estimated process values (EPV) using current prices, by elevator, for October 1999 to November 2001.

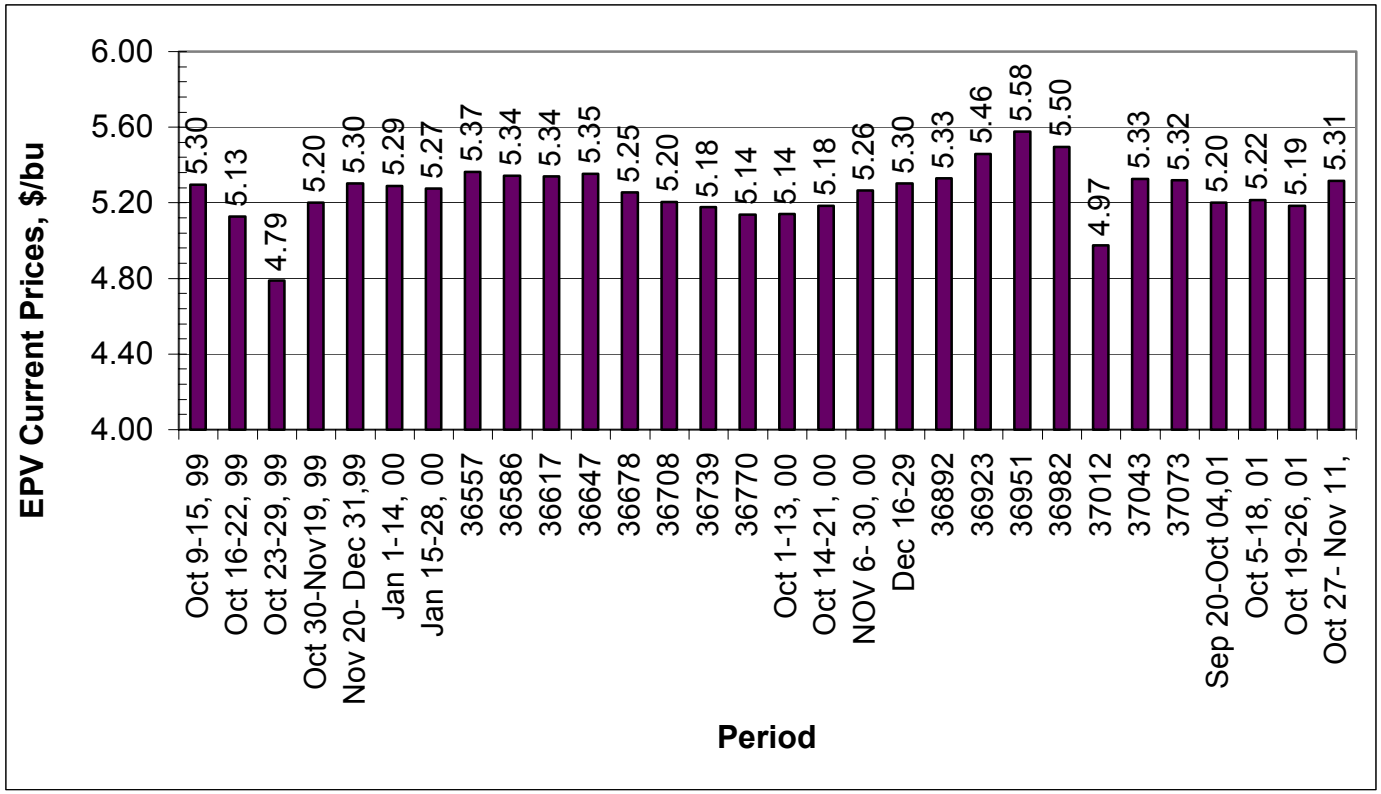

Figure12: Average estimated process value (EPV) using current period prices, by reporting period.

