

## CHAPTER III: *Survey of Retail Meat Price Data Users*

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### 3.1. Overview and Objectives of the Survey

The survey<sup>1</sup> was developed for two reasons:

1. To determine how respondents rate the changes in terms of relevance and importance.
2. To gather information on how respondents view the proposed changes, e.g., quantity weighting and the frequency of reporting of prices, and

### 3.2. Survey format

A web-based survey was developed using Web Application Research and Development (WARD)<sup>2</sup> of Virginia Tech (VT). The survey tool, known as *SurveyMaker*,<sup>3</sup> was developed for use free of charge by all VT faculty, staff, and students to create and administer simple surveys and generate website feedback and registration forms. To draft the survey, the user is prompted with regard to the format of the questions, the type of response, and the addition, deletion, and editing of questions. To use the survey instrument, a website location was provided for the selected respondents where the survey could be completed and returned online. *Surveymaker* enables submitted results to be exported directly into a database such as Excel, SAS, or SPSS.

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<sup>1</sup> See attached Appendix for a copy of the survey.

<sup>2</sup> WARD offers a variety of web-related services to VT departments and organizations. WARD also serves as a web technology advocacy group for Information Systems.

<sup>3</sup> The online survey tool can be found at: <http://www.survey.vt.edu>

Several advantages are associated with administering a web-based survey:

1. The ease associated with creating the survey;
2. The ease associated with completing the survey. Respondents have easy, direct access to the survey through a web link that they receive via e-mail;
3. The online format negates incompatibility problems, e.g., Word Perfect versus Microsoft Word software;
4. It creates spaces for respondents to type the answers to questions while the survey is on their computer screens without scrambling the format of the survey document;
5. Online completed survey results can be exported into a data processing program;
6. The submitted results are anonymous; and
7. It lowers cost due to paperless format and direct submission of results into a database rather than needing data transcription and verification.

*SurveyMaker* has some disadvantages in the choice of response design. Firstly, this survey tool makes it possible to compile only survey instruments with fairly simple and straightforward formats. For more complicated elicitation formats that require branching, multi-page inputs, etc., other survey tools have to be used. Secondly, while the structure ensures anonymity, it leads to problems in determining whom to target for a reminder follow-up. Nevertheless, while additional time is needed to create the online survey, this cost is outweighed by the reduced time needed to administer the survey and put data into a database.

The survey was sent out to all the members of the current NCR-134<sup>4</sup> list serve, the NE-165 Regional Research Project,<sup>5</sup> and a subset of the members of the American Agricultural Economics Association (AAEA).<sup>6</sup> These membership lists were chosen as they were considered to be the largest and most complete pool of retail meat price data users in academia - the target audience. A separate listserv was created from these membership lists and all duplications were removed before the e-mail list consisting of 496 respondents was finalized.

### **3.3. Survey Design**

#### ***3.3.1. Study Population and Sampling***

The survey targeted the whole population of researchers and users of retail meat price data. The size of the study population – 496 researchers – corresponded with the number of names on the listserv. Although the distribution of the survey was an attempt to survey the whole population, it cannot be considered a census as the whole population of potential respondents did not complete the survey. Nonetheless, the response rate of 21% was considered to be representative of the whole population of users of retail meat price data.

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<sup>4</sup> NCR-134 is a North Central Research Effort by accredited Land Grant Universities. The primary focus is on applied commodity price analysis, market research management, and forecasting.

<sup>5</sup> NE-165 is made up of members primarily from universities and government agencies and a core research group at the Food Marketing Policy Center of the Universities of Connecticut and Massachusetts. Those members who fall under the research categories of *Strategic Decision-Making and Marketing* and *Consumer Risk Perception and Demand* were polled. Further information about NE-165 can be found online at <http://www.umass.edu/ne165/>.

<sup>6</sup> Members of AAEA who specialize in the research areas of *Marketing* and *Consumer Economics* were included in this list.

### ***3.3.2. Question and Response Format***

To avoid measurement error, to reduce the time associated with completing the survey, and to maintain the respondents cooperation, the majority of the questions on the survey were in the form of multiple-choice questions. A major issue associated with the design of multiple-choice questions is the number of alternatives to include. For questions aimed at establishing both the importance of the data and the influence of the data shortcomings, the respondents were given three response levels from which to choose in the multiple choice questions. The number of response levels was limited to ensure a large enough response so as to be meaningful and statistically significant given the small original population and anticipated response rate.

### ***3.3.3. Pretesting and Revision***

In the process of designing and readying the survey for final operations, it was pretested and revised a number of times. The initial draft of the survey consisted of a few open-ended questions and as such consisted of a highly unstructured response format. However, the pre-test produced varying results with the respondents' answers ranging from the highly loquacious to the very brief, due in part to the ambiguous nature of the questions. Furthermore the respondents' answers also indicated that too many implicit assumptions regarding the respondents' frame of reference were embedded in the questions. These assumptions resulted in misunderstandings of, and digressions from, the issues that the survey aimed to address.

Therefore, in revising the questionnaire, the number of questions was increased to include separate questions directed at eliciting responses from the respondents about various aspects<sup>7</sup> about the issues of quantity weighting and frequency of price reporting. Additionally, the questions took on a multiple-choice format to guide the respondents

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<sup>7</sup> These aspects being the mean, the variance, and the variance of the own-price, cross-price and income elasticity parameter estimates as they apply to a beef, pork, and chicken price series.

thinking about the correct aspect of the issues being addressed and thus eliminate the problem of ambiguity as well as reducing the time it took to complete the survey. In the revision process, the questions detailing the respondents work background and the use and application of retail meat price data in their field of work were expanded. It was thought that this would be useful in evaluating any changes in the price collection and reporting process that the respondents recommend as well as aiding in establishing the existence of potential correlations between the respondents' field of expertise and the nature of their answers.

