Agricultural Input Market Segments: Who is Buying?

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Abstract

Cluster analysis was used to identify five distinct buyer segments for expendable input purchases for U.S. crop and livestock commercial producers. A multinomial logit model was used to predict segment membership based on demographic, behavioral, and business management factors. Results provide important information for agricultural input suppliers.

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Introduction

Developing effective marketing strategies, and anticipating the needs of current and future customers is one of the most significant challenges faced by agribusiness firms. The drastic and rapid changes in the structure of the U.S. farm sector mean that agribusiness firms must continually adapt their marketing strategies in order to remain competitive. Due to the massive consolidation of production, input purchasing lies in the hands of fewer and fewer operators, many of them considered commercial producers. This research focuses on the commercial producer, defined as those producers with annual sales of $100,000 or greater. Although this group only accounted for 16.1 percent of operations in 2002, they accounted for 77.4 percent of farm cash expenditures in the United States (Economics Research Service; National Agricultural Statistics Service). Commercial producers represent such a large portion of agricultural input expenditures that it is critical for input suppliers to serve them successfully.

Market segmentation is one tool that helps firms better understand their customers' product, service and information preferences. Each distinct market segment may differ in its requirements for products or marketing mixes, and therefore, each may respond differently to changes in a firm's marketing strategies, including price changes, product changes or introductions, distribution channel changes, promotional activities, or others. Once market segments are identified, individual marketing programs can be tailored to the preferences of the targeted customers. Further, by better understanding the trends in their customers' buying preferences, input suppliers can position themselves strategically.

Market segmentation variables can be classified into two broad categories – customer characteristics and customer responses (Kotler). Markets can be segmented based on customer characteristics including geographic, demographic, and/or psychographic variables.

Alternatively, customer response variables can be used to segment markets on the basis of customer behavior, i.e., group buyers by their knowledge of, attitude toward, use of, or response to a product (Kotler). Behavioral segmentation is more informative than segmentation based on customer characteristics because the customer data is more closely aligned with the customers' basic reasons for purchase (Assael). Furthermore, Minhas and Jacobs comment that market segments based on customer characteristics are poor predictors of future buying behavior in the financial services market, and find that benefit segmentation, a form of behavioral segmentation, proved to have much better predictive power.

For agribusiness managers and salespeople, while understanding their current customers' buying behaviors is valuable, this information becomes much more valuable if they can classify new or potential customers by buying behavior segment. Furthermore, the classification needs to be based on characteristics agribusiness managers and salespeople can easily observe or elicit by asking a couple questions (Gupta and Chintangunta; Wyner).

The two goals of this research are first to identify distinct market segments for expendable inputs such as seed, fertilizer, chemicals, etc. for U.S. crop and livestock commercial producers, and second to predict segment membership based on observable characteristics. Following Gloy and Akridge, this research uses cluster analysis to segment the commercial producer market based on survey data describing their buying behavior. Following Baker and Burnham, who used logit analysis to predict membership in market segments identified using cluster analysis, this research uses a multinomial logit model to predict segment membership based on observable demographic, behavioral, and business management factors.

Data

This research uses survey data collected during the 1998 and 2003 Commercial Producer

Projects conducted by The Center for Food and Agricultural Business at Purdue University. The samples of commercial producers in both 1998 and 2003 were drawn from a database that contained information on farm size, location, and enterprise. The sampling criteria included producers who were believed to have sales of $100,000 or greater in a single enterprise, and six enterprises were targeted: corn/soybeans, wheat/barley/canola, cotton, dairy, hogs, and beef cattle. A reminder card was mailed two weeks after the survey, phone follow-ups were used in both years, and e-mail follow-ups were used in 2003.

In 1998, 10,500 surveys were mailed, and there were 1,721 usable questionnaires completed for a response rate of 16.4 percent. Corn/soybean farms were the largest group in 1998 with 27.5 percent of the sample, and wheat/barley farms made up the smallest percentage of total respondents with 11.6 percent of the sample.

In 2003, 12,106 surveys were mailed, and there were 2,094 completed surveys for a response rate of 17.3 percent. In 2003, corn/soybean farms were once again the largest group with 36.5 percent of all responses, and wheat/barley farms made up the smallest percentage with only 6.9 percent of total responses. Additional detail on the sampling procedure and the response rate can be found in Foley. Seventy-six percent of the questions included in the 2003 survey were also used on the 1998 survey.

