

Animal Feed/Food Consumption and COVID-19 Impact Analysis

December 2020

Prepared For:



Prepared By:



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1 Executive Summary

A major component of this analysis is an update of work originally done for the Institute for Feed Education and Research (IFEEDER) in 2017. Estimating the consumption of feed ingredients for most animal species, including companion animals, in the United States is of great interest to IFEEDER. Using a blend of methodology originally used in 2017 and additional methods developed in the interim, DIS has updated and enhanced coverage and accuracy of original estimates.

In addition to estimating “baseline” feed consumption for major species, we have estimated the impact of COVID-19 on the feeding of major species of livestock and poultry. As one would expect the impact of COVID-19 was, and continues to be, felt throughout the economy – the feeding of animals throughout the United States is no exception.

2019 Feed Consumption

Using the modified methodology (Multi-Species Ration Cost Optimization (RCO) model), DIS estimated the quantities of animal feed ingredients by species for the year 2019. DIS found that approximately 283.8 million tons¹ of feed were fed to major species of livestock, poultry, aquaculture, and pets in 2019 with a value of \$59.9 billion. In descending order of quantity fed by species these amounts were:

1. Beef Cattle: 64.5 million tons
2. Hogs: 61.8 million tons
3. Broilers: 60.8 million tons
4. Dairy Cattle: 49.8 million tons
5. Egg-Layers: 19.2 million tons
6. Turkeys: 10.6 million tons
7. Pets (cats and dogs): 8.6 million tons
8. Horses: 7.7 million tons
9. Aquaculture: 613,000 tons
10. Sheep and Meat Goats: 138,783 tons²

By weight, the top five feed ingredients consumed by the 10 species in 2019 were:

1. Corn: 145.0 million tons
2. Soybean Meal: 34.9 million tons
3. Distillers’ Dried Grains with Solubles (DDGs): 32.0 million tons
4. Wheat Middlings and Wheat Bran: 8.0 million tons³
5. Corn Gluten Feed/Meal: 6.0 million tons⁴

Five states topped the list in tons of animal feed ingredients fed to animals in 2019:

1. Iowa: 28.8 million tons, primarily to hogs, beef cattle and egg-layers
2. Texas: 21.1 million tons, primarily to beef cattle, broilers and dairy cattle
3. California: 17.5 million tons, primarily to dairy cattle and beef cattle

¹ All references to “tons” in this report are U.S. short tons (2,000 lbs.).

² There were 138,566.3 tons of feed fed to sheep and 216.7 tons of feed (SBM only) were fed to meat goats.

³ Wheat Middlings consumption was 8.0 million tons, and Wheat Bran consumption was 28,558 tons.

⁴ Corn Gluten Feed consumption was 5.5 million tons, and Corn Gluten Meal consumption was 0.5 million tons.

4. North Carolina: 16.3 million tons, primarily to hogs, broilers and turkeys
5. Minnesota: 14.6 million tons, primarily to hogs, beef cattle and turkeys

Additionally, DIS estimated harvested forage (e.g., corn silage, alfalfa hay and other hay) consumption in this 2019 study, which was 287.6 million tons, fed to dairy cattle and beef cattle with a value of \$24.7 billion. By weight, the top five states of harvested forage consumption in 2019 were:

1. Texas: 32.3 million tons
2. California: 30.6 million tons
3. Wisconsin: 21.6 million tons
4. Kansas: 16.9 million tons
5. Nebraska: 16.1 million tons

COVID-19 Impacts on the Livestock and Poultry Industry

COVID-19 manifested itself in many ways within the markets for food products and livestock production systems. There were increases in retail/grocery sales of most food products and sharp declines in products normally distributed through the hotel, restaurant and institutional (HRI) networks. In March, April and May there were major disruptions to processing facilities for cattle, hog and poultry. In response to these disruptions as well as significant price variations that accompanied the disruptions, significant production deviations from the pre-COVID-19 baseline developed.

Production and marketing channel disruptions began distorting and overall depressing U.S. livestock markets in March when many schools and other institutions were closed. Processing facilities began experiencing labor and operational disruptions in late March with conditions deteriorating in many cases into late April, early May. Meanwhile, to contain the widespread outbreaks of COVID-19, different animal processing facilities began adopting new health protocols, which at the beginning of implementation affected line speeds.

The following models were developed to assess the impact of COVID-19 in the different U.S. livestock and poultry industries during the 2020 calendar year:

Livestock Models	Poultry Models
Fed Cattle	Broilers
Dairy Cows	Egg-Laying Hens
Hogs	Turkeys

Table 1 is a summary of the COVID-19 impacts estimated by the models due to slaughter and/or production disruptions and changes in production that occurred in response to COVID-19 during 2020. Estimates for October to December were derived from estimates of what actual slaughter and production levels will be for those months. The impacts indicate the differences in value from actual slaughter or production values and the baseline values determined by each of the models that were

expected to be attained in the absence of COVID-19. The results are in million U.S. dollars. The 2020 total projected losses from baseline expectations for the U.S. livestock sector are \$15.9 billion⁵.

Table 1. Summary of COVID-19 Impacts on the U.S. Livestock Industry 2020 Estimates (Million USD)

Fed Cattle	Milk	Hogs	Broilers	Turkey	Eggs	6 Commodity Total
\$(3,272.22)	\$(2,471.10)	\$(3,645.26)	\$(8,467.60)	\$617.14	\$1,319.92	\$(15,919.11)
-8.8%	-6.9%	-20.6%	-21.5%	11.8%	19.9%	-11.2%

Source: DIS estimates based on USDA data.



Additionally, taking into account the COVID-19 impact for the year 2020, feed consumption was estimated by DIS. Six categories of livestock production and feed consumption were considered in this report (i.e., broilers, layers, turkeys, hogs, dairy cows and beef cattle). DIS estimated COVID-19 impact on feed consumption for these six major categories of livestock and poultry. Feed consumption with COVID-19 impacts included are shown in descending order of quantity. As shown in Table 2 (without harvested forages) estimated consumption with COVID-19 is 248.4 million tons. This is 4.2 million tons less feed consumption than what would have occurred without COVID-19.

Table 2. COVID-19 Impact on Feed Consumption

Species	With COVID-19 Impact Feed Consumption (Million Tons)
Hogs and Sows	66.0
Broilers	59.8
Beef Cattle	54.3
Dairy Cows	38.8
Layers	18.3
Turkeys	11.1
Total	248.4

⁵ This figure only accounts for net changes in operating outcomes for the modeled livestock and poultry sectors. It does not include losses for non-modeled segments of the livestock sector, losses for livestock processors, or losses to the grain sector from changes in grain markets, exports and biofuels use.

The total feed value (without forages and roughage) in the baseline 2020 model is \$50.4 billion (Table 3).

Table 3. COVID-19 Impact on Value of Feed Consumption (without forages or roughage)

Species	2020 Baseline Value of Feed (\$ Million)	With Overall COVID-19 Impact Value of Feed (\$Million)
Broilers	13,671	12,899
Layers	3,512	3,352
Turkeys	2,482	2,387
Hogs and Sows	12,483	12,384
Dairy Cows	9,158	9,088
Beef Cattle	9,119	8,835
Total	50,424	48,944

The estimated value of feed (without forages and roughage) consumed in 2020 with COVID-19 is \$48.9 billion. This reflects both changes in feed quantities and feed ingredient prices. The estimated impact of COVID-19 on the value of feed consumed in 2020 is a decline of \$1.5 billion from baseline expectations, a 2.9% decline.

Three forward-looking scenarios were developed for livestock and poultry production which project possible outcomes based on an expected-case scenario, a worst-case scenario and a best-case scenario. The “expected case” is based on the USDA baseline early release tables released in November 2020. The best-case scenario assumes even better outcomes than the expected case (more rapid recovery of the hotel, retail and institutional (HRI) sector of the economy, as well as faster than expected recovery in segments such as travel and trade. The worst-case scenario assumes a worsening of the COVID-19 situation with even more disruptions in the HRI segments, potential disruptions in processing and slaughter, reductions in breeding herds and flocks, and potential sporadic disruptions in trade flows.

Under the expected-case scenario, total feed consumption rises from 248.4 million tons of feed consumption (excluding forages and roughage) in 2020 to 254.6 million tons of feed consumption in 2025. The estimated value of this feed in 2020 is \$47.5 billion and using 2020 feed prices would be \$48.8 billion in 2025. Under the worst-case scenario, feed consumption (excluding forages and roughage) falls from 248.4 million tons (valued at \$47.5 billion) to 237.2 million tons (valued at \$45.4 billion) in 2025 using 2020 feed prices. In the best-case scenario, feed consumption (excluding forages and roughage) rises from 248.4 million tons (valued at \$47.5 billion) in 2020 to 263.1 million tons (valued at \$50.4 billion) in 2025 using 2020 feed prices (Figure 1).

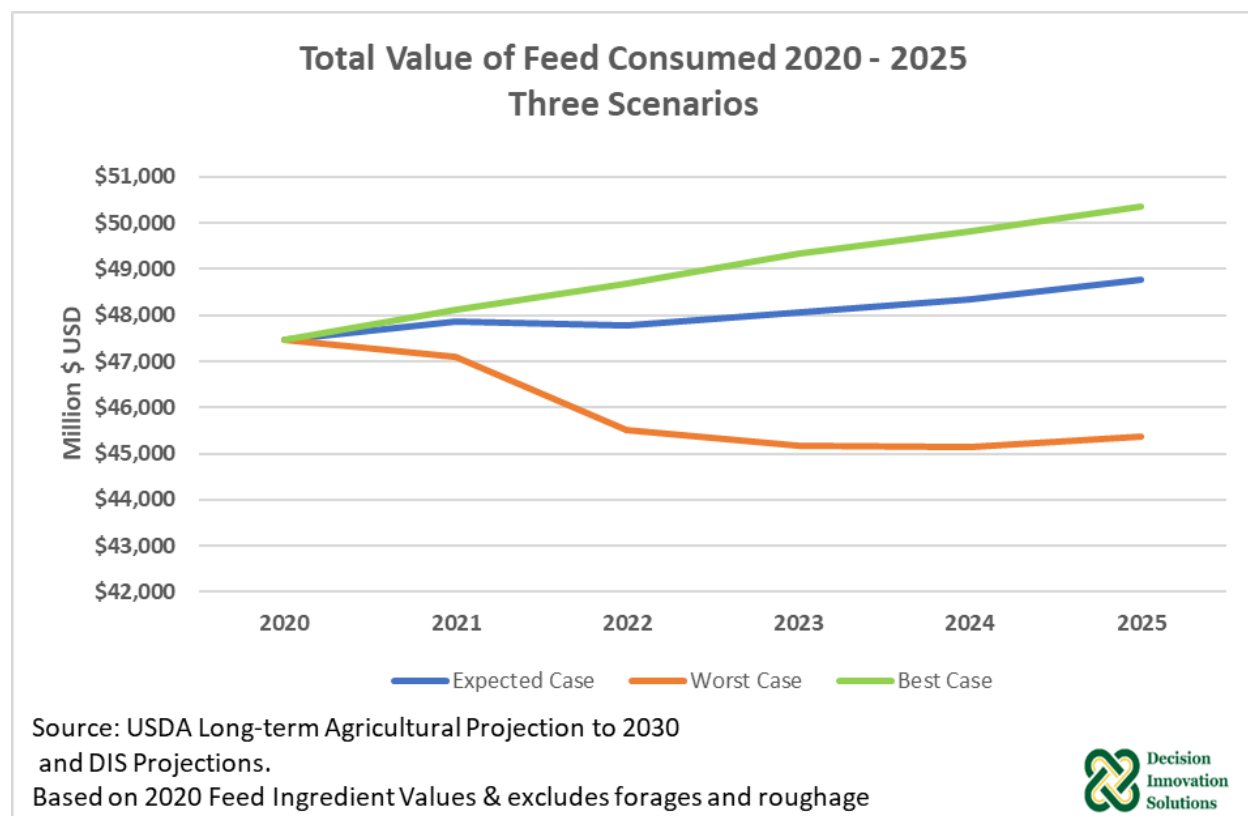


Figure 1. Total Value of Feed Consumed, 2020-2025, Three Scenarios (excluding forages and roughage)

2 Introduction

The total amount of feed for U.S. livestock, poultry, aquaculture and companion animals that passes through feed mills is not well understood. This is primarily because estimates have been driven by animal production numbers with assumed feed conversion ratios⁶ without regard to life-stage diet changes or regional differences. While this approach shows estimated changes year over year, the fact that diets are not adjusted for geography, stage of life, and in many cases, economics, makes it impossible to accurately quantify the amount of feed/food that is consumed by animal species in the United States each year.

In general, DIS used a “bottom-up approach” to estimate animal feed/food consumed from the beginning of the production cycle, rather than the end (i.e., working backwards from pounds of meat or eggs produced). DIS focused on the appropriate diets fed to the many segments of animal agriculture for all animal agriculture segments included in this analysis. These diets were adjusted for geography, stage of life and economics present in 2019. Included in this report is an overview of why and where certain

⁶ A feed conversion ratio is a measure of the number of pounds of feed required to produce one pound of weight gain.

feed ingredients are fed to livestock, poultry, aquaculture and companion animals and additional background on feed ingredient allocation in the United States.

In addition to the results reported on in this analysis for 2019, the impacts of COVID-19 during 2020 have been exceptionally wide and, in some cases, deep. The COVID-19 analysis estimates the impact of COVID-19 on animal backlogs, slaughter timing and quantities for six major animal species (i.e., broilers, layers, turkeys, cattle, dairy cattle and hogs). Estimates of the resulting impact on feed consumption resulting from interruptions in these meat and animal product supply chains are included in a separate section of this report.

2.1 Historical Production of Farm Commodities

Corn, soybeans, alfalfa hay, DDGs, oats, barley, sorghum and wheat are key crops used in animal diets. The trends within these crop markets provide insights into animal ration pricing as well as the variety of inputs in animal diets. Furthermore, these markets are influenced by a number of external issues ranging from variable harvests to government policy changes and changes in international trade policies. DIS used data from the U.S. Department of Agriculture's (USDA) National Agricultural Statistics Service (NASS), Economic Research Service (ERS) and the World Agricultural Supply and Demand Estimates (WASDE) to provide historical background to the commodity markets in this section.

Ethanol production increased sharply in the early to mid-2000s due to a number of technological advances (e.g., dry milling) and policy changes (e.g., renewable fuels standard). Increased ethanol production fueled an increase in DDGs production. Although the early production of DDGs was fraught with inconsistency between and within producers (i.e., ethanol plants), great improvements over the years have been made as ethanol production margins have come down, incentivizing investment in quality improvements of DDGs. Figure 2 through Figure 8 summarize the historical production of primary feed ingredients fed to U.S. animal agriculture.

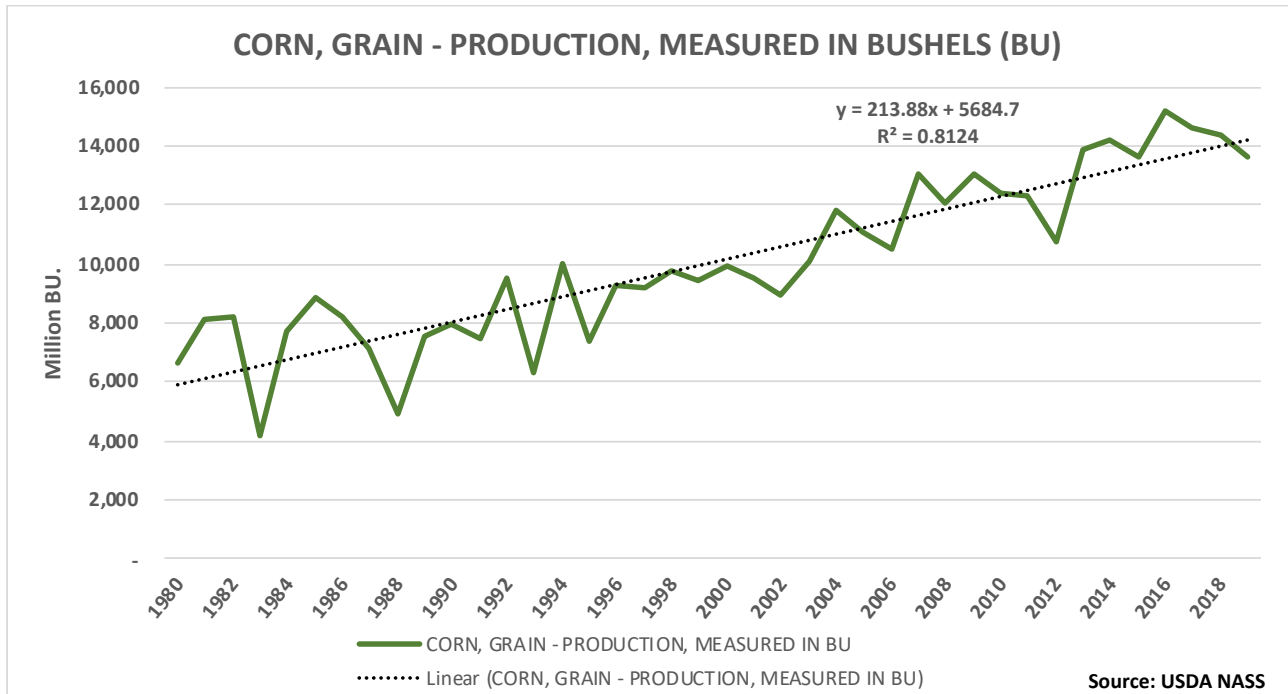


Figure 2. Historical U.S. Corn Production

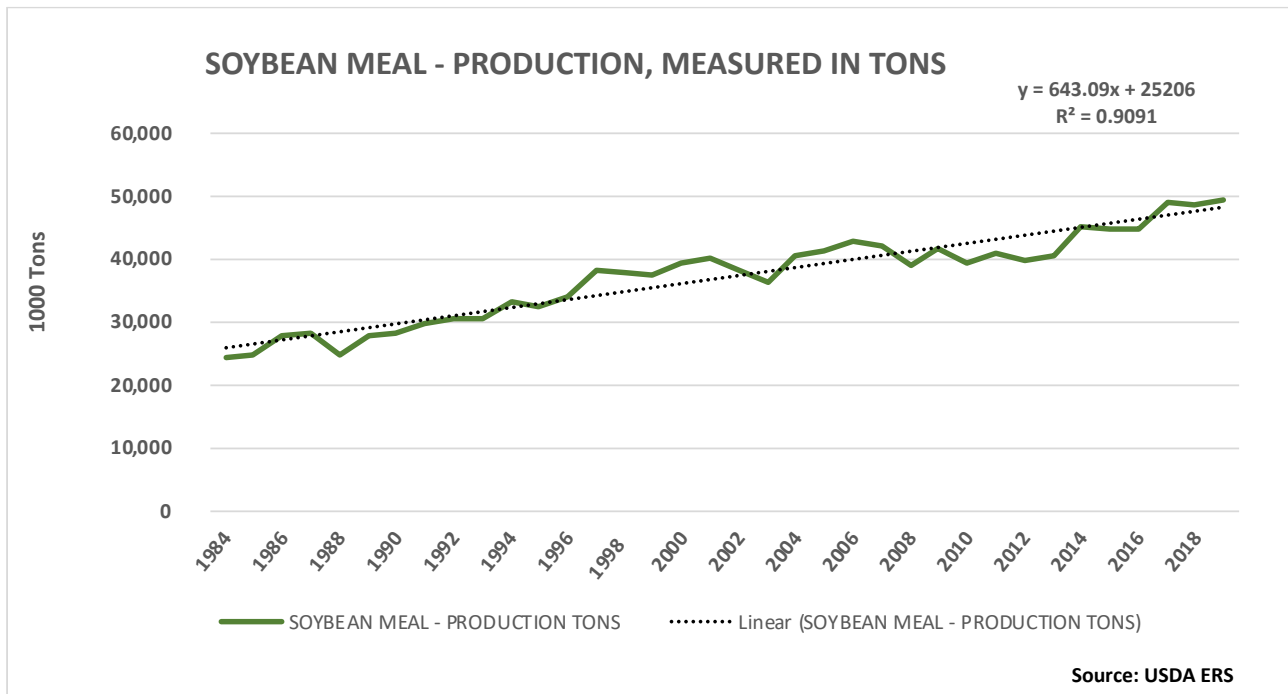


Figure 3. Historical U.S. Soybean Meal Production

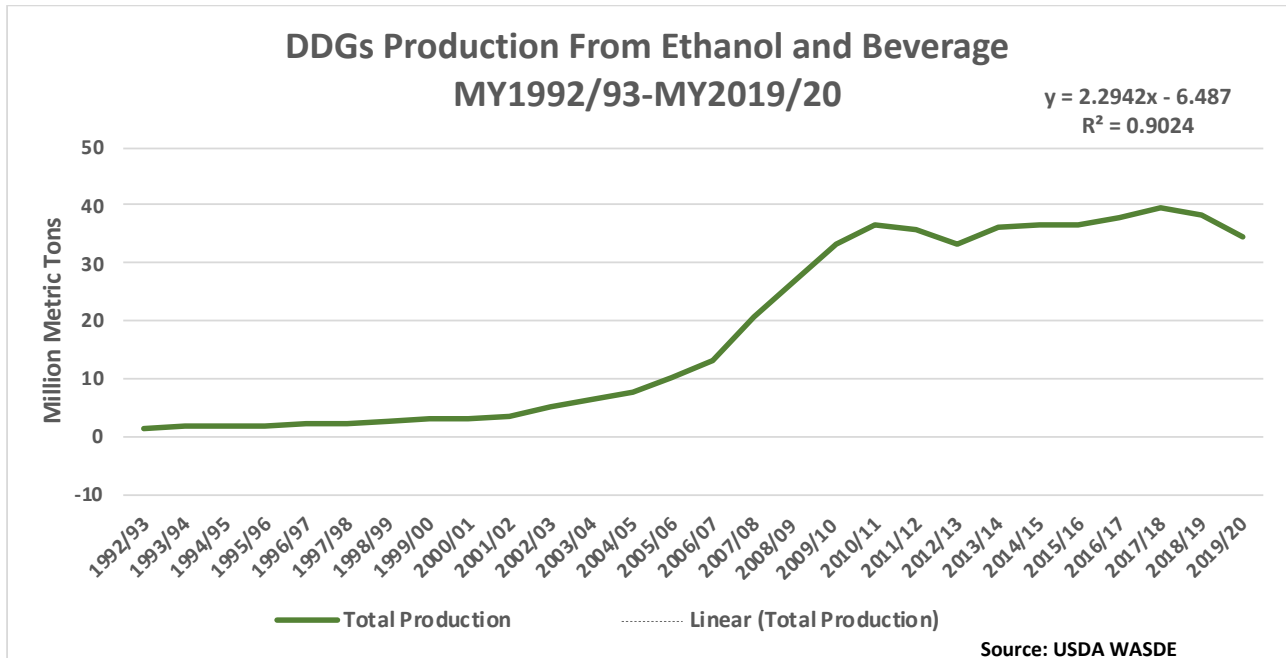


Figure 4. Historical U.S. DDGs Production

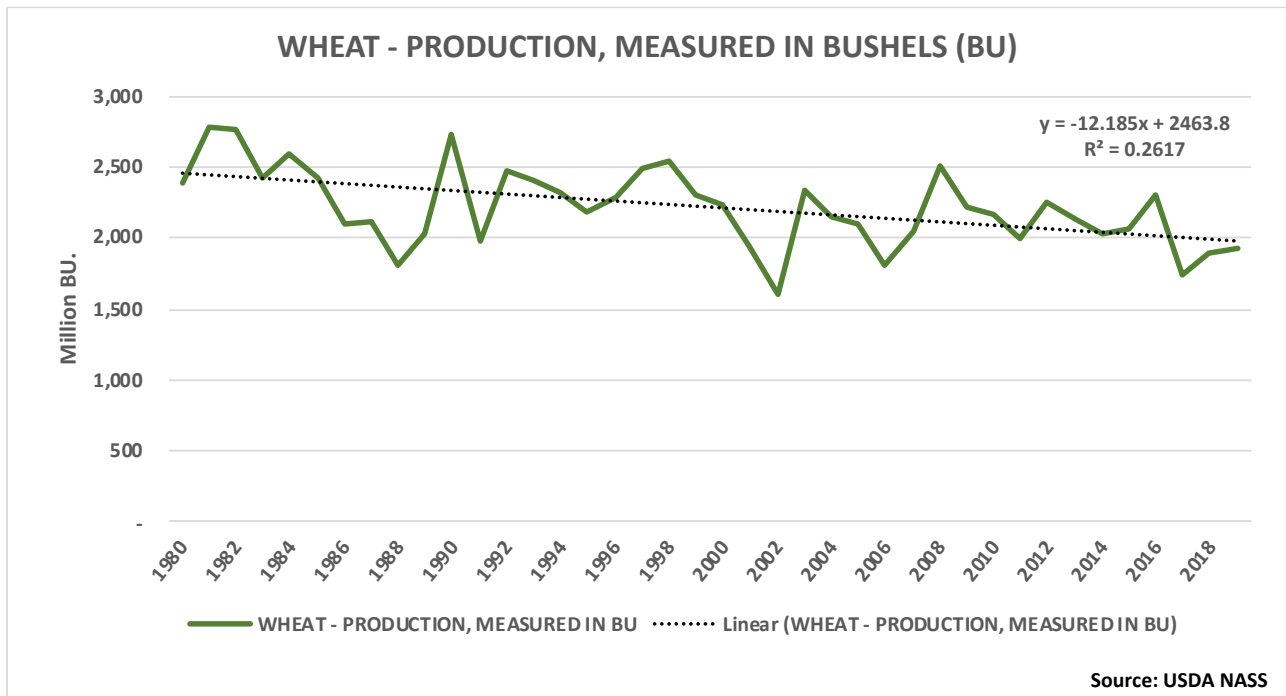


Figure 5. Historical U.S. Wheat Production

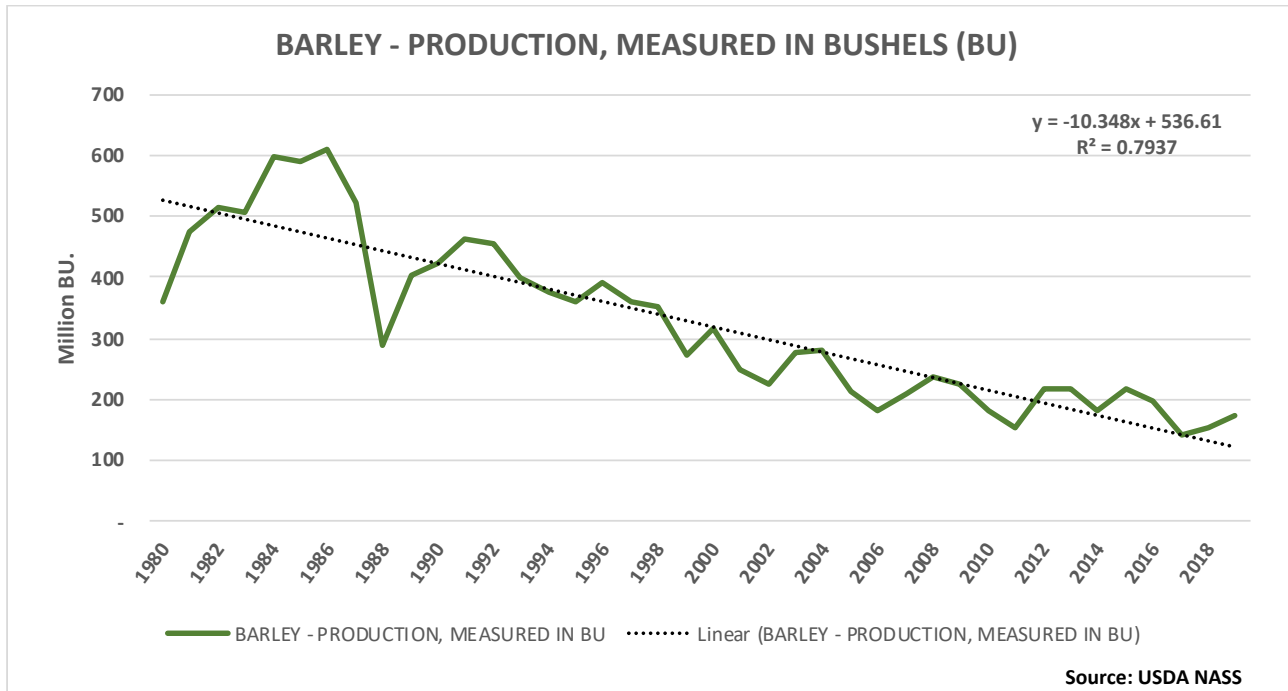


Figure 6. Historical U.S. Barley Production

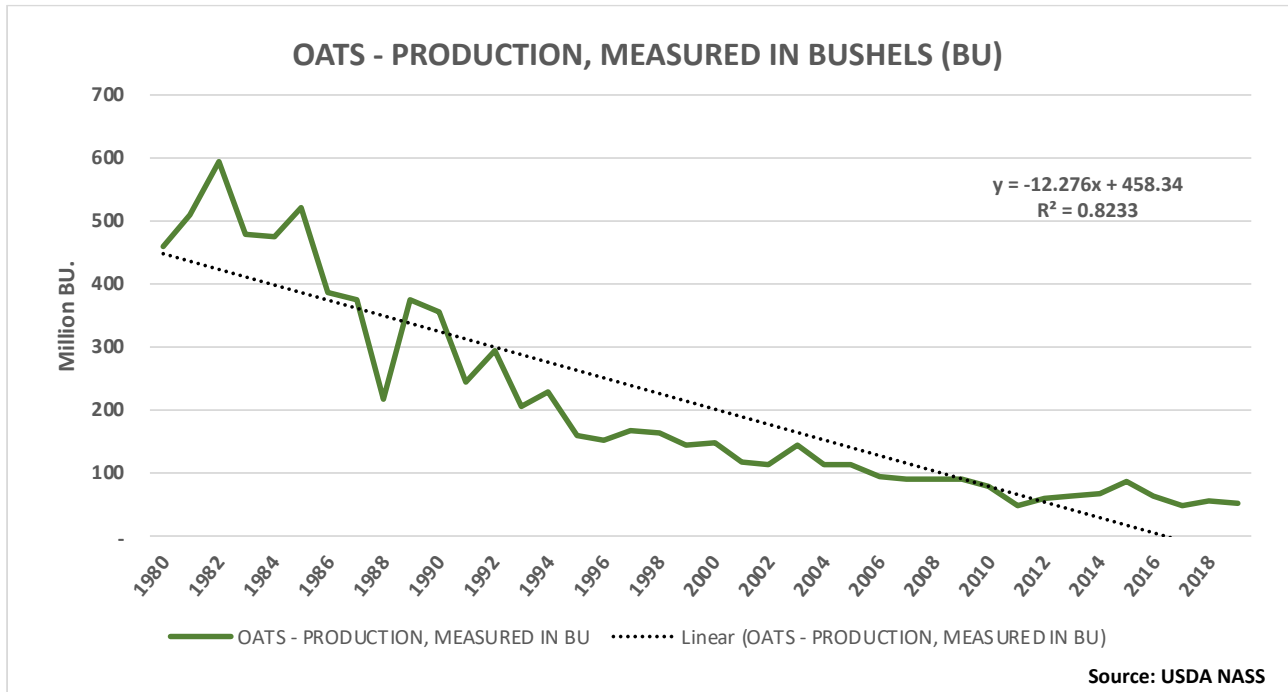


Figure 7. Historical U.S. Oats Production

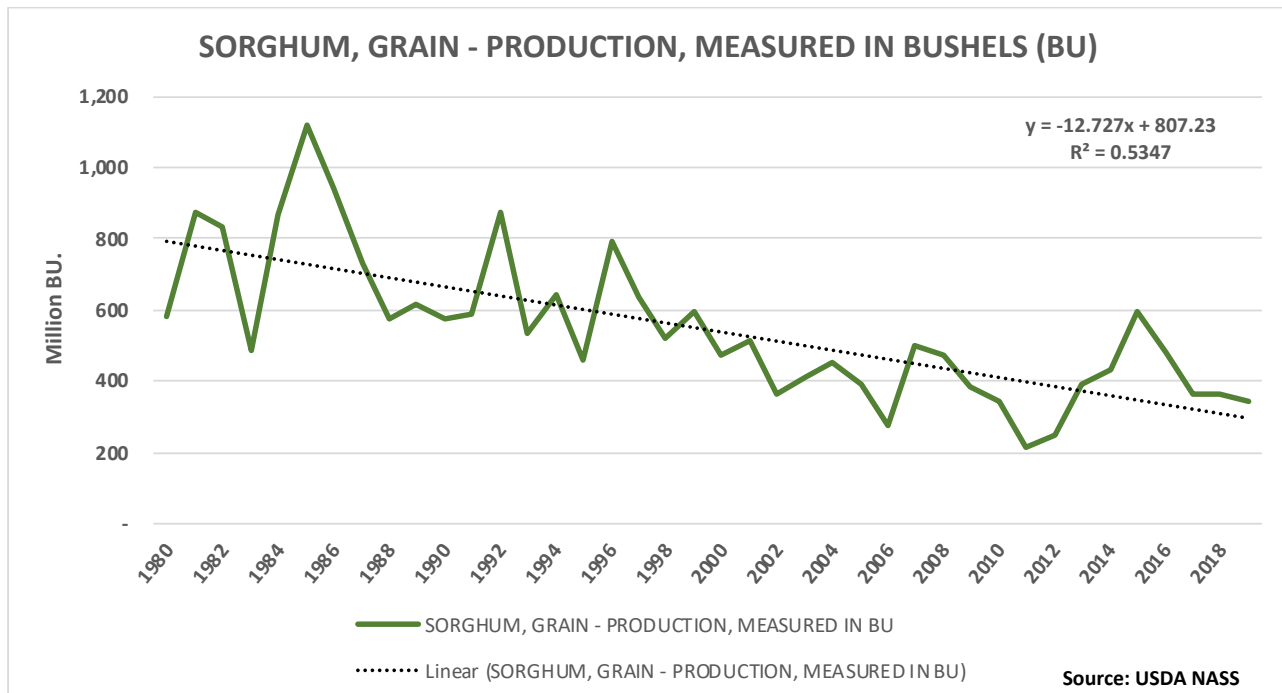


Figure 8. Historical U.S. Grain Sorghum Production

2.2 Grains and Oilseed Meals

Corn is the highest consumed grain in animal diets. The quantity of corn used as a feed ingredient is dependent upon the crop’s supply and price. The supply and price of corn is greatly affected by advances in technology (both genetic and mechanical) as well as farm policy. Since the beginning of the 1990s, there has been a steady decrease in the amount of grains other than corn (i.e., grain sorghum, barley, oats and wheat) used in feeds. This is represented by the red dotted line in Figure 9, which shows corn percentage of total animal consumption increasing over time (USDA ERS, Capenhart).

In addition, there have been decreases in the total consumption of animal feed from the 2004/05 marketing year (MY) through the 2012/13 MY, but this decreasing trend reversed in the 2013/14 MY. This is partly due to drought conditions in the Midwest, which were at their worst in 2012.

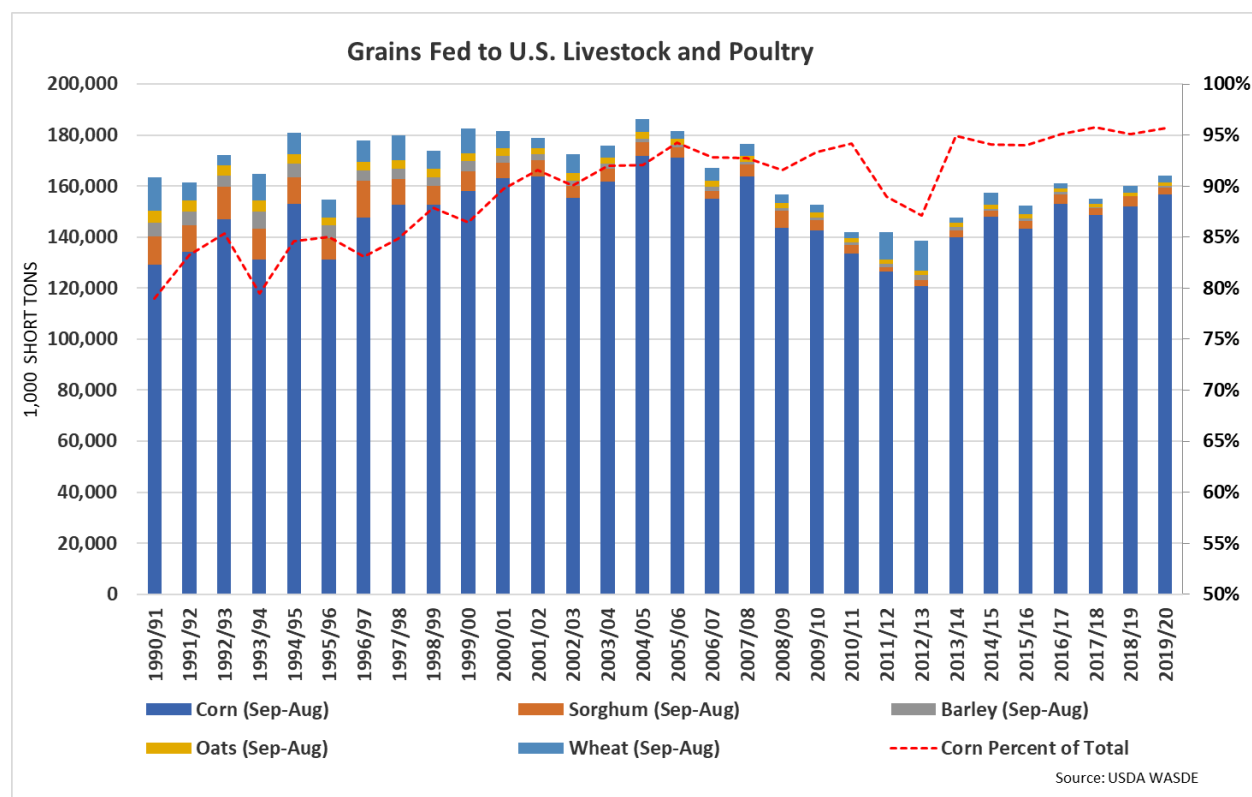


Figure 9. Grains

As seen in Figure 10, there have been notable increases in the amount of total oilseed meals fed to livestock and poultry. Oilseed meals have increased in total consumption over the last nearly 30 years, but the dominance of soybean meal in animal diets in relation to other oilseed meals has decreased. Much of the increase in oilseed supply for feed is due to increases in corn production and the need for a rotation crop. Furthermore, advancing genetics and processing technology have increased, making a stronger market for oilseeds. Additionally, support of minor oilseed crops was boosted by the Food, Agriculture, Conservation and Trade Act of 1990, which decreased the risks of planting less popular oilseed crops, thereby increasing the farmer profits.

Other oilseed meals, such as canola meal (or rapeseed meal), have gradually taken up more of total consumption since 1990. Soybean meal has decreased slightly from 86% of oilseed meal market share to 81%. Canola meal consumption has increased from 4.6 million tons⁷ between 1990/91 and 2019/20. Soybean meal consumption has also increased 15.1 million tons during the same period. This is due to the increased availability (thus decreased price) as well as the increasing awareness of the protein value of oilseed meals as a feed additive, primarily for beef cattle, dairy cows and pigs (USDA ERS, Ash).

⁷ All references to “tons” in this report are U.S. short tons (2,000 lbs.).

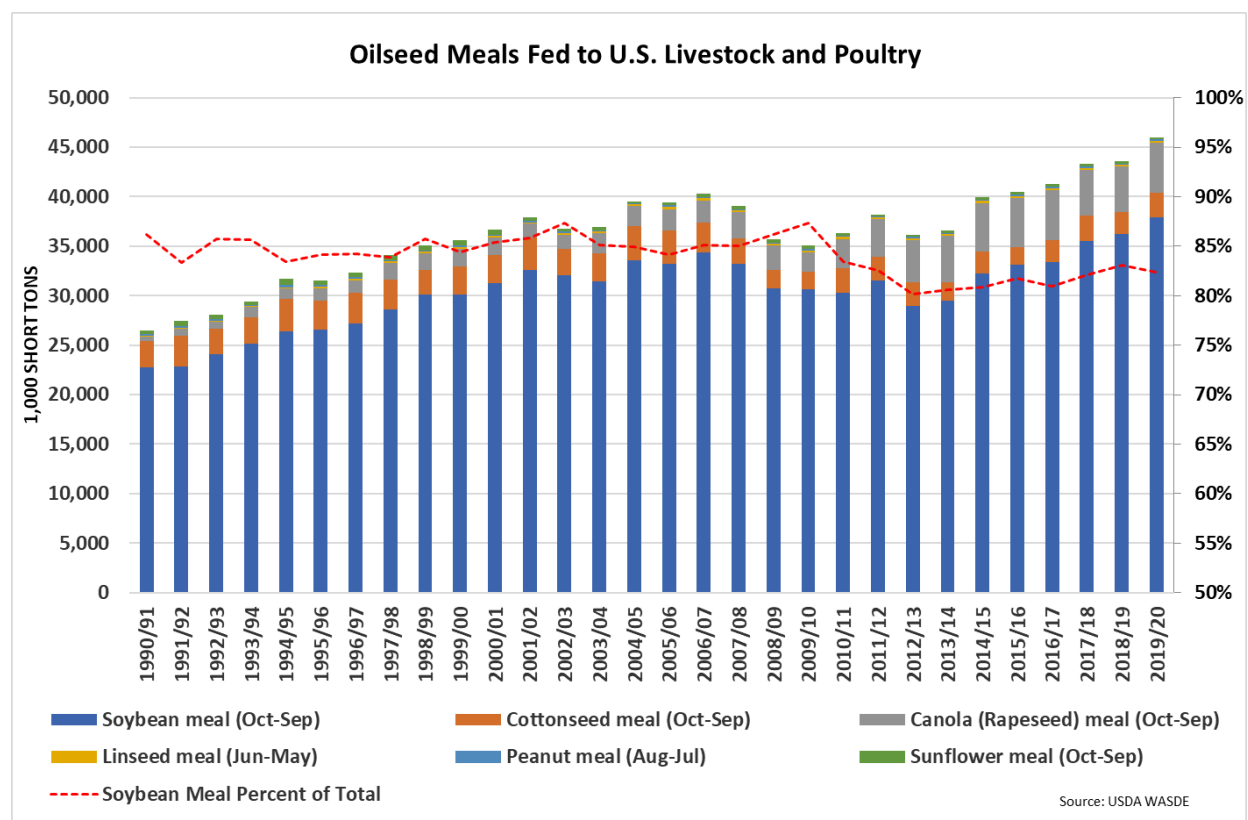


Figure 10. Oilseed Meals

2.3 2020 Feed Mill Distribution in the United States

Across the United States, in 2019 nearly 10.2 billion food-producing animals were fed. These include broilers, turkeys, egg-laying hens (layers), hogs, dairy cows, beef cattle and aquaculture. As such, U.S. animal agriculture, mainly farmers and ranchers, are the feed manufacturing industry’s primary customers.

To best serve customers and meet demand requirements, feed manufacturers strive to minimize two aspects of their business through selecting a strategic location. The first is to select a location that is within close proximity to feed inputs (e.g., grains, oilseeds and co-products) and the other is a location that minimizes feed transportation costs to the animals that will consume the feed. With these two considerations in mind, it is clear why the areas with the most feed mills coincide with the most concentrated populations of animals on feed and inputs for feed processing.

Figure 11 represents the distribution of the 5,317 animal feed mills located in 3,782 cities across the United States, where each dot represents a city that has at least one feed mill, based on data from the Food and Drug Administration’s “BSE/Ruminant Feed Inspections Firms Inventory” list. With the data presented, a clear conclusion can be made that the concentration of animals on feed as well as the production of the necessary feed ingredients occurs in the midwestern, southern and eastern regions of the United States.

The distribution of pet food manufacturing facilities is also relevant for results in this analysis. Figure 12 shows the 439 cities that have at least one (of the 519) U.S. pet food manufacturing facilities, based on data from the FDA.

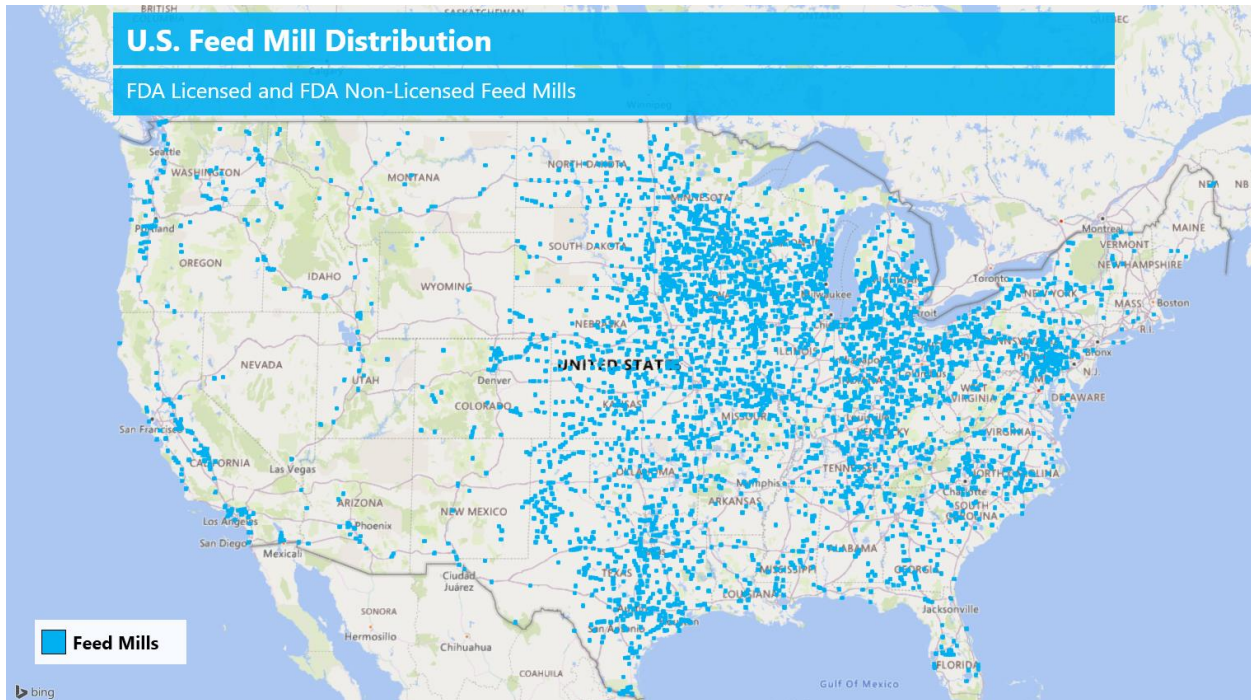


Figure 11. Cities with at Least One Feed Mill



Figure 12. Cities with at Least One Pet Food Manufacturer

3 Feed Consumption Methodology

One of the primary objectives of this analysis has been to estimate feed consumption by animal species by life stage (as appropriate) by state and region. Efforts to ascertain feed use in this fashion have been undertaken in the past. However, the methodology we utilized differs in some ways. We focus on the appropriate rations fed to the many segments of animal agriculture, essentially employing a bottom-up approach to estimating feed consumption by animal agriculture segments.

To better understand the current state of feed industry, we made targeted contact with industry and university nutritionists and subject matter experts (collectively referred to herein as SMEs) who have many years of practical industry experience. In our discussions with these SMEs, we sought to understand the following for each of the animal species under study:

1. **Population** by state/region
 - a. Broken out by stage of life, as appropriate.
 - b. Relevant production and practice trends taking place.
 - i. Recognition and identification of geographic shifts in production areas taking place as part of a mid- to longer-term trend.
 - ii. An understanding of “best management practices” with regard to rations.
2. **Typical ration ingredients and associated inclusion rates**
 - a. Regional differences in production practices and ration ingredient availability and their impact on rations.
 - b. An understanding of the nutritional profiles of key feed ingredients.
 - c. Characteristic(s) of the key ingredients that make them attractive for feeding.

The above outline was used to collect notes in numerous phone, web conference and email conversations with our chosen SMEs. As we discussed the above with SMEs, specific conditions unique to some species were identified and incorporated in our estimates of feed consumption.

In addition to working with SMEs (the “prior” method), estimates were made for each major livestock and poultry species using a second “ration cost optimization” methodology. This method relied heavily upon using scientifically developed nutritional requirements for these species. Moreover, the second methodology had a broader view, by considering available feed ingredients (and their associated quantities) and a practical understanding of how these ingredients are fed across the United States. This study used a mixture of these two methods, which will be described in more details in the next two sub-sections (3.1 and 3.2), and DIS will transition from the prior method to the ration cost optimization method in future studies.

3.1 Prior Methodology

3.1.1 Broilers

The following methodology was adopted to estimate feed consumption for broilers:

1. Broiler production and slaughter numbers are available in monthly and/or annual reports produced by USDA/National Agricultural Statistics Service (USDA/NASS) for 20 major broiler-producing states. While this covers a majority of the annual production, the reports do not provide a sound basis for distributing the “Other States” data. Using publicly available data and internally developed methodology and resources we allocated the “Other States” data to the “missing” states.
2. Distribution of broiler production by target weight needs to account for varying finishing weights. Broilers are typically raised to one of four target weights (3.75 lbs., 5.25 lbs., 7 lbs. and 9 lbs.). Since the grow-out period and resulting feed consumption is different for each range it is important to estimate the number of birds grown to each target weight.
3. Converted annual 2018 and 2019 broiler production data to 2018/19 marketing year.
4. Worked with Meghan Schwartz (private nutritionist) to determine four regional diets (see Figure 13). These diets were then weighted based upon their estimated usage. For example, Nebraska’s applied diet was 75% weighted to the Midwest diet and 25% weighted to the West diet. Similar weighting was done for other states as applicable.
5. Average broiler finishing weight in 2019 was calculated. Diets were adjusted to four finishing weights to account for varying total feed intake and weighted by their respective shares (by count) in each state.
6. Summarized ration ingredient quantities.

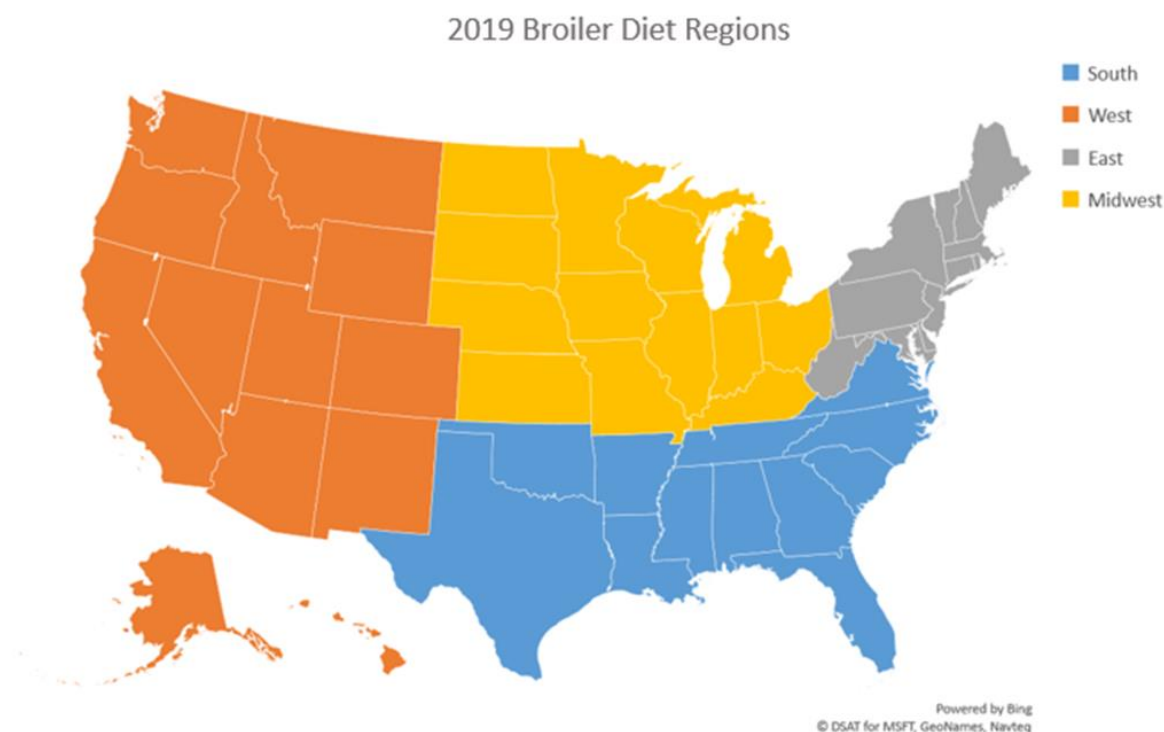


Figure 13. Broiler Ration Regions

3.1.2 Layers

The following methodology was adopted to estimate feed consumption for layers:

1. Layers were categorized into four general types of layers to account for the differential feeding to each category according to their respective differing nutritional requirements and feed intake. These types of layers are:
 - a. Table egg layers
 - i. Layers that lay eggs for table egg consumption.
 - b. Table egg layer pullets
 - i. Pullets ages 0-18 weeks of age that will become table egg layers.
 - c. Breeder table layers
 - i. Laying hens that lay eggs which become table egg pullets.
 - d. Breeder broiler layers
 - i. Laying hens that lay eggs which become broiler pullets.
2. Obtained 2019 monthly table egg layer data from the “Chicken and Eggs Summary” report from USDA, which contains inventory estimates by state for table and broiler layers. This report was used as the basis for estimating all four types of layers.
3. Worked with Meghan Schwartz (private nutritionist) to determine four regional diets (see Figure 14). These diets were then weighted based upon their estimated usage. For example, Missouri’s applied diet was 75% weighted to the Midwest diet and 25% weighted to the South diet. Similar weighting was done for other states as applicable.
4. Summarized ration ingredient quantities.

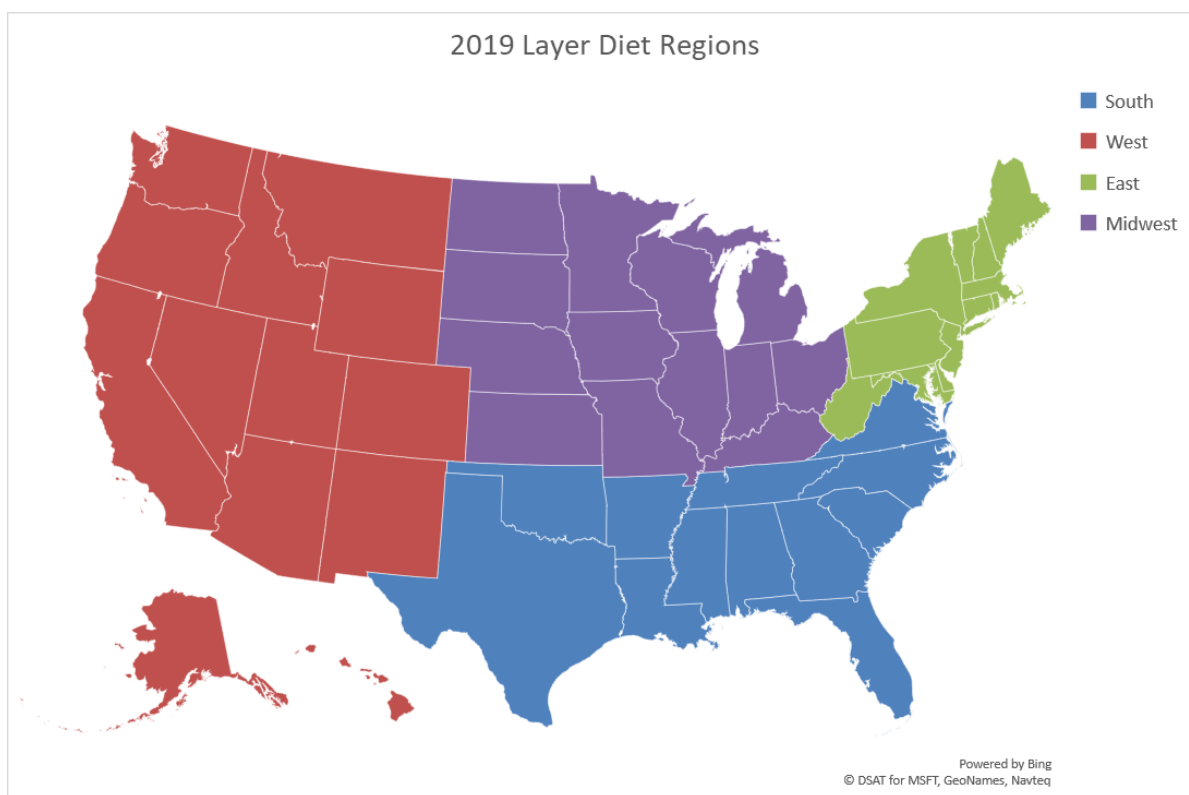


Figure 14. Layer Ration Regions

3.1.3 Turkeys

The following methodology was adopted to estimate feed consumption for turkeys:

1. Obtained 2019 turkey production from USDA's "Poultry – Production and Value, 2019 Summary" report. This report includes data for 19 major turkey-producing states. While this covers a majority of the annual production, the reports do not provide a sound basis for distributing the "Other States" data. Using publicly available data and internally developed methodology and resources, DIS allocated the "Other States" data to the "missing" states.
2. Monthly turkey production data (from USDA/NASS) was collected and summarized according to the soybean marketing year (September to August of following year).
3. Worked with Meghan Schwartz, a private turkey nutritionist, to determine four regional rations (see Figure 15). These diets were then weighted based upon their estimated usage. For example, Oklahoma's applied diet was 75% weighted to the South diet and 25% weighted to the Midwest diet. Similar weighting was done for other states as applicable. Diets were also adjusted by the following turkey production categories:
 - a. Toms (50% of total turkeys)
 - b. Light Hens (65% of 50% of total turkeys)
 - c. Heavy Hens (35% of 50% of total turkeys)
4. Summarized ration ingredient quantities.

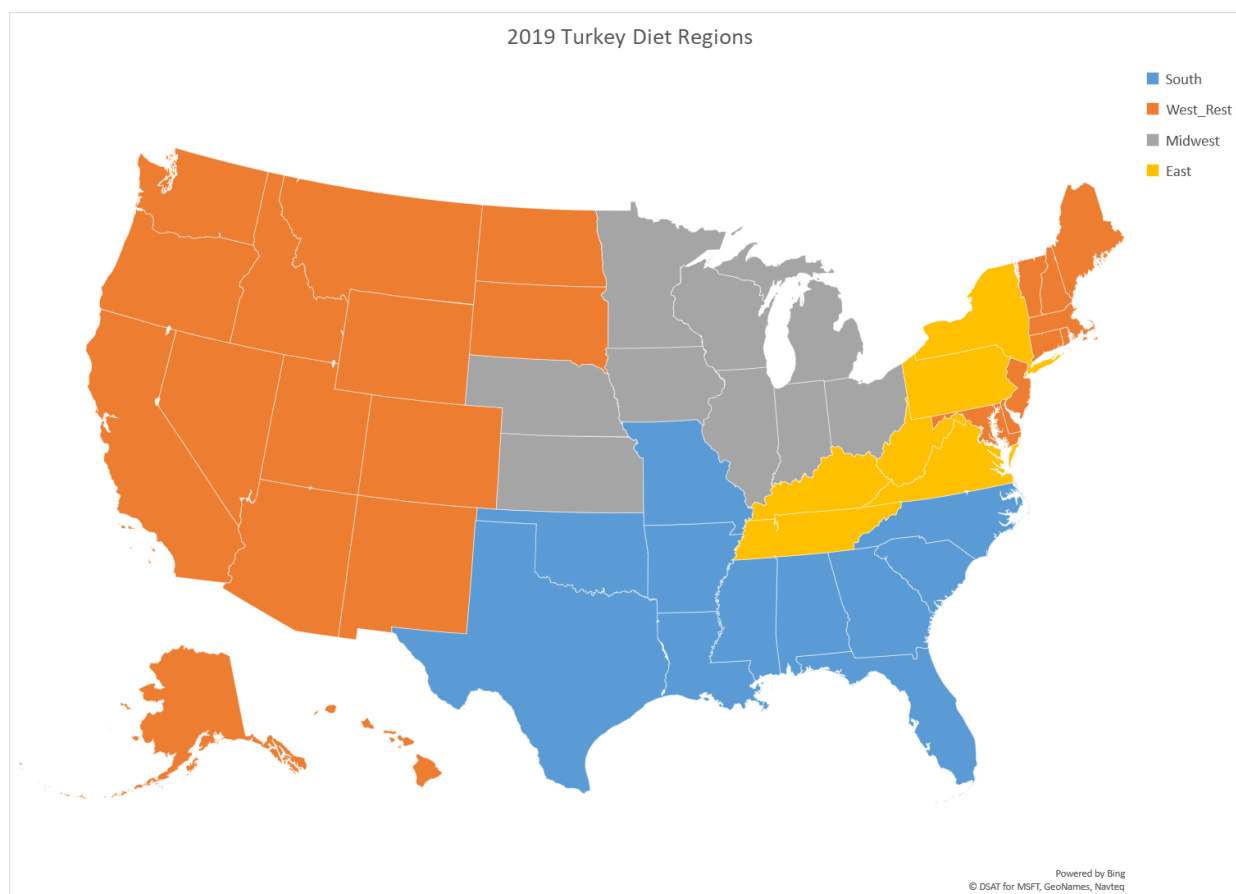


Figure 15. Turkey Ration Regions

3.1.4 Hogs

The following methodology was adopted to estimate feed consumption for hogs:

1. Obtained 2018 and 2019 marketings data from the USDA's "Meat Animal Production, Disposition, and Income 2019 Summary" report.
2. Converted 2018 and 2019 marketings data to 2018/19 marketing year.
3. Worked with Bart Borg (private nutritionist) to determine three (see Figure 16) appropriate regional rations for the following hog life stages. These diets were then weighted based upon their estimated usage. For example, Colorado's applied diet was 75% weighted to the West diet and 25% weighted to the Midwest diet. Similar weighting was done for other states as applicable. These diets also reflected the following:
 - a. A composite Gestation/Lactation ration based upon two sub-phases.
 - b. A composite Nursery ration based upon four sub-phases.
 - c. A composite Grower/Finisher based upon six sub-phases.
4. Adapted hog inventory by weight and breeding stock data from USDA to coincide with corresponding rations provided by nutritionists.
5. Summarized ration ingredient quantities.

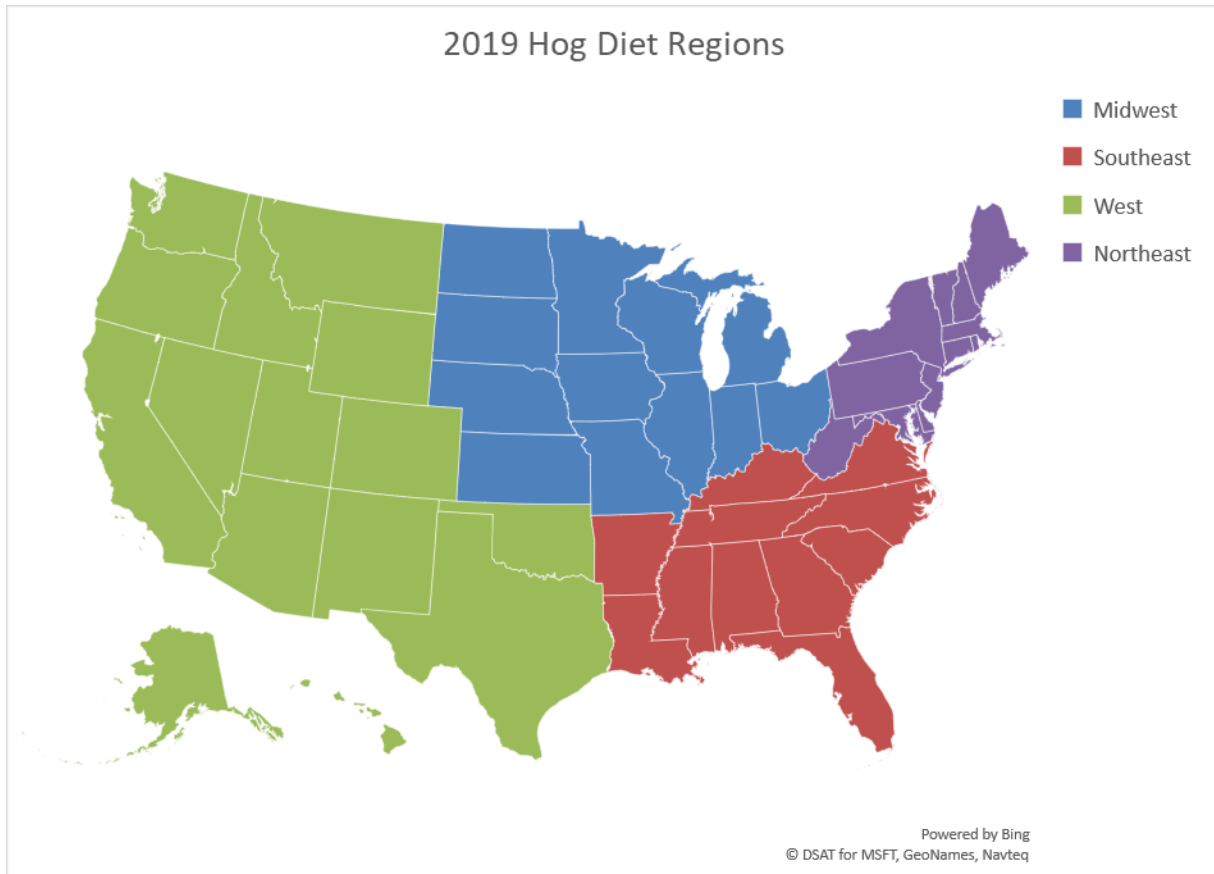


Figure 16. Hog Ration Regions

3.1.5 Dairy Cows

The following methodology was adopted to estimate feed consumption for dairy cows:

1. Obtained monthly 2018 and 2019 inventory data by state from the USDA/NASS.
2. Calculated average inventory by state for months making up the 2018/19 marketing year.
3. Worked with primarily Mike Hutjens (University of Illinois) to determine appropriate regional rations for lactating dairy cattle (see Figure 17). These diets were then weighted based upon their estimated usage. For example, Iowa's applied diet was 75% weighted to the 70/30 Corn Silage/Alfalfa diet and 25% weighted to the 50/50 Corn Silage/Alfalfa diet. Similar weighting was done for other states as applicable.
4. Summarized ration ingredient quantities.

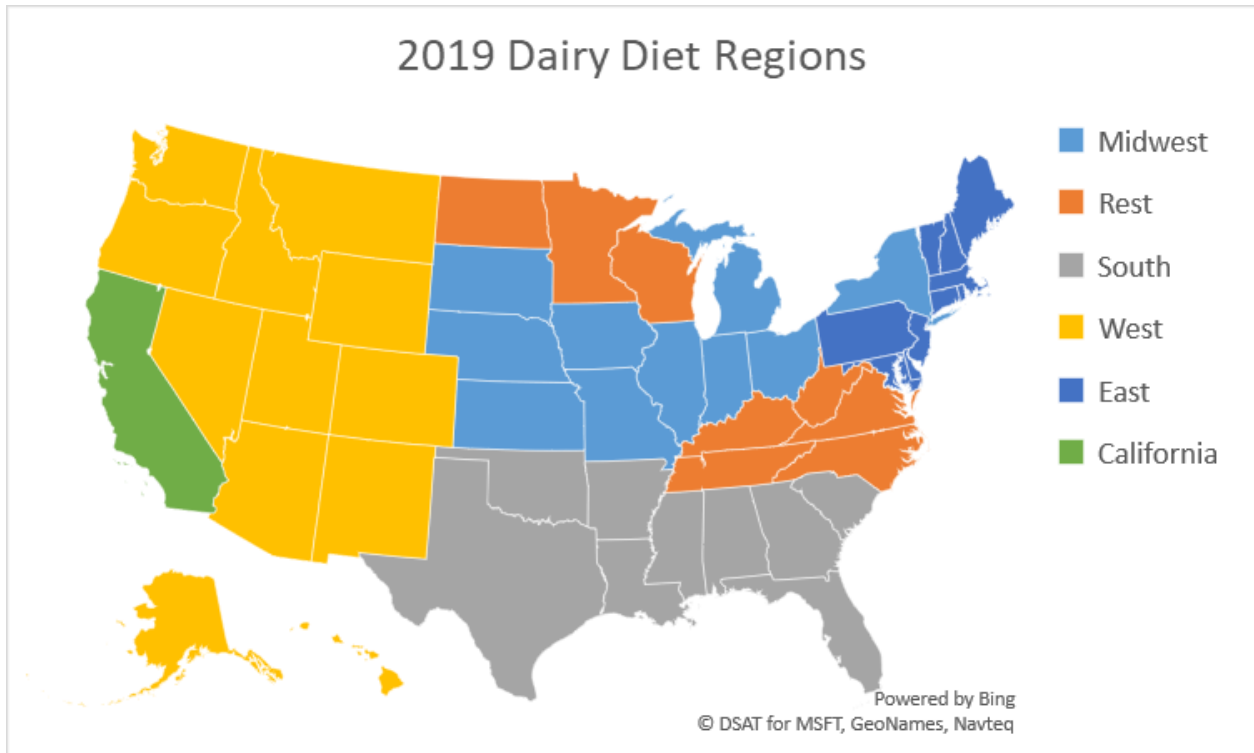


Figure 17. Dairy Ration Regions

3.1.6 Beef Cattle

The following methodology was adopted to estimate feed consumption for beef cows:

1. Obtained 2018 and 2019 marketings data from the USDA's "Meat Animal Production, Disposition, and Income 2019 Summary" report.
2. Converted 2018 and 2019 marketings data to 2018/19 marketing year.
3. Worked with SMEs, including Eric Bailey (University of Missouri) as well as online resources from the University of Missouri and Kansas State University to determine appropriate rations for beef production:
 - a. Creep feed for young calves at or around weaning time.
 - b. Receiving and Finishing diets for both calf-feds and yearlings.
 - i. Determined two (see Figure 18) appropriate regional rations for finishing cattle. These diets were then weighted based upon their estimated usage. For example, Utah's applied diet was 75% weighted to the Southern diet and 25% weighted to the Northern diet.
4. Summarized ration ingredient quantities.

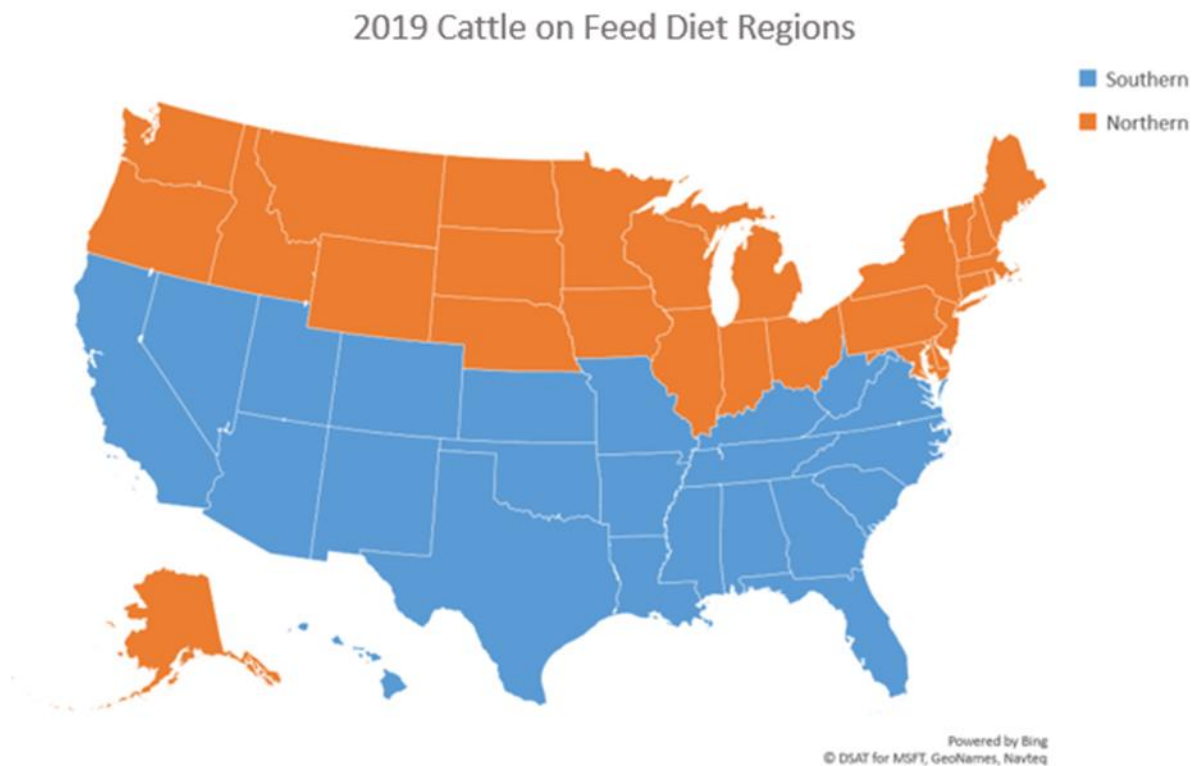


Figure 18. Cattle on Feed Ration Regions

3.1.7 Aquaculture

The 2017 USDA Census of Agriculture provides information on the number of aquaculture operations with sales within each state. However, species-level details are only available for Catfish and Trout. The other categories are Food Fish, Bait Fish, Crustaceans, Mollusks, Ornamental Fish, Sport Fish, Aquaculture and other. The 2018 USDS Census of Aquaculture will not be released in time for use in this report.

Five major food fish were included in previous studies. They are: catfish, trout, tilapia, hybrid striped bass and yellow perch. Saltwater shrimp and freshwater prawns were included in the shrimp category. For this report, DIS used the 2017 USDA Census of Aquaculture Census Table number 31, Aquaculture Sales.

In most species of food fish, the sales information is reported in four life stages: broodstock, fingerlings and fry, stockers and food size. This breakdown is not available for bait fish, hybrid striped bass and yellow perch and is not applicable to crustaceans.

For trout and catfish, the USDA also produces annual reports for the previous two years. The data included in these USDA/NASS reports are very similar to the data included in the 2013 Census providing updated data on catfish and trout production. However, data is not updated or included in the annual reports for the number of operations.

For all other species, using input from SMEs and datasets from FishStatJ⁸, we established a growth percentage from the 2013 census to create the 2017 estimates. The 2017 populations for each species include an adjustment for losses through the specific life stage growth period.

Working with industry experts, average target weights, feed conversion ratios (FCR), and soybean meal inclusion rates were determined for each species (i.e., catfish, trout, tilapia, hybrid striped bass, yellow perch, baitfish and shrimp). In addition, we created an estimate for the percent of death losses for each species. A loss factor was established based on the assumption that losses occur evenly over the grow-out period. These factors were used to calculate the estimated soybean meal consumption per head in each life stage category.

3.1.8 Meat Goats and Sheep

The following methodology was adopted to estimate feed consumption for meat goats and sheep:

1. Using historical meat goat and sheep population data from the USDA NASS publication, meat goat and sheep population by state estimates for 2019 were generated.
2. Worked with SMEs to determine appropriate inclusion rates for meat goats and sheep.
3. Average daily feed consumption by meat goats and sheep are a function of the goats/sheep weight, food intake and inclusion rates and share of meat goat and sheep food market that utilizes various feed ingredients.
4. The estimated inclusion rates for relevant feed ingredients were factored against total estimated 2019 meat populations by state.

⁸ Food and Agriculture Organization of the UN, <http://www.fao.org/fishery/statistics/software/fishstatj/en>

3.1.9 Horses

Feedstuff usage by horses was greatly aided by the U.S. Pet Ownership and Demographics Sourcebook, a report published by the American Veterinary Medical Association. Data from this report were used as a basis to estimate feed consumption by horses for 2019. SMEs provided additional context regarding the degree to which certain feedstuffs are included in horse diets. The following methodology was adopted to estimate feed consumption by horses:

1. Using historical horse population data from the AVMA publication, 2019 estimated horse populations by state were generated.
2. Worked with James Lattimer (Kansas State University) to determine appropriate inclusion rates for horses.
3. Average daily consumption of relevant feed ingredients were factored against total 2019 horse populations by state.

3.1.10 Cats and Dogs

The following methodology was used to estimate cat and dog food ingredients from the Pet Food Production and Ingredient Analysis report DIS prepared for IFEEDER, the Pet Food Institute and North American Renderers Association in 2019⁹. This section is new from the previous feed consumption report prepared for IFEEDER in 2017.

Nielsen was used to capture SKU/UPC level data in six sales channels (i.e., Petco, Petsense, Petsmart, PetValue, Supermarket and All other channels) for sales of cat and dog foods nationally for the 52 weeks immediately prior to purchase (June 2019). Many aspects of the sales were provided, which allowed classification of the pet foods to take place. Both 'as sold' and 'as bought' ingredient volumes were estimated.

To calculate 'as sold' and 'as bought' ingredient quantities for all cat and dog food products contained in the purchased Nielsen data, the summarized steps and additional detail for the most critical portion (recipe reverse engineering) of methodology follows:

For 'as sold' ingredients:

1. By species (i.e., cat and dog), combine six sales channels within purchased Nielsen data and remove duplicates (by UPC and package size).
2. Determine which UPC's represented 95% (by volume) for cat and dog foods.
3. Conduct online research for each product to obtain the corresponding ingredient panel, guaranteed analysis and caloric information.
4. Identify the products labeled as "private label," defined by the original Nielsen data, to find approximate matches to non-private label products. This was done using the following variables, also defined by the Nielsen data, in descending order of importance:
 - a. Species: cat or dog
 - b. Food types: dry food, wet food, and treat; moist for dog food products only
 - c. Target group ages

⁹ For more details about this study: <https://ifeeder.org/pet-food-report/>

- d. Protein presence claim
 - e. Strategic ingredient presence claim
 - f. Organic claim
 - g. Veterinary claim
 - h. Form
5. Extract all the ingredients from pet food ingredient panels, refine (standardize) ingredient names, assign corresponding ingredient panel placement position and summarize the total frequency of each refined ingredient.
 6. Obtain prioritized ingredient list from research funding organizations.
 7. Categorize/aggregate the prioritized ingredients into nutrient groups, such as animal protein, animal fat, plant protein, plant carbohydrate, etc.
 8. Complete pet food recipe reverse engineering:
 - a. Create a database for all standardized ingredients, including their nutrient facts and national level annual average prices.
 - b. Based on the database, apply recipe reverse engineering techniques on sampled products.
 - Sampled products were randomly selected by species, food categories (three for cat foods and ten for dog foods) and dominant ingredients.
 - c. Apply the distributions for the ingredient inclusion rates based on the corresponding placement in non-sampled products.
 9. Combine estimated ingredient inclusion rates from Step 8 for all standardized ingredients, with the sales data from Nielsen, to calculate quantities of each standardized ingredient for a given pet food product.
 10. By UPC, factor up total volumes by percent coverage within Nielsen data.
 11. Summarize the total quantities for standardized ingredients (i.e., 'as sold' ingredients).

For 'as bought' ingredients:

1. Identify and average moisture content of the finished products, 'as sold' basis, used for adjustment were:
 - Dry dog food (10%)
 - Dog treats (15%)
 - Dry cat food (10%)
 - Cat treats (10%)
 - No ingredient quantity adjustments due to moisture characteristics were applied to ingredients used in moist or wet dog food or wet cat food.

For example, the average moisture content of dry dog food is approximately 10% moisture. Ingredients such as grains and meats are purchased at higher moisture contents than the finished product, so ingredient quantities 'as bought' need to be adjusted for the moisture that is removed in the process of making the finished pet food product.

2. Using moisture content of the major ingredients that were developed as part of the ingredient analysis database in “Ingredient Analysis Step 8.a.,” the quantity of raw ingredients was adjusted for the dry pet food products by the formula:

$$\frac{(\text{As Sold Ingredient Amount} * (1 - \text{Moisture of Pet Food}))}{(1 - \text{Moisture of the Raw Ingredient})}$$

3. Estimate prices of raw ingredients. Prices were collected from a variety of sources including:
- [USDA - AMS Market News](#)
 - [USDA NASS Crop Values 2018 Summary](#)
 - [USDA 2018 Poultry Production and Value Summary](#)
 - [USDA Market News - Fruits](#)
 - [USDA Market News - Dairy](#)
 - [FeedStuffs - Grains and Ingredients](#)
 - [FeedStuffs - Livestock and Poultry](#)
 - [University of Missouri AgEBB By-Products](#)
 - [FeedForLess.com](#)
 - [Alibaba.com Feed Products](#)
4. Prices were converted to \$/cwt and then to \$/ton.
5. Determine value of adjusted raw material ingredient amounts.
- Adjusted raw ingredient amounts (in tons) were multiplied times the price (\$/ton)
6. Aggregate more than 1,200 specific ingredients into 359 ingredient categories.
7. Categorize 359 ingredients into seven sub-categories and into groups within the sub-categories:
- Rendered meals: animal meals, fish meal and poultry meal
 - Slaughter/rendering materials: animal fat, poultry fat, by-product and organ meat and meat and poultry
 - Farm and mill-based ingredients: alfalfa, barley, berry, corn, dairy, dried beans, egg, fruit, herb, Mediterranean, minor oilseed, nut, oats, other, other grain, pea and lentil, peanut, potato, rice, root, soybean, sweetener, tropical (palm and coconut), vegetables and wheat
 - Fishery: sea products and seafood
 - Mineral and other: fiber and mineral
 - Water
 - Broth
8. Estimate aggregated tonnage and value for each of the seven sub-categories.
9. Estimates of state-level “as-bought” ingredients were calculated based on each state’s share of direct output from pet food manufacturing sales (from the 2016 analysis that DIS conducted for IFEEDER) multiplied times the U.S. total ingredient purchases as factored up to U.S. totals. The average pet food ingredients purchased was calculated by dividing the state’s total pet food ingredients purchased by the number of pet food manufacturing facilities in each state.
10. Summarize the volumes for the state-level pet food ingredients purchased (i.e., ‘as bought’ ingredients).

3.1.10.1 Recipe Reverse Engineering

To estimate the quantities of food ingredients 'as sold' for all pet food products, recipe reverse engineering program was applied. The methodology behind this program is as follows:

1. Achieve all the guaranteed analysis and calories by using the ingredients shown on the ingredient panel for a given food product.
2. At the same time, maintain a relative low-cost level for the formulation while maintaining ingredient panel order.

Due to time limitations, applying the recipe reverse engineering on all the pet food products was not feasible. Therefore, a statistical methodology was developed to apply the recipe reverse engineering on representative samples to determine "prevalence distributions" for ingredient placements and ingredients. These sampled result distributions were then applied to non-sampled products. To be more accurate, random samples were selected under **subsegments**, depending on different scenarios:

1. Food categories, defined by Nielsen data:
 - a. For cat food products, three categories were considered: dry food, wet food and treats.
 - b. For dog food products, 10 categories were considered: dry food, wet food, moist food, biscuit, dental, frozen, jerky, rawhide, refrigerated and soft treat.
2. Dominant ingredients, in this case, the first three ingredients were called the dominant ingredients:
 - a. Within each food category, classified subgroups based on the first ingredients, chicken, beef, grains, broth, etc.
 - b. For each subgroup, determined and categorized **subsegments** according to the combinations and relationships of the three dominant ingredients.

Therefore, **27 subsegments** for cat food products and **69 subsegments** for dog food products were established. Within each **subsegment**, representative sample(s) were randomly selected. Overall, there were 199 samples (approximately 35%) for cat food products and 529 sampled products (approximately 43%) for dog foods.

To have a clearer view of the ingredient quantities in the summary plots, one more aggregation step on the ingredient name was completed. For instance, all livers, hearts and lungs were classified as "organ meat;" "carrots," "dehydrated carrots," and "dried carrots" as "carrots;" and all other animal related food ingredients with less than 10 occurrences were combined, such as "other animal by-products." This aggregation was done after the recipe reverse engineering to avoid miscalculation, for a given pet food product.

3.2 Multi-Species Ration Cost Optimization (RCO) Estimating Methodology

As the inspiration from recipe reverse engineering program used in the pet food analysis above, a Multi-Species Ration Cost Optimization model (RCO) was applied. The methodology behind this model is as follows:

1. List the possible feed ingredients for a given species, for all species, i.e. Beef Cattle, Dairy Cattle Broilers, Layers, Turkeys and Hogs.
2. For a given species, use and allocate USDA published price points for all relative feed ingredients plus transport fee to estimate the cost for the corresponding feed ingredients.
3. For a given species, break down into different stages according to National Research Council (NRC). For instance, Beef Cattle is broken into Beef Heifer, Beef Cows since calving (from month 1 to month 12), growing cattle and cattle on feed. And, determine the majority of nutrient requirements (e.g., energy, crude protein, amino acid, fat and fiber) for all stages, published by NRC.
4. For a given state/region, apply unique ingredient limitations, to mirror reality.
 - For beef heifers, beef cows and growing cattle, estimate the percentage of nutrients that come from feed and from grass for all states/regions and all stages.
5. Apply the feed ingredient costs, the nutrient requirements and ingredient limitations into ration cost optimization formulation in Solver of Microsoft Excel to find the optimized cost of feed ration (result shown as g/100g feed) for all stages, for a given state/region, and for a given species.
6. Calculate stages weighted average ration for a given state/region and for a given species.
7. For each species, inventory numbers are available in monthly and/or annual reports produced by USDA/NASS for at least the most producing states. Using publicly available data and internally developed methodology and resources we allocated the “Other States” data to the “missing” states.
8. For a species, use the weighted average percentage of each ingredient calculated from Step 6, multiply by corresponding inventory numbers, corresponding feed consumption, and corresponding days of feeding period to obtain the volume of a given ingredient.
9. Summarize the quantities for a given ingredient for all states, for a given species.

RCO was applied to all states for broilers, layers and turkeys. And this model was applied to the major producing states for hogs, dairy cattle and beef cattle. Some minor states used the same ration as their nearest available state’s ration from RCO. Region maps for livestock are shown below, from Figure 19 to Figure 21. Common colors denote common base feed rations. For instance, in Figure 19, most Midwest states have their own ration, due to the large inventory and production numbers of hogs. But for some other states, such as Washington state and Oregon, that do not have many hogs, their rations were covered by a representative state that is closest to them. For instance, Montana’s and Utah’s rations were applied to Washington and Oregon, respectively. The labeled states in the diet region maps are the representative states.