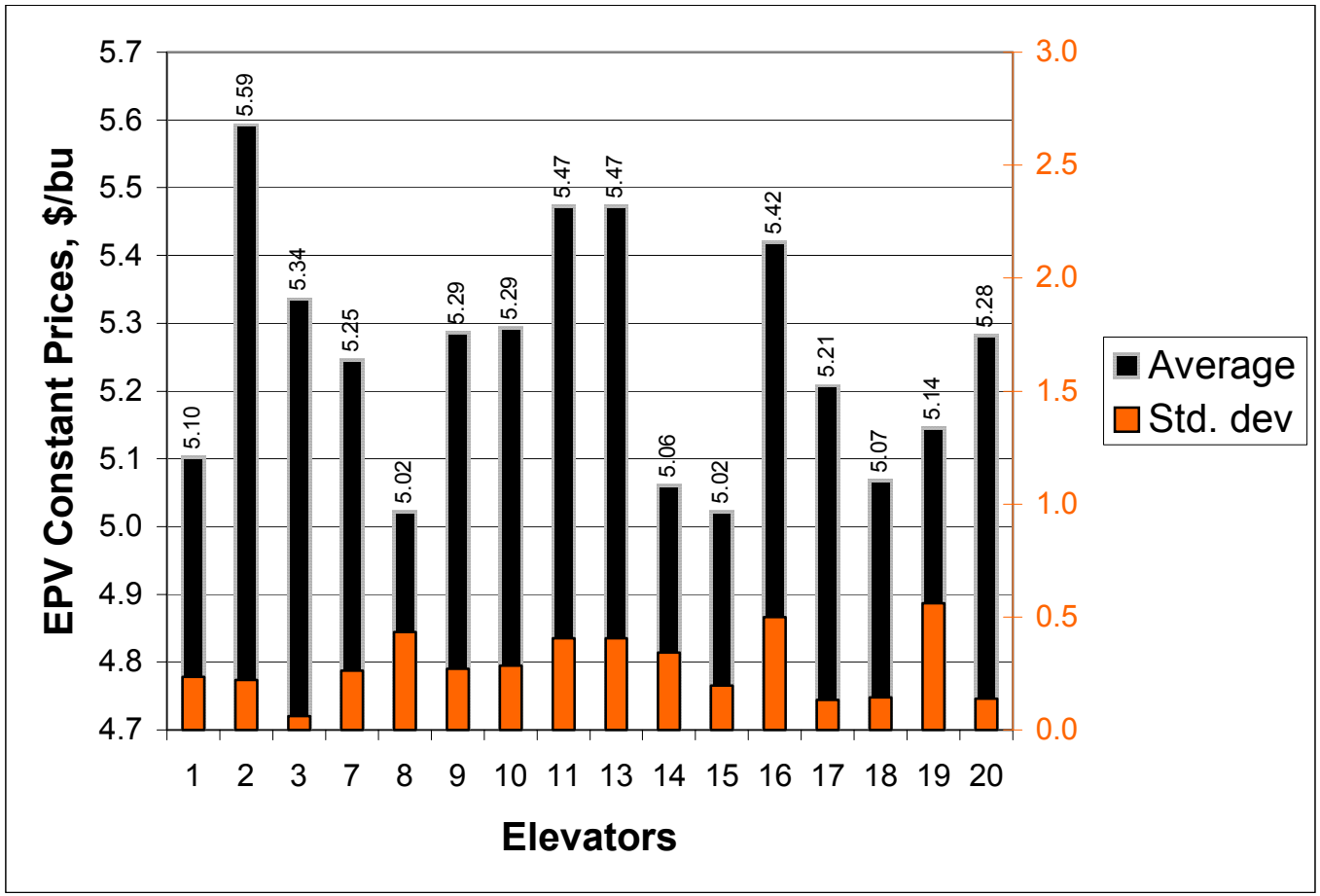

Figure 13. Average estimated process value (EPV) and standard deviation using constant prices, by elevator, for October 1999 to November 2001.