The questionnaire underwent three pre-tests and was frequently revised before the final draft was ready to be administered. The survey was structured so that, on average, only 10 to 15 minutes would be required to complete it.

#### ***3.3.4. Logistics***

After the request for cooperation and link to the questionnaire was sent out to the listserv, the respondents were given 10 days to take the survey online. Upon completion of the survey, the respondents were asked to "reply" to the sender in order that a record could be kept of who had indeed taken the survey. After 10 days had passed, a reminder e-mail was sent out to all those respondents who had not yet taken the survey requesting their cooperation.

### **3.4. Survey Organization and Layout**

According to Kinnear and Taylor (1996), a questionnaire is typically made up of five parts, namely: (1) identification data, (2) request for cooperation, (3) instructions, (4) information sought, and (5) classification data. The retail meat price data users survey did not include an identification data section that asked respondents for their name, address, and phone number in order to ensure anonymity and because this information was not deemed important. As a link to the survey was sent out to the respondents via an e-mail that highlighted the purpose of the study and the survey, the request for cooperation and instructions regarding the completion of the survey were embedded in this e-mail and did not form part of the body of the survey.

The classification data section, which is concerned with gathering information about the characteristics of the respondents, headed the survey. As respondents were classified according to the type of institution they work for, the highest level of education, and their work emphasis rather than personal information such as income, age, etc., this section could be included first to ensure that it was indeed completed, even if respondents did not perhaps complete the survey. The information sought is divided into five sections, each of which is concerned with collecting information on a different aspect of the development of a new price reporting system.

#### ***3.4.1. Information sought***

##### **Section A: Retail Meat Price Data Use and Application**

Section A asks respondents about the nature of their work and how they use retail meat price data. Apart from establishing how important retail meat price data are as an input in the respondents' work, this section also tried to determine the extent to which the respondents thought various shortcomings influenced the usefulness of the data in various research applications. The inclusion of this classification data section was to establish

whether any correlations exist between the type of work the respondents do, how important the data are in their work, and what changes they would like to see made to the current price collection and reporting system.

### Section B: Quantity Weighting vs Simple Averages

Table 3.1 lists the hypotheses that were tested in this section.

**Table 3.1. Null Hypotheses Proposed under Section B: Quantity Weighting vs Simple Averages**

Question Number	Null Hypothesis	H <sub>0</sub>	H <sub>A</sub>
8	The new quantity weighted meat price series is perceived to be different from the price series consisting of simple averages		
8.1	The quantity weighted beef price series is perceived to be equal to the simple average price series	$\mu_A = \mu_B$	$\mu_A \neq \mu_B$
8.2	The quantity weighted pork price series is perceived to be equal to the simple average price series	$\mu_A = \mu_B$	$\mu_A \neq \mu_B$
8.3	The quantity weighted chicken price series is perceived to be equal to the simple average price series	$\mu_A = \mu_B$	$\mu_A \neq \mu_B$
9	Quantity weighting is perceived to have an impact on the own price, cross price, and income elasticity parameters		
9.1a	The own price elasticity of the quantity-weighted beef price series is perceived to be equal to that of the simple average price series	$\varepsilon_A = \varepsilon_B$	$\varepsilon_A \neq \varepsilon_B$
9.1b	The cross price elasticity of the quantity-weighted beef price series is perceived to be equal to that of the simple average price series	$\varepsilon_A = \varepsilon_B$	$\varepsilon_A \neq \varepsilon_B$

<b>Question Number</b>	<b>Null Hypothesis</b>	<b>H<sub>0</sub></b>	<b>H<sub>A</sub></b>
9.1c	The income elasticity of the quantity-weighted beef price series is perceived to be equal to that of the simple average price series	$\epsilon_A = \epsilon_B$	$\epsilon_A \neq \epsilon_B$
9.2a	The own price elasticity of the quantity-weighted pork price series is perceived to be equal to that of the simple average price series	$\epsilon_A = \epsilon_B$	$\epsilon_A \neq \epsilon_B$
9.2b	The cross price elasticity of the quantity-weighted pork price series is perceived to be equal to that of the simple average price series	$\epsilon_A = \epsilon_B$	$\epsilon_A \neq \epsilon_B$
9.2c	The income elasticity of the quantity-weighted pork price series is perceived to be equal to that of the simple average price series	$\epsilon_A = \epsilon_B$	$\epsilon_A \neq \epsilon_B$
9.3a	The own price elasticity of the quantity-weighted chicken price series is perceived to be equal to that of the simple average price series	$\epsilon_A = \epsilon_B$	$\epsilon_A \neq \epsilon_B$
9.3b	The cross price elasticity of the quantity-weighted chicken price series is perceived to be equal to that of the simple average price series	$\epsilon_A = \epsilon_B$	$\epsilon_A \neq \epsilon_B$
9.3c	The income elasticity of the quantity-weighted chicken price series is perceived to be equal to that of the simple average price series	$\epsilon_A = \epsilon_B$	$\epsilon_A \neq \epsilon_B$
10	Quantity weighting is perceived to have an impact on the variance of the own price, cross price, and income elasticity parameter estimates		
10.1a	There variance of the own-price elasticity parameter estimator of the quantity weighted beef price series is perceived to be equal to that of the simple average series	$\sigma_A^2 = \sigma_B^2$	$\sigma_A^2 \neq \sigma_B^2$