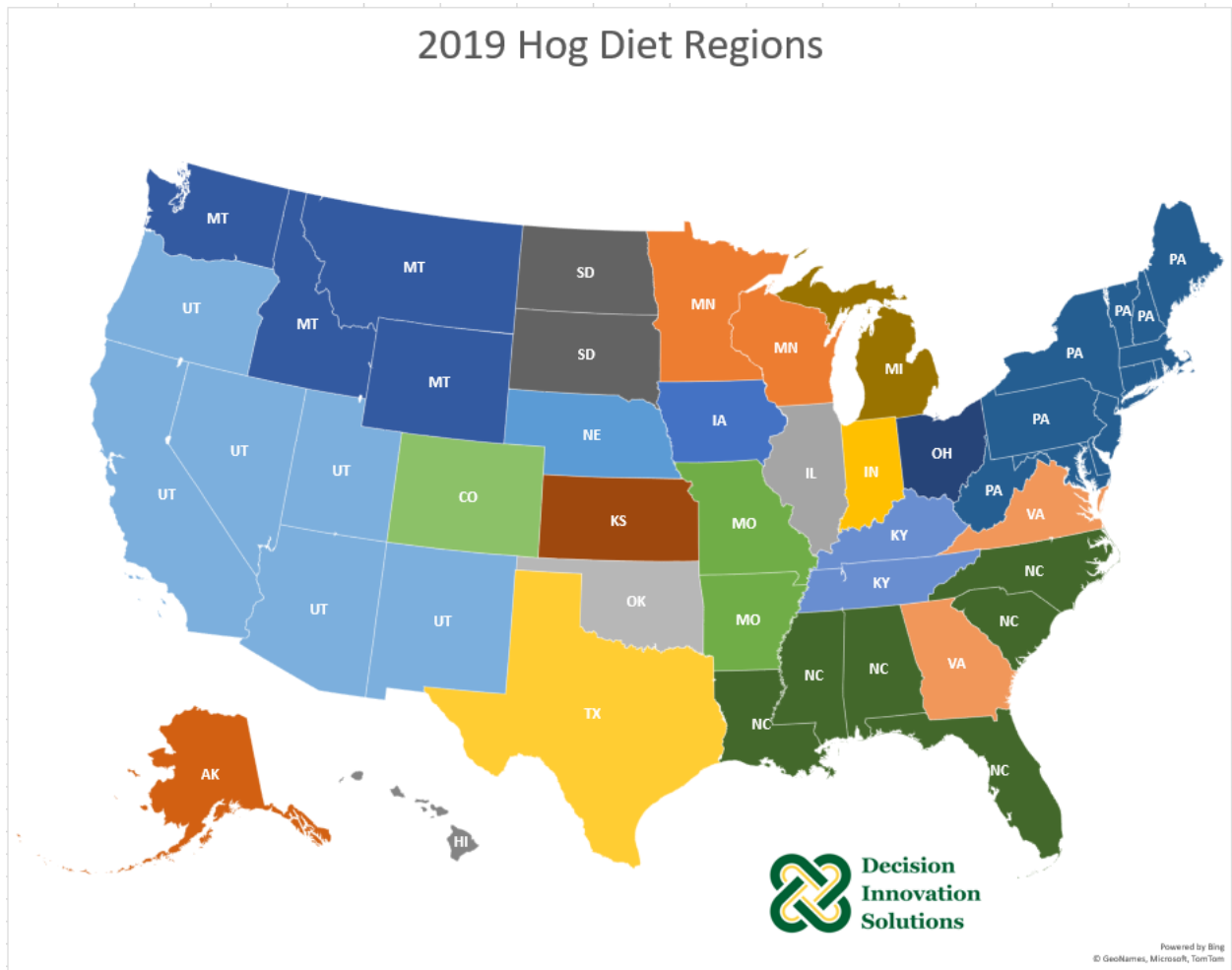


Figure 19. Hog Ration Regions

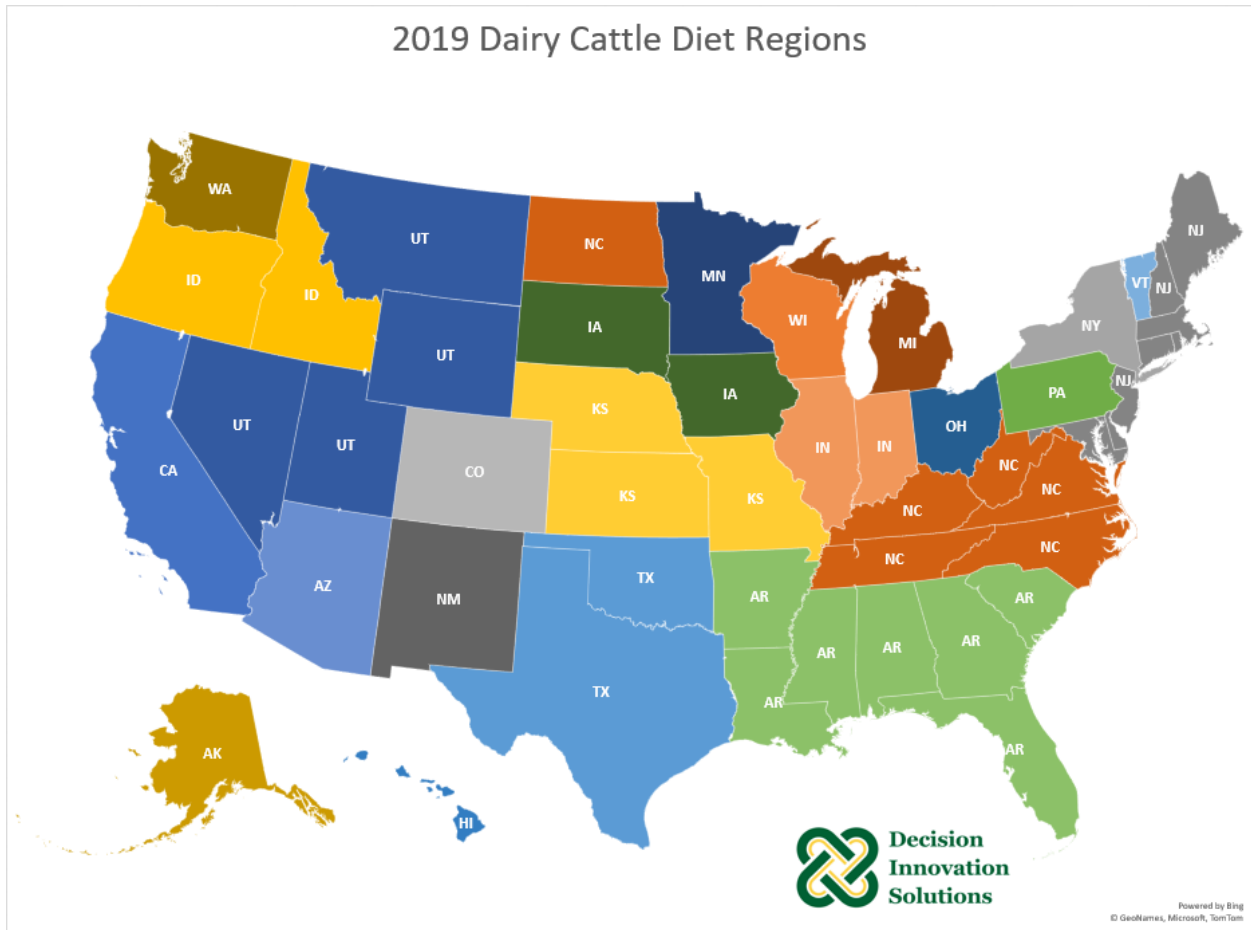


Figure 20. Dairy Cattle Ration Regions

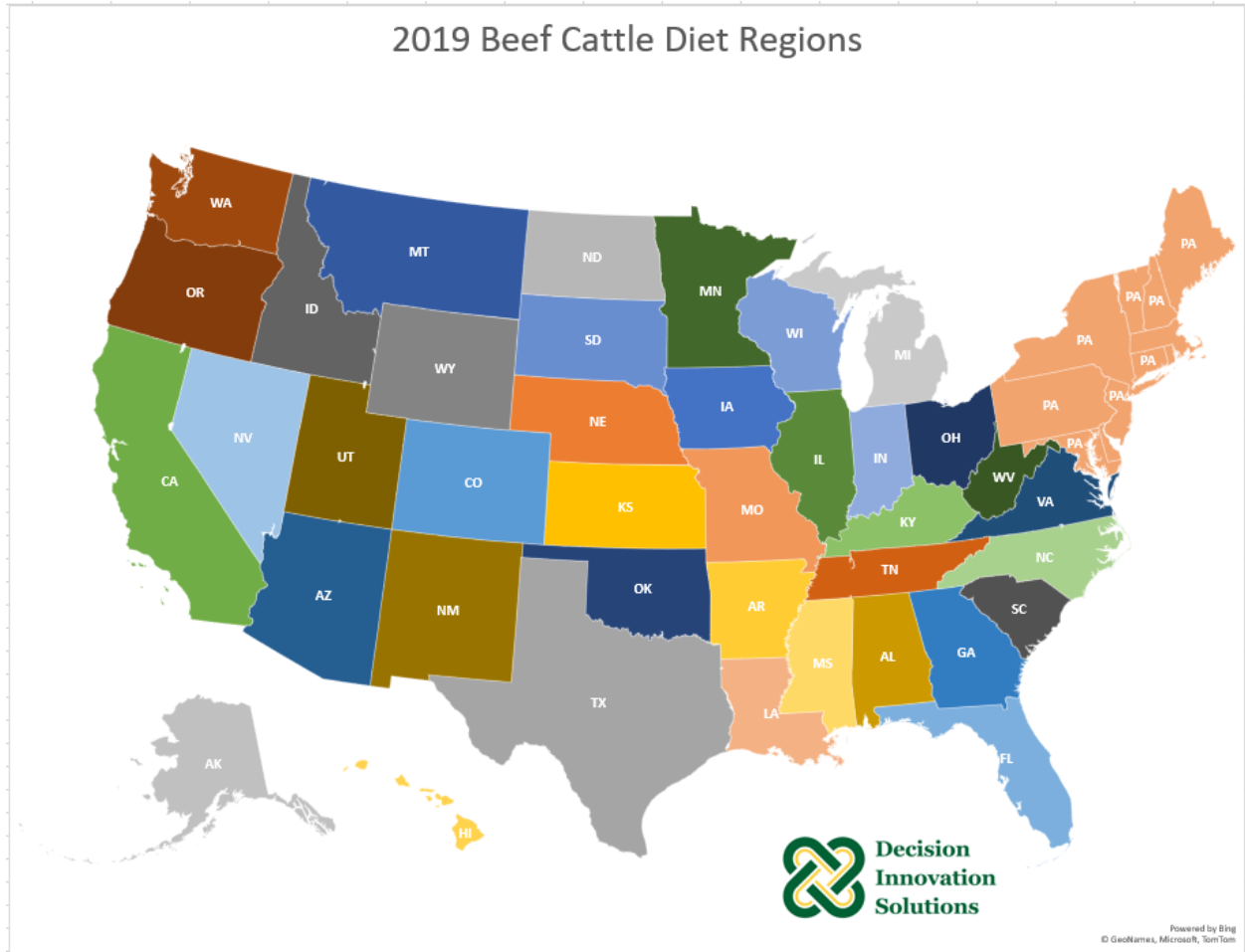


Figure 21. Beef Cattle Ration Regions

4 Results

4.1 Feed Consumption Results for the Year of 2019

Using the methodology described previously, this section represents DIS's animal feed/food consumption estimates by species by ingredient for the year 2019. In addition to the accompanying charts and tables (see Appendix A), DIS also estimated the ingredients which do not normally pass through feed mills (e.g., corn silage, alfalfa hay and other hay). However, these ingredients were excluded from all charts and tables to keep the focus of the report consistent. In all the pie charts in this section, ingredient compositions greater than 1% list separately.

4.1.1 Totals

As shown in Figure 22 and the tables in Appendix A, the total amount of feed/food fed to U.S. livestock, poultry, pets, horse and aquaculture in 2019 equaled approximately 571.4¹⁰ million tons. The map in Figure 23 shows how that is broken out by state.

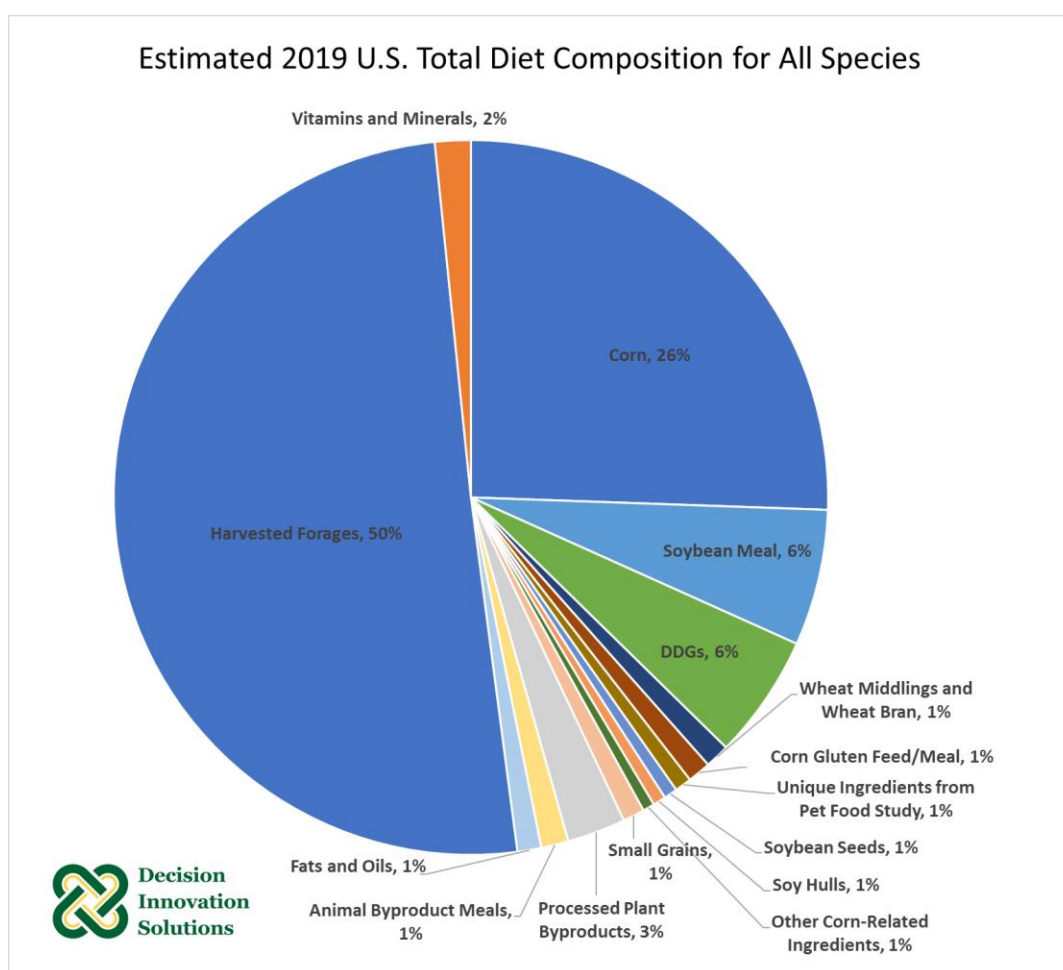


Figure 22. Estimated 2019 Total Diet Composition

¹⁰ Limestone, salt, and other carriers are included in the "Vitamins and Minerals" category.

The top five states for overall feed consumed include Texas, California, Iowa, Wisconsin and Nebraska. Slightly more than half of the total amount came from harvested forage, which includes corn silage, alfalfa hay and other hay. Aside from forage, corn, the most abundantly produced crop in the United States, makes up the largest share (25%) of total feed consumption. Soybean meal (6%) and DDGs (6%), two other commodities produced in large quantities, are also included in relatively large quantities. These top four ingredients represented about 90% of all feed tonnage included in 2019 animal diets. Other commodities comprising at least 1% of tonnage fed to livestock and poultry in 2019 include:

- Corn gluten feed/meal,
- Soybean seeds,
- Soy hulls,
- Other corn related ingredients (grain sorghum and hominy feed)
- Small grains (barley, wheat, oats and millet)
- Processed plant byproducts (canola meal, cottonseeds, cottonseed meal, sunflower meal and hominy feed, bakery meal, almond hulls, rice mill feed, potato peels, potato pulp and potato tubers),
- Animal byproduct meals (meat and bone meal, meat meal, feather meal, blood meal and fish meal),
- Fats and oils (soybean oil, yellow grease, inedible tallow and choice white grease), and
- Unique ingredients from pet food study.

For the full table of ingredient quantities, see Appendix A.

2019 Total Animal Feed Consumed by State

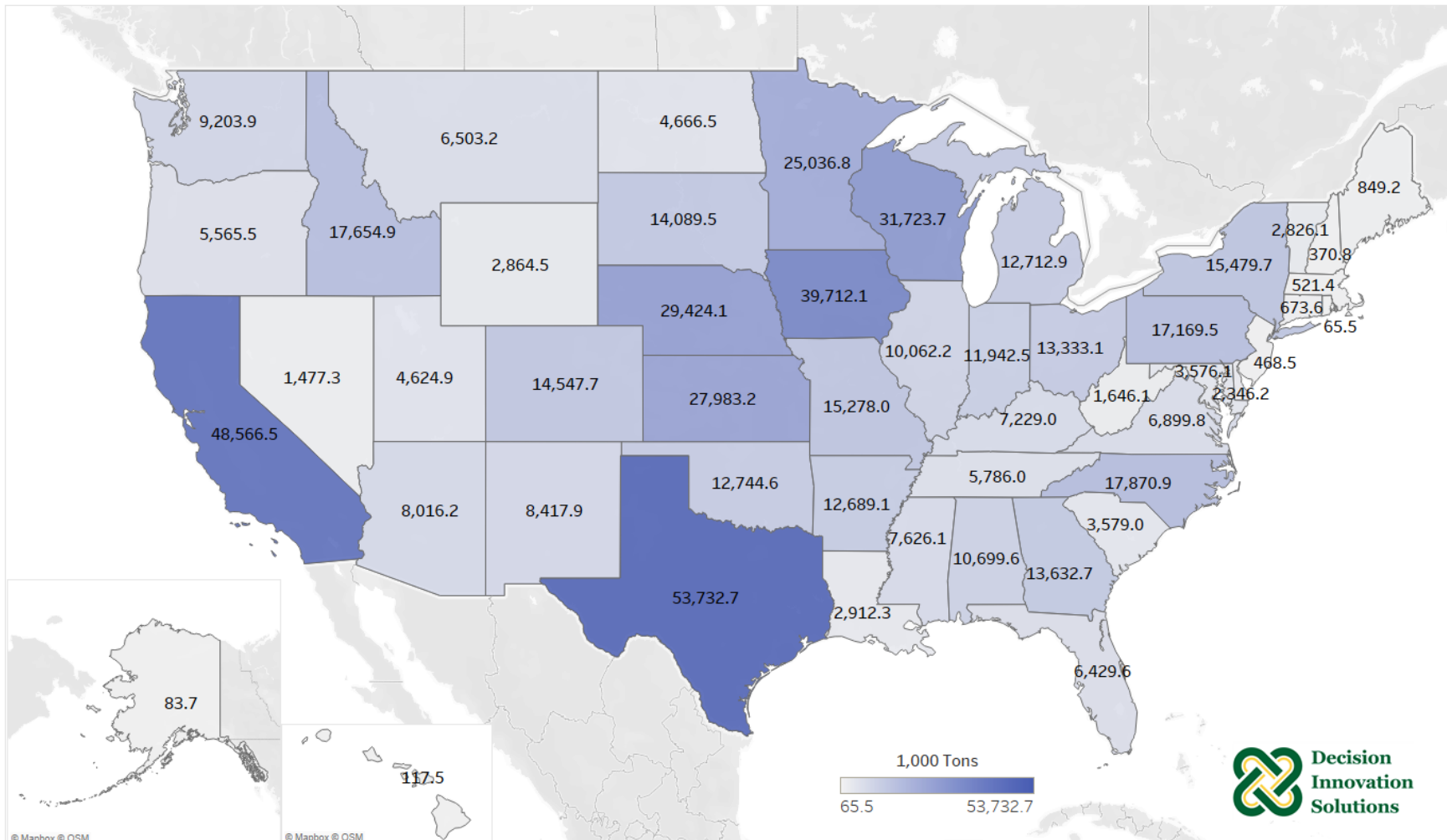


Figure 23. 2019 Total Animal Feed Consumed (in 1,000 Tons) by State

4.1.1.1 Total Animal Feed (without Harvested Forages)

As shown in Figure 24 and the tables in Appendix A, the total amount *without* harvested forages of feed fed to U.S. livestock, poultry, pets, horses and aquaculture in 2019 equaled approximately 279.5¹¹ million tons. The map in Figure 25 shows how that is broken out by state.

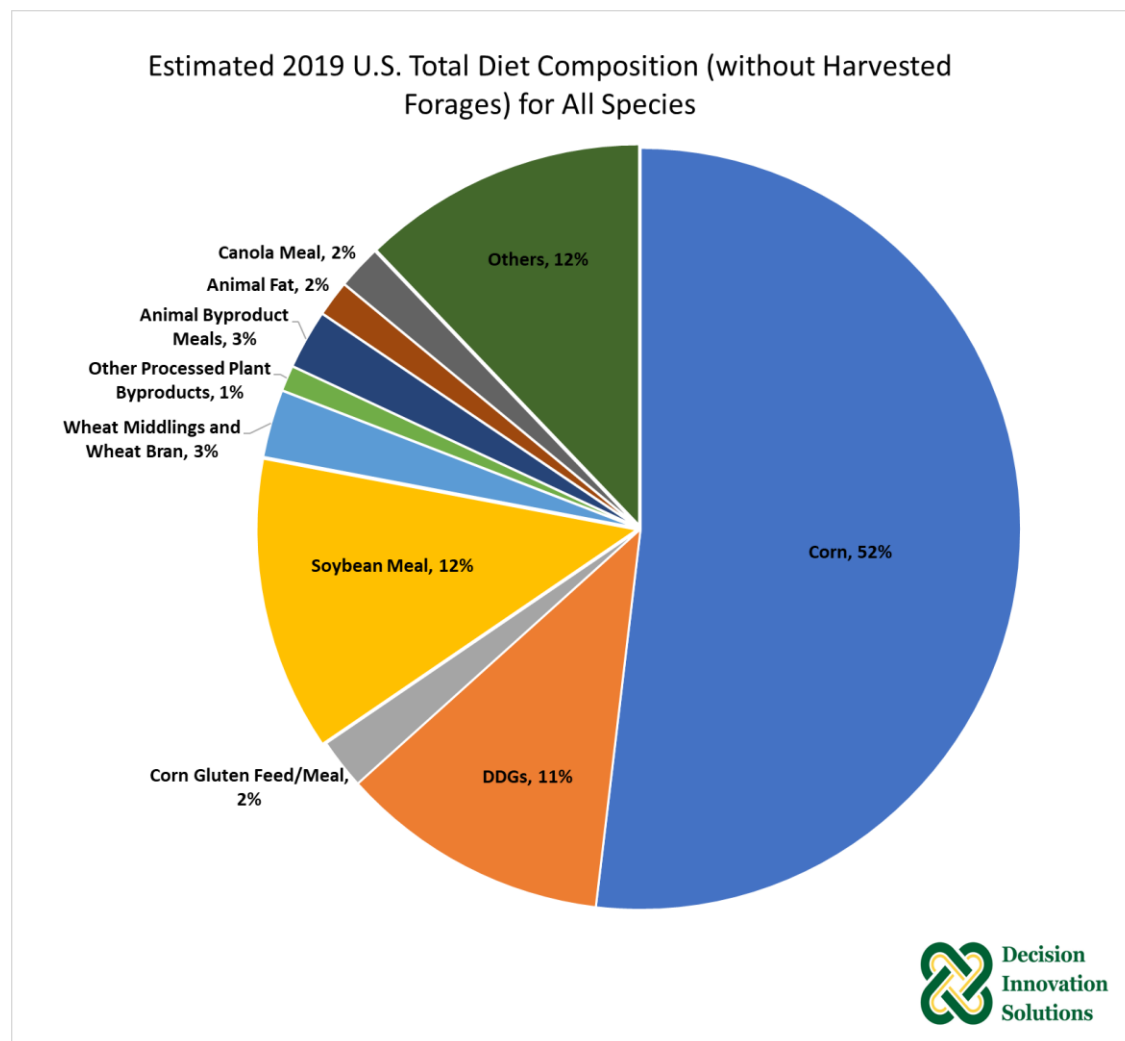


Figure 24. Estimated 2019 Total Diet Composition without Harvested Forages

Excluding harvested forages, the top five states for feed consumed are Iowa, Texas, California, North Carolina and Minnesota. Corn, the most abundantly produced crop in the United States, makes up the largest share (52%) of total feed consumption. Soybean meal (12%) and DDGs (11%), two other commodities produced in large quantities, are also included in relatively large quantities. Included in these totals are the common ingredients that are fed to livestock and also used in pet food study. These top three ingredients represented 75% of all feed tonnage included in 2019 animal diets.

¹¹ The 279.5 million tons also excludes the “unique ingredients from pet food study”, which is 4.3 million tons.

2019 Total Animal Feed (without Harvested Forages) Consumed by State

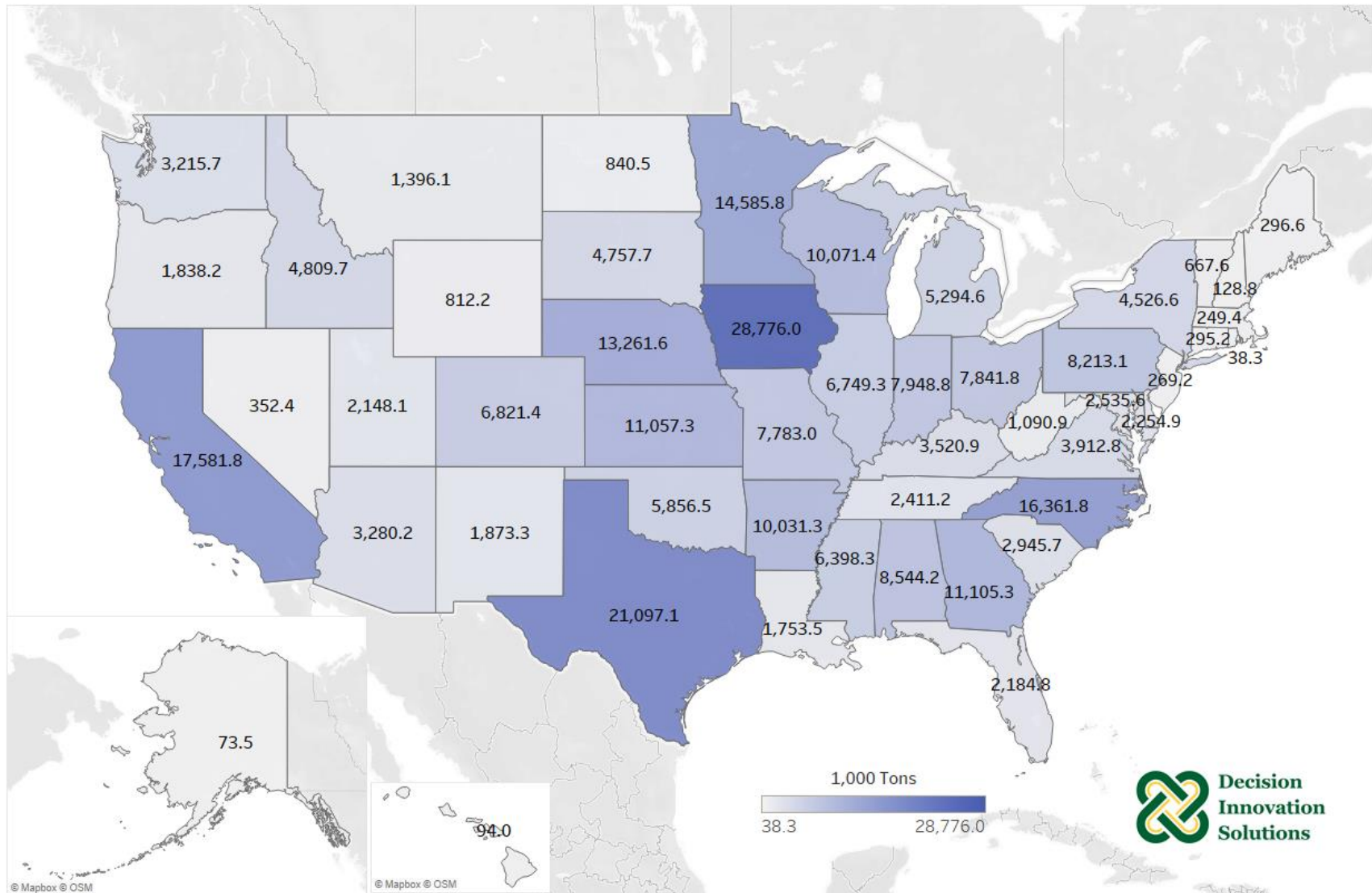


Figure 25. 2019 Total Animal Feed without Harvested Forages Consumed (in 1,000 Tons) by State

4.1.1.2 Total Harvested Forages

Harvested forages (i.e., corn silage, alfalfa hay and other hay) in this study were estimated in the consumption by dairy cattle (including dairy cows have calved, bulls, heifers and calves) and beef cattle (including beef cows, bulls, cattle on feed and calves). The map in Figure 26 shows how that is broken out by state. Texas, California and Wisconsin are the top three states, which combined fed about 84.5 million tons of harvested forages in 2019.

2019 Total Harvested Forages Consumed by State

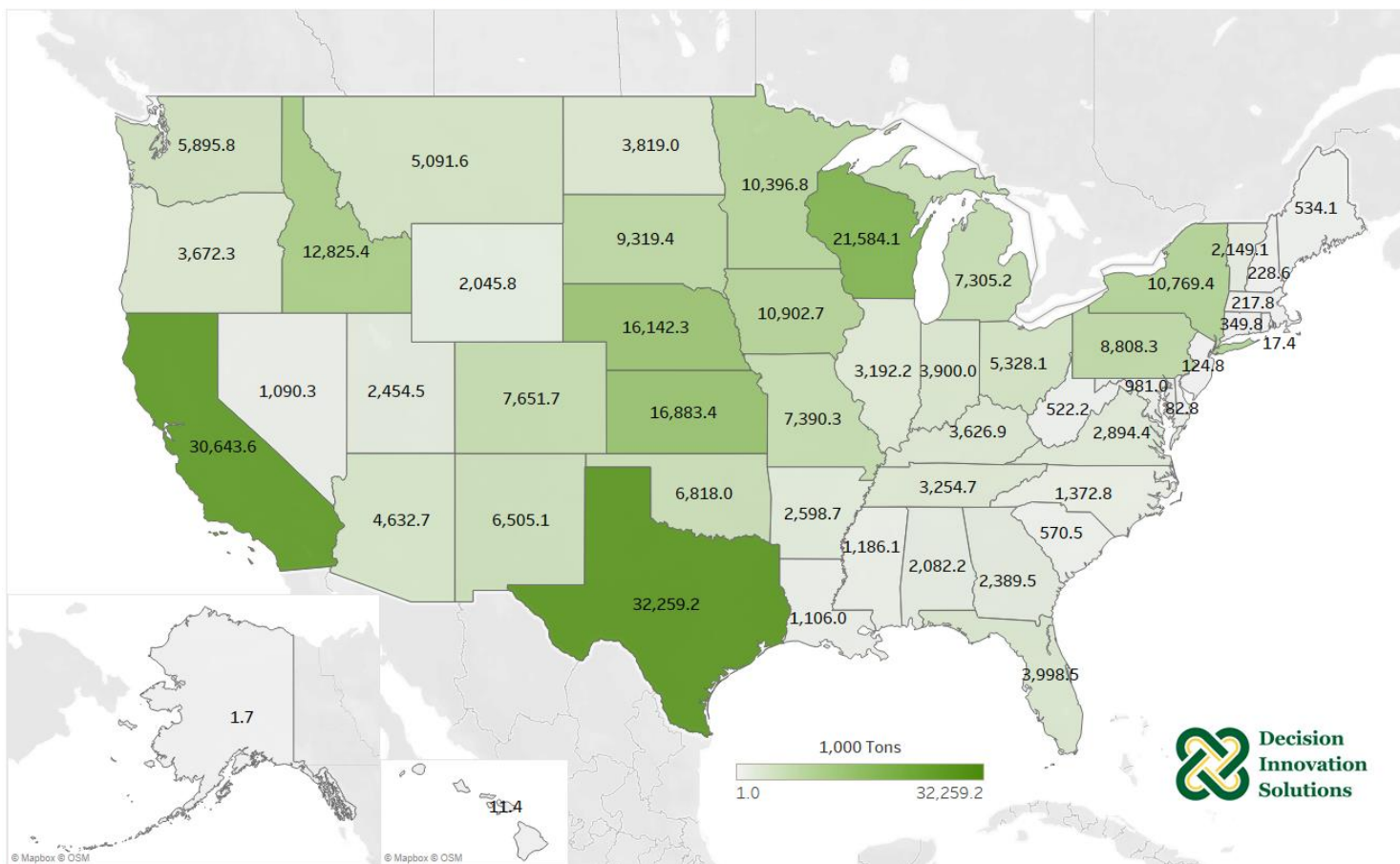


Figure 26. 2019 Total Harvested Forages Consumed (in 1,000 Tons) by State

4.1.1.2.1 Harvested Forages by Species

As shown in Figure 27, 157.1 million tons of harvested forages were consumed by dairy cattle and 130.5 million tons of harvested forages were fed to beef cattle in 2019.

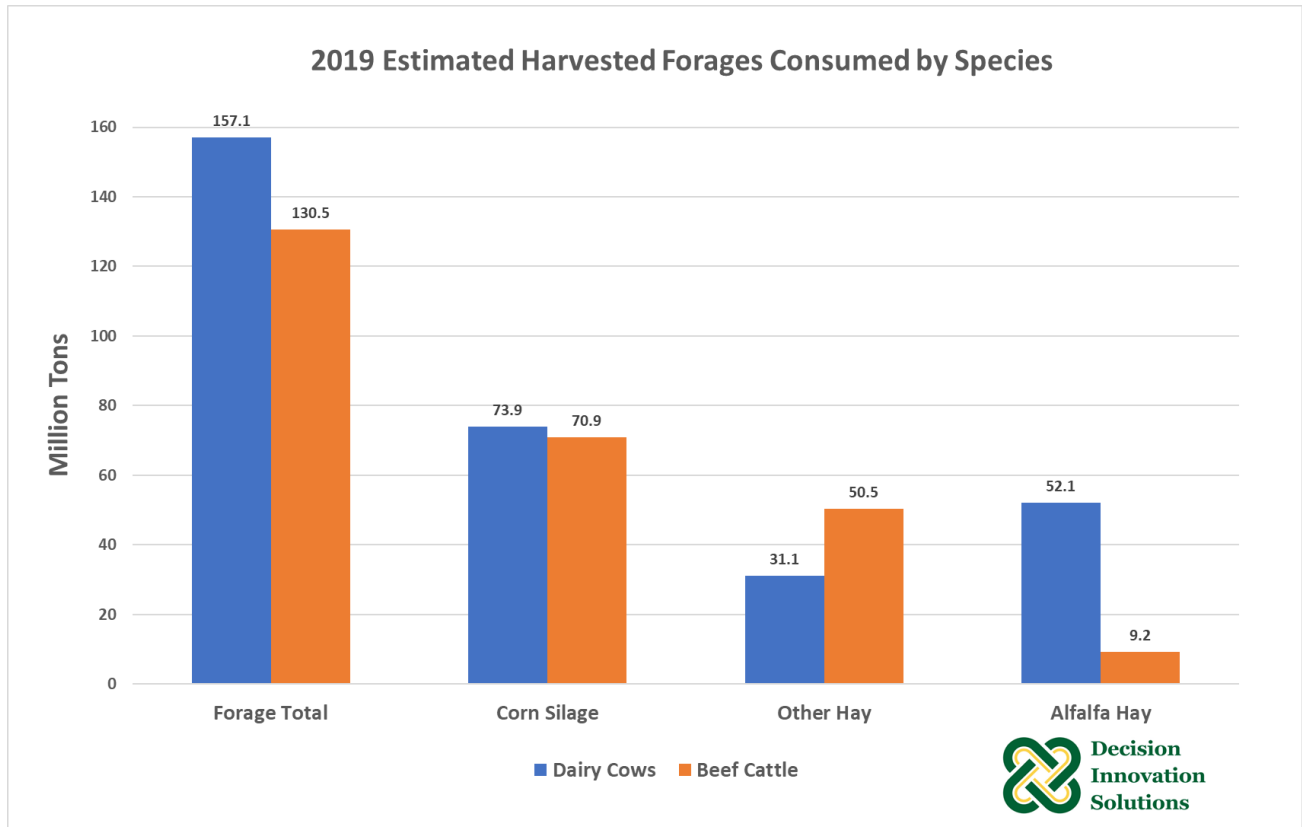


Figure 27. 2019 Harvested Forages Consumption by Species

Components of harvested forages are:

- Estimated corn silage consumption for dairy cattle and beef cattle are 73.9 million tons and 70.9 million tons, respectively.
- Estimated other hay consumption for dairy cattle and beef cattle are 31.1 million tons and 50.5 million tons, respectively.
- Estimated alfalfa hay consumption for dairy cattle and beef cattle are 52.1 million tons and 9.2 million tons, respectively.

4.1.2 Broilers

As shown in Figure 28 and the tables in Appendix A, the total amount of feed fed to U.S. broilers in 2019 equaled approximately 60.8 million tons. Nearly 55% of this amount came from corn. Adding soybean meal and DDGs to corn’s share represented more than 88% of all feed tonnage provided by these three commodities to broilers in 2019. Other commodities comprising at least 1% of tonnage fed to broilers in 2019 include: cottonseed meal, animal byproduct meals, wheat middlings and wheat bran, bakery meal, fats and oils and others. For the full table of ingredient quantities, please see Appendix A.

The map in Figure 29 shows how the total feed tonnage is broken out by state. The top states are in the southeastern United States, including Georgia, Alabama, Arkansas, North Carolina and Mississippi, which combined fed about 35 million tons of feed to broilers in 2019.

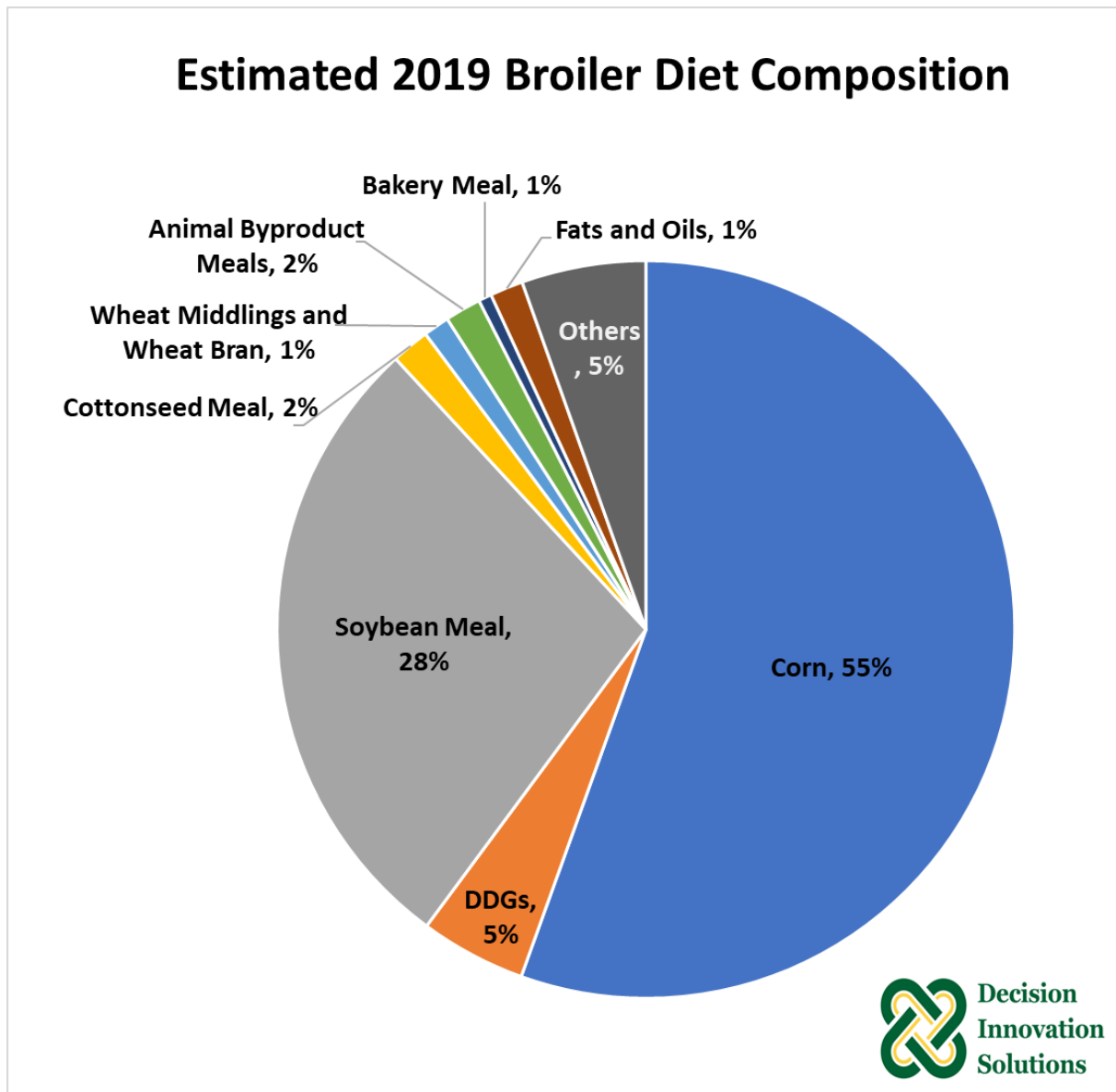


Figure 28. Estimated 2019 Broiler Diet Composition

Broiler Chickens 2019 Feed Consumed by State

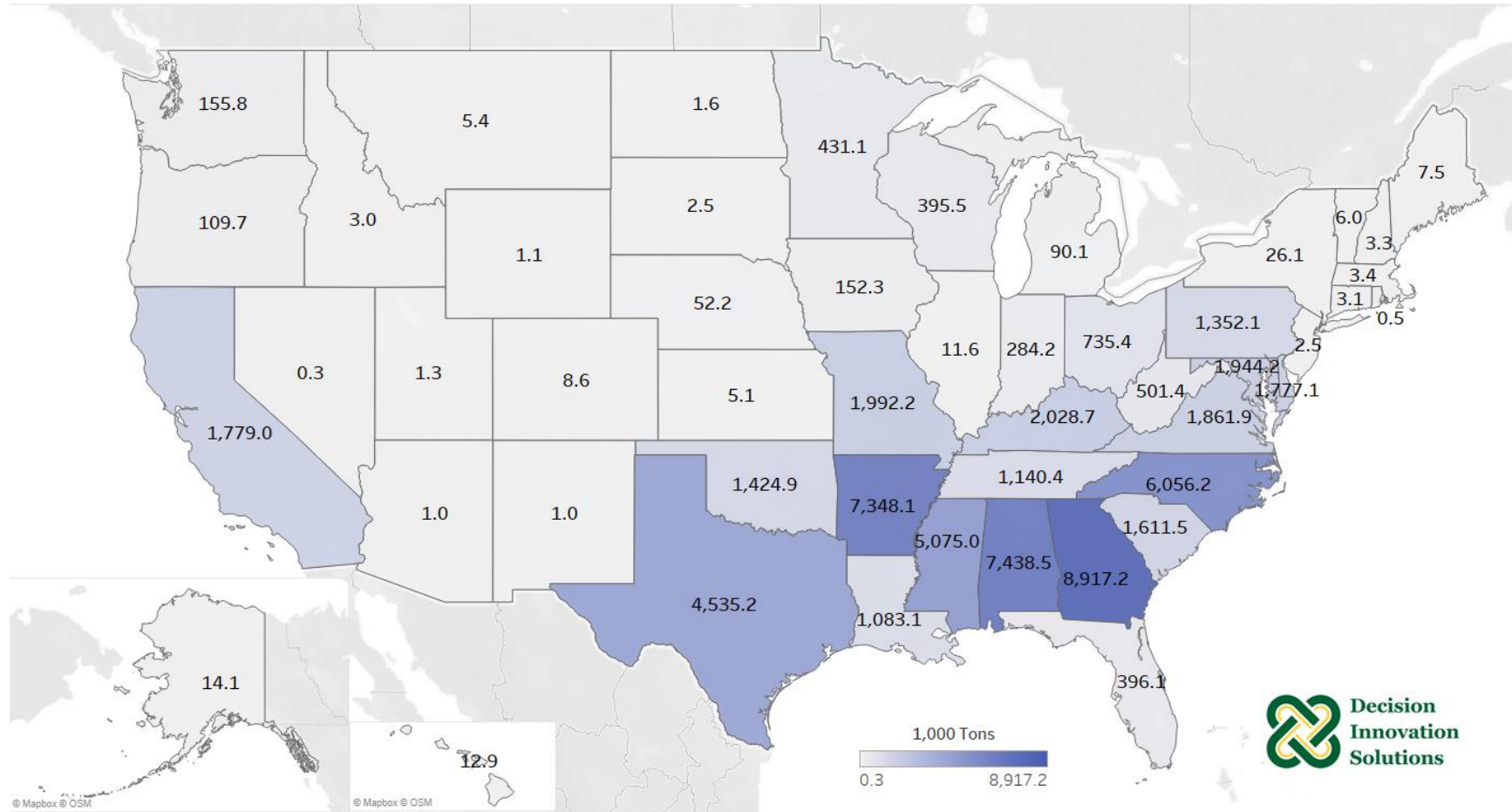


Figure 29. Broiler Chickens – 2019 Feed Consumed (in 1,000 Tons) by State

4.1.3 Egg-Laying Hens

As shown in Figure 30 and the tables in Appendix A, the total amount of feed fed to U.S. egg-laying hens in 2019 equaled approximately 19.2 million tons. Nearly 56% of this amount came from corn. Adding soybean meal and DDGs to corn’s share represented more than 80% of all feed tonnage provided by these three commodities to egg-laying hens in 2019. Other commodities comprising at least 1% of tonnage fed to egg-laying hens in 2019 include limestone, wheat middlings and wheat bran, cottonseed meal, animal byproduct meals, fats and oils and others. For the full table of ingredient quantities, see Appendix A.

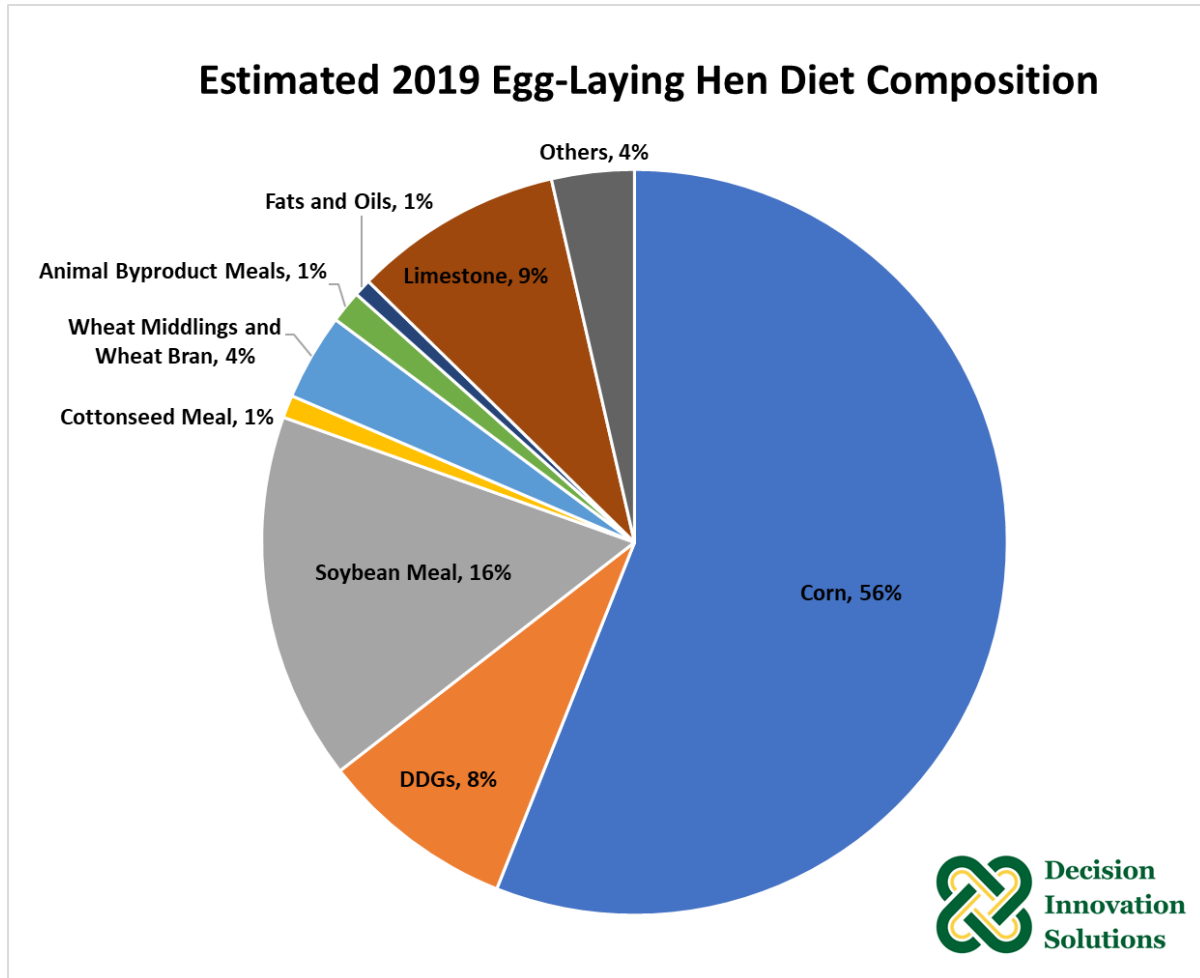


Figure 30. Estimated 2019 Egg-Laying Hen Diet Composition

The map in Figure 31 shows how the total feed tonnage fed to egg-laying hens is broken out by state. The top states are in the midwestern United States and include Iowa, Ohio, Indiana, Pennsylvania and Texas, which combined fed about 8.8 million tons of feed to egg-laying hens in 2019.

Egg-Laying Hens 2019 Feed Consumed by State

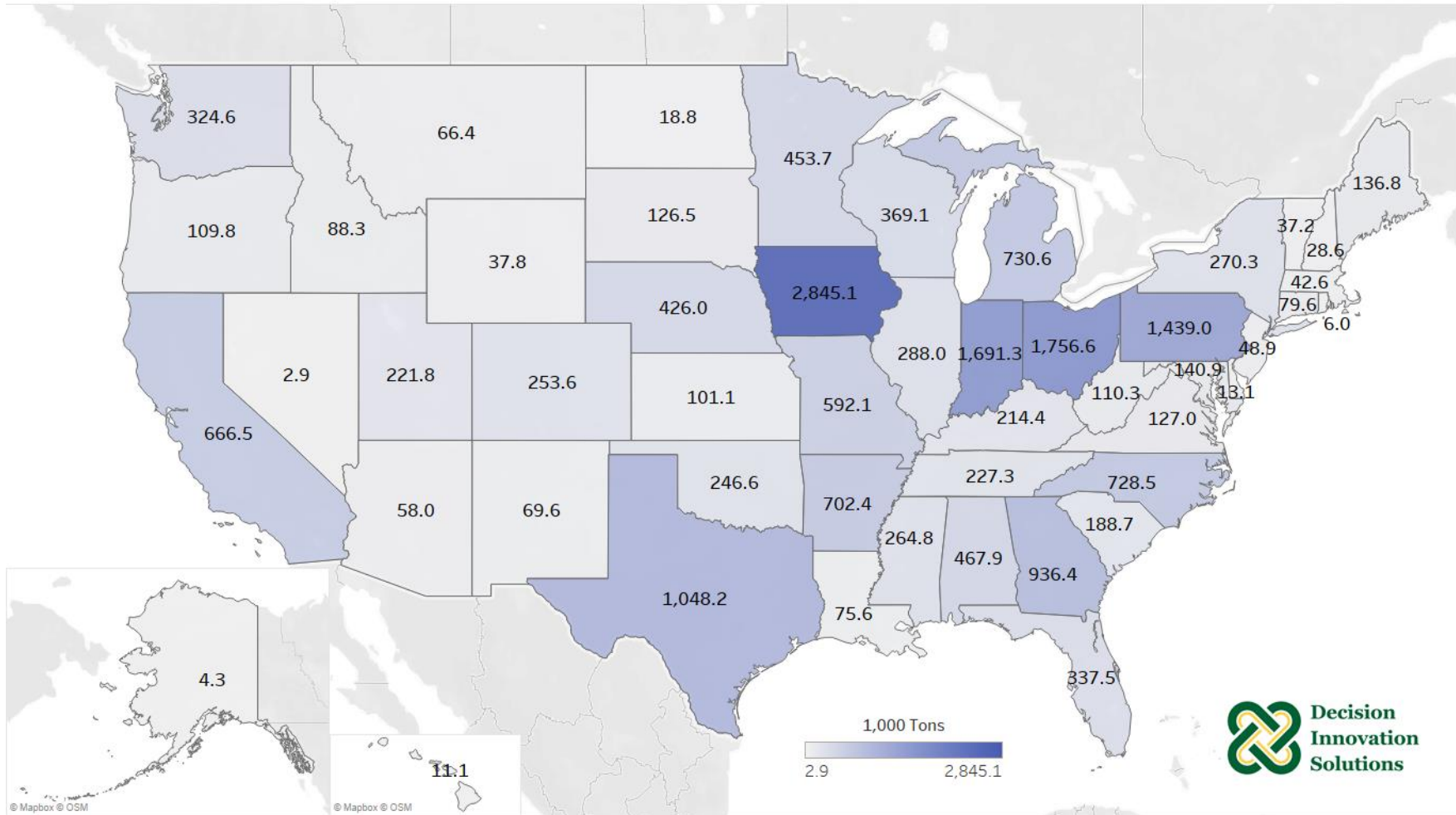


Figure 31. Egg-Laying Hens - 2019 Feed Consumed (in 1,000 Tons) by State

4.1.4 Turkeys

As shown in Figure 32 and the tables in Appendix A, the total amount of feed fed to U.S. turkeys in 2019 equaled approximately 10.6 million tons. About 54% of this amount came from corn. Adding soybean meal and DDGs to corn’s share represented more than 88% of all feed tonnage provided by these three commodities to turkeys in 2019. Other commodities comprising at least 1% of tonnage fed to turkeys that year include animal byproduct meals, fats and oils and others. For the full table of ingredient quantities, see Appendix A.

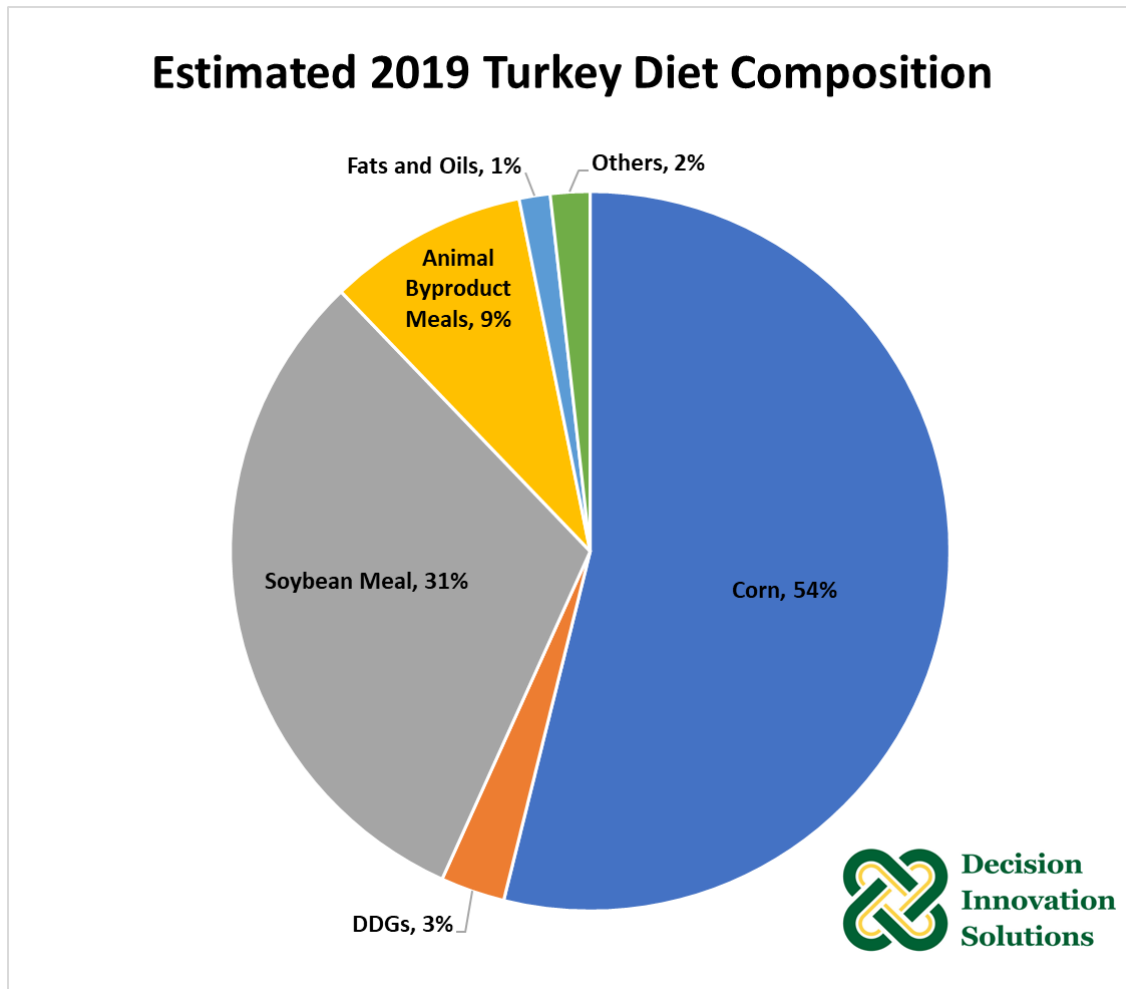


Figure 32. Estimated 2019 Turkey Diet Composition

The map in Figure 33 shows how the total feed tonnage fed to turkeys is broken out by state. The top states are in the midwestern and southeastern United States and include Minnesota, North Carolina, Arkansas, Indiana and Missouri, which combined fed about 6.1 million tons of feed to turkeys in 2019.

Turkeys 2019 Feed Consumed by State

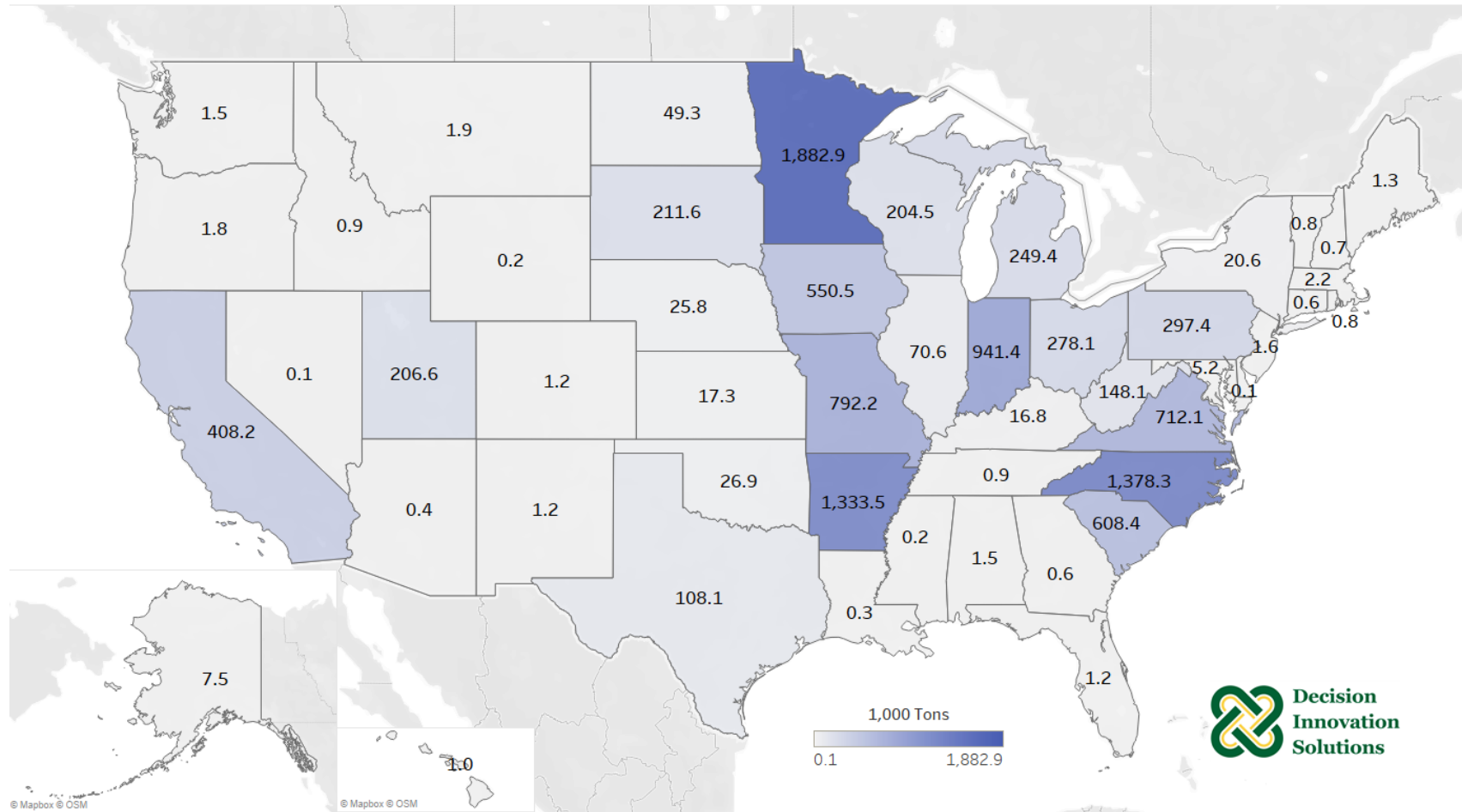


Figure 33. Turkeys - 2019 Feed Consumed (in 1,000 Tons) by State

4.1.5 Hogs

As shown in Figure 34 and the tables in Appendix A, the total amount of feed fed to U.S. hogs in 2019 equaled approximately 61.8 million tons. About 60% of this amount came from corn. Adding soybean meal and DDGs to corn’s share represented nearly 80% of all feed tonnage provided by these three commodities to hogs in 2019. Other commodities comprising at least 1% of tonnage fed to hogs that year include wheat middlings and wheat bran, wheat, corn gluten feed, animal byproduct meals, other processed plant byproducts, fats and oils, grain sorghum and others. For the full table of ingredient quantities, see Appendix A.

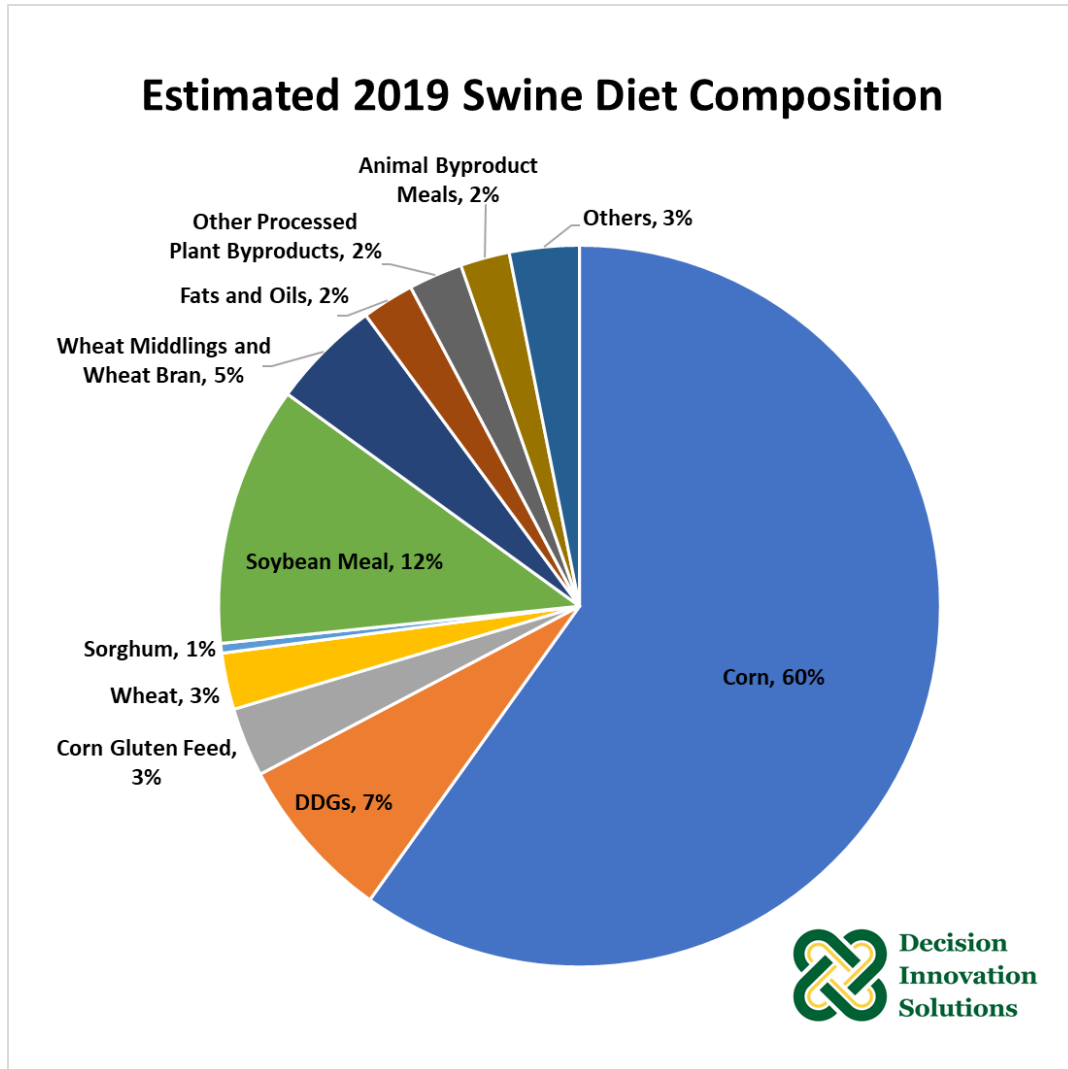


Figure 34. Estimated 2019 Swine Diet Composition

The map in Figure 35 shows how the total feed tonnage fed to hogs is broken out by state. The top states include Iowa, Minnesota, North Carolina, Illinois and Indiana, which combined fed about 41.5 million tons of feed to hogs in 2019.

Hogs 2019 Feed Consumed by State

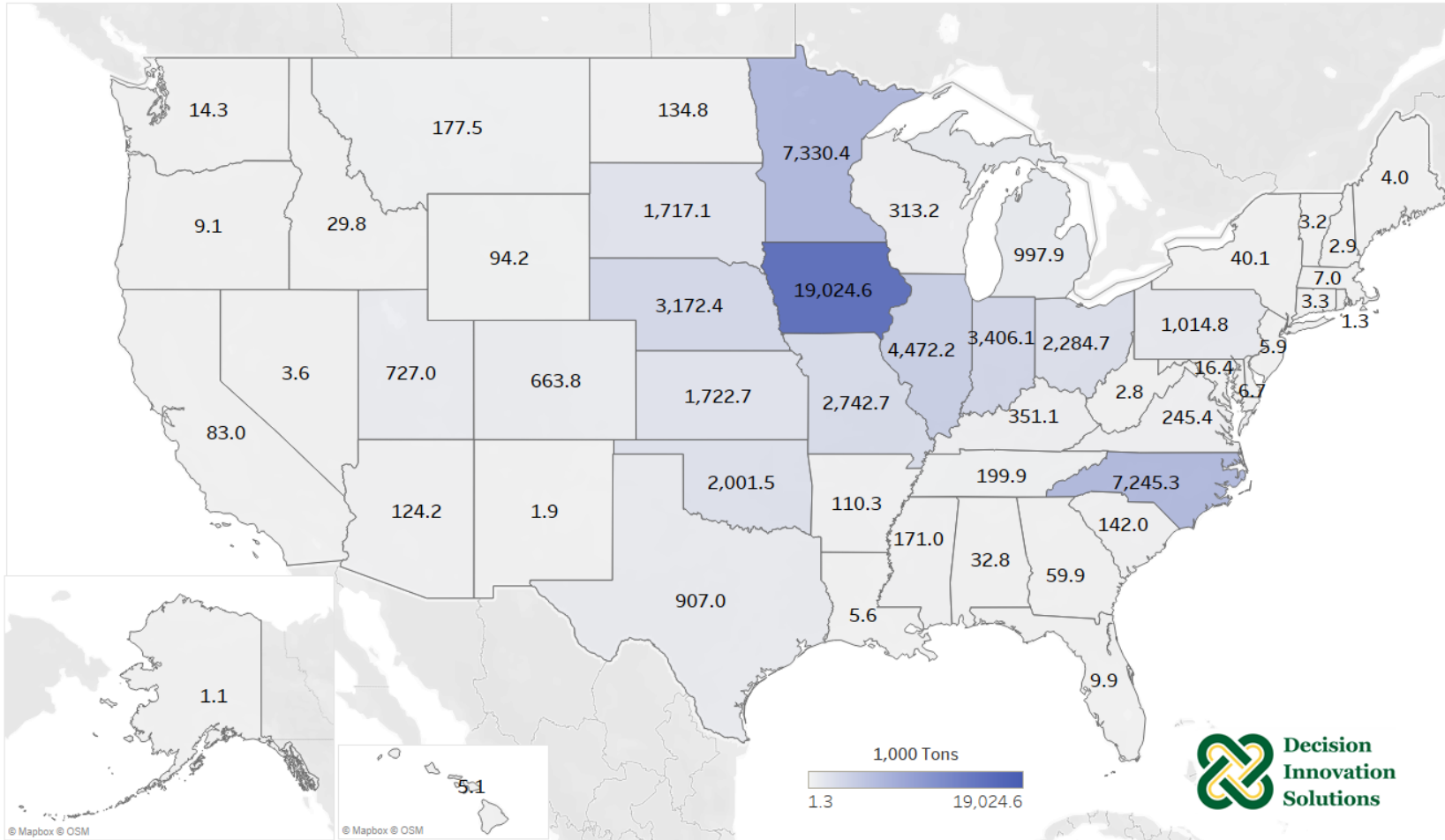


Figure 35. Hogs - 2019 Feed Consumed (in 1,000 Tons) by State

4.1.6 Dairy Cattle

As shown in Figure 36 and the tables in Appendix A, the total amount of feed (without harvested forages) fed to U.S. dairy cattle¹² in 2019 equaled approximately 49.8 million tons. About 39% of this amount came from corn. Adding DDGs, other processed plant byproducts and soybean seeds to corn’s share represented 70% of all feed tonnage provided by these three commodities to dairy cattle in 2019. Other commodities comprising at least 1% of tonnage fed to dairy cattle that year include fats and oils, soybean meal, animal byproduct meals, cottonseed and others. For the full table of ingredient quantities, see Appendix A.

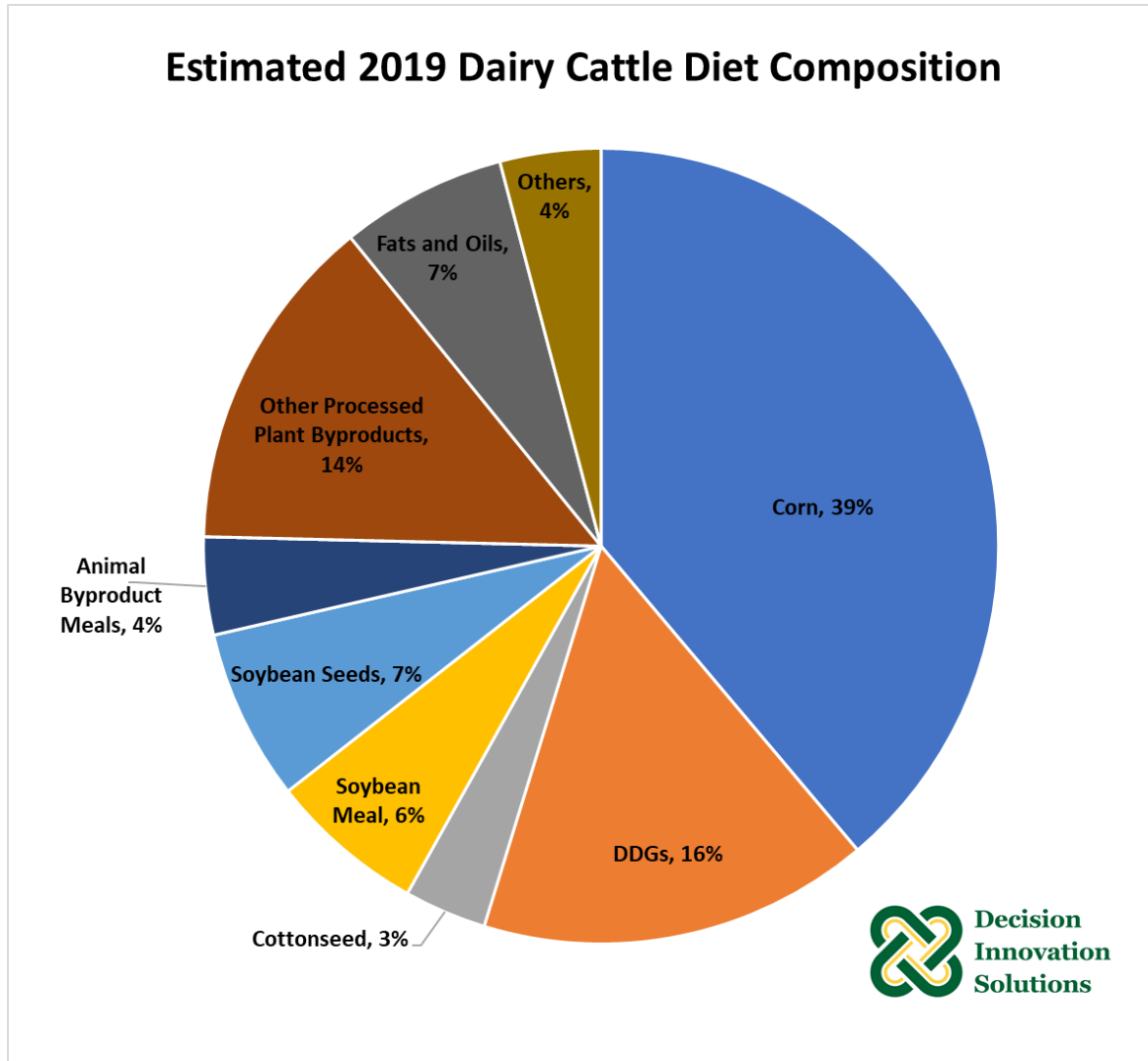


Figure 36. Estimated 2019 Dairy Cattle Diet Composition

The map in Figure 37 shows how the total feed tonnage fed to dairy cattle is broken out by state. The top states include California, Wisconsin, New York, Pennsylvania and Texas, which combined fed about 27.5 million tons of feed to dairy cattle in 2019.

¹² Includes dairy cows that calved, dairy bulls, dairy heifers, and dairy calves

Dairy Cattle 2019 Feed Consumed by State

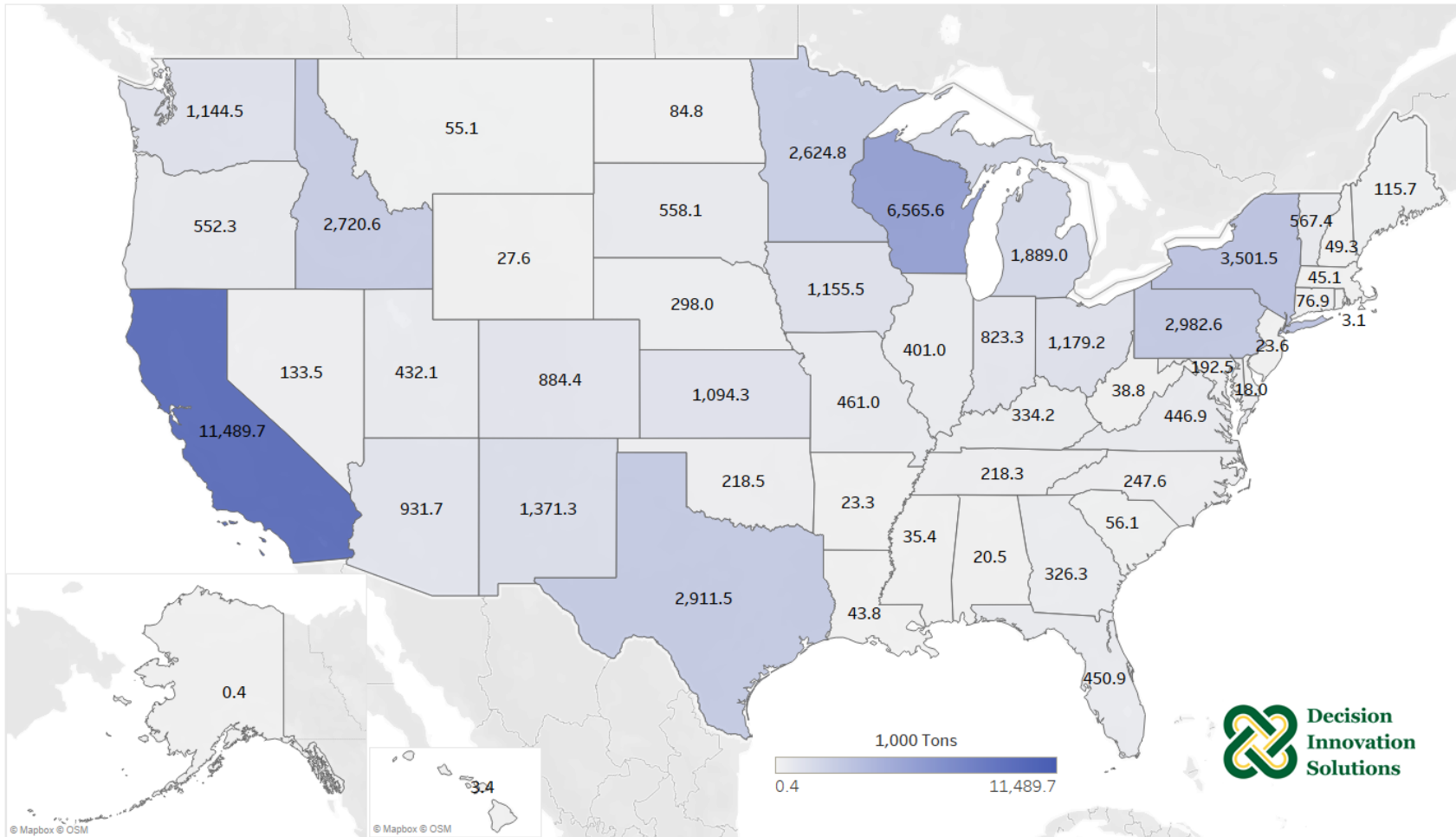


Figure 37. Dairy Cattle - 2019 Feed Consumed (in 1,000 Tons) by State

4.1.7 Beef Cattle

As shown in Figure 38 and the tables in Appendix A, the total amount of feed (without harvested forages) fed to U.S. beef cattle¹³ in 2019 equaled approximately 64.5 million tons. Roughly 57% of this amount came from corn. Adding DDGs to corn’s share represented approximately 80% of all feed tonnage provided by these three commodities to beef cattle in 2019. Other commodities comprising at least 1% of tonnage fed to beef cattle that year include other processed plant byproduct meals, soy related ingredients, small grains and others. For the full table of ingredient quantities, please see Appendix A.

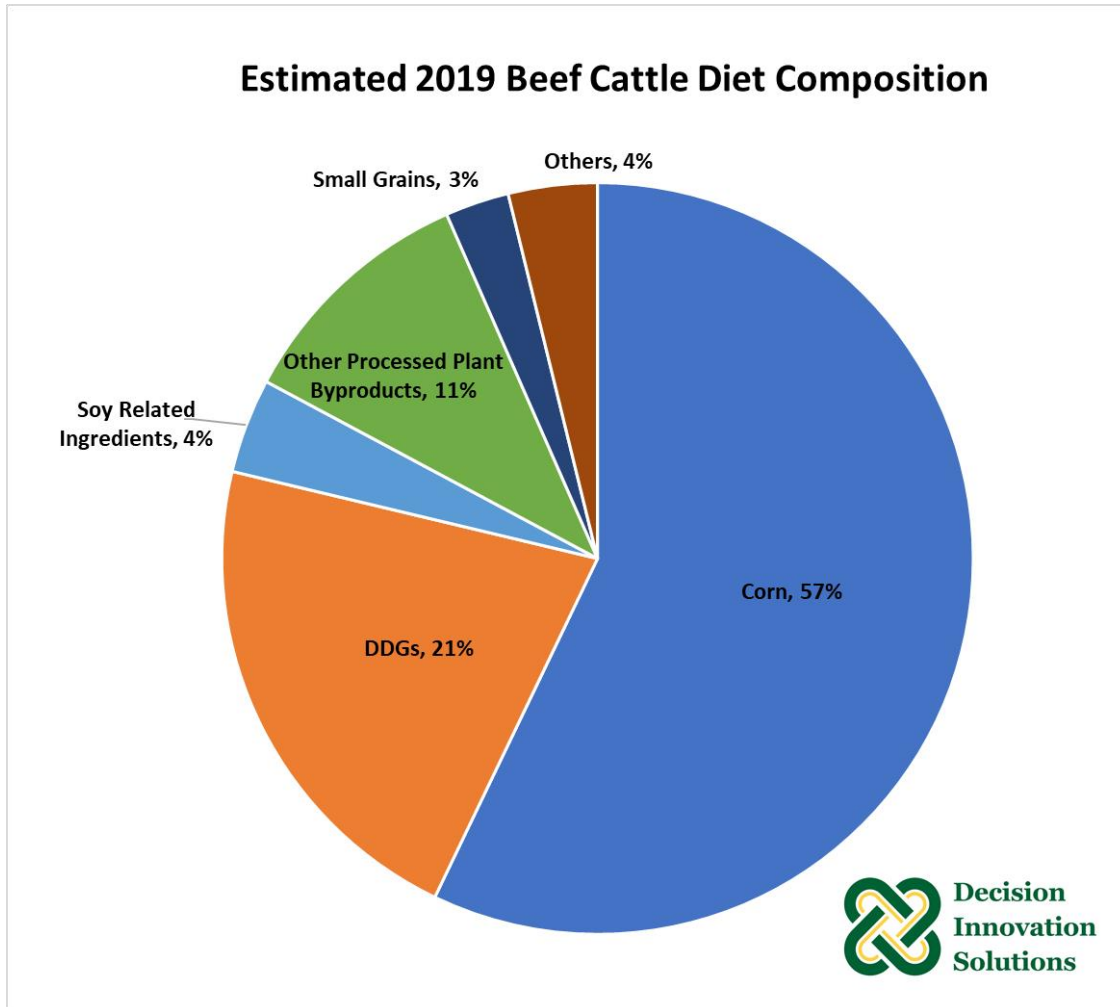


Figure 38. Estimated 2019 Beef Cattle Diet Composition

The map in Figure 39 shows how the total feed tonnage fed to beef cattle is broken out by state. The top states are in the midwestern and southern plains United States and include Texas, Nebraska, Kansas, Iowa and Colorado, which combined fed about 37.2 million tons of feed to beef cattle in 2019.

¹³ Includes beef cows, bulls, cattle on feed and calves

Beef Cattle 2019 Feed Consumed by State

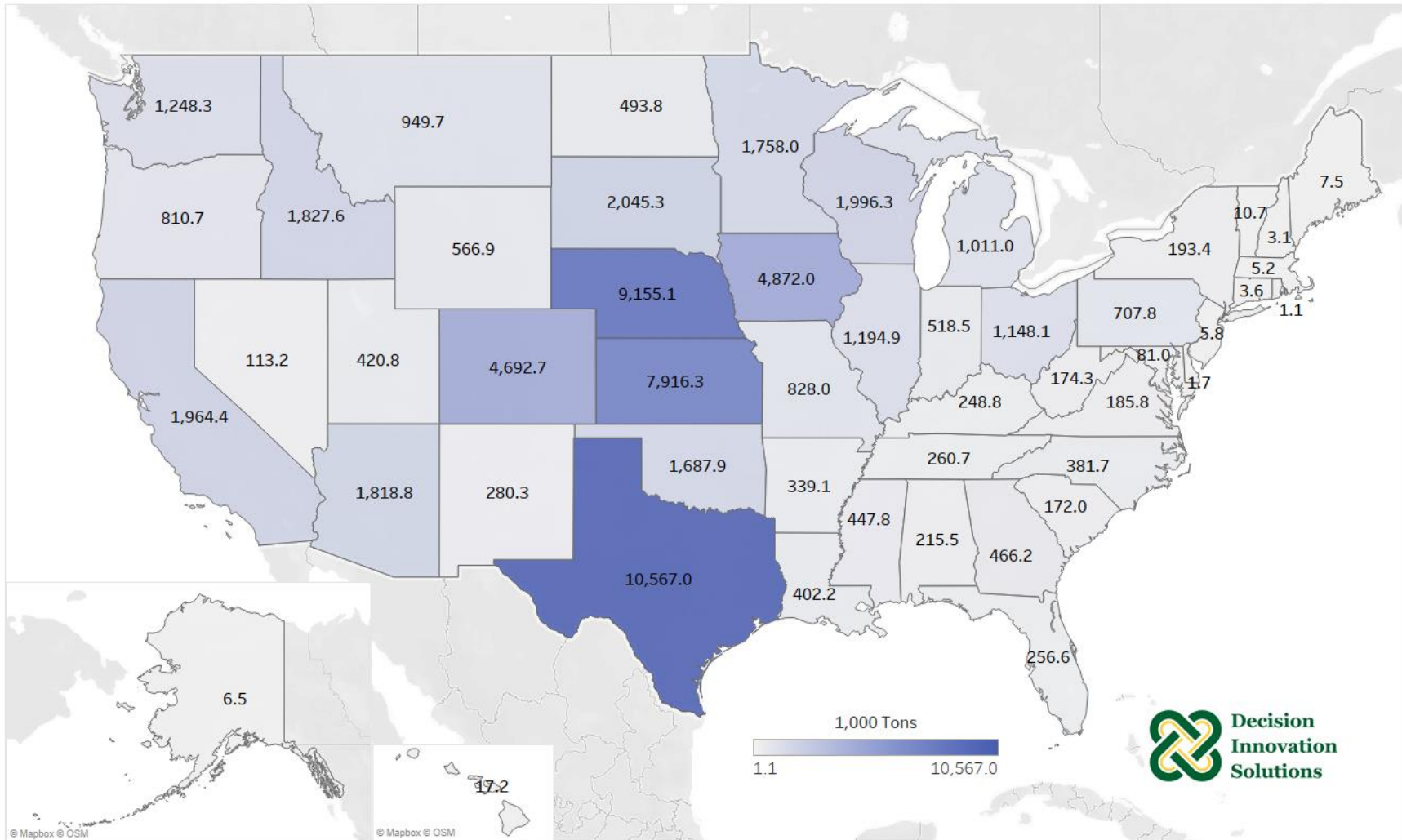


Figure 39. Beef Cattle - 2019 Feed Consumed (in 1,000 Tons) by State

4.1.8 Sheep and Meat Goats

As shown in Figure 40 and the table in Appendix A, the total amount of feed fed to U.S. sheep is about 139,000 tons. About 83% of this amount came from corn. The only other relevant ingredient identified was soybean meal, which made up the other 17% of the diet.

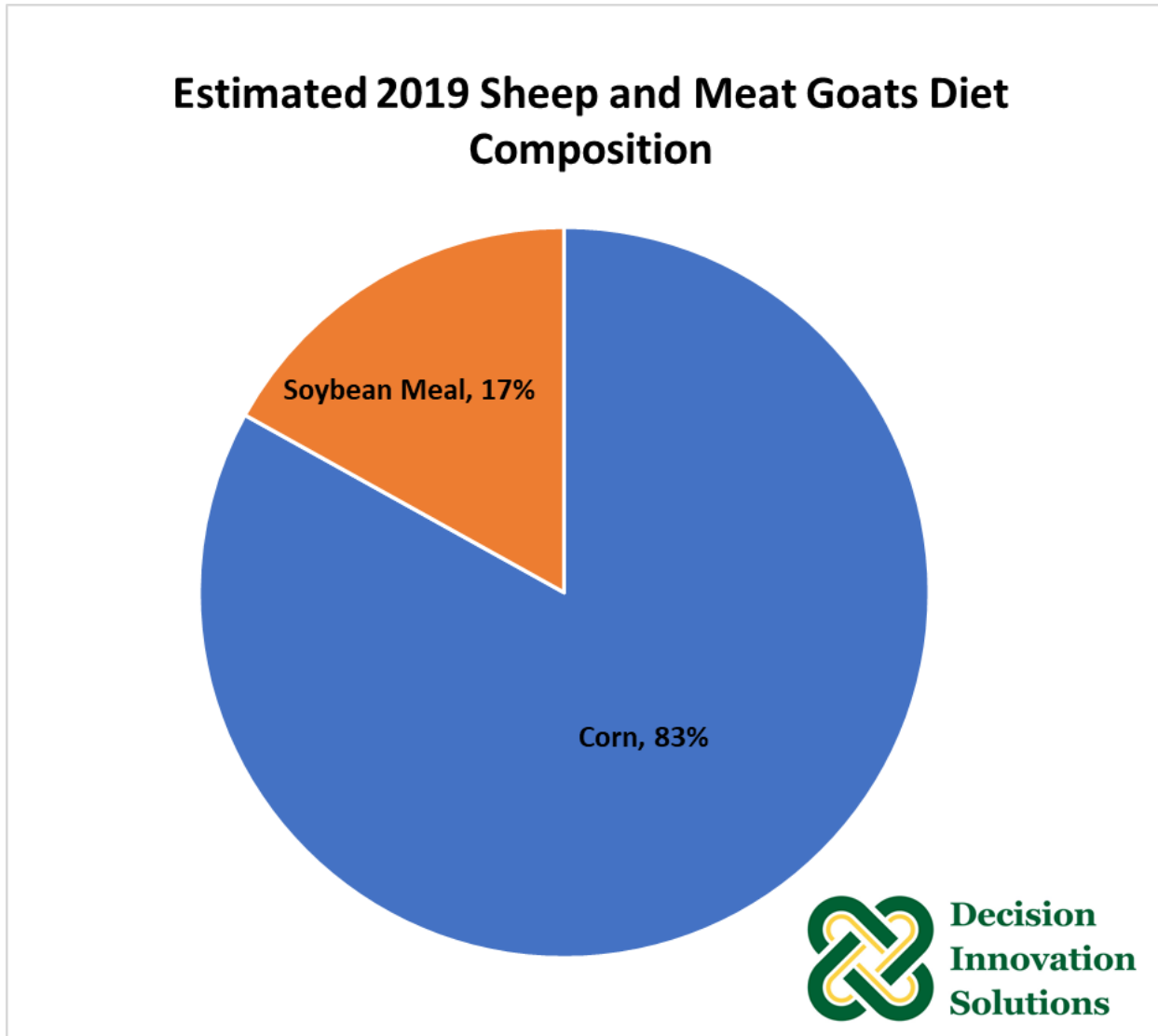


Figure 40. Estimated 2019 Sheep and Meat Goats Diet Composition

The map in Figure 41 shows how the total feed tonnage fed to sheep and meat goats is broken out by state. The top states are in the midwestern and western United States and include Texas, Utah, Wyoming, California and South Dakota, which combined fed about 52,000 tons of feed to sheep in 2019.

Sheep and Meat Goats 2019 Feed Consumed by State

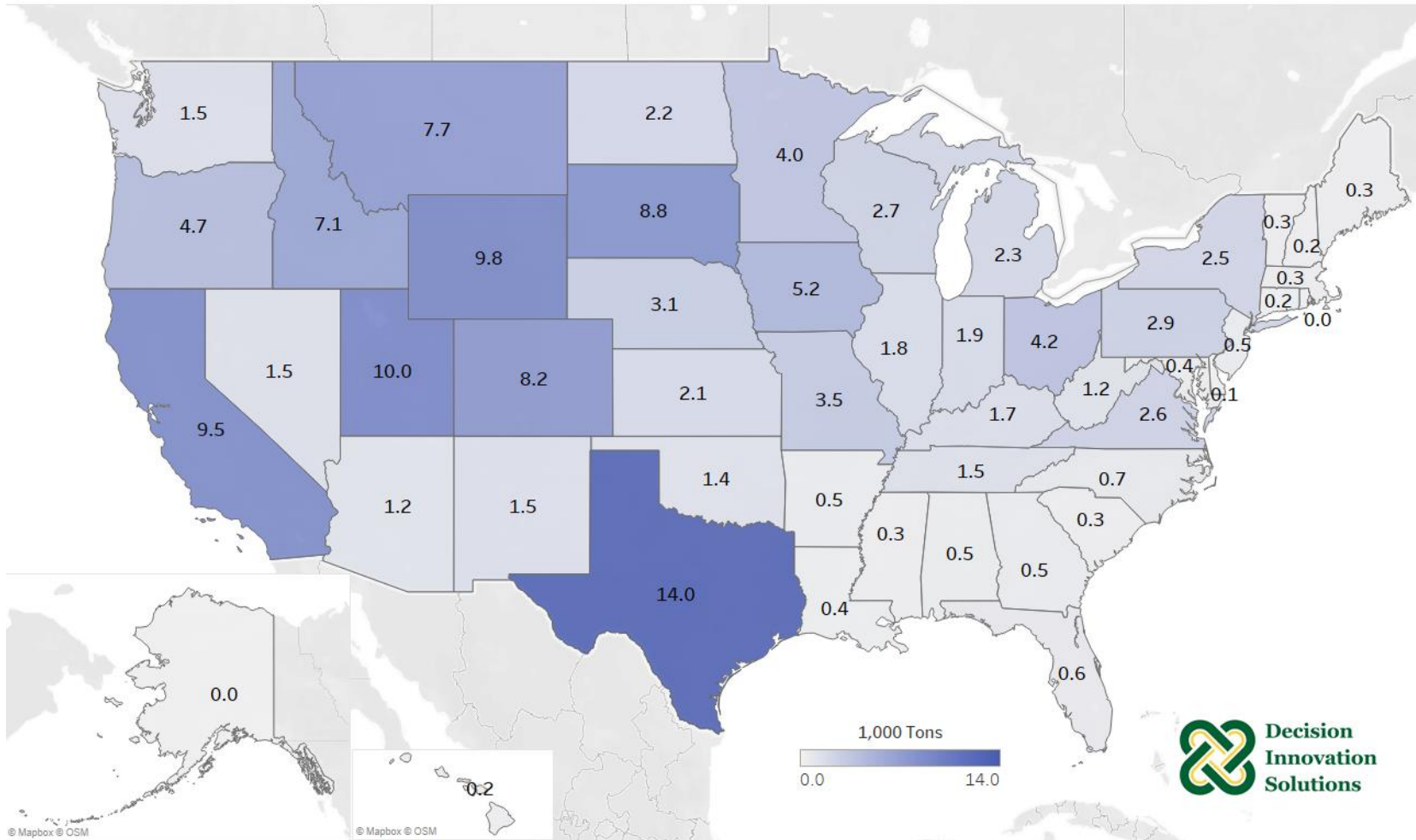


Figure 41. Sheep and Meat Goats - 2019 Feed Consumed (in 1,000 Tons) by State

4.1.9 Cats and Dogs¹⁴

As shown in Figure 42 and the tables in Appendix A, the total amount of food fed to pets (cats and dogs) is 8.6 million tons. About 50% of this amount came from unique ingredients not commonly used as feed ingredients, such as fruits, vegetables, peas, etc. DIS combined them together to make the report more consistent among all species. Besides the “unique ingredients from pet food study” category, the largest feed ingredient was corn at 16%. Adding animal byproduct meals (e.g., meat and bone meal and meat meal), soybean meal, and corn gluten feed/meal to corn’s share represented more than 90% of all feed tonnage provided by these commodities to pets in 2019. Other commodities comprising at least 1% of tonnage fed to pets that year include wheat, inedible tallow, wheat middlings and wheat bran, grain sorghum, barley and others (with the “others” representing the comparable set of feed ingredients to other species in this study). For the full table of ingredient quantities, see Appendix A.