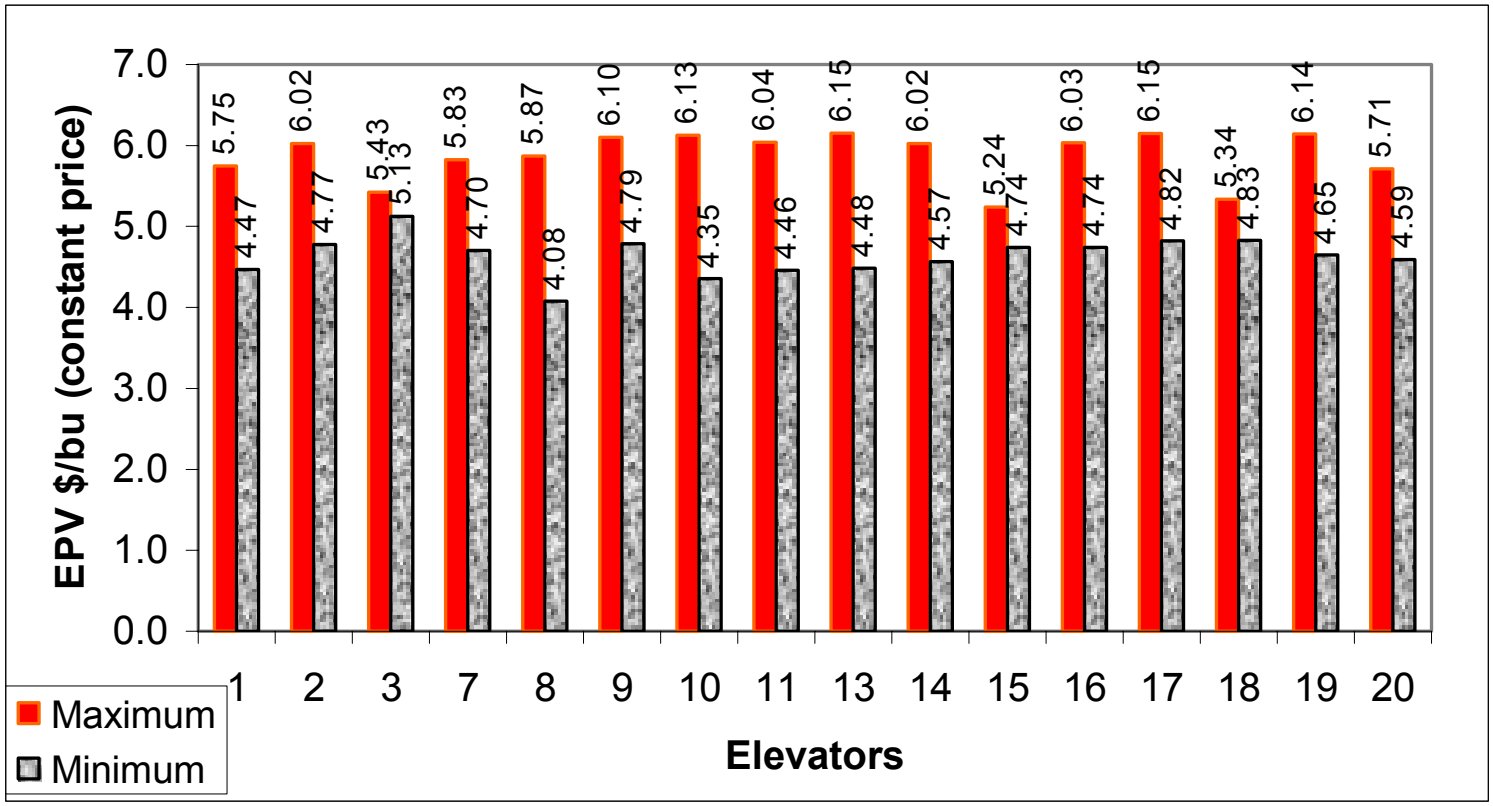

Figure 14. Average maximum and minimum estimated process value (EPV) using constant prices, by elevator, for October 1999 to November 2001.