Question Number	Null Hypothesis	H <sub>0</sub>	H <sub>A</sub>
10.1b	The variance of the cross-price elasticity parameter estimator of the quantity weighted beef price series is perceived to be equal to that of the simple average series	$\sigma_A^2 = \sigma_B^2$	$\sigma_A^2 \neq \sigma_B^2$
10.1c	The variance of the income elasticity parameter estimator of the quantity weighted beef prices series is perceived to be equal to that of the simple average series	$\sigma_A^2 = \sigma_B^2$	$\sigma_A^2 \neq \sigma_B^2$
10.2a	There variance of the own-price elasticity parameter estimator of the quantity weighted pork price series is perceived to be equal to that of the simple average series	$\sigma_A^2 = \sigma_B^2$	$\sigma_A^2 \neq \sigma_B^2$
10.2b	The variance of the cross-price elasticity parameter estimator of the quantity weighted pork price series is perceived to be equal to that of the simple average series	$\sigma_A^2 = \sigma_B^2$	$\sigma_A^2 \neq \sigma_B^2$
10.2c	The variance of the income elasticity parameter estimator of the quantity weighted pork prices series is perceived to be equal to that of the simple average series	$\sigma_A^2 = \sigma_B^2$	$\sigma_A^2 \neq \sigma_B^2$
10.3a	There variance of the own-price elasticity parameter estimator of the quantity weighted chicken price series is perceived to be equal to that of the simple average series	$\sigma_A^2 = \sigma_B^2$	$\sigma_A^2 \neq \sigma_B^2$
10.3b	The variance of the cross-price elasticity parameter estimator of the quantity weighted chicken price series is perceived to be equal to that of the simple average series	$\sigma_A^2 = \sigma_B^2$	$\sigma_A^2 \neq \sigma_B^2$

Question Number	Null Hypothesis	H <sub>0</sub>	H <sub>A</sub>
10.3c	The variance of the income elasticity parameter estimator of the quantity weighted chicken prices series is perceived to be equal to that of the simple average series	$\sigma_A^2 = \sigma_B^2$	$\sigma_A^2 \neq \sigma_B^2$

### Section C: Frequency of Price Reporting

Section C focuses on the mean of the distribution and the precision of the three elasticity parameter estimators as they relates to the issue of frequency of price reporting. Table 3.2 summarizes the hypotheses being tested in this section of the survey.

**Table 3.2. Null Hypotheses Proposed under Section C: Frequency of Price Reporting**

Question Number	Null Hypothesis	H <sub>0</sub>	H <sub>A</sub>
11	Reporting price more frequently than on a monthly basis is perceived to have an impact on the mean of the price series		
11.1	The mean of a more frequently reported beef price series is perceived to be equal to the mean of the price series reported on a monthly basis	$\mu_A = \mu_B$	$\mu_A \neq \mu_B$
11.2	The mean of a more frequently reported pork price series is perceived to be equal to the mean of the price series reported on a monthly basis	$\mu_A = \mu_B$	$\mu_A \neq \mu_B$
11.3	The mean of a more frequently reported chicken price series is perceived to be equal to the mean of the price series reported on a monthly basis	$\mu_A = \mu_B$	$\mu_A \neq \mu_B$

<b>Question Number</b>	<b>Null Hypothesis</b>	<b>H<sub>0</sub></b>	<b>H<sub>A</sub></b>
12	The frequency of price reporting is perceived to have an impact on the variance of the own price, cross price, and income elasticity parameter estimates		
12.1a	The variance of the own-price elasticity parameter estimator of a more frequently reported beef price series is perceived to be equal to that of the current beef price series reported once a month	$\sigma_A^2 = \sigma_B^2$	$\sigma_A^2 \neq \sigma_B^2$
12.1b	The variance of the cross-price elasticity parameter estimator of a more frequently reported beef price series is perceived to be equal to that of the current beef price series reported once a month	$\sigma_A^2 = \sigma_B^2$	$\sigma_A^2 \neq \sigma_B^2$
12.1c	The variance of the income elasticity parameter estimator of a more frequently reported beef price series is perceived to be equal to that of the current beef price series reported once a month	$\sigma_A^2 = \sigma_B^2$	$\sigma_A^2 \neq \sigma_B^2$
12.2a	The variance of the own-price elasticity parameter estimator of a more frequently reported pork price series is perceived to be equal to that of the current pork price series reported once a month	$\sigma_A^2 = \sigma_B^2$	$\sigma_A^2 \neq \sigma_B^2$
12.2b	The variance of the cross-price elasticity parameter estimator of a more frequently reported pork price series is perceived to be equal to that of the current pork price series reported once a month	$\sigma_A^2 = \sigma_B^2$	$\sigma_A^2 \neq \sigma_B^2$
12.2c	The variance of the income elasticity parameter estimator of a more frequently reported pork price series is perceived to be equal to that of the current pork price series reported once a month	$\sigma_A^2 = \sigma_B^2$	$\sigma_A^2 \neq \sigma_B^2$

Question Number	Null Hypothesis	H <sub>0</sub>	H <sub>A</sub>
12.3a	The variance of the own-price elasticity parameter estimator of a more frequently reported chicken price series is perceived to be equal to that of the current chicken price series reported once a month	$\sigma_A^2 = \sigma_B^2$	$\sigma_A^2 \neq \sigma_B^2$
12.3b.	The variance of the cross-price elasticity parameter estimator of a more frequently reported chicken price series is perceived to be equal to that of the current chicken price series reported once a month	$\sigma_A^2 = \sigma_B^2$	$\sigma_A^2 \neq \sigma_B^2$
12.3c.	The variance of the income elasticity parameter estimator of a more frequently reported chicken price series is perceived to be equal to that of the current chicken price series reported once a month	$\sigma_A^2 = \sigma_B^2$	$\sigma_A^2 \neq \sigma_B^2$

#### Section D: Price Detail on Different Meat Cuts

Respondents were asked to list, in descending order of importance, three possible impacts that more complete detail on cut price details could have on cross price and own price elasticities.

#### Section E: Recommendations

Two questions were asked in Section E. The first question asked the respondents to rank six proposed changes according to how important they thought the changes were. Any important changes were not included in the list, the respondents were encouraged to add them and expand the ranking scale accordingly to include the additions. The second question, which was open ended, asked the respondents to describe what the ERS should do in the building of a new price collection and distribution system.

