

# Meat Demand Monitor – Project Methodology

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## Overview

In February 2020, Kansas State University (KSU) with funding support of the pork and beef checkoff, initiated a new project called the “Meat Demand Monitor.” The Meat Demand Monitor (MDM) is focused on domestic meat demand with separate consideration of retail and food service decision making of U.S. residents.

On a monthly basis, over 2,000 U.S. residents are surveyed. One-half of respondents receive some questions framed to better understand retail, grocery-store setting decisions and the other half of respondents receive alternative questions positioned to better understand dinner-meal, restaurant entrée decisions. All surveys are designed to be nationally representative of the U.S. population by age, education, gender, geographic region, household income, and race-ethnicity.

The base survey questions asked each offering are included in a separate document.<sup>1</sup> The remaining sub-sections of this document outline procedures and data analysis employed each month supporting standard, monthly reports generated. In many cases, presented answers or sub-items of a question are randomized in the order of presentation to mitigate presentation order effects on conclusions. Moreover, several questions follow the past approach led by Dr. Jayson Lusk while at Oklahoma State University and the Food Demand Survey project (Lusk, 2017).

Estimates reported each month reflect sample weighting using the RAKING macro in SAS. In particular, the sample is weighted using Census estimates to reflect the national population in age, education, gender, geographic region, income, and race.









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<sup>1</sup> See this webpage for additional details: <https://www.agmanager.info/livestock-meat/meat-demand/monthly-meat-demand-monitor-survey-data>

### Consumer Willingness-to-Pay (WTP) – Retail Setting

Approximately one-half of respondents answers nine choice questions like one presented below.

Which of the following would you purchase?

								If these were the only options, I would buy something else.
<b>Ribeye Steak</b> \$19.49/lb	<b>Ground Beef</b> \$6.99/lb	<b>Pork Chop</b> \$7.49/lb	<b>Bacon</b> \$5.49/lb	<b>Chicken Breast</b> \$1.49/lb	<b>Plant-Based Patty</b> \$14.49/lb	<b>Shrimp</b> \$10.99/lb	<b>Beans and Rice</b> \$2.99/lb	
I would choose:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Preceding these nine questions was the verbiage:

“Imagine you are at the grocery store buying the ingredients to prepare a meal for you or your household. Each product would be boneless and uncooked for you to prepare at home as desired. For each of the following 9 questions, please indicate which you would most likely buy. The only difference across these 9 questions is the price (\$/lb) of each option.”

Each of the nine questions had nine options: ribeye steak, ground beef, pork chop, bacon, chicken breast, plant-based patty, shrimp, beans and rice, and “no purchase”) and the price of each option was one of three levels. The Low, Intermediate, and High price levels for each option were:

	Low	Intermediate	High
Hamburger	\$ 1.99	\$ 4.49	\$ 6.99
Ribeye Steak	\$ 14.49	\$ 16.99	\$19.49
Pork Chop	\$ 2.49	\$ 4.99	\$ 7.49
Bacon	\$ 2.99	\$ 5.49	\$ 7.99
Chicken Breast	\$ 1.49	\$ 3.99	\$ 6.49
Plant-Based Patty	\$ 9.49	\$ 11.99	\$14.49
Shrimp	\$ 8.49	\$ 10.99	\$13.49
Beans and Rice	\$ 0.49	\$ 2.99	\$ 5.49









The prices appearing in each choice were determined by a main effects orthogonal fractional factorial design. A design in which prices of each choice alternative were uncorrelated with each other alternative (perfectly orthogonal) required 27 choices. The 27 choices were blocked into three sets of nine, and each person was randomly assigned to one of the three blocks if allocated to the retail survey. This is the same design employed previously in the Food Demand Survey (Lusk, 2017).

The choice data were analyzed using a multinomial logit model with alternative-specific constants and one common price effect. For specification purposes, the utility of the “no purchase” option is normalized to zero. To estimate willingness-to-pay (WTP), the price amount that would make the representative consumer indifferent to buying the particular meal type and not-buying is determined. Logit model parameter estimates are also used to project each alternative’s market share presuming it was offered at the intermediate price level used across presented scenarios.