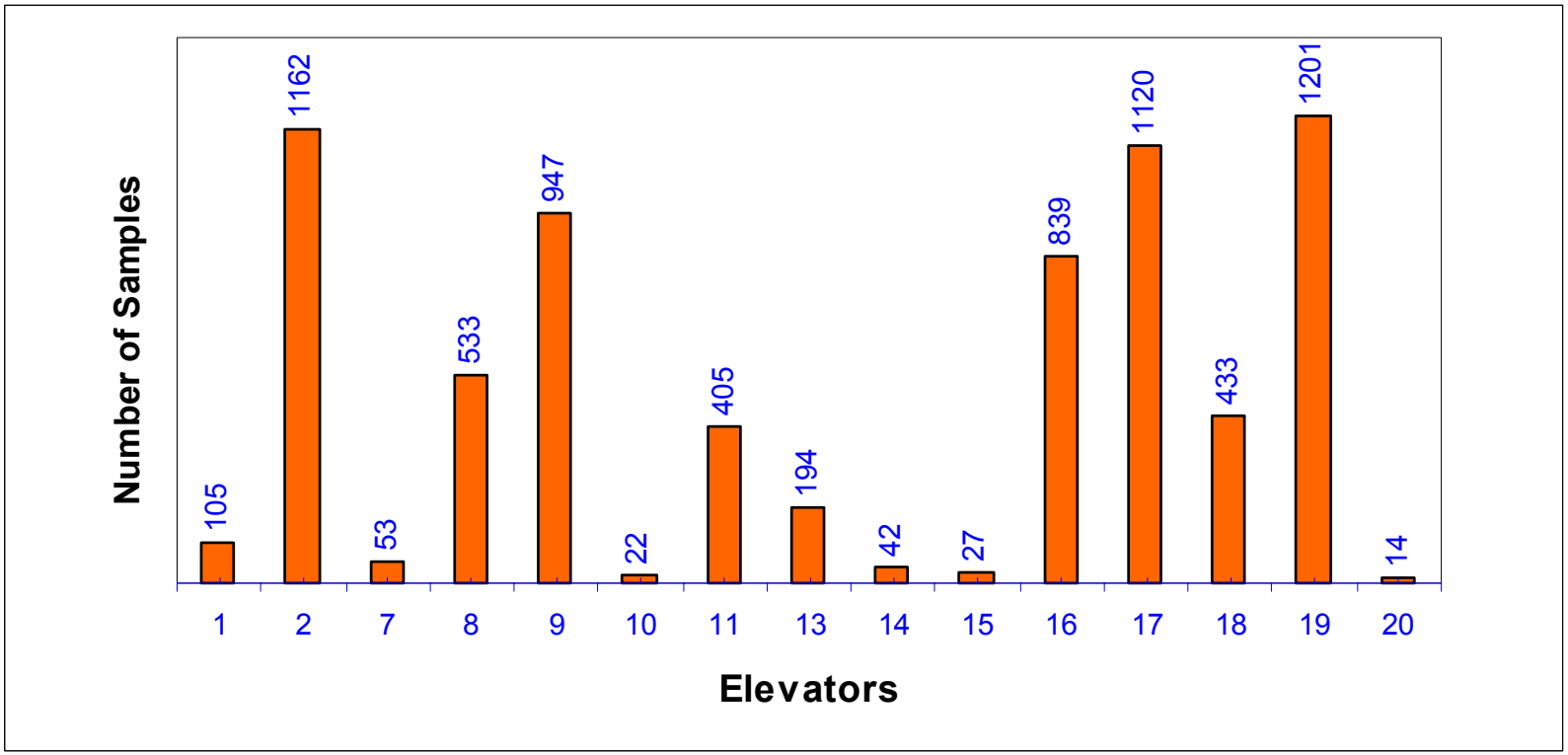

Figure 15. Total number of corn samples tested, by elevator, from October 1999 to November 2001.

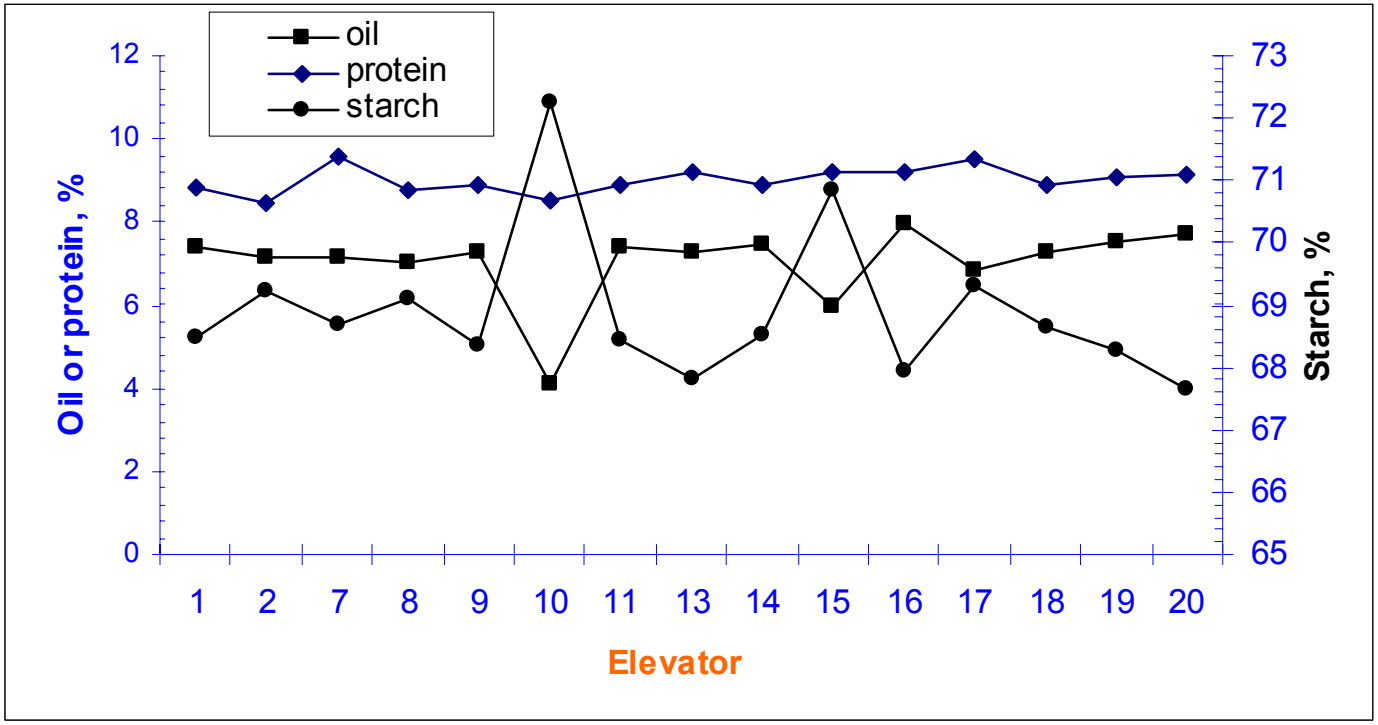

Figure 16. Average protein, oil, and starch contents (% dry basis) for high-oil corn, by elevator, for October 1999 to November 2001.

APPENDIX

Table 1. A sample result.csv file obtained for a set of soybean samples.