Methods

Cluster analysis and multinomial logit regression analysis were used to identify the market segments and to understand the demographic and behavioral characteristics of these segments. Cluster analysis involves selecting the variables to segment on, selecting the clustering algorithm, and validating the solution. Principal component analysis and factor analysis were used in this research to help identify the appropriate variables to segment on. Principal

component analysis and factor analysis were used to identify highly correlated or redundant variables, which were then grouped together into a single factor or principal component for the market segmentation. Proper variable selection is critical to identifying the data's true or natural structure. Since irrelevant variables can blur the true data structure, only those variables that help distinguish clusters in a meaningful way should be included in the analysis (Larson; Milligan). Preprocessing the data can help exclude irrelevant or redundant variables (Larson).

The clustering algorithm used in this research was a two-step process. First, a hierarchical clustering step was performed using the minimum variance algorithm, commonly known as Ward's method. Ward's method was used to determine the correct number of clusters in the data and to identify the initial starting point or means for the second-step, non-hierarchical clustering algorithm. Second, the cluster results from Ward's method were used as the seed values to begin the non-hierarchical k-means algorithm. Larson suggests that this two-step clustering algorithm process is a better approach to cluster analysis than a single hierarchical algorithm. A hierarchical clustering algorithm makes only one pass through the data in determining the cluster results whereas the non-hierarchical k-means algorithm passes through the data repeatedly rearranging the observations until no observations change clusters thereby providing more stable and reliable results than a hierarchical clustering algorithm.

Validating the clustering solutions was the final process in the cluster analysis. First, the pseudo-t^2 value and the pseudo *F*-statistic were used to identify the appropriate number of clusters in the data. The pseudo-t^2 value, the pseudo *F*-statistic, and general rules of thumb associated with these statistics have been very successful at recovering the true group structure of the data in Monte Carlo experiments (Gloy and Akridge; Milligan and Cooper). The appropriate number of clusters was identified using these statistics during the hierarchical clustering (Ward's

method). In addition to validating the appropriate number of clusters, it is important to validate the final clustering solution. Significant differences between the means of the clustering variables should be expected since the clustering algorithm maximizes the differences between clusters and minimizes the similarities within each cluster. An appropriate procedure for validating cluster solutions is to test for significant differences between the groups' responses to non-clustering variables (Gloy and Akridge). After potential clusters were identified, tests for significance were run on the non-clustering variables to determine whether or not there were significant differences between the clusters.

Multinomial logit regression analysis was used to predict segment membership based on characteristics that a salesperson can observe about a potential customer, or can easily elicit with a couple questions. Each producer can only belong to one segment, and each buying behavior segment is distinct and unordered. The multinomial logit model for unordered choice sets is motivated by the random utility model; this model assumes that each producer exhibits the buying behavior that maximizes his/her utility. The multinomial logit model is

$$(1) \qquad \Pr(Y_i = j) = \frac{e^{\beta_j' x_i}}{\sum_{k=1}^{5} e^{\beta_k' x_i}}, \text{ for } j=1, 2,..,5$$

where Y_i is the segment membership for the ith producer (j = Balance, Performance, Price, Service, or Convenience), x_i is a vector of independent variables including total sales, operator age, number of consultants hired, and dummy variables identifying livestock production, college degree, using custom services, contract crop production, contract livestock production, ordering products over the internet, and using computers to gather information (see Greene, p914 -917 for further discussion of the multinomial logit model).

Results

The key survey question used in the segmentation analysis asked the respondents to weight the influence of six factors they may use to choose an input supplier. The influence of these factors was measured on a forced sum scale using the following question: *When you choose a supplier for either capital items like equipment or expendable items like pesticides or feed, how is your decision influenced by the following factors? Assign a percentage value to each factor based on its importance in the decision. The percentages should add to 100 in each column.* The response categories included convenience/location, customer services/information, personal factors, price, product performance, and support services.

Principal component analysis indicated that the customer service/information variable and the personal factors variable were highly correlated and contained redundant information. To minimize redundancy, a new variable was created by summing the percentage values for the customer service/information and the personal factors variables. Consequently, the cluster analysis is based on five buying behavior variables: convenience/location, customer services/information/personal factors, price, product performance, and support services. For the 1998 data, these same five buying behavior variables were used in order to compare the size and composition of the 1998 and 2003 segments.