**Consumer Willingness-to-Pay (WTP) – Dinner Meal, Restaurant Setting**

Approximately one-half of respondents answers nine choice questions like one presented below.

Which of the following would you purchase?

								If these were the only options, I would buy something else.
<b>Ribeye Steak</b> \$18.99/meal	<b>Beef Hamburger</b> \$14.49/meal	<b>Pork Chop</b> \$16.99/meal	<b>Baby Back Ribs</b> \$15.49/meal	<b>Chicken Breast</b> \$12.99/meal	<b>Plant-based Patty</b> \$17.49/meal	<b>Shrimp</b> \$13.49/meal	<b>Salmon</b> \$19.49/meal	
I would choose: <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Preceding these nine questions was the verbiage:

“Imagine you are at your local restaurant for dinner. For each of the following 9 questions, please indicate which main entrée you would most likely select for your meal. Each product would be the dinner meal's main entree, would be prepared as you desire, and served with two side dishes of your choosing. The only difference across these 9 questions is the meal price associated with each main entrée option.”

Each of the nine questions had nine meal options: ribeye steak, beef hamburger, pork chop, baby back ribs, chicken breast, plant-based patty, shrimp, salmon, and “no purchase”) and the price of each option was one of three levels. The Low, Intermediate, and High price levels for each meal option were:

	Low	Intermediate	High
Hamburger	\$ 9.49	\$ 11.99	\$ 14.49
Ribeye Steak	\$18.99	\$ 21.49	\$ 23.99
Pork Chop	\$14.49	\$ 16.99	\$ 19.49
Baby Back Ribs	\$12.99	\$ 15.49	\$ 17.99
Chicken Breast	\$10.49	\$ 12.99	\$ 15.49
Plant-Based Patty	\$12.49	\$ 14.99	\$ 17.49
Shrimp	\$10.99	\$ 13.49	\$ 15.99
Salmon	\$14.49	\$ 16.99	\$ 19.49

The same design and statistical procedures noted above in the retail choice discussion apply.

### Protein Values

Each respondent answers a “best-worst” question design to reveal relative importance of 12 different items when purchasing protein. Respondents had to place four items in a “most important” box, four items in a “medium importance” box, and four items in a “least important” box. The specific question asked was: “Given the following list, please indicate the importance to you when purchasing protein items for your meals. Drag-and-drop 4 items into each of the Most, Medium, and Least importance buckets.”

The 12 items presented were:

- 1) **Freshness** (if product is fresh as indicated by expiration date and visual perception)
- 2) **Taste** (if product is appealing to the senses including flavor, smell, and texture)
- 3) **Price** (the price you pay for the product)
- 4) **Safety** (if consuming the product will not cause illness)
- 5) **Convenience** (if product can be prepared and consumed easily or quickly)
- 6) **Nutrition** (if product provides essential nutrients such as protein, carbohydrates, vitamins, and minerals)
- 7) **Health** (if product positively contributes to long term health; including amount and type of fat and cholesterol in the product)

- 8) **Origin/Traceability** (if locations and identities of producers are known)
- 9) **Hormone-Free/Antibiotic-Free** (if animal source of the product was raised using added hormones or antibiotics)
- 10) **Animal Welfare** (if animal source of the product was raised using animal friendly means)
- 11) **Environmental Impact** (if production and marketing of the product impacts the environment)
- 12) **Appearance** (if product looks appealing and appetizing)

This list follows the assessment published by Lister et al. (2017).

A scale of importance was created by calculating the proportion of times (across the entire sample) an item appeared in the most important box minus the proportion of times it appeared in the least important box. Thus, the range of possible values for an item is from +1 to -1 (or +100% to -100% when converted to a percent scale), where a higher number implies more importance.