## Section F: Assumptions

Because the survey was web-based, the respondents could not make notes in the margin as would have been the case with a paper survey. This section, dealing with assumptions, was included to allow the respondents to note any assumptions that they may have made in the preceding sections to help clarify their responses.

### 3.5. Description of Responses

The survey was mailed electronically to 496 respondents and of these, 106 respondents completed the survey – a response rate of 21%. (A summary of the actual number of responses to each question is in Appendix A). Of the total respondents of 106 respondents, 60% were received from researchers employed at *Land Grant Universities* and 12% from those employed at *Federal Agencies*. Table 3.3 shows the distribution of the entries by type of institution or organization.

**Table 3.3. Percentage Distribution of Responses Across Categories of Employment**

<b>Category of Employment</b>	<b>% of Responses</b>
Land Grant University	60
Other University or College	7
Federal Agency	12
State Agency	0
National Trade Association/Group	2
State Trade Association/Group	2
Industry (Consulting/Advisory)	5
Industry (Manufacturing, Processing, Retail, etc.)	3
Other	8

The majority of the respondents (86%) have a PhD as their highest level of education. Only 2% of the respondents had a BS Degree as their highest level of education. On average, respondents have been in their current jobs for 12 years.

**Table 3.4. Professional Activities of Respondents**

	<b>% of Respondents</b>
Undergraduate Teaching and Advising	21
Graduate Teaching and Advising	15
Applied Research	45
Theoretical Research	11
Outreach/Extension	37

**Table 3.5. Emphasis of Work within the Meat Supply Chain**

	<b>% of Respondents</b>
Producer or Farm Level	39
Processing, Agribusiness, Beyond Farm Gate	38
Retail Level	14
Consumer or Consumption Level	23

### **3.6. Methodology for Analyzing the Survey Results**

Responses that were unclear, incomplete, mismatched, and/or contained conflicting information were dropped from the dataset before proceeding with the data analysis.

#### ***3.6.1. Hypothesis Testing***

The chi-square ( $\chi^2$ ) test was used to test the axioms surrounding quantity weighting and the frequency with which prices are reported.

The formula for the chi-square test is as follows:

$$\chi^2 = \sum_{i=1}^k \frac{(O_i - E_i)^2}{E_i}$$

Where  $k$  = number of categories of the variable

$O_i$  = observed number of respondents in category  $i$

$E_i$  = hypothesized number of respondents in category  $i$

Since the univariate chi-square test was used to test the hypotheses, the degrees of freedom ( $df$ ) equal  $k-1$ . In conducting the chi-square tests, each category was assumed to have an equal probability of being selected, therefore, the number of respondents in each category was expected to be equal. All the tests were conducted at the  $\alpha = 0.05$  significance level. The null hypothesis was rejected when the calculated chi-square exceeded the critical chi-square at  $k-1$   $df$ . Table 3.6 illustrates the format used to determine the chi-square.

**Table 3.6. Calculation of the Chi-Square for the Categories of the Variable**

Category of the Variable	$O_i$	$E_i$	$(O_i - E_i)$	$(O_i - E_i)^2$	$(O_i - E_i)^2/E_i$
Category 1					
Category 2					
Category 3					
<b>Total</b>	<b><math>O_i</math></b>	<b><math>E_i</math></b>			<b><math>(O_i - E_i)^2/E_i</math></b>

## 3.7. Results and Discussion

### 3.7.1. Results of Section A: Retail Meat Price Data Use and Application

*Question 6 – Indicate the level of importance of the final use of retail meat price data in a range of applications, from the econometric modeling of demand relationships, to the direct and indirect analysis of farm policy decisions*

Sub-question 6.8, the use of retail meat price data to test whether structural parameters such as own-price, cross-price, and income elasticities have changed over time, had the highest number of responses in the *Very Important* category. The other questions where the final use of retail meat price data was deemed to be of the highest importance are 6.1, 6.6, 6.7, and 6.9. Table 3.7 lists the number of responses in each category for each sub-question of question 6. From this table it would appear that there is a pattern in the responses to question 6 with the categories *Somewhat Important* and *No Work in this Category* typically receiving the highest number of responses and *Not Important* receiving the smallest number of responses. The number of responses in the category *Very Important* is usually lower than the number of responses in the categories *No Work in this Category* and *Somewhat Important*. Furthermore, across sub-questions 6, the percentage of responses in each category tend to be similar.



**Table 3.7. Percentage of Responses by Category in Question 6 – Importance of Final Use of Retail Meat Price Data**

<b>Category of Final Use of Retail Meat Price Data</b>	<b>Very Important (%)</b>	<b>Somewhat Important (%)</b>	<b>Not Important (%)</b>	<b>No Work in this Category (%)</b>
6.1. Econometric modeling of demand relationships	31	42	7	20
6.2. Developing methodologies and/or testing specific modeling approaches	20	33	12	35
6.3. Applied research on firm-level pricing strategies – stimulate business	19	37	9	35
6.4. Applied research on firm-level decisions regarding which cut within a meat class to promote via price specials	12	23	9	56
6.5. Applied research on firm-level price and sales forecasts	21	33	8	38
6.6. Applied research for trade groups regarding the impact of demand on the meat sector	34	32	5	29
6.7. Testing hypotheses on the direction and/or magnitude of demand shifts	39	37	9	15
6.8. Testing for changes over time in elasticity parameter elasticities	39	40	6	15
6.9. Testing for differences in response parameters at different levels of income	30	33	9	28
6.10. Researching the impact of feedgrain farm policy decisions on size and viability of a meat sector	19	33	10	38

<b>Category of Final Use of Retail Meat Price Data</b>	<b>Very Important (%)</b>	<b>Somewhat Important (%)</b>	<b>Not Important (%)</b>	<b>No Work in this Category (%)</b>
6.11. Researching the impact of feedgrain policy decisions on price levels of meats at the farm, wholesale, retail level	21	27	12	40
6.12. Researching the impact of feedgrain farm policy decisions on income levels of producers	21	27	12	40

*Question 7 – Review the influence of possible shortcomings in the traditional retail meat price series on the usefulness of the data*

The respondents considered the lack of quantity weighting by sales in the BLS reported price series to be the shortcoming with the largest influence on the usefulness of the data. The respondents ranked the reporting of composite prices and the lack of even monthly price data for all the important cuts of beef, pork and chicken in the historical retail meat prices data to be the second most important shortcoming affecting the usefulness of the data. The aggregation of historical price data to a national level was considered to be the third most influential shortcoming. Contrary to expectations, respondents indicated that the aggregation of data and frequency of reporting was less critical in influencing analytical results than the lack of quantity-weighting or regional reporting. Table 3.8 summarizes the responses to question 7.