Next, the hierarchical clustering step was performed, and both the pseudo-t^2 value and the pseudo *F*-statistic indicated that there were five natural clusters for the 2003 sample. For comparison purposes, clusters for the 1998 sample were also computed using five clusters. Table 1 presents the sample means for the expendable clustering variables and the names of each cluster based on the most influential factor in the choice of an expendable input supplier. These results meet the validation criteria since members of the segments differ in the average weights

of the factors they use to choose their input suppliers and in their demographics, general business characteristics, management practices, and attitudes.

Segments' Characteristics

In both 1998 and 2003, the Balance segment is the largest segment, with approximately 34 percent of the respondents (Table 1). As the segment's name implies, members of this segment evenly weight each of the factors when selecting a supplier. Members of the Balance segment look for an expendable input supplier who can provide a wide array of benefits including service and information, convenience, competitive prices, and products that perform well.

The Performance segment grew by 1.5 percent from 14.8 percent in 1998 to 16.3 percent in 2003. Members of the Performance segment look for an input supplier who can provide high quality products that are reasonably priced; on average, these members placed over 50 percent of their emphasis on product performance and over 20 percent on price.

The Price segment was the second largest segment, with 17 percent of the respondents in 1998 and 18.5 percent in 2003. Members in this segment placed a large emphasis, roughly 60 percent of their weight, on price when selecting an input supplier. Product performance was the second most important factor to this segment, at 13 percent, in both 1998 and 2003.

The Convenience segment was the smallest group in 2003, and it was the only segment to decline in size between 1998 and 2003 from 16.8 to 14.8 percent, respectively. In both years, 57 percent of the average weight was placed on the convenience and location provided by an input supplier. As with the Performance and Price segments, price was the second most important factor to the Convenience segment in both 1998 and 2003.

The Service segment accounted for 16.8 percent of the respondents in 1998 and 17.3 percent in 2003. Members of the Service segment placed the most weight, close to 50 percent,

on service/information and personal factors when choosing an input supplier. Price was also an important factor to this segment at 15 and 17 percent in 1998 and 2003, respectively.

Demographics and General Business Characteristics

Table 2 presents the demographics and general business characteristics for each of the 1998 and 2003 segments. Between 1998 and 2003, the number of producers possessing a college degree increased in all segments, with the Price segment having the highest percentage of college graduates at 41 and 46 percent, respectively, and the Service sector having the lowest at 33 and 31 percent, respectively, in both years. The differences in the percent of college graduates among the five segments were statistically significant in 2003 but were not in 1998.

From 1998 to 2003, the percent of young producers (under age 35) increased in all segments except Price, which remained constant. In 2003, the Convenience segment contained the largest proportion of older (age 55 and over) producers, and the Performance segment contained the largest proportion of younger (age 54 and under) producers. These are slight changes from 1998 when the Service segment contained the largest proportion of older producers, followed by the Convenience segment, and the Balance and Price segments contained the largest proportion of younger producers, followed by the Performance segment. Results in 2003 also show that the Service segment operated the largest proportion of operations with sales exceeding $100,000, and the Convenience operated the smallest proportion of these operations. Additionally, producers in the Price segment have the most ambitious growth plans while those in the Convenience segment have the least ambitious.

Loyalty

Input suppliers need to know the brand and product loyalty of their customers, as well as their customers' attitudes towards bundling product and information. Table 3 presents the average

agreement of members of each segment with attitudinal statements related to brand loyalty. The largest change in attitudes from 1998 to 2003 was with the statement that generic products represent a good trade-off between price and quality. In 2003, all segments more neutrally agreed than in 1998 when all segments more weakly agreed with the statement. There were no other substantial shifts in attitudes about brand loyalty between 1998 and 2003. The 2003 results indicate the Price segment exhibits the least product loyalty of all the segments. The Price segment agreed the most strongly with the statements that they usually purchase the lowest priced expendable product, that generics offer a good trade-off between price and quality, and that they will increase their use of generics in the next five years. In contrast, the Service segment is the most loyal segment; members appear more interested in the service associated with a product than in the price or performance of branded or generic products. Service segment members disagreed the strongest with the statement that they usually purchase the lowest priced expendable product; and they had the lowest agreement that generics offer a good trade-off between price and quality and that they will increase their use of generics in the next five years.