### Concerns

Each respondent answers a series of 16 different, 5-point Likert scale questions (answers spanning from “Nothing” to “A Great Deal”). The specific question asked was: “Overall, how much have you heard or read about each of the following topics in the past two weeks?” The 16 topics presented are Mad cow disease/BSE, Antibiotic use in livestock, Growth hormones in livestock, E.coli in meat, Salmonella in meat, Genetically modified foods, Gestation stalls, Battery cages, Farm animal welfare, Meat from cloned animals, Greenhouse gas emissions from livestock, Plant-based proteins, Swine flu, Bird flu, Cancer and meat consumption, and High protein diets.

### Consumption Frequency

Each respondent answers a series of questions indicating the location (at home, away from home, or neither if a meal is skipped) of breakfast, lunch, and dinner meals yesterday. Subsequently, for each of the three main meals yesterday, respondents indicate if Beef, Chicken, Pork, Fish/Seafood, Alternative Proteins, or Other or No Protein were included. A focus on yesterday’s meals should improve accuracy of recall for respondents.

Early in the survey, the following description was provided to clarify protein types:

We are going to ask you some questions about the types of protein you may consume. Please read the following category descriptions before continuing the survey.

“Beef” refers to foods such as beef steak, hamburger, ground beef, beef roast, beef sandwiches and other beef-based meals.

“Pork” refers to foods such as ham, ham sandwiches, bacon, pork chops, pork ribs, pork roast, ground pork, and other pork-based meals.

“Chicken” refers to foods such as chicken breasts, chicken legs/thighs, chicken wings, ground chicken, chicken nuggets, fried chicken, chicken sandwiches and other chicken-based meals.

“Fish/Seafood” refers to foods such as fish sticks, fish sandwiches, tuna, salmon, shrimp, trout, catfish and other fish-based meals.

“Alternative Proteins” refers to foods, not derived from live animals that have been developed to be eaten in a meal for protein.

### **Knowledge Assessment**

Each respondent answers four true-false questions to assess understanding of meat safety and quality issues and form the basis of a basic “knowledge accuracy” index. This is motivated by the work of DeVuyst, Lusk, and DeVuyst (2014) and Lusk et al. (2018). The four true-false statements presented are:

- 1) USDA inspects all meat sold commercially to ensure it is safe, wholesome, and properly labeled
- 2) Cooking temperature is more accurate than color in assessing if meat is “done”
- 3) *White* color indicates better pork eating quality than *Red* color
- 4) *Select* indicates better beef eating quality than *Choice*

### **Additional Questions**

The survey also contains questions capturing socio-economic information and other demographic characteristics.

## Data Quality Filters

Each respondent answers four questions that are utilized to assess and ultimately improves data quality. That is, data quality “filters” are used to identify responses that are excluded from subsequent analyses. These questions are:

1) Grocery Involvement Which of the following best describes how involved you are in the grocery shopping for your household?

- I am solely or primarily responsible for grocery shopping
- I typically do at least one-half of the grocery shopping
- I typically do some, but less than one-half of the grocery shopping
- I typically do not do any grocery shopping
- Don't know or am not sure

*{omit observations for respondents selecting “I typically do not do any grocery shopping” OR “Don't know or am not sure”}*

2) What is your current age? \_\_\_\_\_

*{omit observations for respondents under 18 or over 120 years old}*

3) To ensure the next section of the survey loads correctly, please select the word “Blue” from below.

- Yellow
- Purple
- Green
- Blue
- Other

*{omit observations for respondents not selecting “Blue”}*

4) LAST QUESTION! Did you answer all the questions in this survey to the best of your ability? It is VERY important that you answer this question truthfully, as your survey answers are taken seriously by scientists and policy-makers.

- Yes
- No, I rushed through the survey at times
- No, I was not fully paying attention at times
- No, for some other reason

*{omit observations not selecting "Yes"}*

Finally, if any of these four questions are skipped that observation is also removed from subsequent analysis. In an initial, trial-run in December of 2019, about 10% of collected, full response observations were removed following this process. Expecting about 10% each month to be removed, a total sample of about 2,300 will be collected each month with a targeted final, useable sample total of 2,000.



## References

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