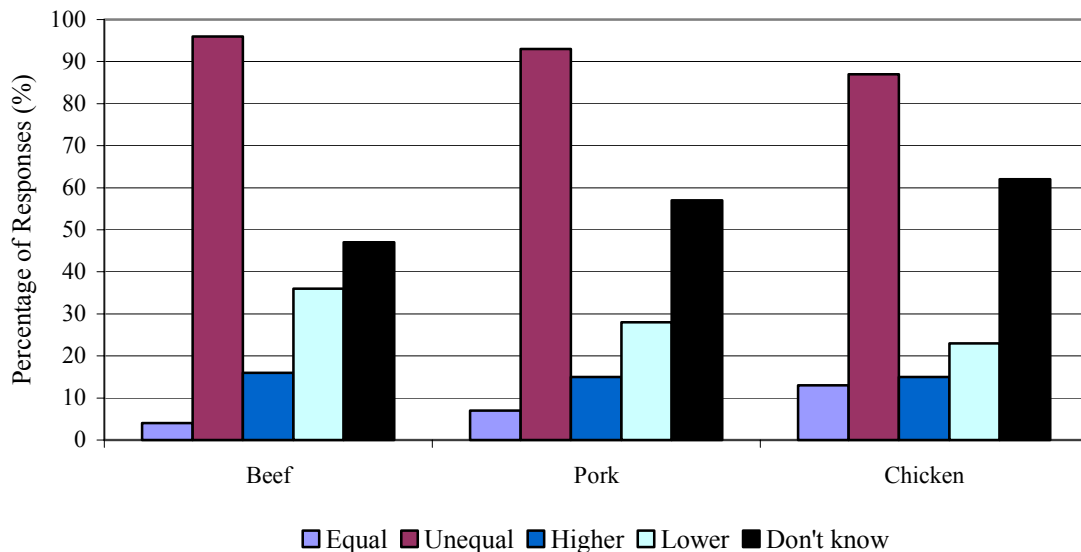
**Table 3.8. Percentage of Responses under Question 7 – Review of the Extent of the Influence of Possible Shortcomings on the Usefulness of the Traditional Retail Meat Price Data**

<b>Possible Shortcoming</b>	<b>Large Influence (%)</b>	<b>Small Influence (%)</b>	<b>No Influence (%)</b>	<b>No Opinion (%)</b>
7.1. Reported price series are simple averages and not weighted by quantity of sales	63	28	0	9
7.2. Price observations are aggregated to monthly averages	23	57	11	9
7.3. Price reports more frequently than on a monthly basis would be useful in policy applications	25	47	16	12
7.4. Price series is a composite series – no prices are available for all the important meat cuts <sup>†</sup>	55	27	6	12
7.5. Price information on meats by region is needed	49	32	7	12
7.6. Price data need to be reported by subsets of the demographic and income profiles of consumers	35	34	14	17

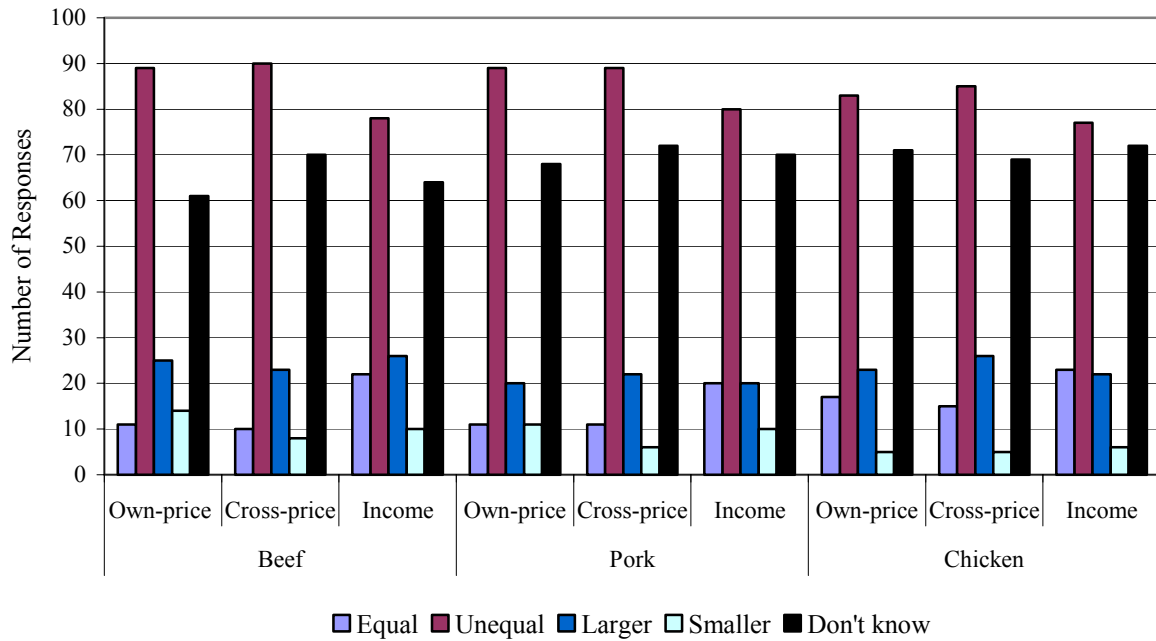
<sup>†</sup>While analyzing the survey results, an error in the form of a double negative was noticed in the wording of this question thus making the results of this question difficult, if not impossible, to interpret accurately. For completeness sake, the responses to the question have been included in this table, but the results may not be reliable.