Overall, producers in all segments disagreed with the statement that suppliers should charge separately for products and information; however, there were significant differences between the segments. The Performance segment was most opposed to the separate pricing scheme, followed by the Price segment. On average, producers in all segments prefer that input suppliers provide a bundle that includes the product and associated information at a single price.

Information Sources

Input suppliers can benefit from understanding which information sources are important to their customers, including how their customers use computers and consultants. Table 4 presents the percentages of producers who used computers as well as how they used computers in 1998 and

2003. Results indicate that computer use increased for all segments from 1998 to 2003 with over 90 percent of the Balance, Performance, and Price segments using computers in 2003. From 1998 to 2003, the Performance and Service segments experienced the largest increases (10 and 6 percent, respectively) in respondents using a computer for financial record keeping. As expected, with the increasing popularity of the Internet, there was a substantial increase between 1998 and 2003 in the use of computers for communication purposes and information gathering. The Performance group experienced the largest increase, from 31 to 66 percent, in the percent of members using a computer for farm communications.

The results for 2003 show strong significant differences between the segments in the use of a computer, the use for keeping farm financial records, the use for farm communications, and the use for information gathering. The Performance segment was the most likely to own a computer while the Convenience segment was the least likely. Likewise, the Performance segment was the most likely to use the computer to keep farm financial records, for farm communications, and for information gathering purposes, while the Convenience segment was the least likely to use the computer for all of these purposes. Nearly 60 percent of the Balance, Performance, and Price segments use the computer to gather information while only 43 and 52 percent of the Convenience and Service segments, respectively, do so. In general, the results show that the Performance and Balance segments are the heavier computer users while the Convenience and Service segments are much less likely to use the computer.

Consultants provide valuable information and services to many commercial producers. From 1998 to 2003, the use of consultants for the five choice consultant practices generally increased for all segments, with the Balance and Performance segments generally experiencing the largest increases (Table 5). Results further indicate significant differences in 2003 among the

segments in the use of each consultant practice, while in 1998 only the use of a management consultant significantly differed among the five segments. Results for 2003 show the Balance segment is the most likely to use a crop, environmental, and marketing consultant; the Service segment is the most likely to use a management consultant; and the Performance segment is the most likely to use an independent nutritionist. In contrast, the Convenience segment is the least likely to use all of these consultants, and 48 percent of this segment do not use any consultants.

Custom Services and Salespeople

The use of custom services appears to be important to and relatively equally used by producers in all buyer segments as shown in Table 6. In 2003, at least 88 percent of members of each of the producer segments used some kind of custom service. Custom fertilizer application was the most commonly used service in both 1998 and 2003, and there were no substantial changes between the two years. Other frequently used custom services for crop production were custom pesticide application and custom harvesting. From 1998 to 2003, a larger percentage of producers in each segment used custom seeding and a smaller percentage used custom pesticide application. Results in 2003 indicate significant differences among the segments in the use of custom pesticide application, harvesting, livestock waste handling, and raising breeding stock replacements. Members of the Price and Convenience segments are the least likely to use any of the custom services, with the Price members being the least likely to use custom seeding and fertilizer and pesticide applications and the Convenience segment being the least likely to use any of the custom livestock services. Members of the Balance and Performance segments had the highest use of custom livestock services among all segments.

Table 7 identifies the characteristics that members of each of the segments desire in a sales representative. In 2003, the primary factor that roughly 60 percent of members of all of the

segments desired was honesty. Another very important characteristic to all segments, especially the Balance and Performance segments, was that salespersons have a high level of technical competence. Also, important to all segments, but especially to the Convenience and Service segments, was that salespersons provide good follow-up service. These three characteristics were also the most important characteristics in 1998, but not to the extent that they were in 2003. Also, as expected, there are certain characteristics that one segment prefers in a salesperson that another segment does not consider as important. Results for 2003 indicate significant differences among the segments for the characteristics of provides relevant/timely information, brings me the best price, is a consultant to my operation, is a good communicator, and calls on me frequently. Among the segments, provides relevant/timely information was most important to the Performance segment and least important to the Convenience segment, while is a good communicator was least important to the Performance group and most important to the Convenience group. Brings me the best price was most important to the Price segment and least important to the Service segment, while is a consultant to my operation was least important to the Price segment and most important to the Service segment. Calls on me frequently was most important to the Service segment and least important to the Performance segment.