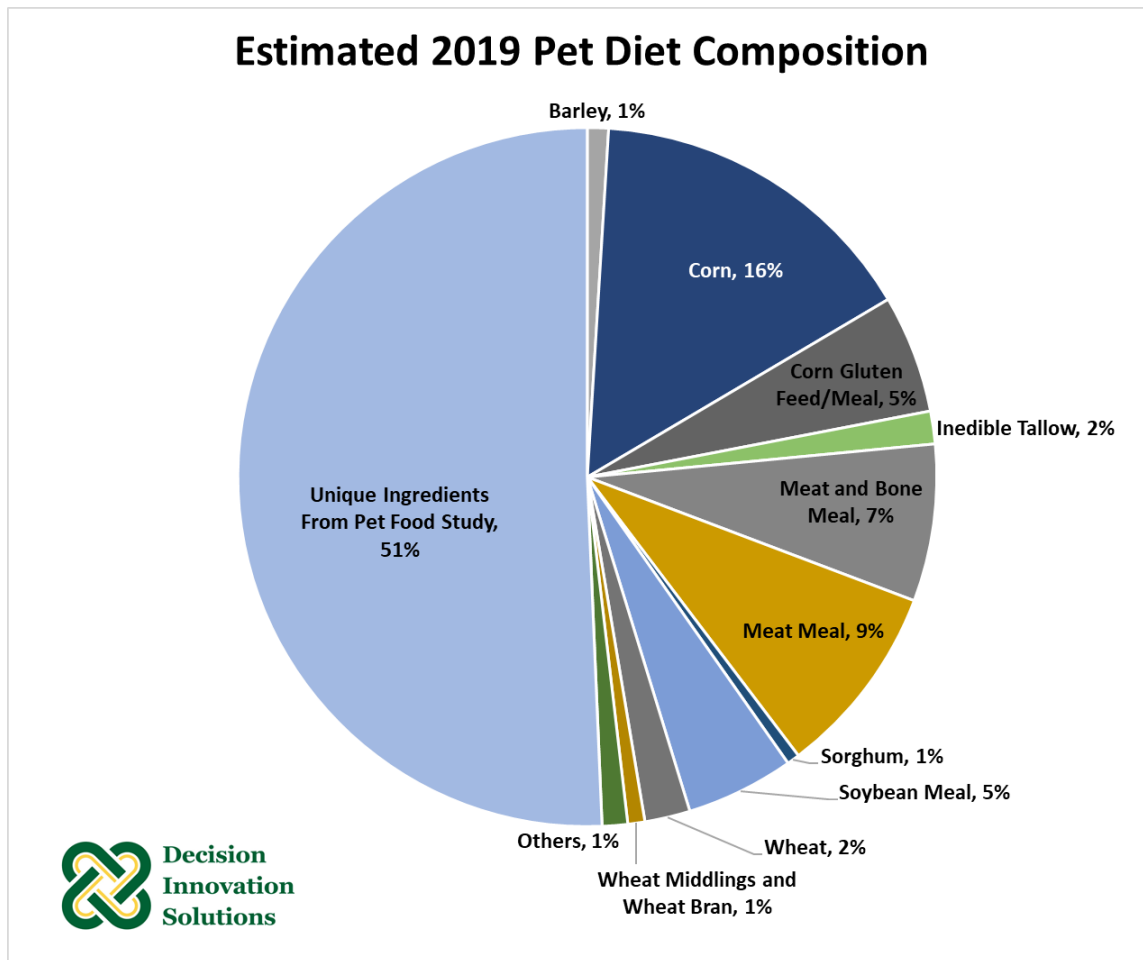


Figure 42. Estimated 2019 Pet Diet Composition

The map in Figure 43 shows how the total feed tonnage fed to pets is broken out by state. The top states include Texas, California, Florida, New York and Ohio, which combined fed about 2.9 million tons of feed to pets in 2019.

¹⁴ For more details about the pet food study, visit <https://ifeeder.org/pet-food-report/>.

Pets (Cats and Dogs) 2019 Feed Consumed by State

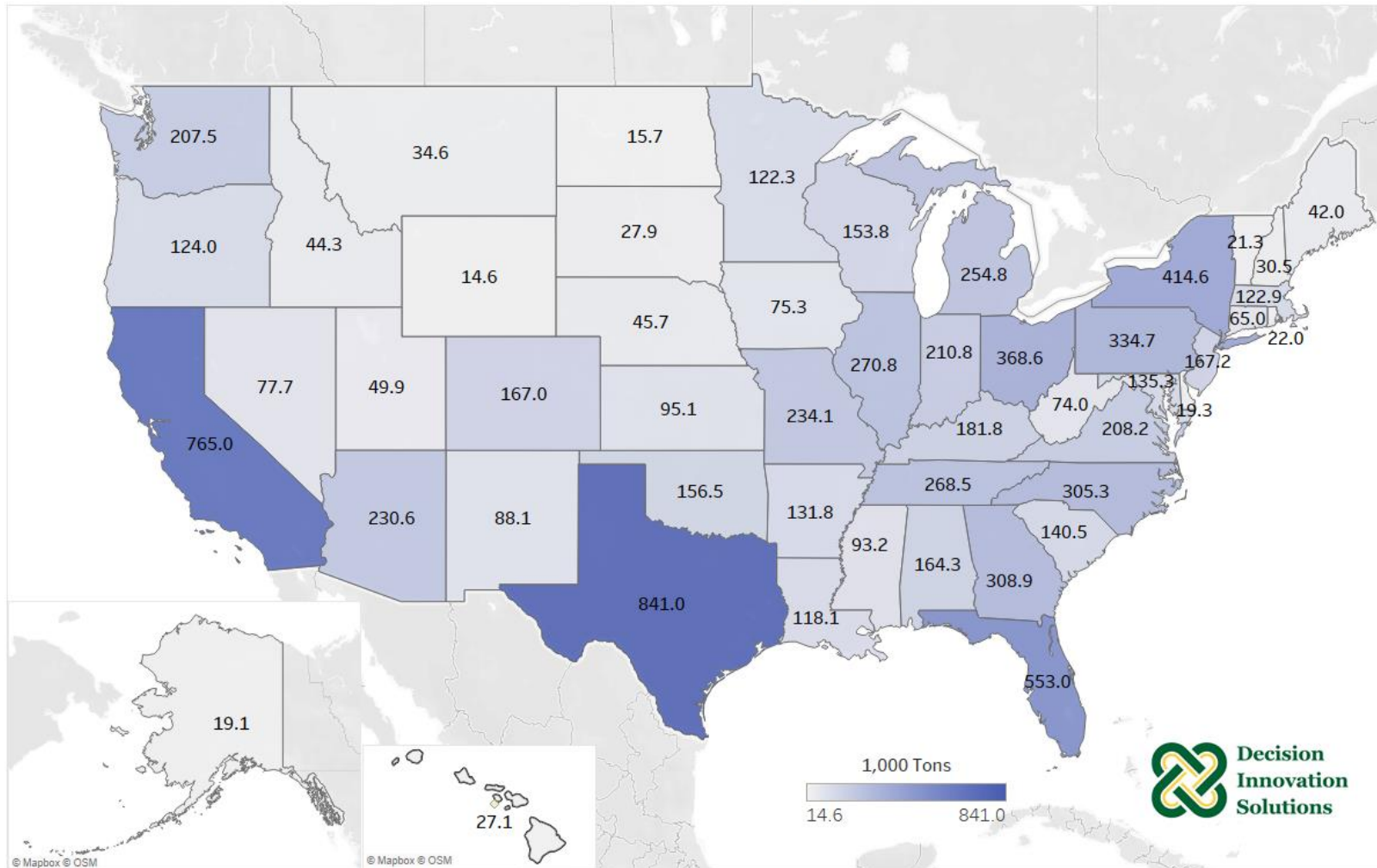


Figure 43. Pets - 2019 Food Consumed (in 1,000 Tons) by State

4.1.10 Horses

As shown in Figure 44 and the table in Appendix A, the total amount of feed fed to horses is 7.7 million tons. About 45% of this amount came from wheat middlings. Adding oats and DDGs to wheat middlings' share represented about 85% of all feed tonnage provided by these three commodities to horses in 2019. Other commodities fed to horses that year include rice mill feed, corn gluten meal, canola meal and soybean meal. For the full table of ingredient quantities, see Appendix A.

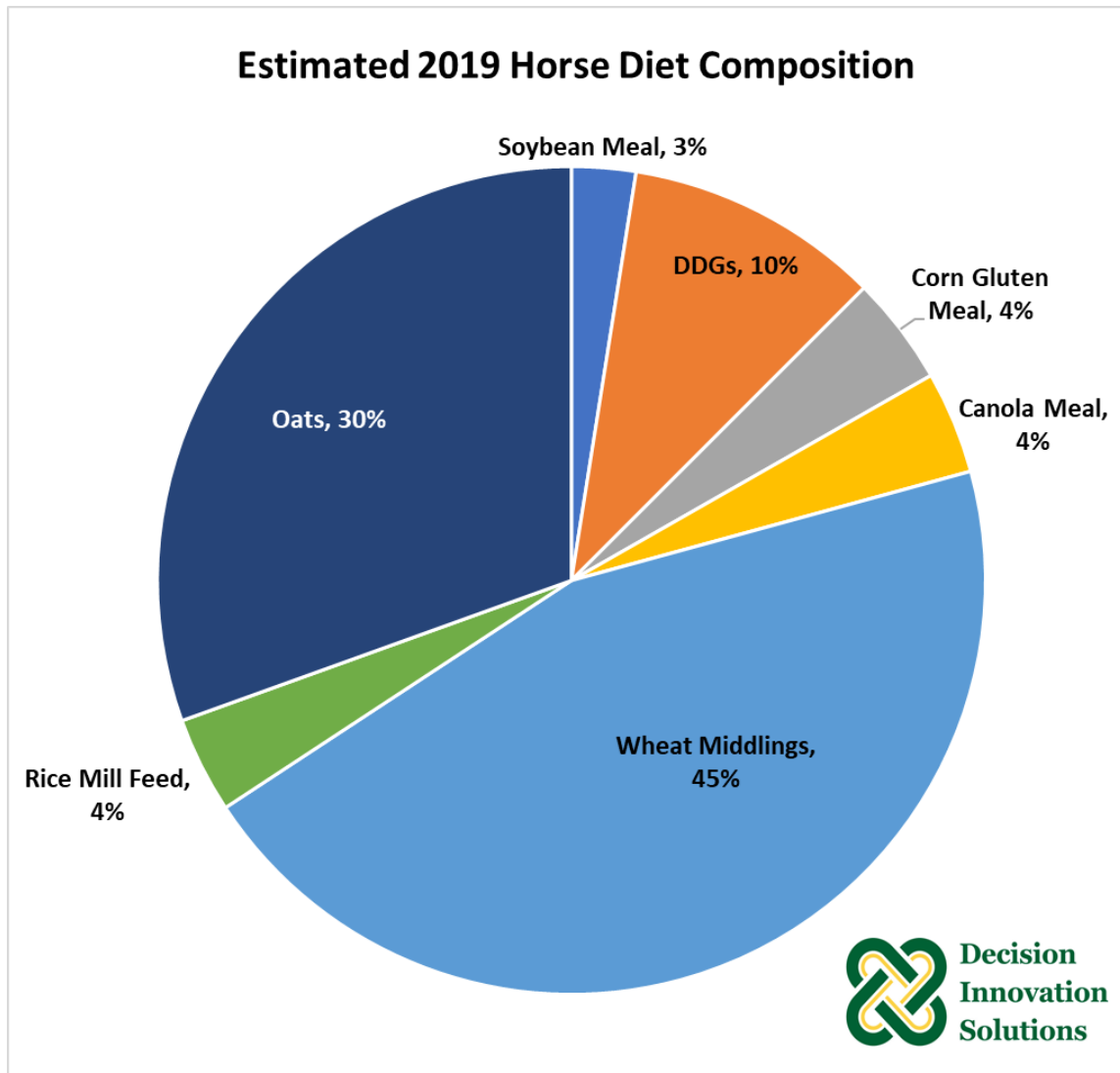


Figure 44. Estimated 2019 Horse Diet Composition

The map in Figure 45 shows how the total feed tonnage fed to horses is broken out by state. The top states include California, Texas, Delaware, Florida and Ohio, which combined fed about 2.3 million tons of feed to horses in 2019.

Horses 2019 Feed Consumed by State

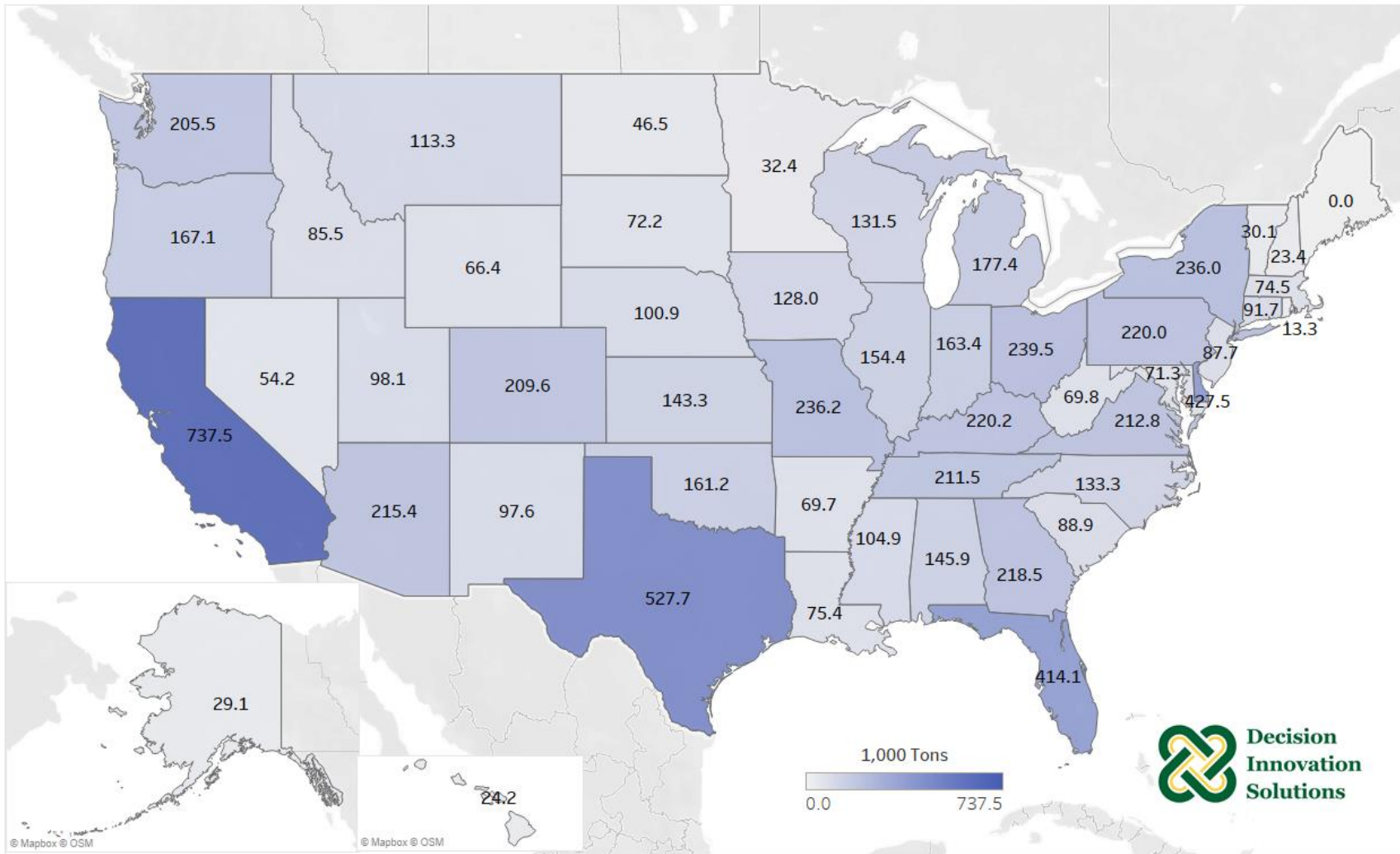


Figure 45. Horses - 2019 Feed Consumed (in 1,000 Tons) by State

4.1.11 Aquaculture

As shown in Figure 46 and the tables in Appendix A, the total amount of feed fed to U.S. aquaculture in 2019 equaled approximately 613,000 tons. More than 33% of this amount came from soybean meal. Adding corn, wheat middlings, cottonseed meal and DDGs to soybean meal’s share represented about 80% of all the feed tonnage provided by these five commodities to aquaculture in 2019. Other commodities comprising at least 1% of tonnage fed to aquaculture that year include fishmeal, wheat flour, meat meal, feather meal, meat and bone meal, corn gluten meal, soybean oil and others. For the full table of ingredient quantities, see Appendix A.

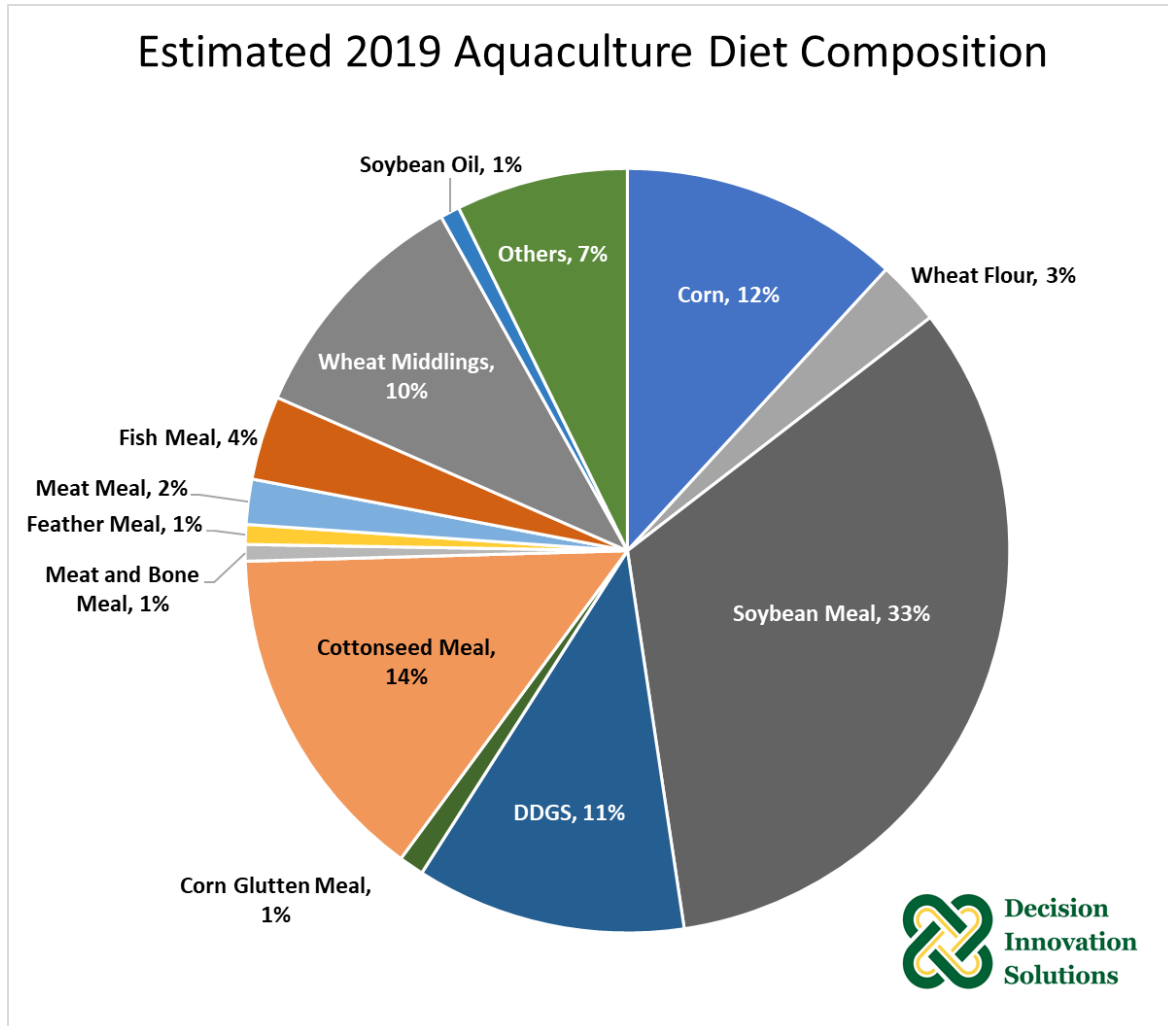


Figure 46. Estimated 2019 Aquaculture Diet Composition

The map in Figure 47 shows how the total feed tonnage fed to aquaculture is broken out by state. The top states include Mississippi, Alabama, Idaho, North Carolina and Texas, which combined fed nearly 400,000 tons of feed to aquaculture in 2019.

Aquaculture 2019 Feed Consumed by State

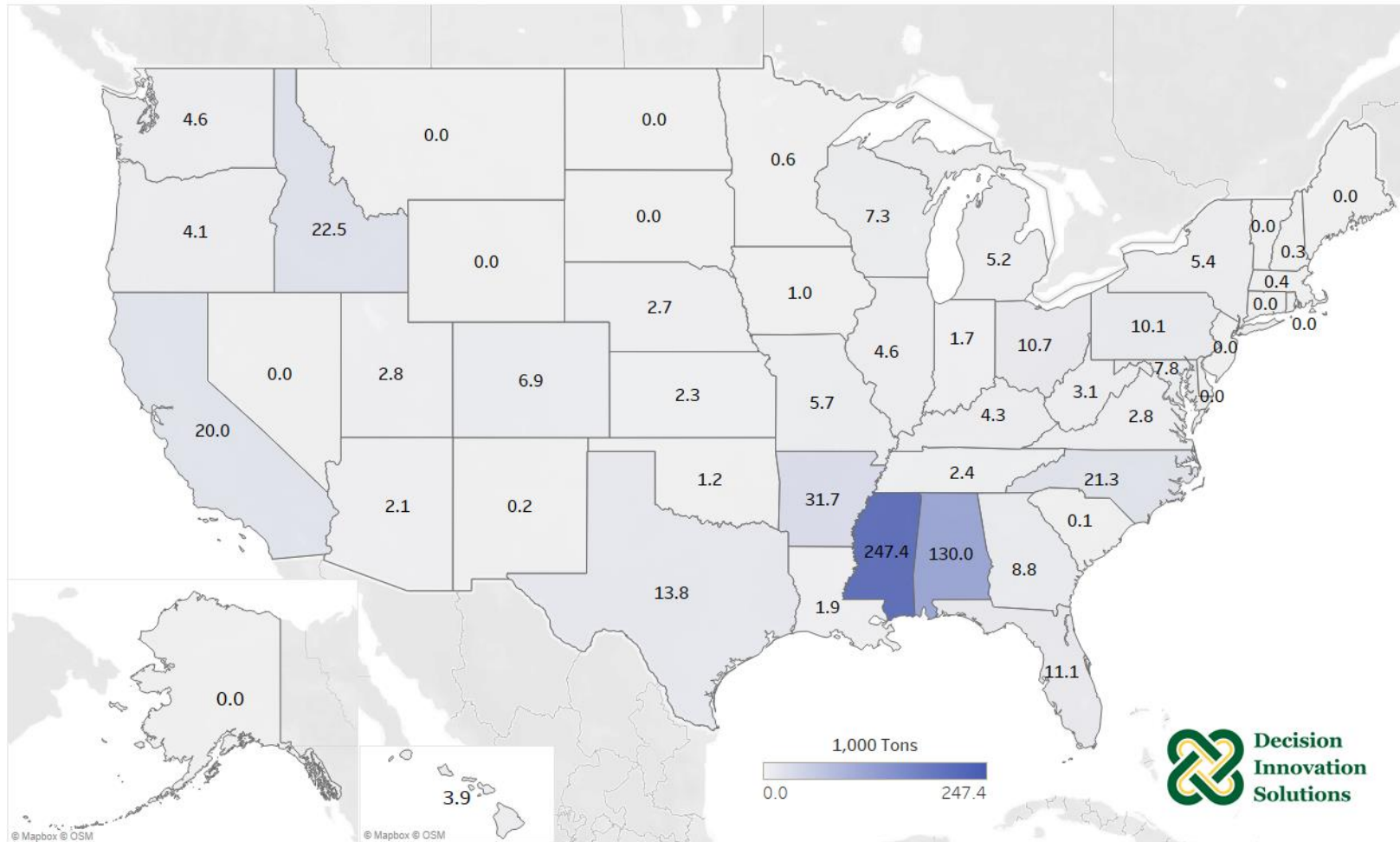


Figure 47. Aquaculture - 2019 Feed Consumed (in 1,000 Tons) by State

4.2 COVID-19 Impact on the Livestock and Poultry Industry

It is no surprise that the effects of the COVID-19 crisis have been felt everywhere. From the macroeconomies of the world to small businesses scattered across the U.S., the virus has disrupted marketing and production patterns. Among those that have been affected, the U.S. agricultural sector watched as commodity prices plummeted (and in some cases fully recovered by October 2020), and the threat of labor disruptions and shortages increased. A team of experts from Texas A&M University's Department of Homeland Security (DHS), Arizona State University's DHS, and Victoria University in Australia¹⁵ came together to examine the economic impact of COVID-19 on the U.S. economy. Their estimated results show that COVID-19 will reduce U.S. GDP by 11.9% over the coming year, which is about a 2.5 trillion-dollar reduction. These authors also expected the employment rate to decrease by 12.2%, which is equal to approximately 19 million full-time jobs losses in the economy. In June 2020, The World Bank predicted that the COVID-19 pandemic would create a global recession with the sharpest contraction ever seen in our lifetime, having affected more countries' economies than that of the Great Depression.

Inside the agricultural sector, significant impacts from the crisis have had humanitarian and food insecurity implications due to national lockdowns and supply chain disruptions. As COVID-19 began, many restaurants, schools and food processing facilities were forced to shut their doors to prevent the further spread of the virus. Consumers quickly changed their travel and purchasing habits by buying more food at retail stores to be cooked and eaten at home. However, because the processing facilities were not running, a bottleneck in the supply chain was created causing many food channels to be disrupted. With no way to get their commodities to the retail level, some farmers were forced to dump their commodities; meanwhile, prices at the retail stores increased. As processing facilities reopened (or moved back toward normal operations), the supply of commodities started to normalize, but the industry continues to feel lasting effects.

According to the authors, they expect a 5.2% decrease in real U.S. farm income this year and a 0.8% decrease next year. USDA's February farm income outlook projected all crop receipts to be up 1% in 2020 and all livestock receipts to be up 4.6% for 2020¹⁶. By mid-year both of those projections had changed significantly with feed crops projected to be down 4.5%, oilseeds down 0.6% and all livestock down 8.1%¹⁷. To help the U.S. agricultural sector, the government issued the Coronavirus Food Assistance Program (CFAP) on April 17, 2020, which included \$19 billion in funding designed to help farmers and ranchers who have been affected by the virus. In addition, a second phase of the CFAP was announced on Sept. 18, 2020, which included \$14 billion for agricultural producers who continue to face market disruptions and associated costs because of COVID-19.

Focusing on the future, researchers have mentioned that the U.S. economy will eventually recover, but unemployment likely will continue to remain 5% higher than it was before the virus. Interest rates will continue to be low to help stimulate the economy and incentivize people to purchase goods. Many signs show that the value of the dollar will depreciate in the near-term, which will help the U.S. agricultural

¹⁵ <https://agrillifetoday.tamu.edu/2020/09/08/texas-am-coordinated-study-expects-covid-19-economic-impacts-of-2-5-trillion-loss-in-goods-services-nationwide/>

¹⁶ 2020 Farm Income Forecast, USDA-ERS, February 5, 2020.

¹⁷ 2020, Farm Income Forecast, USDA-ERS. September 2, 2020.

sector involved in international trade. The country is expected to have an increase of \$5.5 billion in exports in the year 2021. The agricultural sector will continue to adapt to the market characteristics, which affect the supply and demand of agricultural commodities.

The USDA also reported on COVID-19 impacts on the food system and agriculture. In an Oct. 13, 2020, blog, Robert Johansson¹⁸, USDA chief economist, reports that:

“the rapid proliferation of COVID-19 at home and abroad and subsequent shutdown of parts of the economy led to unprecedented and simultaneous supply and demand shocks to the food system.” Crude oil prices, which began the year at \$61.18 per barrel, briefly traded negative for the first time ever in April. Grocery store retail sales rose sharply while sales at food service and drinking places during March and April were \$47.5 billion lower than during the same period in 2019.” The consequences of the crisis for farmers and their families were immediate and severe. For example, the reduction in miles driven as the public sheltered in place meant less demand for biofuels, which in turn led to reduced demand for grains used in biofuels, particularly corn. In addition, the immediate and drastic decline in food demand by restaurants and hotel customers isolated farmers and food processors from some of their biggest buyers, especially for meat, dairy and specialty crops. As a result, agricultural commodity prices declined significantly over the past few months (see Figure 48). In recent weeks, a reversal in some prices shows global demand is recovering.

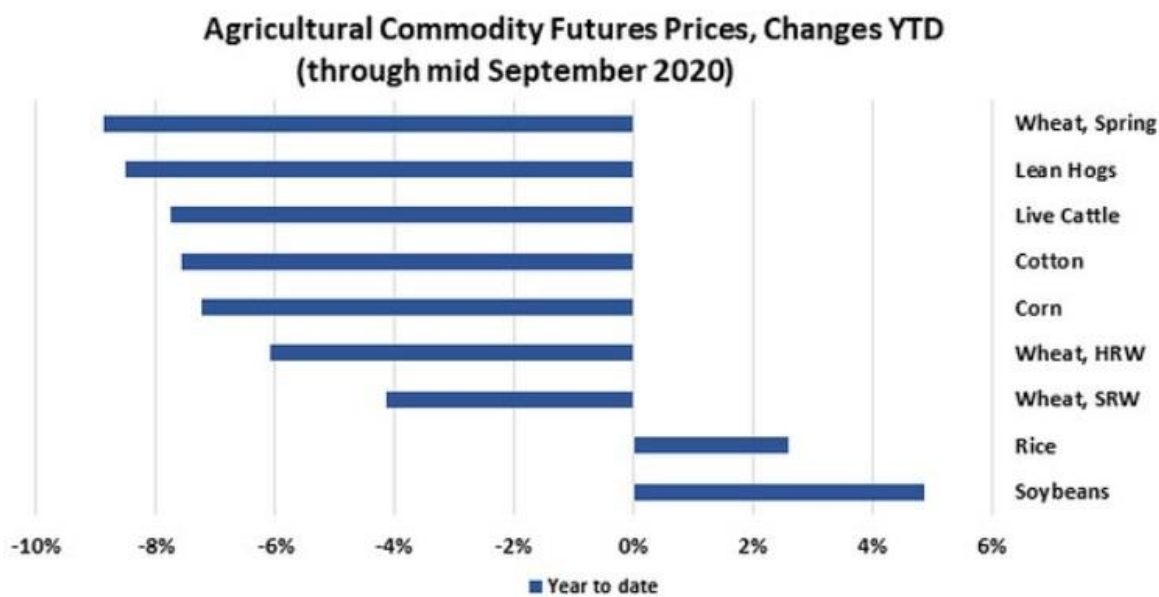


Figure 48. Agricultural Commodity Futures Prices, Changes YTD

Source: Bloomberg. Percentage changes as of closing Sept 17, 2020.

“As consumers were dealing with localized food shortages and rising retail food prices, producers were grappling with falling farmgate prices and a glut of output that forced them to euthanize livestock, dump milk, and dispose of perishable products that could not be stored.

¹⁸ <https://www.usda.gov/media/blog/category/farming>

Data on differences in prices at the farm and retail levels show that, as of August, the price paid by consumers for one pound of retail beef, for example, has risen by 5% since January 2020 (a significant fall-off from June, when it was 30% higher), while cattle producers are receiving 20% less for their cattle. Similarly, milk prices are up by nearly 5% for consumers since the beginning of the year, and milk prices received by dairy farmers and, although were up 5% as well in August, followed successive decreases in prices received from February through June, including a 31% decrease from January to June¹⁹.”

COVID-19 is having very disruptive impacts on markets for food products with increases in retail/grocery sales of most food products and sharp declines in products distributed through the hotel, restaurant and institutional (HRI) networks. In addition, there are ongoing disruptions to processing facilities for cattle, hogs and poultry. While in the short run the ‘in the barn’ and ‘on the ground’ livestock and poultry inventory must be fed, there likely will be long-term adjustments to production levels and resultant changes in feed consumption.

The following are models developed to capture the effects of COVID-19 on the six major species of livestock and poultry (i.e., broilers, egg-laying hens, turkeys, hogs, dairy cows and cattle).

¹⁹ America's Farmers: Resilient Throughout the COVID Pandemic posted by Robert Johansson, USDA chief economist, in [Farming Trade](#), Oct 13, 2020.

4.2.1 Broiler Slaughter Model

The baseline estimated for the broiler weekly slaughter model is based on the USDA long-term outlook. This baseline is used to assess the difference between expected slaughter and actual slaughter.

Broiler slaughter baseline was estimated by using:

- Year-over-year (YOY) percent change USDA’s annual broiler production outlook for the 2020 calendar year. **Note:**
 - For 2020, the USDA’s annual broiler production outlook was estimated to be 1.6% higher than 2019 production levels.

4.2.1.1 Broiler Model Results

As Figure 49 shows, there was a reduction in the actual number of broilers slaughtered compared with the baseline from the beginning of April 2020. The decrease in slaughter numbers reflects the initial negative impacts of COVID-19, which caused workforce absenteeism and temporary plant stops. Meanwhile, processing plants implemented new safety measures.

Compared with the baseline estimate, on average, there were 8.153 million fewer broilers processed from the first week of April to the second week of October 2020. The largest difference between the baseline and actual broiler slaughter was during the last weeks of June 2020 when actual slaughter was down 8% (14.4 million birds) from the baseline estimate. Since the beginning of April 2020 to Oct. 10, 2020, the cumulative slaughter deviation from baseline has reached 228.3 million head. Actual slaughter has consistently run 5% below the baseline during these 28 weeks of the year.

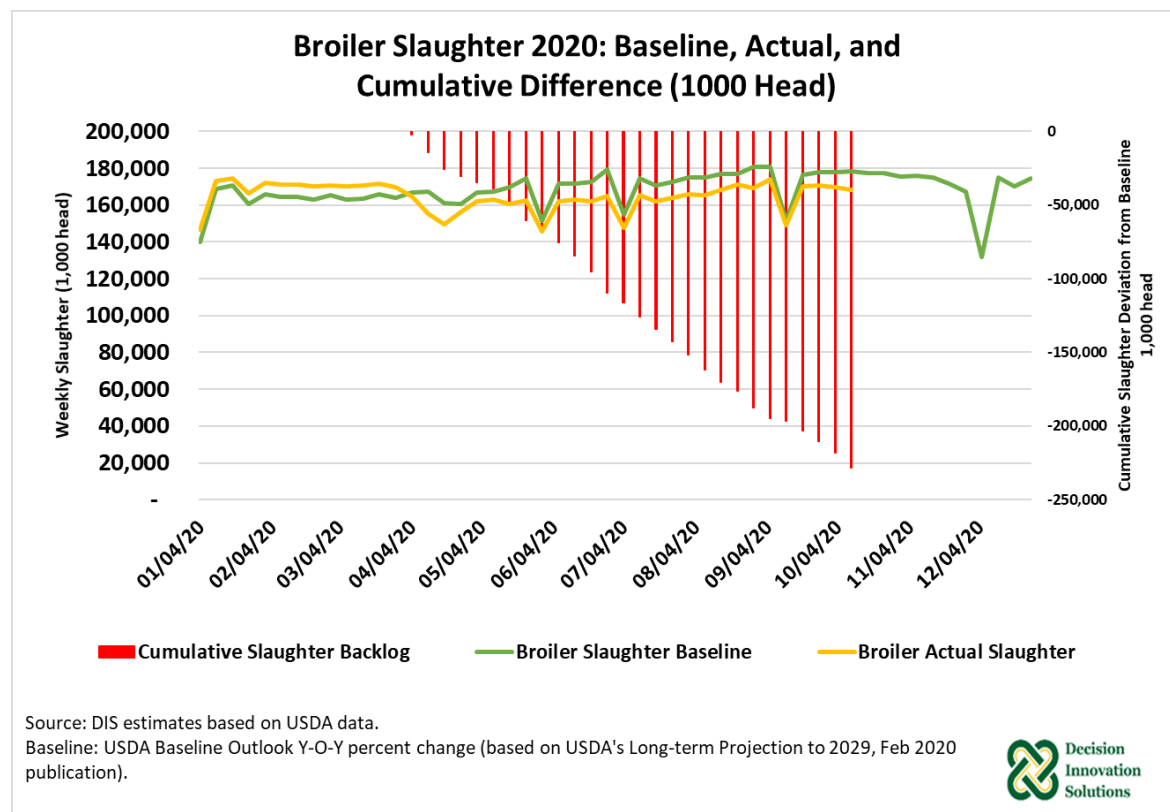


Figure 49. Broiler Slaughter 2020 Baseline, Actual and Cumulative Difference (1,000 Head)

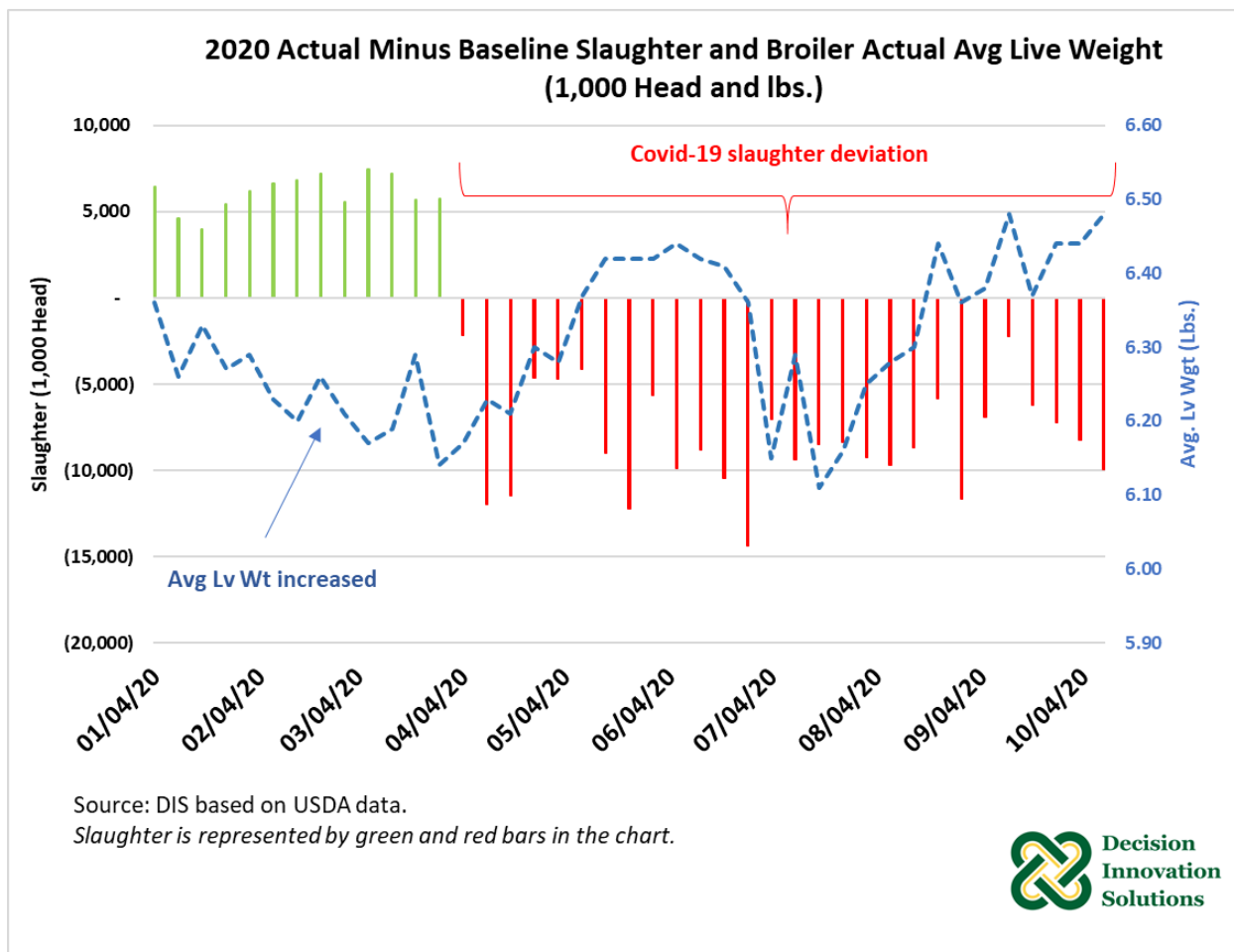


Figure 50. 2020 Broiler Slaughter Adjustment and Broiler Avg Live Weight (1,000 Head and lbs.)

Figure 50 shows the broiler slaughter deviation from baseline generated by COVID-19 resulted in the weight of broilers ready for slaughter to increase. The supply disruption increased broiler average live weight from 6.28 lbs. during the first week of May to 6.44 lbs. during the first week of June. Although declining after the first week of June, broiler live weight remained up for the next three weeks compared with pre-COVID-19 average broiler live weight. The most recent data indicates average live weight increased to higher levels than those in June. Birds ready for slaughter weighed 6.48 lbs. by Oct. 10, 2020.

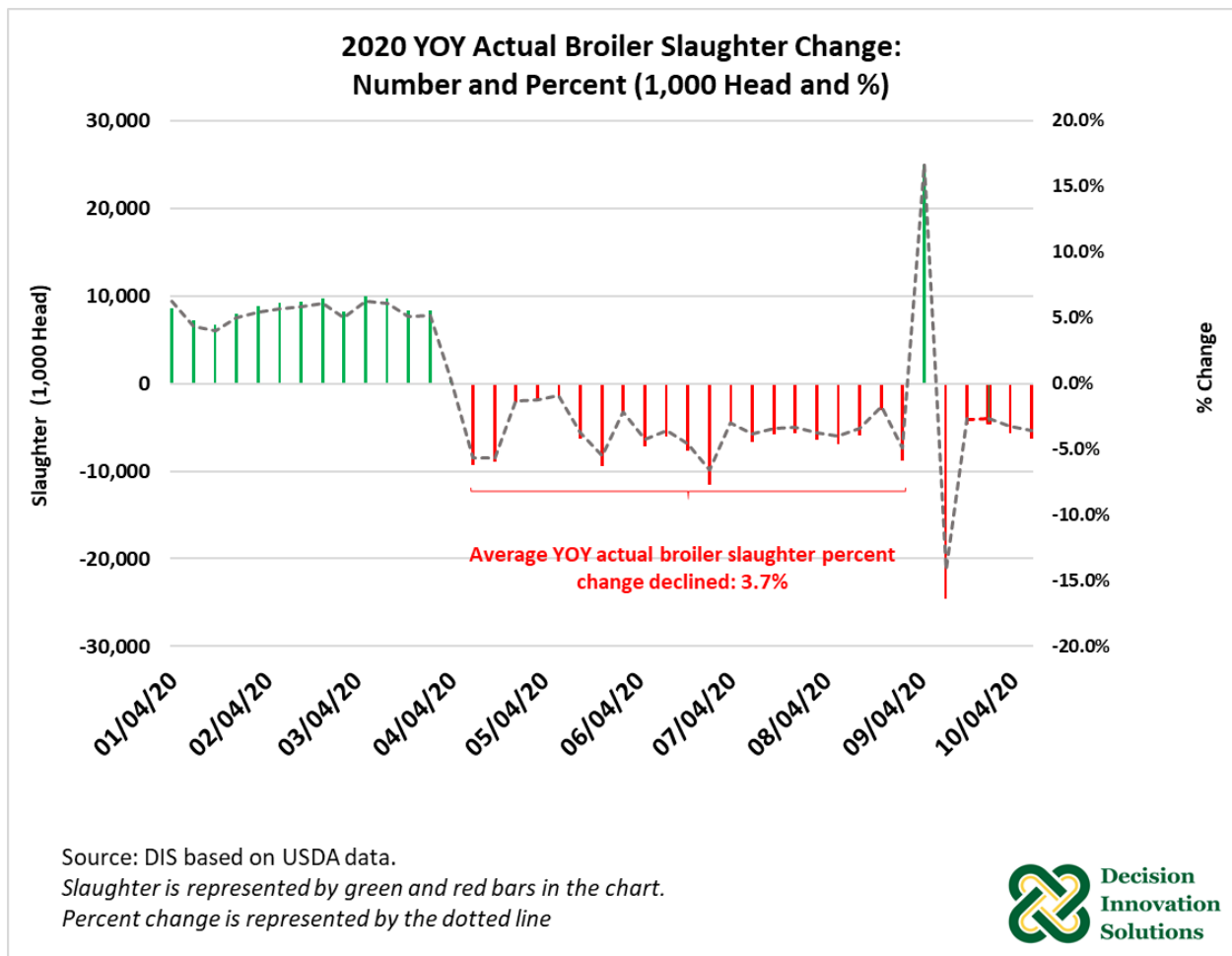


Figure 51. 2020 YOY Actual Broiler Slaughter Change: Number and Percent (1,000 Head and %)

Actual broiler slaughter estimates indicate that from the first week of January to the first week of April 2020, actual broiler slaughter was up 5% (on average) year-over-year. From the second week of April to the end of August 2020, actual broiler slaughter was down 3.7% on average. Overall, from the second week of April to second week of October 2020, the number of broiler slaughter drop by 150.1 million head (3.2%) compared with the same period a year early (see Figure 51).

4.2.1.2 Broiler Prices

Mainly due to the disruptions in broiler slaughter caused by COVID-19 starting in April 2020, the national composite broiler price (national composite) was down 29.5% during the second quarter of 2020 compared with the USDA’s projection formulated at the beginning of the year (Figure 52). During the second quarter, the broiler average national composite price fell from \$0.95/lb., the projected price in January 2020, to \$0.67/lb., the actual price in second quarter of 2020. The slaughter backlog resulting from COVID-19 during April and May increased broiler (animal) supply and put downward pressure on prices. Back in June, the USDA indicated, based on preliminary data, that processing operations have mainly stabilized but continued to operate below pre-COVID-19 levels. The USDA’s September price projections for the third and fourth quarters of 2020 were down 22.1% and 15.4% than the prices projected in January, respectively. The USDA’s September projection for the 2020 annual national

composite broiler price was reduced by 18% to \$0.71/lb. compared with the January projection (\$0.87/lb.). If realized, the 2020 national composite broiler price would be down \$0.10/lb. year-over-year and down \$0.27/lb. from 2018 (\$0.98/lb.).

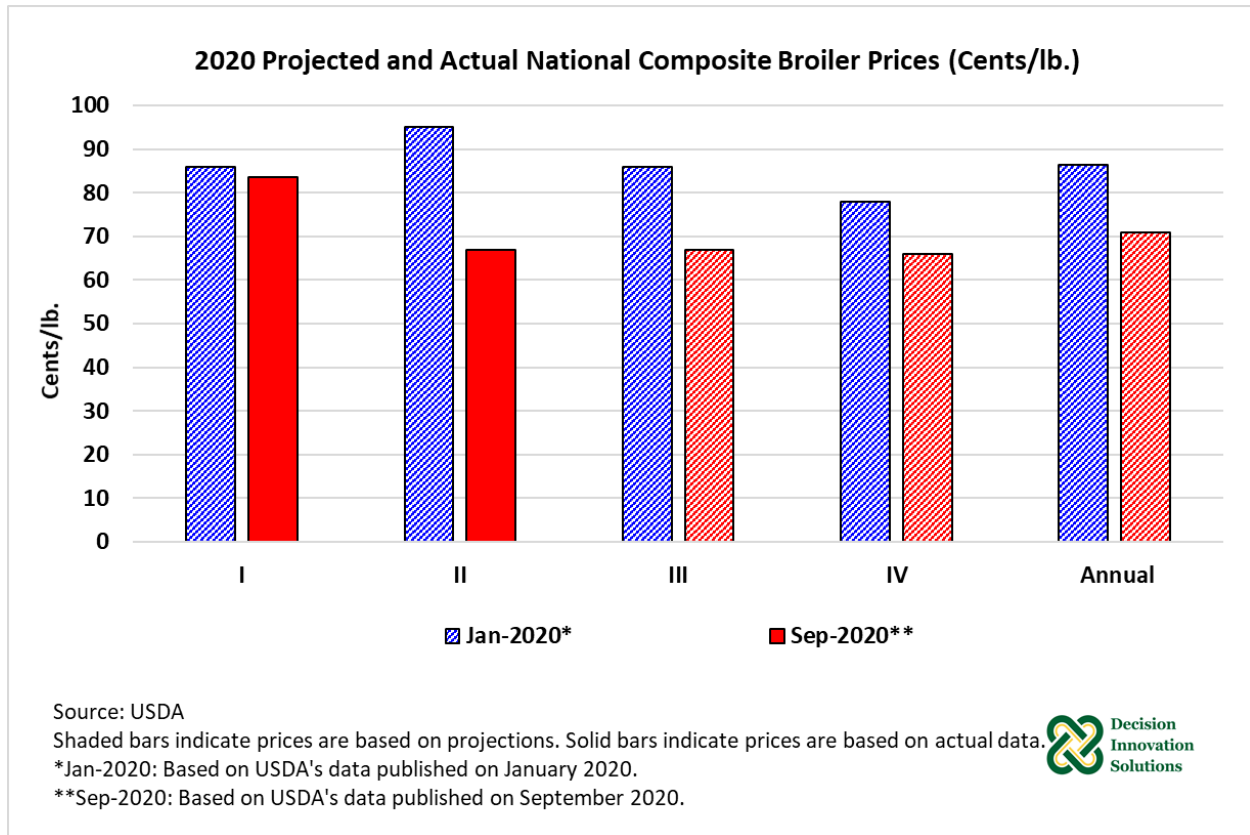


Figure 52. 2020 Projected and Actual National Composite Broiler Prices (Cents/lb.)

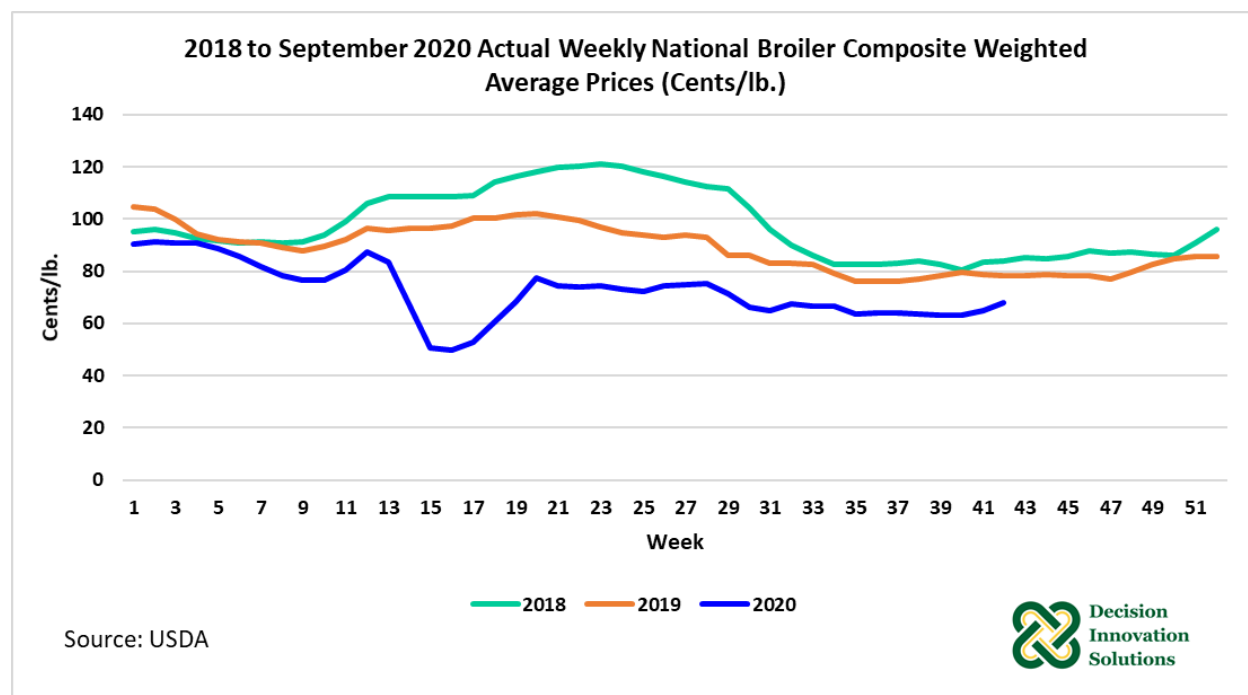


Figure 53. Actual Weekly National Broiler Composite Weighted Average Price (Cents/lb.)

Overall, actual broiler composite weighted average prices have been down relative to the previous two years (see Figure 53). Weekly price data indicates that during April and through the first two weeks of May 2020 (weeks 14 to 19), broiler prices fell 48% and 41%, on average, compared with the prices in 2018 and 2019 during that period, respectively. Prices from the third week of May to the second week of October 2020 (weeks 20 to 41) fell behind by \$0.31/lb. and \$0.18/lb., on average, compared with the same period in 2018 and 2019.

4.2.1.3 Value of Broiler Slaughter

Expected prices (baseline prices) for broiler slaughter were estimated based on the USDA's January 2020 quarterly estimates of broiler prices²⁰. Year-over-year percentage changes in quarterly price estimates were applied to 2019 weekly prices to generate 2020 weekly broiler prices (Figure 54).

To estimate the baseline (outlook) value of broiler slaughter, expected weekly prices were multiplied by baseline expected broiler slaughter and expected broiler weight. Expected broiler weight was estimated based on the 5-year seasonal average weight times the YOY weight trend.

The three components of the actual value of broiler slaughter estimates were: 1) actual broiler prices, which were published by the USDA in its Weekly National Whole Broiler/Fryer Report; 2) young chickens' average live weight, which were sourced from the Livestock Marketing Information Center (LMIC); and 3) young chickens' slaughter data, sourced from the LMIC as well.

²⁰ USDA-ERS, [January 2020](#).

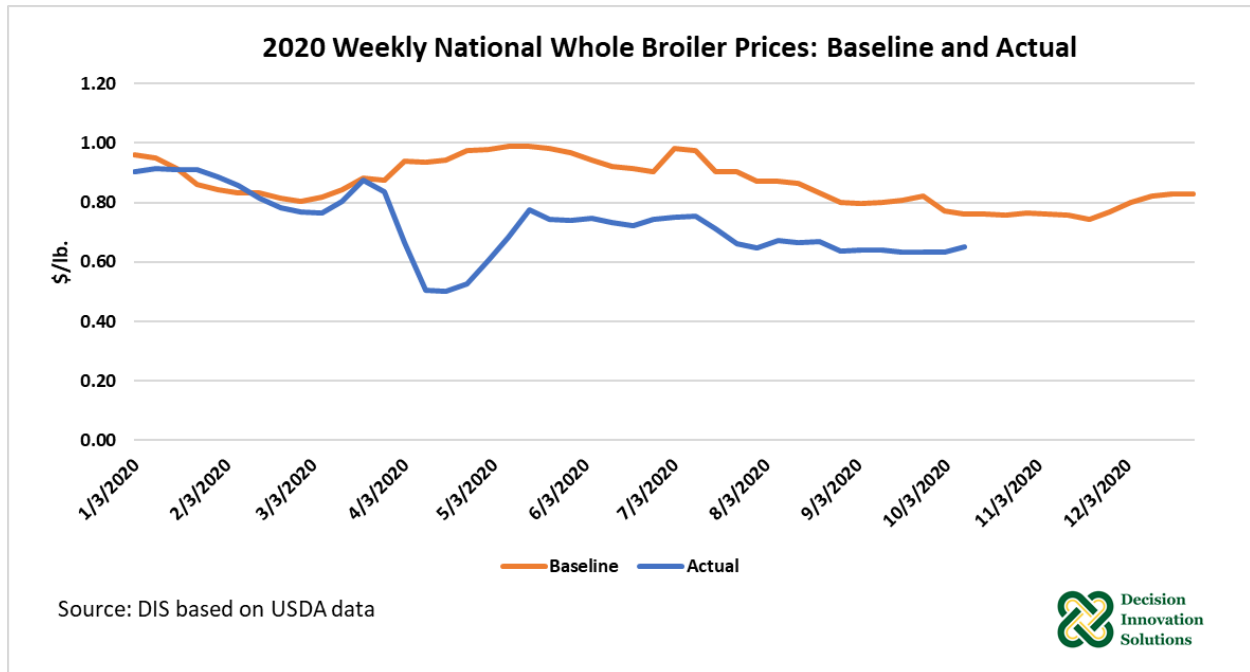


Figure 54. 2020 Weekly National Whole Broiler Prices: Baseline and Actual

The analysis comparing actual value of broiler slaughter includes data from April 11, 2020, to Oct. 10, 2020. During this period, actual broiler prices were down 25.5% compared with baseline prices, on average.

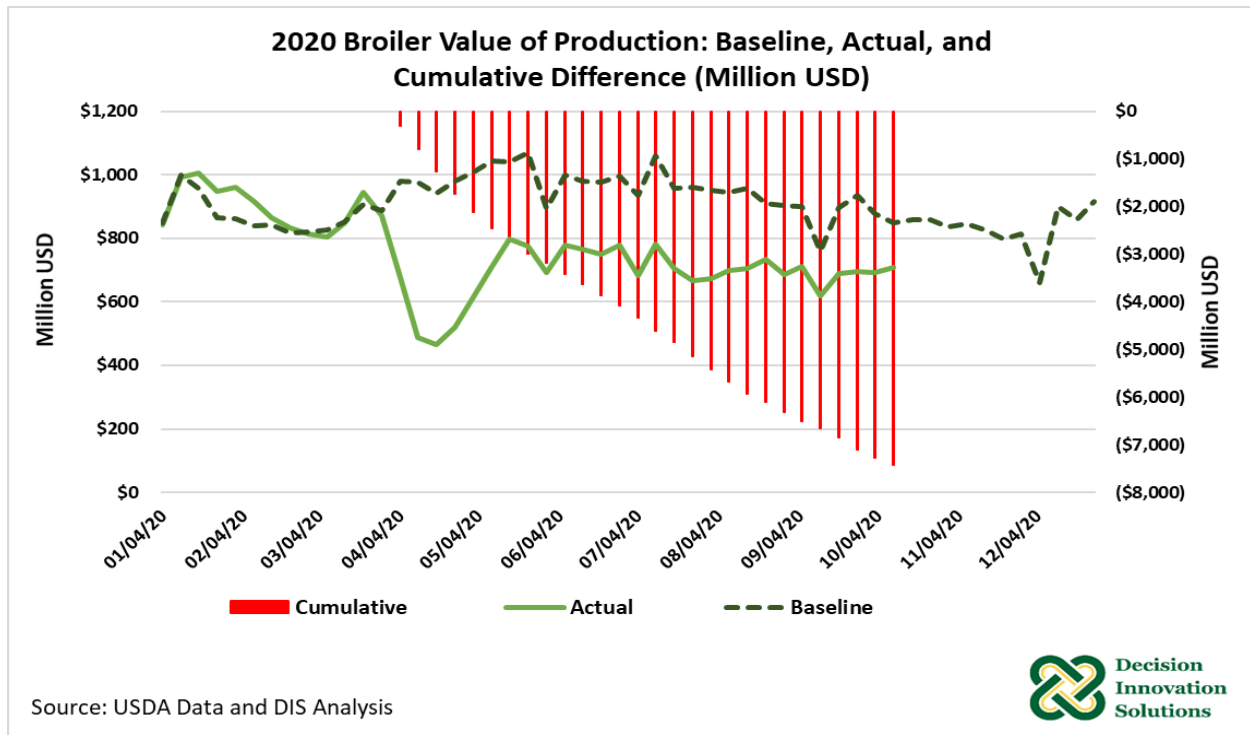


Figure 55. 2020 Value of Broiler Production: Actual, Baseline and Cumulative Difference (Million USD)

As Figure 55 indicates the largest difference between the actual value of slaughter and the expected value happened from April 11, 2020, to May 23, 2020, which includes the period when COVID-19 started impacting the broiler industry as well as the period whereby processing plants started implementing new safety measures. During these seven weeks, the cumulative loss of broiler slaughter value was estimated at \$3 billion. Based on the baseline, the cumulative loss of broiler slaughter value²¹ totaled \$7.4 billion (April 4 to Oct. 10, 2020). With slaughter numbers continuing to run well below baseline levels since the slaughter plant disruptions occurred, the value of broiler slaughter continues to run well below baseline levels and the cumulative losses in slaughter value continue to grow.

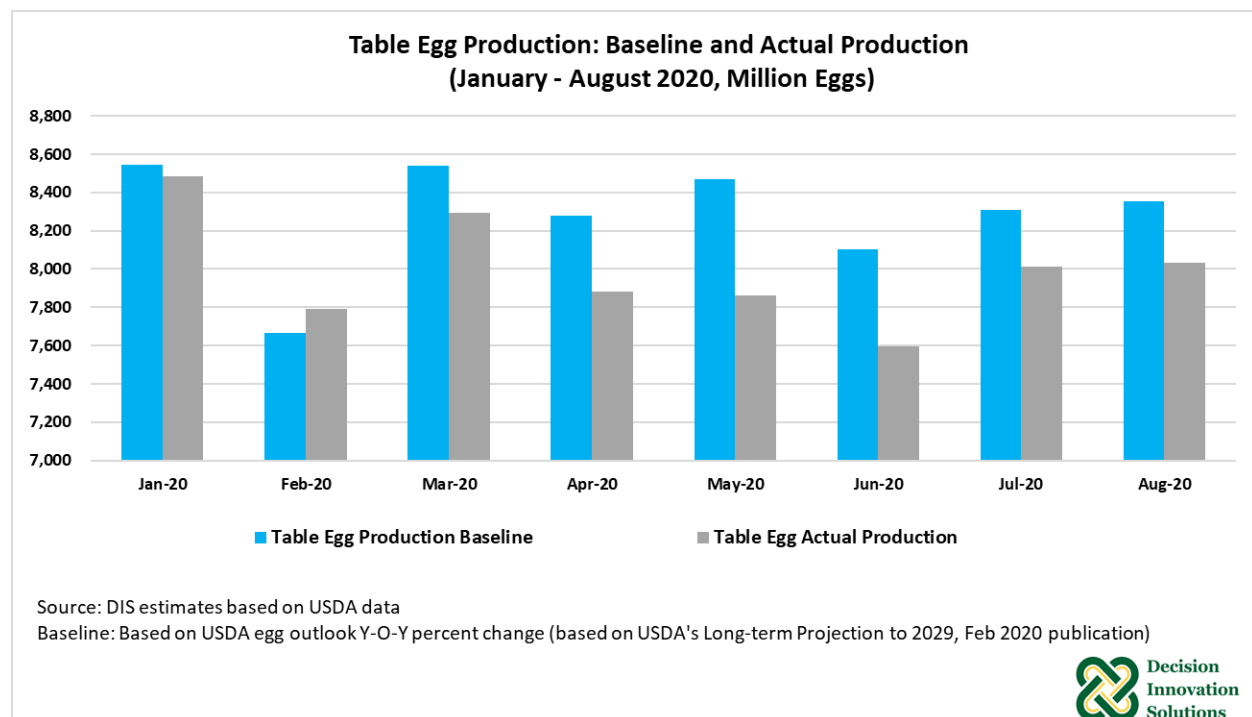
4.2.2 Egg Production Model

Egg production baseline estimates were derived from:

- YOY percent change USDA's annual egg production outlook for the 2020 calendar year applied to 2019 monthly egg production data. **Note:**
 - For 2020, the USDA's annual egg production outlook was estimated 1.008 relative to 2019.

4.2.2.1 Egg Model Results

From March to August 2020, baseline egg production was up 5% (on average) compared with actual egg production (Figure 56). With May showing the largest contrast between expected and actual egg production. Actual production was down 7.8% from the baseline in May. Back in March, the production decline resulted from a smaller layer flock (3.5% down from a year earlier).



²¹ A loss in the value of slaughter is registered when the expected value of slaughter (as estimated by the baseline) is higher than the actual value of slaughter.

Figure 56. Table Egg Production: Baseline and Actual (January-August Million Eggs)

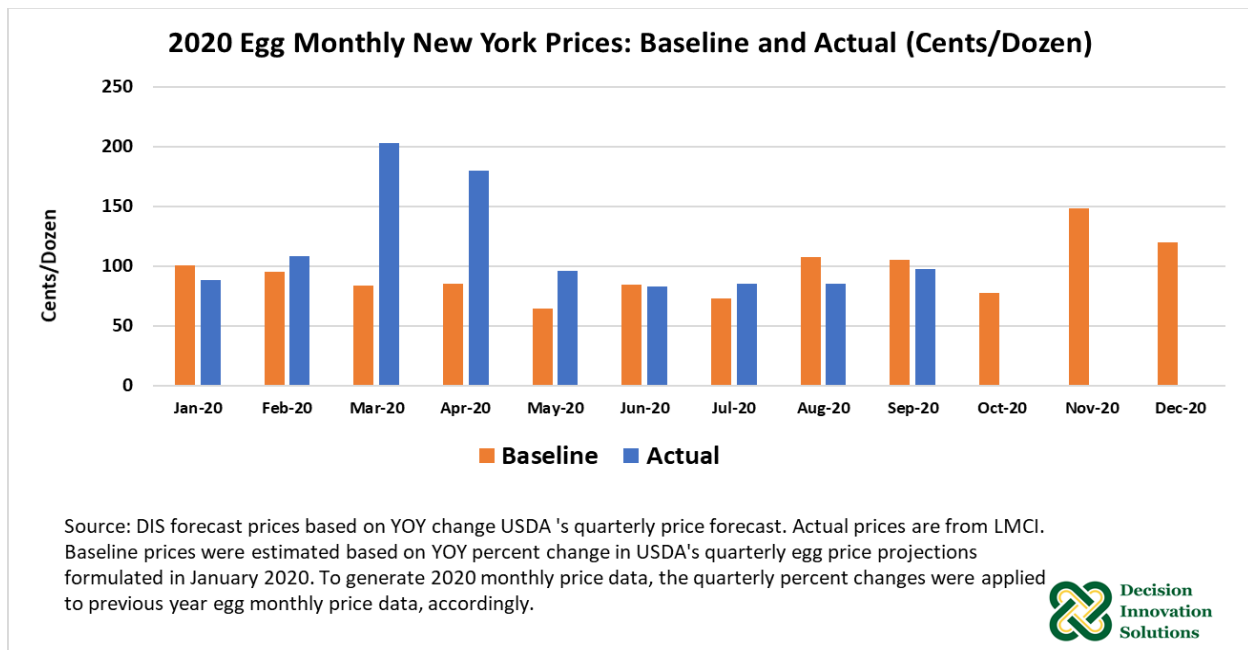


Figure 57. 2020 Egg Monthly New York Prices: Forecast and Actual (Cents/Dozen)

The smaller egg supplies in March and an increase in retail demand moved up wholesale egg prices to a record high at \$2.03/dozen (on average), up from \$1.08/dozen the previous month. Compared with the baseline prices²², the price in March was up almost 2.5 times from the estimated baseline price (\$0.835/dozen). Typically egg prices rise in March with higher demand for Easter, but the main driver this year was consumer demand growth in anticipation for at-home meal cooking due to COVID-19. Prices in April fell from previous months but remained above baseline estimates. This trend continued for the next two months (Figure 57). At the retail level, demand continued strong but demand for processing food products, which is mainly distributed into foodservice, declined.

²² Baseline monthly prices were estimated based on YOY percent change in the USDA's quarterly data egg price projections formulated in [January 2020](#). To generate 2020 monthly price data, the quarterly percent changes were applied to previous year egg monthly price data, accordingly.

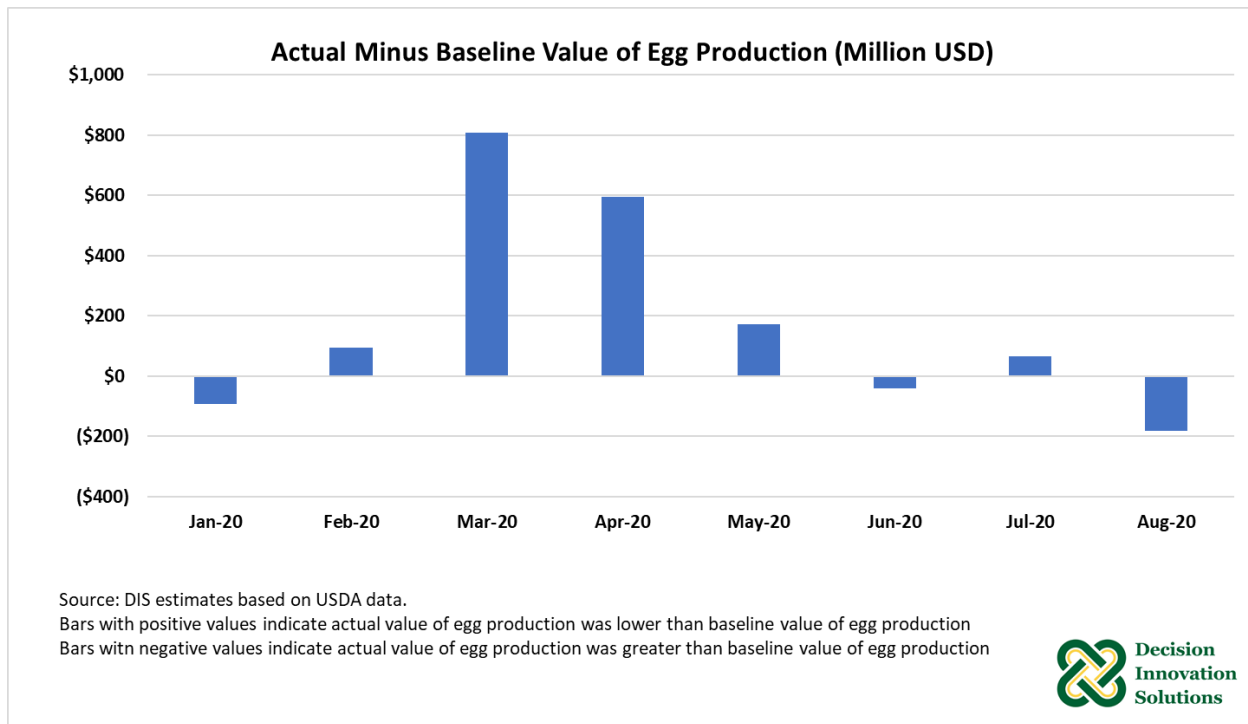


Figure 58. Actual Minus Baseline Value of Egg Production (Million USD)

The baseline value of egg production (baseline price times baseline production) compared with the actual value (actual price times actual production) indicates that actual values were up from February to May 2020 and then again in July (see Figure 58). Higher prices, particularly during March and April, boosted the value of egg production. The cumulative net actual value of egg production over baseline estimates was about \$1.4 billion during the first eight months of 2020.

4.2.3 Turkey Slaughter Model

A baseline was estimated for the turkey weekly slaughter model which is used to estimate the difference between expected slaughter and actual slaughter.

Turkey slaughter baseline was derived by:

- YOY percent change in the USDA's annual turkey production outlook. **Note:**
 - For 2020, the USDA's annual turkey production outlook was estimated at 1.02, which was the YOY projected annual production growth for turkeys in 2020.

4.2.3.1 Turkey Model Results

Five weeks out of the first 12 weeks of the year (January to the third week of March 2020), actual slaughter was below baseline estimates; nonetheless, at the end of those 12 weeks, actual slaughter was ahead of the baseline by 918,000 head. Except for one week, the trend reversed for the following 14 weeks (from March 28 to June 27, 2020) (Figure 59).

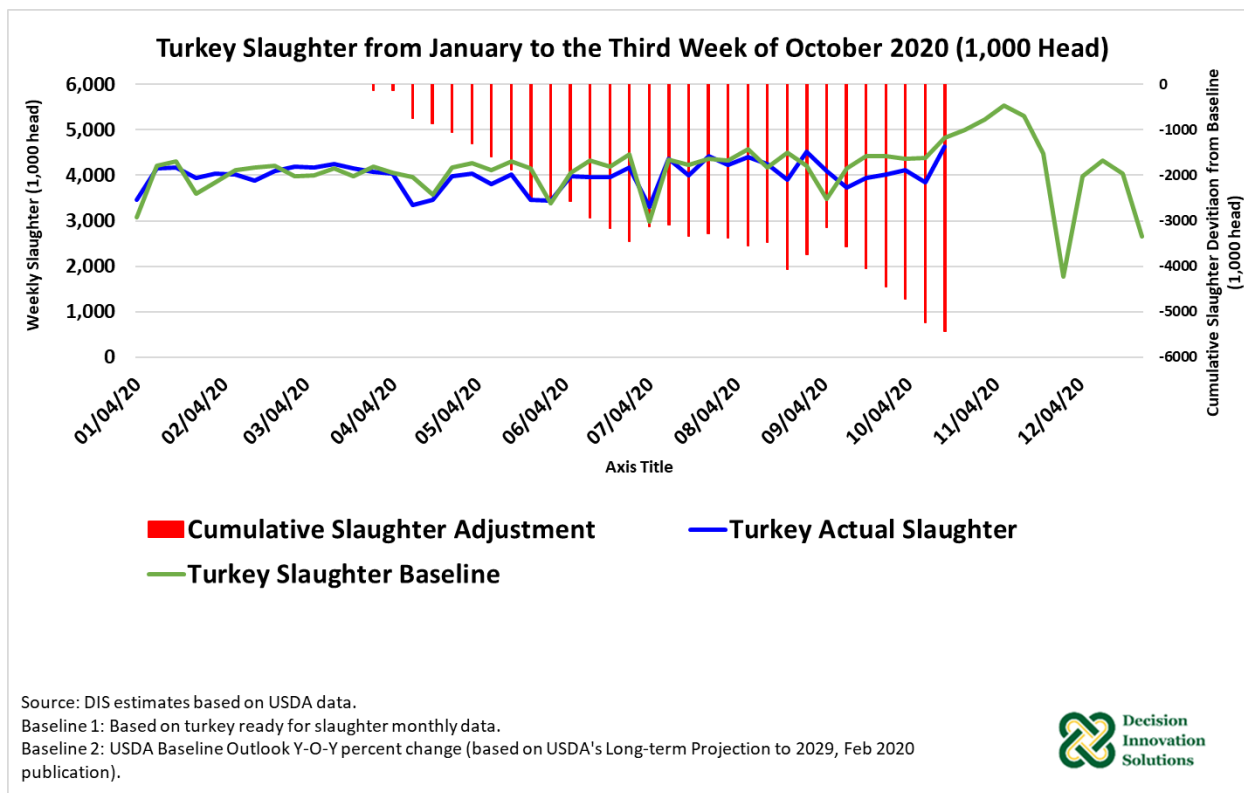


Figure 59. Turkey Slaughter from January to the Third Week of October 2020 (1,000 Head)

During this period, actual slaughter dropped by 3.4 million head (6%) relative to the baseline. As USDA’s data indicates, poult placement has declined this year compared with 2019 (see Figure 60). From January to March 2020, poult placement dropped 2% YOY on average. Placement data for the first nine months of the year shows that except for June 2020, poult placement fell from the previous year, with May’s placements experiencing the largest decline (10%). The cumulative difference between actual and expected slaughter reached a total of 3.3 million head from March 28 to June 27, 2020. As the industry has adjusted, actual slaughter has fluctuated above and below the expected values estimated by the baseline but for the most part, actual slaughter has trended below expected slaughter. From March 28 to the third week of October 2020, the total cumulative difference indicates that actual slaughter declined from the baseline by 5.4 million head (see Figure 59).

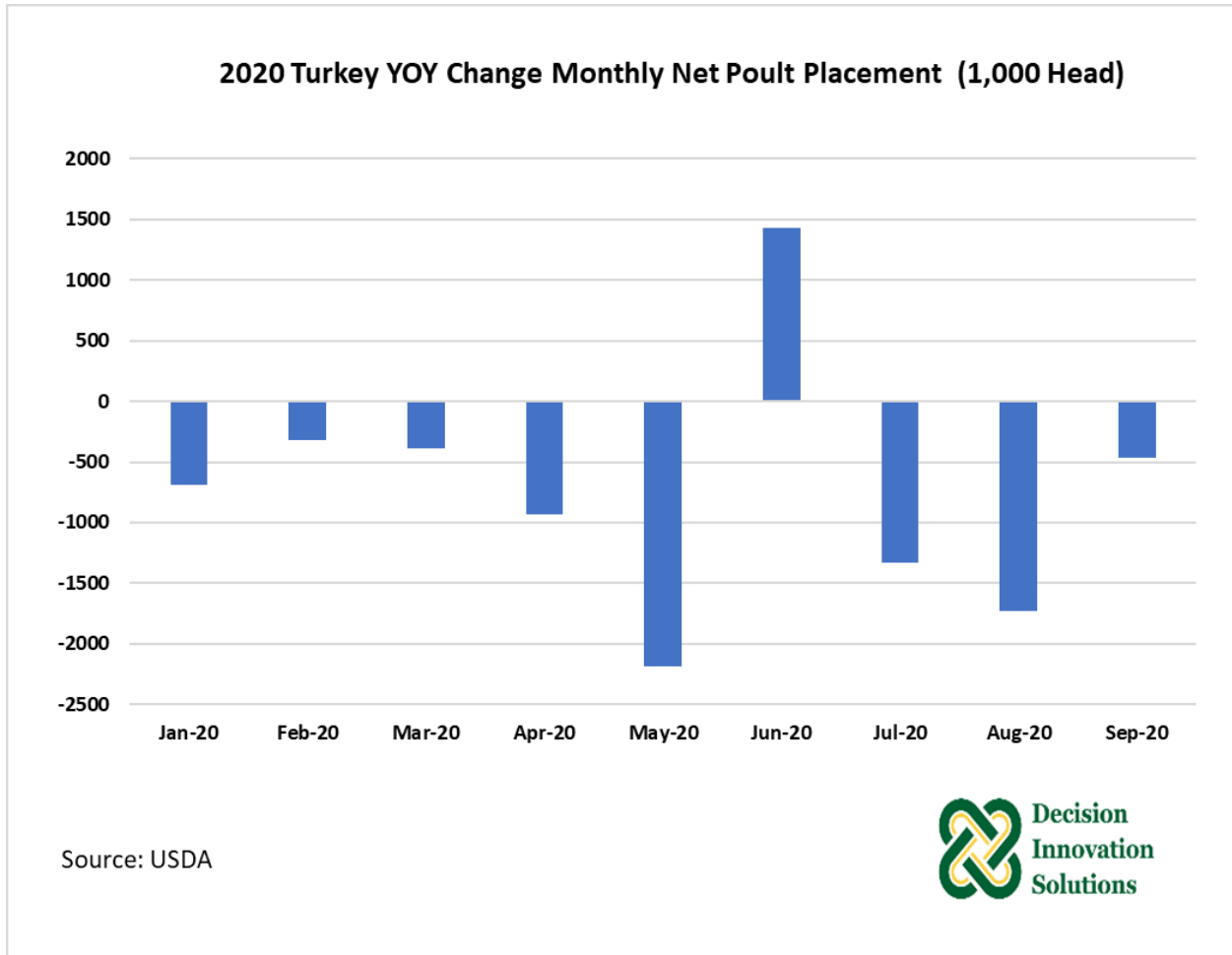


Figure 60. 2020 Turkey YOY Change Monthly Net Poults Placement (1,000 Head)

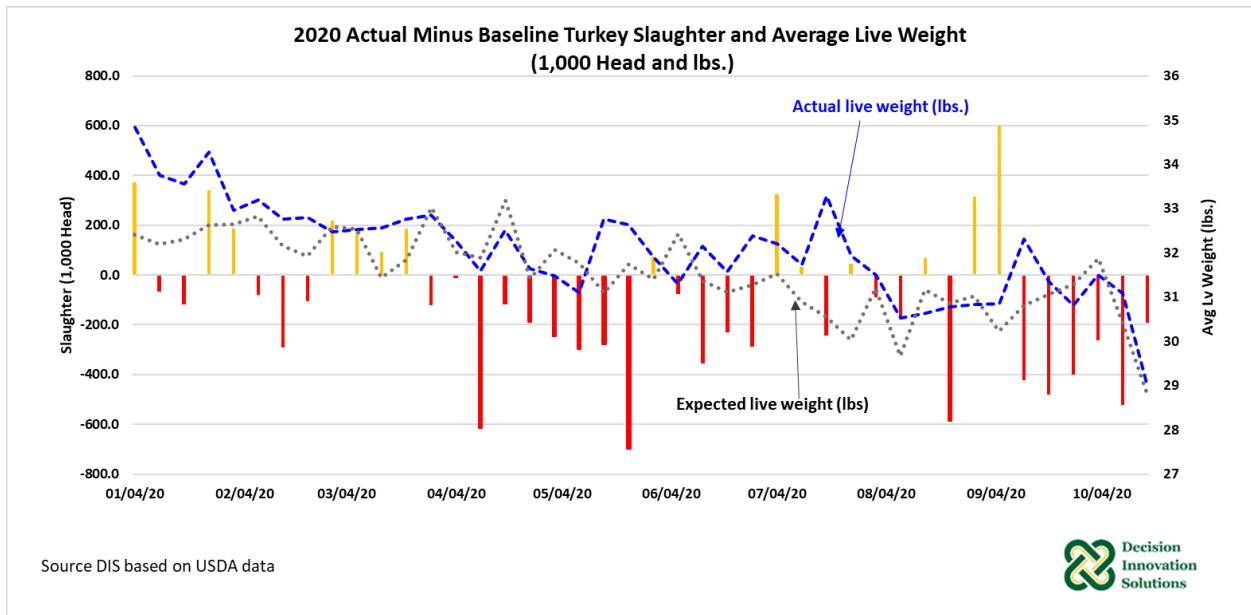


Figure 61. 2020 Actual Minus Baseline Turkey Slaughter and Average Live Weight (1,000 Head and lbs.)

From January to Oct. 17, 2020, actual average live weight has been up 0.53 lbs. from the expected live weight average (32.1 lbs.) (see Figure 61).

4.2.3.2 Turkey Prices

Figure 62 shows USDA’s projected and actual turkey national prices, the blue bars in the charts indicate USDA’s projected prices formulated in January 2020, whereas the orange bars indicate actual prices for the first two quarters of the 2020 and the latest projections for the last two quarters of the year, published in September. Actual prices were up 11% and 15% during the first and second quarters of 2020 compared with their corresponding forecasts. With lower poult placement, production has declined pushing prices up. As this trend has continued, the USDA increased its turkey price forecast for the third and fourth quarters of the year compared with the projections in January. If realized, turkey national price would average \$1.11/lb. during the third and fourth quarters, in contrast with 93 and 96 cents/lb., on average, which were January’s forecast for each of these quarters, respectively. The annual turkey price is expected at \$1.06/lb., up 13 cents/lb. from the original forecast.

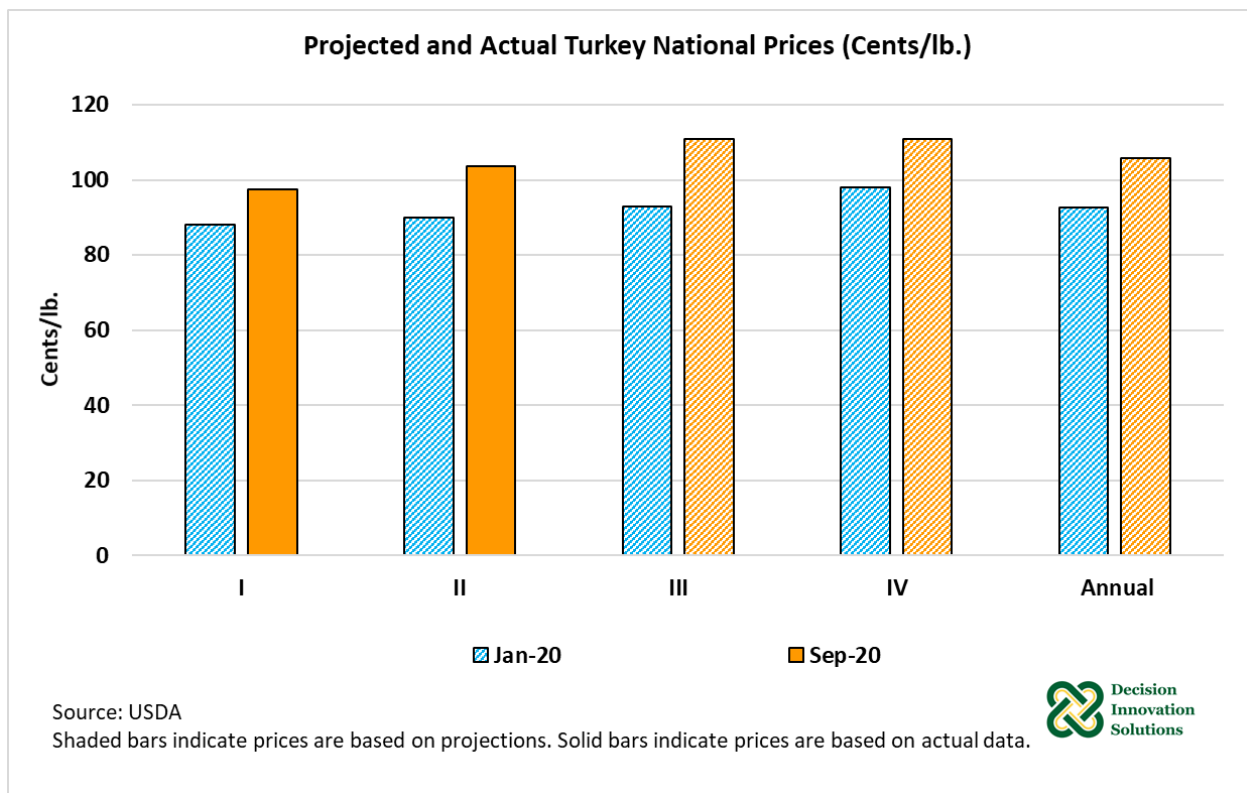


Figure 62. Projected and Actual Turkey National Prices (Cents/lb.)

Expected weekly prices for turkeys were forecast based on the USDA’s January 2020²³ quarterly estimates of turkey prices. Year-over-year percentage changes in quarterly price estimates were applied to 2019 weekly prices to generate 2020 weekly turkey prices (Figure 63).

²³ USDA-ERS, [January 2020](#).

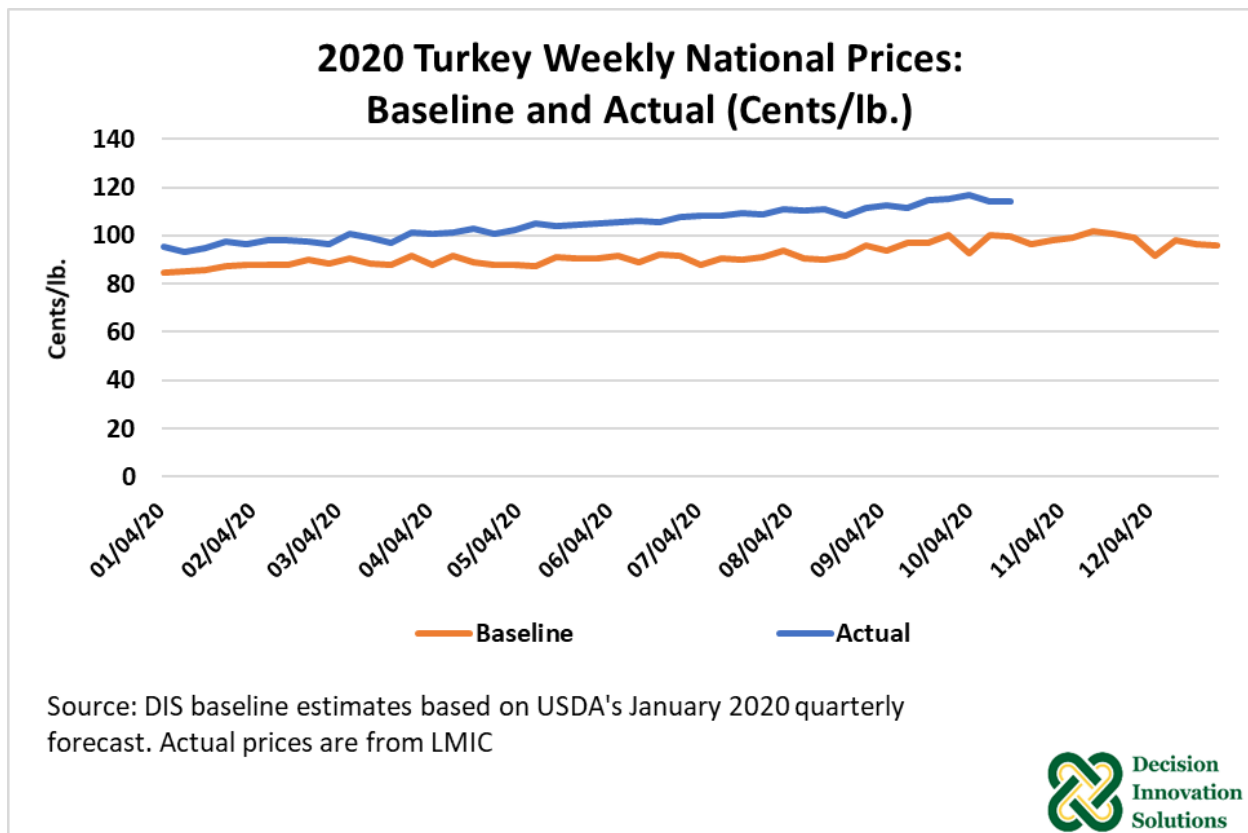


Figure 63. 2020 Turkey Weekly National Turkey Prices: Baseline and Actual (Cents/lb.)