### 3.7.2. Results of Section B: Quantity Weighting vs Simple Averages

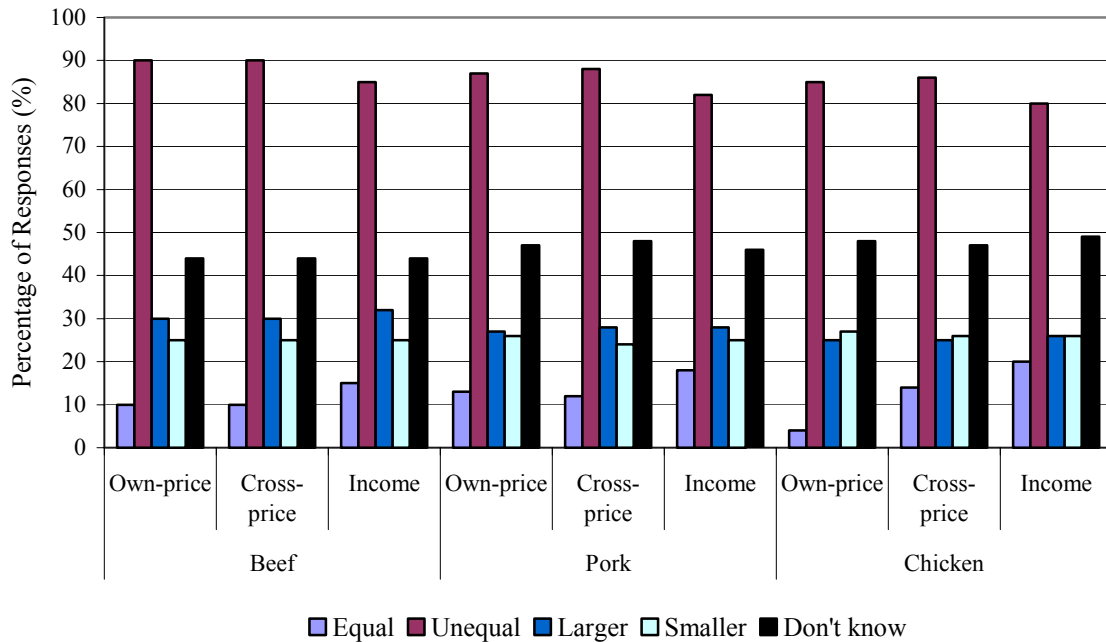
Question 8 dealt with the effect that the use of quantity weighting would have on the mean value of the price series. Question 9 asked respondents about the affect of quantity weighting on the value of the own-price, cross-price, and income elasticity parameters. Question 10 was concerned with the variance of the own-price, cross-price and income parameter estimators. Respondents generally thought that all of these measures would be different if weighting prices by the quantity of sales were introduced to the historical price series consisting of simple averages. Figures 3.1, 3.2 and 3.3 show the distribution of responses across questions 8, 9, and 10. The responses appear to have a pattern with the number of responses being more or less similar across the sub-questions.



**Figure 3.1. Percentage Responses for Question 8: Perceived Value of a Quantity-Weighted Price Series vs a Simple Average Price Series.**



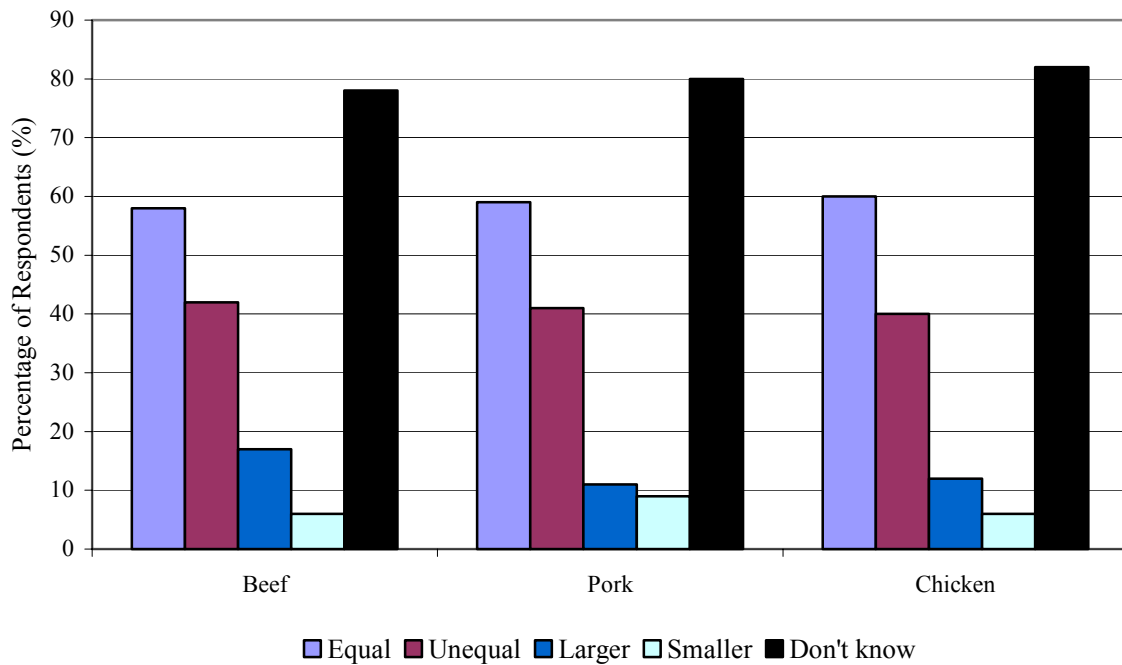
**Figure 3.2. Percentage Responses for Question 9: Perceived Value of Quantity-Weighted vs Simple Average Price Series Elasticity Parameters.**