Predicting Segment Membership

The multinomial logit analysis was performed using the Stata 8.0 mlogit procedure. Table 8 reports the marginal effects, which indicate the impact that each observable characteristic has on the probability that a customer will be a member of a specific buying behavior segment. The model χ^2 statistic (106.29 with 40 degrees of freedom) is significant at the 1% level of probability. In addition, the predicted shares for each segment are consistent with the actual shares. For all segments except Performance, there are three or four observable characteristics

that provide statistically significant predictive power for segment membership. There are two statistically significant variables that provide information on the Performance segment.

Overall, the two variables that provide the most predictive power are whether or not the farm operator has a college degree, and the number of consultants hired by the producer. If the producer has a college degree, he/she is 4 percent more likely to be a member of the Price segment, and 7.5 percent less likely to be a member of the Service segment. For each consultant that a producer hires, he/she is 3.5 percent more likely to be a member of the Balance segment, and 1.7 percent less likely to be a member of the Price segment, and 2.7 percent less likely to be a member of the Convenience segment.

If a producer raises livestock, he/she is 6.1 percent less likely to be in the Price segment. While the rest of the coefficients on the livestock dummy variable are not statistically significant, they indicate that a producer is 4.3 percent more likely to be in the Balance segment, 2.8 percent more likely to be in the Convenience segment, 1.7 percent more likely to be in the Performance segment, and 2.7 percent less likely to be in the Service segment. Consistent with the data presented in Table 2, older producers are significantly more likely to be in the Convenience segment, and farms with higher total sales are significantly more likely to be in the Service segment. If a producer uses custom services he/she is 6.7 percent less likely to be in the Price segment. If the farmer produces crops under contract, he/she is 5 percent more likely to be in the Balance segment and 3.8 percent less likely to be in the Performance segment. If a producer raises livestock under contract, he/she is 4.8 percent less likely to be in the Service segment.

Computer use by commercial producers and input purchases on the Internet provide substantial information about their input buying behavior, but these may be more difficult for a supplier to observe. However, a salesperson could easily ask a producer if he/she uses the

computer to gather information, and if he/she has ever ordered an agricultural product on the Internet. If the producer has ordered an agricultural product over the Internet, then he/she is 5.8 percent more likely to be in the Performance segment and 4.8 percent less likely to be in the Service segment. If the producer uses the computer to gather information, then he/she is 4.5 percent more likely to be a member of the Balance segment, and 4.4 percent less likely to be a member of the Convenience segment.

Conclusion

This research used cluster analysis and identified five distinct market segments for expendable inputs for U.S. crop and livestock commercial producers. This research also used a multinomial logit model to predict segment membership based on observable demographic, behavioral, and business management factors. Results indicate several key findings.

Buyers in the Balance segment consider all of the input supplier criteria to be equally important. This was the largest segment of commercial producers, with 34 percent of the 2003 sample, and was unchanged in size between 1998 and 2003. Members of this segment tend to be middle-aged and intend to grow their operations about 25 percent. Producers in the Balance segment are likely to continue purchasing branded products. These producers are information intensive and heavy computer users. In addition, they are the heaviest users of consultants and custom services, indicating that they are willing to pay for high quality information and service. Agricultural input suppliers can expect this segment to continue to demand a value bundle that delivers high quality products, services, and information.

For producers in the Price segment, price is the ultimate consideration. This segment is much less interested in service and product performance than other segments. This is the second largest segment at 18.5 percent of the sample, and this segment contains a large group of young

farmers. Members of the Price segment have the most ambitious growth intentions. Price segment members are the most likely to purchase the lowest priced expendable products, and they are the least brand loyal. This segment has the lowest overall use of custom services and also has a relatively low use of consultants in comparison to other segments, indicating that they are unwilling to pay others to do what they can do themselves. These producers are very capable; this segment has the highest percentage of college graduates among all segments. Producers in this segment value salespeople who can deliver the best price.