4.2.3.3 Value of Turkey Slaughter

Turkey baseline weekly prices were estimated based on the USDA's turkey weekly national average prices²⁴. To estimate the expected value of turkey slaughter, baseline weekly prices were multiplied by the baseline expected turkey slaughter and expected turkey weight. Expected turkey weight was estimated based on the 5-year seasonal weight times and the YOY weight trend, which was sourced from LMIC.

Actual value of turkey slaughter estimates include the following components: 1) turkey prices (turkey weekly national average prices for 2020) published by LMIC, 2) actual turkey average live weight sourced from LMIC; and 3) actual total turkey slaughter data published by LMIC, as well.

The analysis comparing expected and actual value of turkey slaughter includes from January 4 to Oct. 17, 2020. During this period, actual turkey prices were up 15% compared with baseline prices, on average.

²⁴ These are wholesale prices between processors and end buyers.

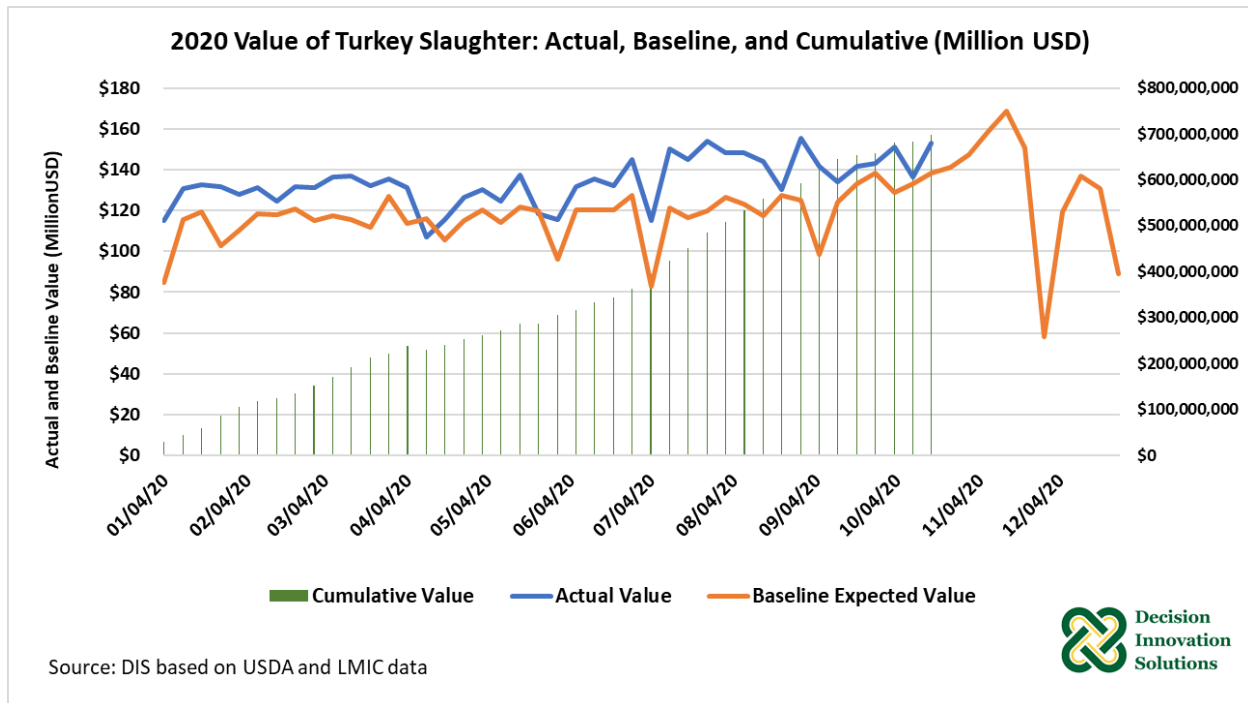


Figure 64. 2020 Value of Turkey Slaughter: Actual, Baseline and Cumulative (Million USD)

From Jan. 4 to Oct. 17, 2020, actual value of turkey slaughter was up \$699 million relative to the baseline (Figure 64).

4.2.4 Federally Inspected Hog Slaughter Models

In the Federally Inspected (FI) Hog Slaughter Model, the effect of COVID-19 on the number of hogs slaughtered is assessed as the difference between an estimated baseline for FI hogs slaughtered and actual FI hogs slaughtered, as published by the USDA.

There were several baselines estimated for the FI hog slaughter analysis. The analysis started with a baseline estimated based on the USDA's pork production outlook (outlook baseline) for the 2020 calendar year, which consists of:

- Weekly expected hog slaughter based on YOY percent change in the USDA's annual pork production outlook. **Notes:**
 - The outlook baseline uses the USDA's annual hog production growth rate forecast for 2020 (4.0%) relative to 2019.
 - The estimates in this baseline include a 2.4% death loss factor, which was applied for the entire 52 weeks of estimates.

There were four additional baselines estimated in the case of FI hog slaughter based on the periodicity of the USDA's Hogs and Pigs reports²⁵ (December, March, June, and September), which includes hog

²⁵ Note that since the analysis for this project corresponds to the 2020 year, the first day of baseline was set at the beginning of January 2020, not the end of December 2019.

inventories at different stage/weight levels. Therefore, in each baseline, which includes 52 weeks, estimates incorporate hog inventories as they reach readiness for the slaughter process, as follows:

- Weeks 1 to 6: hog slaughter based on YOY percent change hog inventory >180 lbs.
- Weeks 7 to 13: hog slaughter based on YOY percent change hog inventory 120-179 lbs.
- Weeks 14 to 22: hog slaughter based on YOY percent change hog inventory 50-119 lbs.
- Weeks 23 to 32: hog slaughter based on YOY percent change hog inventory <50 lbs.
- Weeks 33 to 52: hog slaughter based on YOY percent change hog inventory of pigs kept for breeding times pigs per litter.

Each baseline for this analysis started at the beginning of their corresponding quarterly data as follows: Dec-19 baseline (Dec. 1, 2019), Mar-20 baseline (March 1, 2020), Jun-20 baseline (June 1, 2020), and Sep-20 baseline (Sept. 1, 2020).

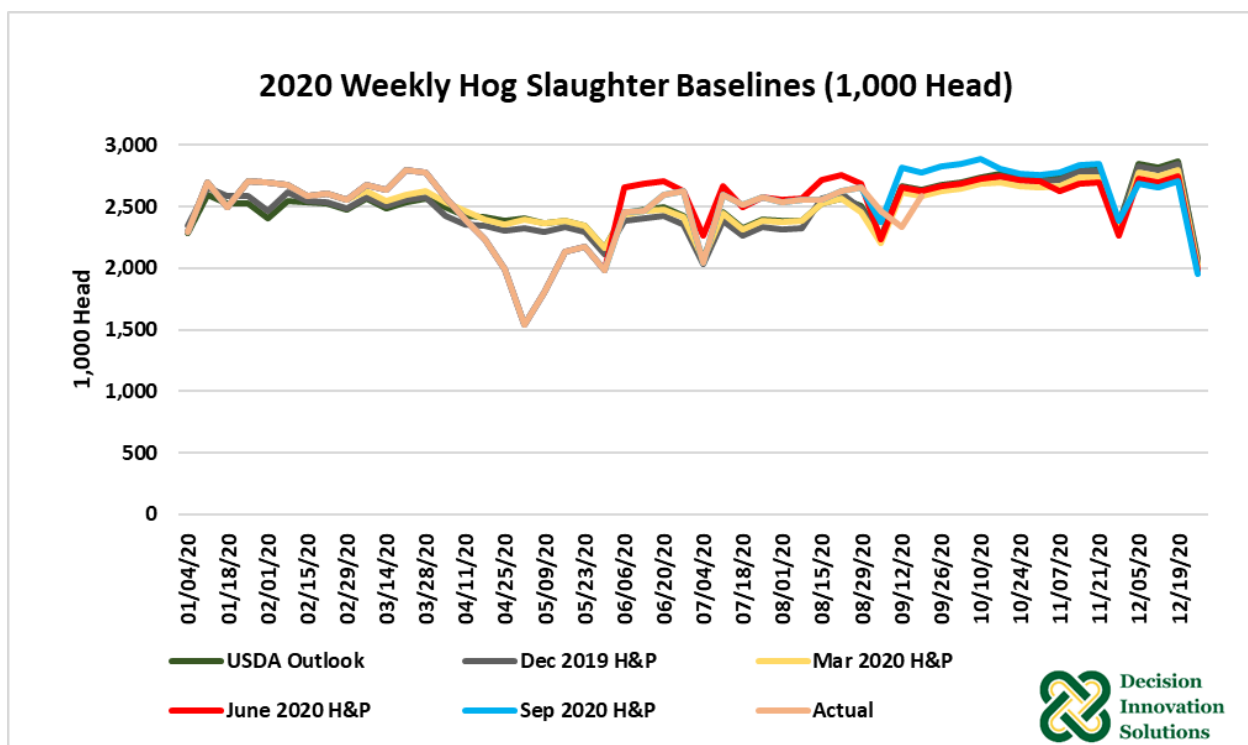


Figure 65. 2020 Weekly Hog Slaughter Baselines (1,000 Head)

In addition, to account for losses due to death and euthanasia, each of the estimates in each of the baselines were multiplied by a hog death loss factor of 2.4% and a euthanasia factor. The euthanasia factor was applied as follows:

- No euthanasia factor was applied to the USDA Outlook's baseline as it reflects pre-COVID-19 expectations.
- Dec-19 baseline: weeks 1 to 15: 0%; weeks 16-20: 1.0% (reflects euthanasia of heavy hogs), weeks 21-34: 0% and weeks 35-52: 2.0% (reflects euthanasia of pre-weaned hogs).
- Mar-20 baseline: weeks 1 to 15: 0% and weeks 16-20: 1.0% (reflects euthanasia of heavy hogs), weeks 21-34: 0% and weeks 35-52: 2.0% (reflects euthanasia of pre-weaned hogs).

- No euthanasia factor was applied to estimates from the June or September Hog & Pig Reports as we believe that little, if any euthanasia occurred after June 1, 2020, and inventory numbers in these reports would have already reflected any euthanasia that occurred.

As can be seen in Figure 65 as slaughter hogs were backed up, the near-term slaughter estimates from the June and September Hog & Pig Reports jumped a bit higher. And, although the September Hog & Pig Report inventory numbers implied hogs ready for slaughter were still backlogged, marketings in September and October 2020 indicate that hog marketing were essentially current by early September.

4.2.4.1 Federally Inspected Hog Model Results

Three baselines (Outlook, Dec-19 and Mar-20) include hog slaughter backlog estimates for the period when the COVID-19 virus began impacting the U.S. hog industry and extend to Aug. 29, 2020. The Jun-20 baseline includes hog slaughter backlog estimates starting on June 6, 2020, and continue through Aug. 29, 2020. Our analysis indicates that the industry was essentially current on hog marketings by early September.

Figure 66 to Figure 70 show the actual FI hog slaughter in contrast with the baseline estimates. The figures also include the corresponding net cumulative hog slaughter backlogs (sum of weekly differences between baseline estimates and actual slaughter).

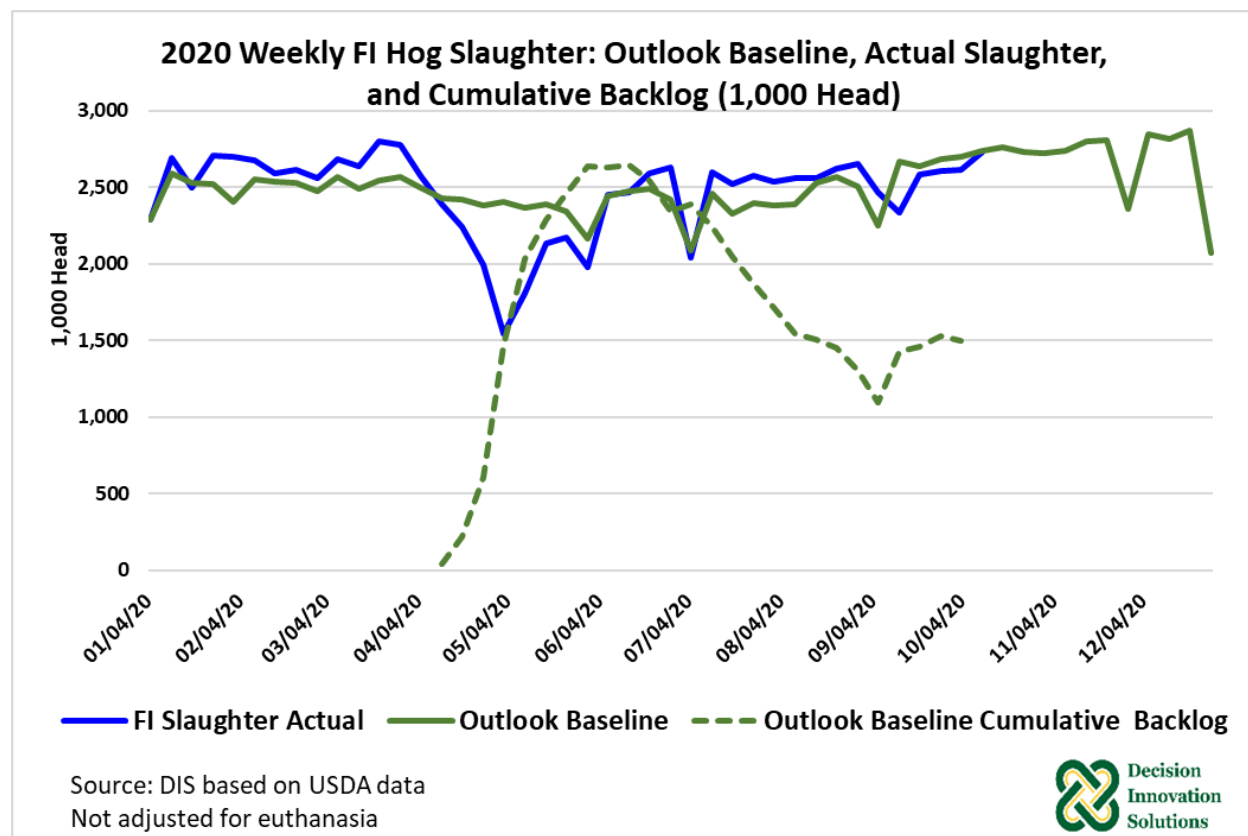


Figure 66. 2020 Weekly FI Hog Slaughter: Outlook Baseline, Actual Slaughter and Cumulative Backlog (1,000 Head)

The outlook baseline reached the highest weekly hog slaughter backlog on May 2, 2020, at 861,670 head. Based on the outlook baseline, there was a continuous build-up of slaughter backlog that lasted

from April 11 to May 30, 2020 (Figure 69). The cumulative backlog was about 2.6 million head during this period. By the end of August, the net cumulative backlog²⁶ indicated by the Outlook baseline was 1.3 million head, but it needs to be remembered that this baseline was not adjusted for any euthanasia. DIS estimates that 190,820 heavy hogs were euthanized and 756,840 pre-weaned hogs were euthanized during the months of April to June 2020.

Overall, as Figure 69 shows, based on the outlook baseline, the highest backlog happened during the period from April 11 to June 13, which corresponds to the period that hog processing facilities were most impacted by the COVID-19 virus during 2020. Processing plants experienced labor disruptions and even closures for deep sanitation and to allow employees to recover from COVID-19, which forced the sector to adjust its schedules. As the labor force returned to production and the industry adapts to COVID-19, U.S. government guidelines hog processing started to recover. Compared with 2019, actual FI slaughter hogs were up through the first 14 weeks of the 2020 calendar year and it appears that some slaughter hogs were “pulled ahead” in February and March 2020, which provided some additional farm-level capacity when the slaughter plant disruptions began in April.

For the Dec-19 and Mar-20 baselines (which are adjusted for euthanasia), the highest weekly hog slaughter backlogs were estimated at 784,890 and 858,680 head, respectively. These numbers were registered the week ending May 2, 2020. An uninterrupted period of cumulative backlog for the Dec-19 baseline was assessed at 2.1 million head. Whereas for the Mar-20 baseline, a period of persistent slaughter backlog reached 2.6 million head. The continuous increase in backlogs stretched from April 11 to May 30, 2020, for both Dec-19 and Mar-20 baselines (see Figure 67 and Figure 68). By the end of August, the net cumulative backlogs were estimated at 193,000 head and 1.1 million head for the Dec-19 and Mar-20 baselines, correspondingly. We believe that the estimated backlogs derived from the December Hog & Pigs Report more accurately reflect what happened in the marketplace from the perspective of disruptions in hog marketings.

²⁶ A net cumulative backlog was estimated because there were weekly periods where the baseline slaughter was lower than the actual slaughter.

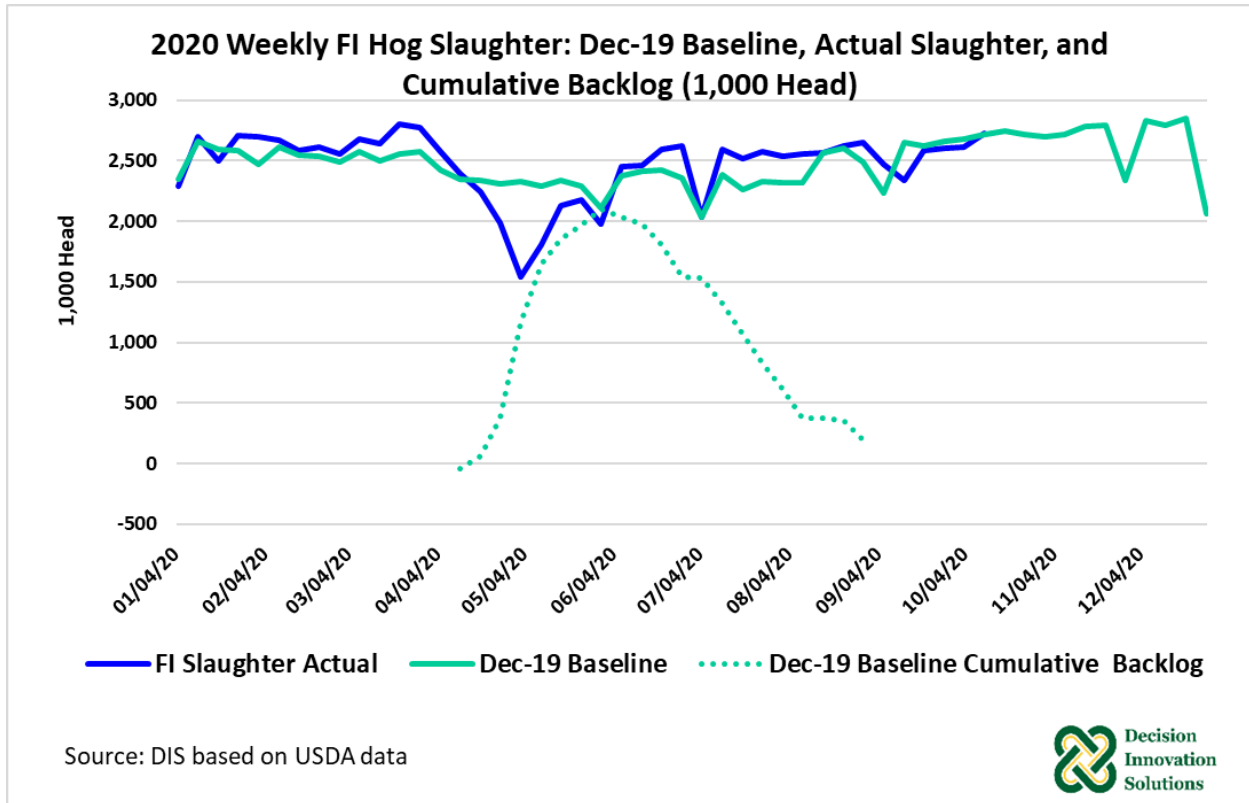


Figure 67. 2020 Weekly FI Hog Slaughter: Dec-19 Baseline, Actual Slaughter and Cumulative Backlog (1,000 Head)

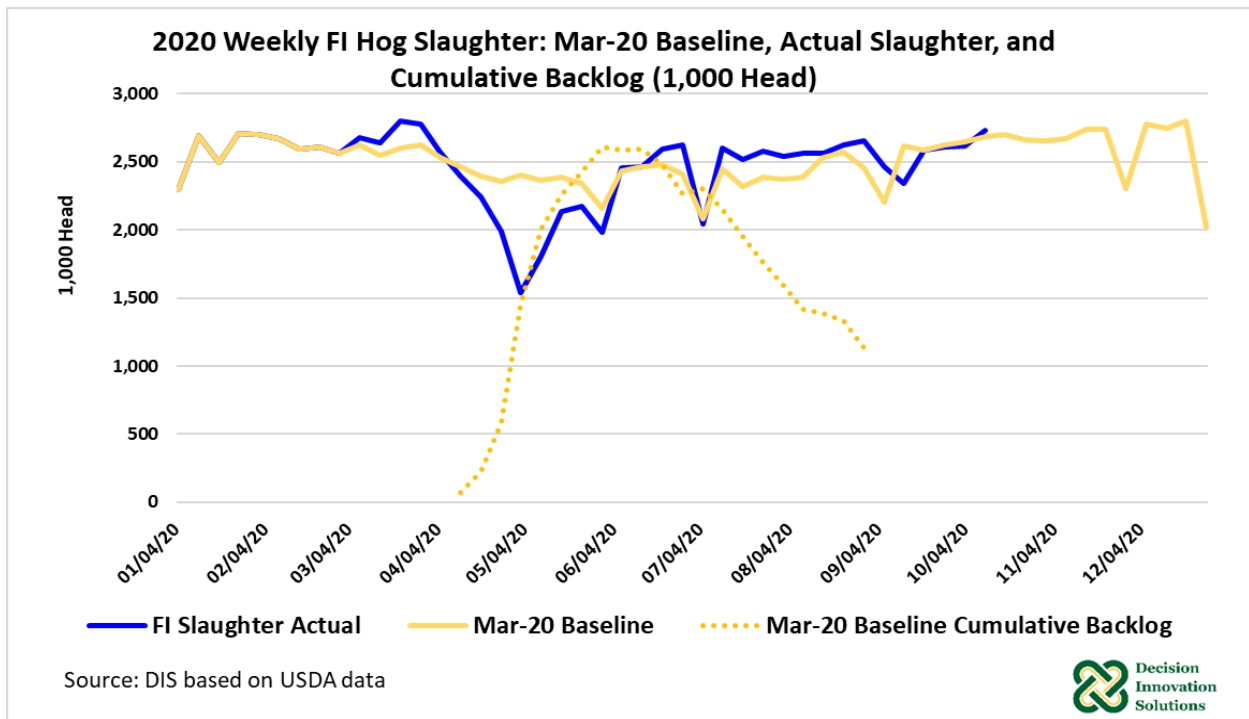


Figure 68. 2020 Weekly FI Hog Slaughter: Mar-20 Baseline, Actual Slaughter and Cumulative Backlog (1,000 Head)

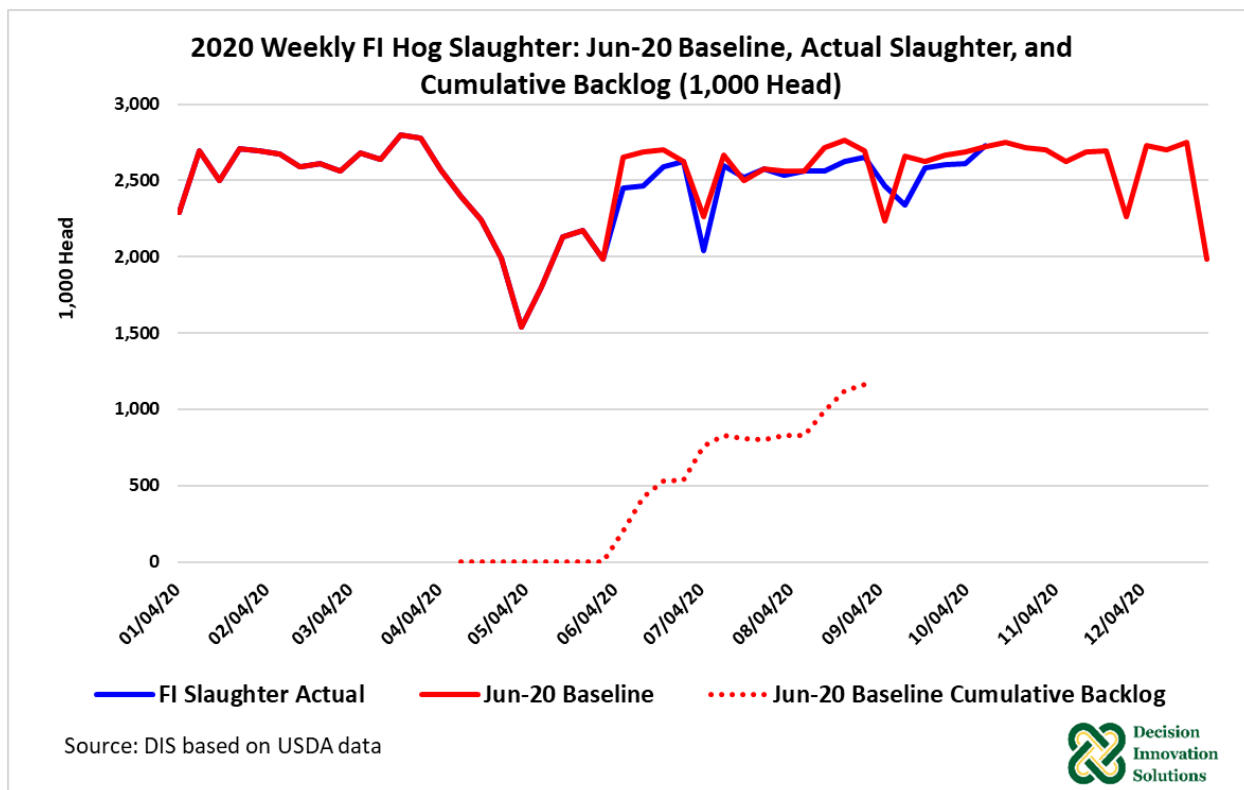


Figure 69. 2020 Weekly FI Hog Slaughter: Jun-20 Baseline, Actual Slaughter and Cumulative Backlog (1,000 Head)

The June 2020 Hog & Pigs Report indicated that the 180 lb. and over hog category was 112.8% of June 2019 levels. The 120-179 lb. group was estimated to be 111.8% of 2019 levels. These inventory numbers suggested that hog slaughter levels in June 2020 should average 2.7 million head weekly during the month of June. Actual slaughter levels were below the June baseline levels through the week ending July 4, 2020. For much of July and early August, slaughter levels were very near the June-20 baseline levels.

Based on the Jun-20 baseline, there were still about 1 million head of backlogged slaughter hogs in the system during the month of June. The model suggests that very few of those backlogged hogs were processed during July and August, but actual market conditions suggest that the heavy weight hog categories may have been estimated too high since it appeared that hog marketings were current by early September.

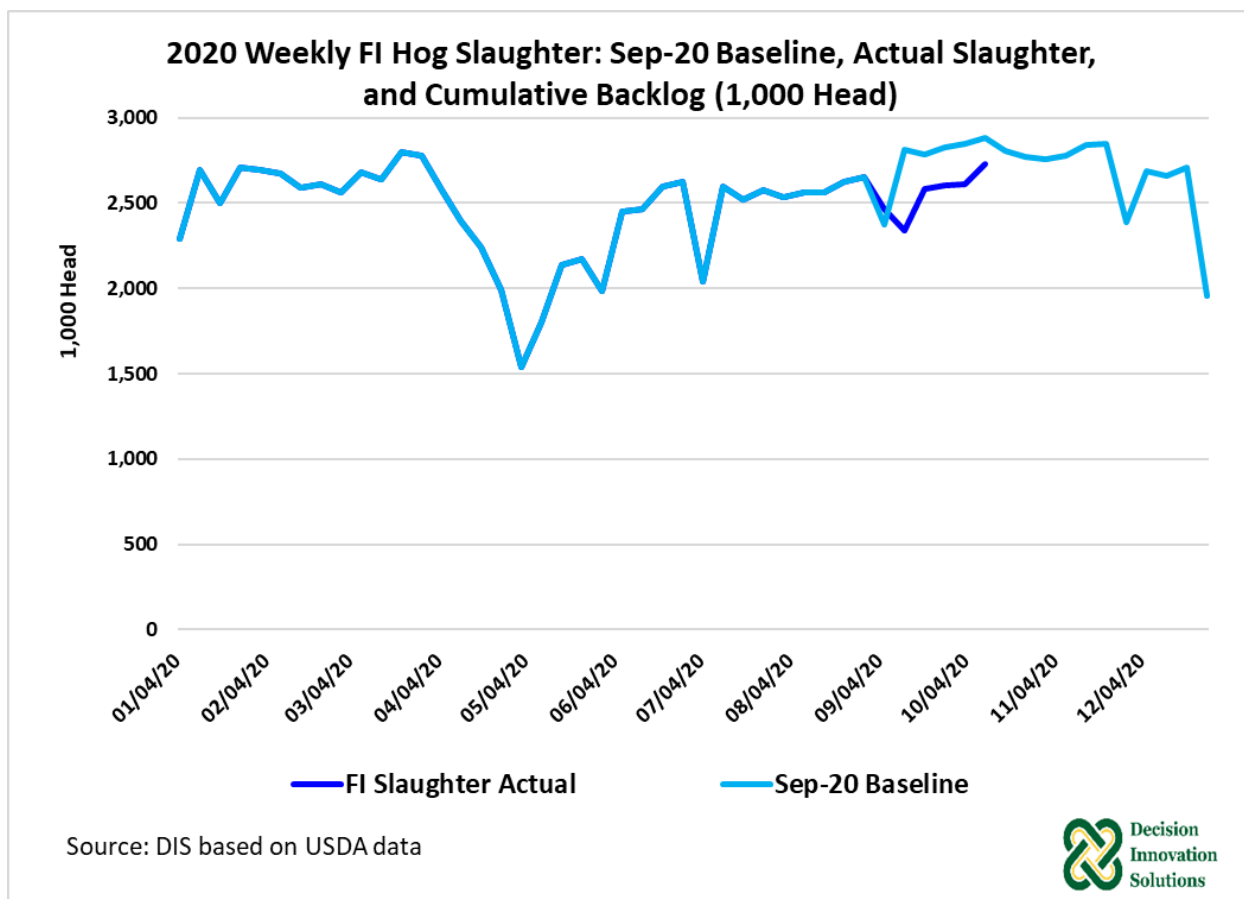


Figure 70. 2020 Weekly FI Hog Slaughter: Sep-20 Baseline, Actual Slaughter and Cumulative Backlog (1,000 Head)

The September Hog & Pigs Report estimated the 180 lbs. and over category of hogs at 109.6% of 2019 levels. The 120-179 lbs. group was estimated to be 105.5% of 2019 levels. Based on these inventory numbers, hog marketings in September were estimated to average 2.6 million head weekly. Actual slaughter numbers have average 2.498 million head weekly, which is 99.2% of 2019 levels. It appears that the heaviest category of hogs was over-estimated by the USDA in the September report and that some of those hogs may actually have been in the 120-179 lbs. category. By mid-October, slaughter numbers were approaching levels implied by the Sep-20 model. Slaughter backlog tracking was not included in the September baseline model as market conditions suggest marketing became current in early September.

4.2.4.2 Hog Weekly Average Live Weight

Figure 71 shows the 2019 and 2020 weights of federally inspected slaughter hogs. As can be seen in the graph, slaughter hog weights rose dramatically during weeks 16-20 and remained at elevated levels compared to 2019 until week 36, which coincides with the week ending Sept. 5, 2020. At the peak of the COVID-19 disruptions of hog marketings, hog weights were 7 lbs. heavier than they were in 2019. While weights exhibited a normal seasonal decline during the summer months, weights were still elevated over year-earlier weights by nearly 5 lbs. per hog throughout the summer. It was not until early September when weights were at year-ago levels, although it appears that was due to a sharp increase

in weights in 2019 as slaughter hog weights in 2020 began their normal seasonal increase in September and continue to run several pounds per hog heavier than year ago levels.

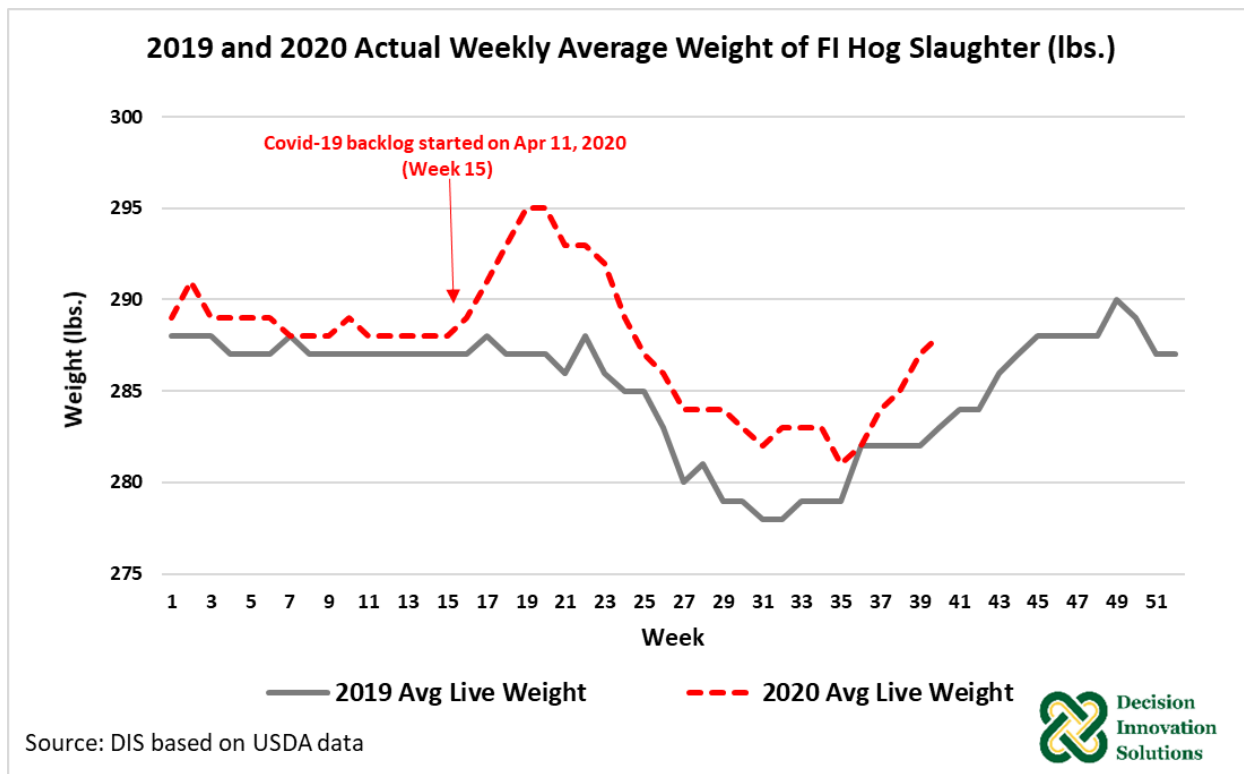


Figure 71. 2019 and 2020 Actual Weekly Average Weight of FI Hog Slaughter (lbs.)

Figure 72 shows expected weekly hog slaughter (based on Dec-19 baseline) and actual weekly hog slaughter. Due to COVID-19, a slaughter backlog was generated starting on April 11, 2020 (week 15) and by May 30, 2020 (week 22 of the calendar year), the accumulated number of unprocessed hogs total 2.103 million head, which resulted in an increase in hog weekly average live weight, as Figure 72 indicates; the average live weight of hogs started to increase around week 16. Hog average weights grew from 288 lbs. in April 11 to 295 lbs. by May 16, 2020. From that point on, hog average weights declined but continued above previous year levels (See Figure 73).

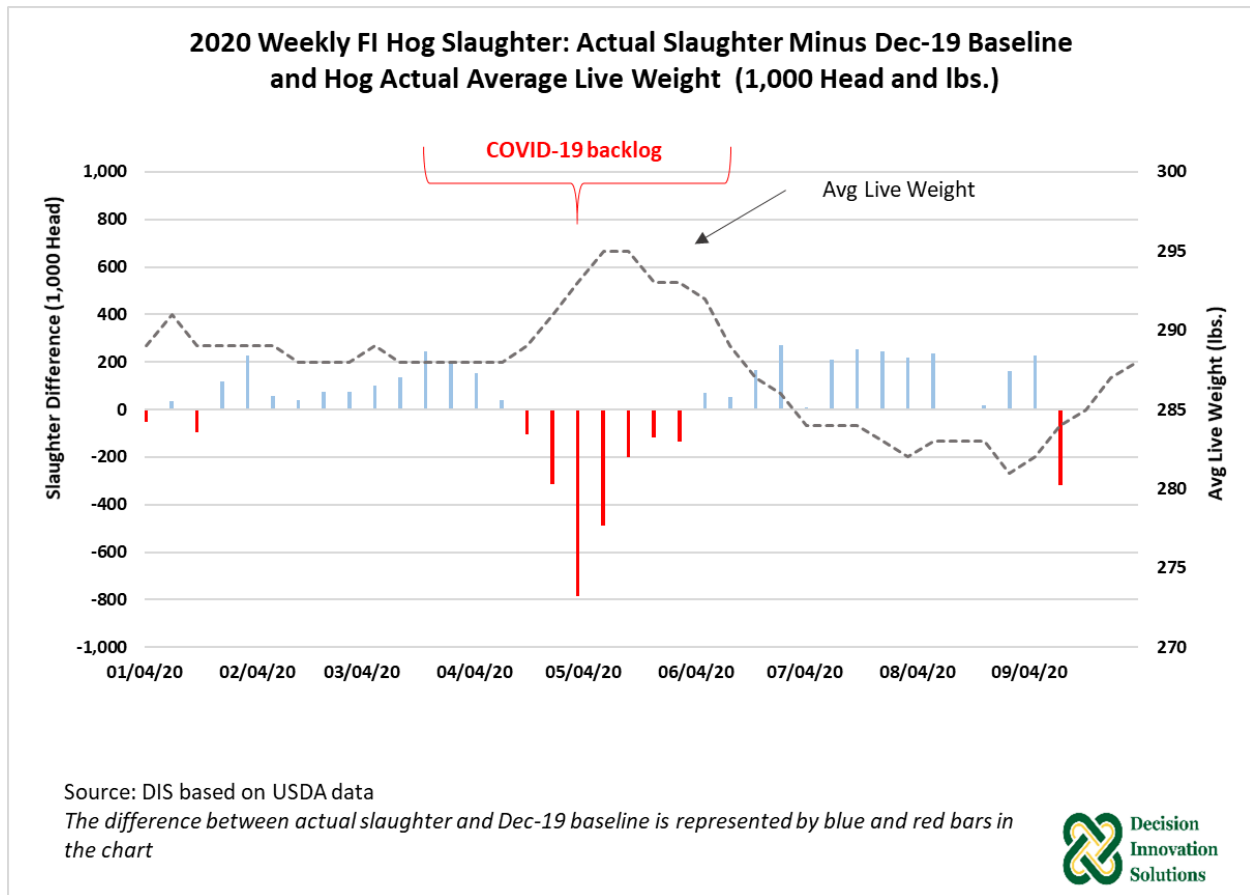


Figure 72. 2020 Weekly FI Hog Slaughter: Dec-19 Actual Minus Baseline Slaughter and Hog Actual Average Live Weight (1,000 Head and lbs.)

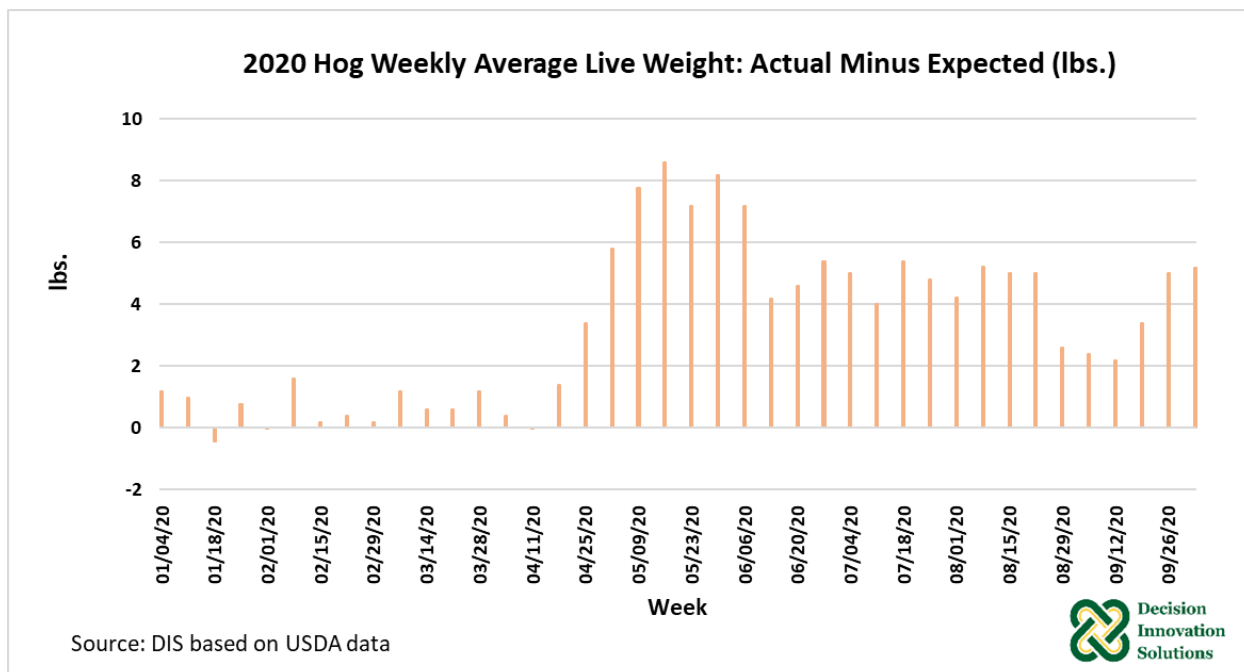


Figure 73. 2020 Hog Weekly Average Live Weight: Actual Minus Expected (lbs.)

4.2.4.3 Value of Hog Slaughter

Expected prices for hog slaughter were estimated for two different slaughter baselines (Outlook and Dec-19). Weekly hog futures prices (multiplied times 0.74 to convert to live weight equivalent) were used to build the database for expected prices, which were applied to estimate the expected value of hog slaughter according to the baselines and the expected average weekly seasonal hog weight. The Chicago Mercantile Exchange (CME) lean hog index was used to build a database for actual hog prices. These prices were multiplied by 0.74 to convert from carcass weight to live weight equivalent and then multiplied times actual hog slaughter and actual hog slaughter weight to estimate the actual value of hog slaughter. Figure 74 and Figure 75 show comparisons of actual hog slaughter value with each of the hog slaughter value according to each of these baselines. The analysis comparing actual value of hog slaughter goes from April 11 to Oct. 10, 2020 in the case of the outlook and Dec-19 baselines. Throughout the analyzed periods, actual hog prices were down 31.9% relative to baseline prices, on average.

Based on the outlook baseline, the cumulative loss of hog slaughter value totaled \$3.7 billion (Figure 74), whereas the Dec-19 baseline indicates an aggregated reduction in value of \$3.5 billion (Figure 75).

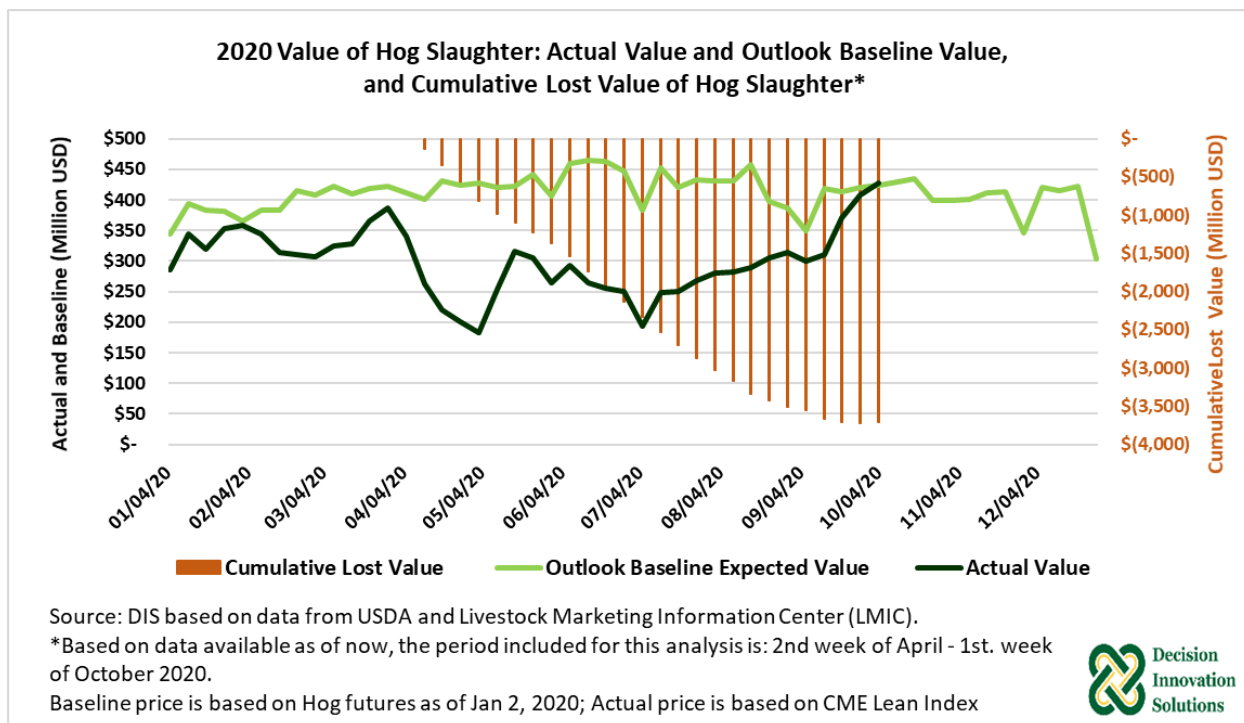


Figure 74. 2020 Value of Hog Slaughter: Actual Value and Outlook Baseline Value, and Cumulative Lost Value of Hog Slaughter

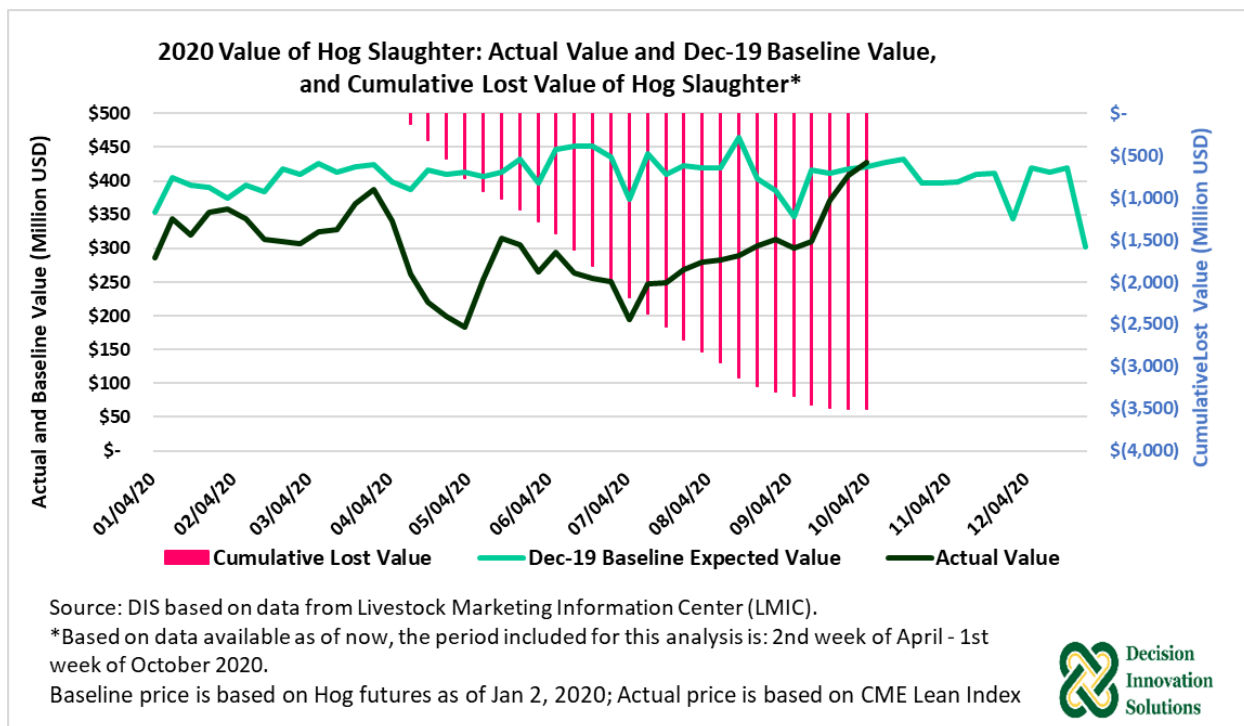


Figure 75. 2020 Value of Hog Slaughter: Actual Value and Dec-19 Baseline Value, and Cumulative Lost Value of Hog Slaughter

4.2.5 Dairy Model: Milk Production

Milk production baseline estimates for 2020 were derived from:

- YOY percent change USDA’s annual outlook of milk cow inventory for the 2020 calendar year applied to 2019 monthly milk cow inventory data; and
- YOY percent change USDA’s annual outlook of milk production per cow for the 2020 calendar year applied to 2019 monthly milk production per cow data.

Note for 2020, the USDA’s annual outlook milk cow inventory growth was estimated at 1.001 relative to 2019²⁷. In the case of milk production per cow, the USDA projected a growth factor equal to 1.014 in 2020 compared with the previous year.

4.2.5.1 Dairy Model Results

Except for January 2020, milk cow inventory actual numbers surpassed baseline estimates. Actual numbers exceeded baseline estimates by 29,000 head from March to August, on average (see Figure 76). This is due to a combination of reduced dairy cow slaughter compared to the baseline (74,700 less dairy cows slaughtered from March through August than projected by the baseline) and some additional retention of heifers once milk prices recovered above baseline expectations in July 2020. Assuming that this level of difference holds for the balance of 2020, the net impact of COVID-19 on dairy cow numbers would be a 0.16% increase in average dairy cow numbers.

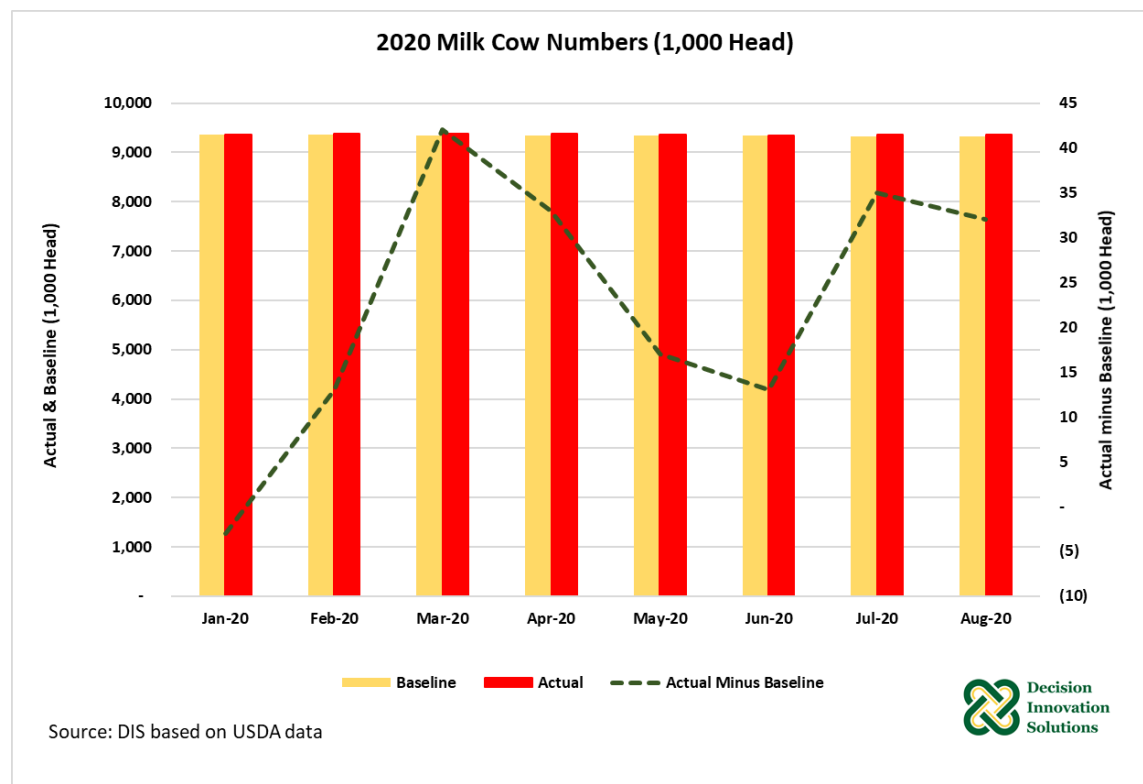


Figure 76. 2020 Milk Cow Numbers (1,000 Head)

²⁷ USDA’s Long-term Agricultural Projections Report (https://www.usda.gov/sites/default/files/documents/USDA_Agricultural_Projections_to_2029.pdf, February 2020).

Actual volume of milk production outpaced baseline volumes by about 3.9% (664 million pounds) and 1.3% (246 million pounds) during February and March 2020, respectively (see Figure 77). The trend reversed for the next three months, with actual production dropping the most in May, down 397 million pounds (2%) compared with the baseline (see Figure 77). From April to August 2020, the total volume of milk production over-estimated by the baseline was equal to 446 million pounds compared with the actual production (see Figure 78).

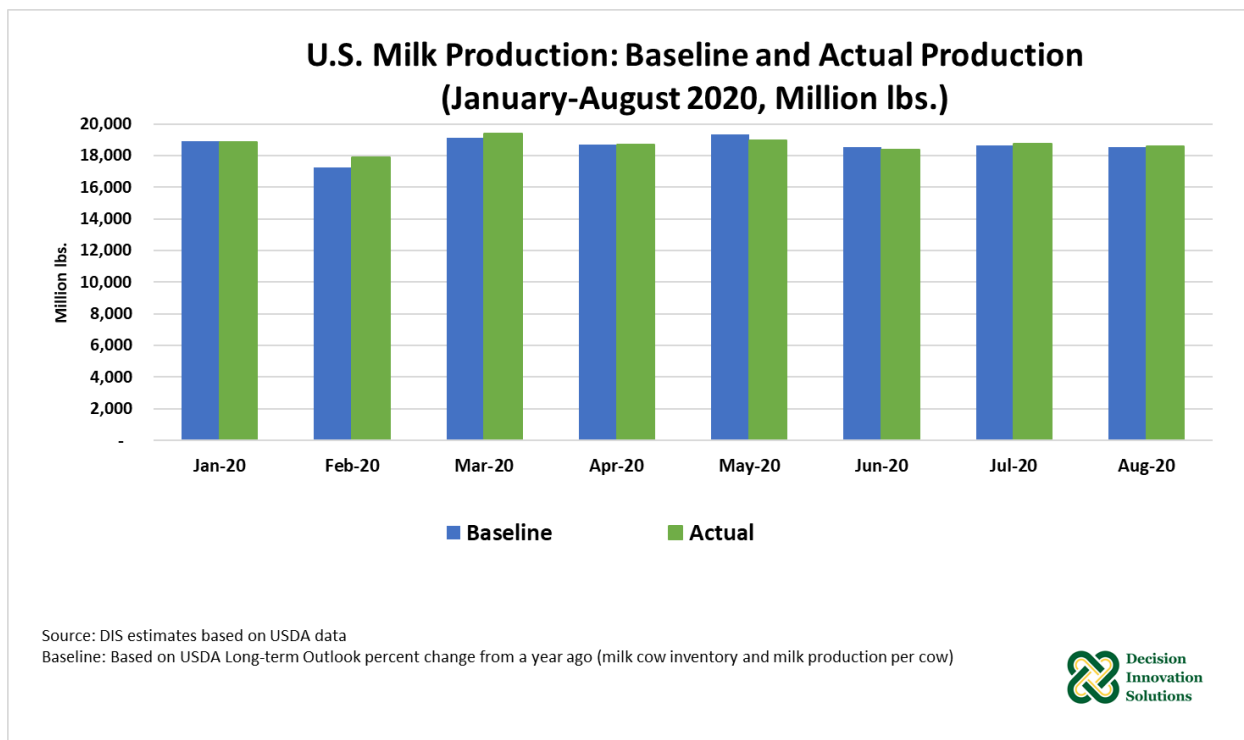


Figure 77. U.S. Milk Production: Baseline and Actual Production (January-August 2020, Million lbs.)

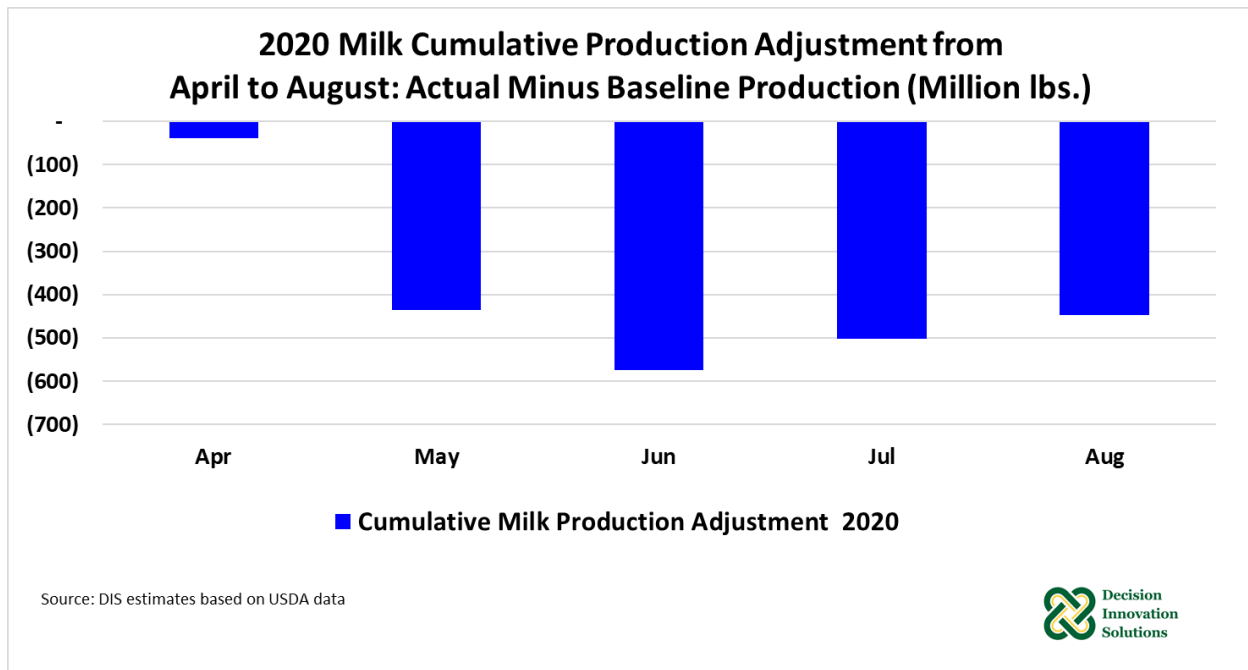


Figure 78. 2020 Milk Cumulative Production Adjustment from April to August: Actual Minus Baseline Production (Million lbs.)

Note that actual milk production was up 1.8% (on average) compared with the previous year's first eight months. As indicated by the USDA²⁸, due to COVID-19 some regions of the country did not process large quantities of milk production in April 2020. The pandemic reduced the demand for dairy products and generated logistical constraints.

Actual wholesale milk prices declined significantly in April from the previous month. The all-milk price dropped 20% to \$14.40 per hundredweight (cwt), a reduction of \$3.60 from March 2020 (\$18.0/cwt). The USDA data indicates that second quarter all-milk prices fell from \$19.30/cwt, the USDA's January 2020 projection, to \$15.37/cwt, on average (Figure 79). The USDA's September forecast indicated a 2% increase in the price of all-milk during the third quarter of the year relative to the January's forecast.

²⁸ USDA-ERS, [June 2020](#).

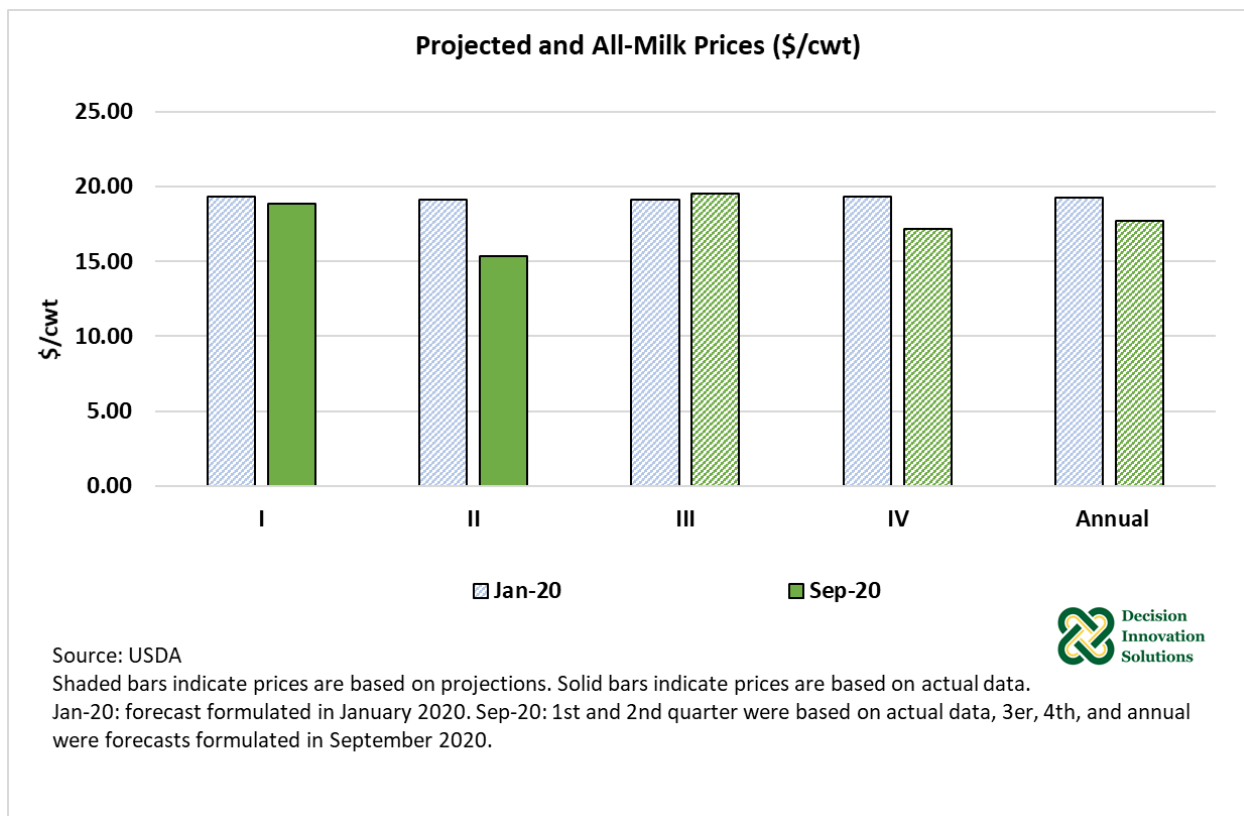


Figure 79. Projected and Actual Milk Prices (\$/cwt)

Baseline monthly prices were estimated based on YOY percent change in the USDA's quarterly all-milk price projections formulated in January 2020²⁹. To estimate 2020 monthly price data, the quarterly percent changes were applied to previous year all-milk price data, accordingly. Actual milk prices experienced large volatility from January to August 2020. From \$19.60/cwt in January to \$13.60/cwt in May and then recovered to \$20.50/cwt in July. Compared with baseline prices, actual prices deteriorated the most during the months of April and May, with actual prices falling 26.5% (on average) from expected prices (see Figure 80).

²⁹ USDA-ERS, [January 2020](#).

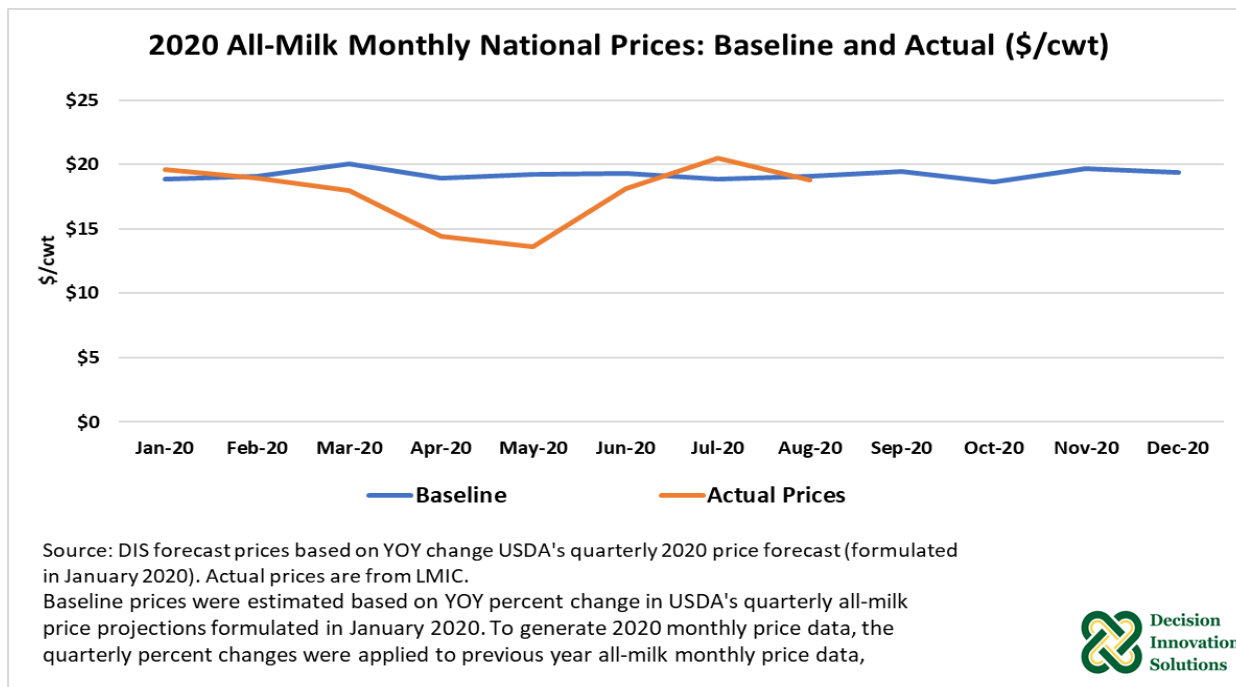


Figure 80. 2020 All-Milk Monthly National Prices: Baseline and Actual (\$/cwt)

The baseline value of all-milk production in Figure 80 (baseline price times baseline production) shows the contrast with actual value (the actual price times actual production). It also shows that the actual value was down relative to the baseline estimates from March to June 2020 and then again in August 2020, with the largest difference occurring in May 2020. That month, the actual value of production fell by \$1.14 billion relative to the expected value estimated by the baseline. The cumulative value of net actual value of all-milk production below the baseline estimate was about \$2.09 billion during the first eight months of the year (see Figure 81).

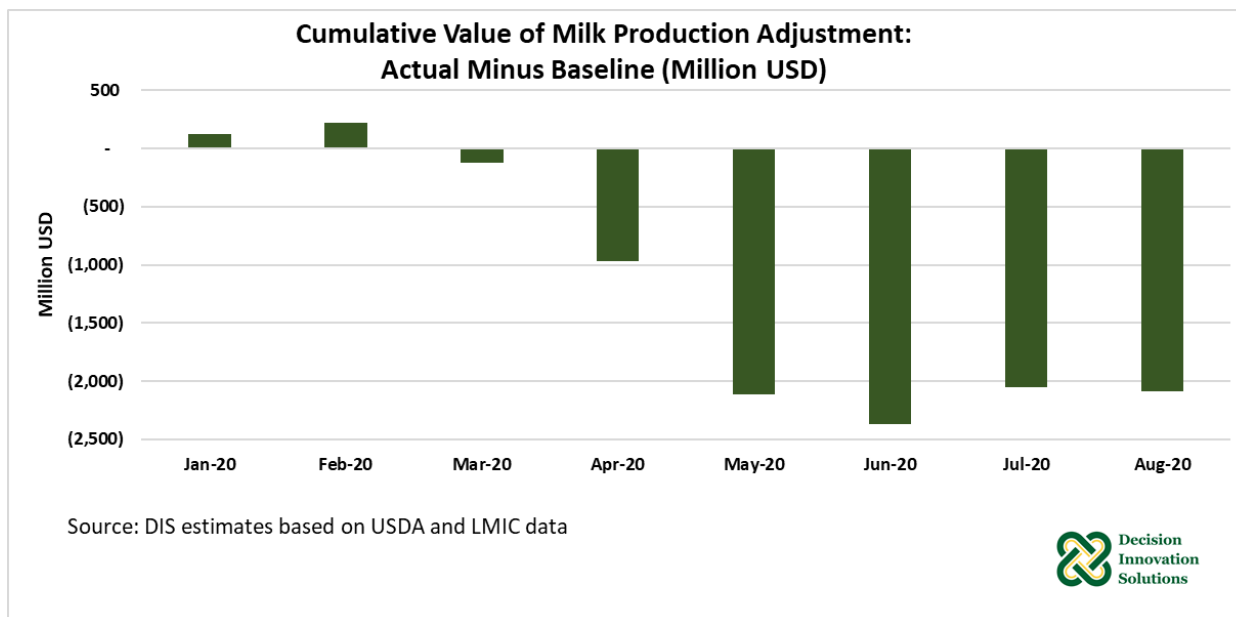


Figure 81. Cumulative Value of Milk Production Adjustment: Actual Minus Baseline (Million USD)

4.2.6 Federally Inspected Cattle Slaughter Model

In the federally inspected (FI) Cattle Slaughter Model, the impact of COVID-19 on the number of cattle slaughtered is based on the difference between an estimated baseline for FI cattle slaughtered and actual FI cattle slaughtered as reported by the USDA.

The baseline for the FI cattle slaughter model encompasses the following components:

Baseline FI Cattle Slaughter

- 2020 steer slaughter + 2020 heifer slaughter + 2020 beef cow slaughter + 2020 bull slaughter + 2020 dairy cow slaughter.

2020 steer slaughter is the average of two models:

- 2020 steer slaughter baseline (2) Jan. 1, 2020, based on YOY percent change cattle on feed (COF) U.S. total inventory [back one month as COF comes out near the later part of the month], and
- 2020 steer slaughter baseline (3) Jan. 1, 2020, based on YOY percent change COF 7-State inventory [back one month as COF comes out near the later part of the month].

2020 heifer slaughter consists of the average of two models:

- 2020 Heifer slaughter baseline (H2) based on COF total inventory [YOY percent change offset back 1 month as COF comes out near the later part of the month], and
- 2020 Heifer slaughter baseline (H3) based on COF 7 states inventory [YOY percent change offset back 1 month as COF comes out near the later part of the month].

2020 beef cow slaughter consists of:

- 2020 baseline Beef Cow slaughter (BC1) based on YOY percent change in beef cows

2020 bull slaughter consists of:

- 2020 baseline Bull (B) slaughter (B1) based on YOY percent change in bulls, and

2020 dairy cow slaughter comprises:

- Baseline Dairy Cow (DC) slaughter (DC1) based on YOY percent change in dairy cows.

4.2.6.1 Federally Inspected Cattle Model Results

Due to COVID-19, U.S. beef packers experienced several disruptions. First, in early April, there were processing slowdowns due to employee absenteeism. Then, in response to more widespread outbreaks of COVID-19, processing plants adopted new health protocols starting in April 2020, which affected line speeds and tended to slow the daily rate at which a plant could process cattle.

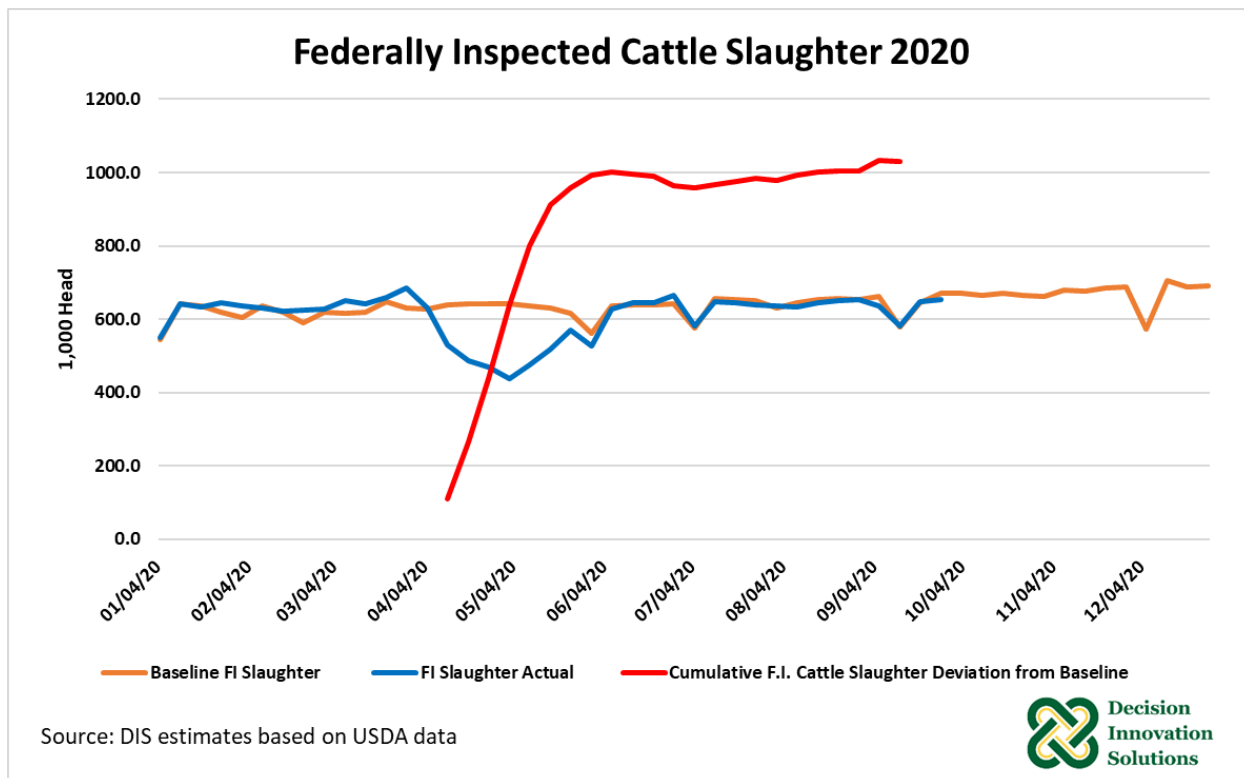


Figure 82. Federally Inspected Cattle Slaughter 2020

Compared with the baseline estimates in Figure 82, there were, on average, 124,100 fewer animals processed weekly during the months of April and May 2020 compared to the baseline. The largest difference between the baseline estimates and actual slaughter occurred at the end of April/beginning of May (week ending May 2, 2020) when the number of cattle slaughtered was down by 202,800 head relative to the baseline. From April to May, the cumulative slaughter deviation from baseline was 992,500 head. Since the beginning of June, weekly cattle slaughter has continued to run slightly less than projected by the baseline (about 5,100 head per week less) which is about 0.8% less than the baseline.

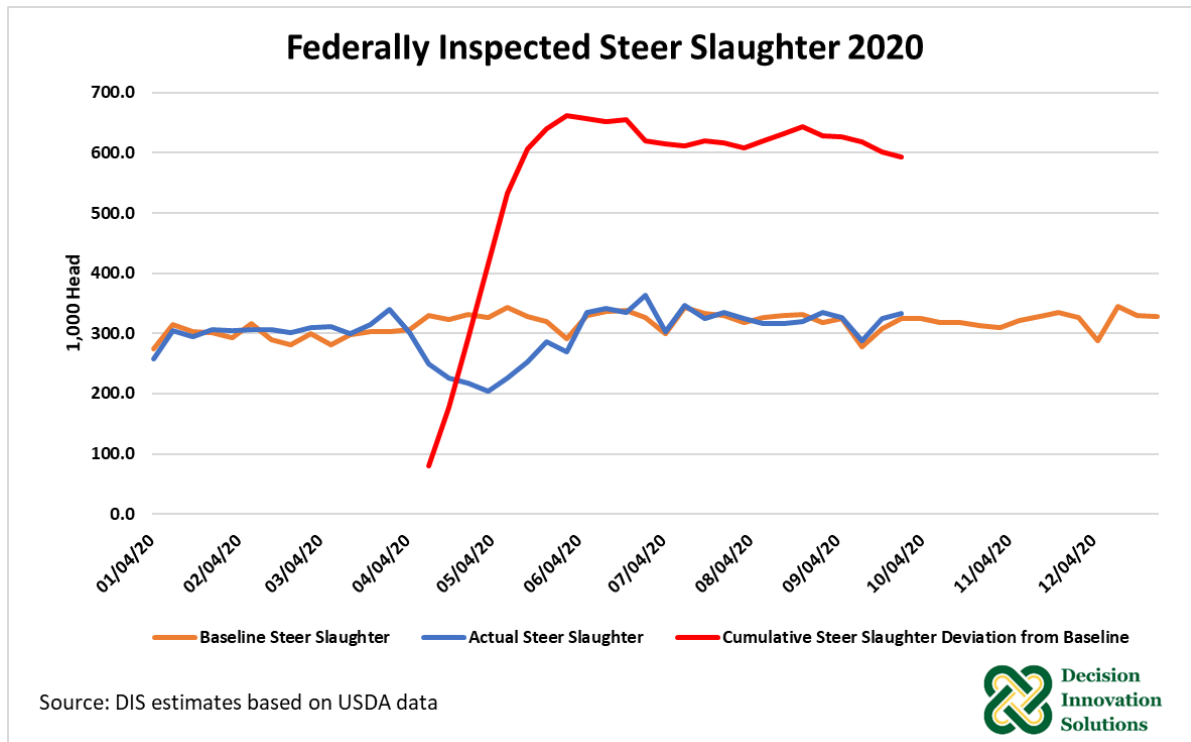


Figure 83. Federally Inspected Steer Slaughter 2020

As shown in Figure 83, slaughter was delayed for nearly 600,000 steers during April and May 2020. Since mid-June, steer slaughter has tracked near the pre-COVID-19 baseline.

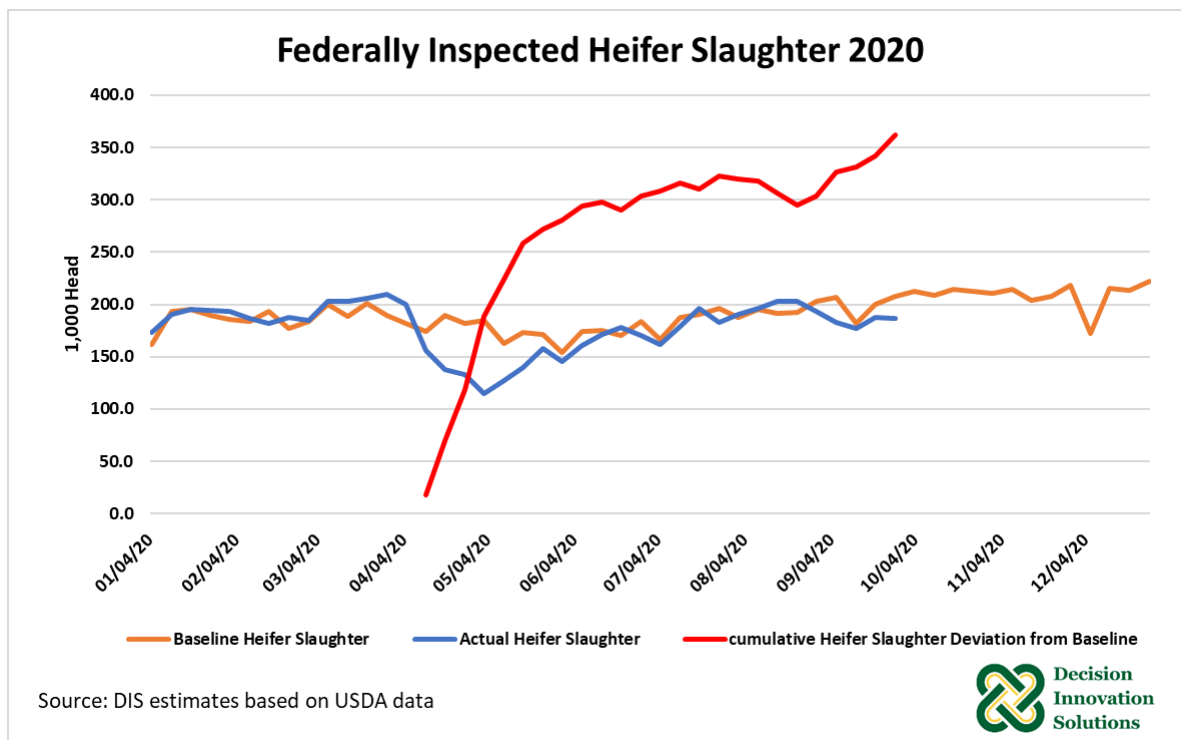


Figure 84. Federally Inspected Heifer Slaughter 2020

As shown in Figure 84, roughly 300,000 heifers in feedlots experienced a delay in slaughter during the months of April, May and June. Heifer slaughter since June has tracked with pre-COVID-19 baseline expectations until early September when heifer slaughter began to deviate from the baseline again. If the drop in heifer slaughter compared to baseline continues for the rest of the year, it would indicate that some heifer retention for inclusion in the breeding herd could be occurring.

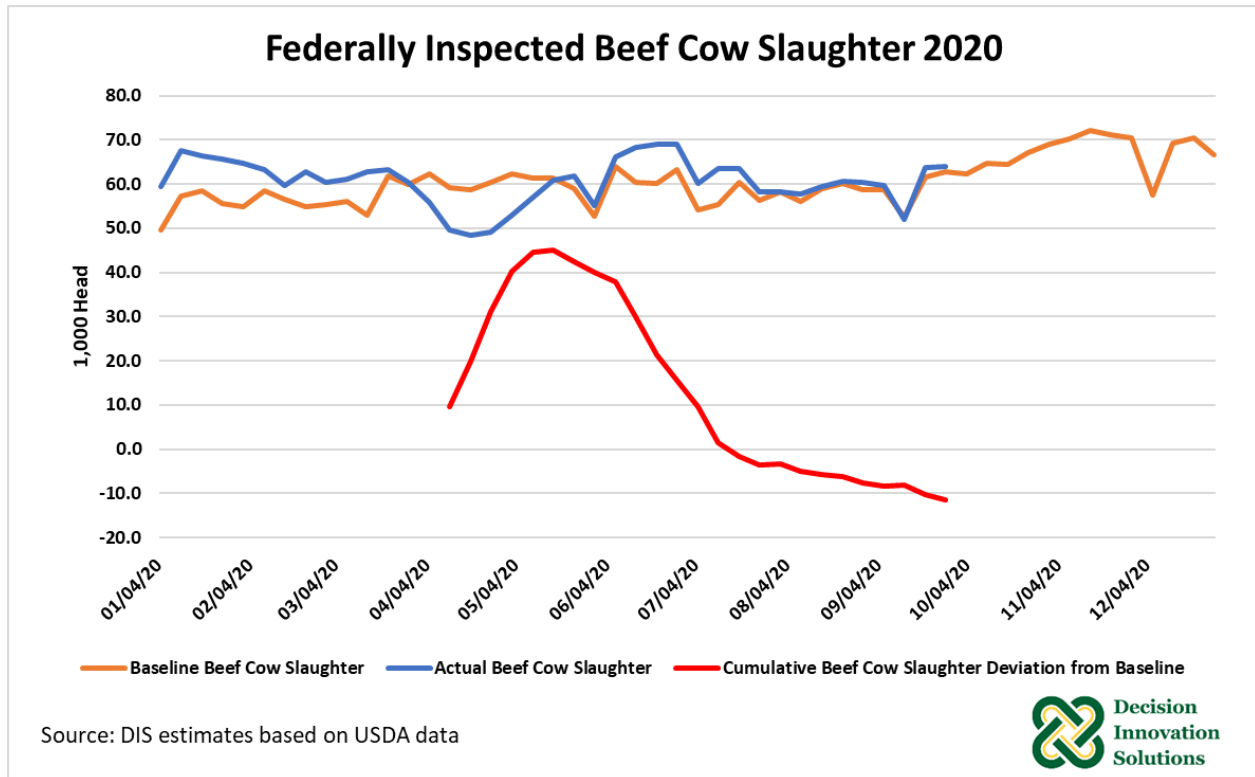


Figure 85. Federally Inspected Beef Cow Slaughter 2020

As shown in Figure 85, about 45,000 beef cows were backlogged in slaughter queues during the months of April, May, and June. Beginning in early June, beef cow slaughter began to work through the backlog and by early August, all the beef cow slaughter backlog was processed. The data appears to imply that some slight liquidation is occurring in the beef cow herd as approximately 10,000 more beef cows have been slaughtered since July than the baseline projected.

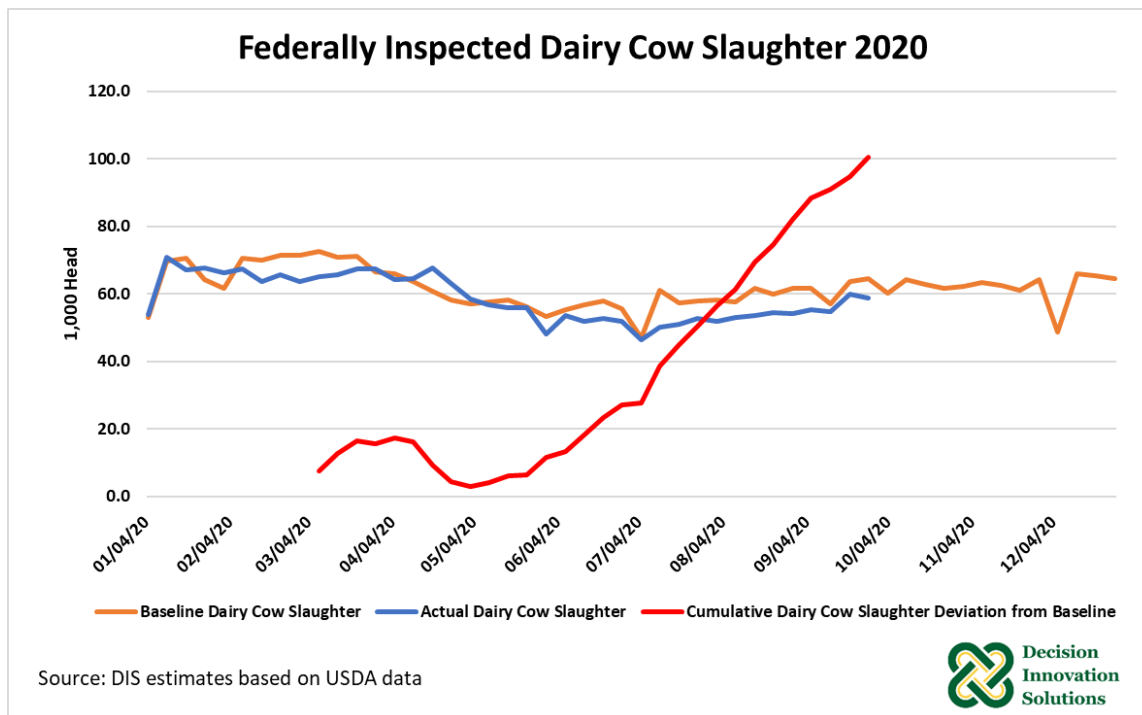


Figure 86. Federally Inspected Dairy Cow Slaughter 2020

Dairy cow slaughter as shown in Figure 86 was slightly above the baseline in April and early May, but since early June, dairy cow slaughter has been significantly below pre-COVID-19 baseline projections. This suggests that some level of herd building is now happening in the milking herd.

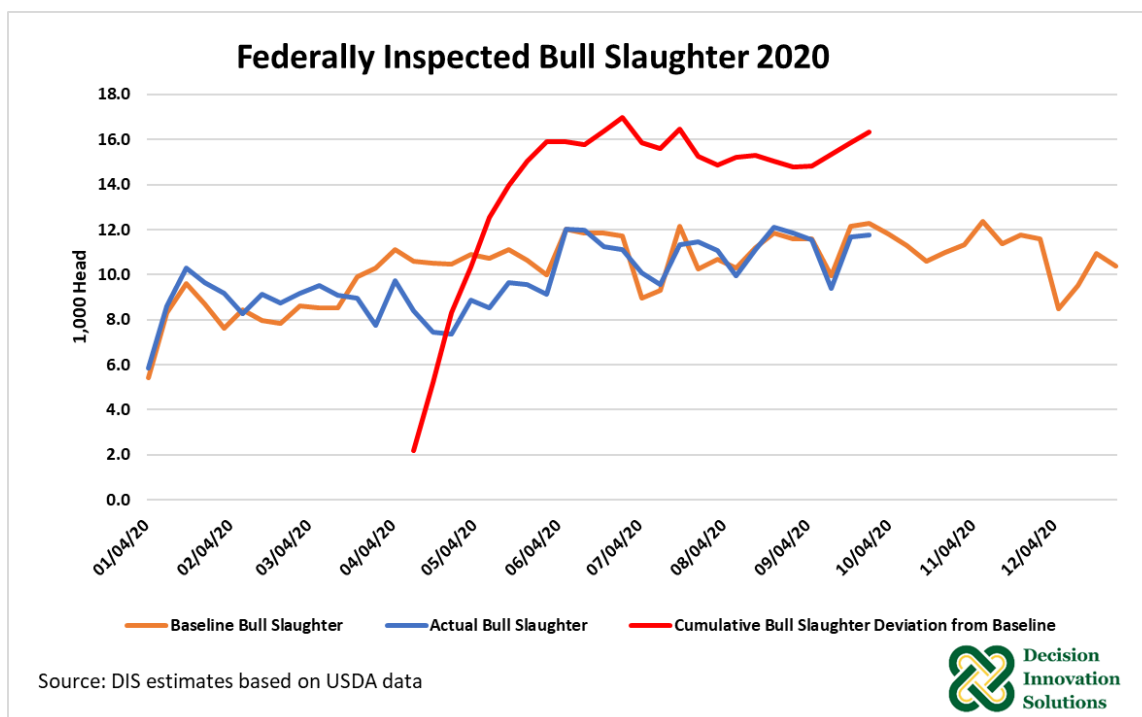


Figure 87. Federally Inspected Bull Slaughter 2020

As shown in Figure 87 federally inspected bull slaughter significantly declined below baseline levels during April and May. Since early June, bull slaughter has been slightly above baseline but there appears to be approximately 15,000 to 16,000 bulls that have been delayed in slaughter.