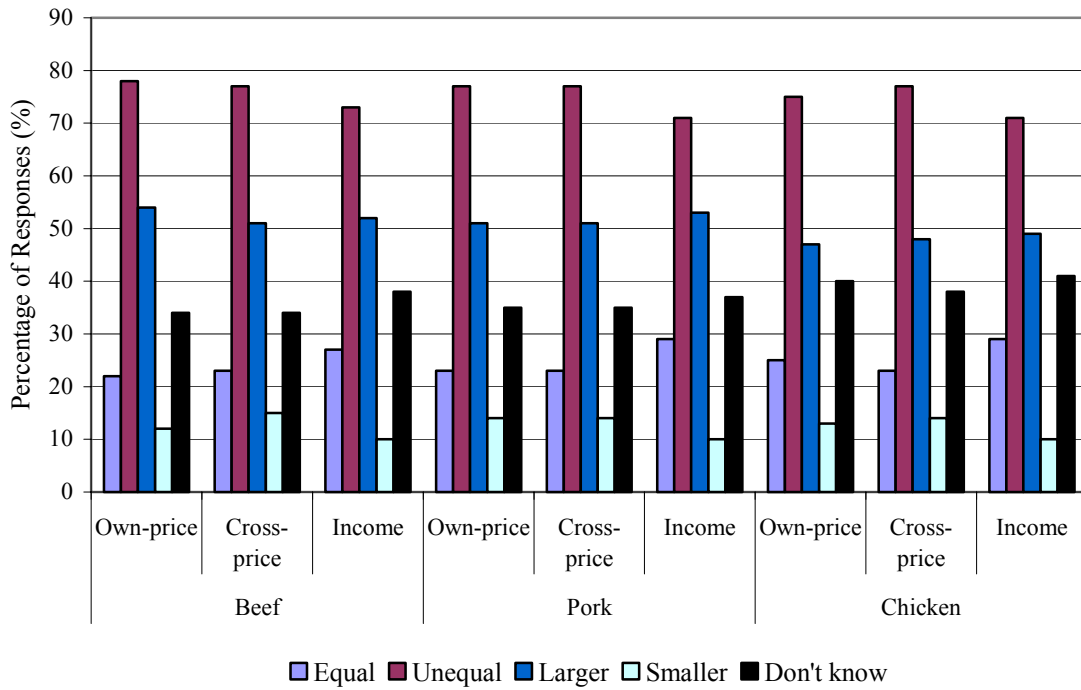
**Figure 3.3. Percentage Responses for Question 10: Perceived Variance of Quantity-Weighted vs Simple Average Price Series Elasticity Parameters.**

### 3.7.3. Results of Section C: Frequency of Price Reporting

The respondents thought that the mean of a price series reported more frequently than on a monthly basis would not be different from the mean of the current BLS price series that is reported once a month (Question 11). On the other hand, the respondents did think that the variance of the own-price, cross-price, and income parameter estimators of a more frequently price series would be different from those of the current price series that is reported on a monthly basis (Question 12). However, the distribution of responses across these two questions appears to be similar to the responses in these questions (Figures 3.4 and 3.5).



**Figure 3.4. Percentage Responses for Question 11: Perceived Mean Value of the Meat Price Series Reported Monthly vs more Frequently Reported Meat Price Series.**



**Figure 3.5. Percentage Responses for Question 12: Perceived Variance of Elasticity Parameter Estimators of a More Frequently Reported Meat Price Series vs Meat Price Series Reported Monthly.**

### 3.7.4. Results of the Hypothesis Testing

The hypotheses were tested using the Chi-Square ( $\chi^2$ ) test. The tests were conducted at  $\alpha = 0.05$ .

Table 3.9 illustrates the  $\chi^2$  test as it applies to the testing of the hypotheses. This table shows the set-up of the  $\chi^2$  test as it applies to question 8.1. The null hypothesis is that a quantity-weighted beef price series is equal to a beef price series consisting of simple average prices. Thus, the expectation is that an equal number of respondents are in each category of use. The number of degrees of freedom equals 1, as the number of categories is 2.<sup>9</sup> The calculated chi-square equals 79.67. At  $\alpha = 0.05$ , the critical  $\chi^2$  value at 1 *df* is

<sup>9</sup> In a univariate chi-square test, the degrees of freedom equal k-1.

3.84. Therefore, as the calculated chi-square exceeds the critical chi-square, the null hypothesis of equality is rejected and the conclusion is that a perceived difference exists between a beef price series consisting of quantity weighted prices and a beef price series consisting of simple average prices.

**Table 3.9. Calculation of Chi Square for Question 8.1 – Perceived Value of a Quantity Weighted Beef Price Series vs Simple Average Beef Price Series**

Category of Use	$O_i$	$E_i$	$(O_i - E_i)$	$(O_i - E_i)^2$	$(O_i - E_i)^2/E_i$
Equal	4	47.5	-43.5	1892.2	39.8
Unequal	91	47.5	43.5	1892.2	39.8
<b>Total</b>	<b>95</b>	<b>95</b>			<b>79.7</b>

The null hypotheses were also rejected for questions 8.2 and 8.3 as they pertain to the pork and chicken price series, respectively.