Producers in the Performance segment choose input suppliers based on the quality of the products and information. Producers in this segment are primarily young to middle-aged, and they have growth intentions of about 25 percent. Performance segment producers are willing to pay more for high quality products, but they are very sensitive to quality differences between brands. Producers in this segment are the most information intensive, and are the heaviest users of computers and the Internet. They value salespeople who offer a high level of technical competence and who provide relevant, timely information.

Producers in the Service segment place a high emphasis on service and information. Between 1998 and 2003, this segment increased in size. This segment operates a larger proportion of larger farms and has ambitious growth plans. Producers in the Service segment are the least likely to have a college degree, and thus, they depend on management consultants and others for information and advice. This segment is the most brand loyal and is the least likely to increase its use of generic products. These producers place a greater emphasis on salespeople who provide good follow-up service and are consultants to their operations. Producers in the Service segment are willing to pay more for products from salespeople who offer them reliable information and good service.

Producers in the Convenience segment choose their suppliers based on location and service. This segment is the smallest segment and is the only one that decreased in size from 1998. Members of this segment operate the smallest farms, and the average age of members is much higher than the other segments and has increased since 1998. Further, they have the lowest expected growth plans. Producers in the Convenience segment are willing to pay more for locally-supplied products. They are the least likely to use the computer to find information and are the least likely to use consultants. They are the most interested in having salespersons who provide good follow-up service and who are good communicators. When marketing to the Convenience segment, input suppliers should focus on giving significant time and attention to each producer.

For agribusiness managers and salespeople, understanding customers and their preferences and behaviors is crucial to success. Salespeople often categorize producers as business buyers, economic buyers, and relationship buyers. This research identified five distinct buyer segments that can be related to the traditional three market segments. Producers in the Balance and Performance segments can be categorized as business buyers. Producers in the Price segment can be categorized as economic buyers. Finally, producers in the Convenience and Service segments can be categorized as relationship buyers. Understanding these buyers and their product, service, and information preferences is key to effectively and profitably serving these customers.

Table 1. Percent Importance by Segment of Each Factor in the Expendable Input Supplier Decision.

		Producer Segments				
Year	Factor	Balance	Performance	Price	Convenience	Service
1998	Convenience / Location	15	6	10	57	17
	Service / Information & Personal Factors	27	13	11	13	50
	Price	22	19	59	17	15
	Product Performance	19	56	13	7	9
	Support Services	17	6	7	6	9
	Percent of Sample	34.5	14.8	17.0	16.8	16.8
2003	Convenience / Location	18	6	9	57	13
	Service / Information & Personal Factors	21	9	10	13	47
	Price	25	26	62	19	17
	Product Performance	20	51	13	8	13
	Support Services	17	7	7	5	11
	Percent of Sample	34.2	16.3	18.5	13.8	17.3

Table 2. Demographics and General Business Characteristics.

Demographic Characteristics	Balance	Performance	Price	Convenience	Service	Prob. of No Assoc.
			1998			
Percent of College Graduates	36	40	41	35	33	0.3055
Age < 35	13	12	16	11	8	0.0121**
Age 35 to 44	27	25	21	21	20	0.0121**
Age 45 to 54	28	30	31	32	35	0.0121**
Age 55 to 64	21	23	26	22	21	0.0121**
Age > 64	10	10	6	13	16	0.0121**
Growth Expectations[a]	26	28	26	28	41	0.0438**
			2003			
Percent of College Graduates	41	43	46	40	31	0.0038**
Age < 35	16	16	16	13	16	0.2000
Age 35 to 44	21	24	21	19	21	0.2000
Age 45 to 54	32	34	34	27	33	0.2000
Age 55 to 64	21	16	20	25	20	0.2000
Age > 64	11	11	9	17	11	0.2000
Age	49	48	49	52	49	
Contract crop production	34%	28%	28%	32%	31%	
Contract livestock production	43%	42%	42%	45%	38%	
Total Sales ($100,000s)	14.1	15.1	15.7	9.9	19.0	
Livestock	71%	72%	65%	68%	70%	
Growth Expectations[a]	25	24	28	19	26	0.1264

[a]Expected percent growth in size of operations from 2003 to 2008
**Significant at 95%

Table 3. Average Agreement with Attitudinal Statements Related to Brand Loyalty[a].