S/N INFRATEC	Calib ID	Sample ID	Oil	Protein	Moisture	Fiber	Date-test	Time-test	Sequence
	553765	SO990922	13024	22.138	38.506	9.8895	5.2047	20-01-2002	09.13.11	17991
	553765	SO990922	13025	21.7501	39.0741	9.9356	5.1513	20-01-2002	09.14.38	17992
	553765	SO990922	13026	22.0256	39.2828	9.8252	5.1102	20-01-2002	09.16.30	17993
	553765	SO990922	13027	22.1715	38.7883	10.9678	5.046	20-01-2002	09.17.51	17994
	553765	SO990922	13028	21.884	39.4822	11.3547	4.9029	20-01-2002	09.19.27	17995
	553765	SO990922	13029	22.1259	39.1961	11.3684	4.913	20-01-2002	09.20.51	17996
	553765	SO990922	13030	21.9199	39.4286	11.7504	4.8139	20-01-2002	09.23.00	17997
	553765	SO990922	13031	21.7142	39.7172	11.4747	4.932	20-01-2002	09.24.48	17998
	553765	SO990922	13032	22.0513	39.6222	10.0148	5.0396	20-01-2002	09.26.58	17999
	553765	SO990922	13033	21.8255	39.6332	10.157	5.0222	20-01-2002	09.29.03	18000
	553765	SO990922	13034	21.6554	40.1373	9.9117	5.042	20-01-2002	09.30.59	18001
	553765	SO990922	13035	21.7674	38.9625	10.4113	5.1101	20-01-2002	09.33.49	18002
	553765	SO990922	13036	22.0049	38.9624	11.0782	5.0096	20-01-2002	09.35.31	18003
	553765	SO990922	13037	22.0637	39.214	11.5982	4.8743	20-01-2002	09.42.49	18004
	553765	SO990922	13038	22.2352	38.9624	11.2891	4.9581	20-01-2002	09.44.30	18005
	553765	SO990922	13039	22.1653	38.8607	11.0983	5.0229	20-01-2002	09.45.57	18006
	553765	SO990922	13040	22.0591	39.2831	10.6398	4.9699	20-01-2002	09.47.52	18007
	553765	SO990922	13041	22.2292	38.3953	9.9188	5.1768	20-01-2002	09.49.47	18008
	553765	SO990922	13042	22.0415	39.1787	9.8803	5.1071	20-01-2002	09.52.32	18009
	553765	SO990922	13043	21.985	38.769	10.4053	5.0908	20-01-2002	09.53.52	18010
	553765	SO990922	13044	21.8153	39.4722	10.0605	5.0372	20-01-2002	09.55.17	18011
	553765	SO990922	13045	21.742	39.6884	11.5058	4.866	20-01-2002	09.57.03	18012
	553765	SO990922	13046	21.9375	39.3889	11.3491	4.9551	20-01-2002	10.00.38	18013
	553765	SO990922	13047	21.7267	39.042	11.3551	4.9852	20-01-2002	10.02.04	18014
	553765	SO990922	13048	22.0364	39.2427	10.4497	4.971	20-01-2002	10.04.20	18015
	553765	SO990922	13049	22.0091	39.4068	9.7634	5.1645	20-01-2002	10.06.51	18016

Table 2. Example of result.log data for corn as it was stored on hard drives of NIT analyzers.

```
"243110","CO010511","0          ","Oil     ",    4.04,"0000","18-12-2001","10.17.18","0000005497"
"243110","CO010511","0          ","Protein ",    8.79,"0000","18-12-2001","10.17.18","0000005497"
"243110","CO010511","0          ","Starch  ",   74.80,"0000","18-12-2001","10.17.18","0000005497"
"243110","CO010511","0          ","Moisture",   16.37,"0000","18-12-2001","10.17.18","0000005497"
"243110","CO010511","0          ","Oil     ",    4.02,"0000","18-12-2001","10.19.43","0000005498"
"243110","CO010511","0          ","Protein ",    8.83,"0000","18-12-2001","10.19.43","0000005498"
"243110","CO010511","0          ","Starch  ",   74.60,"0000","18-12-2001","10.19.43","0000005498"
"243110","CO010511","0          ","Moisture",   16.37,"0000","18-12-2001","10.19.43","0000005498"
"243110","CO010511","0          ","Oil     ",    4.01,"0000","18-12-2001","10.26.52","0000005499"
"243110","CO010511","0          ","Protein ",    8.80,"0000","18-12-2001","10.26.52","0000005499"
"243110","CO010511","0          ","Starch  ",   74.83,"0000","18-12-2001","10.26.52","0000005499"
"243110","CO010511","0          ","Moisture",   16.40,"0000","18-12-2001","10.26.52","0000005499"
"243110","CO010511","0          ","Oil     ",    3.91,"0000","18-12-2001","11.04.34","0000005501"
"243110","CO010511","0          ","Protein ",    8.81,"0000","18-12-2001","11.04.34","0000005501"
"243110","CO010511","0          ","Starch  ",   74.97,"0000","18-12-2001","11.04.34","0000005501"
"243110","CO010511","0          ","Moisture",   16.45,"0000","18-12-2001","11.04.34","0000005501"
"243110","CO010511","0          ","Oil     ",    3.92,"0000","18-12-2001","11.06.52","0000005502"
"243110","CO010511","0          ","Protein ",    8.76,"0000","18-12-2001","11.06.52","0000005502"
"243110","CO010511","0          ","Starch  ",   74.78,"0000","18-12-2001","11.06.52","0000005502"
"243110","CO010511","0          ","Moisture",   16.48,"0000","18-12-2001","11.06.52","0000005502"
"243110","CO010511","0          ","Oil     ",    3.71,"0000","18-12-2001","11.11.25","0000005503"
"243110","CO010511","0          ","Protein ",    8.74,"0000","18-12-2001","11.11.25","0000005503"
"243110","CO010511","0          ","Starch  ",   75.46,"0000","18-12-2001","11.11.25","0000005503"
"243110","CO010511","0          ","Moisture",   16.47,"0000","18-12-2001","11.11.25","0000005503"
"243110","CO010511","0          ","Oil     ",    3.89,"0000","18-12-2001","11.20.28","0000005504"
```