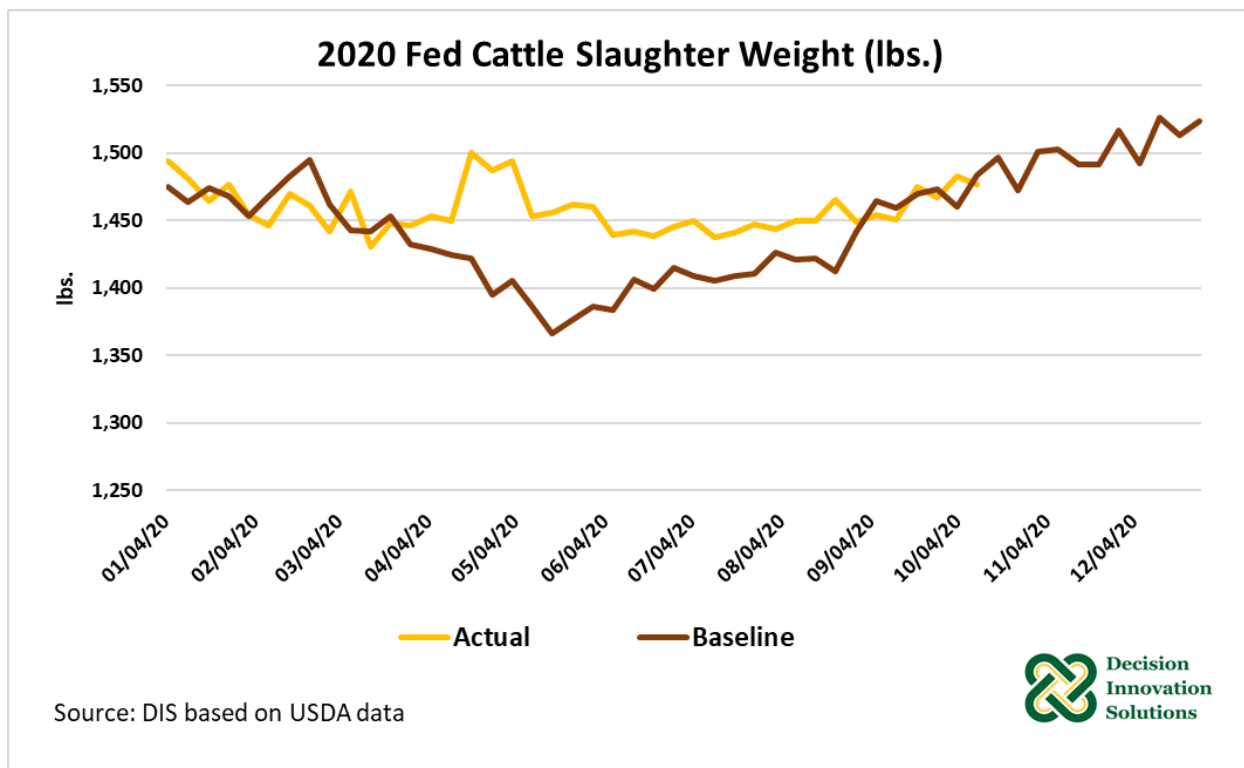


Figure 88. 2020 Fed Cattle Slaughter Weights (lbs.)

Fed cattle slaughter weights (Figure 88) rose dramatically as slaughter plant operations were disrupted by COVID-19. Prior to COVID-19, fed cattle weights were on either side of baseline, but once slaughter delays began, fed cattle weights shot up to as much as 92 lbs. over the baseline by April 25. Heavier than normal weights continued from May through August. By September 2020, fed cattle weights were back to baseline levels.

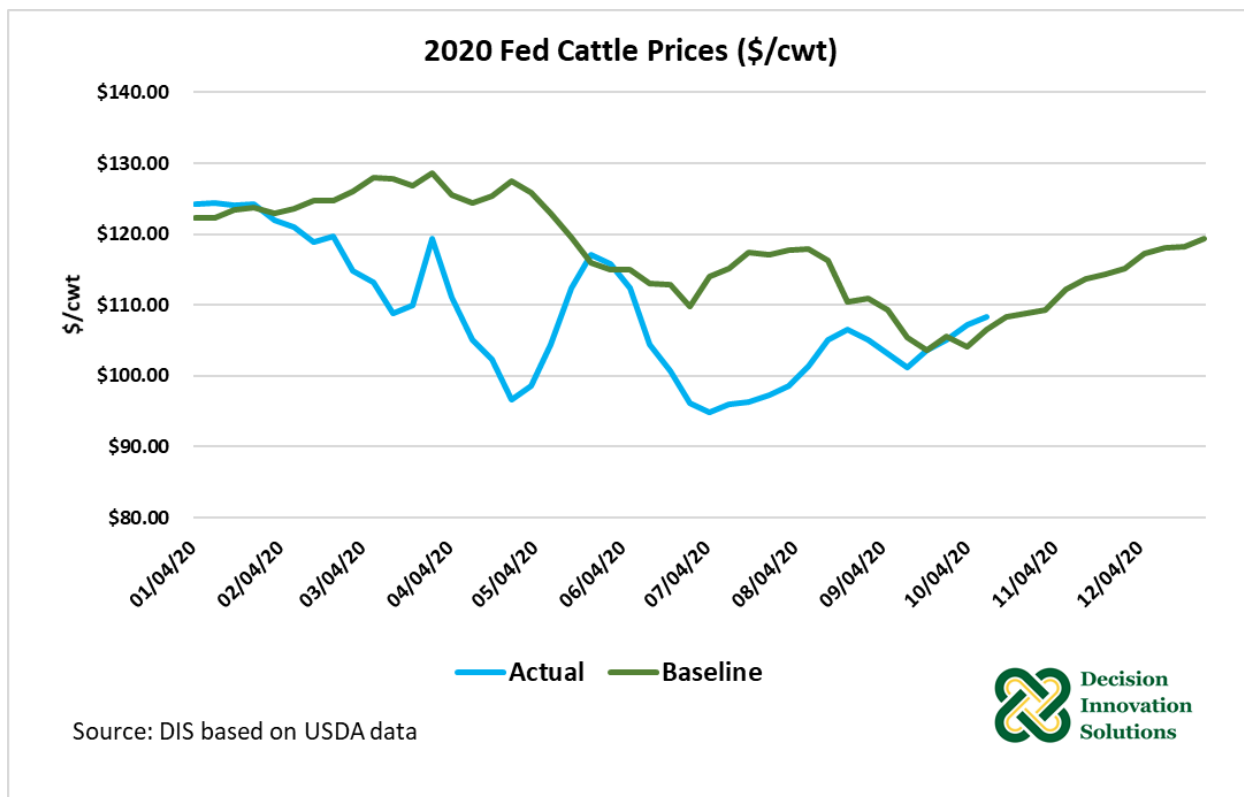


Figure 89. 2020 Fed Cattle Prices (\$/cwt)

Fed cattle prices in 2020 (Figure 89) began moving below the baseline in early February. Prices declined sharply after the disruptions in slaughter facilities began, dropping to 24% below the baseline prices by April 25. From April 11, 2020, through the end of August, fed cattle prices averaged 88% of expected baseline price. By early October, fed cattle prices were trading above expected baseline levels and trending higher.

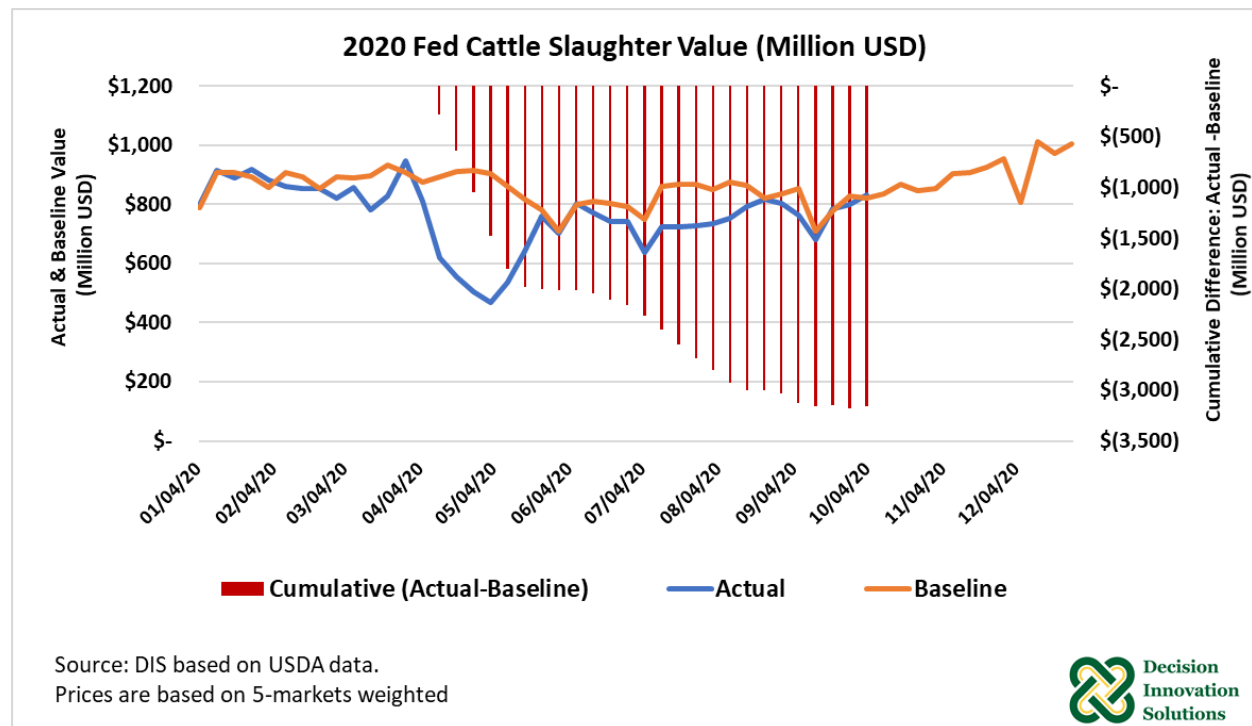


Figure 90. 2020 Fed Cattle Slaughter Value (Million USD)

As shown in Figure 90, the value of fed cattle slaughter was significantly negatively affected by COVID-19. Fed cattle slaughter numbers dropped, prices dropped and weights went up. With slaughter facilities experiencing operational disruptions the impacts on fed cattle slaughter values was immediate.

Compared to baseline expectations, by the week ending April 25, 2020, the value of fed cattle slaughter had declined such that it was \$435 million less than baseline, a decline of 48%. By early June, revenues for fed cattle slaughter had returned to baseline levels, but quickly dropped again during July and August. By October, fed cattle slaughter values had returned to baseline levels.

The cumulative decline of fed cattle slaughter values compared to the baseline is a reduction of \$3.2 billion for the April through September 2020 period.

4.2.7 Summary of Slaughter Loss Impacts

Production and marketing channel disruptions began distorting and generally depressing U.S. livestock markets in March when many schools and other institutions closed. Processing facilities began experiencing labor and operational disruptions in late March with conditions worsening in many instances into late April and early May. Table 4 is a summary of the COVID-19 impacts by month of the modeled impacts due to slaughter and/or production disruptions and changes in production that occurred in response to COVID-19. Estimates for October to December are based on estimates of what actual slaughter and production levels will be for those months. The calculated impacts reflect the differences in value from actual slaughter or production values and the baseline values that were expected to exist in the absence of COVID-19. The total projected direct losses from baseline expectations for the U.S. livestock sector are \$15.9 billion.

Table 4. Summary of COVID-19 Impacts on U.S. Livestock

Summary of COVID-19 Impacts on U.S. Livestock							
Million USD							
	Fed Cattle	Milk	Hogs	Broilers	Turkey	Eggs	6 Commodity Total
Jan							
Feb							
Mar	\$ (211.4)	\$ (341.5)	\$ (275.2)	\$ 1.9	\$ 69.9	\$ 807.8	\$ 51.6
Apr	\$ (1,108.3)	\$ (848.7)	\$ (591.6)	\$ (1,727.3)	\$ 30.4	\$ 595.2	\$ (3,650.2)
May	\$ (966.6)	\$ (1,142.4)	\$ (741.4)	\$ (1,464.1)	\$ 53.7	\$ 170.9	\$ (4,089.8)
Jun	\$ (146.4)	\$ (253.0)	\$ (721.0)	\$ (881.3)	\$ 55.8	\$ (41.9)	\$ (1,987.8)
Jul	\$ (532.9)	\$ 317.8	\$ (685.7)	\$ (1,074.7)	\$ 124.1	\$ 65.4	\$ (1,786.0)
Aug	\$ (346.4)	\$ (41.4)	\$ (620.6)	\$ (1,168.9)	\$ 106.5	\$ (181.7)	\$ (2,252.4)
Sep	\$ (139.2)	\$ (39.7)	\$ (202.6)	\$ (780.4)	\$ 66.3	\$ (25.2)	\$ (1,120.8)
Oct	\$ 63.9	\$ (41.4)	\$ 67.5	\$ (624.5)	\$ 56.2	\$ (34.2)	\$ (512.5)
Nov	\$ 57.9	\$ (39.4)	\$ 64.9	\$ (385.0)	\$ 27.2	\$ (13.9)	\$ (288.3)
Dec	\$ 57.3	\$ (41.5)	\$ 60.3	\$ (363.6)	\$ 27.1	\$ (22.5)	\$ (282.8)
2020	\$ (3,272.2)	\$ (2,471.1)	\$ (3,645.3)	\$ (8,467.6)	\$ 617.1	\$ 1,319.9	\$ (15,919.1)

Source: DIS estimates based on USDA data.



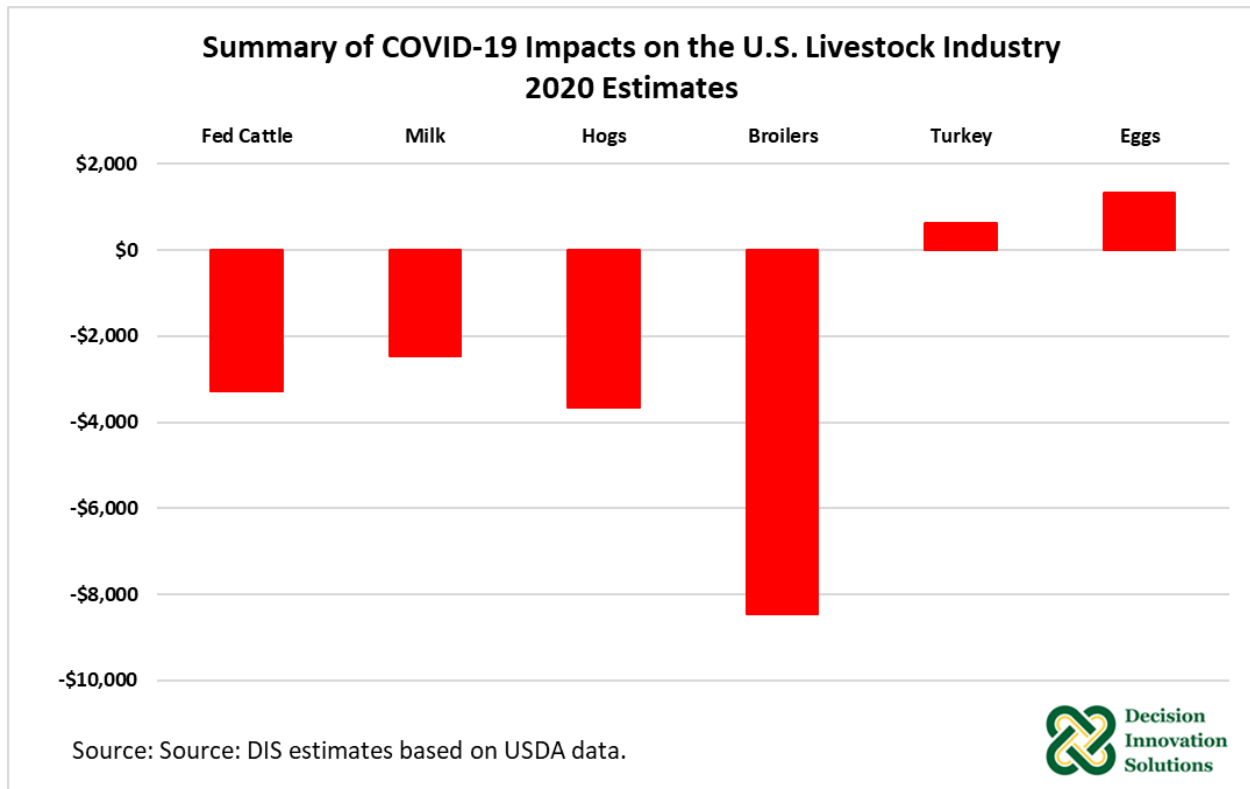


Figure 91. Summary of COVID-19 Impacts on U.S. Livestock Industry, 2020 Estimates (Million USD)

Figure 91 summarizes the 2020 annual impacts by production sector for the major commodities of the U.S. livestock industry. The broiler industry is expected to see revenues from production to be more than \$8 billion less than was expected prior to COVID-19. Hog slaughter values are expected to be \$3.6 billion less than the baseline value. Fed cattle marketings in 2020 are expected to be \$3.2 billion less than the baseline, milk revenues \$2.3 billion less than the baseline, while turkey revenues and egg revenues are expected to be \$617 million and \$1.3 billion above baseline expectations, respectively.

4.3 Impacts on Feed Consumption from COVID-19 Pandemic Disruptions

As mentioned in the previous section, the pandemic has had an impact on the livestock and poultry industries in many ways, such as through production, slaughter and market values, etc. Consequently, it affects feed consumption from livestock and poultry. Some major factors and reasons for the influence on feed consumption could be: 1) backlogs from slaughter due to COVID-19 processing facility shutdowns, causing more animals to need to be fed longer and/or euthanized, and 2) the pandemic's impact on animal inventory numbers, such as through the reduced farrowing of hogs.

For this section, six major species were considered: broilers, layers, turkeys, hogs and sows, dairy cows, and beef cattle (which includes beef cows and bulls and cattle on feed). Feed consumption under a 2020 baseline and feed consumption with the COVID-19 pandemic's impact broken out by ingredient and overall COVID-19 impact (alternative scenario) were estimated. Table 5 shows these impacts in descending order of quantity. As shown in Table 5 (without harvested forages), the baseline consumption would have been 252.6 million tons; estimated consumption with COVID-19 is 248.4 million tons. The difference in feed consumption between both scenarios is approximately 4.2 million tons *less* feed consumption compared with the baseline, or a decline of 1.7%. The remaining subsections provide additional details for each of the six species studied.

Table 5. COVID-19 Pandemic's Impact on Feed Consumption

Species	2020 Baseline Feed Consumption (Million Tons)	With Overall COVID-19 Pandemic Impact on Feed Consumption (Million Tons)
Hogs and Sows	65.8	66.0
Broilers	62.4	59.8
Beef Cattle	55.3	54.3
Dairy Cows	38.7	38.8
Layers	18.9	18.3
Turkeys	11.4	11.1
Total	252.6	248.4

To be consistent, ingredient aggregation for a given species is similar as feed consumption results for 2019 in 4.1 section. For more details about ingredient aggregation, see Appendix A.

4.3.1 Broilers

The USDA's long-term outlook projected broiler production to be up 1.6% in 2020 compared to 2019. For the first 14 weeks of 2020, actual broiler slaughter was up an average of 3.4% from the baseline. During the period of weeks ending April 11 through the end of June, average weekly slaughter was down 5.3% from baseline projections.

For the period of weeks ending April 11 through Oct. 10, cumulative broiler slaughter numbers were down 228 million head compared to baseline expectations. The broiler industry reduced chick sets compared to baseline levels, resulting in slaughter since July 2020 averaging 4.5% below baseline levels.

If this reduced broiler production level continues for the balance of the year, a total of 313.4 million fewer broilers will be produced in 2020 than were expected prior to COVID-19.

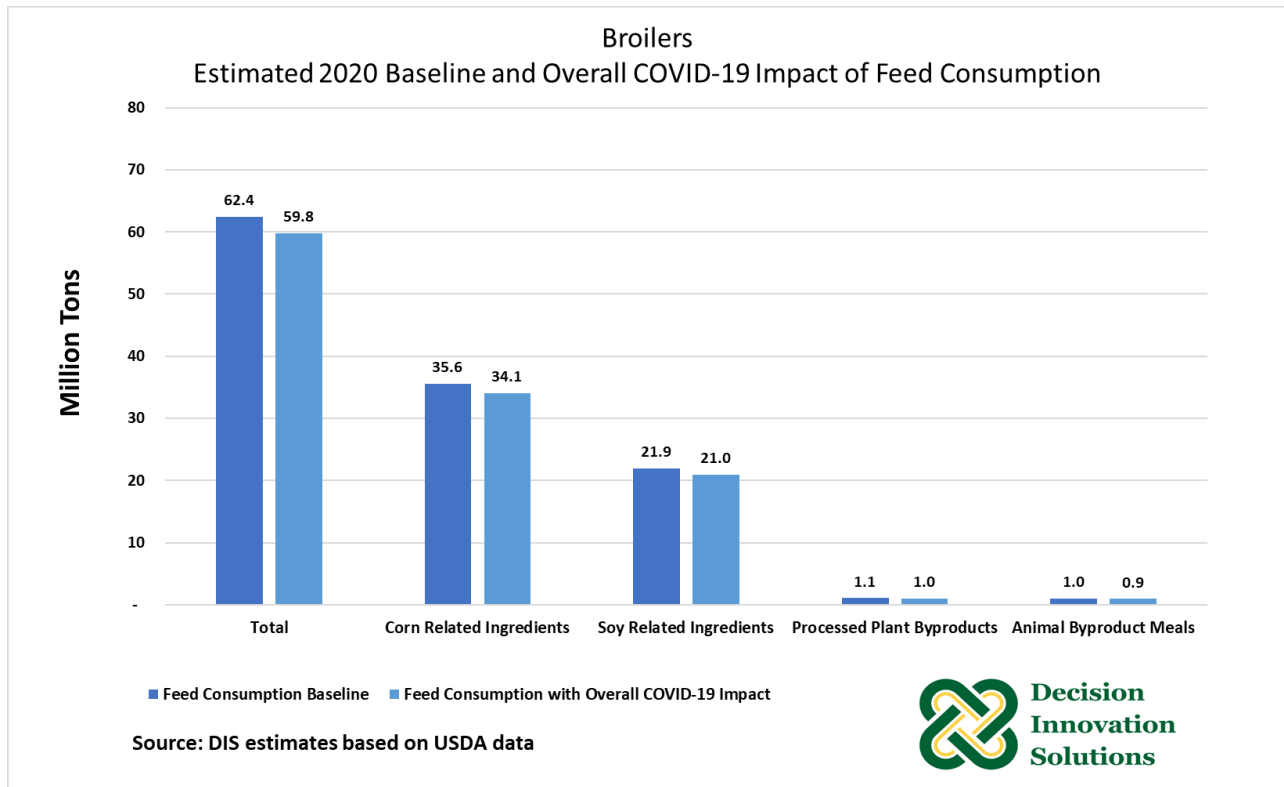


Figure 92. Estimated 2020 Baseline and Overall COVID-19 Impact on Feed Consumption for Broilers

Figure 92 shows the estimated 2020 baseline feed consumption and estimated with COVID-19 impact feed consumption for broilers. High-level impacts include:

- Estimated total feed consumption of baseline and of overall COVID-19 pandemic's impact are 62.4 million tons and 59.8 million tons, respectively. Primary components of this impact are:
 - Estimated total *corn-related ingredient consumption* of baseline and of the overall COVID-19 pandemic's impact are 35.6 million tons and 34.1 million tons, respectively.
 - Estimated total *soy-related ingredient consumption* of baseline and of the overall COVID-19 pandemic's impact are 21.9 million tons and 21.0 million tons, respectively.
 - Estimated total *processed plant byproducts consumption* of baseline and of the overall COVID-19 pandemic's impact are 1.1 million tons and 1.0 million tons, respectively.
 - Estimated total *animal byproduct meal consumption* of baseline and of the overall COVID-19 pandemic's impact are 1.0 million tons and 0.9 million tons, respectively.

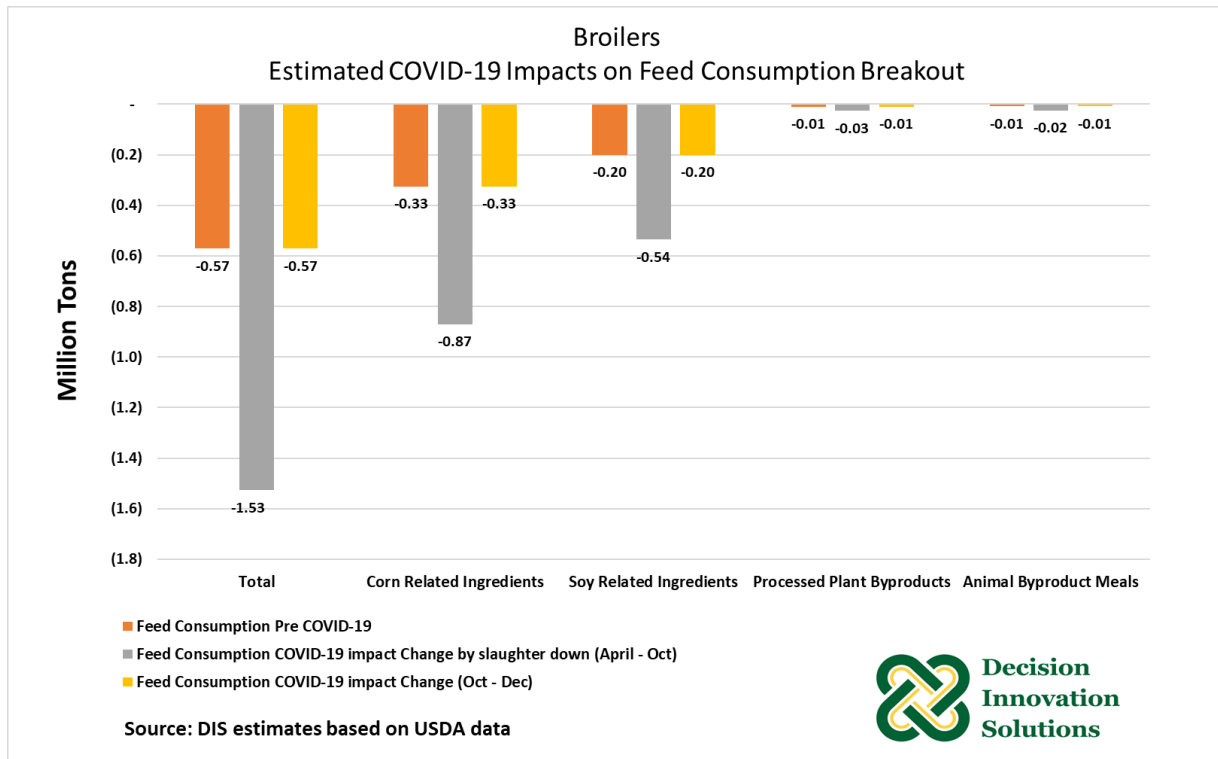


Figure 93. Estimated COVID-19 Impact Breakout of Feed Consumption for Broilers

Figure 93 demonstrates the COVID-19 pandemic’s impact on feed consumption, broken out by ingredient, for broilers based on three periods mentioned at the beginning of this section. For the full table of ingredient quantities of 2020 baseline, along with the COVID-19 impact on feed consumption, see Appendix B.

4.3.2 Layers

The baseline expectation for layers in 2020 was for an increase in layer numbers of 0.8%. Due to losses and pressure on profits, the egg industry had already begun reducing layer numbers in early 2020 from the baseline expectations. By February, there were 10 million fewer layers in the flock than projected by the baseline. In response to marketing chain disruptions, further reductions in the layer flock were seen in March, April and May. By August, the layer flock consisted of 6.6 million fewer layers in response to COVID-19 impacts (see Figure 94). For the year, layer feed consumption in 2020 is projected to be 3.63% lower than the baseline projection with 43% of that reduction (-1.57% of 2020 baseline) due to the COVID-19 pandemic’s impacts.

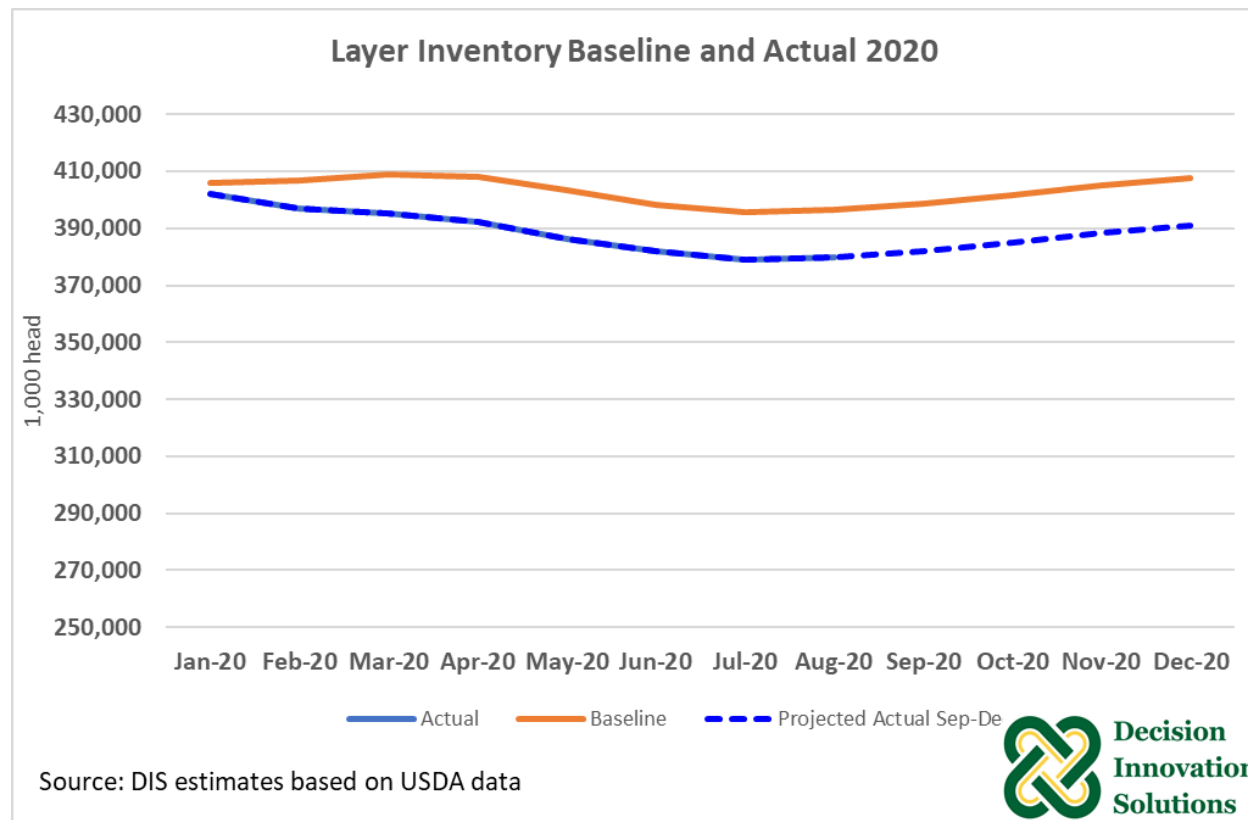


Figure 94. Layer Inventory Baseline and Actual 2020

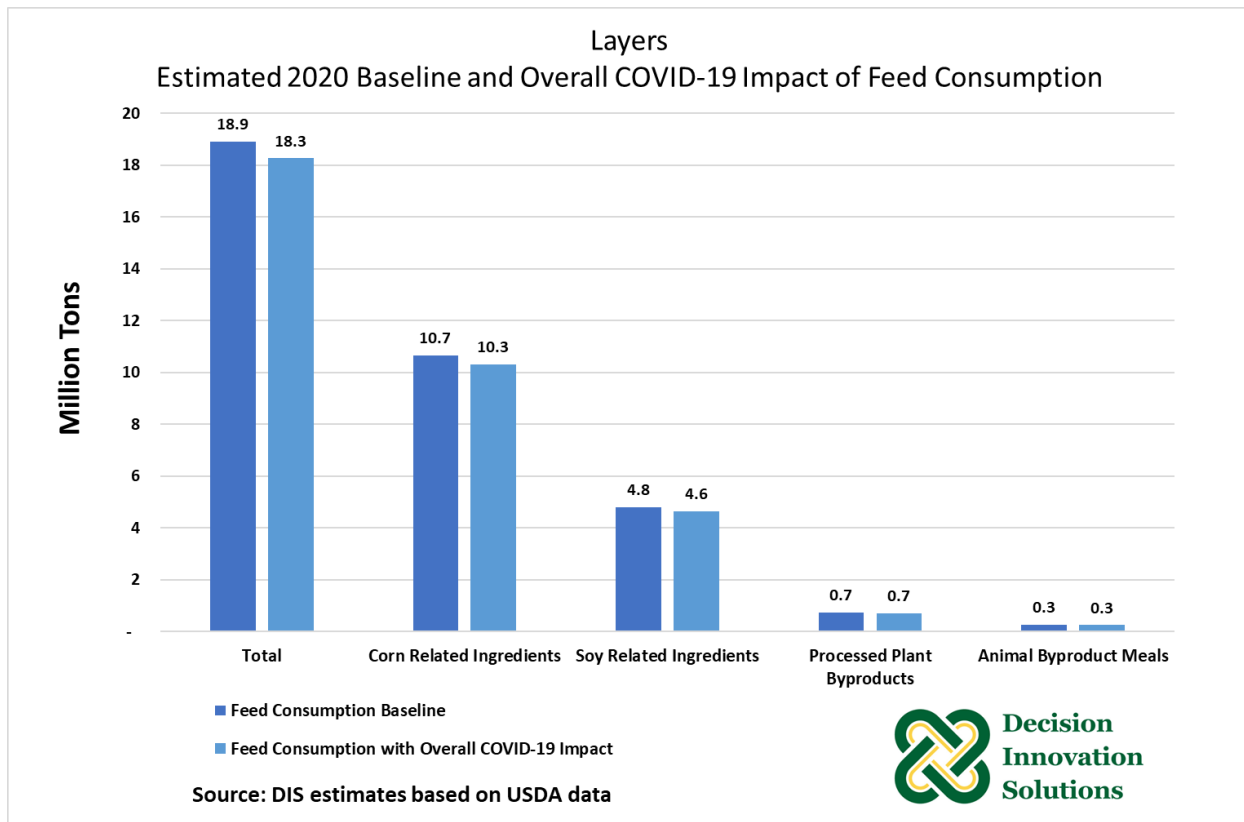


Figure 95. Estimated 2020 Baseline and Overall COVID-19 Pandemic's Impact on Feed Consumption for Layers

Figure 95 shows estimated 2020 baseline feed consumption and estimated with COVID-19 impact feed consumption for layers. High-level impacts include:

- Estimated total feed consumption of baseline and of overall COVID-19 pandemic's impacts are 18.9 million tons and 18.3 million tons, respectively.
 - Estimated total *corn-related ingredient consumption* of baseline and of the overall COVID-19 pandemic's impact are 10.7 million tons and 10.3 million tons, respectively.
 - Estimated total *soy-related ingredient consumption* of baseline and of the overall COVID-19 pandemic's impact are 4.8 million tons and 4.6 million tons, respectively.
 - Estimated total *processed plant byproducts consumption* of baseline and of the overall COVID-19 pandemic's impact are 0.7 million tons and 0.7 million tons, respectively.
 - Estimated total *animal byproduct meal consumption* of baseline and of the overall COVID-19 pandemic's impact are 0.3 million tons and 0.3 million tons, respectively.

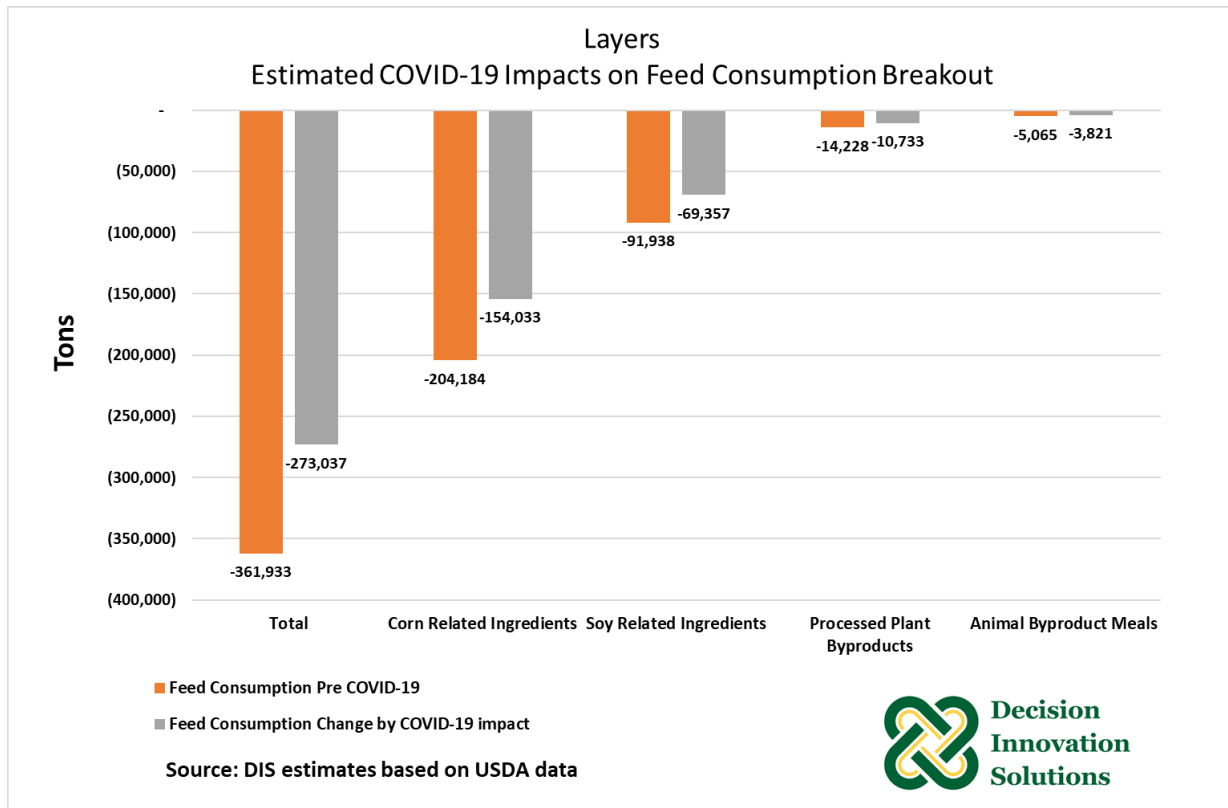


Figure 96. Estimated COVID-19 Pandemic’s Impact Breakout of Feed Consumption for Layers

Figure 96 demonstrates the COVID-19 pandemic’s impact on feed consumption, broken out by ingredient, for layers. Feed consumption changes were due to losses on profits, and the number impact from COVID-19, which are shown in the orange and grey colors in Figure 96, respectively. For the full table of ingredient quantities of 2020 baseline, along with COVID-19 pandemic’s impact on feed consumption, see Appendix B.

4.3.3 Turkeys

The turkey production baseline for 2020 projected turkey slaughter numbers would have been 1.1% higher in 2020 than in 2019. Prior to COVID-19, turkey slaughter was up 1.8% over the baseline projection. When COVID-19 disrupted turkey processing on the week ending April 11, turkey slaughter dropped 15.6% below baseline. From that period through the end of June, turkey production was 6.6% less than the baseline. From Sept. 12 through Oct. 17, slaughter averaged 8.7% less than the baseline. If turkey production for the remainder of 2020 runs 8.7% under baseline projections, the total reduction in turkey production for 2020 due to COVID-19 will be 9.0 million head, or a reduction of 4.2% from pre-COVID-19 baseline projections. For the year, it is likely that 3.8% less turkeys will be fed than the projected by the baseline.

The 2020 baseline model projected turkey weights to be 3.0% less than in 2019. So far in 2020, turkey slaughter weights are averaging 1.8% higher than expected baseline weights. Since April, turkey weights are 1.4% higher than baseline.

Total feed consumption for turkeys in 2020 was expected to be 98.9% of 2019 levels. With the COVID-19 disruptions, actual feed consumption by turkeys in 2020 is expected to be down 2.1% from baseline expectations. Feed consumption for the months affected by COVID-19 is expected to be 4.4% less than the baseline.

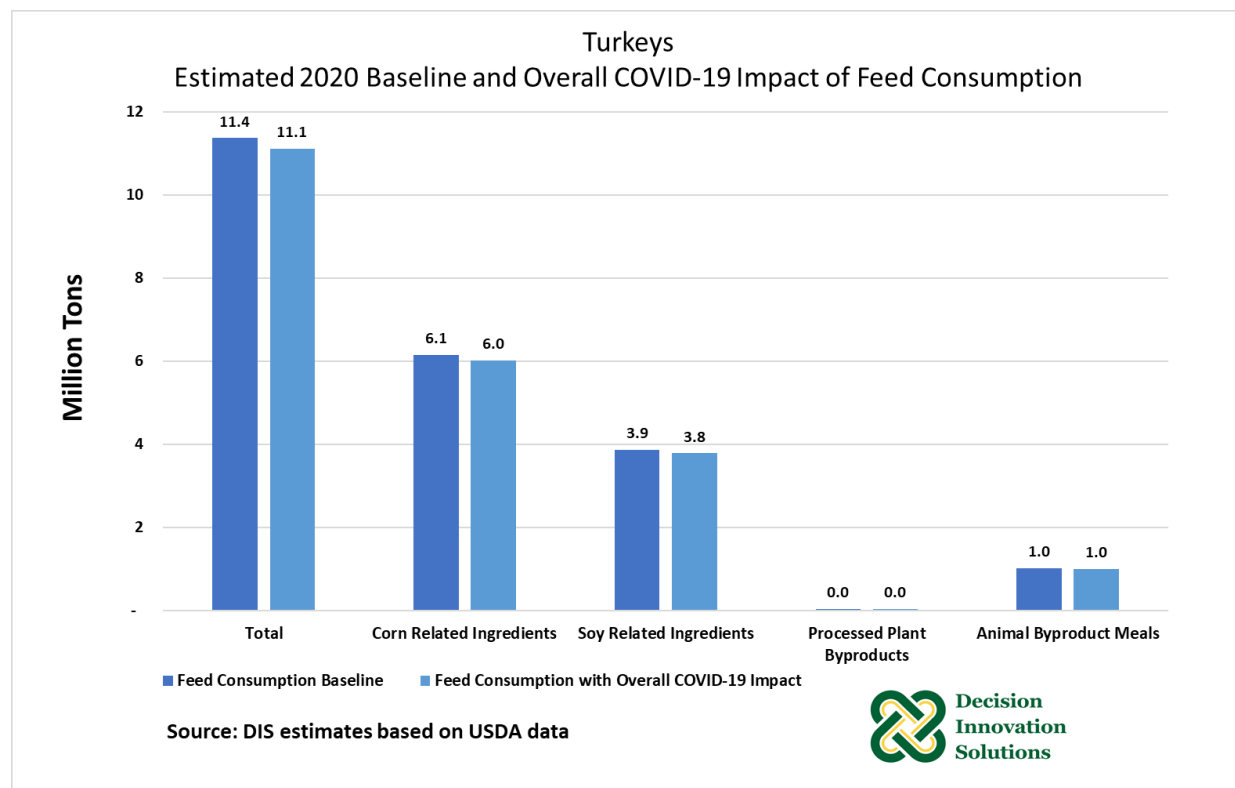


Figure 97. Estimated 2020 Baseline and Overall COVID-19 Pandemic’s Impact on Feed Consumption for Turkeys

Figure 97 shows estimated 2020 baseline feed consumption and estimated with the COVID-19 pandemic’s impact on feed consumption for turkeys. High-level impacts include:

- Estimated total feed consumption of baseline and of the overall COVID-19 pandemic’s impact are 11.4 million tons and 11.1 million tons, respectively.
 - Estimated total *corn-related ingredient consumption* of baseline and of the overall COVID-19 pandemic’s impact are 6.1 million tons and 6.0 million tons, respectively.
 - Estimated total *soy-related ingredient consumption* of baseline and of the overall COVID-19 pandemic’s impact are 3.9 million tons and 3.8 million tons, respectively.
 - Estimated total *animal byproduct meal consumption* of baseline and of the overall COVID-19 pandemic’s impact are 1.0 million tons and 1.0 million tons, respectively.
 - Estimated total *processed plant byproducts consumption* of baseline and of the overall COVID-19 pandemic’s impact are 41,706 tons and 40,924 tons, respectively.

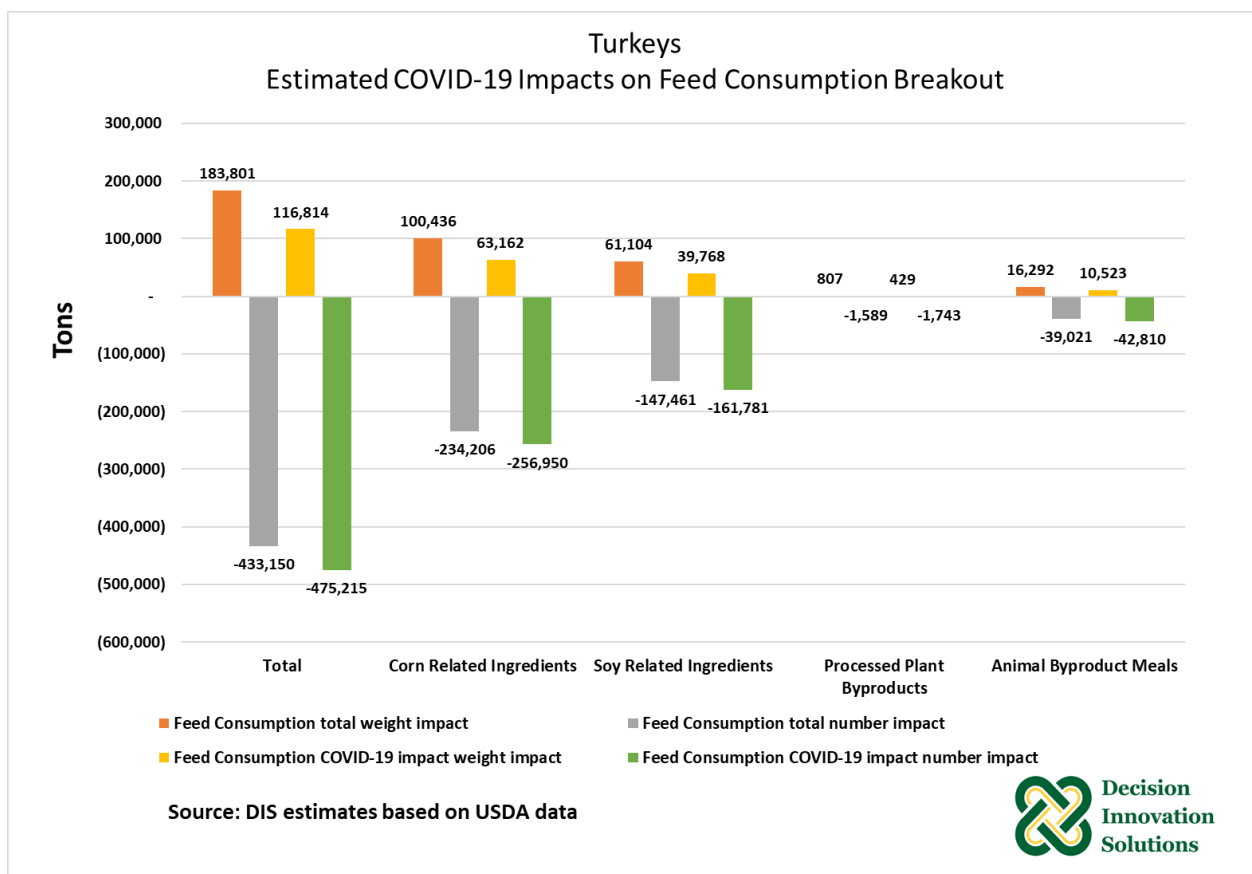


Figure 98. Estimated COVID-19 Pandemic’s Impact Breakout on Feed Consumption for Turkeys

Figure 98 demonstrates the COVID-19 pandemic’s impact on feed consumption, broken out by ingredient, for turkeys. The total weight impact led 183,801 tons more feed to be fed and the total number impact indicated 433,150 ton less feed was needed. For the full table of ingredient quantities of 2020 baseline, along with the COVID-19 pandemic’s impact on feed consumption, see Appendix B.

4.3.4 Hogs

Baseline feed consumption for hogs for 2020 is based on the December 2019 Hogs and Pigs Report, which estimated that market hog inventory numbers in December 2019 were 3.1% larger than a year earlier and hogs kept for breeding were 2.13% greater than a year earlier levels. The YOY percentage changes in inventory numbers were multiplied times the 2019 feed consumption estimates for sows and market hogs.

For the year 2020, DIS estimates that actual hog marketings will be 250,530 lower than the baseline estimated. Prior to COVID-19, hog marketings were 1,712,700 more than the baseline projections and hog market weights were heavier than the baseline, accounting for another 178,200 hog equivalents from a feed use consideration. Once the COVID-19 disruptions began, slaughter delays led to reduced marketings and heavier feeding weights in the April through August time frame. Also, DIS estimates that 190,800 heavy hogs were euthanized during this period and 756,000 pre-wean hogs were euthanized. The heavier feeding weights since April approximately equal feeding an extra 444,800 hogs. Producers also adjusted farrowings due to COVID-19 and DIS estimates a decrease in feed consumption due to reduced farrowings equal to 1,015,600 hogs. Increased sow marketings are estimated by DIS to reduce sow feed consumption the equivalent of feeding 6,600 fewer sows for a year.

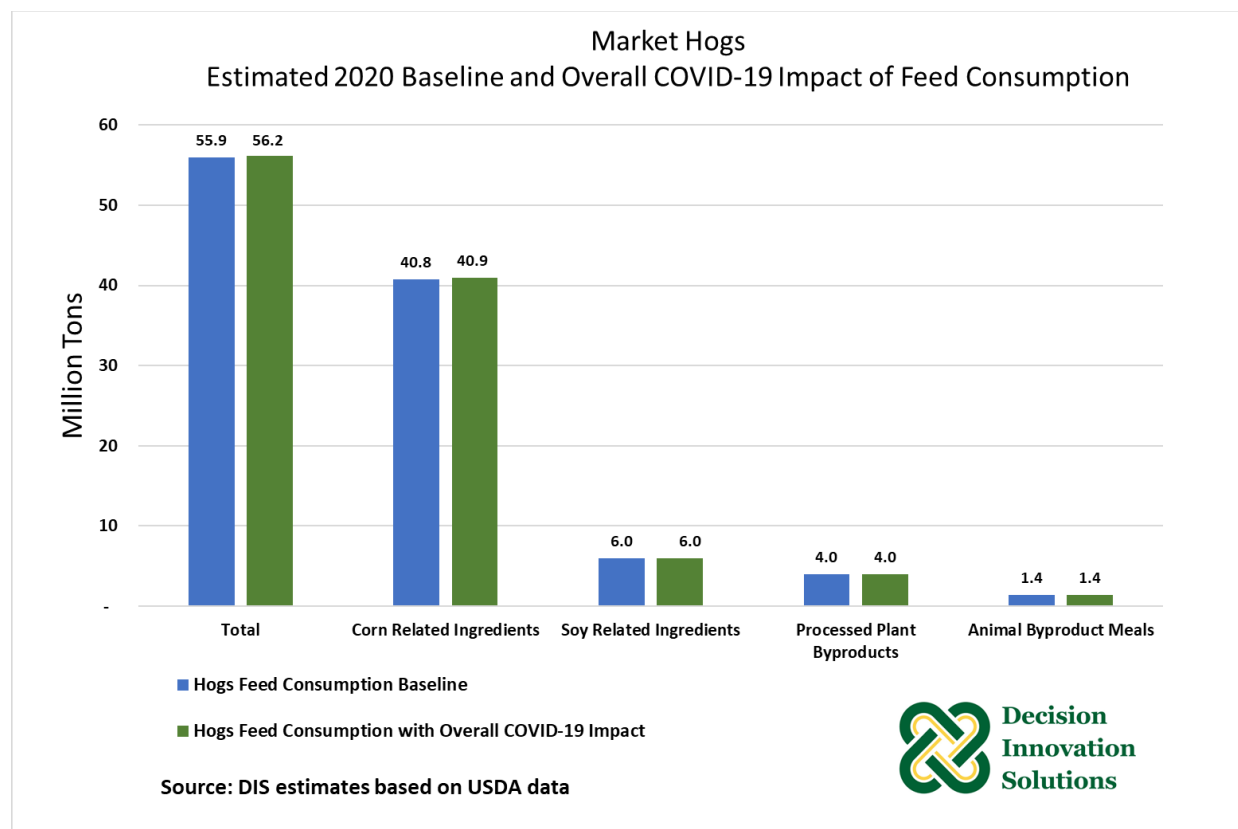


Figure 99. Estimated 2020 Baseline and Overall COVID-19 Impact on Feed Consumption for Market Hogs

Figure 99 shows the estimated 2020 baseline feed consumption and estimated with the COVID-19 pandemic’s impact on feed consumption for market hogs. High-level impacts include:

- Estimated total feed consumption of baseline and of the overall COVID-19 pandemic’s impact are 55.9 million tons and 56.2 million tons, respectively.
 - Estimated total *corn-related ingredient consumption* of baseline and of the overall COVID-19 pandemic’s impact are 40.8 million tons and 40.9 million tons, respectively.
 - Estimated total *soy-related ingredient consumption* of baseline and of the overall COVID-19 pandemic’s impact are 6.0 million tons and 6.0 million tons, respectively.
 - Estimated total *processed plant byproducts consumption* of baseline and of the overall COVID-19 pandemic’s impact are 4.0 million tons and 4.0 million tons, respectively.
 - Estimated total *animal byproduct meal consumption* of baseline and of the overall COVID-19 pandemic’s impact are 1.4 million tons and 1.4 million tons, respectively.

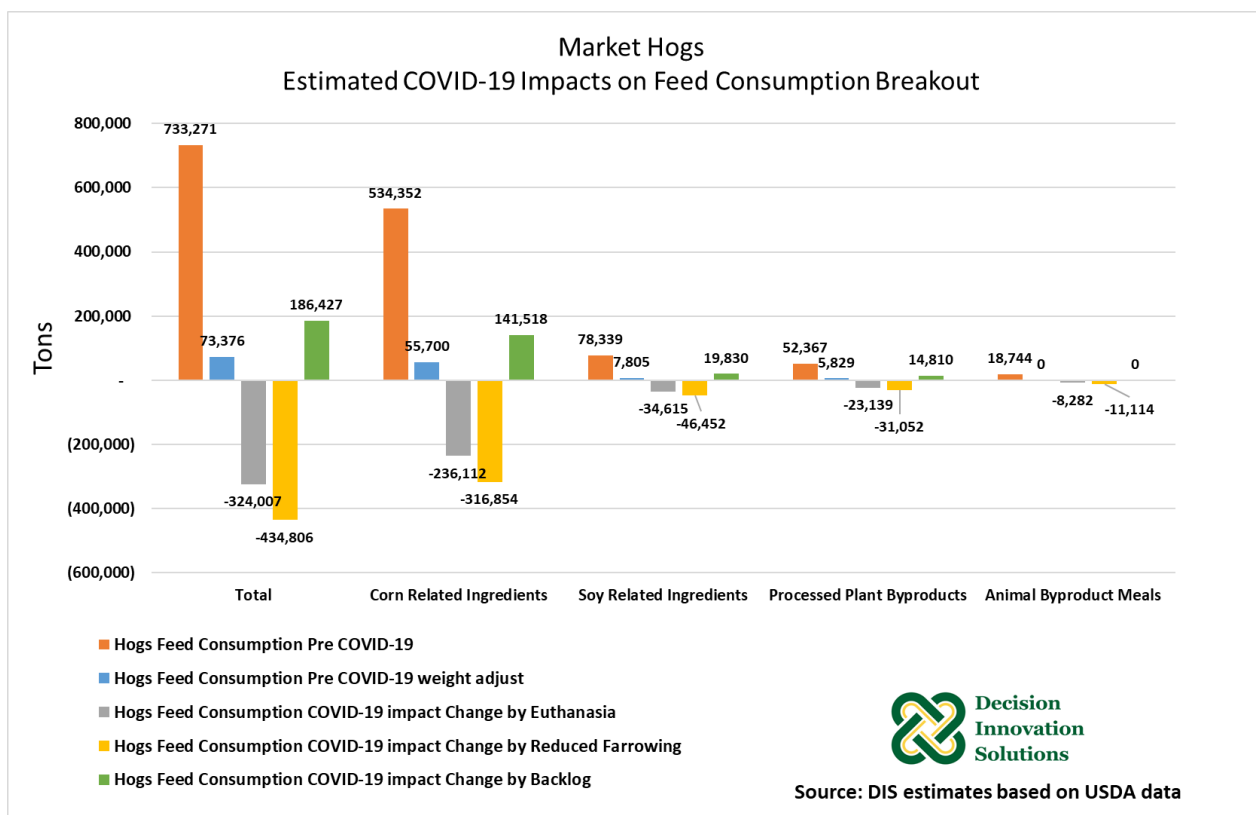


Figure 100. Estimated COVID-19 Pandemic’s Impact Breakout on Feed Consumption for Market Hogs

Figure 100 demonstrates the COVID-19 pandemic’s impact on feed consumption, broken out by ingredient, for market hogs. The biggest feed consumption changes from COVID-19 for hogs was due to farrowing reduction, followed by euthanasia, which are shown in the yellow and grey colors in Figure 100, respectively. For the full table of ingredient quantities of 2020 baseline and with COVID-19 impact feed consumption, see Appendix B.

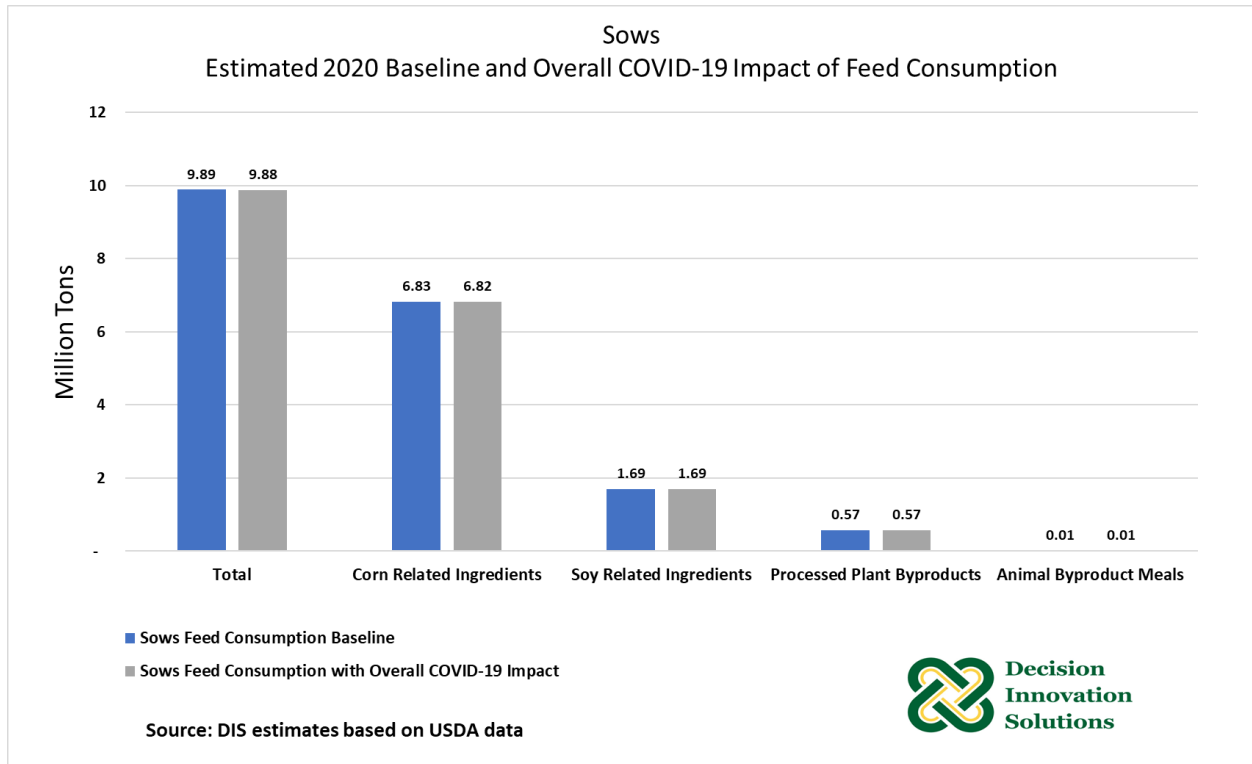


Figure 101. Estimated 2020 Baseline and the Overall COVID-19 Pandemic’s Impact on Feed Consumption for Sows

Figure 101 shows estimated 2020 baseline feed consumption and estimated with the COVID-19 pandemic’s impact on feed consumption for sows. Since the COVID-19 pandemic’s impact on sows was only from the equivalent 6,600 reduced sow inventory, the differences between feed consumption of baseline and feed consumption with the COVID-19 pandemic’s impacts are fairly small.

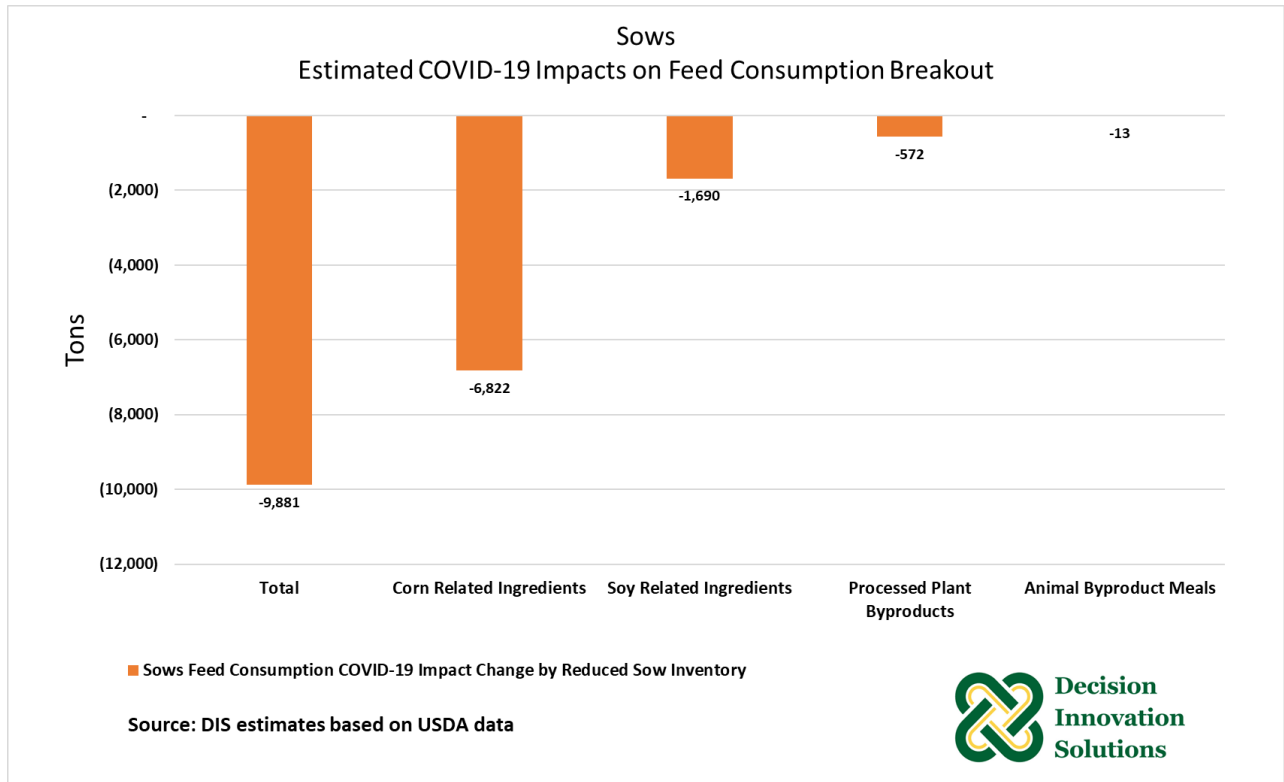


Figure 102. Estimated COVID-19 Pandemic’s Impact Breakout on Feed Consumption for Sows

Figure 102 demonstrates the COVID-19 pandemic’s impact on feed consumption, broken out by ingredient, for sows. In this case, the impact was only from the 6,600 heads (sow inventory reduction), which led to 9,881 fewer tons fed. For the full table of ingredient quantities of 2020 baseline, along with the COVID-19 impact feed consumption, see Appendix B.

4.3.5 Dairy Cows

Baseline feed consumption for dairy cows is calculated by taking 2019 estimated feed consumption and multiplying it times the change in dairy cow numbers projected by the USDA in its long-term outlook projections. This is 0.1% larger than what it was in 2019.

Adjustments to feed consumption for dairy cows is estimated by comparing the difference in actual dairy cow numbers as reported by the USDA for March 2020 through August 2020. On average during that time, there were 29,000 more dairy cows in the milking herd than was expected from the USDA baseline. Assuming this increase holds for the balance of 2020 and similar ration components as were used in 2019 were to be used in 2020, feed consumption for dairy cows would be up 0.2% due to COVID-19.

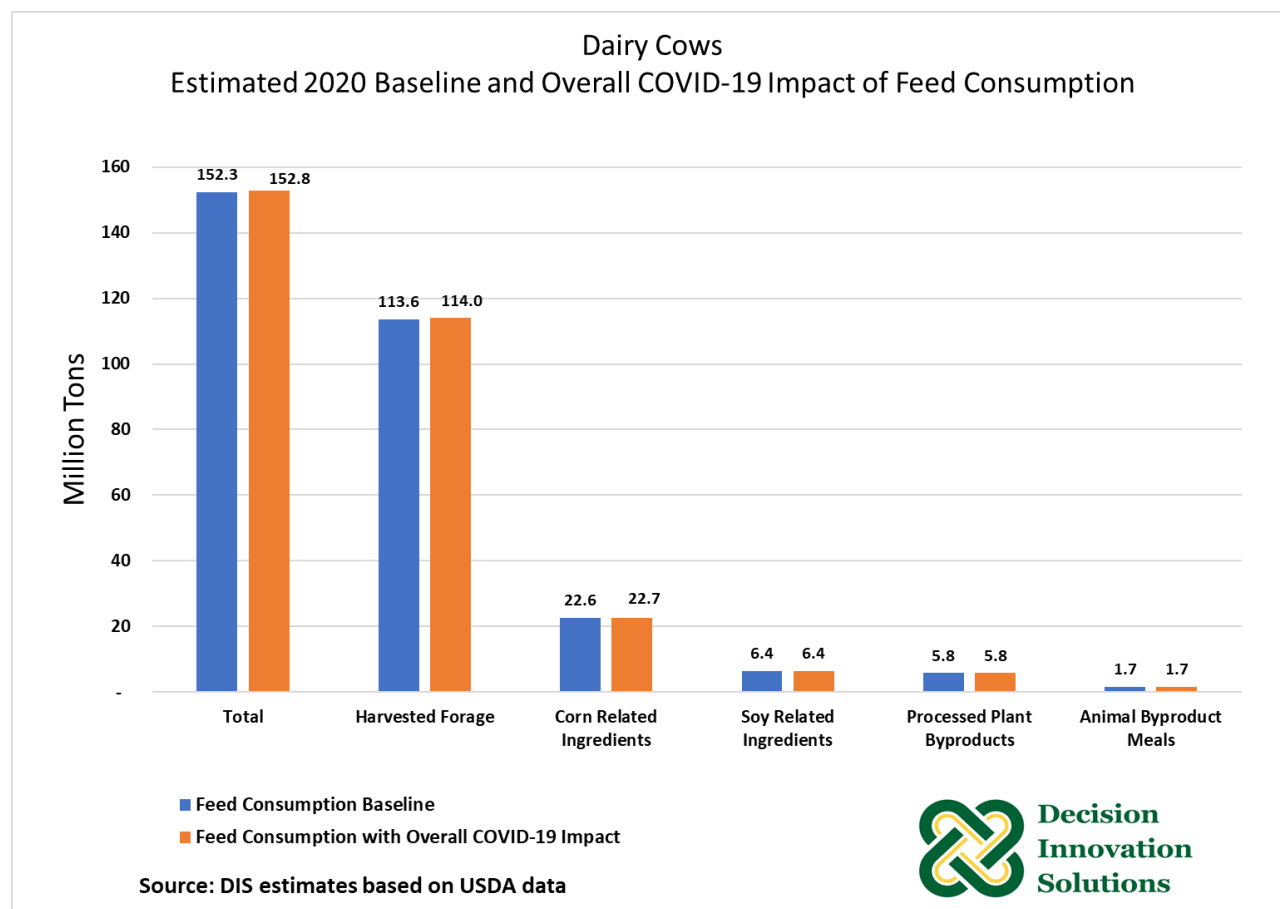


Figure 103. Estimated 2020 Baseline and Overall COVID-19 Pandemic's Impact on Feed Consumption for Dairy Cows

Figure 103 shows the estimated 2020 baseline feed consumption and estimated with the COVID-19 pandemic's impact on feed consumption for dairy cows. High-level impacts include:

- Estimated total feed consumption of baseline and of the overall COVID-19 pandemic's impact are 152.3 million tons and 152.8 million tons, respectively.
 - Estimated *harvested forage* (i.e., corn silage, alfalfa hay and other hay) consumption of baseline and of the overall COVID-19 pandemic's impact are 113.6 million tons and 114.0 million tons, respectively.

- Estimated total *corn-related ingredient consumption* of baseline and of the overall COVID-19 pandemic’s impact are 22.6 million tons and 22.7 million tons, respectively.
- Estimated total *soy-related ingredient consumption* of baseline and of the overall COVID-19 pandemic’s impact are 6.4 million tons and 6.4 million tons, respectively.
- Estimated total *processed plant byproducts consumption* of the baseline and of the overall COVID-19 pandemic’s impact are 5.8 million tons and 5.8 million tons, respectively.
- Estimated total *animal byproduct meal consumption* of baseline and of the overall COVID-19 pandemic’s impact are 1.7 million tons and 1.7 million tons, respectively.

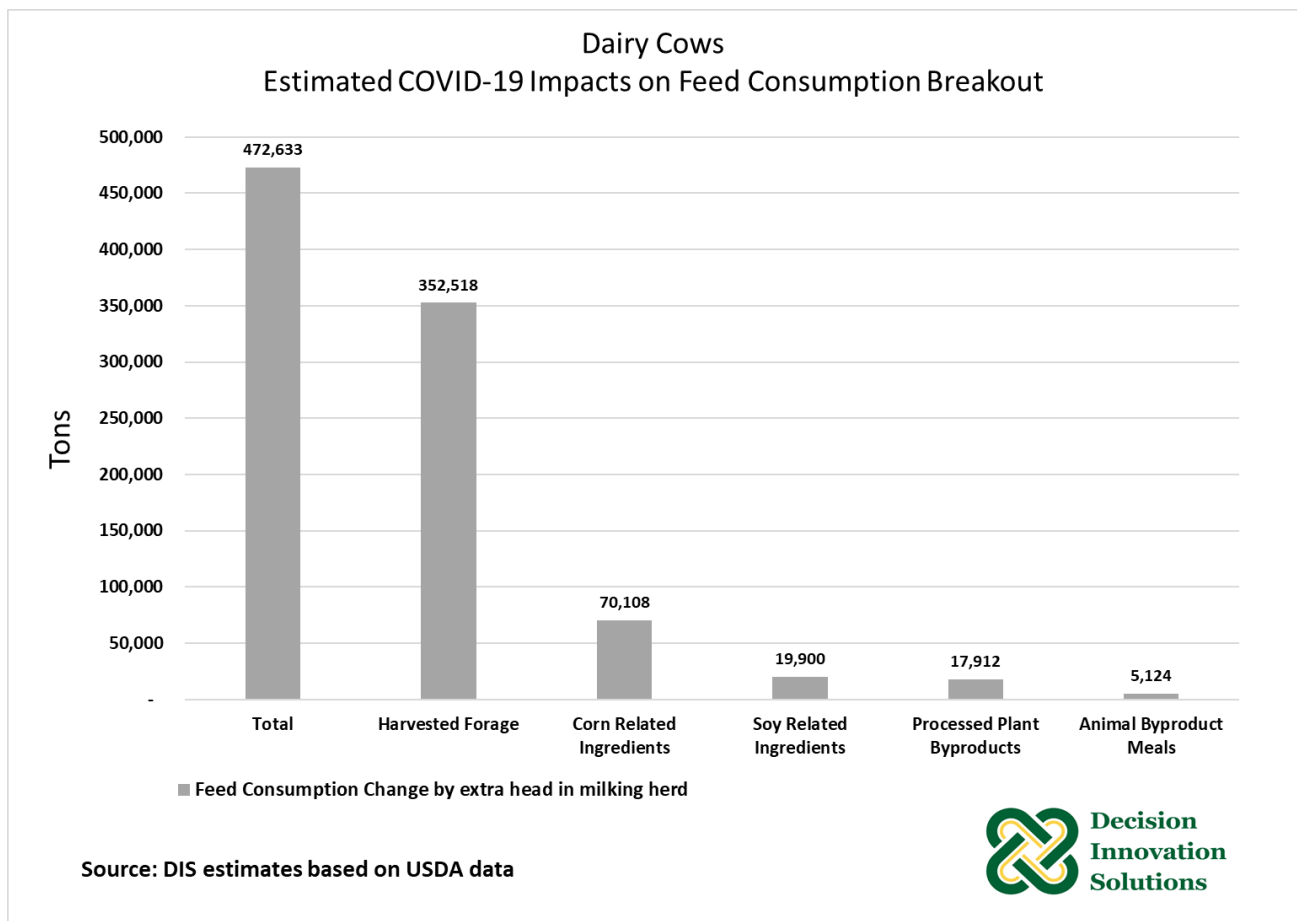


Figure 104. Estimated COVID-19 Pandemic’s Impact Breakout on Feed Consumption for Dairy Cows

Figure 104 demonstrates the COVID-19 pandemic’s impact on feed consumption, broken out by ingredient, for dairy cows. Feed consumption changes were due to extra dairy cows in the milking herd as shown in Figure 104. For the full table of ingredient quantities of 2020 baseline, along with the COVID-19 pandemic’s impact on feed consumption, see Appendix B.

4.3.6 Beef Cattle

Baseline feed consumption for beef cattle is calculated by taking the 2019 estimated beef feed consumption by category and multiplying them by the percent changes in U.S. cattle inventories in January 2020. Beef cow numbers were down 1.2%, replacement heifers were down 1.9%, steers over 500 lbs. were down 0.5%, calves under 500 lbs. were up 1.4% and cattle on feed were up 2.1%. The baseline cattle on feed estimates assumes that, on average for 2020, 3.9% more cattle would have been in U.S. feedlots throughout the year than in 2019.

Changes in cattle feed due to COVID-19 were calculated from estimated changes to beef cows slaughter, beef bull slaughter, and changes to cattle on feed numbers. Data for the first nine months of 2020 does not suggest that the COVID-19 pandemic had a significant impact on the 2020 calf crop or on replacement heifers.

Cumulative deviations in beef cow slaughter since the COVID-19 disruptions to beef cattle slaughter indicate that 8,100 additional beef cows would have been slaughtered compared to the baseline. Cumulative beef bull slaughter is 15,400 less than the baseline. Combined, the net deviation of breeding stock slaughter is a decline of 7,300 head slaughtered due to the COVID-19 pandemic.

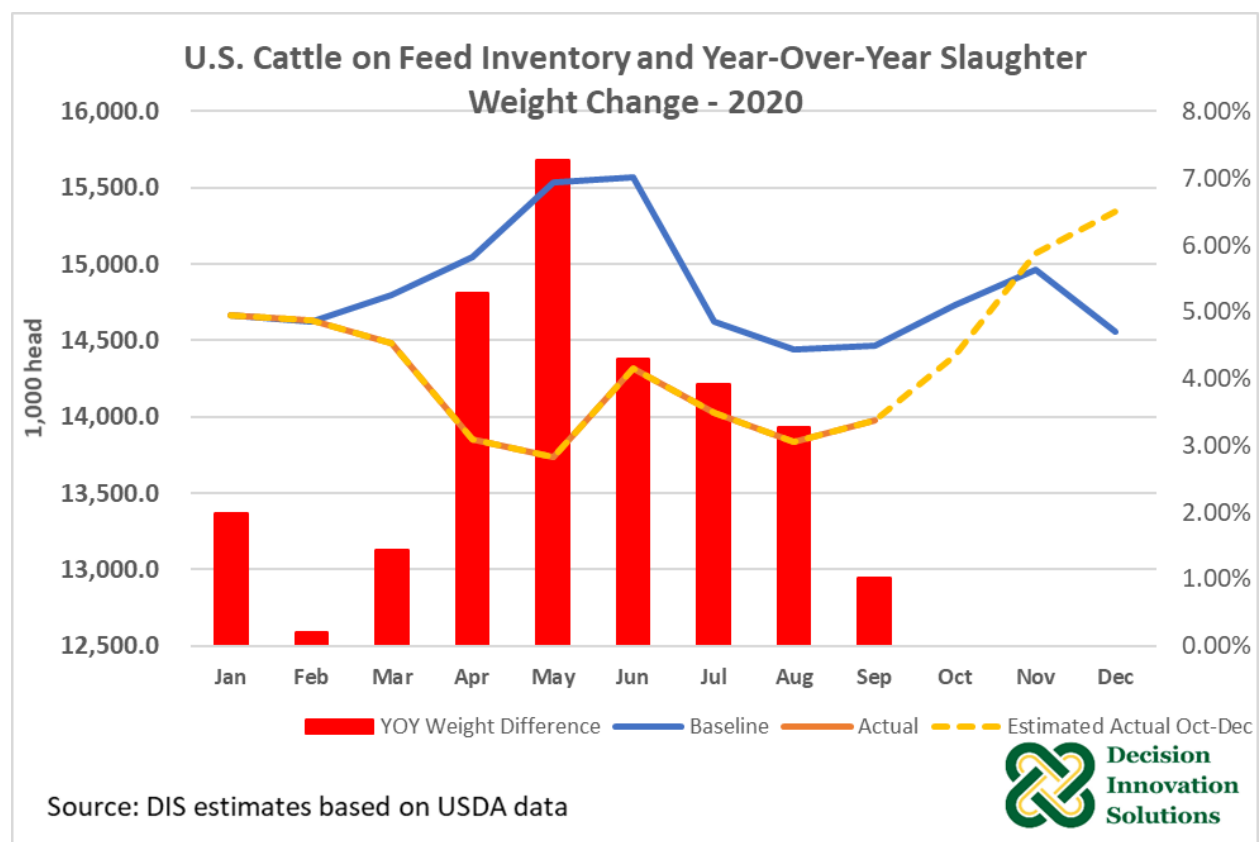


Figure 105. U.S. Cattle on Feed Inventory and Year-Over-Year Slaughter Weight Change - 2020

Cattle on feed inventories (Figure 105) were impacted by lower than baseline slaughter levels and lower than baseline placement levels. In addition, cattle in feedlots were fed to heavier weights. Assuming U.S. cattle on feed inventories reacted similarly to the states covered by the monthly cattle on feed reports, there was a significant decline in cattle on feed numbers especially during the months of April and May.

This was a combination of reduced cattle slaughter but an even greater reduction in feeder cattle placements into feedlots. On-feed numbers continued to run below the baseline estimates through September but are expected to increase relative to the baseline in October through December. It is likely that it will take about 9-12 months for feedlots to get current on feeder cattle placements and for cattle feeding to return to normal. Cattle in feedlots were fed to significantly higher weights April 2020 through August 2020.

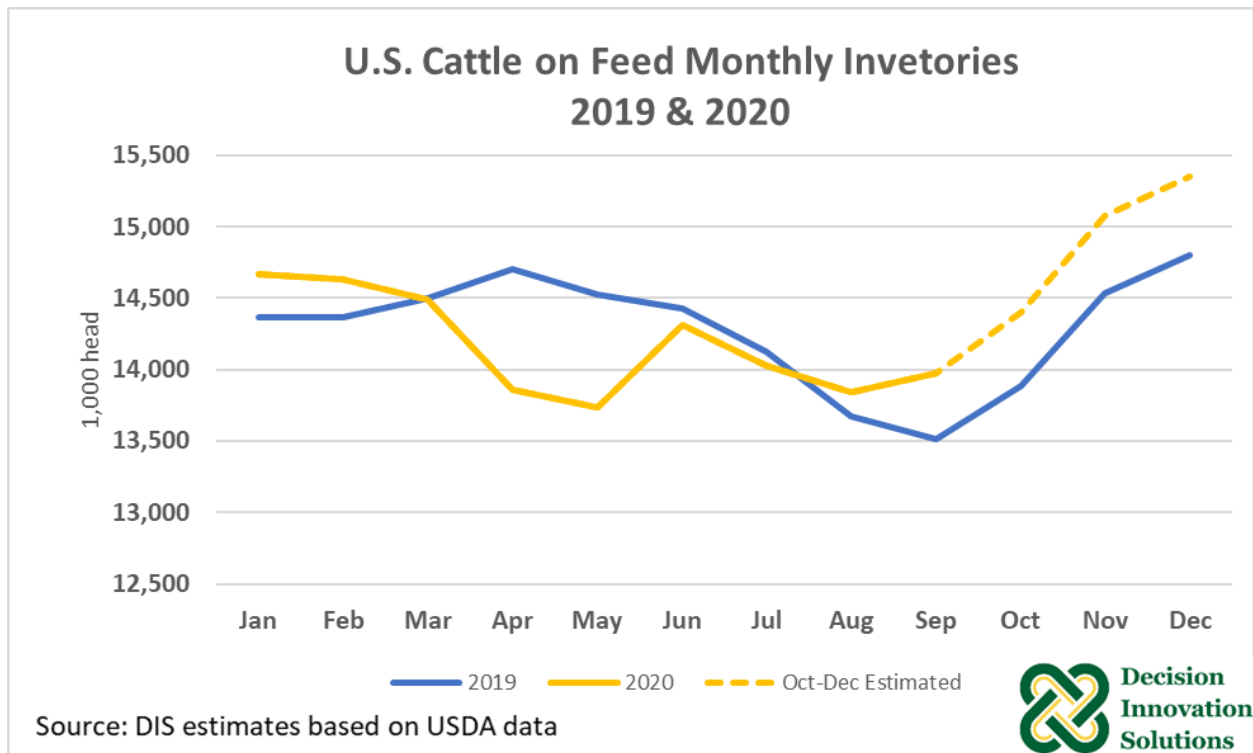


Figure 106. U.S. Cattle on Feed Monthly Inventories 2019 and 2020

In March 2020, U.S. cattle feedlots had roughly the same number of cattle on feed compared to a year earlier (see Figure 106). In April 2020, cattle on feed dropped to 95% of what it would have otherwise been. It held at 95% in May and then returned to 100% of year-earlier levels by June 2020. By September 2020, U.S. cattle on feed numbers were 4% greater than a year earlier. For the five months of April – August 2020, there was an average 332,900 fewer cattle on feed than a year ago, or 2.3% fewer cattle on feed.

From mid-April through the end of August, an estimated 892,100 fed steers and heifers were subjected to delayed slaughter. By the end of May, feeder cattle placements were 1,017,100 head below baseline expectations and were still 617,100 below baseline expectations by the end of August. If monthly placements of feeder cattle into feedlots run at or above the rate seen in September 2020, cattle in U.S. feedlots will be 5.4% above baseline by December 2020.

The peak slaughter weight differential in 2020 compared to 2019 occurred the week of April 26 with slaughter cattle that week weighing 92 lbs. more than a year ago. During the April 12-Aug. 30 time frame, average slaughter weights were 4.9% higher than a year earlier. During the 14 weeks of 2020 prior to slaughter disruptions, average slaughter weights were 1.4% higher than a year earlier and since

September, slaughter weights have returned to about 1.3% higher than a year earlier. DIS does not see a significant fed-cattle weight differential due to COVID-19 for the other weeks of 2020. Thus, the annual effect of cattle weights on feed consumption in 2020 due to the COVID-19 pandemic is an annual average increase of 1.4% in feed consumed by cattle in feedlots.

For 2020, feed consumption for cattle on feed due to the reduced inventory numbers was a decline of 3.2% from baseline. For the total year, feed consumption due to heavier feeding weights is estimated at 1.4%. Thus, total feed consumption for cattle on feed is estimated to be 1.9% less than the baseline.

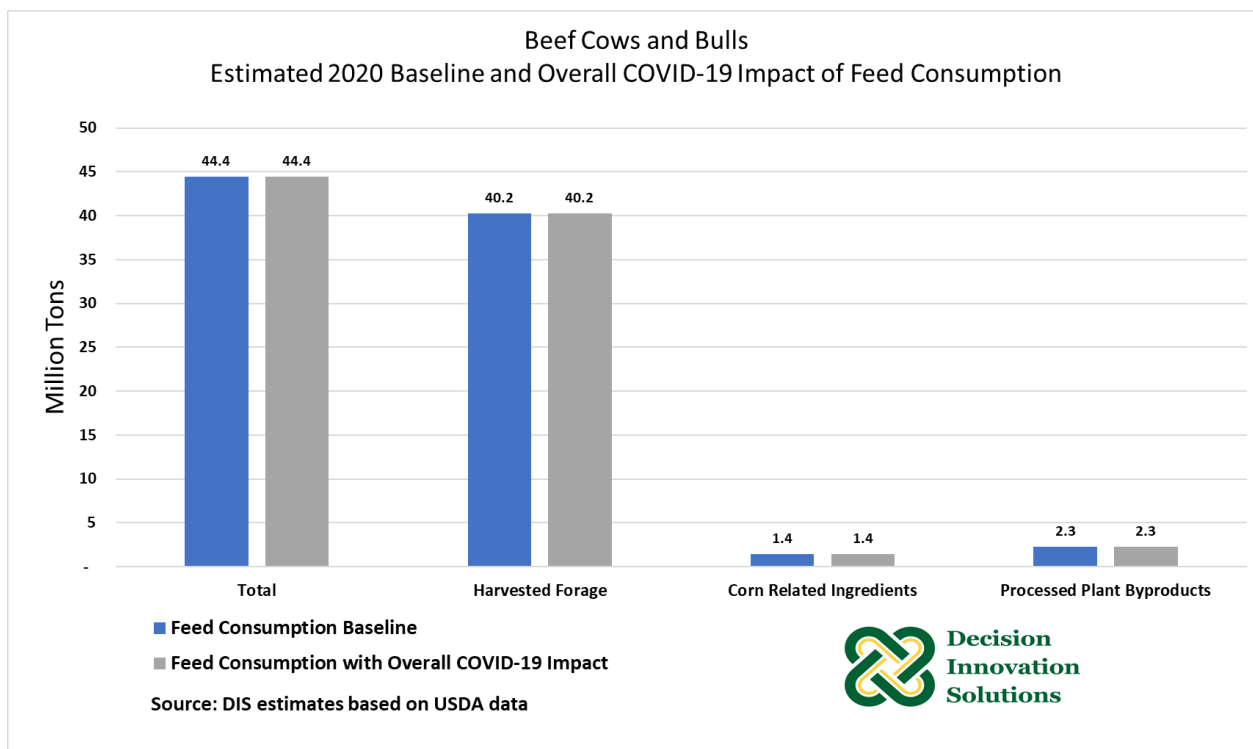


Figure 107. Estimated 2020 Baseline and Overall COVID-19 Impact on Feed Consumption for Beef Cows and Bulls

Figure 107 shows the estimated 2020 baseline feed consumption and estimated with the COVID-19 pandemic’s impact on feed consumption for beef cows and bulls. Since the pandemic’s impact on them was only from the 7,300 head slaughter backlog, the differences between feed consumption of the baseline and feed consumption with the COVID-19 pandemic’s impacts are fairly small.

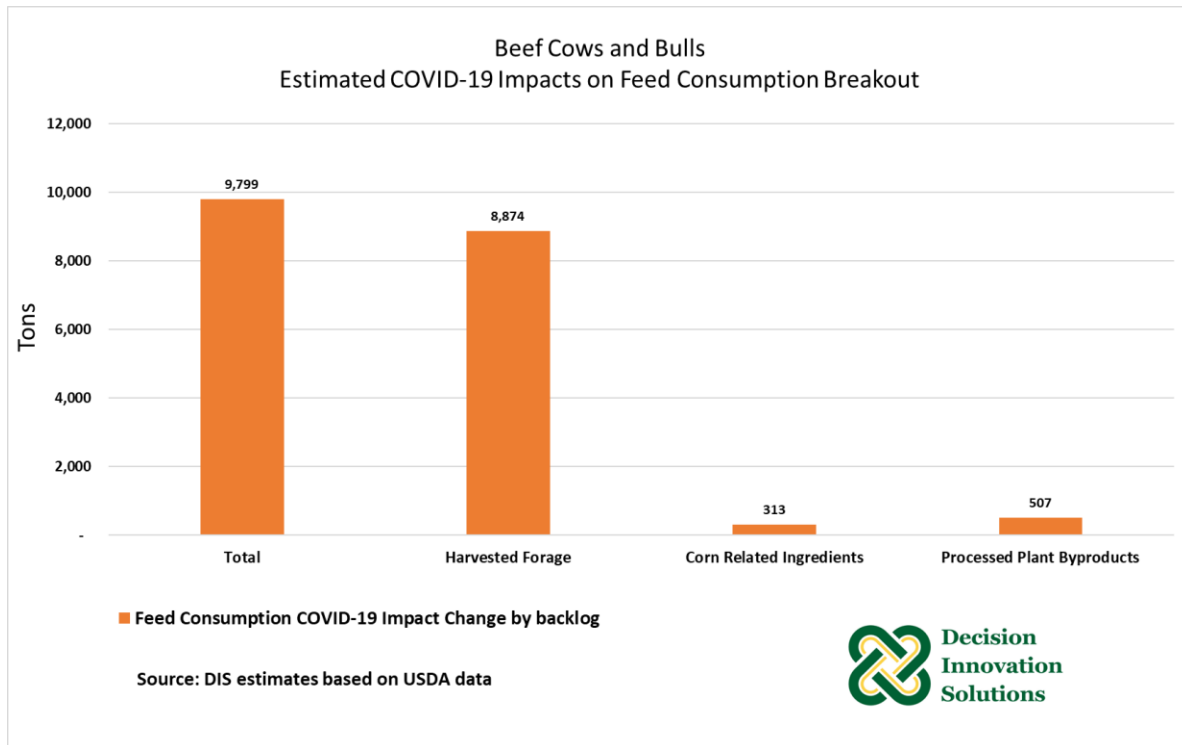


Figure 108. Estimated COVID-19 Pandemic’s Impact Breakout on Feed Consumption for Beef Cows and Bulls

Figure 108 demonstrates the COVID-19 pandemic’s impacts on feed consumption, broken out by ingredient, for beef cows. In this case, the impact was from 7,300 head, which led to 9,799 fewer tons of feed than would have been consumed without the COVID-19 pandemic. For the full table of ingredient quantities of 2020 baseline, along with the COVID-19 pandemic impact on feed consumption, see Appendix B.