Statement	Balance	Performance	Price	Convenience	Service	Prob. of NoAssoc
			1998			
Expendable brands are more or less the same	2.6	2.5	2.8	2.9	2.7	0.0050**
Generics offer a good trade-off between price and quality	3.6	3.5	3.5	3.4	3.5	0.1792
Will increase use of generics in next five years	3.3	3.2	3.5	3.4	3.2	0.0066**
Usually purchase lowest priced expendables	2.9	2.8	3.3	2.9	2.8	<.0001**
			2003			
Expendable brands are more or less the same	2.6	2.6	2.7	2.8	2.7	0.5496
Generics offer a good trade-off between price and quality	3.1	3.2	3.3	3.2	3.0	0.3798
Will increase use of generics in next five years	3.2	3.2	3.4	3.3	3.1	0.4985
Usually purchase lowest priced expendables	2.8	2.7	3.2	2.8	2.7	0.8057
Suppliers should charge separately for products and information[b]	2.4	2.2	2.3	2.4	2.4	0.0002**

[a]Mean response using a 1-5 Likert Scale where 1=strongly disagree and 5=strongly agree.
[b]Did not ask in the 1998 Commercial Producer Survey.
**Significant at 95%

Table 4. Percent of Producers by Segment that Use Computers.

Practice	Balance	Performance	Price	Conv.	Service	Prob. of No Assoc.
		1998				
Do not own or use a computer	13	18	13	20	22	0.0076*
Own a computer, but not for farm business	11	8	11	9	7	0.5050
Use a computer for keeping farm financial records	69	66	67	65	63	0.4416
Use a computer for farm communications	42	31	42	33	39	0.0128*
Hire a computer farm records service	11	10	14	13	12	0.5547
		2003				
Do not own or use a computer	8	6	9	15	12	0.0011*
Use a computer for keeping farm financial records	72	76	64	63	69	0.001*
Use a computer for farm communications	60	66	54	50	52	0.0001*
Use a computer for information gathering[a]	59	60	57	43	52	<.0001*
Own a computer and use Internet[a]	78	81	81	79	76	0.7099
Order agricultural products on Internet	14%	20%	19%	10%	13%	

*Significant at 95%

[a]Did not ask in the 1998 Commercial Producer Survey.

Table 5. Percent of Producers Using Consultants by Segment.

Practice	Balance	Performance	Price	Conv.	Service	Prob. of No Assoc.
			1998			
Independent Crop Consultant	33	33	34	32	32	0.9694
Environmental Consultant	6	8	5	6	5	0.6586
Marketing Consultant	24	18	22	23	20	0.4297
Management Consultant	13	6	8	10	14	0.0112*
Independent Nutritionist	24	21	23	22	27	0.6995
			2003			
Independent Crop Consultant	44	34	34	32	38	0.0014*
Environmental Consultant	16	14	11	6	14	0.0037*
Marketing Consultant	32	31	23	23	30	0.0072*
Management Consultant	12	13	9	5	14	0.0021*
Independent Nutritionist	26	28	23	15	25	0.0026*
No Consultant[a]	34	37	42	48	39	0.0024*
Mean No. of Consultants	1.3	1.2	0.9	0.7	1.2	

*Significant at 95%

[a]Did not ask in the 1998 Commercial Producer Survey.

Table 6. Percent of Producers Using Custom Services by Segment.

Practice	Balance	Performance	Price	Convenience	Service	Prob. of No Assoc.
			1998			
Custom Fertilizer Application	66	62	56	62	63	0.1452
Custom Pesticide Application	61	55	51	56	58	0.1456
Custom Seeding	14	7	10	9	10	0.0564
			2003			
Uses custom services	91%	91%	88%	89%	91%	
Custom Fertilizer Application	61	64	57	59	62	0.3895
Custom Pesticide Application	57	53	46	55	57	0.0090*
Custom Seeding	15	14	12	14	16	0.5359
Harvesting[a]	32	27	30	23	33	0.0332*
Row Crop Tillage[a]	5	5	4	6	6	0.7667
Livestock Waste Handling[a]	20	21	15	12	16	0.0118*
Livestock Finishing[a]	12	11	12	10	11	0.9540
Raising Breeding Stock Replacements[a]	14	14	10	7	13	0.0414*

*Significant at 95%

[a] Did not ask in the 1998 Commercial Producer Survey.