Table 3. Example of data of Table 2 imported into Excel showing 4 lines used for each sample.

243110CO010511		0Oil	4.04	018-12-2001	10.17.18	5497
243110CO010511		0Protein	8.79	018-12-2001	10.17.18	5497
243110CO010511		0Starch	74.8	018-12-2001	10.17.18	5497
243110CO010511		0Moisture	16.37	018-12-2001	10.17.18	5497
243110CO010511		0Oil	4.02	018-12-2001	10.19.43	5498
243110CO010511		0Protein	8.83	018-12-2001	10.19.43	5498
243110CO010511		0Starch	74.6	018-12-2001	10.19.43	5498
243110CO010511		0Moisture	16.37	018-12-2001	10.19.43	5498
243110CO010511		0Oil	4.01	018-12-2001	10.26.52	5499
243110CO010511		0Protein	8.8	018-12-2001	10.26.52	5499
243110CO010511		0Starch	74.83	018-12-2001	10.26.52	5499
243110CO010511		0Moisture	16.4	018-12-2001	10.26.52	5499
243110CO010511		0Oil	3.91	018-12-2001	11.04.34	5501
243110CO010511		0Protein	8.81	018-12-2001	11.04.34	5501
243110CO010511		0Starch	74.97	018-12-2001	11.04.34	5501
243110CO010511		0Moisture	16.45	018-12-2001	11.04.34	5501
243110CO010511		0Oil	3.92	018-12-2001	11.06.52	5502
243110CO010511		0Protein	8.76	018-12-2001	11.06.52	5502
243110CO010511		0Starch	74.78	018-12-2001	11.06.52	5502
243110CO010511		0Moisture	16.48	018-12-2001	11.06.52	5502
243110CO010511		0Oil	3.71	018-12-2001	11.11.25	5503
243110CO010511		0Protein	8.74	018-12-2001	11.11.25	5503
243110CO010511		0Starch	75.46	018-12-2001	11.11.25	5503
243110CO010511		0Moisture	16.47	018-12-2001	11.11.25	5503
243110CO010511		0Oil	3.89	018-12-2001	11.20.28	5504
243110CO010511		0Protein	8.91	018-12-2001	11.20.28	5504
243110CO010511		0Starch	75.07	018-12-2001	11.20.28	5504
243110CO010511		0Moisture	16.5	018-12-2001	11.20.28	5504
243110CO010511	620_a	Oil	3.03	018-12-2001	11.40.43	5505
243110CO010511	620_a	Protein	10.35	018-12-2001	11.40.43	5505
243110CO010511	620_a	Starch	73.68	018-12-2001	11.40.43	5505
243110CO010511	620_a	Moisture	11.32	018-12-2001	11.40.43	5505
243110CO010511	620_b	Oil	3.35	018-12-2001	11.44.50	5506
243110CO010511	620_b	Protein	10.54	018-12-2001	11.44.50	5506
243110CO010511	620_b	Starch	72.68	018-12-2001	11.44.50	5506
243110CO010511	620_b	Moisture	11.5	018-12-2001	11.44.50	5506
243110CO010511	620_c	Oil	3.06	018-12-2001	11.47.23	5507
243110CO010511	620_c	Protein	10.37	018-12-2001	11.47.23	5507
243110CO010511	620_c	Starch	73.53	018-12-2001	11.47.23	5507
243110CO010511	620_c	Moisture	11.23	018-12-2001	11.47.23	5507

Table 4. Example of the Excel data in Table 3 after the auto filter routine was used to pull out every fourth line of oil data. Procedure was repeated for protein, moisture, etc and all constituents were merged into one file.