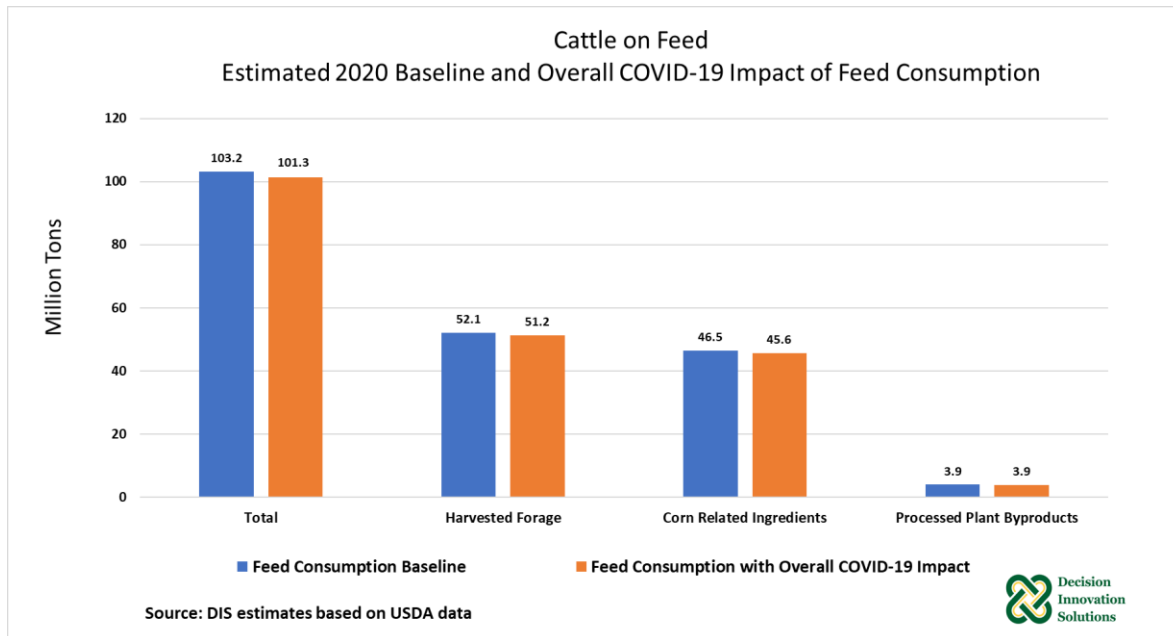


Figure 109. Estimated 2020 Baseline and the Overall COVID-19 Pandemic Impact on Feed Consumption for Cattle on Feed

Figure 109 shows the estimated 2020 baseline feed consumption and estimated with the COVID-19 pandemic's impact on feed consumption for cattle on feed. High-level impacts include:

- Estimated total feed consumption of the baseline and of the overall COVID-19 pandemic's impact are 103.2 million tons and 101.3 million tons, respectively.
 - Estimated *harvested forage* (i.e., *corn silage, alfalfa hay and other hay*) consumption of the baseline and of the overall COVID-19 pandemic's impact are 52.1 million tons and 51.2 million tons, respectively.
 - Estimated total *corn-related ingredient consumption* of the baseline and of the overall COVID-19 pandemic's impact are 46.5 million tons and 45.6 million tons, respectively.
 - Estimated total *processed plant byproducts consumption* of the baseline and of the overall COVID-19 pandemic's impact are 3.9 million tons and 3.9 million tons, respectively.

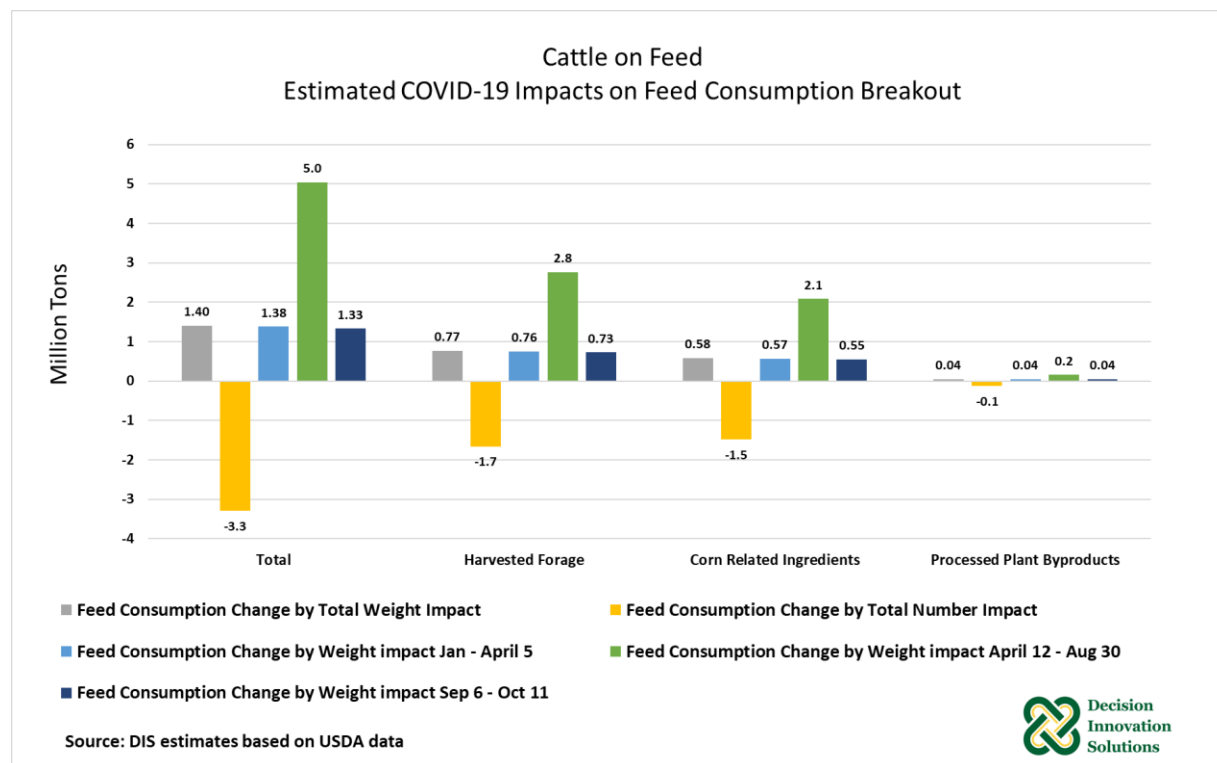


Figure 110. Estimated COVID-19 Pandemic's Impact Breakout on Feed Consumption for Cattle on Feed

Figure 110 demonstrates the COVID-19 pandemic's impact on feed consumption, broken out by ingredient, for cattle on feed. The total weight impact led to 1.4 million tons more feed being fed and the total number impact indicated 3.3 million tons less feed was needed. For the full table of ingredient quantities of the 2020 baseline, along with the overall COVID-19 pandemic's impact on feed consumption, see Appendix B.

4.3.7 Feed Value

Baseline feed prices were calculated for the feed ingredients used in the feed consumption estimates of the Ration Cost Optimization (RCO) model. Corn, other grains, soybeans and soybean product prices were obtained from the USDA's long-term outlook for 2020. For other feed ingredients, a reference baseline grain, or feed ingredient, was assigned to each ingredient and a ratio of the reference ingredient price for 2019 to the 2019 annual price of that ingredient was calculated. This ratio was used to establish the 2020 baseline prices for each feed ingredient. Estimated actual prices for the major grains and feed ingredients for calendar year were calculated using the USDA WASDE annual average prices pro-rating 75% of the calendar year 2020 price to the FY19/20 marketing year price and 25% to the FY20/21 price. These prices were used to estimate prices for the calendar year for each of the ingredients in the RCO model. (See the table in Appendix B.)

The total feed value (with forages) in the baseline 2020 model is estimated to be \$68.3 billion. The value of feed consumed in 2020 with the COVID-19 pandemic's impact is estimated to be \$66.7 billion. This reflects both changes in feed quantities and feed ingredient prices. The estimated impact of the COVID-19 pandemic on the value of feed consumed in 2020 is a decline of \$1.6 billion from baseline expectations, a decline of 2.4%. The total feed value (without forages and roughage) in the baseline

2020 model is estimated to be \$50.4 billion. The value of feed consumed in 2020 with the COVID-19 pandemic's impact is estimated to be \$48.9 billion. This reflects both changes in feed quantities and feed ingredient prices. The estimated impact of the COVID-19 pandemic on the value of feed consumed in 2020 is a decline of \$1.5 billion from baseline expectations, a decline of 3.0%.

4.4 COVID-19 Pandemic's Impact on 5-year Forward Projections

Three scenarios are projected forward for five years depicting an "expected case" with regard to the COVID-19 pandemic's impact on livestock production and feed consumption; a "worst-case" scenario; and a "best case" scenario. The "expected case" is based on the USDA baseline early release tables released in November 2020. The projections are used as a starting point, with the short-term forecasts from the Oct. 9, 2020, World Agricultural Supply and Demand Estimates report.

The "worst case" scenario is based on projections in which the COVID-19 cases continue to escalate not only in the U.S., but throughout the world in 2021 and COVID-19 cases continue at high enough rates to cause sporadic disruptions to supply chains and continued restrictions on travel, public meetings, schools and other institutions.

The "best case" scenario is based on projections in which COVID-19 cases peak early in 2021, vaccines and other interventions are very effective at reducing cases, and travel, public meetings, schools and other institutions can resume pre-COVID-19 activities.

4.4.1 Status of COVID-19

As of Dec. 16, 2020, nearly 74 million cases of COVID-19 have been confirmed with 16.9 million cases in the U.S. Globally, more than 1.6 million deaths have been attributed to COVID-19 with 306,363 deaths in the U.S. (Figure 111)

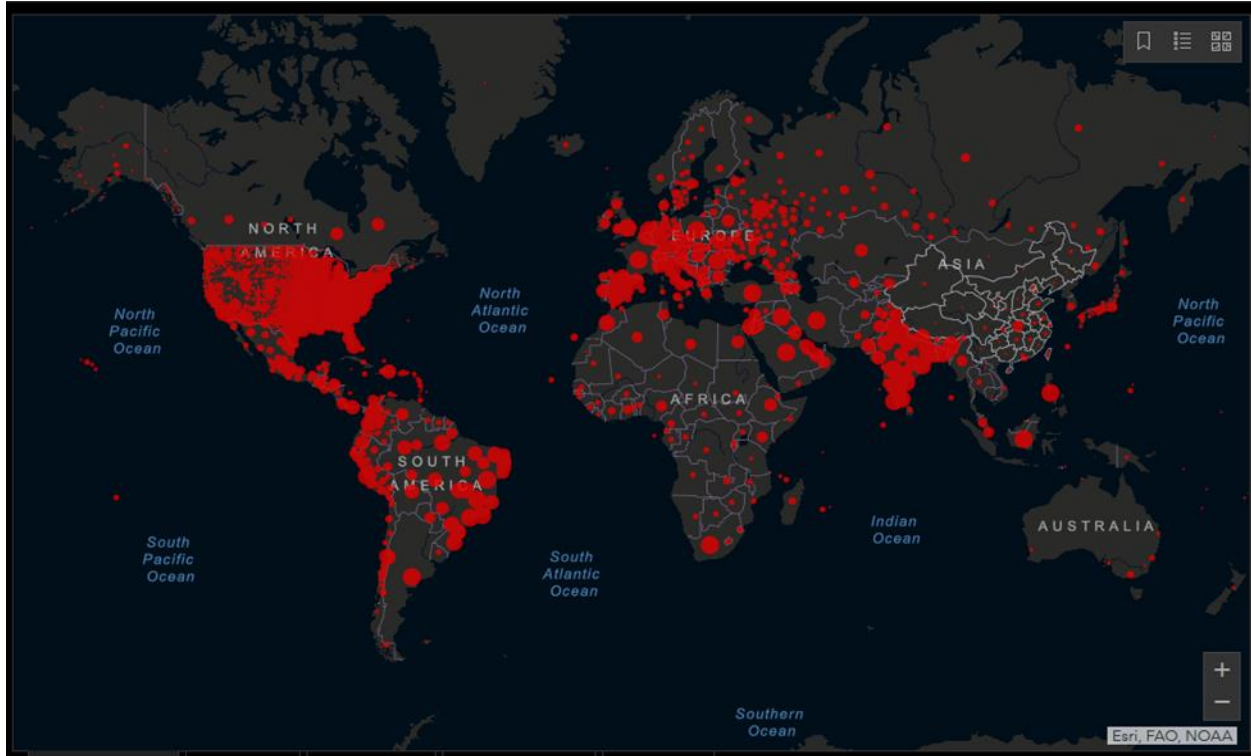


Figure 111. Map of Cumulative World COVID-19 Cases, Dec. 15, 2020. Source: John Hopkins University, <https://coronavirus.jhu.edu/map.html>.

The daily “new case” rate in the U.S. reached new record highs in December 2020 with more than 233,000 new cases recorded on Dec. 11, 2020. (Figure 112)

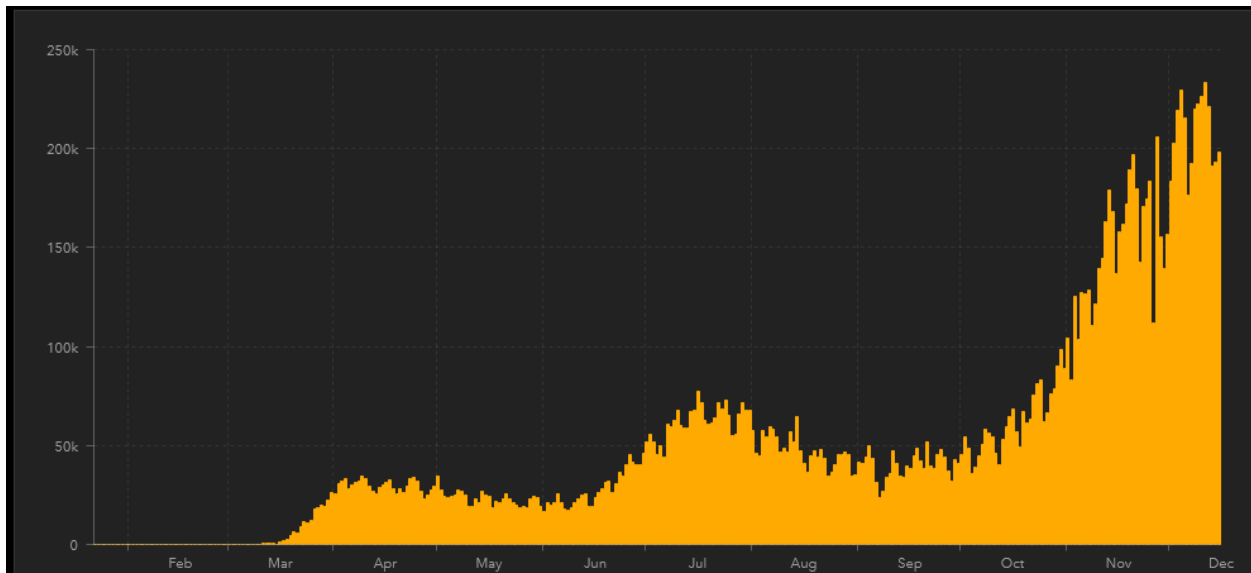


Figure 112. U.S. Daily Cases COVID-19, Dec. 15, 2020. Source: John Hopkins University

4.4.2 Three Forward-Looking Scenarios

While 16.9 million cases is a very significant number of cases, it only represents 5.1% of the U.S. population and suggests that the potential for the number of COVID-19 cases to get significantly larger certainly exists. The first vaccines were approved for emergency use in the U.S. and England in December 2020. More vaccine approvals are expected in the first half of 2021 and while the first priority for vaccination is healthcare workers, first responders, and the most vulnerable in long-term care nursing homes, widespread vaccination in the U.S. is expected to ramp up throughout 2021. Other intervention steps are likely to be employed by local, state and national governments over the foreseeable future. Many states still have quarantine restrictions in place for travelers. Many cities and states are initiating or re-instating restrictions on public gatherings, school attendance, operating hours and conditions for restaurants and bars, etc. Since mid-summer 2020, the disruptions to meat processing chains have been minimal, but infection rates in counties with major slaughter facilities are running at higher rates than neighboring counties.

Three forward-looking scenarios were developed for livestock and poultry production which project possible outcomes based on an expected-case scenario, a worst-case scenario and a best-case scenario.

The “expected case” is based on the USDA baseline early release tables released in November 2020. The projections are used as a starting point on the short-term forecasts from the Oct. 9, 2020 World Agricultural Supply and Demand Estimates report.

- Per capita beef consumption declines by 4.2% by 2022 then rises by 1.5% into 2025.
- Per capita pork consumption declines by 3.7% into 2022 then rises by 2.1% into 2025.
- Per capita chicken consumption rises by 2.4% from 2020 to 2025.
- Per capita turkey consumption declines by 3.0% from 2020 to 2025. (See Figure 113)
- Per capita egg consumption rises by 5.9% from 2020 to 2025.

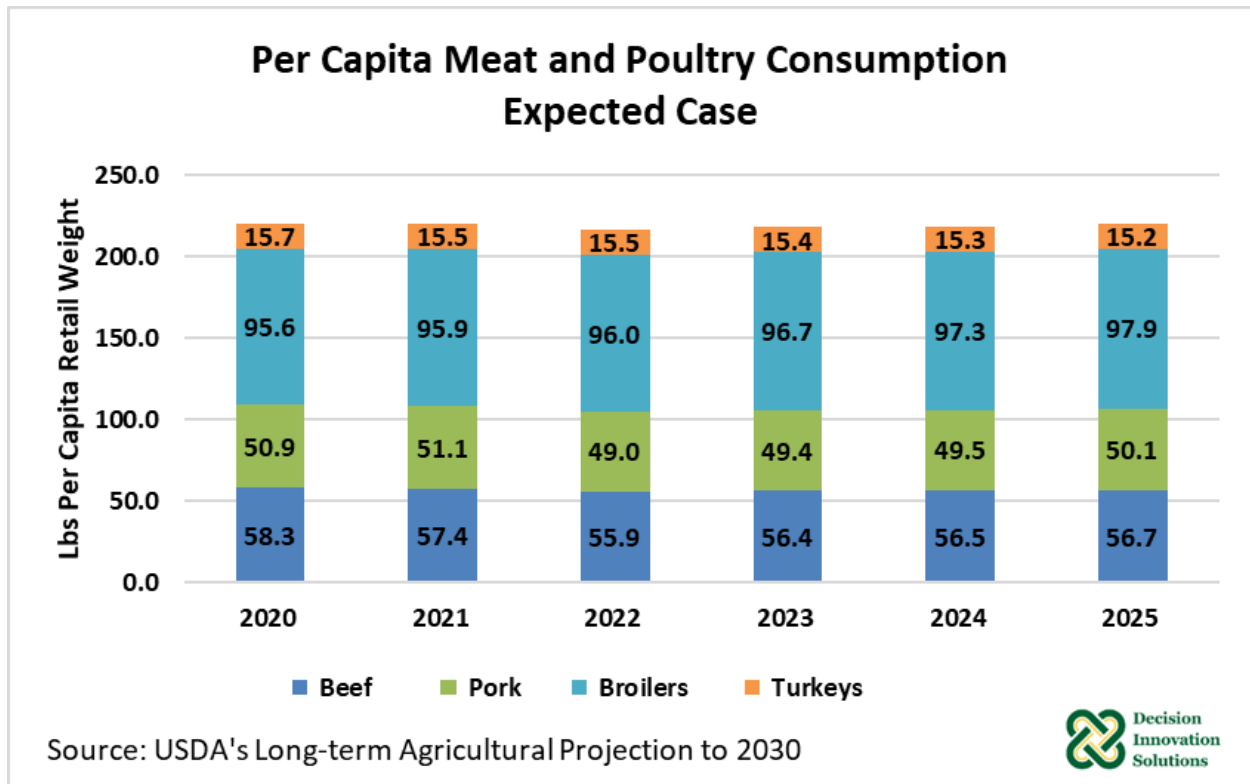


Figure 113. Per Capita Meat and Poultry Consumption, Expected Case

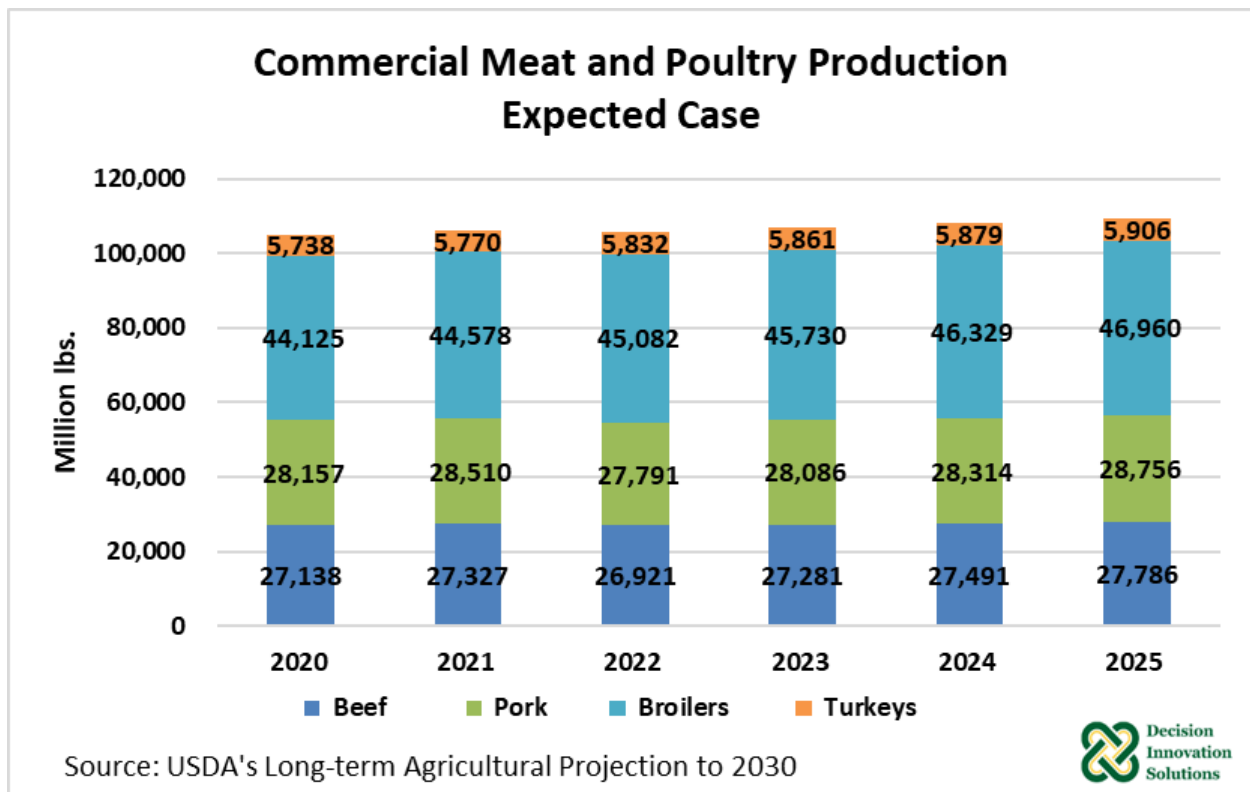


Figure 114. Commercial Meat and Poultry Production, Expected Case

- Commercial beef production rises by 2.4% from 2020 to 2025
- Commercial pork production rises by 2.1% from 2020 to 2025
- Broiler production rises by 6.4% from 2020 to 2025
- Turkey production rises by 2.9% from 2020 to 2025 (Figure 114)
- Egg production rises by 9.1% from 2020 to 2025
- Milk production rises by 5.6% from 2020 to 2025

- Corn production increases by 5.6% from 2020 to 2025
- Soybean production increases 10.9% from 2020 to 2025
- Wheat production increases by 4.7% from 2020 to 2025
- Sorghum production increases by 15.2% from 2020 to 2025
- Barley production increases by 5.9% from 2020 to 2025
- Cottonseed production increases by 15.2% from 2020 to 2025
- Rice production declines by 9.1% from 2020 to 2025
- Oats production increases by 4.0% from 2020 to 2025 (Figure 115)

Overall, crop production of these major crops increases by 6.7% from 2020 to 2026.

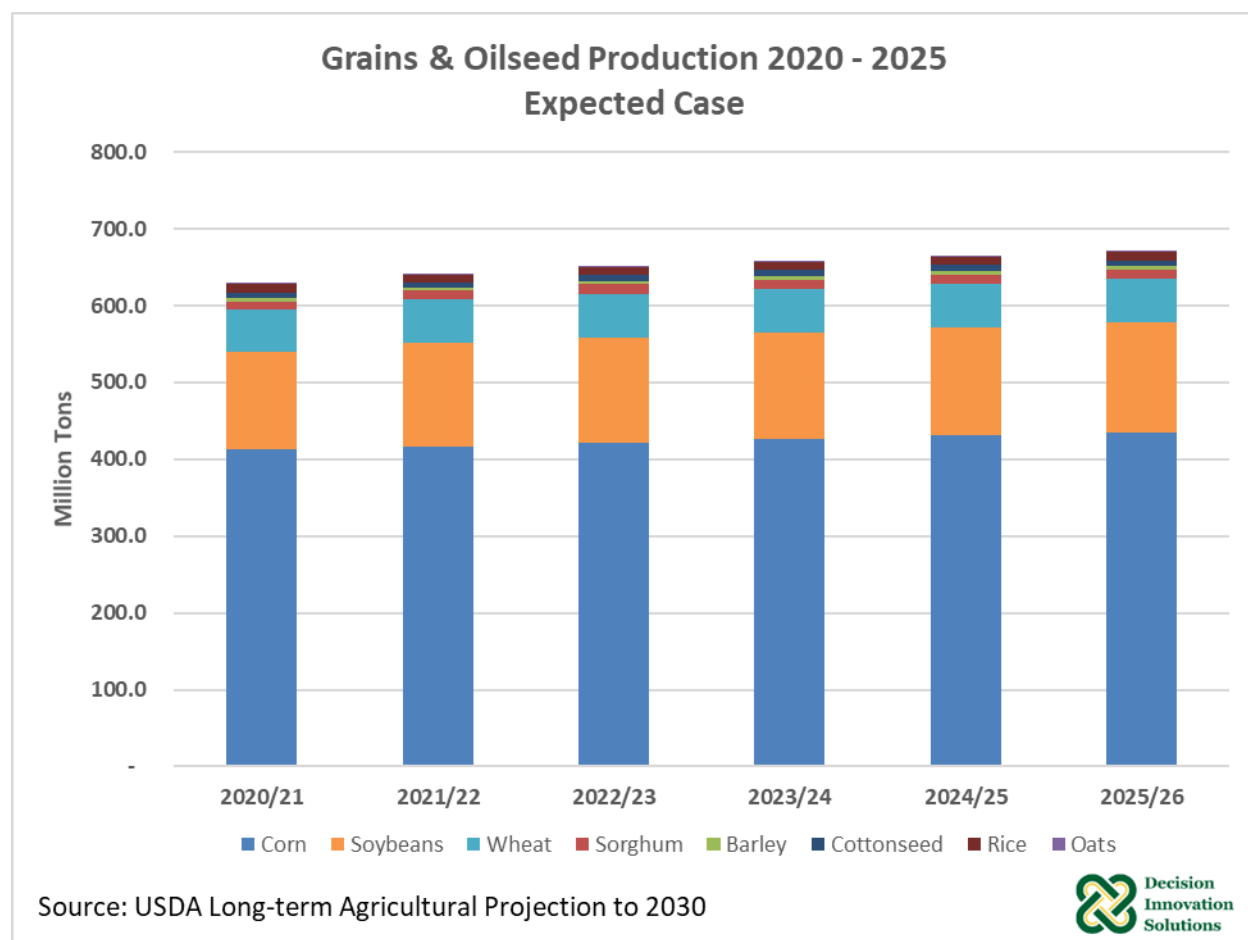


Figure 115. Grains & Oilseed Production 2020 - 2025, Expected Case

The “worst case” scenario is defined as:

- Intermittent slaughter facility disruptions return in 2021.
- Reductions in breeding herds and production occur in most major species.
 - Beef: Instead of a baseline reduction of 1% in the beef cow herd, it is reduced by 5% in 2021, then holds steady for a couple years before beginning a slow re-building pace in 2024.
 - Hogs: Instead of a baseline growth in inventory numbers of 1.72% to start 2021, it sees a 1% increase over January 2020, but hog numbers decline 7% during 2021, decline another 3% in 2022 and then begin to increase in 2024.
 - Broilers: Instead of a 1% growth in broiler production in 2021, broiler production drops by 3% in 2021, drops 2% in 2022 and then flattens out for the balance of the period.
 - Turkeys: Instead of a .55% increase in 2021, production drops by 1% in 2021, drops another 1% in 2022 and then levels out for the remainder of the period.
 - Eggs: Instead of a 1.5% increase in production, production in 2021 drops by 1% and remains at that level through the end of the period.
 - Milk: Instead of milk cow numbers increasing by 0.05% in 2021, milk cow numbers decline by 2% in 2021, decline by 1% in 2022 and then remain stable for the balance of the period.
- This scenario assumes exports of livestock and poultry products may experience some short-term disruptions in shipments but no disruptions that are worse than those experienced during 2020.

For the “Best Case” scenario, the assumptions would suggest that increased demand for products for hotels, restaurants and institutions (HRI) would stimulate more production throughout the year and that these improved conditions would carry through for a year or so with greater than baseline growth in nearly all livestock products. More specifically, the assumptions are:

- Increases in breeding herds and production occur in most major species.
 - Beef: Instead of a 1% decline in the beef herd, cow numbers remain stable in 2021 and slow growth is seen in each of the remaining years of the study period. This implies that heifer retention will be slightly higher than baseline and that heifer slaughter will be slightly less than the baseline, at least for the first two years of the scenario. Steer slaughter would be slightly higher in each year of the scenario.
 - Hogs: Hog inventory would increase each year of the scenario period beginning with a slightly higher beginning herd at the end of 2020 than included in the baseline and instead of declining by 2.5% during 2021, inventory during the year increases by 2% during the year, 1.5% in 2023 and 1% in the remaining years.
 - Broilers: Instead of a 1% baseline increase in production in 2021 and 2022, this scenario begins with a 1.5% increase in 2021 and 2022, then grows to a 2% increase during the remaining years.

- Turkeys: Instead of a 0.55% baseline increase in 2021, turkey production increases by 1% in 2021 and maintains that rate of increase through 2023 and then slows to trendline annual increases of 0.5% for the balance of the period.
- Eggs: With an opening up of HRI trade and travel, egg production in 2021 increases by 3% in 2021, 2.5% in 2022 and then holds at a 2% annual increase for the balance of the scenario.
- Milk: Dairy cow numbers increase by 1% in 2021, increase by 0.5% in 2022 and 2023 and then hold steady for the balance of the period.

4.4.3 Meat, Poultry and Dairy Production Scenario Results

Estimates for each of the three scenarios were calculated for each of the major food animal species/products. Figure 116 to Figure 121 show the year-over-year percentage changes for production of each of these. It should be noted that changes in beef and pork production do not align perfectly with changes in the underlying changes in the breeding herds or inventories of cattle and hogs since more beef and pork are produced in the year when herd liquidation is happening, and less beef and pork are produced when heifers and gilts are retained for expansion of the breeding herd and pulled out of current marketing channels.

In the best-case scenario for beef production, beef demand for HRI trade returns to pre-pandemic levels, exports increase, and retail demand remains strong. In the worst-case scenario, HRI trade drops from 2020 levels, exports remain sluggish and herd reduction begins which greatly affects beef production in the subsequent years.

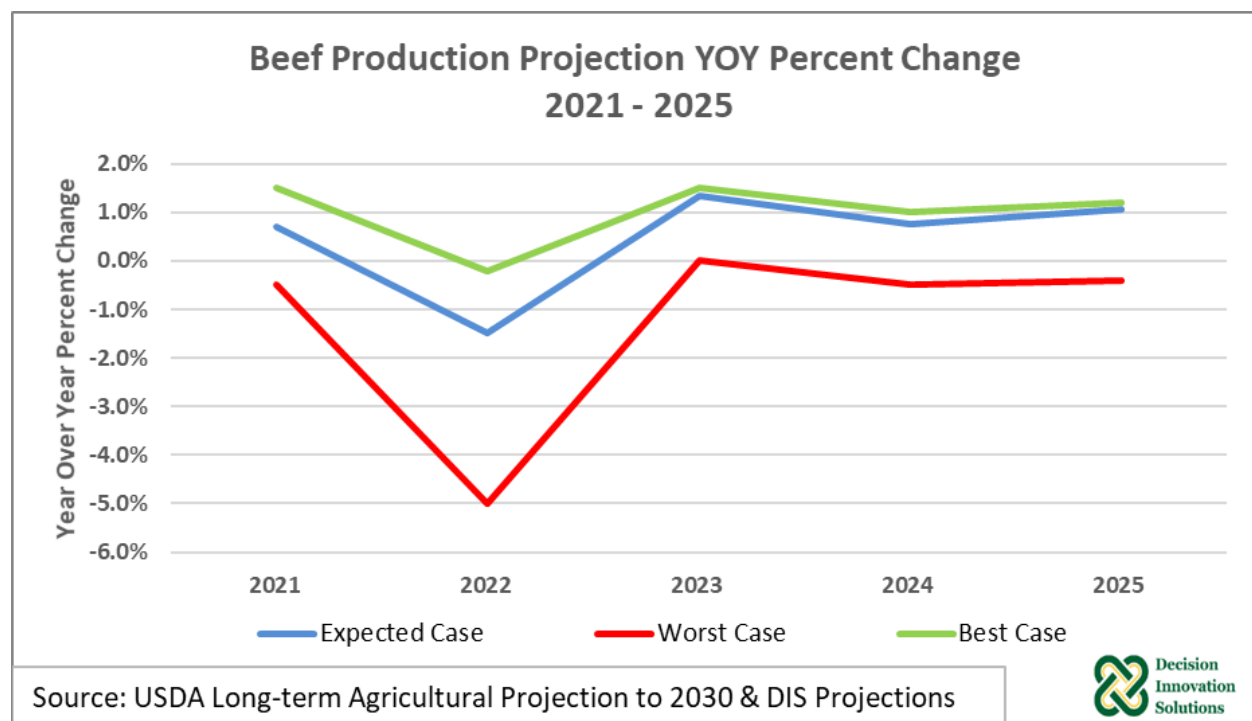


Figure 116. Beef Production Projection YOY Percent Change 2021-2025

In the best-case scenario for pork production, HRI trade returns to normal, exports to China continue to improve and breeding herd expansion resumes in 2021 creating more production in the subsequent years. In the worst-case scenario, HRI trade continues to decline in 2021, herd reduction is seen in 2021 and 2022 which leads to sharply lower production in 2023 and 2024 before returning to pre-pandemic levels by 2025.

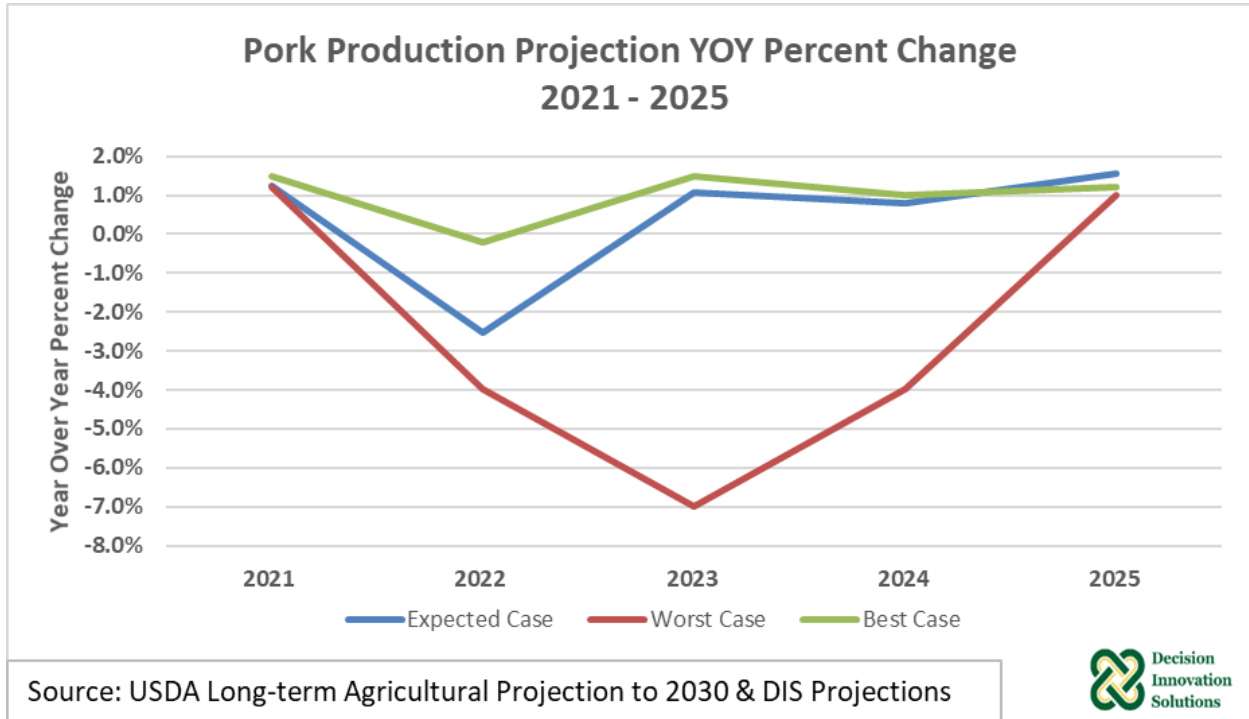


Figure 117. Pork Production Projection YOY Percent Change, 2021 – 2025

In the best-case scenario for broiler production, recovery from the depressed production levels of 2020 exceeds expectations and reflects increased demand of HRI trade and growth in exports. In the worst-case scenario, HRI trade continues to decline into 2021 and 2022 and export demand remains stable to weak. There is no growth in production during the 5-year period, but production stabilizes in 2023 and remains below baseline expectations throughout the 5-year period.

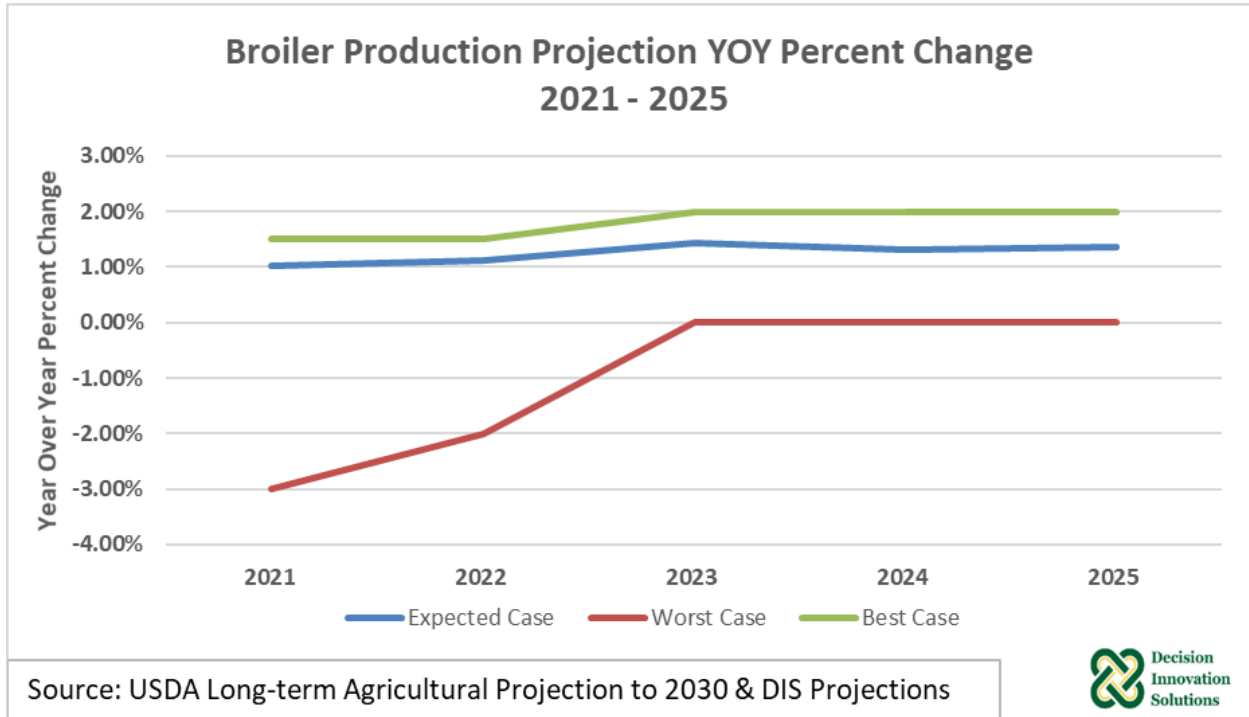


Figure 118. Broiler Production Projection YOY Percent Change, 2021 – 2025

In the best-case scenario for turkey production, increases from production levels of 2020 exceeds expectations and reflects increased demand of HRI trade. In the worst-case scenario, HRI trade continues to decline into 2021 and 2022 and export demand is weak. There is no growth in production during the 5-year period, but production stabilizes in 2023 and remains below baseline expectations throughout the 5-year period.

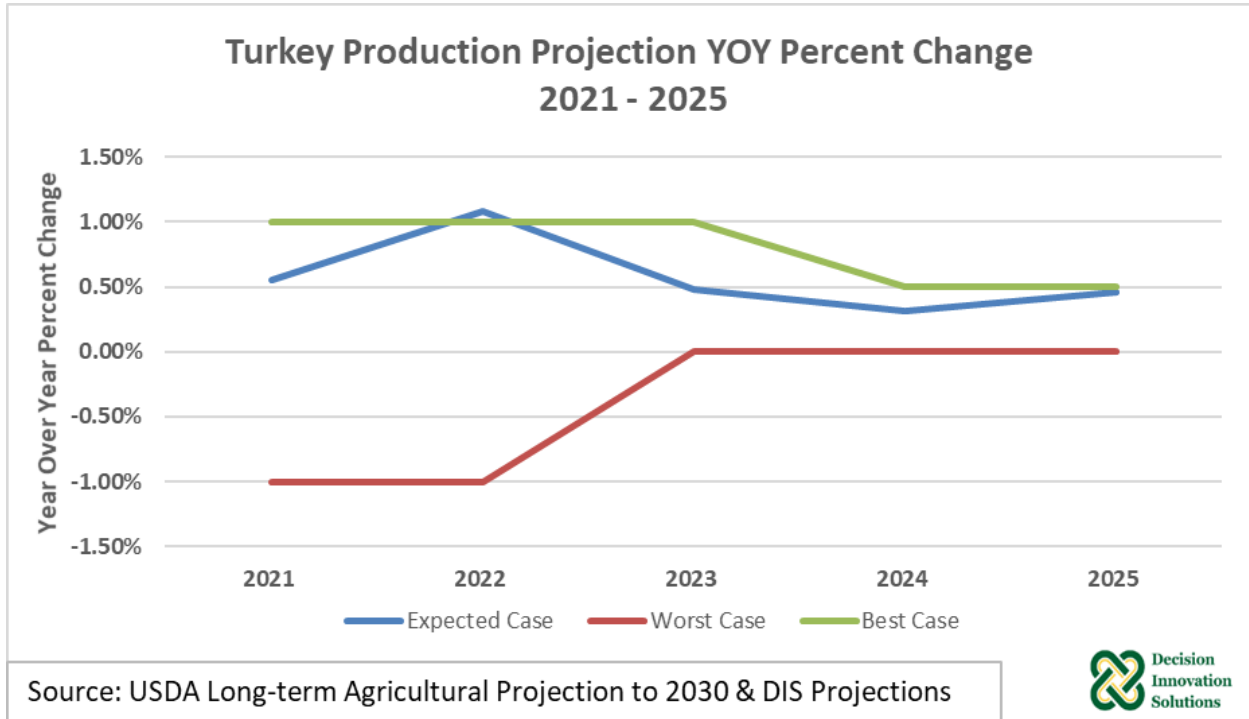


Figure 119. Turkey Production Projection YOY Percent Change, 2021 – 2025

In the best-case scenario for egg production, recovery from the depressed production levels of 2020 exceeds expectations and reflects increased demand of HRI trade. In the worst-case scenario, HRI trade continues to decline into 2021 and demand remains stable to weak. There is no growth in production during the 5-year period until 2025, but production stabilizes in 2022 and remains below baseline expectations throughout the 5-year period.

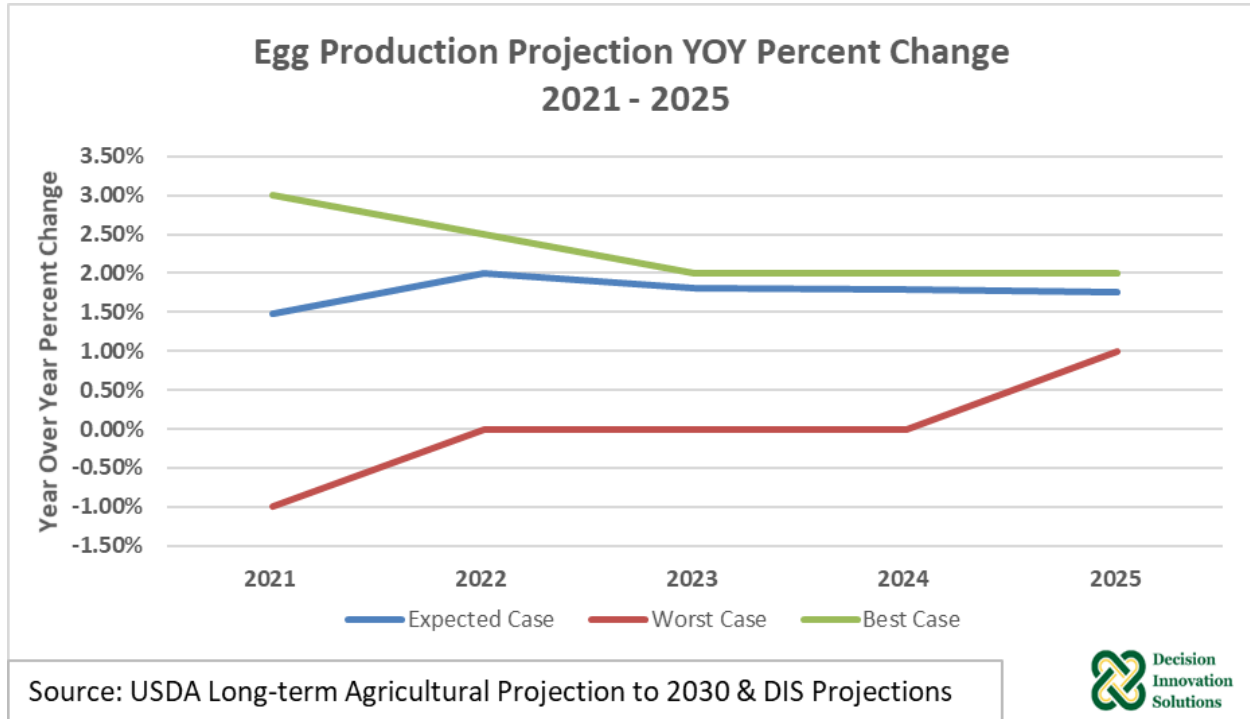


Figure 120. Egg Production Projection YOY Percent Change, 2021 – 2025

In the best-case scenario for dairy production, milk production sees expansion beyond the baseline and exceeds baseline expectations until 2024. This would reflect increased demand of HRI trade and growth in exports. In the worst-case scenario, HRI trade continues to decline into 2021 and 2022 and export demand remains stable to weak. There is no growth in production during the 5-year period, but production stabilizes in 2023.

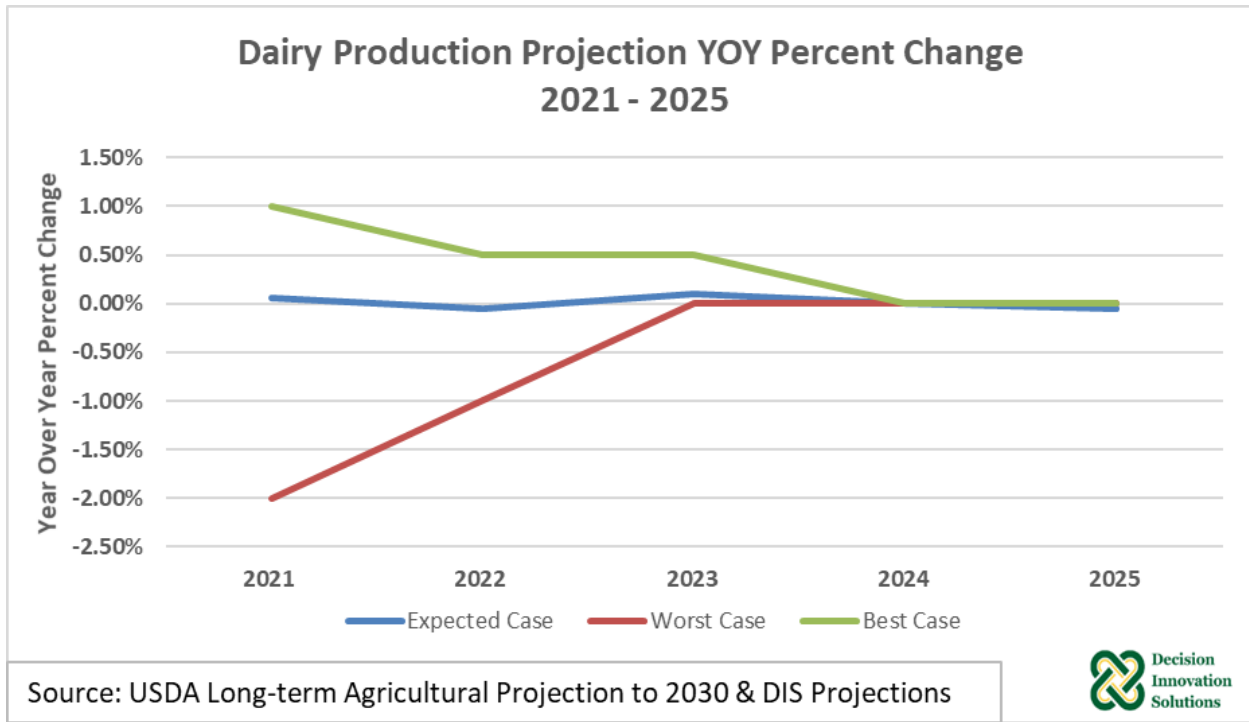


Figure 121. Dairy Production Projection YOY Percent Change, 2021 – 2025

4.4.4 Feed Consumption Projections, 2021 – 2025

Total feed consumption for the three scenarios is shown in Figure 122.

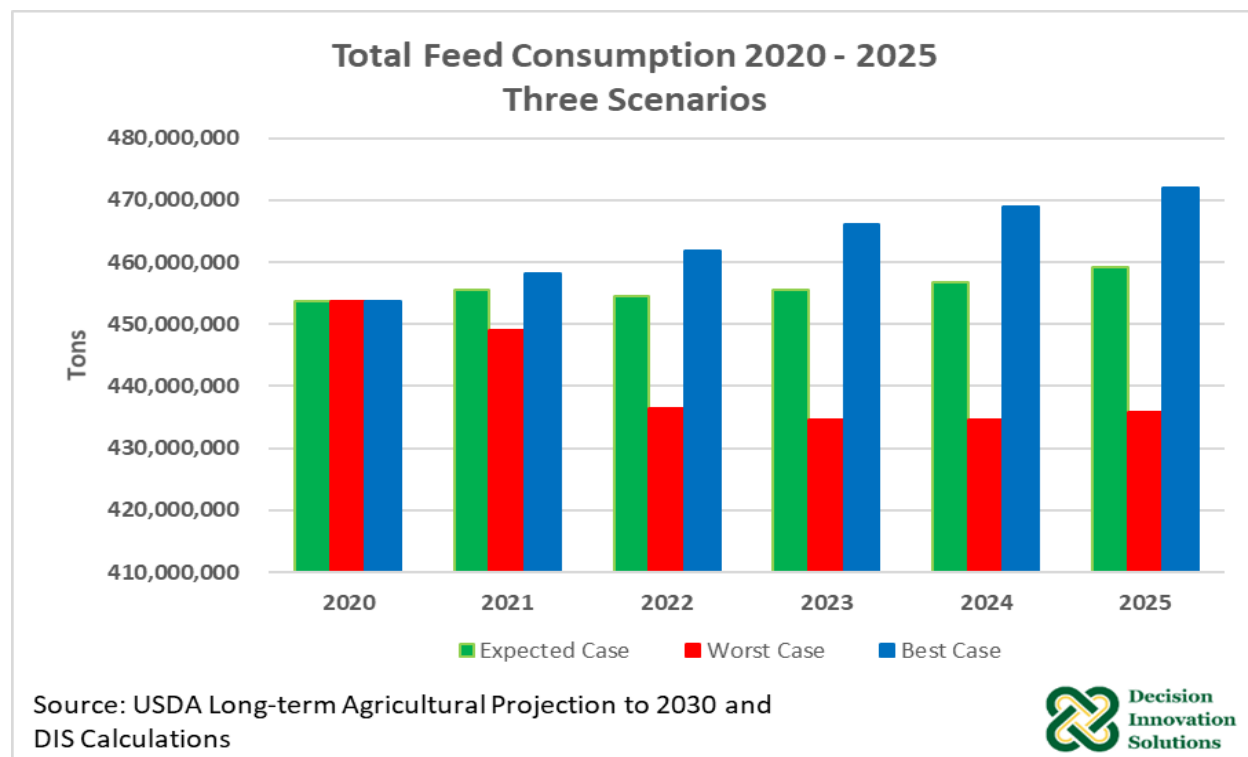


Figure 122. Total Feed Consumption 2020 - 2025, Three Scenarios

Changes in animal numbers and feed consumption (with forages) were calculated for each of the three scenarios based on the changes in projected production. For beef, changes in beef cow inventories and cattle on-feed were estimated. For dairy, changes in dairy cow numbers were estimated. For pork production, changes in sow numbers and market hogs were estimated. For broiler, turkey and egg production, changes in production are directly used to calculate changes in feed consumption.

Under the expected-case scenario, total feed consumption (with forages) rises from 453.8 million tons in 2020 to 459.2 million tons in 2025. In the worst-case scenario, total feed consumption drops from 453.8 million tons in 2020 to 434.5 million tons in 2023 before rising to 435.9 million tons in 2025. In the best-case scenario, total feed consumption rises from 453.8 million tons in 2020 to 472.1 million tons by 2025.

Figure 123 to Figure 134 show the feed consumption by feed grouping for 2020 to 2025 for each of the scenarios.

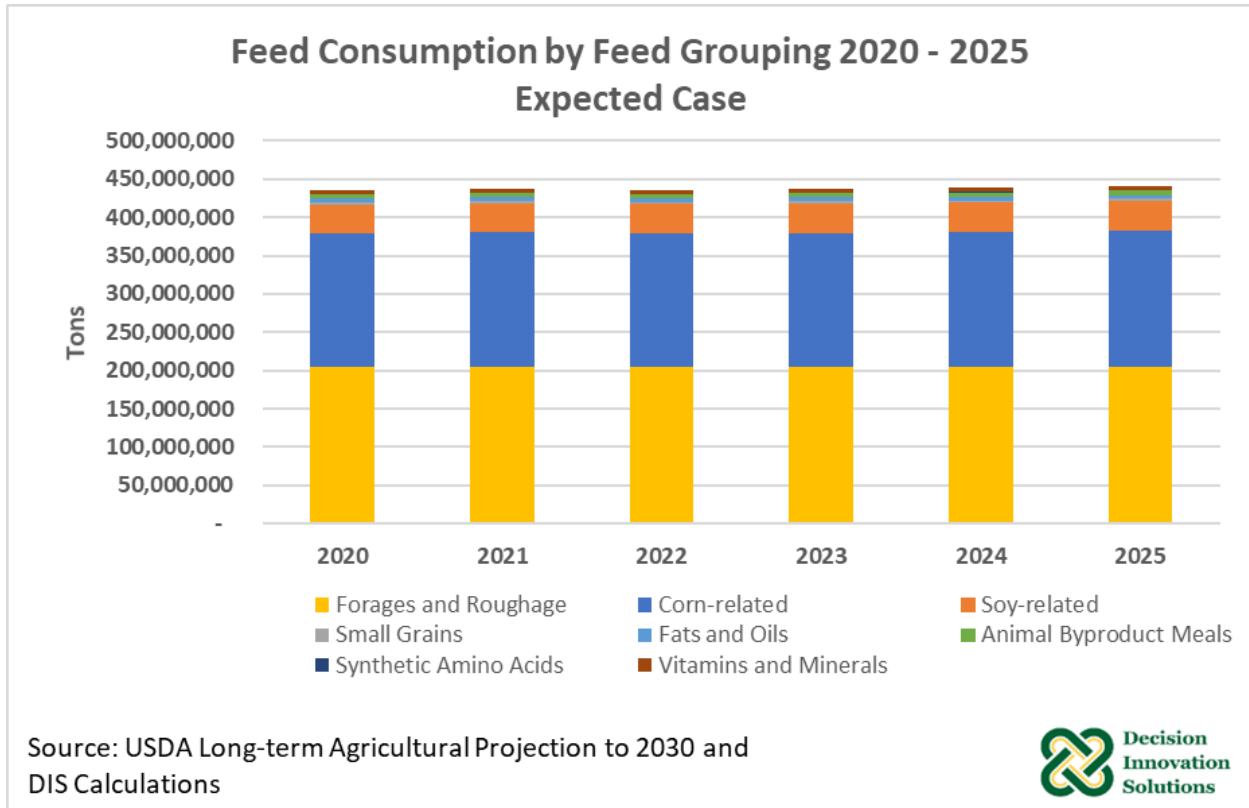


Figure 123. Feed Consumption by Feed Grouping 2020 - 2025, Expected Case

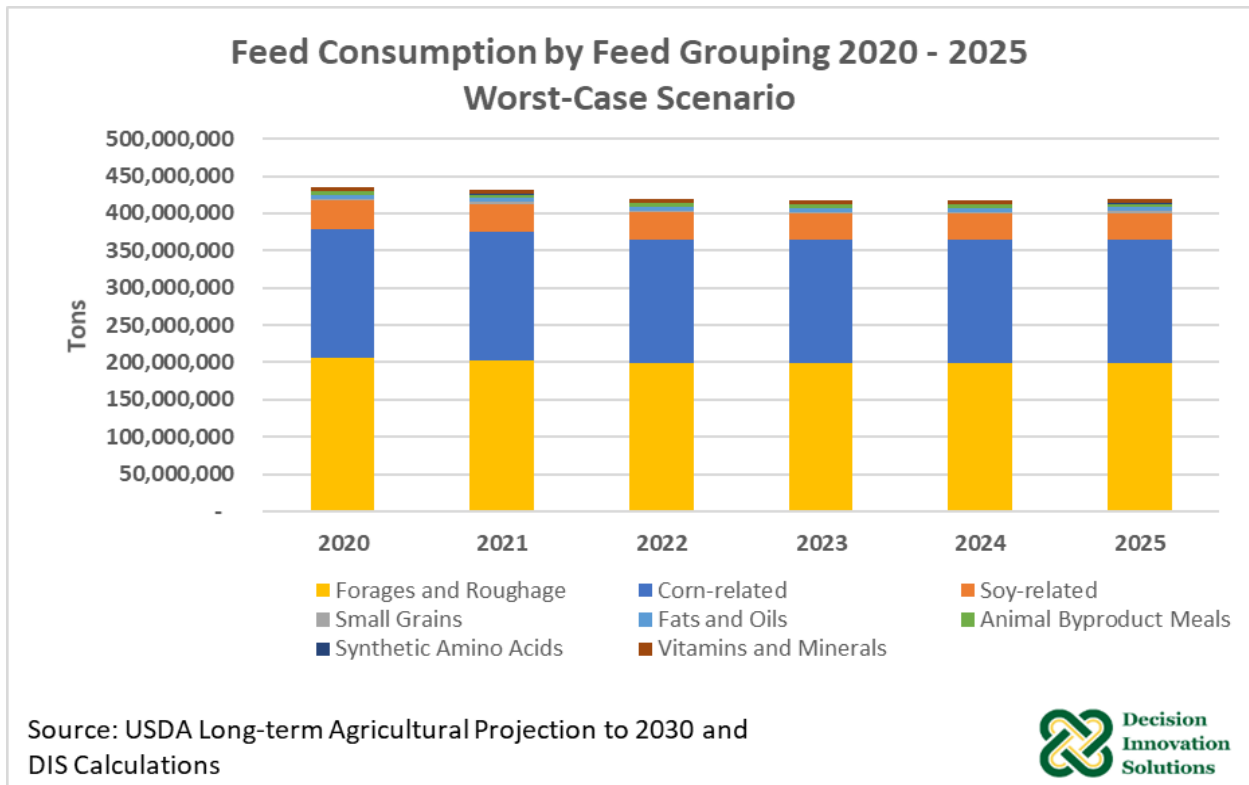


Figure 124. Feed Consumption by Feed Grouping 2020 - 2025, Worst-Case Scenario

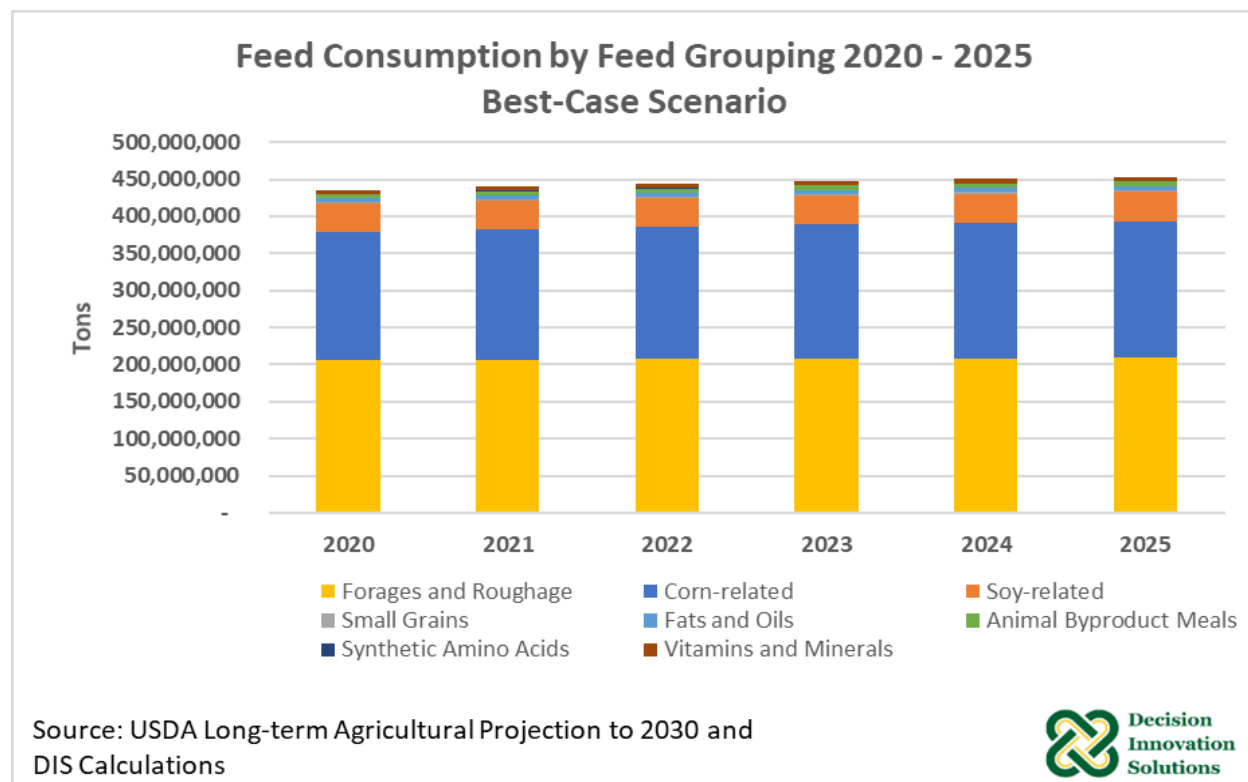


Figure 125. Feed Consumption by Feed Grouping 2020 - 2025, Best-Case Scenario

4.4.4.1 Feed Consumption by Sub-category Projections, 2021-2025

Figure 135 through Figure 134 show the feed consumption by sub-category projections for 2021 through 2025.

In general, corn and corn-related product consumption (Figure 126) in the expected case and the best-case scenario are projected to increase across the 5-year period. Consumption of corn-related products is expected to decline in the worst-case scenario, dropping nearly 10 million tons per year below the baseline projection by 2023 and ending up nearly 12 million tons lower than the expected case by 2025.

Soy-related feed consumption (Figure 127) rises by nearly 2 million tons in the expected case by 2025, rises by nearly 3 million tons in the best-case scenario by 2025, but declines by approximately 1.5 million tons in the worst-case scenario by 2025.

Small grains feed consumption (Figure 128) is essentially stable in the expected case, rises by nearly 200,000 tons by 2025 in the best-case scenario, and declines by nearly 200,000 tons by 2023 in the worst-case scenario before beginning a modest recovery.

Processed plant byproduct feed consumption (Figure 129) rises gradually during the expected-case scenario, increasing about 400,000 tons by 2025. In the best-case scenario, consumption of processed plant byproduct feeds rises by nearly a million tons by 2025. In the worst-case scenario, consumption of processed plant byproduct feeds declines by more than 700,000 tons by 2024 before beginning a gradual recovery.

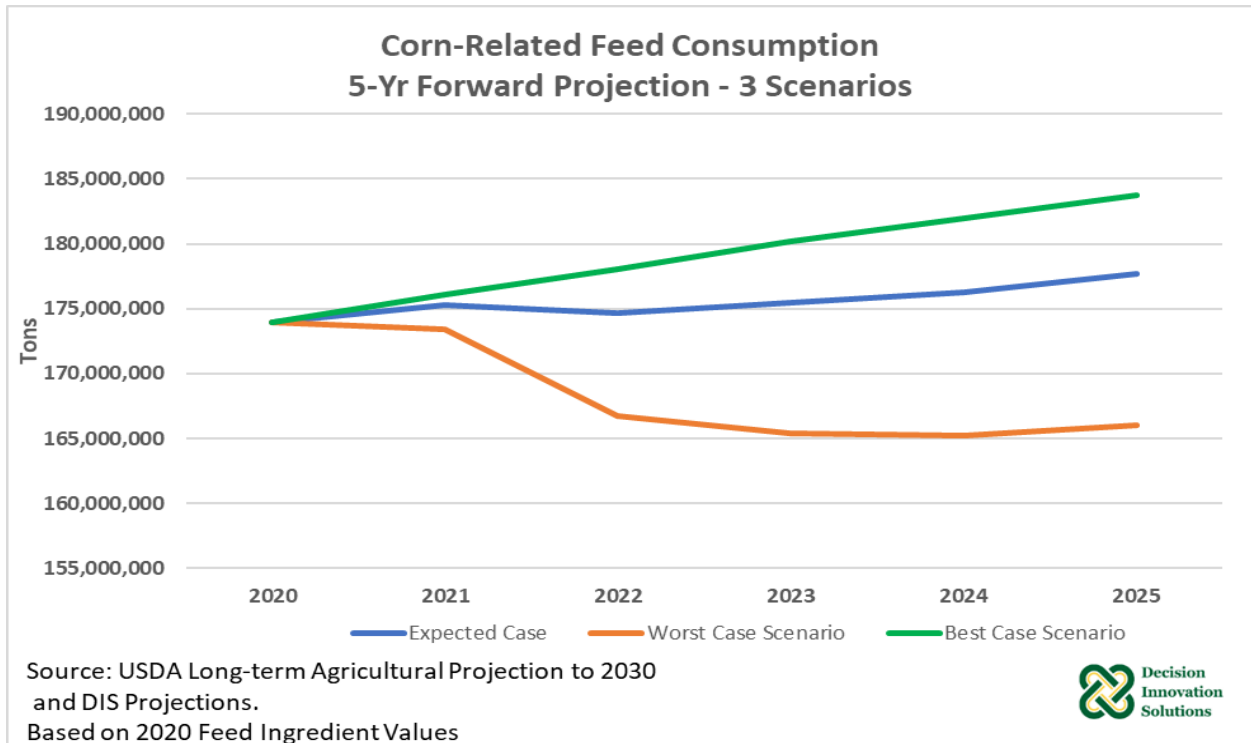


Figure 126. Corn-Related Feed Consumption, 5-Yr Forward Projection - 3 Scenarios

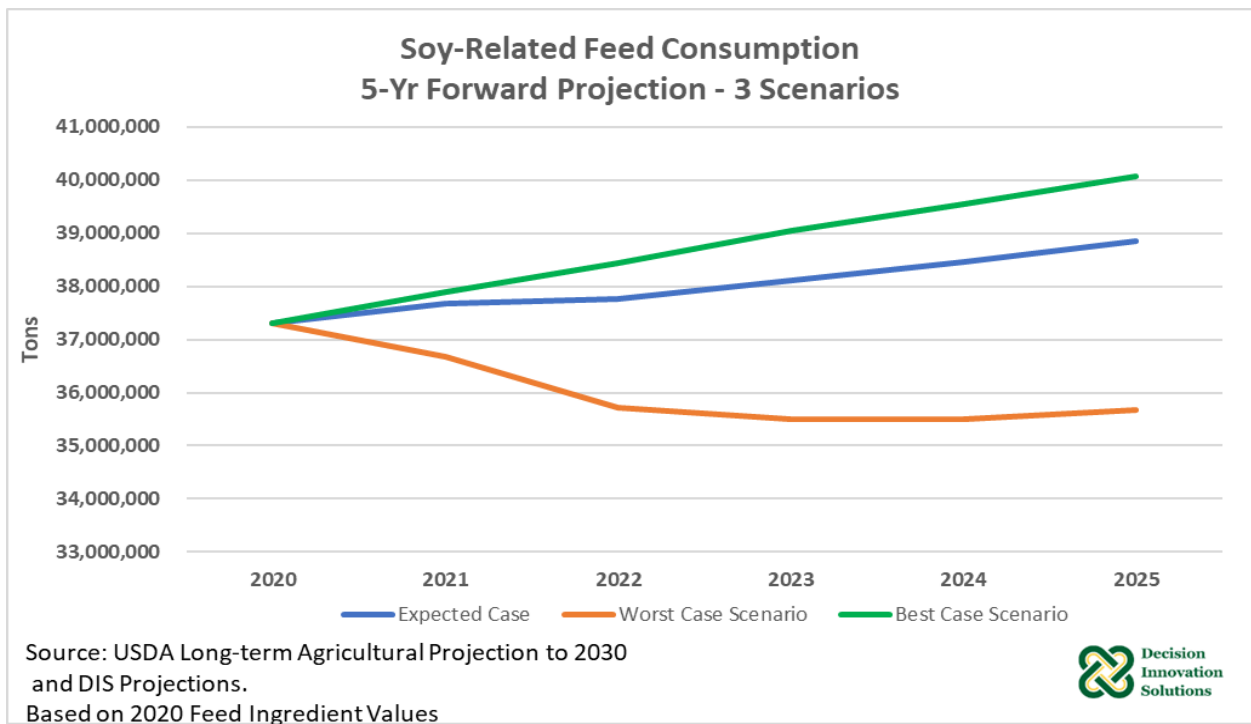


Figure 127. Soy-Related Feed Consumption, 5-Yr Forward Projection - 3 Scenarios

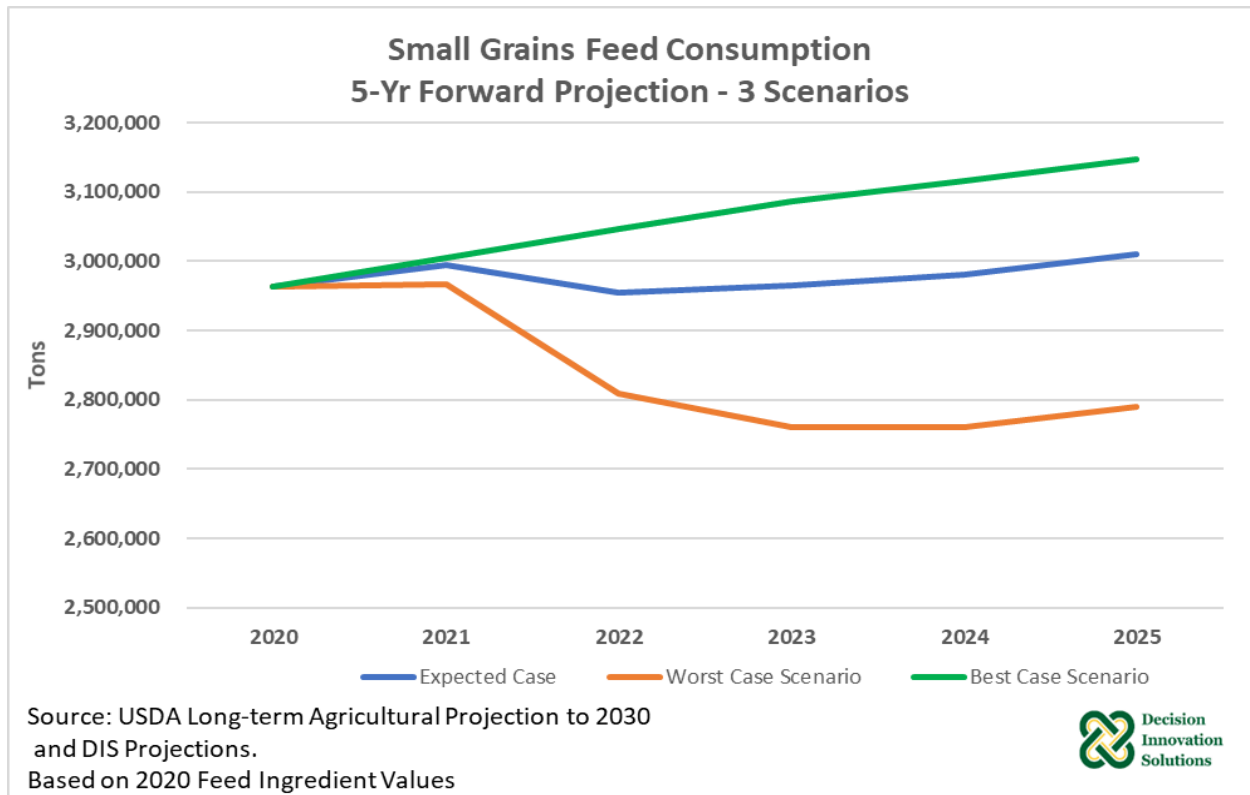


Figure 128. Small Grains Feed Consumption, 5-Yr Forward Projection - 3 Scenarios

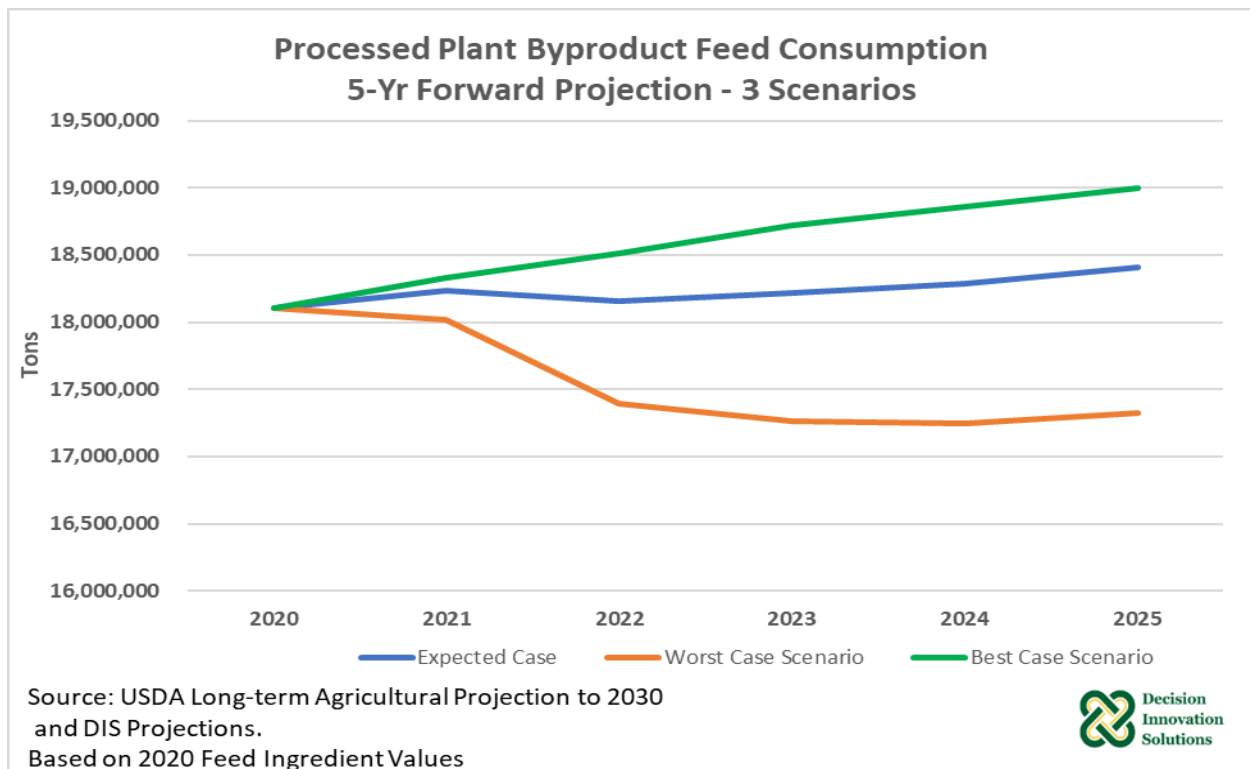


Figure 129. Processed Plant Byproduct Feed Consumption, 5-Yr Forward Projection - 3 Scenarios

Consumption of animal byproduct meal feeds (Figure 130) rises by slightly more than 100,000 tons by 2025 in the expected-case scenario. In the best-case scenario, consumption rises by nearly 300,000 tons. In the worst-case scenario, consumption of animal byproduct meal feeds declines by approximately 240,000 tons by 2023, then begins a gradual recovery into 2025.

Consumption of fats and oils in feeds (Figure 131) rises by approximately 100,000 tons by 2025 under the expected-case scenario. In the best-case scenario, consumption of fats and oils in feeds rises by nearly 250,000 tons by 2025. In the worst-case scenario, consumption of fats and oils in feeds declines by 270,000 tons by 2023 before gradually increasing into 2025.

Consumption of synthetic amino acids in feeds (Figure 132) increases by 22,000 tons by 2025 in the expected-case scenario. In the best-case scenario, consumption of synthetic amino acids in feeds rises by 43,000 tons by 2025. In the worst-case scenario, consumption of synthetic amino acids in feeds declines by 34,000 tons by 2023 before gradually increasing into 2025.

Vitamin and mineral consumption in feeds (Figure 133) increases by approximately 300,000 tons by 2025 in the expected-case scenario. In the best-case scenario, consumption of vitamins and minerals in feeds increases by approximately 500,000 tons by 2025. In the worst-case scenario, consumption of vitamins and minerals in feeds declines by approximately 200,000 tons by 2023 before beginning a gradual recovery.

By 2025, consumption of forages and roughage feeds (Figure 134) declines by slightly more than a million tons in the expected-case scenario. Consumption of forages and roughage feeds increases by nearly 2 million tons in the best-case scenario by 2025. In the worst-case scenario, consumption of forages and roughage feeds declines by more than 7 million tons by 2022 then begins a very slow recovery into 2025.

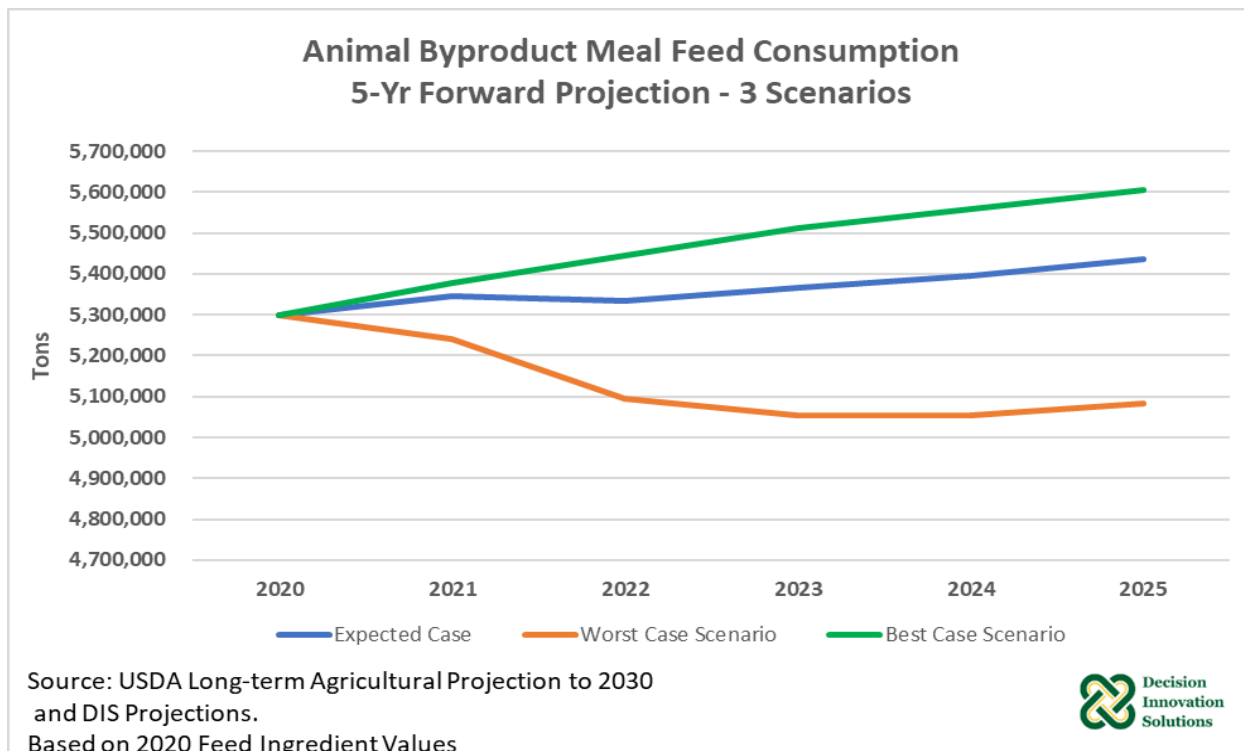


Figure 130. Animal Byproduct Meal Feed Consumption, 5-Yr Forward Projection - 3 Scenarios

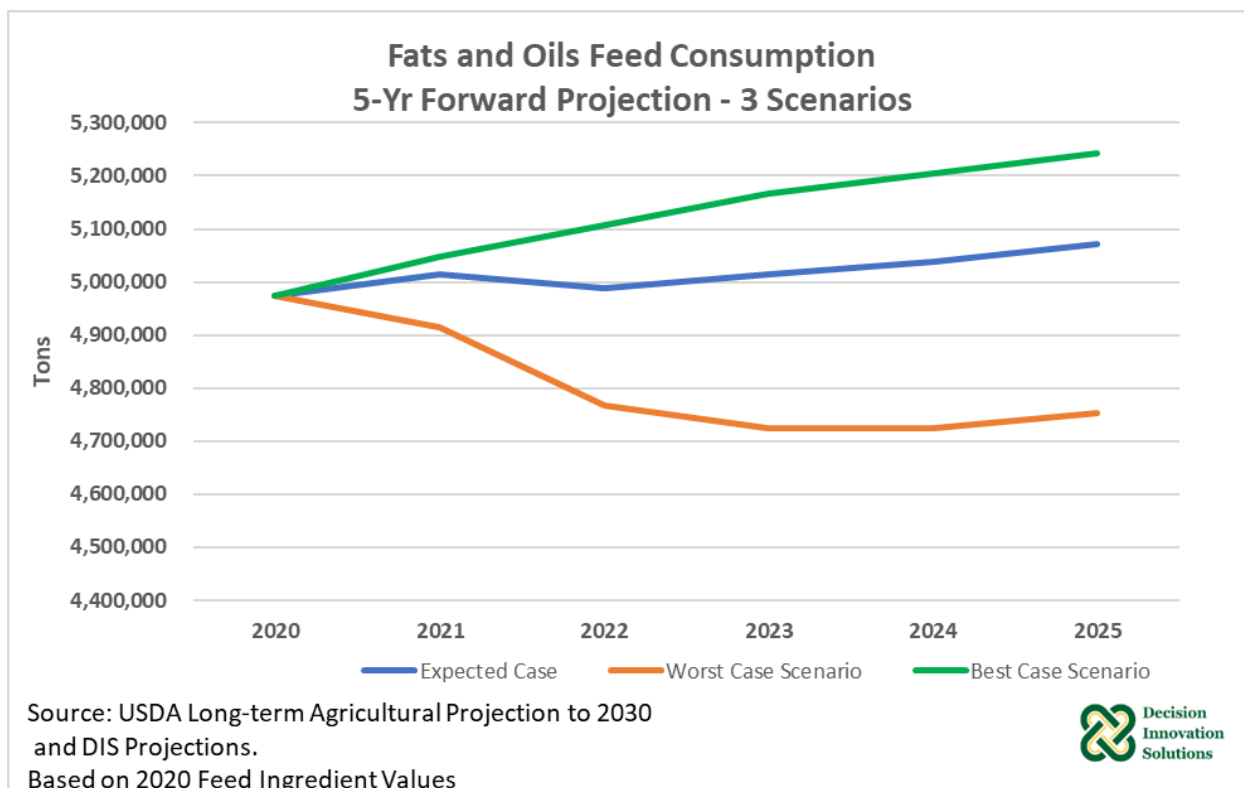


Figure 131. Fats and Oils Feed Consumption, 5-Yr Forward Projection - 3 Scenarios

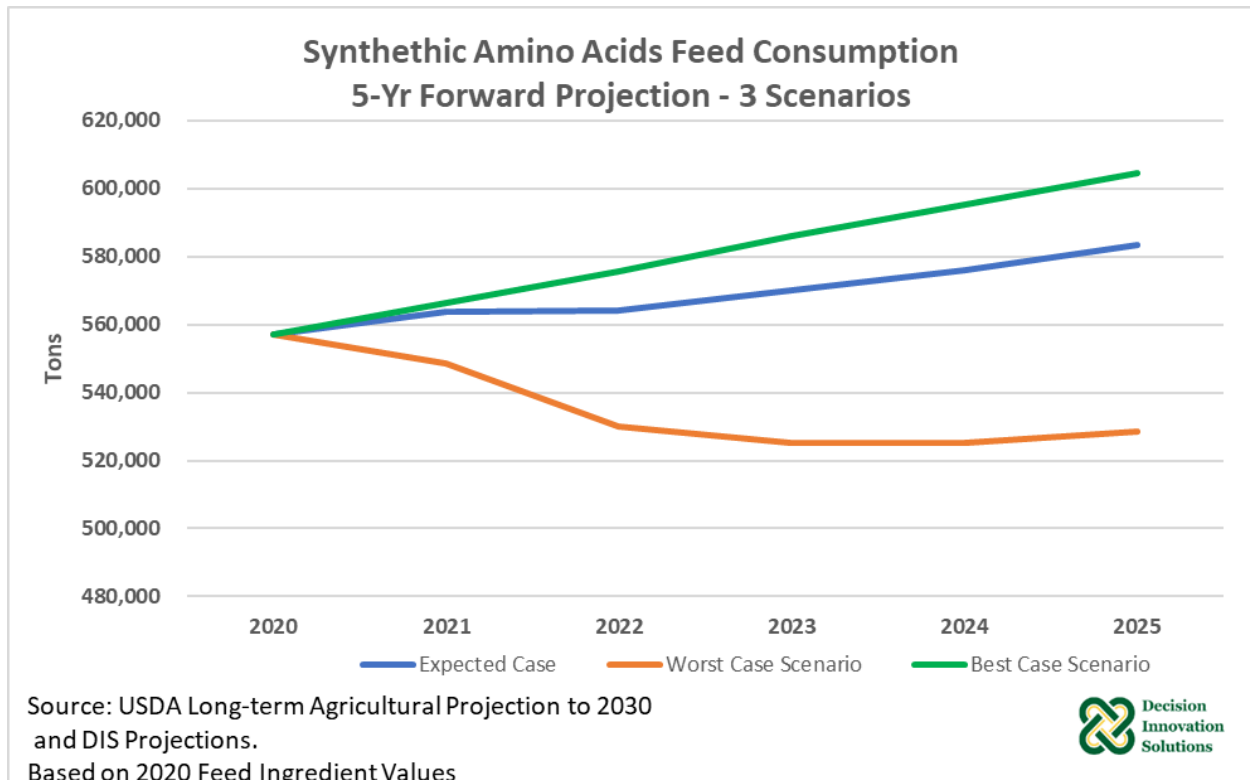


Figure 132. Synthetic Amino Acids Feed Consumption, 5-Yr Forward Projection - 3 Scenarios

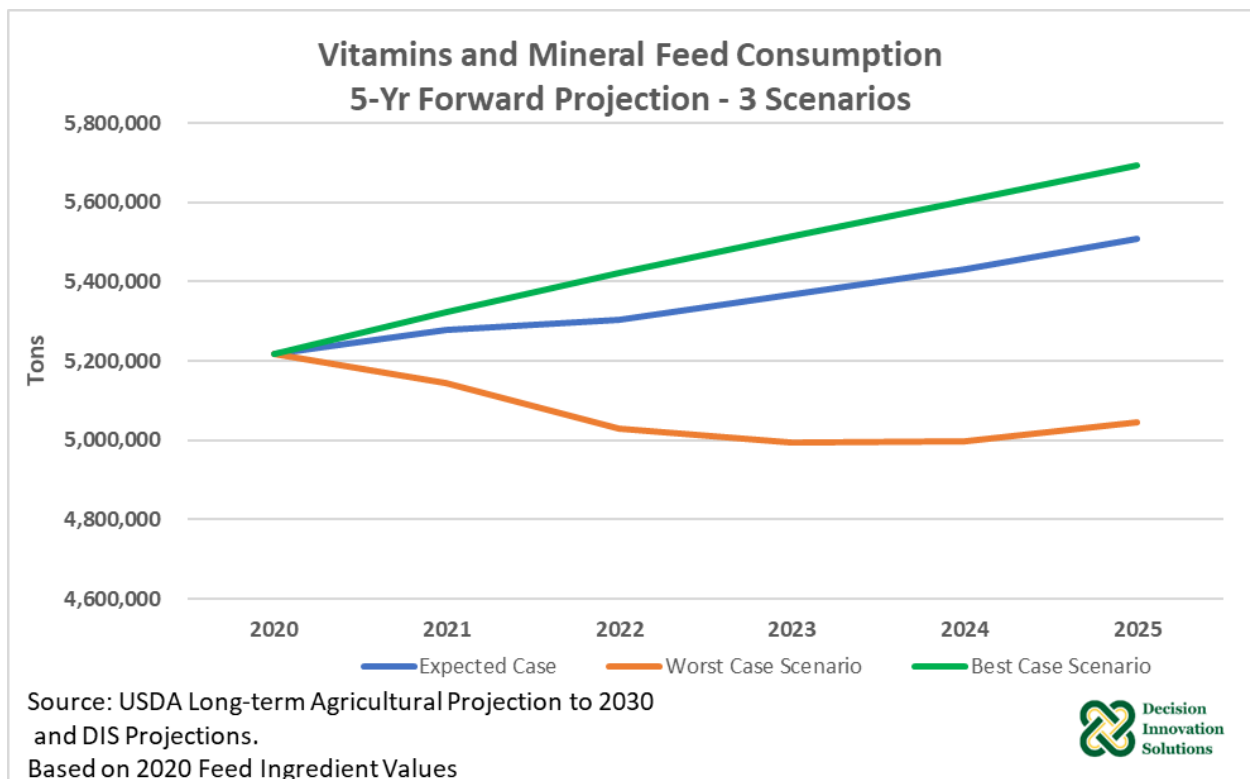


Figure 133. Vitamins and Mineral Feed Consumption, 5-Yr Forward Projection - 3 Scenarios

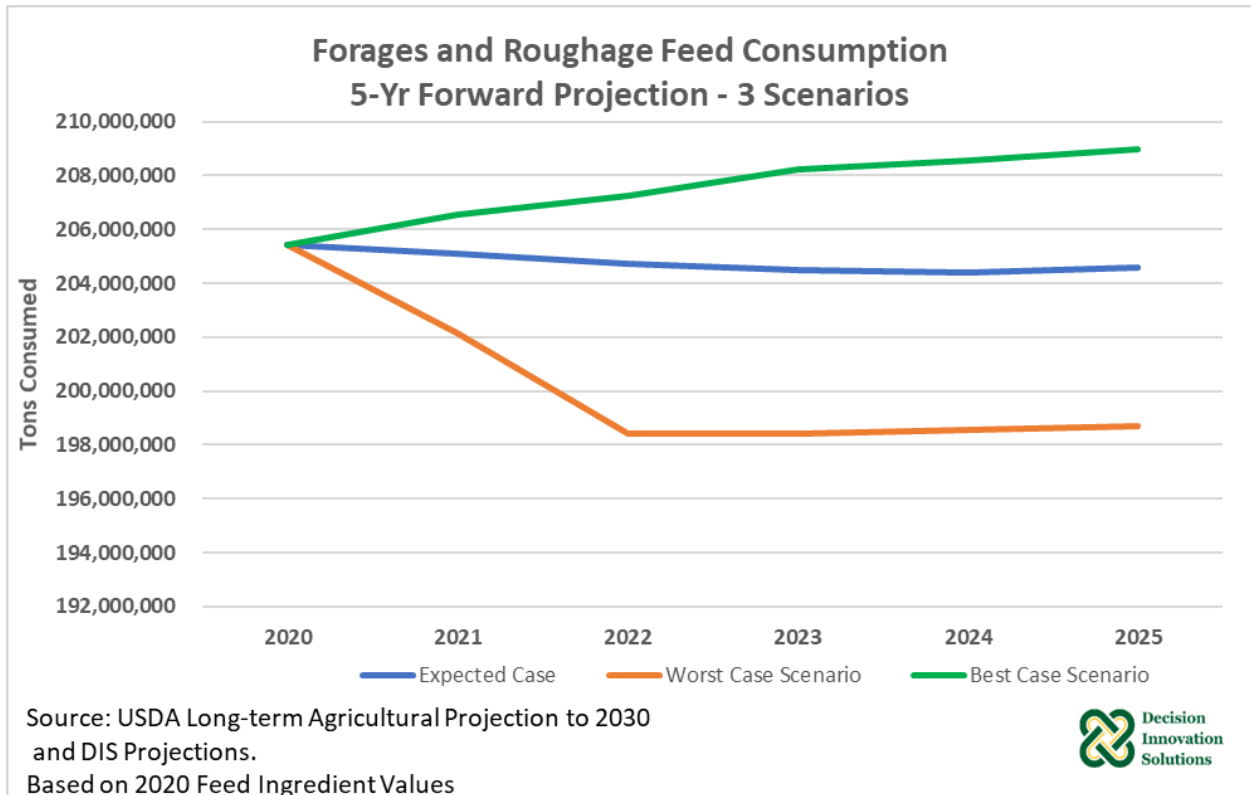


Figure 134. Forages and Roughage Feed Consumption, 5-Yr Forward Projection - 3 Scenarios

4.4.5 Value of Feed Consumption, Three Scenarios

A summary of the total value of feed consumed (with forages) in the three scenarios is shown in Figure 135 and without forages in Figure 136. Values for feed ingredients in Figure 135 through Figure 139 are based on 2020 prices.

