

**USDA Food Safety and Inspection Service**  
**2024 *Salmonella* Framework**  
**Risk Assessment Model Documentation**  
**July 2024**

These files accompany the FSIS' *Quantitative Risk Assessment for Salmonella in Raw Chicken and Raw Chicken Products* (referred to here as the chicken risk assessment) and *Quantitative Risk Assessment for Salmonella in Raw Turkey and Raw Turkey Products* (referred to here as the turkey risk assessment).

Below is an outline of the file nesting and short description of each codebooks' and datafiles' contents. These model codes can be implemented using the [free software environment R](#), unless otherwise noted, and datafiles are provided in the widely supported CSV format.

For questions, please contact [joanna.zablotsky-kufel@usda.gov](mailto:joanna.zablotsky-kufel@usda.gov).

## File Nesting

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## FSIS Chicken Model

**Filename:** `Process_control_chicken_July_2024.R`

**Type:** R codebook

**Author:** USDA Food Safety and Inspection Service

**Description:** The codes provides implementation of the process control indicator organism analysis described in Chapter 7 of the chicken risk assessment. To fully implement this model, data from [the FSIS 2022 Young Chicken Carcass Exploratory Sampling Program](#) from late April through October 2022 with establish identifying volume weights are required. These data are not provided.

**Filename:** `Cluster_distribution_recieving_July_2024.R`

**Type:** R codebook

**Author:** USDA Food Safety and Inspection Service

**Description:** The codes provides implementation of the sampling at receiving analysis described in Chapter 6 of the chicken risk assessment.

## Final\_Product

**Filename:** `Chicken_FinProdStds_July_2024.R`

**Type:** R codebook

**Author:** USDA Food Safety and Inspection Service

**Description:** The code provides an implementation of the final product standards model described in Chapter 5 of the chicken risk assessment for chicken carcasses, parts, and comminuted product. Also included is the code for the comminuted sensitivity analysis and the uncertainty analysis for the major scenarios under consideration from Chapter 5, and an illustrative dose calculation that is described in Chapter 4. The “Maximum potential benefits of receiving guidelines” (section 6.1) code, which relies on the final product standards model, begins on line 296.

**Filename:** `EpiX_To_Source_July_2024.R`

**Type:** R codebook

**Author:** EpiX Analytics provided to USDA Food Safety and Inspection Service under Cooperative Agreement FSIS-02152022

**Description:** The code provides a fast implementation of the dose-response curves for the two *Salmonella* serotype clusters using polynomials. See EpiX Analytics report in Appendix A of the FSIS chicken risk assessment or Chapter 2 for more details. It is necessary to run the model in `Chicken_FinProdStds_July_2024.R` and needs to be in the same working directory.

**Filename:** `Polynomial2.csv`

**Type:** CSV file

**Author:** EpiX Analytics provided to USDA Food Safety and Inspection Service under Cooperative Agreement FSIS-02152022

Description: This CSV file contains the polynomial coefficients for the dose-response approximation implemented in **EpiX\_To\_Source\_July\_2024.R**. It is not a dataset. It is necessary to run the model in **Chicken\_FinProdStds\_July\_2024.R** and needs to be in the same working directory.

Filename: **PertsPercRed\_July\_2024.csv**

Type: Datafile

Author: USDA Food Safety and Inspection Service

Description: This CSV file contains the parameters of Pert distributions for the uncertain effectiveness of selected concentration thresholds. It is not a dataset. Variable descriptions are noted in the uncertainty analysis in **Chicken\_FinProdStds\_July\_2024.R** where used. It is necessary to run the uncertainty analysis in **Chicken\_FinProdStds\_July\_2024.R** and needs to be in the same working directory.

## Consumption

Filename: **CHICKEN\_SAS\_July\_2024.pdf**

Type: PDF file containing SAS code

Author: Centers for Disease Control and Prevention's (CDC) National Health and Nutrition Examination Survey (NHANES)

Description: The code which implements the consumption estimates provided in Chapter 4 and Appendix B of the chicken risk assessment. It was written by CDC NHANES, [is available here](#), and was adapted for these purposes by USDA FSIS. It requires SAS to implement.

Filename: **CHICKPT4.csv**

Type: CSV file

Author: Centers for Disease Control and Prevention's (CDC) National Health and Nutrition Examination Survey (NHANES)

Description: This datafile contains the data on the consumption of chicken in the U.S. that FSIS obtained from NHANES. Due to the COVID-19 pandemic, data collected from 2019 to March 2020 were combined with data from the NHANES 2017-2018 cycle to form a nationally representative sample of NHANES 2017-March 2020 pre-pandemic data. These data and accompanying data dictionaries [are available here](#).

## FSIS Turkey Model

Filename: **Process\_control\_turkey\_July\_2024.R**

Type: R codebook

Author: USDA Food Safety and Inspection Service

Description: The codes provides implementation of the process control indicator organism analysis described in Chapter 7 of the turkey risk assessment. To fully implement this model, data from the [FSIS 2007-2008 Young Turkey Microbiological Baseline](#) with establish identifying volume weights are required. These data are not provided.

## Final\_Product

Filename: **CommTurk\_FinProdStds\_July\_2024.R**

Type: R codebook

Author: USDA Food Safety and Inspection Service

Description: The code provides an implementation of the final product standards model described in Chapter 5 of the turkey risk assessment for comminuted turkey. Also included is the code for the sensitivity analysis and the uncertainty analysis for the major scenarios under consideration from Chapter 5, and an illustrative dose calculation that is described in Chapter 4.

Filename: **EpiX\_To\_Source\_July\_2024.R**

Type: R codebook

Author: EpiX Analytics provided to USDA Food Safety and Inspection Service under Cooperative Agreement FSIS-02152022

Description: The code provides a fast implementation of the dose-response curves for the two *Salmonella* serotype clusters using polynomials. See EpiX Analytics report in Appendix A of the FSIS turkey risk assessment or Chapter 2 for more details. It is necessary to run the model in **CommTurk\_FinProdStds\_July\_2024.R** and needs to be in the same working directory.

Filename: **Polynomial2.csv**

Type: CSV file

Author: EpiX Analytics provided to USDA Food Safety and Inspection Service under Cooperative Agreement FSIS-02152022

Description: This CSV file contains the polynomial coefficients for the dose-response approximation implemented in **EpiX\_To\_Source\_July\_2024.R**. It is not a dataset. It is necessary to run the model in **CommTurk\_FinProdStds\_July\_2024.R** and needs to be in the same working directory.

## Consumption

Filename: **TURKEY\_SAS\_July\_2024.pdf**

Type: PDF file containing SAS code

Author: Centers for Disease Control and Prevention's (CDC) National Health and Nutrition Examination Survey (NHANES)

Description: The code which implements the consumption estimates provided in Chapter 4 and Appendix B of the turkey risk assessment. It was written by CDC NHANES, [is available here](#), and was adapted for these purposes by USDA FSIS. It requires SAS to implement.

Filename: **TURKPT5.csv**

Type: CSV file

Author: Centers for Disease Control and Prevention's (CDC) National Health and Nutrition Examination Survey (NHANES)

Description: This datafile contains the data on the consumption of chicken in the U.S. that FSIS obtained from NHANES. Due to the COVID-19 pandemic, data collected from 2019 to March 2020 were combined with data from the NHANES 2017-2018 cycle to form a nationally representative sample of NHANES 2017-March 2020 pre-pandemic data. These data and accompanying data dictionaries [are available here](#).