243110CO010511	0Oil	4.04	018-12-2001	10.17.18	5497
243110CO010511	0Oil	4.02	018-12-2001	10.19.43	5498
243110CO010511	0Oil	4.01	018-12-2001	10.26.52	5499
243110CO010511	0Oil	3.91	018-12-2001	11.04.34	5501
243110CO010511	0Oil	3.92	018-12-2001	11.06.52	5502
243110CO010511	0Oil	3.71	018-12-2001	11.11.25	5503
243110CO010511	0Oil	3.89	018-12-2001	11.20.28	5504
243110CO010511	620_a	Oil	3.03	018-12-2001	11.40.43	5505
243110CO010511	620_b	Oil	3.35	018-12-2001	11.44.50	5506
243110CO010511	620_c	Oil	3.06	018-12-2001	11.47.23	5507
243110CO010511	633_a	Oil	3.12	018-12-2001	11.59.41	5509
243110CO010511	633_b	Oil	3.03	018-12-2001	12.01.24	5510
243110CO010511	633_c	Oil	3.18	018-12-2001	12.03.58	5512
243110CO010511	574_a	Oil	2.65	218-12-2001	12.15.08	5513
243110CO010511	574_b	Oil	2.47	218-12-2001	13.50.39	5514
243110CO010511	574_c	Oil	2.01	218-12-2001	13.52.34	5515
243110CO010511	587_a	Oil	2.7	218-12-2001	13.55.08	5516
243110CO010511	587_b	Oil	2.8	218-12-2001	13.57.19	5517
243110CO010511	587_c	Oil	2.97	018-12-2001	13.59.17	5518
243110CO010511	526_a	Oil	2.74	218-12-2001	14.01.44	5519
243110CO010511	526_b	Oil	2.29	218-12-2001	14.03.29	5520
243110CO010511	526_c	Oil	2.38	218-12-2001	14.05.20	5521
243110CO010511	578_a	Oil	2.81	218-12-2001	14.07.22	5522
243110CO010511	578_b	Oil	2.68	218-12-2001	14.09.27	5523
243110CO010511	578_c	Oil	2.79	218-12-2001	14.11.14	5524
243110CO010511	153_a	Oil	2.86	218-12-2001	14.13.13	5525
243110CO010511	153_b	Oil	2.92	018-12-2001	14.15.05	5526
243110CO010511	153_c	Oil	3.01	018-12-2001	14.16.48	5527
243110CO010511	28Oil	3.23	018-12-2001	14.20.45	5528
243110CO010511	28_b	Oil	3.07	018-12-2001	14.22.35	5529
243110CO010511	28_c	Oil	3.01	018-12-2001	14.24.21	5530
243110CO010511	431_a	Oil	3.04	018-12-2001	14.30.20	5531
243110CO010511	431_b	Oil	2.95	018-12-2001	14.32.02	5532
243110CO010511	431_c	Oil	3.13	018-12-2001	14.34.06	5533
243110CO010511	64_a	Oil	3.1	018-12-2001	14.36.16	5534
243110CO010511	64_b	Oil	2.93	018-12-2001	14.38.11	5535
243110CO010511	64_c	Oil	2.92	018-12-2001	14.39.47	5536
243110CO010511	63_a	Oil	2.93	018-12-2001	14.41.42	5537
243110CO010511	63_b	Oil	2.79	218-12-2001	14.43.31	5538
243110CO010511	63_c	Oil	2.96	018-12-2001	14.45.16	5539
243110CO010511	89_a	Oil	3	018-12-2001	14.48.22	5540
243110CO010511	89_b	Oil	2.92	018-12-2001	14.50.00	5541
243110CO010511	89_c	Oil	2.93	018-12-2001	14.51.38	5542

Download Procedure 1 for NIT Elevators Using Customer Care that have a Prediction Disk

Dear Cooperator;

If you have received this letter without a diskette you should still have an IPD diskette from a previous mailing. Please download and return the diskette even if you do not have any new data. For those of you submitting results via e-mail please do the data transfer on the date given below. If you have any questions please feel free to call me at anytime.

Thanks!!

Sandy

Please download on November 9, 2001 or as soon as you receive the disk.
Thanks for all your help and cooperation. It is greatly appreciated.

Downloading procedure

1. Remove the front panel
2. Unscrew and remove diskette cover to access the disk drive.
3. Insert the "IPD" Diskette (don't use a blank!).
3. From the main menu select:

    SUPPORT
    Enter Password
    NEXT
    SYSTEM
    INSTALL
    CONTINUE
    The Infratec will display "Please wait".
    The Infratec will reboot (restart).

4. Hit confirm to complete the "rebooting" process.
5. Remove the diskette from the drive.
6. Replace the drive cover and front panel.
7. Email the Result.csv file as an email attachment or return the diskette via US Mail ASAP. Please call if you have any questions.

THANK YOU!