Under the expected case, the value of feed (with forages) consumed rises from \$65.0 billion in 2020 to \$66.3 billion by 2025. Under the worst-case scenario, the total value of feed consumed drops from \$65.0 billion in 2020 to \$62.1 billion in 2023 and slowly rises to \$62.4 billion by 2025. Under the best-case scenario, the total value of feed consumed rises from \$65.0 billion in 2020 to \$68.2 billion by 2025.

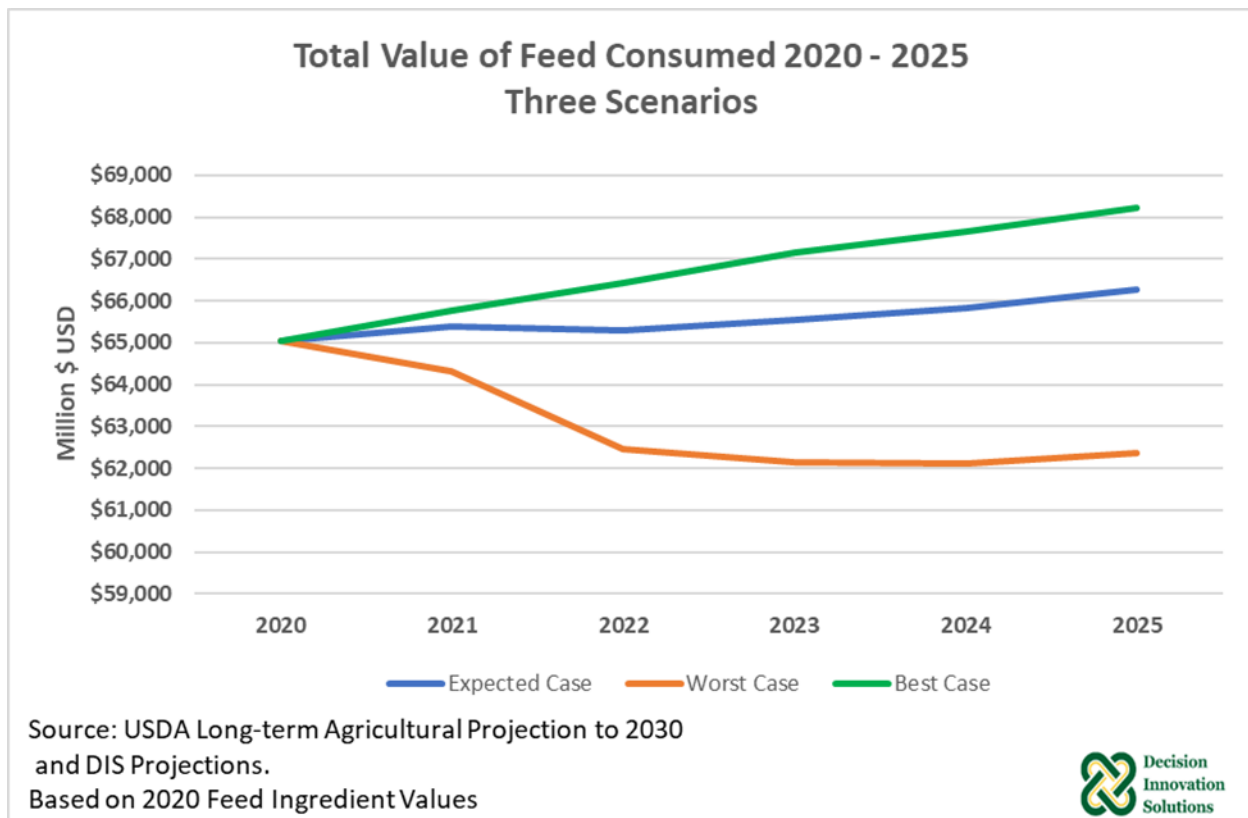


Figure 135. Total Value of Feed Consumed (with forages), 2020 - 2025, Three Scenarios

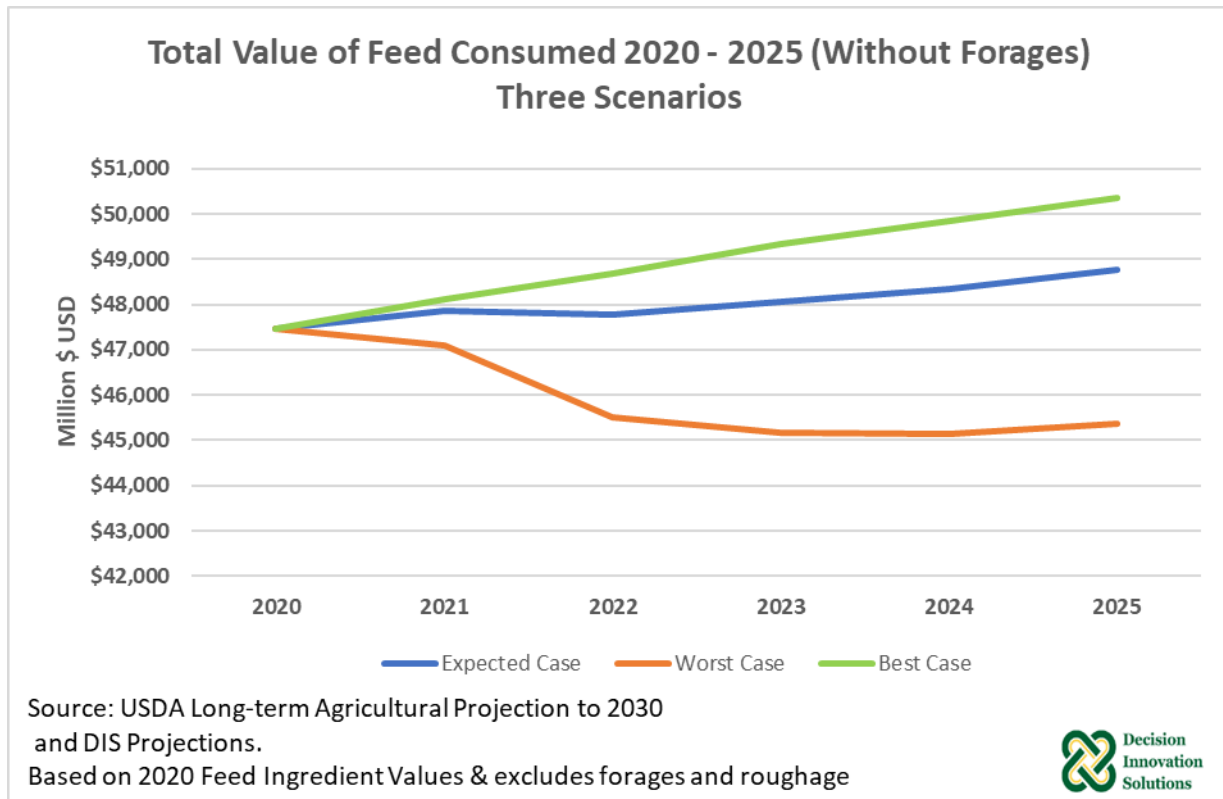


Figure 136 Total Value of Feed Consumed 2020 - 2025 (Without Forages)

Under the expected case, the value of feed (without forages) consumed rises from \$47.4 billion in 2020 to \$48.8 billion by 2025. Under the worst-case scenario, the total value of feed consumed drops from \$47.5 billion in 2020 to \$45.2 billion in 2023 and slowly rises to \$45.4 billion by 2025. Under the best-case scenario, the total value of feed consumed rises from \$47.5 billion in 2020 to \$50.4 billion by 2025.

Figure 137 through Figure 139 show the total value of feed consumed by feed grouping for the 2020 to 2025 period for three scenarios.

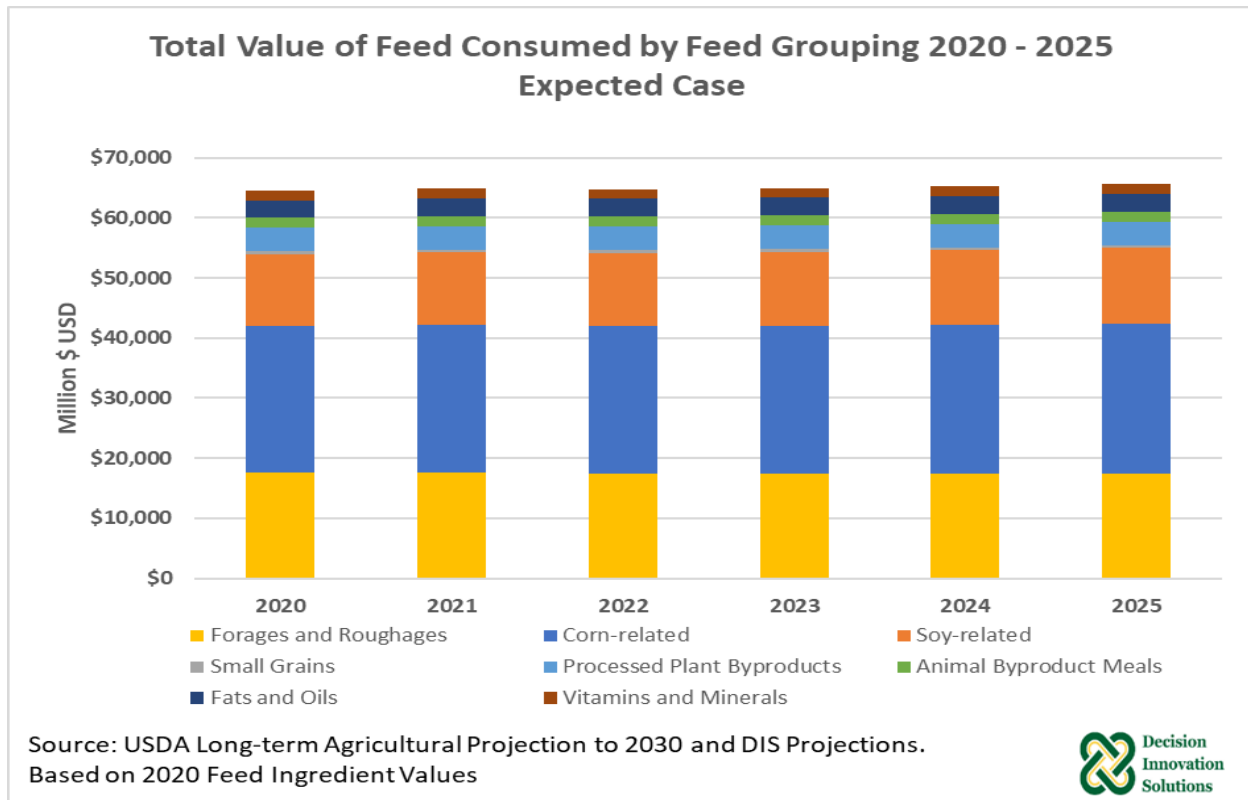


Figure 137. Total Value of Feed Consumed by Feed Grouping, 2020-2025, Expected Case

In the expected-case scenario (Figure 137) total value of corn-related feeds rises from \$24.4 billion in 2020 to \$24.9 billion in 2025; the total value of soy-related feeds rises from \$12.0 billion in 2020 to \$12.6 billion in 2025; the total value of small grains rises from \$464 million in 2020 to \$469 million in 2025; the total value of processed plant byproducts rises from \$3.90 billion in 2020 to \$3.95 billion in 2025; the total value of animal byproduct meals rises from \$1.65 billion in 2020 to \$1.70 billion in 2025; the total value of fats and oils rises from \$2.93 billion in 2020 to \$2.98 billion in 2025; the total value of synthetic amino acid feeds rises from \$569 million in 2020 to \$593 million in 2025, the total value of vitamins and minerals rises from \$1.55 billion in 2020 to \$1.64 billion in 2025; and the total value of forages and roughage feeds declines from \$17.55 billion in 2020 to \$17.50 billion in 2025.

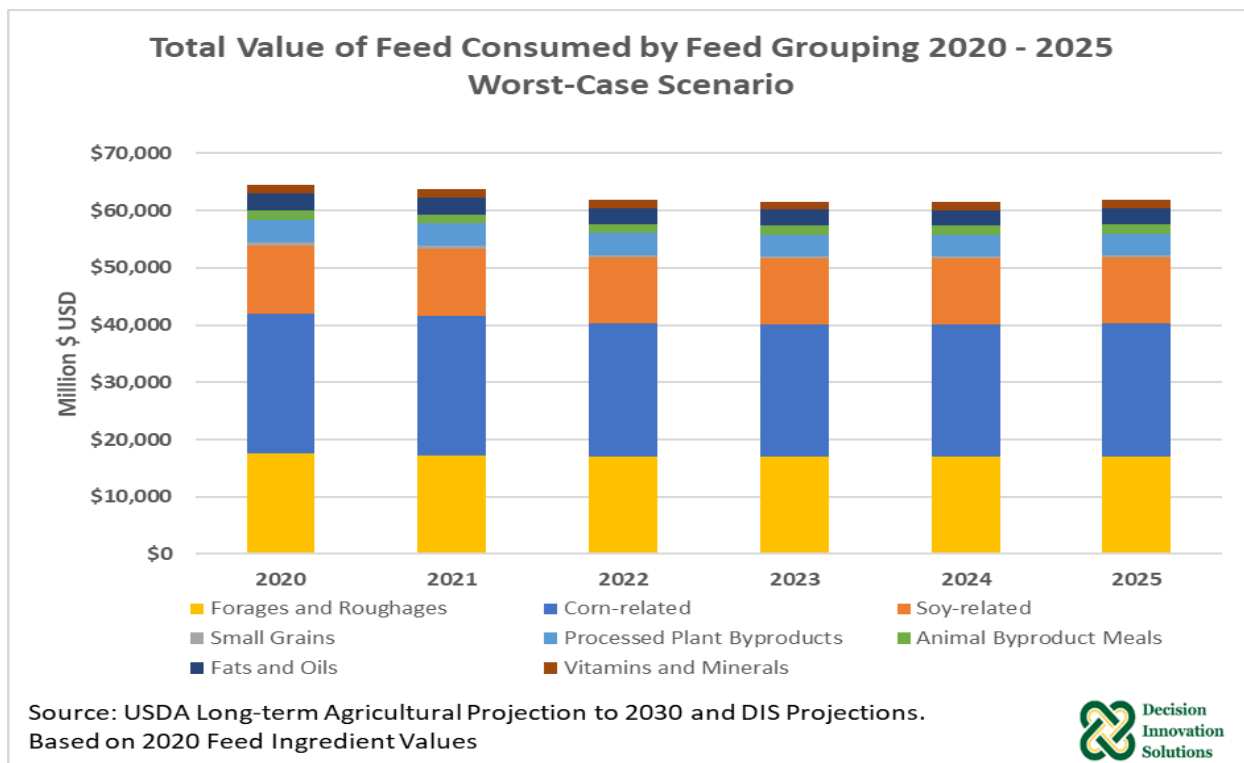


Figure 138. Total Value of Feed Consumed by Feed Grouping, 2020 - 2025, Worst-Case Scenario

For the worst-case scenario (Figure 138), the total value of corn-related feeds declines from \$24.4 billion in 2020 to \$23.3 billion by 2025; the total value of soy-related feeds declines from \$12.0 billion in 2020 to \$11.5 billion in 2025; the total value of small grains in feeds declines from \$464 million in 2020 to \$438 million in 2025; the total value of processed plant byproduct feeds declines from \$3.9 billion in 2020 to \$3.7 billion in 2025; the total value of animal byproduct meal feeds declines from \$1.65 billion in 2020 to \$1.58 billion in 2025; the total value of farms and oils in feeds declines from \$2.93 billion in 2020 to \$2.80 billion in 2025; the total value of synthetic amino acids in feeds declines from \$569 million in 2020 to \$537 million in 2025; the total value of vitamins and minerals in feeds declines from \$1.55 billion in 2020 to \$1.49 billion in 2025; and the total value of forages and roughage in feeds declines from \$17.55 billion to \$16.99 billion in 2025

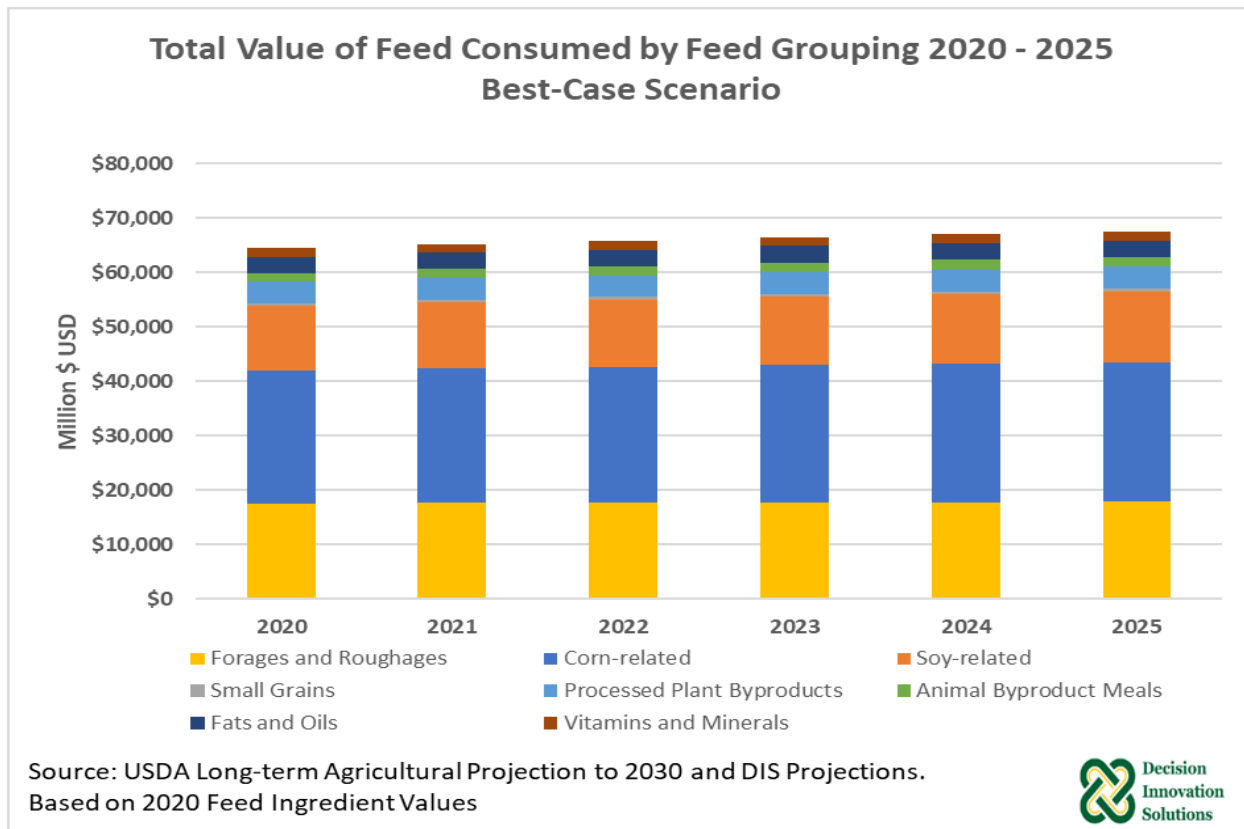


Figure 139. Total Value of Feed Consumed by Feed Grouping, 2020 - 2025, Best-Case Scenario

In the best-case scenario (Figure 139) total value of corn-related feeds rises from \$24.4 billion in 2020 to \$25.7 billion in 2025; the total value of soy-related feeds rises from \$12.0 billion in 2020 to \$13.0 billion in 2025; the total value of small grains rises from \$464 million in 2020 to \$489 million in 2025; the total value of processed plant byproducts rises from \$3.90 billion in 2020 to \$4.06 billion in 2025; the total value of animal byproduct meals rises from \$1.65 billion in 2020 to \$1.75 billion in 2025; the total value of fats and oils rises from \$2.93 billion in 2020 to \$3.08 billion in 2025; the total value of synthetic amino acid feeds rises from \$569 million in 2020 to \$616 million in 2025, the total value of vitamins and minerals rises from \$1.55 billion in 2020 to \$1.69 billion in 2025; and the total value of forages and roughage feeds increases from \$17.55 billion in 2020 to \$17.87 billion in 2025.

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6 Appendices

6.1 Appendix A, 2019 Animal Feed Consumption Tables

6.1.1 Totals

Summary tables for a given species:

- **Total corn-related ingredients:** corn, DDGs, wet distillers grains, corn gluten feed/meal and hominy feed, and grain sorghum.
- **Total soy-related ingredients:** soybean meal, soy hulls and soybean seeds.
- **Total small grains:** barley, oats, millet and wheat.
- **Total processed plant byproducts:** almond hulls, bakery byproducts and meal, canola meal, cottonseed, cottonseed meal, potato tubers, potato peels, potato pulp, rice mill feed, rice bran, sunflower meal, wheat flour, wheat middlings and wheat bran.
- **Total animal byproduct meals:** meat and bone meal, meat meal, feather meal, blood meal, porcine meal, poultry byproduct meal, whey permeate and fishmeal.
- **Total fats and oils:** corn oil, soybean oil, inedible tallow, yellow grease, choice white grease, lecithin, fish oil, and poultry fat, animal-based fats and plant-based fats.
- **Total synthetic amino acid:** lysine, threonine, DL-methionine and tryptophan.
- **Total harvested forages and roughage:** corn silage, legume silage, alfalfa hay, other hay and corn stalks (stover).
- **Vitamins and Minerals:** dicalcium phosphate, limestone, monocalcium phosphate, potassium chloride, salt, minerals, vitamins and phytase.

State (All Numbers are in Short Tons)	Corn	Corn DDGs	Corn Gluten Feed/Meal	Hominy Feed	Wheat	Sorghum	Barley	Oats	Cottonseed
Alabama	4,599,854	471,792	16,333	6	4,228	989	1,656	44,570	9,401
Alaska	22,537	4,295	2,283	1	408	3,127	190	8,872	-
Arizona	1,270,718	1,079,813	89,646	389	11,563	3,712	2,433	65,824	123,432
Arkansas	5,387,975	486,714	13,199	2,901	4,958	175,043	1,410	21,317	12,093
California	6,454,512	2,189,188	84,945	275	21,625	59,898	7,610	225,337	392,422
Colorado	4,991,638	98,624	51,383	8,106	67,142	14,909	1,698	67,824	-
Connecticut	92,994	28,265	8,629	47	1,335	346	568	28,014	-
Delaware	1,062,614	102,880	19,764	62	402	108	179	130,407	-
Florida	727,096	150,571	48,799	20	12,375	3,277	5,473	126,587	83,246
Georgia	5,828,477	809,998	82,111	1,183	8,551	1,887	3,165	66,795	64,508
Hawaii	37,713	5,733	2,512	1	579	2,567	270	7,385	-
Idaho	1,466,591	1,168,546	318,006	75	6,981	489	145,656	26,090	-
Illinois	3,738,713	864,387	286,370	189,684	135,782	1,596	2,664	47,216	-
Indiana	4,343,717	811,818	212,818	159,059	108,084	1,217	2,025	49,938	-
Iowa	17,378,077	3,190,003	656,625	191,531	310,161	430	714	39,089	40,597
Kansas	5,752,120	2,031,409	195,890	392	60,279	988,714	971	43,771	726,563
Kentucky	1,718,359	211,367	61,547	14,299	111,644	21,150	1,863	67,272	2,580
Louisiana	719,754	274,979	73,895	5	2,688	1,797	1,230	23,046	11,800
Maine	141,456	31,309	3,996	49	859	221	363	39	-
Maryland	1,304,329	166,705	25,893	230	3,768	670	1,088	21,912	-
Massachusetts	69,504	18,903	12,166	86	2,494	632	1,032	22,821	-
Michigan	2,503,450	1,050,594	201,349	43,092	87,102	1,452	2,412	54,227	-
Minnesota	8,176,255	1,834,390	240,897	257,698	288,191	674	1,114	9,929	-
Mississippi	3,236,328	471,756	86,407	4	5,767	1,590	964	32,050	11,371
Missouri	4,109,966	692,099	121,644	114,184	98,479	48,548	2,449	72,172	106,555
Montana	570,047	118,348	13,180	3,792	10,018	761	178,755	34,580	2,464
Nebraska	9,069,047	2,203,974	259,406	78,270	119,215	754	421	30,788	61,957
Nevada	86,582	27,607	18,943	15	1,844	481	764	16,574	5,899
New Hampshire	45,640	11,976	3,432	37	632	168	277	7,155	-
New Jersey	70,307	18,520	14,148	95	3,552	984	1,643	26,866	-
New Mexico	609,016	354,320	95,438	7	2,021	5,859	937	29,809	120,197
New York	2,279,062	427,042	112,134	671	9,442	2,305	3,814	72,448	-
North Carolina	9,438,408	674,534	437,531	12	124,475	1,856	3,111	40,817	1,987
North Dakota	338,976	124,761	63,472	4,306	1,705	96	16,705	15,078	652
Ohio	3,906,012	1,136,937	318,991	104,363	146,441	2,018	4,417	73,240	-
Oklahoma	3,120,393	442,374	106,340	1,737	349,270	155,384	1,662	49,250	51,059
Oregon	347,609	454,899	94,960	28	24,138	774	6,713	51,016	-
Pennsylvania	3,996,916	1,000,355	267,111	16,305	7,794	1,821	3,003	73,887	-
Rhode Island	9,718	2,658	2,058	19	463	126	209	4,079	-
South Carolina	1,464,838	189,124	52,039	5	5,482	860	1,443	27,197	9,458
South Dakota	2,558,555	671,922	134,164	66,027	11,566	158	262	36,598	19,699
Tennessee	1,070,252	176,777	56,555	8,326	10,045	1,666	2,801	64,642	1,664
Texas	11,944,961	1,781,944	99,646	33	224,656	252,279	8,835	165,553	1,398,418
Utah	1,056,623	163,679	72,280	2,306	70,481	9,399	486	29,934	19,944
Vermont	257,907	189,523	8,501	36	435	111	183	9,197	-
Virginia	1,832,986	226,811	64,389	9,349	10,048	1,209	2,014	65,007	6,838
Washington	614,574	764,150	223,878	314	6,141	1,270	105,466	62,773	-
West Virginia	484,996	121,031	67,061	30	3,343	439	733	21,340	293
Wisconsin	4,209,303	2,405,472	476,180	9,315	103,439	854	1,414	50,298	-
Wyoming	453,103	104,327	10,447	1,250	5,198	640	23,827	20,271	1,221
U.S. Total	144,970,581	32,039,204	5,989,392	1,290,027	2,607,288	1,777,316	559,092	2,380,896	3,286,320

State (All Numbers are in Short Tons)	Soybean Meal	Canola Meal	Cottonseed Meal	Sunflower Meal	Wheat Middlings and Wheat Bran	Rice Mill Feed	Almond Hulls	Soy Hulls
Alabama	2,321,431	10,652	224,699	401	236,605	7,370	-	59,771
Alaska	8,743	1,170	-	0	13,355	1,090	-	58
Arizona	118,448	99,560	89	2	102,658	8,078	-	26,398
Arkansas	2,690,676	8,999	267,991	675	138,431	5,129	-	76,532
California	1,927,872	802,847	9,828	8	343,118	27,657	1,524,354	41,825
Colorado	423,782	314,655	60	2	119,733	7,859	-	114,481
Connecticut	30,829	3,706	-	1	41,830	3,438	-	4,158
Delaware	540,053	29,635	-	0	192,977	16,029	-	1,195
Florida	205,643	32,440	39,112	7,691	232,218	16,077	-	88,963
Georgia	2,932,342	19,427	195,771	6,130	158,975	9,483	-	59,173
Hawaii	10,837	979	479	0	12,435	906	-	182
Idaho	204,793	359,181	60	0	39,806	3,205	-	50,279
Illinois	579,356	36,622	879	3	279,392	5,788	-	59,913
Indiana	996,636	58,122	7,057	2	296,356	6,127	-	53,034
Iowa	2,910,084	98,102	10,841	24,999	1,665,391	4,801	-	123,398
Kansas	237,931	235,956	194	41,480	77,870	5,376	-	119,003
Kentucky	599,896	36,662	2,068	2	185,775	11,486	-	83,097
Louisiana	337,536	7,008	47,567	825	56,374	3,148	-	33,199
Maine	44,949	218	-	0	433	-	-	6,454
Maryland	601,120	16,696	-	1	40,608	2,675	-	13,046
Massachusetts	22,160	3,040	-	1	34,709	2,795	-	3,056
Michigan	345,754	162,901	817	1,286	146,153	6,652	-	98,262
Minnesota	1,773,052	151,444	4,280	1,939	322,913	1,213	-	67,568
Mississippi	1,584,452	214,281	148,883	889	160,276	13,970	-	38,023
Missouri	1,078,398	55,367	44,666	12,540	373,170	8,858	-	141,534
Montana	53,829	34,607	-	0	52,675	4,249	-	107,934
Nebraska	461,268	70,016	113	6,396	174,363	3,783	-	144,035
Nevada	10,202	4,846	9,188	1	25,120	2,033	-	25,334
New Hampshire	11,811	1,039	-	0	10,839	876	-	2,735
New Jersey	23,571	3,593	-	2	42,491	3,288	-	2,194
New Mexico	128,497	132,995	2,707	1	44,762	3,659	-	44,767
New York	278,334	110,458	-	4	111,006	8,850	-	137,453
North Carolina	3,290,742	181,451	67,974	3	229,898	478,312	-	49,097
North Dakota	49,225	14,039	-	924	32,997	1,742	-	86,582
Ohio	821,999	79,185	13,437	3	281,345	8,983	-	78,717
Oklahoma	631,680	38,071	132,274	5,184	178,071	6,045	-	150,418
Oregon	118,704	215,308	230	1	76,474	6,265	-	55,513
Pennsylvania	1,103,297	49,819	234	3	182,198	8,249	-	111,468
Rhode Island	3,455	544	-	0	6,206	499	-	351
South Carolina	717,166	87,081	17,364	1,039	59,319	12,912	-	18,304
South Dakota	317,900	88,397	0	24,397	196,912	2,708	-	156,216
Tennessee	389,931	25,946	53,119	3	148,537	9,608	-	77,116
Texas	1,641,249	961,324	121,650	71,538	450,110	19,790	-	345,224
Utah	189,064	15,487	-	0	64,955	3,677	-	51,217
Vermont	14,832	19,114	-	0	13,791	1,128	-	9,716
Virginia	881,696	38,583	73,887	2	115,530	8,302	-	80,640
Washington	190,547	240,852	-	2	94,226	7,705	-	19,176
West Virginia	194,488	5,458	17,816	1	35,510	2,618	-	21,096
Wisconsin	837,151	49,480	3,948	1	106,704	4,931	-	126,023
Wyoming	30,655	18,202	-	0	30,717	2,491	-	52,483
U.S. Total	34,918,063	5,245,560	1,519,281	208,384	8,036,315	791,914	1,524,354	3,316,412

State (All Numbers are in Short Tons)	Soybean Oil	Soybean Seeds	Meat and Bone Meal	Feather Meal	Meat Meal	Bloodmeal	Fishmeal	Miscellaneous Byproduct Feeds
Alabama	55,713	35	14,572	4,957	38,069	42,686	709	7
Alaska	227	121	2,408	62	1,720	13	77	1
Arizona	19,625	52,867	20,384	2,546	21,075	159	1,028	11
Arkansas	15,282	35	88,663	52,244	86,847	39,571	901	6
California	94,656	831,038	385,777	692	70,071	56,753	4,611	802,928
Colorado	23,094	-	24,165	206	18,562	1,167	1,550	7
Connecticut	868	-	6,790	4,404	6,233	934	296	14,080
Delaware	6	448	2,005	1,038	1,794	225	84	73,447
Florida	28,378	-	85,759	2,247	54,205	42,155	3,275	24
Georgia	106,811	563	53,430	204	118,898	30,880	1,450	14
Hawaii	395	784	2,577	8	2,440	83	557	1
Idaho	66,407	125,524	174,540	1,385	5,414	13,244	3,886	2
Illinois	5,226	42,754	79,649	-	74,755	3,533	1,128	12
Indiana	10,227	88,706	208,086	-	65,148	8,821	1,037	9
Iowa	10,012	91,449	410,914	0	203,960	35,890	415	3
Kansas	30,726	39,226	28,926	2,505	28,197	1,109	504	4
Kentucky	9,481	24,679	45,020	4,769	47,776	51,670	916	8
Louisiana	14,868	77	30,465	5,836	21,945	9,944	487	5
Maine	1,474	-	6,411	6,579	4,049	1,408	195	21,409
Maryland	49	4,345	15,040	11,430	14,039	2,324	2,124	152,737
Massachusetts	471	-	9,514	2,629	11,988	527	604	8,299
Michigan	43,240	22,237	79,213	284	35,270	3,150	1,828	10
Minnesota	14,264	319,139	383,315	18,231	49,720	25,837	625	5
Mississippi	28,863	57	12,121	6,437	59,887	3,514	494	4
Missouri	11,300	19,776	108,346	3,748	64,892	49,096	1,440	11
Montana	2,166	-	14,474	2	4,271	4,837	139	1
Nebraska	5,516	14,358	49,735	453	40,559	3,856	472	2
Nevada	3,711	-	31,420	0	7,059	9,790	318	3
New Hampshire	295	-	3,696	2,847	2,868	580	220	8,916
New Jersey	548	550	13,198	1,371	15,151	288	687	4,658
New Mexico	29,613	79,000	7,071	3,756	7,635	9	346	4
New York	67,142	112,249	61,194	27,626	39,427	25,074	2,603	237,537
North Carolina	82,336	19,547	226,450	121,451	29,291	63,660	3,370	13
North Dakota	1,995	6,811	11,784	793	2,503	491	61	1
Ohio	14,755	126,504	144,474	2	74,803	17,339	2,397	14
Oklahoma	13,647	25,148	49,567	726	32,614	8,143	619	7
Oregon	18,941	-	45,609	197	11,675	2,728	1,023	5
Pennsylvania	37,982	478,347	172,293	42,265	37,145	11,845	2,665	93,501
Rhode Island	66	-	1,752	184	2,033	36	93	617
South Carolina	22,253	99	77,452	20,282	28,824	5,319	555	6
South Dakota	2,378	45,790	78,300	0	20,627	8,838	123	1
Tennessee	22,198	16,601	53,405	8,750	37,604	7,030	1,041	12
Texas	41,155	335,846	87,944	2,927	125,453	630	3,670	38
Utah	11,942	-	105,960	415	9,979	34,928	604	2
Vermont	378	-	1,466	19,590	2,063	2	98	82,516
Virginia	32,383	35,335	112,204	34,966	40,992	11,806	1,223	9
Washington	29,419	57,436	92,968	309	19,121	5,932	1,695	9
West Virginia	2,696	-	21,691	602	8,941	283	793	23,814
Wisconsin	82,789	455,837	340,871	47,286	21,730	23,768	1,969	6
Wyoming	1,143	-	6,818	0	1,713	2,383	61	1
U.S. Total	1,119,108	3,473,317	4,089,890	469,243	1,731,031	674,290	57,066	1,524,740

State (All Numbers are in Short Tons)	Corn Silage	Alfalfa Hay	Other Hay	Inedible Tallow	Yellow Grease	Choice White Grease	Potato Pulp	Potato Peels	Potato Tubers	Millet
Alabama	1,034,958	195,335	851,856	3,920	72,918	1,036	-	-	642	-
Alaska	1,657	1	-	294	-	478	-	-	74	-
Arizona	2,145,399	1,461,548	1,025,761	41,160	62	2,643	-	-	942	-
Arkansas	1,317,680	214,253	1,066,737	3,629	95,923	3,495	-	-	546	-
California	14,851,242	7,853,015	7,939,360	637,979	9,843	1,790	-	-	2,951	-
Colorado	4,251,645	1,546,444	1,853,576	263,793	647	18,124	-	-	658	-
Connecticut	164,249	121,535	63,973	3,410	6	111	-	-	221	-
Delaware	39,020	28,230	15,559	794	9,186	226	-	-	70	-
Florida	1,818,577	988,904	1,191,029	38,965	9,938	338	-	-	2,123	-
Georgia	941,399	681,183	766,868	26,799	104,020	1,848	-	-	1,227	-
Hawaii	11,414	1	-	417	-	163	-	-	105	-
Idaho	5,777,100	4,936,687	2,111,627	101,519	1,711	627	47,111	245,112	16,327	-
Illinois	1,516,742	697,682	977,797	22,052	81	90,007	-	-	1,033	-
Indiana	1,825,115	1,159,263	915,597	39,759	2,776	69,365	-	-	786	-
Iowa	5,637,049	1,923,504	3,342,141	71,921	2,077	385,115	-	-	277	-
Kansas	10,645,315	1,521,859	4,716,256	71,393	1	34,678	-	-	376	-
Kentucky	1,747,260	480,274	1,399,374	14,679	20,039	10,829	-	-	722	-
Louisiana	392,710	181,338	531,922	4,801	27,821	185	-	-	476	-
Maine	249,354	183,578	101,159	4,253	4	134	-	-	141	-
Maryland	449,044	314,000	217,963	9,293	10,102	547	-	-	424	-
Massachusetts	100,807	72,763	44,237	3,442	4	238	-	-	402	-
Michigan	3,505,674	2,261,342	1,538,159	109,512	1,468	28,550	-	-	936	-
Minnesota	5,167,143	2,456,892	2,772,739	93,496	5,273	148,620	-	-	433	-
Mississippi	424,348	176,144	585,612	3,812	57,462	5,436	-	-	374	-
Missouri	3,943,370	777,433	2,669,502	28,482	7,485	79,498	-	-	949	-
Montana	1,947,995	500,826	2,642,767	15,888	19	4,963	-	-	134	-
Nebraska	9,752,717	1,489,116	4,900,426	15,484	-	76,470	-	-	163	-
Nevada	436,054	267,006	387,281	37,520	2	81	-	-	296	-
New Hampshire	106,812	78,524	43,230	2,183	2	99	-	-	108	-
New Jersey	56,856	39,018	28,909	3,385	4	202	-	-	637	-
New Mexico	3,061,876	2,048,880	1,394,334	55,825	9	45	-	-	363	-
New York	5,124,329	2,789,005	2,856,016	186,017	83	1,335	-	-	1,481	-
North Carolina	554,110	278,537	540,132	13,605	123,164	231,987	-	-	1,206	-
North Dakota	1,608,773	343,741	1,866,523	3,367	2	3,432	-	-	63	923
Ohio	2,390,953	1,637,603	1,299,539	58,079	16,058	46,666	-	-	1,294	-
Oklahoma	3,574,542	830,720	2,412,775	9,862	15,056	54,242	-	-	644	-
Oregon	1,561,407	1,065,300	1,045,557	22,450	4,811	199	47,716	103,313	32,739	-
Pennsylvania	4,609,464	2,217,112	1,981,724	98,838	5,834	33,494	-	-	1,167	-
Rhode Island	7,905	5,307	4,199	456	0	45	-	-	81	-
South Carolina	218,874	140,110	211,503	5,972	22,662	4,576	-	-	559	-
South Dakota	4,535,827	1,079,915	3,703,678	30,855	0	46,918	-	-	102	14,931
Tennessee	1,605,974	381,928	1,266,758	12,005	28,577	6,170	-	-	1,085	-
Texas	17,731,380	4,702,018	9,825,765	111,142	19,279	19,307	-	-	3,423	2,391
Utah	1,105,561	749,734	599,242	120,087	5,692	15,465	-	-	189	-
Vermont	1,002,898	830,766	315,433	629	15	109	-	-	71	-
Virginia	1,474,262	442,429	977,658	19,215	69,317	7,695	-	-	781	-
Washington	2,615,930	2,067,848	1,212,014	54,201	10,159	411	155,097	206,507	101,037	-
West Virginia	238,703	65,052	218,462	2,561	2,915	98	-	-	284	-
Wisconsin	10,567,470	6,814,983	4,201,679	306,849	8,746	6,296	-	-	549	-
Wyoming	917,564	192,299	935,968	7,934	2	2,378	-	-	55	-
U.S. Total	144,766,509	61,290,982	81,570,375	2,793,984	771,255	1,446,763	249,923	554,933	181,727	18,246

State (All Numbers are in Short Tons)	Lysine	Threonine	DL Methionine	Dicalcium Phosphate	Limestone	Potassium Chloride	Salt	Minerals	Vitamins	Phytase	Tryptophan
Alabama	20,408	1,589	22,384	36,820	110,966	9,754	34,487	25,503	21,235	3,928	2
Alaska	47	2	63	107	485	-	89	11	53	9	0
Arizona	270	30	188	8,437	21,577	5,169	2,038	64,932	315	36	3
Arkansas	20,299	1,369	24,487	51,351	136,447	14,044	37,432	31,362	21,733	3,875	11
California	1,309	101	2,384	38,314	81,899	4,427	12,186	381,637	2,516	401	2
Colorado	2,123	308	945	12,399	32,478	451	6,928	119,825	1,697	170	44
Connecticut	182	5	221	1,247	3,530	90	299	3,736	242	42	0
Delaware	4,063	5	3,968	17,469	31,038	28	3,876	1,857	4,888	919	1
Florida	1,312	101	1,898	8,940	39,842	4,757	4,080	42,246	2,145	387	0
Georgia	25,057	1,971	27,874	50,866	174,480	4,785	43,606	33,537	26,995	4,980	6
Hawaii	44	5	50	187	1,129	-	118	16	68	11	2
Idaho	332	16	458	19,974	21,306	10,219	4,075	150,998	492	80	1
Illinois	8,961	1,858	1,910	31,819	69,429	7,552	16,142	43,057	4,370	170	307
Indiana	8,733	1,723	5,548	46,008	195,243	3,145	19,419	46,762	8,185	922	249
Iowa	39,107	7,847	11,708	145,709	441,880	17,328	70,971	154,387	22,607	1,518	1,573
Kansas	3,757	679	877	14,761	26,017	498	11,346	236,589	1,855	83	126
Kentucky	4,593	275	5,961	25,254	52,638	3,501	12,378	39,202	6,361	1,121	17
Louisiana	460	36	577	2,981	8,287	6,952	1,243	14,234	617	109	0
Maine	477	11	547	2,625	6,643	156	643	5,753	574	100	0
Maryland	4,643	15	4,692	22,520	47,454	483	4,912	12,033	5,878	1,091	1
Massachusetts	252	8	295	1,491	4,743	84	349	2,369	323	58	0
Michigan	3,254	434	3,461	28,396	103,701	2,841	10,822	88,964	4,618	704	65
Minnesota	17,881	3,430	8,201	56,268	128,280	4,608	29,790	129,807	8,580	440	590
Mississippi	13,888	1,133	15,039	26,220	79,433	7,614	23,590	18,062	14,352	2,642	10
Missouri	11,107	1,521	8,679	48,091	104,261	25,344	24,203	80,112	9,467	1,184	239
Montana	484	64	266	33,230	35,484	34,559	2,198	55,377	414	46	9
Nebraska	6,130	1,094	1,651	24,937	67,068	10,316	16,370	236,125	3,691	244	202
Nevada	33	2	53	2,882	2,048	5,161	342	11,833	57	9	0
New Hampshire	227	8	268	1,221	3,499	67	311	2,463	269	46	0
New Jersey	151	6	199	1,154	4,483	84	255	1,382	247	41	0
New Mexico	103	4	194	12,879	12,691	11,507	1,886	70,594	250	39	0
New York	797	36	1,085	16,804	34,534	2,723	3,966	124,332	1,388	244	2
North Carolina	28,350	4,078	21,523	81,251	170,934	6,110	47,547	21,176	22,257	3,162	228
North Dakota	568	96	214	2,575	4,496	5,535	1,876	40,429	336	26	18
Ohio	5,099	801	4,780	41,893	191,542	4,735	14,858	68,023	7,649	1,106	128
Oklahoma	8,442	1,159	4,541	33,346	63,545	2,457	17,356	80,838	6,409	783	105
Oregon	687	17	1,053	8,344	19,404	8,111	2,554	44,694	1,007	177	0
Pennsylvania	4,908	464	5,471	45,734	165,156	1,277	12,130	109,213	7,720	1,284	54
Rhode Island	37	1	44	214	667	19	50	197	49	8	0
South Carolina	4,606	379	5,120	12,703	37,784	3,363	8,171	8,097	4,962	908	3
South Dakota	4,495	816	1,273	16,418	33,675	44,710	9,693	108,267	2,154	81	146
Tennessee	3,332	286	3,753	12,210	35,468	4,144	7,379	34,638	3,866	689	10
Texas	13,497	1,056	14,567	47,195	159,061	107,662	34,971	416,395	15,457	2,693	39
Utah	997	136	589	13,106	33,994	7,769	3,082	29,045	1,103	130	15
Vermont	319	7	363	3,451	5,613	308	856	23,442	393	72	0
Virginia	6,380	493	6,805	14,683	37,063	2,791	9,756	32,479	5,751	993	7
Washington	524	17	1,065	13,004	40,506	4,367	3,563	72,657	1,370	243	0
West Virginia	1,456	38	1,734	7,920	18,919	3,582	2,203	7,015	1,859	333	0
Wisconsin	1,509	177	1,692	32,484	63,893	6,858	9,753	260,166	2,160	336	29
Wyoming	262	39	174	2,622	4,299	956	1,094	24,335	242	28	5
U.S. Total	285,952	35,747	230,892	1,180,515	3,169,013	413,002	587,240	3,610,204	261,223	38,699	4,252

State (All Numbers are in Short Tons)	Unique Ingredients from Pet Food Study	Total	Total Corn- Related	Total Soy- Related	Total Small Grains	Total Processed Plant Byproducts	Total Animal Byproduct Meals	Total Fats and Oils	Total Synthetic Animo Acids	Total Harvested Forages	Vitamins and Minerals
Alabama	82,186	10,699,616	5,088,974	2,381,237	50,454	489,776	100,993	133,588	44,383	2,082,149	242,692
Alaska	9,572	83,701	32,243	8,923	9,469	15,689	4,281	999	112	1,658	755
Arizona	115,087	8,016,170	2,444,278	197,712	79,820	334,773	45,192	63,490	491	4,632,709	102,504
Arkansas	65,736	12,689,054	6,065,832	2,767,243	27,686	433,871	268,226	118,330	46,167	2,598,670	296,245
California	382,982	48,566,463	8,788,816	2,800,735	254,571	3,906,113	517,905	744,267	3,796	30,643,617	521,381
Colorado	83,506	14,547,677	5,164,660	538,263	136,664	442,973	45,650	305,658	3,420	7,651,665	173,948
Connecticut	32,776	673,643	130,281	34,987	29,918	63,276	18,657	4,395	408	349,757	9,186
Delaware	9,673	2,346,223	1,185,429	541,696	130,989	312,158	5,146	10,211	8,037	82,809	60,074
Florida	276,884	6,429,639	929,764	294,606	144,435	412,929	187,642	77,620	3,311	3,998,510	102,396
Georgia	154,407	13,632,745	6,723,656	2,992,078	78,510	455,535	204,861	239,477	54,907	2,389,450	339,248
Hawaii	13,581	117,492	48,526	11,803	8,234	14,905	5,665	975	101	11,415	1,529
Idaho	22,157	17,654,874	2,953,707	380,596	178,726	710,804	198,469	170,264	808	12,825,413	207,144
Illinois	135,662	10,062,171	5,080,751	682,023	185,662	323,729	159,065	117,366	13,037	3,192,220	172,540
Indiana	105,746	11,942,490	5,528,628	1,138,377	160,047	368,459	283,092	122,127	16,253	3,899,975	319,683
Iowa	37,763	39,712,130	21,416,666	3,124,932	349,964	1,845,011	651,180	469,126	60,235	10,902,694	854,399
Kansas	47,550	27,983,223	8,968,525	396,161	105,021	1,087,818	61,241	136,798	5,439	16,883,431	291,149
Kentucky	90,885	7,229,004	2,026,722	707,672	180,778	239,303	150,151	55,029	10,847	3,626,908	140,454
Louisiana	58,968	2,912,271	1,070,430	370,812	26,963	127,204	68,677	47,674	1,073	1,105,970	34,422
Maine	21,154	849,183	177,032	51,403	1,261	22,201	18,642	5,866	1,036	534,091	16,495
Maryland	68,405	3,576,062	1,497,827	618,511	26,768	213,141	44,957	19,991	9,352	981,007	94,372
Massachusetts	62,022	521,359	101,291	25,216	26,348	49,246	25,263	4,154	556	217,807	9,416
Michigan	127,889	12,712,911	3,799,936	466,253	143,741	318,755	119,744	182,770	7,214	7,305,175	240,046
Minnesota	61,475	25,036,759	10,509,915	2,159,758	299,234	482,227	477,727	261,653	30,103	10,396,774	357,774
Mississippi	46,555	7,626,070	3,796,085	1,622,532	38,782	550,048	82,453	95,572	30,071	1,186,104	171,914
Missouri	116,855	15,278,040	5,086,441	1,239,708	173,100	602,116	227,521	126,765	21,546	7,390,305	292,662
Montana	17,322	6,503,175	706,129	161,763	223,352	94,131	23,723	23,036	823	5,091,588	161,308
Nebraska	22,964	29,424,094	11,611,453	619,661	150,424	316,792	95,075	97,470	9,077	16,142,259	358,751
Nevada	38,936	1,477,332	133,629	35,535	19,181	47,387	48,588	41,314	87	1,090,342	22,333
New Hampshire	15,321	370,832	61,253	14,546	8,064	21,778	10,212	2,580	503	228,566	7,875
New Jersey	83,748	468,471	104,054	26,316	32,061	54,669	30,696	4,140	356	124,783	7,648
New Mexico	43,948	8,417,871	1,064,640	252,263	32,767	304,688	18,816	85,492	300	6,505,090	109,847
New York	208,372	15,479,707	2,821,215	528,035	85,704	469,335	155,924	254,578	1,920	10,769,349	183,992
North Carolina	152,620	17,870,867	10,552,341	3,359,386	168,403	960,845	444,221	451,091	54,178	1,372,779	352,437
North Dakota	7,850	4,666,542	531,611	142,618	34,412	50,417	15,632	8,796	897	3,819,037	55,272
Ohio	185,404	13,333,068	5,468,320	1,027,219	224,098	384,262	239,015	135,558	10,808	5,328,095	329,805
Oklahoma	78,059	12,744,624	3,826,228	807,246	400,182	411,356	91,668	92,807	14,247	6,818,037	204,734
Oregon	62,250	5,565,541	898,270	174,217	81,868	482,051	61,231	46,401	1,756	3,672,264	84,291
Pennsylvania	168,429	17,169,503	5,282,509	1,693,111	84,684	335,170	266,213	176,147	10,897	8,808,301	342,512
Rhode Island	11,037	65,480	14,578	3,806	4,750	7,947	4,099	567	82	17,411	1,203
South Carolina	70,191	3,578,971	1,706,867	735,569	34,123	187,739	132,433	55,463	10,108	570,487	75,986
South Dakota	14,005	14,089,499	3,430,826	519,905	63,357	332,217	107,887	80,152	6,730	9,319,421	214,998
Tennessee	134,047	5,786,015	1,313,576	483,649	77,488	239,974	107,830	68,950	7,381	3,254,660	98,394
Texas	419,756	53,732,726	14,078,863	2,322,319	401,435	3,026,291	220,624	190,883	29,159	32,259,162	783,435
Utah	24,986	4,624,859	1,304,287	240,282	100,901	104,254	151,887	153,186	1,737	2,454,537	88,229
Vermont	10,747	2,826,078	456,078	24,548	9,815	116,621	23,219	1,130	689	2,149,097	34,135
Virginia	104,360	6,899,790	2,134,744	997,670	77,069	243,932	201,191	128,610	13,684	2,894,349	103,516
Washington	103,949	9,203,890	1,604,186	267,160	174,381	805,433	120,025	94,191	1,606	5,895,792	135,711
West Virginia	37,066	1,646,081	673,557	215,583	25,415	85,793	32,311	8,270	3,228	522,217	41,832
Wisconsin	77,298	31,723,716	7,101,125	1,419,012	155,150	165,619	435,624	404,679	3,407	21,584,132	375,650
Wyoming	7,327	2,864,538	569,766	83,138	49,297	52,688	10,975	11,457	481	2,045,831	33,576
U.S. Total	4,329,469	571,432,237	186,066,519	41,707,793	5,565,521	23,123,451	7,021,520	6,131,110	556,843	287,627,866	9,259,897

6.1.1.1 Totals by Ingredient

Ingredient (All Numbers are in Short Tons)	Broilers	Layers	Turkeys	Beef Cattle	Dairy Cows	Hogs	Sheep and Meat Goats	Horses	Pets	Aquaculture	Total
Corn	33,734,896	10,774,724	5,696,106	36,840,153	19,352,948	37,025,213	115,288		1,358,709	72,543	144,970,581
Corn Silage	-	-	-	70,855,754	73,910,755	-	-	-	-	-	144,766,509
Other Hay	-	-	-	50,451,821	31,118,553	-	-	-	-	-	81,570,375
Alfalfa Hay	-	-	-	9,230,277	52,060,401	-	-	-	304	-	61,290,982
Soybean Meal	17,014,277	3,066,463	3,285,199	340,975	3,156,231	7,199,986	23,495	191,455	437,311	202,672	34,918,063
Corn DDGs	2,822,404	1,630,124	305,300	13,921,309	7,930,973	4,590,499	-	765,819	2,819	69,956	32,039,204
Wheat Middlings and Wheat Bran	694,880	723,730	-	-	-	3,039,275	-	3,446,185	68,904	63,343	8,036,315
Corn Gluten Feed/Meal	-	-	-	2,378,143	885,848	1,915,544	-	325,473	477,906	6,479	5,989,392
Canola Meal	481,909	-	-	2,039,857	2,225,456	188,345	-	306,327	3,666	-	5,245,560
Unique Ingredients from Pet Food Study	-	-	-	-	-	-	-	-	4,329,469	-	4,329,469
Meat and Bone Meal	171,385	269,102	828,975	-	1,474,191	706,179	-	-	635,739	4,319	4,089,890
Minerals	31,469	10,547	-	1,797,662	1,770,527	-	-	-	-	-	3,610,204
Soybean Seeds	-	-	-	905	3,472,412	-	-	-	-	-	3,473,317
Soy Hulls	-	-	-	2,289,280	929,609	78,710	-	-	18,813	-	3,316,412
Cottonseed	-	-	-	1,600,904	1,668,836	16,579	-	-	-	-	3,286,320
Limestone	643,032	1,745,789	51,047	128,217	62,995	537,932	-	-	-	-	3,169,013
Inedible Tallow	-	-	-	-	2,661,520	-	-	-	132,464	-	2,793,984
Wheat	469,672	-	-	373,414	-	1,563,733	-	-	183,837	16,633	2,607,288
Oats	-	-	-	10,115	-	30,599	-	2,335,748	4,434	-	2,380,896
Sorghum	439,750	73,908	22,018	920,359	-	270,253	-	-	51,027	-	1,777,316
Meat Meal	416,133	-	6,971	-	-	515,531	-	-	780,702	11,694	1,731,031
Miscellaneous Byproduct Feeds	350,416	31,696	38,760	-	1,103,499	-	-	-	368	-	1,524,740
Almond Hulls	-	-	-	-	1,524,354	-	-	-	-	-	1,524,354
Cottonseed Meal	1,018,488	189,152	8,535	214,496	-	-	-	-	-	88,611	1,519,281
Choice White Grease	-	-	530	-	-	1,445,846	-	-	386	-	1,446,763
Hominy Feed	-	-	-	-	-	1,289,709	-	-	318	-	1,290,027
Dicalcium Phosphate	367,760	202,872	4,272	110,405	146,989	348,117	-	-	99	-	1,180,515
Soybean Oil	267,008	133,648	-	4,745	706,031	-	-	-	2,659	5,017	1,119,108
Rice Mill Feed	-	-	-	-	-	504,732	-	287,182	-	-	791,914
Yellow Grease	613,362	10,837	147,056	-	-	-	-	-	-	-	771,255
Bloodmeal	322,819	-	1	-	300,254	48,165	-	-	695	2,357	674,290
Salt	254,345	55,247	13,959	38,505	38,412	186,771	-	-	-	-	587,240
Barley	201	1,611	18	469,441	-	2,633	-	-	85,188	-	559,092
Potato Peels	40,434	77,209	158	437,132	-	-	-	-	-	-	554,933
Feather Meal	51,256	-	116,474	-	204,121	92,285	-	-	-	5,106	469,243
Potassium Chloride	-	-	-	389,238	23,764	-	-	-	-	-	413,002
Lysine	149,545	-	17,774	-	-	118,634	-	-	-	-	285,952
Vitamins	157,338	52,715	4,639	1	1	46,529	-	-	-	-	261,223
Potato Pulp	40,434	77,209	159	132,122	-	-	-	-	-	-	249,923
DL Methionine	169,058	21,356	23,973	-	-	16,505	-	-	-	-	230,892
Sunflower Meal	-	-	-	-	190,054	18,246	-	-	85	-	208,384
Potato Tubers	28,165	77,209	119	43,192	-	-	-	-	33,042	-	181,727
Fishmeal	-	-	-	-	-	0	-	-	35,249	21,817	57,066
Phytase	31,467	7,232	-	-	-	-	-	-	-	-	38,699
Threonine	8,785	-	2,197	-	-	24,765	-	-	-	-	35,747
Millet	-	-	-	-	-	18,246	-	-	-	-	18,246
Tryptophan	-	-	-	-	-	4,252	-	-	-	-	4,252
U.S. Total	60,790,688	19,232,380	10,574,242	195,018,422	206,918,734	61,843,813	138,783	7,658,189	8,644,194	570,545	571,389,988

6.1.2 Broilers

State (All Numbers are in Short Tons)	Corn	Corn DDGs	Wheat	Sorghum	Barley	Soybean Meal	Canola Meal	Cottonseed Meal	Wheat Middlings and Wheat Bran	Soybean Oil
Alabama	4,179,558	407,216	-	-	-	2,195,677	-	151,984	109,308	44,221
Alaska	6,762	699	-	1,398	-	4,317	-	-	-	162
Arizona	102	10	-	4	-	42	-	-	-	-
Arkansas	4,084,518	397,956	-	148,528	-	2,090,747	-	198,722	28,950	-
California	1,004,159	53,394	-	44,089	-	541,706	-	-	-	-
Colorado	2,746	6	-	419	-	986	-	-	-	-
Connecticut	687	79	-	-	-	323	9	-	-	-
Delaware	1,044,196	56,750	-	-	-	526,052	12,524	-	-	-
Florida	206,624	19,539	-	-	-	110,557	-	14,464	8,265	4,132
Georgia	5,010,975	500,877	-	-	-	2,747,128	-	136,663	-	71,034
Hawaii	6,165	637	-	1,275	-	3,936	-	-	-	148
Idaho	110	10	-	-	-	76	-	-	-	-
Illinois	5,018	355	67	-	-	1,677	-	41	365	10
Indiana	171,796	12,153	2,306	-	-	57,425	-	1,388	12,492	337
Iowa	80,134	7,102	2,112	-	-	27,290	-	1,408	7,041	-
Kansas	994	81	-	184	-	415	-	4	-	-
Kentucky	1,098,198	74,481	100,197	20,039	-	491,960	4,008	-	70,138	-
Louisiana	579,518	51,149	-	-	-	310,080	-	40,566	17,386	11,590
Maine	1,168	149	-	-	-	470	197	-	-	-
Maryland	1,084,548	93,611	-	-	-	559,816	13,772	-	-	-
Massachusetts	397	45	-	-	-	187	5	-	-	-
Michigan	37,398	2,694	986	-	-	12,917	-	657	4,195	-
Minnesota	243,949	14,377	12,839	-	-	90,405	-	4,280	21,399	-
Mississippi	2,832,787	178,588	-	-	-	1,419,053	206,021	92,709	72,107	19,787
Missouri	1,122,445	62,109	73,421	-	-	471,539	-	42,159	66,046	-
Montana	2,393	222	86	-	183	1,136	-	-	-	-
Nebraska	31,317	3,031	-	500	-	9,959	-	54	-	-
Nevada	26	3	-	-	-	10	-	-	-	-
New Hampshire	528	67	-	-	-	212	89	-	-	-
New Jersey	565	65	-	-	-	268	7	-	-	-
New Mexico	130	21	-	12	-	38	-	-	-	-
New York	10,561	1,218	-	-	-	4,998	134	-	-	-
North Carolina	3,374,663	328,795	-	-	-	1,716,409	153,394	30,679	92,036	61,358
North Dakota	151	12	8	-	9	62	-	-	4	-
Ohio	438,443	36,448	7,347	-	-	159,851	-	-	14,695	-
Oklahoma	764,220	44,610	106,142	42,457	-	318,039	-	54,794	21,228	7,076
Oregon	23,960	5,909	-	-	-	24,829	-	-	-	-
Pennsylvania	775,929	42,478	-	-	-	406,268	9,378	-	-	-
Rhode Island	35	4	-	-	-	16	0	-	-	-
South Carolina	902,513	62,070	-	-	-	450,643	82,047	8,205	-	16,409
South Dakota	575	42	48	-	-	204	-	0	-	-
Tennessee	595,090	56,275	-	-	-	305,675	-	41,656	23,804	11,902
Texas	2,476,555	191,539	158,233	180,838	-	1,133,568	-	113,023	104,339	-
Utah	217	24	-	8	-	94	-	-	-	-
Vermont	1,302	90	-	-	-	499	324	-	-	-
Virginia	979,711	77,205	-	-	-	554,452	-	65,942	-	18,841
Washington	34,789	8,673	-	-	-	36,628	-	-	-	-
West Virginia	293,292	15,940	-	-	-	139,715	-	15,170	-	-
Wisconsin	222,865	13,586	5,877	-	-	85,864	-	3,918	21,081	-
Wyoming	115	10	2	-	9	56	-	-	-	-
U.S. Total	33,734,896	2,822,404	469,672	439,750	201	17,014,277	481,909	1,018,488	694,880	267,008

State (All Numbers are in Short Tons)	Meat and Bone Meal	Feather Meal	Meat Meal	Bloodmeal	Miscellaneous Byproduct Feeds	Yellow Grease	Potato Pulp	Potato Peels	Potato Tubers
Alabama	-	4,680	23,399	40,725	-	72,877	-	-	-
Alaska	419	-	-	-	-	-	-	-	-
Arizona	14	-	-	-	-	0	-	-	-
Arkansas	-	15,926	74,264	37,132	-	50,736	-	-	-
California	33,008	-	-	9,129	79,574	9,573	-	-	-
Colorado	311	-	-	-	-	33	-	-	-
Connecticut	-	-	-	-	49	6	-	-	-
Delaware	-	-	-	-	70,245	9,186	-	-	-
Florida	4,132	2,066	4,132	-	-	9,918	-	-	-
Georgia	-	-	91,109	-	-	104,012	-	-	-
Hawaii	382	-	-	-	-	-	-	-	-
Idaho	39	-	-	-	-	12	71	71	71
Illinois	81	-	81	162	-	81	-	-	-
Indiana	2,776	-	2,776	5,552	-	2,776	-	-	-
Iowa	1,408	-	2,112	4,224	-	2,077	-	-	-
Kansas	92	-	-	-	-	1	-	-	-
Kentucky	-	442	27,738	50,099	-	20,039	-	-	-
Louisiana	17,386	5,795	11,590	5,795	-	27,817	-	-	-
Maine	-	-	-	-	182	4	-	-	-
Maryland	-	-	-	-	116,846	10,102	-	-	-
Massachusetts	-	-	-	-	28	4	-	-	-
Michigan	657	-	986	1,644	-	1,468	-	-	-
Minnesota	4,280	-	6,420	12,839	-	5,273	-	-	-
Mississippi	-	5,151	51,505	-	-	57,459	-	-	-
Missouri	9,742	-	15,741	47,223	-	7,485	-	-	-
Montana	-	-	-	-	-	19	-	-	-
Nebraska	2,502	-	-	-	-	-	-	-	-
Nevada	4	-	-	-	-	-	-	-	-
New Hampshire	-	-	-	-	82	2	-	-	-
New Jersey	-	-	-	-	52	4	-	-	-
New Mexico	13	-	-	-	-	0	-	-	-
New York	-	-	-	-	966	83	-	-	-
North Carolina	-	-	-	61,358	-	76,471	-	-	-
North Dakota	-	-	-	-	-	2	-	-	-
Ohio	11,021	-	11,021	14,695	-	16,058	-	-	-
Oklahoma	4,358	-	-	7,076	-	14,152	-	-	-
Oregon	1,636	-	-	-	-	2,778	16,357	16,357	11,385
Pennsylvania	-	-	-	-	67,379	5,834	-	-	-
Rhode Island	-	-	-	-	2	0	-	-	-
South Carolina	24,614	1,825	16,409	-	-	1,829	-	-	-
South Dakota	48	-	-	-	-	0	-	-	-
Tennessee	17,853	5,951	11,902	5,951	-	28,564	-	-	-
Texas	-	-	40,229	-	-	15,632	-	-	-
Utah	30	-	-	-	-	0	-	-	-
Vermont	-	-	-	-	6	15	-	-	-
Virginia	28,261	9,420	18,841	9,420	-	45,217	-	-	-
Washington	2,401	-	-	-	-	4,099	24,006	24,006	16,709
West Virginia	-	-	-	-	15,005	2,915	-	-	-
Wisconsin	3,918	-	5,877	9,795	-	8,746	-	-	-
Wyoming	-	-	-	-	-	2	-	-	-
U.S. Total	171,385	51,256	416,133	322,819	350,416	613,362	40,434	40,434	28,165

State (All Numbers are in Short Tons)	Lysine	Threonine	DL Methionine	Dicalcium Phosphate	Limestone	Salt	Minerals	Vitamins	Phytase
Alabama	20,265	1,559	21,823	33,515	71,705	32,735	3,897	19,485	3,897
Alaska	29	-	39	60	124	58	8	35	7
Arizona	65	-	88	137	286	132	16	79	16
Arkansas	17,730	1,134	20,736	44,306	77,498	32,738	3,780	18,902	3,780
California	347	-	467	725	1,517	703	84	421	84
Colorado	279	-	391	842	1,451	619	72	359	72
Connecticut	137	-	131	584	777	124	31	155	31
Delaware	4,038	-	3,854	17,252	22,941	3,671	918	4,588	918
Florida	1,189	91	1,280	1,966	4,206	1,920	229	1,143	229
Georgia	24,781	1,906	26,687	40,984	87,687	40,031	4,766	23,828	4,766
Hawaii	26	-	35	55	114	53	7	32	6
Idaho	202	-	272	422	883	409	49	245	49
Illinois	158	-	257	1,053	1,339	472	50	250	50
Indiana	541	-	880	3,611	4,591	1,617	171	856	171
Iowa	757	-	1,232	5,052	6,423	2,263	240	1,198	240
Kansas	181	5	259	885	1,217	452	49	246	49
Kentucky	3,861	105	5,528	18,894	25,985	9,658	1,052	5,260	1,052
Louisiana	430	33	463	711	1,521	694	83	413	83
Maine	371	-	354	1,584	2,107	337	84	421	84
Maryland	4,548	-	4,341	19,432	25,840	4,134	1,034	5,168	1,034
Massachusetts	190	-	182	814	1,082	173	43	216	43
Michigan	1,151	-	1,872	7,678	9,762	3,438	364	1,821	364
Minnesota	656	-	1,067	4,374	5,561	1,959	208	1,038	208
Mississippi	13,563	1,043	14,606	22,430	47,991	21,909	2,608	13,041	2,608
Missouri	3,233	-	5,258	21,566	27,417	9,657	1,023	5,115	1,023
Montana	90	-	127	273	470	200	23	116	23
Nebraska	242	-	373	1,278	1,750	652	71	356	71
Nevada	18	-	24	38	79	36	4	22	4
New Hampshire	158	-	151	675	898	144	36	180	36
New Jersey	105	-	101	450	599	96	24	120	24
New Mexico	62	-	83	129	269	125	15	75	15
New York	562	-	537	2,402	3,195	511	128	639	128
North Carolina	15,623	1,202	16,824	25,837	55,280	25,236	3,004	15,022	3,004
North Dakota	67	-	103	351	481	179	20	98	20
Ohio	1,274	-	1,800	7,528	9,671	2,966	367	1,835	367
Oklahoma	3,273	209	3,828	8,180	14,308	6,044	698	3,490	698
Oregon	519	-	698	1,083	2,267	1,050	126	630	126
Pennsylvania	2,789	-	3,024	13,209	17,355	3,655	682	3,410	682
Rhode Island	27	-	26	117	155	25	6	31	6
South Carolina	4,360	335	4,695	7,211	15,428	7,043	838	4,192	838
South Dakota	79	-	122	418	572	213	23	116	23
Tennessee	2,876	184	3,364	7,187	12,572	5,311	613	3,066	613
Texas	11,258	685	12,754	19,639	41,790	19,148	2,284	11,418	2,284
Utah	75	-	101	156	327	152	18	91	18
Vermont	259	-	248	1,108	1,474	236	59	295	59
Virginia	4,870	292	5,113	10,860	19,528	7,110	974	4,870	974
Washington	358	-	481	746	1,562	724	87	434	87
West Virginia	1,206	-	1,308	5,711	7,504	1,580	295	1,474	295
Wisconsin	609	-	991	4,064	5,167	1,820	193	964	193
Wyoming	59	-	83	178	307	131	15	76	15
U.S. Total	149,545	8,785	169,058	367,760	643,032	254,345	31,469	157,338	31,467

State (All Numbers are in Short Tons)	Total	Total Corn- Related	Total Soy- Related	Total Small Grains	Total Processed Plant Byproducts	Total Animal Byproduct Meals	Total Fats and Oils	Total Synthetic Animo Acids	Vitamins and Minerals
Alabama	7,438,525	4,586,774	2,195,677	-	261,292	68,803	117,098	43,647	165,234
Alaska	14,118	8,859	4,317	-	-	419	162	68	293
Arizona	991	115	42	-	-	14	0	153	666
Arkansas	7,348,084	4,631,002	2,090,747	-	227,672	127,322	50,736	39,600	181,006
California	1,778,980	1,101,642	541,706	-	79,574	42,137	9,573	814	3,534
Colorado	8,587	3,172	986	-	-	311	33	669	3,415
Connecticut	3,123	765	323	-	57	-	6	267	1,703
Delaware	1,777,130	1,100,946	526,052	-	82,769	-	9,186	7,892	50,286
Florida	396,082	226,163	110,557	-	22,729	10,331	14,050	2,560	9,691
Georgia	8,917,234	5,511,852	2,747,128	-	136,663	91,109	175,046	53,375	202,061
Hawaii	12,873	8,077	3,936	-	-	382	148	62	267
Idaho	2,989	120	76	-	212	39	12	474	2,057
Illinois	11,567	5,373	1,677	67	405	324	91	415	3,214
Indiana	284,216	183,948	57,425	2,306	13,880	11,104	3,113	1,422	11,018
Iowa	152,315	87,236	27,290	2,112	8,449	7,745	2,077	1,989	15,416
Kansas	5,115	1,259	415	-	4	92	1	445	2,899
Kentucky	2,028,735	1,192,718	491,960	100,197	74,146	78,279	20,039	9,495	61,901
Louisiana	1,083,102	630,666	310,080	-	57,952	40,566	39,407	926	3,505
Maine	7,513	1,317	470	-	379	-	4	725	4,618
Maryland	1,944,226	1,178,159	559,816	-	130,618	-	10,102	8,889	56,642
Massachusetts	3,410	442	187	-	33	-	4	372	2,372
Michigan	90,053	40,092	12,917	986	4,852	3,287	1,468	3,023	23,428
Minnesota	431,131	258,327	90,405	12,839	25,679	23,539	5,273	1,722	13,347
Mississippi	5,074,966	3,011,375	1,419,053	-	370,838	56,656	77,246	29,212	110,587
Missouri	1,992,204	1,184,554	471,539	73,421	108,205	72,706	7,485	8,491	65,802
Montana	5,361	2,615	1,136	269	-	-	19	217	1,105
Nebraska	52,156	34,849	9,959	-	54	2,502	-	615	4,178
Nevada	269	29	10	-	-	4	-	42	183
New Hampshire	3,258	595	212	-	171	-	2	309	1,968
New Jersey	2,479	630	268	-	59	-	4	206	1,312
New Mexico	986	162	38	-	-	13	0	145	628
New York	26,062	11,779	4,998	-	1,101	-	83	1,099	7,002
North Carolina	6,056,194	3,703,458	1,716,409	-	276,109	61,358	137,828	33,649	127,384
North Dakota	1,567	162	62	17	4	-	2	169	1,149
Ohio	735,388	474,892	159,851	7,347	14,695	36,737	16,058	3,074	22,734
Oklahoma	1,424,879	851,286	318,039	106,142	76,023	11,434	21,228	7,311	33,417
Oregon	109,711	29,870	24,829	-	44,100	1,636	2,778	1,217	5,282
Pennsylvania	1,352,072	818,407	406,268	-	76,756	-	5,834	5,814	38,993
Rhode Island	452	39	16	-	3	-	0	53	341
South Carolina	1,611,505	964,583	450,643	-	90,251	42,849	18,238	9,391	35,550
South Dakota	2,484	617	204	48	0	48	0	201	1,366
Tennessee	1,140,408	651,364	305,675	-	65,460	41,656	40,466	6,424	29,363
Texas	4,535,216	2,848,932	1,133,568	158,233	217,363	40,229	15,632	24,697	96,563
Utah	1,312	249	94	-	-	30	0	176	763
Vermont	5,973	1,392	499	-	331	-	15	507	3,230
Virginia	1,861,901	1,056,916	554,452	-	65,942	65,942	64,058	10,275	44,315
Washington	155,789	43,462	36,628	-	64,721	2,401	4,099	838	3,640
West Virginia	501,410	309,231	139,715	-	30,175	-	2,915	2,514	16,860
Wisconsin	395,529	236,451	85,864	5,877	24,999	19,591	8,746	1,600	12,400
Wyoming	1,058	125	56	11	-	-	2	142	722
U.S. Total	60,790,688	36,997,050	17,014,277	469,873	2,654,726	961,592	880,370	327,388	1,485,412

6.1.3 Egg-Laying Hens

State (All Numbers are in Short Tons)	Corn	Corn DDGs	Sorghum	Barley	Soybean Meal	Cottonseed Meal	Wheat Middlings and Wheat Bran	Soybean Oil
Alabama	264,652	11,906	-	-	54,607	37,218	46,018	9,332
Alaska	2,390	401	266	-	678	-	-	59
Arizona	30,169	6,251	770	-	15,371	-	-	-
Arkansas	384,438	37,098	23,049	-	97,204	17,102	69,915	13,983
California	341,515	68,906	-	-	166,507	-	-	-
Colorado	134,908	17,281	11,143	-	64,498	-	-	-
Connecticut	43,926	9,050	-	-	22,214	-	-	848
Delaware	2,621	533	-	-	966	-	250	-
Florida	186,298	8,316	-	-	42,291	20,314	32,122	6,519
Georgia	553,884	62,464	-	-	142,672	-	56,561	22,799
Hawaii	5,385	955	949	-	2,216	-	-	211
Idaho	15,553	9,541	-	-	13,111	-	-	-
Illinois	182,690	30,310	-	-	37,895	-	-	-
Indiana	1,027,489	173,297	-	-	195,944	5,669	49,590	-
Iowa	1,577,515	289,369	-	-	506,573	9,303	53,469	-
Kansas	65,284	6,156	2,949	-	14,596	-	-	-
Kentucky	136,712	9,488	-	-	27,529	1,527	6,022	-
Louisiana	42,286	5,493	455	-	11,399	3,321	3,809	1,523
Maine	75,691	15,594	-	-	38,277	-	-	1,462
Maryland	68,890	14,015	-	-	25,398	-	6,569	-
Massachusetts	22,166	4,567	-	-	11,209	-	-	428
Michigan	461,577	46,278	-	-	96,009	-	20,856	-
Minnesota	271,159	46,414	-	-	54,908	-	13,053	-
Mississippi	144,925	27,485	-	-	35,895	5,849	12,882	5,153
Missouri	338,582	62,110	-	-	108,732	1,997	11,476	-
Montana	34,743	7,158	-	1,033	16,899	-	-	671
Nebraska	270,807	44,930	-	-	56,173	-	-	-
Nevada	970	199	-	-	495	-	-	-
New Hampshire	14,816	3,052	-	-	7,492	-	-	286
New Jersey	25,670	5,294	-	-	11,076	-	1,489	496
New Mexico	36,994	7,592	3,559	-	12,379	2,707	-	-
New York	137,915	28,414	-	-	69,744	-	-	2,664
North Carolina	411,535	35,747	-	-	89,186	36,540	73,080	14,616
North Dakota	9,909	1,981	-	-	4,931	-	-	186
Ohio	1,142,940	82,112	-	-	229,859	12,796	50,456	-
Oklahoma	135,784	21,798	49	-	36,034	761	19,780	4,945
Oregon	18,609	11,416	-	-	15,687	-	-	-
Pennsylvania	741,440	152,918	-	-	319,912	-	43,005	14,335
Rhode Island	3,093	637	-	-	1,564	-	-	60
South Carolina	102,028	8,862	-	-	22,111	9,059	18,118	3,624
South Dakota	77,110	13,190	-	-	15,604	-	3,644	-
Tennessee	126,550	11,967	-	-	26,930	11,033	22,066	4,413
Texas	536,563	107,703	30,720	-	139,760	6,731	82,853	20,713
Utah	113,619	22,924	-	-	57,075	-	-	-
Vermont	19,228	3,961	-	-	9,724	-	-	371
Virginia	71,783	6,016	-	-	16,078	4,679	12,300	2,460
Washington	55,071	33,952	-	-	46,723	-	-	-
West Virginia	58,273	11,900	-	-	18,596	2,546	3,347	1,116
Wisconsin	228,525	39,117	-	-	46,275	-	11,001	-
Wyoming	20,045	4,007	-	578	9,460	-	-	376
U.S. Total	10,774,724	1,630,124	73,908	1,611	3,066,463	189,152	723,730	133,648

State (All Numbers are in Short Tons)	Meat and Bone Meal	Miscellaneous Byproduct Feeds	Yellow Grease	Potato Pulp	Potato Peels	Potato Tubers	DL Methionine	Dicalcium Phosphate	Limestone	Salt	Minerals	Vitamins	Phytase
Alabama	-	-	-	-	-	-	492	1,976	38,598	1,084	339	1,695	31
Alaska	94	-	-	-	-	-	4	43	322	13	3	12	2
Arizona	-	-	62	-	-	-	50	664	4,250	173	30	152	20
Arkansas	-	-	-	-	-	-	649	4,016	50,765	1,591	423	2,114	95
California	-	9,359	270	-	-	-	770	8,674	65,757	2,282	365	1,826	317
Colorado	-	-	613	-	-	-	243	2,683	20,756	714	116	580	98
Connecticut	-	589	-	-	-	-	33	301	2,484	52	15	74	11
Delaware	-	89	-	-	-	-	100	48	7,949	148	58	290	2
Florida	-	-	-	-	-	-	468	4,226	34,497	1,134	193	965	159
Georgia	-	-	-	-	-	-	1,095	7,082	83,414	2,540	612	3,059	214
Hawaii	98	-	-	-	-	-	12	131	1,010	38	9	31	5
Idaho	-	-	1,699	13,416	13,416	13,416	79	887	6,692	238	41	203	31
Illinois	7,020	-	-	-	-	-	291	3,055	25,082	818	128	638	120
Indiana	49,893	-	-	-	-	-	1,805	20,516	155,660	5,430	870	4,351	751
Iowa	87,638	-	-	-	-	-	3,067	34,474	264,531	9,129	1,452	7,261	1,278
Kansas	3,164	-	-	-	-	-	90	956	7,382	258	44	218	34
Kentucky	6,105	-	-	-	-	-	280	2,187	22,831	727	161	805	69
Louisiana	-	-	-	-	-	-	82	770	6,043	211	39	194	26
Maine	-	1,015	-	-	-	-	53	457	4,027	86	25	124	16
Maryland	-	2,350	-	-	-	-	266	1,670	20,435	428	136	679	58
Massachusetts	-	297	-	-	-	-	45	362	3,373	61	18	88	15
Michigan	18,002	-	-	-	-	-	846	9,119	72,723	2,462	402	2,010	339
Minnesota	8,062	-	-	-	-	-	575	6,385	49,471	1,713	281	1,404	232
Mississippi	-	-	-	-	-	-	365	1,534	28,462	783	234	1,169	33
Missouri	18,805	-	-	-	-	-	490	5,042	41,558	1,468	284	1,418	161
Montana	-	-	-	-	-	-	57	621	4,910	166	27	136	23
Nebraska	10,406	-	-	-	-	-	419	4,634	36,018	1,232	197	984	173
Nevada	-	-	2	-	-	-	11	137	976	36	6	31	5
New Hampshire	-	199	-	-	-	-	31	279	2,312	50	14	71	10
New Jersey	-	446	-	-	-	-	49	489	3,693	82	23	114	17
New Mexico	-	-	9	-	-	-	60	740	5,126	194	33	164	24
New York	-	1,849	-	-	-	-	332	3,042	24,964	487	136	679	116
North Carolina	-	-	-	-	-	-	754	5,307	57,215	1,815	425	2,125	157
North Dakota	-	-	-	-	-	-	17	177	1,468	49	9	43	6
Ohio	50,721	-	-	-	-	-	1,863	20,208	154,827	4,842	874	4,369	739
Oklahoma	-	-	-	-	-	-	301	2,306	23,173	708	141	703	85
Oregon	-	-	2,033	16,052	16,052	16,052	136	1,412	11,543	388	66	332	51
Pennsylvania	-	12,874	-	-	-	-	1,665	15,736	129,305	2,957	701	3,503	602
Rhode Island	-	41	-	-	-	-	6	58	472	10	3	15	2
South Carolina	-	-	-	-	-	-	281	1,958	21,158	635	136	679	69
South Dakota	2,299	-	-	-	-	-	140	1,597	12,053	423	68	342	58
Tennessee	-	-	-	-	-	-	268	2,047	20,601	628	124	621	76
Texas	-	-	-	-	-	-	1,344	11,359	103,042	3,300	624	3,119	410
Utah	-	-	90	-	-	-	271	3,030	23,142	796	126	632	112
Vermont	-	258	-	-	-	-	41	312	3,103	55	16	82	13
Virginia	-	-	-	-	-	-	154	695	11,926	312	92	459	19
Washington	-	-	6,060	47,741	47,741	47,741	383	4,188	32,702	1,111	178	889	156
West Virginia	-	2,331	-	-	-	-	132	1,071	10,295	243	64	320	38
Wisconsin	6,794	-	-	-	-	-	360	3,852	30,923	1,045	172	862	143
Wyoming	-	-	-	-	-	-	32	361	2,766	97	16	81	13
U.S. Total	269,102	31,696	10,837	77,209	77,209	77,209	21,356	202,872	1,745,789	55,247	10,547	52,715	7,232

State (All Numbers are in Short Tons)	Total	Total Corn- Related	Total Soy- Related	Total Small Grains	Total Processed Plant	Total Animal Byproduct Meals	Total Fats and Oils	Total Synthetic Animo Acids	Vitamins and Minerals
Alabama	467,947	276,558	54,607	-	83,237	-	9,332	492	43,722
Alaska	4,287	3,056	678	-	-	94	59	4	396
Arizona	57,962	37,190	15,371	-	-	-	62	50	5,289
Arkansas	702,441	444,585	97,204	-	87,016	-	13,983	649	59,004
California	666,547	410,421	166,507	-	9,359	-	270	770	79,221
Colorado	253,632	163,332	64,498	-	-	-	613	243	24,947
Connecticut	79,596	52,976	22,214	-	589	-	848	33	2,937
Delaware	13,055	3,154	966	-	339	-	-	100	8,495
Florida	337,503	194,615	42,291	-	52,436	-	6,519	468	41,174
Georgia	936,398	616,348	142,672	-	56,561	-	22,799	1,095	96,921
Hawaii	11,050	7,289	2,216	-	-	98	211	12	1,225
Idaho	88,323	25,094	13,111	-	40,248	-	1,699	79	8,092
Illinois	288,047	213,001	37,895	-	-	7,020	-	291	29,840
Indiana	1,691,266	1,200,786	195,944	-	55,259	49,893	-	1,805	187,579
Iowa	2,845,060	1,866,884	506,573	-	62,772	87,638	-	3,067	318,126
Kansas	101,131	74,389	14,596	-	-	3,164	-	90	8,892
Kentucky	214,442	146,199	27,529	-	7,549	6,105	-	280	26,779
Louisiana	75,650	48,234	11,399	-	7,129	-	1,523	82	7,283
Maine	136,828	91,285	38,277	-	1,015	-	1,462	53	4,736
Maryland	140,893	82,906	25,398	-	8,919	-	-	266	23,405
Massachusetts	42,627	26,732	11,209	-	297	-	428	45	3,916
Michigan	730,622	507,855	96,009	-	20,856	18,002	-	846	87,054
Minnesota	453,656	317,573	54,908	-	13,053	8,062	-	575	59,486
Mississippi	264,771	172,410	35,895	-	18,732	-	5,153	365	32,216
Missouri	592,124	400,692	108,732	-	13,473	18,805	-	490	49,931
Montana	66,443	41,901	16,899	1,033	-	-	671	57	5,883
Nebraska	425,972	315,737	56,173	-	-	10,406	-	419	43,237
Nevada	2,868	1,169	495	-	-	-	2	11	1,190
New Hampshire	28,612	17,868	7,492	-	199	-	286	31	2,736
New Jersey	48,938	30,965	11,076	-	1,935	-	496	49	4,418
New Mexico	69,582	48,145	12,379	-	2,707	-	9	60	6,282
New York	270,341	166,329	69,744	-	1,849	-	2,664	332	29,423
North Carolina	728,500	447,282	89,186	-	109,619	-	14,616	754	67,044
North Dakota	18,776	11,890	4,931	-	-	-	186	17	1,752
Ohio	1,756,606	1,225,052	229,859	-	63,252	50,721	-	1,863	185,860
Oklahoma	246,567	157,632	36,034	-	20,541	-	4,945	301	27,115
Oregon	109,828	30,025	15,687	-	48,155	-	2,033	136	13,793
Pennsylvania	1,438,953	894,358	319,912	-	55,878	-	14,335	1,665	152,804
Rhode Island	5,961	3,730	1,564	-	41	-	60	6	560
South Carolina	188,718	110,890	22,111	-	27,177	-	3,624	281	24,636
South Dakota	126,527	90,299	15,604	-	3,644	2,299	-	140	14,541
Tennessee	227,324	138,517	26,930	-	33,100	-	4,413	268	24,098
Texas	1,048,240	674,986	139,760	-	89,584	-	20,713	1,344	121,853
Utah	221,819	136,544	57,075	-	-	-	90	271	27,839
Vermont	37,166	23,190	9,724	-	258	-	371	41	3,582
Virginia	126,974	77,799	16,078	-	16,979	-	2,460	154	13,504
Washington	324,634	89,022	46,723	-	143,222	-	6,060	383	39,224
West Virginia	110,271	70,173	18,596	-	8,224	-	1,116	132	12,031
Wisconsin	369,069	267,642	46,275	-	11,001	6,794	-	360	36,998
Wyoming	37,831	24,051	9,460	578	-	-	376	32	3,334
U.S. Total	19,232,380	12,478,756	3,066,463	1,611	1,176,204	269,102	144,485	21,356	2,074,402