In question 9, the null hypothesis under 9.1a is that the own price elasticity of a quantity-weighted beef price series is equal to the own-price elasticity of a simple average price series. The null hypotheses under 9.1b and 9.1c are the same, except that they are testing for the value of the cross-price and income elasticity parameters, respectively. In all three cases at the  $\alpha = 0.05$  level of significance, the calculated chi-square was greater than the critical chi-square at 1 *df*, and the null hypotheses were rejected. The conclusion can be made that the survey respondents believe a difference will exist between the own-price, cross price, and income elasticity parameters of a quantity-weighted beef price series and a simple average beef price series. The same results were obtained for questions 9.2 and 9.3 that examined the value of the elasticity parameters of a pork and chicken price series.

The format of Question 10 was very similar to that of question 9, the only difference being that the hypotheses under question 10 were testing for differences in the variances of the parameter estimators between a quantity-weighted and a simple average meat price series. The null hypothesis under 10.1a is that the variance of the own-price elasticity



parameter estimator of the quantity-weighted beef price series is equal to the variance of the own-price elasticity parameter estimator of the simple average beef price series. The null hypothesis was rejected. Respondents, therefore, believe the variances will differ. The same was true for question 10.1b, dealing with the variance of the cross-price elasticity parameter estimator, and question 10.1c, which dealt with the variance of the income elasticity parameter estimator. These same null hypotheses as they pertain to the pork price series (10.2) and chicken price series (10.3) were all also rejected. Therefore, it can be postulated that the variances of the elasticity parameter estimators are expected to be dissimilar for a quantity-weighted and a simple average price series.

Question 11 investigated the impact of the frequency of price reporting on the mean value of a meat price series. In question 11.1, the null hypothesis is that the mean of a more frequently reported beef price series is equal to the mean of a beef price series where prices are reported on a monthly basis. The null hypothesis is not rejected. The null hypothesis was also not rejected in questions 11.2 and 11.3. Consequently, it cannot be suggested that more frequent reporting of prices is expected to result in a change in the mean value of a meat price series.

Question 12 studied the effect of the frequency of price reporting on the variance of the elasticity parameter estimators for a beef (12.1), pork (12.2), and chicken (12.3) price series. The null hypothesis for question 12.1a stated that the variance of the own-price elasticity parameter estimator of a more frequently reported beef price series is equivalent to the variance of the own-price elasticity parameter estimator associated with the current, monthly beef price series. The null hypothesis was rejected. The outcomes regarding the variance of the cross-price (12.1b) and income (12.1c) elasticity parameter estimators were the same, and the null hypotheses were rejected. Thus, theoretically, increasing the frequency with which prices are reported is expected to change the variance of the beef price series. The same is true regarding the pork price and chicken price series.

### **3.8. Summary and Recommendations**

From the preceding discussion of the results obtained from the survey, clearly, the respondents agree that the issues of quantity weighting of retail meat prices and the frequency with which prices are reported are of importance and need to be addressed in the design of a new price reporting system. Although the respondents did feel that both quantity weighting and the frequency of price reporting would have an impact on the variance of the elasticity parameter estimators, they did think that the introduction of quantity-weighted prices, and not the frequency with which prices are reported, will affect the mean value of a retail meat price series.

However, given the apparent existence of patterns or trends in the question responses, the reliability of the responses are questionable and one has to wonder how much thought the respondents did indeed give the matter before answering the questions. From some of the open-ended question responses, some respondents appear very well informed about the current problems with, and data shortcomings of, the historical retail meat price series and have spent some time contemplating the issues and difficulties associated with the data as well as ways in which these problems could potentially be rectified. This is best seen in the answers to question 16 of the survey where the respondents were asked to list what they think the ERS should do in building a new price collection and distribution program.

#### ***3.8.1. Respondent Recommendations***

In their recommendations, the respondents once again emphasized the importance of weighting prices by quantity of sales and reporting prices more frequently – either on a bi-weekly or weekly basis (one week following sales). A strong preference for weekly data exists, as such data would aid the analysis of time sensitive events, especially when the huge impact that the holidays have on demand is considered. One respondent did,

however, feel that monthly price and quantity data work better for the purpose of dynamic analysis and estimation.

Quantity-weighted data are essential when price data are aggregated to create, for example, a beef price. The emphasis is certainly on reporting true monthly data and not assumed monthly data as is currently the case. The users of retail meat price data want to see the reporting of “true prices” (i.e. what the consumer actually paid) and not a list price or an “adjusted price” based on expert opinion, as is the current practice. One respondent did, however, have a slightly different opinion on the issue of quantity weighting:

While quantity-sold-weighted price is more useful in some applications, the current method of fixed-weight average price calculation also has its place. If ERS chooses to produce a quantity-weighted price; it should be IN ADDITION TO its current price series...

Additionally, respondents placed much emphasis on the breakdown of prices by region and reporting the most important retail cut and quantity data. Respondents feel that reported prices should include data on representative cuts, quality grade, branded programs, and packaging. As one respondent put it:

A new price series should at least break down high, medium and low value components. This would be useful for tracking seasonal changes and income elasticities for several products.

Another respondent emphasized differentiating cuts by the at least the quality classes *Choice*, *Select*, and *No-roll*. But regardless of whether separate price series are reported for each quality level, quality must be accounted for in the national average as no way exists currently make comparisons across different qualities of cuts. Furthermore, it is becoming ever more important to look at the product mix in each sector. One respondent considered it vital to track a few key products to account for changes in the product mix.

Respondents do not only view quality comparisons as being essential, but also making price comparisons on a regional basis. If reporting regional prices is not a viable option, then providing at least major metro market price reports on a monthly basis is called for.

In addition to more information on cuts, the respondents placed much emphasis on the provision of demographic and income data, especially by geographic region, along with some indication of consumer preferences. Access to demographic and cut data bases will not only be useful for purposes of market research and market analysis, but also enable policy makers to better understand and determine whether the policies in place are actually achieving their proposed objectives.

Finally, it was suggested that the current method of collecting prices on a Wednesday misses the sales days. Several respondents also listed the need for electronic access to the data.