Table 7. Percent of Members Selecting Each Characteristic as One of the Three Most Important Characteristics of a Sales Representative.

Characteristic	Balance	Performance	Price	Conv.	Service	Prob. of No Assoc.
			1998			
Is honest	47	48	45	43	55	0.0542
Has a high level of technical competence	34	43	34	26	30	0.0010*
Provides good follow-up service	35	34	30	33	32	0.7895
Provides relevant/ timely information	28	35	27	27	25	0.1512
Provides access to supplier resources	26	28	28	27	23	0.7117
Brings me the best price	21	24	39	20	18	<.0001*
Knows my operation well	19	14	10	12	18	0.0051*
Is fair	11	10	9	14	15	0.1225
Is a consultant to my operation	9	7	10	7	8	0.8486
Brings me innovative ideas	24	27	23	21	22	0.6002
Is a good communicator	10	11	9	12	12	0.6907
Calls on me frequently	5	5	7	8	9	0.1087
Is a friend	8	4	6	8	8	0.3621

*Significant at 95%

Table 7. Continued.

Characteristic	Balance	Performance	Price	Conv.	Service	Prob. of No Assoc.
		2003				
Is honest	61	64	58	59	56	0.3300
Has a high level of technical competence	51	53	45	45	46	0.1281
Provides good follow-up service	36	32	29	38	36	0.0965
Provides relevant/ timely information	25	29	23	16	27	0.0052*
Provides access to supplier resources	7	6	10	7	7	0.2516
Brings me the best price	24	21	36	19	16	<.0001*
Knows my operation well	20	17	21	22	16	0.3798
Is fair	17	17	14	17	16	0.8317
Is a consultant to my operation	8	13	6	11	14	0.0015*
Brings me innovative ideas	12	12	9	9	11	0.4019
Is a good communicator	10	8	9	16	9	0.0124*
Calls on me frequently	7	4	7	6	11	0.0068*
Is a friend	6	6	6	6	8	0.5846

*Significant at 95%

Table 8. Multinomial Logit Model Predicting Segment Membership in 2003. Marginal Effects, Standard Errors in Parentheses.

Variables	Balance	Performance	Price	Convenience	Service
Total Sales ($100,000s)	-0.0004 (0.0006)[a]	0.0002 (0.0003)	0.0005 (0.0003)	-0.001 (0.001)	0.0006** (0.0003)
Livestock	0.043 (0.033)	0.017 (0.025)	-0.061** (0.029)	0.028 (0.020)	-0.027 (0.027)
Age	-0.0005 (0.001)	-0.00009 (0.0008)	-0.0007 (0.0008)	0.001** (0.0007)	-0.00005 (0.0008)
College degree	0.006 (0.025)	0.022 (0.020)	0.040** (0.020)	0.006 (0.017)	-0.075*** (0.019)
No. of consultants	0.035*** (0.010)	0.004 (0.007)	-0.017** (0.008)	-0.027*** (0.009)	0.006 (0.008)
Uses custom services	0.025 (0.039)	0.008 (0.030)	-0.067* (0.034)	0.0004 (0.025)	0.032 (0.028)
Contract crop production	0.050* (0.028)	-0.038* (0.021)	-0.023 (0.022)	0.014 (0.020)	-0.002 (0.021)
Contract livestock production	0.026 (0.029)	0.028 (0.024)	-0.017 (0.023)	0.012 ((0.022)	-0.048** (0.020)
Order agricultural products on internet	-0.037 (0.036)	0.058* (0.031)	0.038 (0.030)	-0.011 (0.025)	-0.048* (0.048)
Use computers to gather information	0.045* (0.026)	0.019 (0.020)	0.004 (0.021)	-0.044** (0.018)	-0.023 (0.020)
Predicted Share	35.4%	17.1%	18.1%	12.5%	16.9%
Actual Share	34.2%	16.3%	18.5%	13.8%	17.3%
χ^2 statistic	106.29	Prob > χ^2	0.000		

*, **, and *** represent 0.10, 0.05, and 0.01 levels of statistical significance, respectively.
[a]Numbers in parentheses are standard errors.

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