Download Procedure 2 for NIT Elevators that Do Not Have a Prediction Disk

Dear Cooperator;

The disks we have been using have expired and will not work correctly now. It is necessary to download using a different procedure. Please download using the following instructions and return the diskette or email the Result.log file. For those of you submitting results via e-mail please do the data transfer on the date given below. If you have any questions please feel free to call me at anytime.

Thanks!!

Sandy

Please download on January 11, 2002 or as soon as you receive the disk. Thanks for all your help and cooperation. It is greatly appreciated.

Downloading procedure

1. Remove the front panel
2. Unscrew and remove diskette cover to access the disk drive
3. Insert the blank diskette into the drive
4. Make sure the machine is ON and the display screen reads:
   Select: Analyze Setup Support

5. Hit F4 for *Support*
6. Enter your password
7. Hit F3 for *Dumplog*
8. Hit F2 for *Disk*
9. Hit F2 for *Result*
10. Hit F3 for *All*

The display will show a *reading* message and then will dump the data onto the diskette. When finished remove the diskette and replace the drive cover and front panel.

11. Hit Cancel repeatedly until the display screen returns to:
    Select: Analyze Setup Support

Use the provided label and return the diskette via US Mail or send the Result.log file via e-mail. If you have any questions please feel free to call. Thank you.

Example of Report Format

GX GR120
Springfield Il. Tue Nov 20, 2001 USDA-Illinois Market News

Soybean component levels and values summary

This report of data is gathered by the University of Illinois in cooperation with the Illinois Department of Agriculture and the USDA Agriculture Marketing Service. Further data will be released on a biweekly basis through harvest. Only statewide averages are available at this time, but additional elevator cooperators could facilitate more detailed area breakdowns.

Component levels and values of soybeans at selected Illinois grain elevators are shown for Oct 27-Nov 11 2001. Component data are derived from measurements taken with NIT Whole Grain Analyzers taken by operators at the elevator. Oil and protein values are calculated on 13% moisture basis. The Estimated Processing Value (EPV) is in dollars per bushel and is obtained from a formula using prices of soybean meal and oil, along with restrictions on protein level and minimum fiber content of the meal. EPV represents an estimate of the value of a bushel of soybeans after extracting the oil and processing into 48% protein meal.

The oil content of soybeans nationwide can vary from 13 to 26%, and averages around 19.0%. The protein level of soybeans ranges from 30 to 43% and averages around 36% on a 13% moisture basis.

For the Period of Oct 27-Nov 11 2001 -87 samples taken

OIL	Range	Avg.	Last Period	Same period last year
AREA Statewide	16.0-20.1	18.4	18.4	18.1

PROTEIN	Range	Avg.	Last Period	Same period last year
AREA Statewide	33.5-39.4	35.8	36.1	36.8

EPV	Range	Avg.	Last Period	Same period last year
AREA Statewide	5.16-5.43	5.33	5.32	5.71

EPV calculation uses the average price of soybean oil and 48% protein meal rail offered for sale at Central Illinois processing plants as quoted in the Central Illinois Soybean Processor Report GX GR117. The current time periods values are based on the Nov 16,2001 report using 15.12 cents/lb for oil and 170.00 dollars/ton for 48% meal.

Cooperating Grain Elevators: Assumption Co-op Grain Co.,Palmer;Hintzsche Grain Co., Maple Park; Osterbur and Assoc., Quincy; Prarie Central Co-op,

Ocoya; McLean County Service, McLean; Donovan Farmers Co-op, Beaverville; Sharon Intl., Sharon WI; Schuyler-Brown FS Inc., Rushville; Ursa Farmers Coop, Meyer; Elkart Grain Co., Elkhart; Taloma Farmers Grain, Delavan; Colusa Elevator, Colusa; Cargill at Florence, Gibson City, Tuscola; Lambert Grain, Bourbonnais; Grand Prarie, Tolono; Ludlow Co-op, Paxton.

SOURCE: USDA-Illinois Dept of Ag Market News Springfield, Il 217-782-4925
In state only toll free 888-458-4787
www.ams.usda.gov/mnreports/gx_gr120.txt

Table 5. AGP Soybean Component Premium Schedule, 2001 Crop.

Percent Oil @As-Is Moisture	Premium	Protein Premium 37% or Higher @ As-Is Moisture
19.4 or less*	None	None
19.5 to 19.8	2.0 cents/bu	3.0 cents/bu
19.9 to 20.1	3.0 cents/bu	3.0 cents/bu
20.2 to 20.4	4.0 cents/bu	3.0 cents/bu
20.5 to 20.7	5.0 cents/bu	3.0 cents/bu
20.8 to 21.0	6.0 cents/bu	3.0 cents/bu
21.1 and higher	7.0 cents/bu	3.0 cents/bu

*Minimum oil required is 19.5% to receive protein premium.
SOURCE: Ag Processing, Inc., Omaha, NE