6.1.4 Turkeys

State (All Numbers are in Short Tons)	Corn	Corn DDGs	Sorghum	Barley	Soybean Meal	Cottonseed Meal
Alabama	634	10	-	-	423	-
Alaska	3,245	-	1,350	-	1,807	-
Arizona	128	7	4	-	45	-
Arkansas	689,937	11,228	-	-	460,454	-
California	255,502	6,073	10,669	-	82,422	8,535
Colorado	276	12	13	-	90	-
Connecticut	182	11	-	-	48	-
Delaware	13	1	-	-	4	-
Florida	299	5	-	-	200	-
Georgia	115	2	-	-	77	-
Hawaii	439	-	182	-	244	-
Idaho	254	1	-	-	14	-
Illinois	35,868	2,817	-	-	23,894	-
Indiana	476,536	37,428	-	-	317,454	-
Iowa	278,774	21,895	-	-	185,710	-
Kansas	11,326	546	1,444	-	3,117	-
Kentucky	8,320	653	-	-	5,542	-
Louisiana	62	1	-	-	41	-
Maine	422	26	-	-	113	-
Maryland	3,031	165	-	-	973	-
Massachusetts	1,171	73	-	-	312	-
Michigan	126,282	9,918	-	-	84,125	-
Minnesota	953,072	74,856	-	-	634,907	-
Mississippi	55	1	-	-	37	-
Missouri	561,134	59,353	4,240	-	121,355	-
Montana	1,069	53	-	18	367	-
Nebraska	13,133	1,031	-	-	8,749	-
Nevada	30	2	-	-	10	-
New Hampshire	201	13	-	-	54	-
New Jersey	882	55	-	-	234	-
New Mexico	611	27	29	-	197	-
New York	12,324	768	-	-	3,278	-
North Carolina	712,935	11,603	-	-	475,803	-
North Dakota	25,185	1,978	-	-	16,778	-
Ohio	140,578	11,041	-	-	93,649	-
Oklahoma	13,804	225	-	-	9,213	-
Oregon	422	-	-	-	52	-
Pennsylvania	186,262	11,603	-	-	49,406	-
Rhode Island	482	30	-	-	128	-
South Carolina	318,092	5,177	-	-	212,290	-
South Dakota	107,221	8,421	-	-	71,427	-
Tennessee	191	3	-	-	128	-
Texas	55,685	906	-	-	37,163	-
Utah	134,167	7,298	4,087	-	43,075	-
Vermont	260	16	-	-	69	-
Virginia	367,966	5,988	-	-	245,576	-
Washington	306	0	-	-	40	-
West Virginia	93,087	5,801	-	-	24,750	-
Wisconsin	104,089	8,175	-	-	69,341	-
Wyoming	48	3	-	-	15	-
U.S. Total	5,696,106	305,300	22,018	18	3,285,199	8,535

State (All Numbers are in Short Tons)	Meat and Bone Meal	Feather Meal	Meat Meal	Miscellaneous Byproduct Feeds	Yellow Grease	Choice White Grease	Potato Pulp	Potato Peels	Potato Tubers
Alabama	69	33	-	-	42	-	-	-	-
Alaska	463	62	-	-	-	467	-	-	-
Arizona	18	0	-	-	-	-	-	-	-
Arkansas	75,312	36,272	-	-	45,187	-	-	-	-
California	21,338	405	-	17,852	-	-	-	-	-
Colorado	46	1	-	-	-	-	-	-	-
Connecticut	28	-	4	13	-	-	-	-	-
Delaware	2	0	-	0	-	-	-	-	-
Florida	33	16	-	-	20	-	-	-	-
Georgia	13	6	-	-	8	-	-	-	-
Hawaii	62	8	-	-	-	63	-	-	-
Idaho	42	12	-	-	-	-	39	44	27
Illinois	7,558	-	-	-	-	-	-	-	-
Indiana	100,416	-	-	-	-	-	-	-	-
Iowa	58,743	-	-	-	-	-	-	-	-
Kansas	667	-	-	-	-	-	-	-	-
Kentucky	1,753	-	-	-	-	-	-	-	-
Louisiana	7	3	-	-	4	-	-	-	-
Maine	64	-	9	30	-	-	-	-	-
Maryland	506	7	-	87	-	-	-	-	-
Massachusetts	177	-	23	81	-	-	-	-	-
Michigan	26,610	-	-	-	-	-	-	-	-
Minnesota	200,831	-	-	-	-	-	-	-	-
Mississippi	6	3	-	-	4	-	-	-	-
Missouri	35,285	2,113	-	-	-	-	-	-	-
Montana	142	2	-	-	-	-	-	-	-
Nebraska	2,767	-	-	-	-	-	-	-	-
Nevada	5	0	-	-	-	-	-	-	-
New Hampshire	30	-	4	14	-	-	-	-	-
New Jersey	135	-	21	63	-	-	-	-	-
New Mexico	102	1	-	-	-	-	-	-	-
New York	1,867	-	247	857	-	-	-	-	-
North Carolina	77,822	37,481	-	-	46,693	-	-	-	-
North Dakota	5,307	-	-	-	-	-	-	-	-
Ohio	29,623	-	-	-	-	-	-	-	-
Oklahoma	1,507	726	-	-	904	-	-	-	-
Oregon	76	7	-	-	-	-	77	71	50
Pennsylvania	28,552	-	4,534	13,236	-	-	-	-	-
Rhode Island	73	-	10	34	-	-	-	-	-
South Carolina	34,722	16,723	-	-	20,833	-	-	-	-
South Dakota	22,594	-	-	-	-	-	-	-	-
Tennessee	21	10	-	-	13	-	-	-	-
Texas	6,078	2,927	-	-	3,647	-	-	-	-
Utah	11,205	305	-	-	5,603	-	-	-	-
Vermont	39	-	5	18	-	-	-	-	-
Virginia	40,166	19,345	-	-	24,100	-	-	-	-
Washington	45	7	-	-	-	-	44	43	42
West Virginia	14,105	-	2,113	6,475	-	-	-	-	-
Wisconsin	21,934	-	-	-	-	-	-	-	-
Wyoming	8	0	-	-	-	-	-	-	-
U.S. Total	828,975	116,474	6,971	38,760	147,056	530	159	158	119

State (All Numbers are in Short Tons)	Lysine	Threonine	DL Methionine	Dicalcium Phosphate	Limestone	Salt	Vitamins
Alabama	44	3	59	11	127	39	11
Alaska	14	1	20	4	39	13	4
Arizona	31	3	42	6	82	27	8
Arkansas	2,251	149	3,054	561	6,520	1,985	584
California	832	81	1,142	165	2,218	718	212
Colorado	117	15	161	24	315	92	30
Connecticut	42	4	58	8	112	36	11
Delaware	9	1	12	2	24	8	2
Florida	104	5	148	21	282	86	27
Georgia	51	3	69	13	147	45	13
Hawaii	2	0	3	1	5	2	1
Idaho	76	7	104	15	203	66	19
Illinois	75	16	104	16	209	41	20
Indiana	1,431	269	1,894	363	4,224	962	379
Iowa	838	175	1,164	176	2,338	453	226
Kansas	33	6	46	7	91	21	9
Kentucky	77	11	92	26	250	71	20
Louisiana	23	1	32	5	61	19	6
Maine	102	10	139	20	271	88	26
Maryland	60	6	83	12	161	52	15
Massachusetts	50	5	68	10	132	43	13
Michigan	374	70	496	95	1,105	252	99
Minnesota	2,995	539	4,146	619	8,257	1,869	796
Mississippi	21	1	28	5	60	18	5
Missouri	1,350	115	1,919	278	3,696	1,021	357
Montana	38	4	52	7	100	32	10
Nebraska	25	4	34	5	68	15	7
Nevada	13	1	17	2	33	11	3
New Hampshire	63	6	87	13	168	54	16
New Jersey	35	3	49	7	94	30	9
New Mexico	36	3	50	7	98	31	9
New York	177	21	212	59	571	177	45
North Carolina	2,373	158	3,220	592	6,874	2,092	616
North Dakota	14	2	19	3	38	11	4
Ohio	479	90	635	122	1,415	322	127
Oklahoma	81	7	114	17	220	61	21
Oregon	159	16	219	32	425	137	40
Pennsylvania	532	78	639	179	1,733	491	136
Rhode Island	8	1	11	2	21	7	2
South Carolina	95	4	135	19	257	78	25
South Dakota	308	38	425	62	831	242	80
Tennessee	70	8	85	23	227	69	18
Texas	265	15	376	54	718	222	69
Utah	131	13	179	26	348	113	33
Vermont	54	5	74	11	144	47	14
Virginia	1,254	136	1,521	421	4,063	1,241	318
Washington	146	14	200	29	389	126	37
West Virginia	245	36	294	83	798	226	63
Wisconsin	154	32	214	32	429	83	42
Wyoming	21	2	28	4	55	18	5
U.S. Total	17,774	2,197	23,973	4,272	51,047	13,959	4,639

State (All Numbers are in Short Tons)	Total	Total Corn- Related	Total Soy- Related	Total Small Grains	Total Processed Plant Byproducts	Total Animal Byproduct Meals	Total Fats and Oils	Total Synthetic Animo Acids	Vitamins and Minerals
Alabama	1,505	644	423	-	-	103	42	106	188
Alaska	7,489	4,595	1,807	-	-	525	467	35	60
Arizona	401	139	45	-	-	18	-	76	123
Arkansas	1,333,494	701,165	460,454	-	-	111,584	45,187	5,454	9,650
California	408,164	272,244	82,422	-	26,388	21,743	-	2,056	3,312
Colorado	1,190	301	90	-	-	47	-	292	460
Connecticut	557	193	48	-	13	31	-	104	167
Delaware	78	14	4	-	0	2	-	22	36
Florida	1,244	304	200	-	-	48	20	257	416
Georgia	561	117	77	-	-	19	8	123	218
Hawaii	1,012	621	244	-	-	71	63	5	9
Idaho	924	255	14	-	110	54	-	188	303
Illinois	70,619	38,685	23,894	-	-	7,558	-	195	286
Indiana	941,355	513,964	317,454	-	-	100,416	-	3,594	5,928
Iowa	550,492	300,669	185,710	-	-	58,743	-	2,177	3,192
Kansas	17,311	13,315	3,117	-	-	667	-	85	127
Kentucky	16,814	8,973	5,542	-	-	1,753	-	180	366
Louisiana	265	63	41	-	-	10	4	56	90
Maine	1,320	448	113	-	30	73	-	251	404
Maryland	5,159	3,195	973	-	87	514	-	149	240
Massachusetts	2,158	1,244	312	-	81	201	-	123	198
Michigan	249,427	136,200	84,125	-	-	26,610	-	940	1,551
Minnesota	1,882,887	1,027,928	634,907	-	-	200,831	-	7,680	11,540
Mississippi	243	56	37	-	-	9	4	50	88
Missouri	792,214	624,727	121,355	-	-	37,397	-	3,384	5,351
Montana	1,893	1,122	367	18	-	144	-	93	150
Nebraska	25,839	14,164	8,749	-	-	2,767	-	64	96
Nevada	128	32	10	-	-	5	-	31	50
New Hampshire	723	214	54	-	14	35	-	156	251
New Jersey	1,619	937	234	-	63	157	-	87	141
New Mexico	1,203	667	197	-	-	104	-	90	145
New York	20,603	13,092	3,278	-	857	2,114	-	411	851
North Carolina	1,378,261	724,537	475,803	-	-	115,303	46,693	5,750	10,174
North Dakota	49,339	27,163	16,778	-	-	5,307	-	35	56
Ohio	278,081	151,619	93,649	-	-	29,623	-	1,204	1,986
Oklahoma	26,899	14,029	9,213	-	-	2,233	904	202	319
Oregon	1,782	422	52	-	197	83	-	393	634
Pennsylvania	297,380	197,865	49,406	-	13,236	33,086	-	1,249	2,539
Rhode Island	808	512	128	-	34	83	-	20	32
South Carolina	608,450	323,268	212,290	-	-	51,445	20,833	234	379
South Dakota	211,649	115,642	71,427	-	-	22,594	-	771	1,215
Tennessee	865	195	128	-	-	31	13	162	337
Texas	108,125	56,591	37,163	-	-	9,006	3,647	656	1,062
Utah	206,581	145,553	43,075	-	-	11,510	5,603	322	520
Vermont	757	276	69	-	18	45	-	134	215
Virginia	712,095	373,955	245,576	-	-	59,511	24,100	2,911	6,043
Washington	1,470	307	40	-	129	52	-	360	581
West Virginia	148,076	98,889	24,750	-	6,475	16,218	-	575	1,170
Wisconsin	204,525	112,264	69,341	-	-	21,934	-	400	586
Wyoming	207	50	15	-	-	8	-	51	82
U.S. Total	10,574,242	6,023,424	3,285,199	18	47,732	952,422	147,586	43,944	73,918

6.1.5 Hogs

State (All Numbers are in Short Tons)	Corn	Corn DDGs	Corn Gluten Feed/Meal	Hominy Feed	Wheat	Sorghum	Barley	Oats	Cottonseed
Alabama	21,375	177	1,189	-	710	-	-	-	-
Alaska	597	124	0	-	-	-	-	-	-
Arizona	78,482	5,533	6,292	380	6,550	868	-	-	-
Arkansas	69,895	2,277	3,210	2,896	1,927	542	-	-	-
California	52,340	3,660	4,184	246	4,368	587	-	-	-
Colorado	412,834	6,961	9,989	8,099	34,061	2,320	-	3,819	-
Connecticut	2,072	137	104	45	-	-	-	18	-
Delaware	4,214	256	179	62	-	-	-	25	-
Florida	6,557	58	318	-	247	-	-	-	-
Georgia	37,686	1,208	2,075	1,171	1,605	-	-	-	-
Hawaii	2,897	312	0	-	-	-	-	-	-
Idaho	18,667	1,244	1,467	73	1,558	226	-	-	-
Illinois	2,622,973	442,182	107,141	189,674	129,958	-	-	-	-
Indiana	2,026,779	260,861	95,163	159,051	101,330	-	-	-	-
Iowa	11,185,543	1,921,472	541,519	191,528	306,465	-	-	-	-
Kansas	1,026,322	129,026	64,834	388	58,234	135,241	-	-	-
Kentucky	219,383	11,279	15,581	14,292	7,532	-	-	-	-
Louisiana	3,731	32	195	-	132	-	-	-	-
Maine	2,519	161	119	48	-	-	-	20	-
Maryland	10,361	683	519	226	-	-	-	92	-
Massachusetts	4,421	281	206	82	-	-	-	33	-
Michigan	589,018	84,282	25,784	43,083	36,138	-	-	-	-
Minnesota	4,228,267	738,016	202,153	257,694	272,809	-	-	-	-
Mississippi	112,927	934	6,273	-	3,755	-	-	-	-
Missouri	1,636,823	134,407	87,167	114,174	19,437	20,226	-	-	-
Montana	109,767	8,084	6,140	3,791	9,192	554	1,867	-	-
Nebraska	1,867,187	311,076	79,361	78,269	118,262	-	-	-	-
Nevada	2,302	168	187	13	192	24	-	-	-
New Hampshire	1,856	119	88	36	-	-	-	15	-
New Jersey	3,741	252	195	89	-	-	-	36	-
New Mexico	1,204	75	92	3	100	16	-	-	-
New York	25,487	1,755	1,384	657	-	-	-	268	-
North Carolina	4,759,845	33,582	331,201	-	116,598	-	-	-	-
North Dakota	74,903	9,154	1,539	4,306	1,359	-	-	900	-
Ohio	1,356,049	176,353	62,555	104,351	79,570	-	-	-	-
Oklahoma	1,190,717	49,989	91,568	1,731	125,577	68,499	-	-	-
Oregon	5,776	389	455	24	482	69	-	-	-
Pennsylvania	646,272	44,231	34,710	16,294	-	-	-	6,637	-
Rhode Island	838	55	41	18	-	-	-	7	-
South Carolina	93,410	626	6,883	-	2,049	-	-	-	-
South Dakota	962,808	110,378	22,010	66,026	10,933	-	-	14,559	-
Tennessee	124,675	6,531	8,986	8,315	4,231	-	-	-	-
Texas	557,695	16,060	31,236	-	48,168	35,471	-	4,145	16,579
Utah	460,939	32,810	37,085	2,304	38,473	5,012	-	-	-
Vermont	2,036	128	93	36	-	-	-	15	-
Virginia	152,305	8,040	12,565	9,342	5,220	-	-	-	-
Washington	8,888	654	497	307	744	45	151	-	-
West Virginia	1,773	109	77	27	-	-	-	11	-
Wisconsin	179,608	30,540	7,312	9,310	10,883	-	-	-	-
Wyoming	58,450	3,778	3,622	1,249	4,886	554	615	-	-
U.S. Total	37,025,213	4,590,499	1,915,544	1,289,709	1,563,733	270,253	2,633	30,599	16,579

State (All Numbers are in Short Tons)	Soybean Meal	Canola Meal	Sunflower Meal	Wheat Middlings and Wheat Bran	Rice Mill Feed	Soy Hulls
Alabama	4,567	19	-	-	1,901	-
Alaska	161	0	-	126	-	6
Arizona	13,190	1,186	-	3,367	-	392
Arkansas	14,198	117	-	3,508	2,517	119
California	8,916	769	-	2,199	-	294
Colorado	91,403	13,576	-	23,362	-	3,375
Connecticut	495	4	-	116	-	34
Delaware	1,095	5	-	228	-	122
Florida	1,434	4	-	-	548	-
Georgia	8,462	41	-	718	1,291	-
Hawaii	637	0	-	1,024	-	75
Idaho	3,425	229	-	689	-	171
Illinois	473,491	10,216	-	206,901	-	5,348
Indiana	370,104	8,739	-	158,791	-	2,341
Iowa	2,136,580	29,768	-	1,546,605	-	12,395
Kansas	177,944	5,171	-	12,242	-	2,678
Kentucky	42,761	201	-	8,504	3,227	153
Louisiana	806	3	-	-	322	12
Maine	622	4	-	140	-	54
Maryland	2,474	19	-	582	-	171
Massachusetts	1,098	7	-	244	-	98
Michigan	105,597	2,330	-	39,241	-	2,571
Minnesota	872,881	61,810	-	272,885	-	7,039
Mississippi	24,132	99	-	-	10,035	-
Missouri	325,383	4,380	-	187,044	-	4,430
Montana	21,153	1,551	-	1,401	-	793
Nebraska	363,107	7,095	-	128,259	-	6,887
Nevada	363	39	-	108	-	5
New Hampshire	457	3	-	103	-	39
New Jersey	872	7	-	212	-	49
New Mexico	243	11	-	36	-	17
New York	5,788	54	-	1,461	-	245
North Carolina	969,834	6,218	-	-	473,313	-
North Dakota	16,689	692	923	11,957	-	536
Ohio	254,037	5,701	-	104,225	-	4,285
Oklahoma	231,011	3,065	-	62,970	-	8,288
Oregon	1,045	74	-	219	-	49
Pennsylvania	147,847	1,337	-	36,930	-	4,974
Rhode Island	202	1	-	47	-	15
South Carolina	18,761	134	-	-	9,578	-
South Dakota	198,400	11,186	14,931	160,557	-	4,036
Tennessee	24,185	117	-	4,948	1,678	80
Texas	99,975	2,082	2,391	16,342	-	2,824
Utah	76,208	7,201	-	20,269	-	1,959
Vermont	512	3	-	112	-	49
Virginia	32,794	328	-	5,723	323	61
Washington	1,713	126	-	113	-	73
West Virginia	457	2	-	96	-	37
Wisconsin	39,939	2,111	-	13,966	-	735
Wyoming	12,541	511	-	705	-	793
U.S. Total	7,199,986	188,345	18,246	3,039,275	504,732	78,710

State (All Numbers are in Short Tons)	Meat and Bone Meal	Feather Meal	Meat Meal	Bloodmeal	Choice White Grease	Millet	Lysine	Threonine	DL Methionine	Dicalcium Phosphate	Limestone	Salt	Vitamins	Tryptophan
Alabama	339	244	1	3	1,028	-	100	27	9	418	502	174	43	2
Alaska	17	-	0	2	10	-	4	1	0	-	-	5	2	0
Arizona	2,226	-	854	139	2,632	-	174	27	7	652	897	305	76	3
Arkansas	729	-	764	48	3,489	-	318	85	49	1,272	1,625	536	132	11
California	1,461	-	554	90	1,755	-	129	20	5	488	673	228	57	2
Colorado	10,957	-	3,204	1,058	18,116	-	1,728	293	151	6,061	8,761	2,932	728	44
Connecticut	48	17	-	0	108	-	3	1	0	18	22	6	2	0
Delaware	72	23	-	0	225	-	16	5	1	78	92	30	7	1
Florida	79	56	0	1	313	-	20	5	1	105	130	39	10	0
Georgia	552	107	382	9	1,834	-	225	61	22	907	1,076	383	95	6
Hawaii	23	-	1	3	99	-	16	5	0	-	-	24	3	2
Idaho	474	-	165	27	625	-	54	9	3	221	303	98	24	1
Illinois	44,166	-	50,154	3,041	89,995	-	8,728	1,843	1,258	26,193	41,286	13,888	3,462	307
Indiana	37,779	-	42,901	2,601	69,356	-	6,760	1,455	968	18,711	29,120	10,421	2,598	249
Iowa	187,866	-	194,900	14,625	385,112	-	37,512	7,671	6,245	91,281	156,152	55,844	13,921	1,573
Kansas	17,673	-	19,595	1,101	34,674	-	3,544	668	483	9,834	16,007	5,540	1,381	126
Kentucky	5,057	588	3,788	37	10,821	-	656	159	61	2,415	3,172	1,106	276	17
Louisiana	52	37	0	0	179	-	7	2	0	44	57	16	4	0
Maine	53	18	-	0	133	-	5	1	0	28	34	10	3	0
Maryland	240	83	-	2	542	-	35	9	2	151	179	62	16	1
Massachusetts	91	30	-	1	233	-	12	3	1	59	71	22	6	0
Michigan	10,074	-	10,514	1,356	28,539	-	1,728	364	248	5,250	8,237	2,760	688	65
Minnesota	80,325	-	31,791	11,370	148,615	-	14,231	2,891	2,414	36,043	61,764	21,454	5,343	590
Mississippi	1,788	1,284	5	14	5,432	-	305	89	40	1,471	1,764	553	137	10
Missouri	26,365	-	28,511	1,776	79,487	-	6,524	1,407	1,012	19,932	31,046	10,365	2,577	239
Montana	2,456	-	1,173	235	4,961	-	356	60	31	1,290	1,874	613	152	9
Nebraska	30,673	-	35,942	3,852	76,468	-	5,864	1,089	825	17,519	28,692	9,416	2,345	202
Nevada	70	-	28	5	77	-	2	0	0	9	12	4	1	0
New Hampshire	39	13	-	0	98	-	5	1	0	26	32	10	3	0
New Jersey	93	33	-	1	195	-	10	3	1	43	51	18	4	0
New Mexico	26	-	8	1	40	-	5	1	0	20	28	9	2	0
New York	676	240	-	5	1,318	-	58	15	3	242	286	102	25	2
North Carolina	110,844	80,598	302	850	231,973	-	10,354	2,718	726	42,464	51,140	18,021	4,495	228
North Dakota	959	-	1,116	60	3,431	923	488	95	75	1,437	2,304	770	191	18
Ohio	24,566	-	27,988	1,697	46,651	-	3,346	711	482	9,906	15,463	5,284	1,317	128
Oklahoma	31,407	-	19,057	1,053	54,234	-	5,088	943	298	19,351	25,561	8,828	2,195	105
Oregon	150	-	53	9	194	-	9	1	0	44	63	18	4	0
Pennsylvania	16,836	5,956	-	128	33,480	-	1,588	385	143	5,967	7,708	2,690	671	54
Rhode Island	19	7	-	0	44	-	2	1	0	10	12	4	1	0
South Carolina	2,379	1,734	6	18	4,570	-	152	39	9	596	718	262	65	3
South Dakota	15,510	-	18,037	971	46,917	14,931	4,107	778	587	11,869	19,269	6,492	1,616	146
Tennessee	2,940	342	2,204	22	6,157	-	386	94	37	1,387	1,810	643	160	10
Texas	16,298	-	11,738	557	19,267	2,391	1,974	355	94	7,348	9,745	3,415	851	39
Utah	13,314	-	5,183	844	15,462	-	791	123	38	3,031	4,168	1,397	347	15
Vermont	40	13	-	0	108	-	6	2	0	29	35	11	3	0
Virginia	4,313	855	3,046	69	7,686	-	256	65	17	879	1,027	415	104	7
Washington	199	-	95	19	402	-	20	3	1	87	122	38	9	0
West Virginia	32	10	-	0	94	-	5	1	0	28	34	10	3	0
Wisconsin	2,743	-	1,086	388	6,289	-	746	145	127	2,106	3,680	1,175	293	29
Wyoming	1,090	-	386	77	2,377	-	183	37	31	801	1,128	328	80	5
U.S. Total	706,179	92,285	515,531	48,165	1,445,846	18,246	118,634	24,765	16,505	348,117	537,932	186,771	46,529	4,252

State (All Numbers are in Short Tons)	Total	Total Corn- Related	Total Soy- Related	Total Small Grains	Total Processed Plant Byproducts	Total Animal Byproduct Meals	Total Fats and Oils	Total Synthetic Animo Acids	Vitamins and Minerals
Alabama	32,827	22,741	4,567	710	1,920	586	1,028	138	1,137
Alaska	1,056	721	167	-	126	19	10	6	6
Arizona	124,232	91,554	13,582	6,550	4,554	3,219	2,632	211	1,930
Arkansas	110,266	78,819	14,317	1,927	6,143	1,541	3,489	464	3,566
California	83,025	61,017	9,210	4,368	2,968	2,105	1,755	156	1,446
Colorado	663,832	440,204	94,778	37,880	36,938	15,219	18,116	2,215	18,481
Connecticut	3,250	2,358	529	18	120	65	108	4	47
Delaware	6,736	4,710	1,218	25	233	95	225	23	207
Florida	9,925	6,933	1,434	247	552	136	313	27	283
Georgia	59,914	42,140	8,462	1,605	2,049	1,050	1,834	314	2,461
Hawaii	5,123	3,210	712	-	1,024	27	99	23	28
Idaho	29,753	21,678	3,597	1,558	918	666	625	68	645
Illinois	4,472,205	3,361,970	478,840	129,958	217,116	97,360	89,995	12,136	84,830
Indiana	3,406,079	2,541,855	372,446	101,330	167,530	83,281	69,356	9,432	60,850
Iowa	19,024,580	13,840,063	2,148,975	306,465	1,576,374	397,392	385,112	53,002	317,198
Kansas	1,722,705	1,355,812	180,622	58,234	17,412	38,369	34,674	4,820	32,762
Kentucky	351,064	260,536	42,914	7,532	11,932	9,469	10,821	892	6,968
Louisiana	5,633	3,958	818	132	325	90	179	10	121
Maine	3,970	2,847	676	20	143	70	133	7	75
Maryland	16,450	11,789	2,645	92	601	325	542	47	409
Massachusetts	6,999	4,990	1,195	33	251	121	233	16	159
Michigan	997,868	742,166	108,168	36,138	41,572	21,944	28,539	2,405	16,936
Minnesota	7,330,385	5,426,130	879,921	272,809	334,695	123,486	148,615	20,126	124,604
Mississippi	171,045	120,134	24,132	3,755	10,134	3,090	5,432	444	3,925
Missouri	2,742,712	1,992,798	329,813	19,437	191,423	56,652	79,487	9,182	63,919
Montana	177,501	128,335	21,946	11,058	2,952	3,864	4,961	456	3,929
Nebraska	3,172,389	2,335,893	369,994	118,262	135,354	70,468	76,468	7,980	57,971
Nevada	3,609	2,694	367	192	148	103	77	3	26
New Hampshire	2,943	2,098	497	15	106	52	98	7	71
New Jersey	5,905	4,278	921	36	220	126	195	13	117
New Mexico	1,937	1,390	260	100	46	35	40	6	59
New York	40,071	29,284	6,032	268	1,514	922	1,318	78	655
North Carolina	7,245,303	5,124,627	969,834	116,598	479,530	192,594	231,973	14,026	116,120
North Dakota	134,824	89,901	17,224	3,183	13,572	2,135	3,431	675	4,702
Ohio	2,284,664	1,699,308	258,322	79,570	109,926	54,250	46,651	4,667	31,970
Oklahoma	2,001,535	1,402,504	239,300	125,577	66,035	51,517	54,234	6,434	55,934
Oregon	9,125	6,712	1,094	482	293	211	194	10	129
Pennsylvania	1,014,839	741,508	152,821	6,637	38,267	22,920	33,480	2,170	17,036
Rhode Island	1,323	952	216	7	48	26	44	3	26
South Carolina	141,991	100,919	18,761	2,049	9,711	4,138	4,570	202	1,641
South Dakota	1,717,053	1,161,222	202,437	40,423	186,674	34,518	46,917	5,617	39,246
Tennessee	199,937	148,507	24,264	4,231	6,743	5,508	6,157	527	4,000
Texas	907,039	640,461	102,799	54,704	37,394	28,594	19,267	2,461	21,359
Utah	726,973	538,150	78,167	38,473	27,470	19,340	15,462	968	8,943
Vermont	3,227	2,291	561	15	115	53	108	8	77
Virginia	245,438	182,252	32,855	5,220	6,374	8,283	7,686	345	2,425
Washington	14,306	10,391	1,787	895	239	313	402	24	256
West Virginia	2,806	1,986	493	11	99	42	94	7	74
Wisconsin	313,212	226,771	40,674	10,883	16,077	4,218	6,289	1,047	7,253
Wyoming	94,227	67,653	13,333	5,501	1,216	1,554	2,377	256	2,337
U.S. Total	61,843,813	45,091,218	7,278,696	1,615,211	3,767,177	1,362,160	1,445,846	164,156	1,119,350

6.1.6 Dairy Cattle

State (All Numbers are in Short Tons)	Corn	Corn DDGs	Corn Gluten Feed/Meal	Cottonseed	Soybean Meal	Canola Meal	Sunflower Meal	Almond Hulls
Alabama	6,272	2,305	-	3,393	165	455	399	-
Alaska	254	75	-	-	78	-	-	-
Arizona	287,678	182,637	54,707	79,141	70,113	87,879	-	-
Arkansas	7,225	2,332	-	3,714	156	455	673	-
California	3,244,646	1,614,626	-	392,422	1,058,953	706,387	-	1,524,354
Colorado	275,664	-	-	-	208,762	32,448	-	-
Connecticut	34,546	8,843	-	-	2,174	-	-	-
Delaware	7,966	2,103	-	-	237	-	-	-
Florida	136,790	53,069	-	76,551	3,508	10,508	7,686	-
Georgia	99,638	37,081	-	54,280	2,568	7,328	6,126	-
Hawaii	2,099	620	-	-	645	-	-	-
Idaho	1,230,730	546,451	628	-	169,342	153,898	-	-
Illinois	157,298	91,410	14,224	-	17,243	20,118	-	-
Indiana	323,164	186,670	29,972	-	36,828	40,476	-	-
Iowa	532,052	100,037	-	40,597	38,484	63,181	24,998	-
Kansas	376,413	148,613	21,987	222,262	19,275	32,824	41,479	-
Kentucky	144,303	48,362	14,633	2,580	7,437	21,914	-	-
Louisiana	13,313	5,067	-	7,404	266	1,002	824	-
Maine	52,115	13,380	-	-	3,188	-	-	-
Maryland	86,343	20,900	-	-	2,065	-	-	-
Massachusetts	20,304	4,982	-	-	1,218	-	-	-
Michigan	917,177	373,875	69,623	-	25,799	149,419	1,284	-
Minnesota	1,307,670	458,279	-	-	108,873	86,357	1,938	-
Mississippi	10,879	3,762	-	5,786	216	738	888	-
Missouri	153,446	70,924	11,085	93,279	10,326	16,548	12,538	-
Montana	14,952	1,428	-	2,464	390	-	-	-
Nebraska	96,198	50,265	8,048	61,957	5,675	12,015	6,396	-
Nevada	35,404	3,875	-	5,707	1,058	-	-	-
New Hampshire	22,160	5,529	-	-	1,367	-	-	-
New Jersey	10,566	2,629	-	-	256	-	-	-
New Mexico	406,198	283,676	86,387	119,554	104,717	124,219	-	-
New York	1,951,848	301,226	45,296	-	165,138	100,661	-	-
North Carolina	102,754	38,055	11,959	1,833	5,891	16,376	-	-
North Dakota	35,356	13,276	4,142	652	2,052	5,771	-	-
Ohio	461,944	268,649	42,368	-	51,282	58,754	-	-
Oklahoma	72,017	40,635	-	30,753	9,044	14,332	5,183	-
Oregon	249,168	112,467	131	-	52,402	32,084	-	-
Pennsylvania	1,346,467	426,902	84,715	-	150,928	30,171	-	-
Rhode Island	1,388	332	-	-	80	-	-	-
South Carolina	17,068	6,485	-	9,458	368	1,282	1,038	-
South Dakota	255,237	55,122	-	19,699	15,954	33,170	9,466	-
Tennessee	92,823	32,448	9,968	1,664	5,003	14,411	-	-
Texas	958,987	542,677	-	410,000	119,551	192,237	69,138	-
Utah	115,894	11,768	-	18,849	3,214	-	-	-
Vermont	227,981	178,175	4,237	-	1,955	17,347	-	-
Virginia	185,603	68,804	21,597	3,324	10,648	29,655	-	-
Washington	473,100	241,982	287	-	77,219	70,419	-	-
West Virginia	16,172	6,146	1,938	293	3,073	2,632	-	-
Wisconsin	2,768,217	1,261,315	347,918	-	580,852	37,985	-	-
Wyoming	7,460	705	-	1,221	193	-	-	-
U.S. Total	19,352,948	7,930,973	885,848	1,668,836	3,156,231	2,225,456	190,054	1,524,354

State (All Numbers are in Short Tons)	Soy Hulls	Soybean Oil	Soybean Seeds	Meat and Bone Meal	Feather Meal	Bloodmeal	Miscellaneous Byproduct Feeds	Corn Silage	Alfalfa Hay	Other Hay
Alabama	418	810	35	1,840	-	1,945	-	36,456	38,544	14,390
Alaska	-	-	-	-	-	9	-	1,005	-	-
Arizona	11,593	19,537	52,867	-	2,546	-	-	1,760,977	1,337,026	579,620
Arkansas	603	969	35	1,986	-	2,359	-	42,986	43,867	17,405
California	-	94,242	831,038	272,913	-	47,339	696,110	12,505,029	7,672,640	6,874,370
Colorado	49,305	18,272	-	-	-	-	-	1,272,984	1,243,031	524,701
Connecticut	3,605	-	-	2,411	4,387	929	13,428	160,106	120,356	58,982
Delaware	841	-	448	584	1,016	223	3,111	37,120	27,735	13,128
Florida	8,625	17,479	-	40,601	-	42,060	-	783,233	845,077	308,279
Georgia	6,531	12,807	563	29,353	-	30,804	-	577,353	613,066	227,591
Hawaii	-	-	-	-	-	78	-	8,293	-	-
Idaho	7,412	66,372	125,524	170,709	-	12,580	-	5,082,014	4,474,193	1,507,920
Illinois	14,791	5,089	42,754	924	-	308	-	700,349	525,773	291,752
Indiana	29,485	9,815	88,706	1,955	-	652	-	1,441,381	1,088,287	594,853
Iowa	46,538	9,983	91,449	69,905	-	17,034	-	1,821,037	1,239,512	891,603
Kansas	46,373	30,682	39,226	-	2,505	-	-	1,485,568	1,167,018	586,530
Kentucky	12,669	9,396	24,679	18,157	3,740	1,518	-	532,958	273,702	174,831
Louisiana	883	1,695	77	3,902	-	4,138	-	76,487	82,087	30,276
Maine	5,466	-	-	3,538	6,562	1,404	20,181	239,872	181,036	89,132
Maryland	8,777	-	4,345	5,734	11,013	2,163	33,449	400,013	302,212	155,419
Massachusetts	2,073	-	-	1,386	2,598	518	7,888	94,404	71,084	36,015
Michigan	88,138	43,155	22,237	5,784	-	-	-	3,347,782	2,243,083	1,320,129
Minnesota	30,698	14,220	319,139	81,422	18,230	1,618	-	3,831,622	2,171,887	1,971,278
Mississippi	841	1,429	57	3,060	-	3,492	-	63,804	66,463	25,644
Missouri	17,947	11,199	19,776	-	1,468	-	-	614,353	473,225	239,165
Montana	2,330	1,484	-	9,293	-	4,599	-	105,536	80,874	38,501
Nebraska	11,361	5,499	14,358	-	453	-	-	374,303	297,082	145,132
Nevada	5,313	3,688	-	25,639	-	9,780	-	256,820	199,065	88,763
New Hampshire	2,280	-	-	1,539	2,834	578	8,620	103,103	77,492	38,684
New Jersey	1,090	-	550	707	1,339	274	4,091	48,778	36,847	18,591
New Mexico	12,978	29,581	79,000	-	3,754	-	-	2,570,028	1,911,427	915,886
New York	127,018	64,347	112,249	29,838	27,138	24,924	233,849	5,009,512	2,757,757	2,722,529
North Carolina	8,927	6,208	19,547	13,645	2,970	1,241	-	382,522	194,226	121,986
North Dakota	3,184	1,804	6,811	4,320	793	430	-	125,024	64,089	41,253
Ohio	43,031	14,604	126,504	2,758	-	919	-	2,059,364	1,551,583	854,817
Oklahoma	3,259	1,561	25,148	-	-	-	-	309,294	296,237	107,846
Oregon	1,545	18,891	-	34,961	-	2,623	-	1,025,609	899,777	301,814
Pennsylvania	86,449	23,531	478,347	103,793	36,041	11,570	-	4,336,230	2,158,585	1,640,491
Rhode Island	140	-	-	93	178	34	538	6,452	4,870	2,521
South Carolina	1,120	2,176	99	5,019	-	5,289	-	98,188	105,220	38,792
South Dakota	23,189	2,370	45,790	35,886	-	7,865	-	847,396	593,238	427,659
Tennessee	8,149	5,774	16,601	11,823	2,447	1,034	-	341,948	175,011	111,357
Texas	43,010	20,035	335,846	-	-	-	-	4,095,962	3,929,448	1,429,807
Utah	17,701	11,927	-	77,668	-	34,030	-	832,277	640,498	295,194
Vermont	9,132	-	-	-	19,577	-	82,233	987,619	828,152	300,011
Virginia	16,198	11,009	35,335	24,399	5,215	2,241	-	686,718	349,097	219,918
Washington	3,392	29,356	57,436	75,064	-	5,756	-	2,249,811	1,787,022	837,450
West Virginia	1,426	1,553	-	2,089	428	201	-	58,872	29,953	18,961
Wisconsin	102,621	82,720	455,837	294,842	46,893	13,392	-	10,029,016	6,751,296	3,848,308
Wyoming	1,155	763	-	4,653	-	2,304	-	53,184	40,653	19,268
U.S. Total	929,609	706,031	3,472,412	1,474,191	204,121	300,254	1,103,499	73,910,755	52,060,401	31,118,553

State (All Numbers are in Short Tons)	Inedible Tallow	Dicalcium Phosphate	Limestone	Potassium Chloride	Salt	Minerals	Vitamins
Alabama	1,380	78	33	13	20	940	0.00
Alaska	-	-	-	-	-	-	-
Arizona	37,526	3,275	1,403	529	856	39,443	0.02
Arkansas	1,540	91	39	15	24	1,092	0.00
California	626,211	27,381	11,735	4,427	7,155	329,809	0.18
Colorado	261,201	2,788	1,195	451	729	33,588	0.02
Connecticut	2,459	296	127	48	77	3,563	0.00
Delaware	505	68	29	11	18	821	0.00
Florida	30,477	1,696	727	274	443	20,430	0.01
Georgia	21,990	1,239	531	200	324	14,926	0.01
Hawaii	-	-	-	-	-	-	-
Idaho	100,839	9,793	4,197	1,583	2,559	117,958	0.06
Illinois	17,905	1,363	584	220	356	16,420	0.01
Indiana	36,561	2,805	1,202	453	733	33,782	0.02
Iowa	70,785	3,629	1,555	587	948	43,707	0.02
Kansas	69,914	3,079	1,319	498	805	37,082	0.02
Kentucky	11,848	935	401	151	244	11,259	0.01
Louisiana	2,950	165	71	27	43	1,991	0.00
Maine	3,641	445	191	72	116	5,354	0.00
Maryland	7,373	746	320	121	195	8,987	0.00
Massachusetts	1,670	175	75	28	46	2,110	0.00
Michigan	105,669	6,252	2,679	1,011	1,634	75,303	0.04
Minnesota	91,679	7,530	3,227	1,217	1,968	90,702	0.05
Mississippi	2,355	136	58	22	36	1,637	0.00
Missouri	24,806	1,270	544	205	332	15,298	0.01
Montana	15,354	199	85	32	52	2,396	0.00
Nebraska	14,803	792	339	128	207	9,537	0.01
Nevada	36,331	482	206	78	126	5,803	0.00
New Hampshire	1,731	191	82	31	50	2,298	0.00
New Jersey	827	91	39	15	24	1,094	0.00
New Mexico	54,432	4,809	2,061	777	1,257	57,921	0.03
New York	179,834	9,940	4,260	1,607	2,597	119,726	0.06
North Carolina	8,862	672	288	109	176	8,098	0.00
North Dakota	3,122	224	96	36	59	2,697	0.00
Ohio	52,620	4,010	1,719	648	1,048	48,305	0.03
Oklahoma	7,390	662	284	107	173	7,974	0.00
Oregon	20,581	1,975	846	319	516	23,785	0.01
Pennsylvania	93,893	7,898	3,385	1,277	2,064	95,138	0.05
Rhode Island	123	12	5	2	3	145	0.00
South Carolina	3,782	212	91	34	55	2,553	0.00
South Dakota	30,436	1,724	739	279	450	20,763	0.01
Tennessee	7,794	601	258	97	157	7,245	0.00
Texas	97,912	8,786	3,765	1,420	2,296	105,824	0.06
Utah	119,326	1,563	670	253	408	18,826	0.01
Vermont	319	1,906	817	308	498	22,961	0.01
Virginia	16,048	1,210	518	196	316	14,570	0.01
Washington	51,021	4,276	1,832	691	1,117	51,503	0.03
West Virginia	1,424	104	45	17	27	1,255	0.00
Wisconsin	304,556	19,319	8,280	3,123	5,049	232,706	0.12
Wyoming	7,711	100	43	16	26	1,204	0.00
U.S. Total	2,661,520	146,989	62,995	23,764	38,412	1,770,527	0.94

State (All Numbers are in Short Tons)	Total	Total Corn- Related	Total Soy- Related	Total Processed Plant Byproducts	Total Animal Byproduct Meals	Total Fats and Oils	Total Forages	Vitamins and Minerals
Alabama	109,892	8,577	618	4,247	3,786	2,190	89,390	1,085
Alaska	1,422	329	78	-	9	-	1,005	-
Arizona	4,609,352	525,022	134,573	167,020	2,546	57,063	3,677,624	45,506
Arkansas	127,564	9,556	794	4,843	4,344	2,509	104,258	1,259
California	38,541,786	4,859,272	1,889,991	3,319,272	320,252	720,454	27,052,039	380,506
Colorado	3,925,119	275,664	258,067	32,448	-	279,474	3,040,715	38,751
Connecticut	416,336	43,390	5,779	13,428	7,727	2,459	339,444	4,110
Delaware	95,964	10,069	1,526	3,111	1,822	505	77,983	947
Florida	2,387,519	189,859	12,132	94,745	82,661	47,956	1,936,595	23,571
Georgia	1,744,300	136,719	9,662	67,734	60,157	34,797	1,418,010	17,221
Hawaii	11,735	2,719	645	-	78	-	8,293	-
Idaho	13,784,702	1,777,809	302,279	153,898	183,289	167,211	11,064,127	136,090
Illinois	1,918,882	262,932	74,788	20,118	1,232	22,994	1,517,874	18,944
Indiana	3,947,780	539,807	155,019	40,476	2,607	46,376	3,124,521	38,975
Iowa	5,107,619	632,089	176,472	128,775	86,939	80,768	3,952,152	50,425
Kansas	4,333,451	547,013	104,873	296,565	2,505	100,596	3,239,116	42,782
Kentucky	1,315,716	207,299	44,785	24,494	23,415	21,244	981,491	12,989
Louisiana	232,669	18,381	1,226	9,229	8,040	4,646	188,850	2,297
Maine	625,694	65,495	8,654	20,181	11,504	3,641	510,040	6,177
Maryland	1,050,174	107,243	15,187	33,449	18,910	7,373	857,644	10,368
Massachusetts	246,576	25,287	3,291	7,888	4,502	1,670	201,504	2,434
Michigan	8,800,034	1,360,675	136,174	150,703	5,784	148,824	6,910,994	86,879
Minnesota	10,599,555	1,765,949	458,710	88,295	101,269	105,899	7,974,787	104,645
Mississippi	191,305	14,642	1,114	7,413	6,553	3,784	155,911	1,889
Missouri	1,787,734	235,455	48,049	122,365	1,468	36,005	1,326,743	17,650
Montana	279,967	16,379	2,720	2,464	13,892	16,838	224,910	2,764
Nebraska	1,114,547	154,511	31,394	80,367	453	20,302	816,517	11,003
Nevada	678,138	39,279	6,371	5,707	35,419	40,018	544,648	6,695
New Hampshire	268,567	27,688	3,647	8,620	4,950	1,731	219,279	2,651
New Jersey	127,805	13,195	1,896	4,091	2,320	827	104,216	1,262
New Mexico	6,768,662	776,260	196,696	243,773	3,754	84,014	5,397,341	66,824
New York	13,991,294	2,298,370	404,405	334,509	81,900	244,181	10,489,798	138,130
North Carolina	946,343	152,768	34,365	18,209	17,855	15,070	698,733	9,343
North Dakota	315,191	52,774	12,047	6,423	5,542	4,927	230,366	3,112
Ohio	5,644,927	772,961	220,817	58,754	3,677	67,224	4,465,764	55,730
Oklahoma	931,898	112,652	37,451	50,268	-	8,950	713,377	9,200
Oregon	2,779,494	361,765	53,947	32,084	37,583	39,473	2,227,200	27,441
Pennsylvania	11,117,876	1,858,085	715,724	30,171	151,403	117,425	8,135,306	109,762
Rhode Island	16,916	1,719	220	538	305	123	13,843	167
South Carolina	298,329	23,553	1,586	11,778	10,308	5,958	242,201	2,945
South Dakota	2,426,432	310,360	84,933	62,336	43,751	32,806	1,868,293	23,955
Tennessee	846,613	135,239	29,753	16,075	15,304	13,568	628,316	8,358
Texas	12,366,700	1,501,664	498,407	671,375	-	117,947	9,455,216	122,091
Utah	2,200,063	127,661	20,914	18,849	111,697	131,252	1,767,969	21,720
Vermont	2,683,228	410,392	11,087	99,581	19,577	319	2,115,782	26,490
Virginia	1,702,617	276,004	62,181	32,980	31,854	27,057	1,255,733	16,809
Washington	6,018,736	715,369	138,047	70,419	80,820	80,377	4,874,284	59,420
West Virginia	146,608	24,255	4,499	2,925	2,718	2,977	107,786	1,447
Wisconsin	27,194,243	4,377,450	1,139,310	37,985	355,126	387,276	20,628,620	268,477
Wyoming	140,659	8,165	1,348	1,221	6,957	8,474	113,105	1,389
U.S. Total	206,918,734	28,169,769	7,558,252	6,712,199	1,978,566	3,367,551	157,089,710	2,042,688

6.1.7 Beef Cattle

State (All Numbers are in Short Tons)	Corn	Corn DDGs	Corn Gluten Feed/Meal	Wheat	Sorghum	Barley	Oats	Cottonseed
Alabama	81,610	16,072	86	-	-	-	-	6,008
Alaska	6,263	85	-	-	-	-	-	-
Arizona	836,451	863,683	7,552	-	622	-	-	44,291
Arkansas	126,305	24,594	98	-	2,088	-	-	8,379
California	1,426,234	367,506	7,058	-	-	-	-	-
Colorado	4,131,860	53,303	23,242	28,823	-	-	-	-
Connecticut	1,361	958	586	-	-	-	-	-
Delaware	554	487	289	-	-	-	-	-
Florida	101,979	27,029	325	-	-	-	-	6,694
Georgia	75,847	185,304	54,408	-	-	-	-	10,229
Hawaii	15,924	405	-	-	-	-	-	-
Idaho	188,269	602,691	309,852	-	-	145,216	-	-
Illinois	690,118	281,128	143,424	-	-	-	-	-
Indiana	283,225	125,004	68,590	-	-	-	-	-
Iowa	3,707,866	837,198	105,337	-	-	-	-	-
Kansas	4,254,879	1,732,470	97,758	-	848,317	-	-	504,301
Kentucky	80,919	44,589	12,184	-	-	-	-	-
Louisiana	61,593	205,441	64,372	-	610	-	-	4,396
Maine	2,766	1,987	1,250	-	-	-	-	-
Maryland	29,915	30,161	13,035	-	-	-	-	-
Massachusetts	1,780	1,468	906	-	-	-	-	-
Michigan	330,075	515,603	83,707	43,701	-	-	-	-
Minnesota	1,149,731	499,176	30,056	-	-	-	-	-
Mississippi	82,821	213,561	70,635	-	1,016	-	-	5,585
Missouri	257,154	279,089	1,279	-	22,626	-	-	13,276
Montana	395,256	90,060	346	-	-	175,308	-	-
Nebraska	6,780,652	1,783,492	164,669	-	-	-	-	-
Nevada	34,385	17,914	12,141	-	-	-	-	192
New Hampshire	1,151	851	525	-	-	-	-	-
New Jersey	2,187	1,402	953	-	-	-	-	-
New Mexico	148,566	53,141	357	-	1,687	-	-	643
New York	74,186	69,937	30,675	-	-	-	-	-
North Carolina	27,213	212,753	70,946	-	-	-	-	155
North Dakota	189,173	93,710	54,987	-	-	16,535	-	-
Ohio	304,680	537,762	180,667	51,883	-	1,087	-	-
Oklahoma	917,689	268,815	-	114,142	43,393	-	-	20,306
Oregon	26,215	307,792	80,107	20,435	-	5,542	-	-
Pennsylvania	245,889	299,944	117,358	-	-	-	-	-
Rhode Island	413	262	188	-	-	-	-	-
South Carolina	9,311	96,964	33,972	406	-	-	-	-
South Dakota	1,143,950	477,539	107,462	-	-	-	-	-
Tennessee	86,854	47,974	14,722	-	-	-	-	-
Texas	7,212,708	868,495	2,665	-	-	-	-	971,840
Utah	215,634	79,033	28,073	30,593	-	-	-	1,095
Vermont	3,517	4,140	1,548	-	-	-	-	-
Virginia	40,696	39,318	9,442	-	-	-	-	3,514
Washington	8,547	458,275	202,884	-	-	103,271	-	-
West Virginia	9,658	74,052	58,007	1,230	-	-	-	-
Wisconsin	679,604	1,039,519	106,237	82,200	-	-	10,115	-
Wyoming	356,519	89,176	3,186	-	-	22,483	-	-
U.S. Total	36,840,153	13,921,309	2,378,143	373,414	920,359	469,441	10,115	1,600,904

State (All Numbers are in Short Tons)	Soybean Meal	Canola Meal	Cottonseed Meal	Soy Hulls	Soybean Seeds	Corn Silage	Alfalfa Hay	Other Hay
Alabama	6,340	4,273	10,839	58,994	-	998,502	156,786	837,465
Alaska	3	-	-	10	121	652	-	-
Arizona	1,559	1,777	-	13,907	-	384,422	124,513	446,141
Arkansas	7,960	5,582	46,826	75,520	-	1,274,693	170,381	1,049,332
California	4,492	65,865	-	39,864	-	2,346,213	180,348	1,064,990
Colorado	41,195	260,175	-	61,437	-	2,978,662	303,407	1,328,876
Connecticut	64	-	-	379	-	4,143	1,177	4,991
Delaware	40	-	-	190	-	1,899	495	2,431
Florida	5,980	5,128	3,114	79,135	-	1,035,339	143,807	882,750
Georgia	7,161	3,185	57,702	51,967	-	364,045	68,106	539,278
Hawaii	15	-	-	48	784	3,121	-	-
Idaho	9,615	201,616	-	42,599	-	695,086	462,492	603,707
Illinois	5,605	-	-	39,184	-	816,393	171,899	686,045
Indiana	3,337	2,284	-	20,751	-	383,734	70,968	320,744
Iowa	7,251	-	-	64,302	-	3,816,012	683,989	2,450,538
Kansas	12,997	192,186	-	69,745	-	9,159,746	354,838	4,129,726
Kentucky	8,151	1,650	-	69,878	-	1,214,302	206,566	1,224,543
Louisiana	6,262	2,938	3,401	32,045	-	316,223	99,247	501,646
Maine	160	-	-	844	-	9,482	2,541	12,026
Maryland	751	-	-	3,809	-	49,031	11,784	62,544
Massachusetts	129	-	-	622	-	6,403	1,675	8,221
Michigan	2,737	3,950	-	7,001	-	157,891	18,250	218,030
Minnesota	3,339	1,934	-	29,566	-	1,335,521	285,001	801,461
Mississippi	7,176	3,185	3,583	36,979	-	360,545	109,677	559,968
Missouri	21,057	24,888	-	118,644	-	3,329,017	304,199	2,430,337
Montana	7,961	28,509	-	104,736	-	1,842,459	419,951	2,604,266
Nebraska	11,432	46,852	-	125,688	-	9,378,414	1,192,032	4,755,294
Nevada	2,742	2,606	9,188	19,847	-	179,234	67,938	298,519
New Hampshire	64	-	-	350	-	3,709	1,032	4,546
New Jersey	129	-	-	692	-	8,078	2,166	10,318
New Mexico	3,639	4,823	-	31,578	-	491,848	137,450	478,447
New York	1,398	-	-	9,294	-	114,817	31,234	133,487
North Carolina	8,720	-	37	39,502	-	171,588	84,300	418,146
North Dakota	6,364	5,711	-	82,829	-	1,483,749	279,651	1,825,270
Ohio	4,864	4,999	-	30,606	-	331,590	86,008	444,722
Oklahoma	15,550	14,157	76,559	138,528	-	3,265,249	534,477	2,304,929
Oregon	12,631	176,416	-	53,650	-	535,798	165,519	743,743
Pennsylvania	3,862	-	-	19,323	-	273,234	58,517	341,234
Rhode Island	25	-	-	149	-	1,453	436	1,677
South Carolina	3,515	-	100	16,877	-	120,686	34,884	172,711
South Dakota	11,579	41,141	-	128,930	-	3,688,431	486,677	3,276,020
Tennessee	7,802	2,841	-	68,300	-	1,264,026	206,907	1,155,401
Texas	47,680	745,525	-	297,547	-	13,635,418	772,538	8,395,958
Utah	2,135	4,343	-	31,449	-	273,285	109,235	304,048
Vermont	222	228	-	490	-	15,280	2,614	15,421
Virginia	5,295	-	3,146	63,928	-	787,544	93,324	757,741
Washington	11,688	162,001	-	15,260	-	366,119	280,818	374,564
West Virginia	1,666	-	-	19,471	-	179,831	35,096	199,501
Wisconsin	2,294	4,061	-	22,335	-	538,454	63,682	353,371
Wyoming	4,338	15,027	-	50,503	-	864,380	151,646	916,700
U.S. Total	340,975	2,039,857	214,496	2,289,280	905	70,855,754	9,230,277	50,451,821

State (All Numbers are in Short Tons)	Potato Pulp	Potato Peels	Potato Tubers	Dicalcium Phosphate	Limestone	Potassium Chloride	Salt	Minerals	Vitamins
Alabama	-	-	-	820	-	9,741	435	20,327	0.01
Alaska	-	-	-	-	-	-	-	-	-
Arizona	-	-	-	3,701	14,657	4,640	545	25,443	0.01
Arkansas	-	-	-	1,103	-	14,030	558	26,067	0.01
California	-	-	-	874	-	-	1,101	51,379	0.02
Colorado	-	-	-	-	-	-	1,843	86,049	0.03
Connecticut	-	-	-	39	9	42	3	128	0.00
Delaware	-	-	-	22	3	17	1	60	0.00
Florida	-	-	-	919	-	4,483	458	21,394	0.01
Georgia	-	-	-	636	1,624	4,585	283	13,233	0.01
Hawaii	-	-	-	-	-	-	-	-	-
Idaho	33,585	231,582	2,643	8,636	9,029	8,636	706	32,951	0.01
Illinois	-	-	-	136	929	7,332	567	26,460	0.01
Indiana	-	-	-	-	446	2,691	256	11,939	0.00
Iowa	-	-	-	11,097	10,880	16,741	2,334	108,988	0.04
Kansas	-	-	-	-	-	-	4,271	199,414	0.08
Kentucky	-	-	-	795	-	3,349	573	26,730	0.01
Louisiana	-	-	-	1,286	534	6,925	260	12,121	0.00
Maine	-	-	-	91	14	84	6	290	0.00
Maryland	-	-	-	508	519	363	40	1,877	0.00
Massachusetts	-	-	-	69	9	56	4	198	0.00
Michigan	-	-	-	-	9,195	1,830	276	12,894	0.01
Minnesota	-	-	-	1,316	-	3,391	827	38,617	0.02
Mississippi	-	-	-	644	1,098	7,592	291	13,583	0.01
Missouri	-	-	-	-	-	25,138	1,360	63,508	0.03
Montana	-	-	-	30,840	28,045	34,527	1,134	52,931	0.02
Nebraska	-	-	-	709	200	10,188	4,848	226,320	0.09
Nevada	-	-	-	2,214	742	5,083	129	6,020	0.00
New Hampshire	-	-	-	37	7	36	2	114	0.00
New Jersey	-	-	-	73	7	70	5	242	0.00
New Mexico	-	-	-	7,173	5,109	10,730	270	12,626	0.01
New York	-	-	-	1,115	1,259	1,116	93	4,342	0.00
North Carolina	-	-	-	6,376	136	6,002	207	9,649	0.00
North Dakota	-	-	-	383	108	5,499	808	37,703	0.02
Ohio	-	-	-	115	8,447	4,086	396	18,477	0.01
Oklahoma	-	-	-	2,829	-	2,350	1,543	72,025	0.03
Oregon	15,230	70,833	4,797	3,798	4,261	7,792	444	20,717	0.01
Pennsylvania	-	-	-	2,740	5,670	-	272	12,693	0.01
Rhode Island	-	-	-	15	1	17	1	43	0.00
South Carolina	-	-	-	2,705	132	3,328	98	4,570	0.00
South Dakota	-	-	-	748	211	44,431	1,872	87,412	0.04
Tennessee	-	-	-	961	-	4,047	571	26,656	0.01
Texas	-	-	-	-	-	106,242	6,590	307,664	0.12
Utah	-	-	-	5,299	5,338	7,517	216	10,074	0.00
Vermont	-	-	-	85	40	-	9	406	0.00
Virginia	-	-	-	616	-	2,596	361	16,844	0.01
Washington	83,306	134,717	35,752	3,676	3,899	3,676	447	20,889	0.01
West Virginia	-	-	-	922	244	3,566	116	5,402	0.00
Wisconsin	-	-	-	3,109	15,415	3,734	580	27,095	0.01
Wyoming	-	-	-	1,177	-	940	495	23,100	0.01
U.S. Total	132,122	437,132	43,192	110,405	128,217	389,238	38,505	1,797,662	0.73

State (All Numbers are in Short Tons)	Total	Total Corn- Related	Total Soy- Related	Total Small Grains	Total Processed Plant Byproducts	Total Forages	Vitamins and Minerals
Alabama	2,208,298	97,767	65,334	-	21,119	1,992,753	31,324
Alaska	7,135	6,348	135	-	-	652	-
Arizona	2,773,906	1,708,308	15,467	-	46,068	955,077	48,987
Arkansas	2,833,516	153,085	83,480	-	60,787	2,494,407	41,758
California	5,555,922	1,800,798	44,356	-	65,865	3,591,551	53,353
Colorado	9,303,618	4,208,406	102,632	28,823	260,175	4,610,944	87,892
Connecticut	13,879	2,904	443	-	-	10,311	220
Delaware	6,489	1,331	230	-	-	4,825	103
Florida	2,318,534	129,333	85,115	-	14,936	2,061,896	27,255
Georgia	1,437,593	315,559	59,128	-	71,116	971,429	20,362
Hawaii	20,297	16,329	847	-	-	3,121	-
Idaho	3,588,911	1,100,813	52,214	145,216	469,426	1,761,285	59,957
Illinois	2,869,218	1,114,669	44,790	-	-	1,674,337	35,423
Indiana	1,293,968	476,819	24,087	-	2,284	775,446	15,331
Iowa	11,822,535	4,650,401	71,553	-	-	6,950,540	150,041
Kansas	21,560,649	6,933,424	82,741	-	696,487	13,644,311	203,686
Kentucky	2,894,228	137,692	78,029	-	1,650	2,645,410	31,447
Louisiana	1,319,300	332,017	38,307	-	10,735	917,116	21,125
Maine	31,541	6,002	1,004	-	-	24,049	485
Maryland	204,337	73,111	4,560	-	-	123,359	3,307
Massachusetts	21,542	4,155	751	-	-	16,299	336
Michigan	1,405,142	929,385	9,738	43,701	3,950	394,172	24,196
Minnesota	4,179,936	1,678,963	32,905	-	1,934	2,421,983	44,150
Mississippi	1,477,940	368,034	44,155	-	12,353	1,030,190	23,208
Missouri	6,891,573	560,149	139,701	-	38,164	6,063,553	90,006
Montana	5,816,329	485,661	112,697	175,308	28,509	4,866,677	147,477
Nebraska	24,480,791	8,728,813	137,120	-	46,852	15,325,740	242,265
Nevada	658,892	64,439	22,588	-	11,986	545,691	14,187
New Hampshire	12,425	2,527	414	-	-	9,286	197
New Jersey	26,321	4,542	821	-	-	20,561	397
New Mexico	1,388,088	203,751	35,217	-	5,466	1,107,745	35,908
New York	472,954	174,798	10,693	-	-	279,538	7,926
North Carolina	1,055,728	310,911	48,223	-	192	674,034	22,368
North Dakota	4,082,480	337,870	89,193	16,535	5,711	3,588,670	44,501
Ohio	2,010,388	1,023,109	35,470	52,969	4,999	862,319	31,521
Oklahoma	7,792,540	1,229,896	154,078	114,142	111,023	6,104,654	78,747
Oregon	2,255,719	414,114	66,281	25,976	267,277	1,445,060	37,011
Pennsylvania	1,380,735	663,190	23,185	-	-	672,985	21,374
Rhode Island	4,680	863	174	-	-	3,567	77
South Carolina	500,258	140,246	20,392	406	100	328,281	10,833
South Dakota	9,496,403	1,728,951	140,509	-	41,141	7,451,127	134,675
Tennessee	2,887,062	149,550	76,101	-	2,841	2,626,334	32,235
Texas	33,370,870	8,083,868	345,226	-	1,717,365	22,803,914	420,496
Utah	1,107,365	322,740	33,584	30,593	5,438	686,567	28,444
Vermont	43,999	9,205	712	-	228	33,315	539
Virginia	1,824,366	89,456	69,224	-	6,661	1,638,609	20,417
Washington	2,269,787	669,705	26,947	103,271	415,776	1,021,501	32,588
West Virginia	588,762	141,717	21,137	1,230	-	414,429	10,249
Wisconsin	2,951,806	1,825,359	24,629	92,315	4,061	955,507	49,934
Wyoming	2,499,669	448,881	54,841	22,483	15,027	1,932,726	25,711
U.S. Total	195,018,422	54,059,964	2,631,161	852,969	4,467,702	130,537,852	2,464,028

6.1.8 Sheep and Meat Goats

State (All Numbers are in Short Tons)	Corn	Soybean Meal	Total
Alabama	381	80	461
Alaska	18	4	22
Arizona	1,008	154	1,161
Arkansas	438	90	528
California	7,948	1,551	9,499
Colorado	6,803	1,414	8,217
Connecticut	134	27	162
Delaware	43	8	51
Florida	526	110	636
Georgia	433	92	525
Hawaii	139	29	167
Idaho	5,872	1,216	7,089
Illinois	1,520	316	1,836
Indiana	1,612	333	1,945
Iowa	4,310	915	5,225
Kansas	1,711	362	2,074
Kentucky	1,380	283	1,663
Louisiana	293	60	353
Maine	273	56	328
Maryland	369	75	444
Massachusetts	241	49	290
Michigan	1,932	402	2,334
Minnesota	3,306	688	3,994
Mississippi	269	56	325
Missouri	2,910	614	3,524
Montana	6,417	1,331	7,748
Nebraska	2,578	543	3,121
Nevada	1,253	239	1,492
New Hampshire	184	37	221
New Jersey	425	85	510
New Mexico	1,311	231	1,542
New York	2,037	414	2,451
North Carolina	557	113	671
North Dakota	1,819	383	2,202
Ohio	3,453	727	4,180
Oklahoma	1,162	242	1,404
Oregon	3,881	797	4,678
Pennsylvania	2,391	490	2,881
Rhode Island	26	5	32
South Carolina	223	47	270
South Dakota	7,294	1,525	8,818
Tennessee	1,222	260	1,482
Texas	11,742	2,232	13,974
Utah	8,324	1,699	10,024
Vermont	285	58	344
Virginia	2,155	453	2,608
Washington	1,253	262	1,515
West Virginia	1,019	215	1,234
Wisconsin	2,238	470	2,708
Wyoming	8,170	1,652	9,823
U.S Total	115,288	23,495	138,783

6.1.9 Cats and Dogs

State (All Numbers are in Short Tons)	Corn	Corn DDGs	Corn Gluten Feed/Meal	Hominy Feed	Wheat	Sorghum	Barley	Oats
Alabama	25,892	55	8,859	6	3,519	989	1,656	85
Alaska	3,008	6	1,048	1	408	114	190	10
Arizona	36,556	81	11,773	9	5,013	1,445	2,433	124
Arkansas	20,933	47	6,613	5	2,878	836	1,410	71
California	120,383	252	41,866	28	16,318	4,553	7,610	395
Colorado	26,351	56	8,912	6	3,587	1,013	1,698	87
Connecticut	10,086	19	4,042	2	1,334	346	568	31
Delaware	3,007	6	1,130	1	402	108	179	10
Florida	86,960	181	30,424	20	11,776	3,277	5,473	284
Georgia	48,787	105	16,344	12	6,651	1,887	3,165	162
Hawaii	4,269	9	1,485	1	579	161	270	14
Idaho	6,962	15	2,427	2	943	263	439	23
Illinois	42,561	88	15,003	10	5,757	1,596	2,664	139
Indiana	33,040	67	11,982	8	4,448	1,217	2,025	106
Iowa	11,776	24	4,327	3	1,582	430	714	38
Kansas	15,015	32	5,052	4	2,046	579	971	50
Kentucky	28,715	62	9,622	7	3,915	1,110	1,863	96
Louisiana	18,686	41	6,126	5	2,556	732	1,230	63
Maine	6,501	12	2,628	1	859	221	363	20
Maryland	20,797	35	8,974	4	2,712	670	1,088	61
Massachusetts	18,975	34	7,886	4	2,493	632	1,032	57
Michigan	39,862	80	14,697	9	5,352	1,452	2,412	127
Minnesota	19,044	37	7,313	4	2,539	674	1,114	60
Mississippi	14,736	32	4,873	4	2,013	574	964	49
Missouri	37,061	81	12,074	9	5,074	1,456	2,449	125
Montana	5,452	11	1,879	1	740	207	347	18
Nebraska	7,125	14	2,708	2	952	254	421	22
Nevada	12,213	25	4,311	3	1,651	458	764	40
New Hampshire	4,745	9	1,826	1	632	168	277	15
New Jersey	26,269	54	9,273	6	3,552	984	1,643	86
New Mexico	13,979	31	4,454	4	1,920	556	937	47
New York	64,649	126	24,582	14	8,634	2,305	3,814	204
North Carolina	48,178	103	16,248	12	6,562	1,856	3,111	160
North Dakota	2,482	5	829	1	338	96	161	8
Ohio	57,359	110	22,221	12	7,635	2,018	3,331	179
Oklahoma	24,824	55	7,921	6	3,409	986	1,662	84
Oregon	19,397	39	7,166	4	2,603	706	1,171	62
Pennsylvania	52,048	99	20,313	11	6,919	1,821	3,003	162
Rhode Island	3,443	7	1,263	1	463	126	209	11
South Carolina	22,189	48	7,405	5	3,027	860	1,443	74
South Dakota	4,359	9	1,623	1	584	158	262	14
Tennessee	42,494	93	13,892	11	5,814	1,666	2,801	143
Texas	133,230	294	43,150	33	18,255	5,251	8,835	450
Utah	7,827	16	2,788	2	1,057	292	486	25
Vermont	3,298	6	1,345	1	435	111	183	10
Virginia	32,649	67	11,738	7	4,402	1,209	2,014	106
Washington	32,621	68	11,477	8	4,413	1,225	2,045	106
West Virginia	11,641	24	4,073	3	1,576	439	733	38
Wisconsin	23,979	47	9,125	5	3,202	854	1,414	76
Wyoming	2,296	5	816	1	310	86	143	7
U.S. Total	1,358,709	2,819	477,906	318	183,837	51,027	85,188	4,434

State (All Numbers are in Short Tons)	Soybean Meal	Canola Meal	Sunflower Meal	Wheat Middlings and Wheat Bran	Soy Hulls	Soybean Oil
Alabama	8,361	71	2	1,342	358	51
Alaska	969	8	0	154	42	6
Arizona	11,887	102	2	1,979	506	73
Arkansas	6,822	59	1	1,148	290	42
California	38,800	326	8	6,160	1,667	236
Colorado	8,521	72	2	1,378	365	52
Connecticut	3,191	26	1	454	140	19
Delaware	960	8	0	144	42	6
Florida	28,007	235	5	4,429	1,204	170
Georgia	15,794	134	3	2,568	675	96
Hawaii	1,376	12	0	218	59	8
Idaho	2,243	19	0	356	96	14
Illinois	13,695	115	3	2,155	589	83
Indiana	10,594	88	2	1,634	458	64
Iowa	3,770	31	1	576	163	23
Kansas	4,859	41	1	788	208	30
Kentucky	9,296	79	2	1,512	397	57
Louisiana	6,065	52	1	999	259	37
Maine	2,054	17	0	290	90	12
Maryland	6,508	51	1	863	289	39
Massachusetts	5,971	48	1	822	263	36
Michigan	12,754	106	2	1,943	552	77
Minnesota	6,061	50	1	895	264	37
Mississippi	4,778	41	1	783	204	29
Missouri	12,036	103	2	1,991	513	74
Montana	1,759	15	0	281	75	11
Nebraska	2,271	19	0	338	99	14
Nevada	3,929	33	1	618	169	24
New Hampshire	1,509	12	0	222	66	9
New Jersey	8,451	71	2	1,328	364	51
New Mexico	4,551	39	1	762	193	28
New York	20,601	169	4	3,065	896	124
North Carolina	15,585	132	3	2,524	667	95
North Dakota	804	7	0	131	34	5
Ohio	18,232	149	3	2,672	795	110
Oklahoma	8,081	69	2	1,353	343	50
Oregon	6,204	51	1	944	269	38
Pennsylvania	16,527	135	3	2,407	721	100
Rhode Island	1,102	9	0	169	48	7
South Carolina	7,187	61	1	1,172	307	44
South Dakota	1,393	11	0	211	60	8
Tennessee	13,795	118	3	2,277	588	84
Texas	43,298	370	9	7,186	1,843	265
Utah	2,515	21	0	393	108	15
Vermont	1,041	8	0	146	46	6
Virginia	10,480	87	2	1,626	452	64
Washington	10,499	88	2	1,654	452	64
West Virginia	3,749	31	1	593	161	23
Wisconsin	7,640	63	1	1,136	332	46
Wyoming	738	6	0	116	32	4
U.S. Total	437,311	3,666	85	68,904	18,813	2,659

State (All Numbers are in Short Tons)	Meat and Bone Meal	Meat Meal	Bloodmeal	Fishmeal	Miscellaneous Byproduct Feeds	Alfalfa Hay	Inedible Tallow	Choice White Grease	Potato
Alabama	12,323	14,660	14	655	7	6	2,540	8	642
Alaska	1,415	1,720	2	77	1	1	294	1	74
Arizona	18,016	20,054	20	875	11	9	3,634	11	942
Arkansas	10,425	11,371	12	492	6	5	2,089	6	546
California	56,728	68,753	62	3,091	33	27	11,767	35	2,951
Colorado	12,629	14,829	14	659	7	6	2,592	8	658
Connecticut	4,304	6,229	5	295	2	2	951	3	221
Delaware	1,346	1,791	1	83	1	1	288	1	70
Florida	40,825	49,824	45	2,245	24	20	8,489	25	2,123
Georgia	23,513	27,318	26	1,210	14	11	4,809	14	1,227
Hawaii	2,012	2,438	2	110	1	1	417	1	105
Idaho	3,276	3,981	4	179	2	2	680	2	170
Illinois	19,887	24,484	22	1,106	12	9	4,147	12	1,033
Indiana	15,157	19,301	16	882	9	7	3,198	9	786
Iowa	5,355	6,929	6	318	3	3	1,136	3	277
Kansas	7,219	8,426	8	374	4	3	1,479	4	376
Kentucky	13,838	16,081	15	712	8	7	2,831	8	722
Louisiana	9,119	10,345	10	454	5	4	1,851	6	476
Maine	2,755	4,034	3	192	2	1	612	2	141
Maryland	8,337	13,403	9	652	5	4	1,920	5	424
Massachusetts	7,860	11,965	8	575	4	4	1,771	5	402
Michigan	18,084	23,496	20	1,080	10	9	3,842	11	936
Minnesota	8,394	11,481	9	536	5	4	1,817	5	433
Mississippi	7,155	8,195	8	361	4	3	1,457	4	374
Missouri	18,149	20,452	20	896	11	9	3,676	11	949
Montana	2,583	3,099	3	139	1	1	534	2	134
Nebraska	3,164	4,271	3	199	2	1	682	2	163
Nevada	5,701	7,031	6	318	3	3	1,190	3	296
New Hampshire	2,088	2,864	2	134	1	1	452	1	108
New Jersey	12,263	15,123	13	684	7	6	2,559	7	637
New Mexico	6,929	7,627	8	331	4	3	1,393	4	363
New York	28,701	38,761	31	1,803	16	13	6,183	17	1,481
North Carolina	23,129	27,071	25	1,202	13	11	4,742	14	1,206
North Dakota	1,198	1,387	1	61	1	1	245	1	63
Ohio	25,120	34,750	27	1,627	14	12	5,459	15	1,294
Oklahoma	12,296	13,554	14	589	7	6	2,473	8	644
Oregon	8,787	11,447	10	527	5	4	1,869	5	455
Pennsylvania	22,668	31,663	24	1,487	13	11	4,944	13	1,167
Rhode Island	1,567	2,024	2	93	1	1	332	1	81
South Carolina	10,718	12,400	12	548	6	5	2,189	7	559
South Dakota	1,964	2,584	2	119	1	1	419	1	102
Tennessee	20,768	23,493	23	1,031	12	10	4,211	13	1,085
Texas	65,456	73,301	72	3,204	38	32	13,230	40	3,423
Utah	3,633	4,528	4	205	2	2	761	2	189
Vermont	1,387	2,057	1	98	1	1	309	1	71
Virginia	15,063	18,982	16	864	9	7	3,167	9	781
Washington	15,260	18,747	17	847	9	7	3,180	9	793
West Virginia	5,466	6,670	6	301	3	3	1,136	3	284
Wisconsin	10,640	14,383	11	669	6	5	2,293	6	549
Wyoming	1,068	1,327	1	60	1	1	223	1	55
U.S. Total	635,739	780,702	695	35,249	368	304	132,464	386	33,042

State (All Numbers are in Short Tons)	Unique Ingredients from Pet Food	Total	Total Corn- Related	Total Soy- Related	Total Small Grains	Total Processed Plant Byproducts	Total Animal Byproduct Meals	Total Fats and Oils	Total Forages	Others
Alabama	82,186	164,289	35,802	8,720	5,260	2,063	27,652	2,599	6	82,188
Alaska	9,572	19,119	4,177	1,011	607	236	3,214	301	1	9,572
Arizona	115,087	230,644	49,864	12,393	7,569	3,037	38,964	3,718	9	115,090
Arkansas	65,736	131,845	28,434	7,111	4,360	1,761	22,299	2,138	5	65,738
California	382,982	765,039	167,082	40,466	24,322	9,478	128,634	12,038	27	382,991
Colorado	83,506	167,012	36,339	8,886	5,373	2,117	28,131	2,652	6	83,508
Connecticut	32,776	65,047	14,495	3,331	1,933	704	10,832	973	2	32,776
Delaware	9,673	19,256	4,251	1,001	591	223	3,221	295	1	9,674
Florida	276,884	552,955	120,862	29,211	17,534	6,816	92,939	8,684	20	276,891
Georgia	154,407	308,937	67,135	16,469	9,978	3,946	52,067	4,920	11	154,411
Hawaii	13,581	27,130	5,925	1,435	863	336	4,562	427	1	13,582
Idaho	22,157	44,256	9,668	2,340	1,406	547	7,440	696	2	22,157
Illinois	135,662	270,836	59,258	14,284	8,560	3,317	45,499	4,243	9	135,665
Indiana	105,746	210,845	46,314	11,051	6,579	2,518	35,355	3,271	7	105,748
Iowa	37,763	75,251	16,560	3,933	2,334	888	12,607	1,162	3	37,764
Kansas	47,550	95,120	20,682	5,066	3,067	1,211	16,027	1,513	3	47,551
Kentucky	90,885	181,840	39,516	9,693	5,873	2,322	30,646	2,896	7	90,887
Louisiana	58,968	118,091	25,589	6,323	3,848	1,534	19,929	1,893	4	58,969
Maine	21,154	41,965	9,363	2,144	1,242	450	6,984	626	1	21,155
Maryland	68,405	135,258	30,481	6,796	3,861	1,344	22,402	1,964	4	68,406
Massachusetts	62,022	122,870	27,530	6,234	3,582	1,277	20,408	1,812	4	62,024
Michigan	127,889	254,806	56,099	13,306	7,891	2,998	42,680	3,931	9	127,892
Minnesota	61,475	122,251	27,072	6,324	3,713	1,383	20,420	1,858	4	61,476
Mississippi	46,555	93,198	20,218	4,981	3,026	1,203	15,720	1,490	3	46,556
Missouri	116,855	234,077	50,681	12,549	7,647	3,055	39,517	3,760	9	116,858
Montana	17,322	34,615	7,551	1,834	1,105	432	5,823	546	1	17,322
Nebraska	22,964	45,689	10,103	2,369	1,395	522	7,637	697	1	22,964
Nevada	38,936	77,727	17,010	4,098	2,455	951	13,056	1,217	3	38,937
New Hampshire	15,321	30,465	6,749	1,575	924	344	5,088	463	1	15,322
New Jersey	83,748	167,185	36,587	8,815	5,280	2,045	28,084	2,618	6	83,750
New Mexico	43,948	88,114	19,024	4,745	2,904	1,169	14,895	1,425	3	43,949
New York	208,372	414,569	91,676	21,497	12,651	4,736	69,295	6,325	13	208,376
North Carolina	152,620	305,275	66,397	16,252	9,833	3,879	51,428	4,852	11	152,624
North Dakota	7,850	15,709	3,412	838	508	201	2,648	250	1	7,851
Ohio	185,404	368,551	81,719	19,027	11,144	4,132	61,524	5,584	12	185,408
Oklahoma	78,059	156,496	33,793	8,424	5,155	2,075	26,453	2,530	6	78,061
Oregon	62,250	124,015	27,312	6,473	3,837	1,456	20,770	1,912	4	62,251
Pennsylvania	168,429	334,689	74,291	17,248	10,083	3,725	55,842	5,057	11	168,432
Rhode Island	11,037	21,995	4,839	1,150	683	260	3,685	340	1	11,037
South Carolina	70,191	140,461	30,508	7,494	4,544	1,800	23,678	2,240	5	70,193
South Dakota	14,005	27,891	6,149	1,453	860	325	4,669	429	1	14,005
Tennessee	134,047	268,476	58,155	14,383	8,759	3,495	45,315	4,308	10	134,050
Texas	419,756	841,033	181,958	45,141	27,540	11,027	142,034	13,535	32	419,766
Utah	24,986	49,860	10,925	2,624	1,568	605	8,370	778	2	24,987
Vermont	10,747	21,310	4,761	1,086	627	226	3,544	317	1	10,747
Virginia	104,360	208,163	45,669	10,932	6,521	2,506	34,926	3,239	7	104,362
Washington	103,949	207,542	45,398	10,951	6,565	2,546	34,870	3,253	7	103,952
West Virginia	37,066	74,023	16,179	3,910	2,347	912	12,442	1,163	3	37,067
Wisconsin	77,298	153,783	34,011	7,973	4,691	1,755	25,704	2,346	5	77,299
Wyoming	7,327	14,623	3,203	770	461	178	2,455	228	1	7,328
U.S. Total	4,329,469	8,644,194	1,890,779	456,124	273,460	106,064	1,452,386	135,510	304	4,329,567

The full list of unique ingredients from the pet food study (used in Figure 42) are shown below:

Unique Ingredient list from Pet Food Study				
Alfalfa Leaf	Chickpeas	Hydrogenated Corn Syrup	Parsley	Shrimp Meal
Alfalfa Meal	Chicory	Hydrolyzed Chicken Liver	Parsley Flakes	Skim Milk
Algae	Chicory Root	Hydrolyzed Soy Protein	Parsnip	Sole
Almond Oil	Chicory Root Inulin	Imitation Crab Meat	Partially Hydrogenated Vegetable Oil	Soy Flakes
Althea Root	Cinnamon	Juniper Berries	Pasta	Soy Flour
Anchovies	Citrus Pulp	Kale	Pea Fiber	Soy Grits
Animal Fat	Coconut	Kelp	Pea Flour	Soy Protein Concentrate
Animal Liver Flavor	Coconut Flour	Kelp Meal	Pea Protein	Soy Protein Isolate
Apple Pomace	Coconut Oil	Lamb	Pea Starch	Soybean Germ Meal
Apples	Cod	Lamb and Chicken Broth	Peanut Butter	Soybean Mill Run
Avocado	Collard Greens	Lamb Broth	Peanut Flour	Spearmint
Avocado Oil	Corn Flour	Lamb Meal	Peanut Oil	Spinach
Bacon	Corn Germ Meal	Lecithin	Pearled Barley	Split Peas
Bacon Broth	Corn Grits	Lentil Fiber	Pears	Sugar
Bananas	Corn Meal	Lentil Flour	Peas	Sunflower Lecithin
Barley Flour	Corn Oil	Lentils	Pheasant	Sunflower Oil
Barley Grass	Corn Starch	Lettuce	Pineapple	Sunflower Seeds
Barley Malt Syrup	Corn Sugar	Linseed	Pinto Beans	Swede
Beef	Corn Syrup	Liver Broth	Pomegranate	Sweet Potato Flour
Beef Broth	Crab	Liver Flavor	Pork	Sweet Potatoes
Beef By-products	Crab Meal	Locust Bean Gum	Pork Broth	Swiss Cheese Powder
Beef Meal	Cracked Pearled Barley	Long Grain Rice	Pork By-products	Tapioca
Beet Powder	Cracked Wheat	Mackerel	Pork Fat	Tapioca Flour
Beet Pulp	Cranberries	Malted Barley	Pork Flavor	Tapioca Starch
Beets	Cranberry Pomace	Malted Barley Extract	Potassium Chloride	Tapioca
Bison	Cultured Milk	Malted Barley Flour	Potato Flour	Taurine
Black Beans	Cultured Skim Milk	Maltodextrin	Potato Product	Textured Soy Protein
Blackberries	Dehydrated Alfalfa Meal	Maple Flavored Syrup	Potato Protein	Tomato
Blueberries	Digest Flavor	Meat	Potato Starch	Tomato Pomace
Blueberry Pomace	DL-methionine	Meat Broth	Poultry	Tomato Puree
Bone Meal	Dried Alfalfa Meal	Meat By-products	Poultry Broth	Tricalcium Phosphate
Brewers Dried Yeast	Dried Brewers Yeast	Menhaden Oil	Poultry By-products	Tuna
Brewers Rice	Dried Cane Molasses	Milk	Poultry Fat	Tuna Broth
Brewers Rice Flour	Dried Yeast	Millet	Powdered Cellulose	Tuna By-product
Broccoli	Duck	Milo	Propylene Glycol	Tuna Meal
Brown Kelp	Egg	Mineral Oil	Psyllium Seed Husk	Turkey
Brown Rice	Egg Powder	Minerals	Pumpkin	Turkey Broth
Brown Sugar	Egg Product	Mixed Tocopherols	Pumpkinseeds	Vegetable Broth
Burdock Root	Egg Shell Membrane	Modified Food Starch	Quinoa	Vegetable Glycerin
Butternut Squash	Egg Whites	Modified Rice Starch	Quinoa Seed	Vegetable Oil
Calcium Carbonate	Expeller Pressed Canola Oil	Modified Tapioca Starch	Raspberries	Vegetable Pomace
Calcium Lactate	Faba Beans	Molasses Beet Pulp	Red Peppers	Vegetables
Cane Sugar	Fava Beans	Mono	Rice	Venison
Canola Oil	Fennel	Monterey Jack Cheese Powder	Rice Bran	Water
Caramel Color	Fenugreek Seed	Natural And Artificial Flavors	Rice Flour	Watercress
Carrots	Fish	Natural flavor	Rice Hulls	Wheat Flour
Cassava Root Flour	Fish Broth	Nonfat Milk	Rice Pasta	Wheat Germ
Celery	Fish Oil	Oat Bran	Rice Starch	Wheat Germ Meal
Cellulose	Flaxseed	Oat Fiber	Rice Syrup	Wheat Gluten
Chard	Flaxseed Meal	Oat Flour	Rolled Oats	Wheat Mill Run
Cheddar Cheese	Flaxseed Oil	Oat Groats	Rosehips	Wheat Starch
Cheddar Cheese Powder	Fresh Bartlett Pears	Oat Hulls	Rosemary	Whey
Cheese	Fructose	Oat Meal	Rye	White Rice
Cheese Powder	Garbanzo Beans	Ocean Fish	Rye Flour	Whitefish
Cheese Product	Gelatin	Oil Of Rosemary	Salmon	Whole Navy Beans
Cherries	Glycerin	Oils	Salmon Meal	Wild Boar
Chia Seed	Grain Distillers Dried Yeast	Olive Oil	Salmon Oil	Wild Rice
Chicken	Grains	Oranges	Salt	Xanthan Gum
Chicken and Turkey Broth	Green Beans	Organ Meat	Scrambled Egg	Yams
Chicken Broth	Green Lipped Mussels	Organic Pea Protein	Sea Cucumber	Yeast Culture
Chicken By-products	Green Peas	Other Animal By-products	Seabass	Yellow Peas
Chicken Fat	Guar Gum	Palm Oil	Seaweed Meal	Zucchini
Chicken Liver Flavor	Ham	Papain	Sesame Oil	
Chickory Root	High Fructose Corn Syrup	Papaya	Sesame Seeds	
Chickpea Flour	Honey	Paprika	Shrimp	

6.1.10 Horses

State (All Numbers are in Short Tons)	Soybean Meal	Corn DDGs	Corn Gluten Meal	Canola Meal	Wheat Middlings	Rice Mill Feed	Oats	Total
Alabama	3,646	14,585	6,199	5,834	65,633	5,469	44,485	145,851
Alaska	726	2,906	1,235	1,162	13,075	1,090	8,862	29,055
Arizona	5,385	21,541	9,155	8,616	96,935	8,078	65,700	215,410
Arkansas	1,741	6,966	2,960	2,786	31,346	2,612	21,246	69,659
California	18,438	73,751	31,344	29,501	331,881	27,657	224,942	737,514
Colorado	5,239	20,957	8,907	8,383	94,305	7,859	63,918	209,567
Connecticut	2,292	9,169	3,897	3,668	41,260	3,438	27,965	91,688
Delaware	10,686	42,745	18,167	17,098	192,353	16,029	130,373	427,451
Florida	10,353	41,411	17,600	16,564	186,348	15,529	126,302	414,106
Georgia	5,462	21,847	9,285	8,739	98,310	8,192	66,632	218,466
Hawaii	604	2,417	1,027	967	10,875	906	7,371	24,167
Idaho	2,137	8,546	3,632	3,419	38,459	3,205	26,067	85,465
Illinois	3,859	15,435	6,560	6,174	69,458	5,788	47,077	154,352
Indiana	4,085	16,338	6,944	6,535	73,523	6,127	49,832	163,384
Iowa	3,201	12,804	5,442	5,121	57,616	4,801	39,051	128,036
Kansas	3,584	14,335	6,092	5,734	64,506	5,376	43,721	143,347
Kentucky	5,506	22,025	9,361	8,810	99,112	8,259	67,176	220,249
Louisiana	1,884	7,535	3,203	3,014	33,909	2,826	22,983	75,354
Maine	-	-	-	-	-	-	-	-
Maryland	1,783	7,134	3,032	2,854	32,102	2,675	21,758	71,339
Massachusetts	1,863	7,453	3,167	2,981	33,537	2,795	22,731	74,526
Michigan	4,434	17,738	7,538	7,095	79,819	6,652	54,100	177,376
Minnesota	809	3,236	1,375	1,294	14,561	1,213	9,869	32,357
Mississippi	2,623	10,492	4,459	4,197	47,215	3,935	32,001	104,922
Missouri	5,906	23,622	10,039	9,449	106,299	8,858	72,047	236,221
Montana	2,833	11,332	4,816	4,533	50,993	4,249	34,562	113,318
Nebraska	2,522	10,087	4,287	4,035	45,392	3,783	30,766	100,871
Nevada	1,355	5,421	2,304	2,168	24,394	2,033	16,534	54,209
New Hampshire	584	2,336	993	935	10,513	876	7,126	23,363
New Jersey	2,192	8,768	3,727	3,507	39,458	3,288	26,744	87,685
New Mexico	2,439	9,758	4,147	3,903	43,911	3,659	29,762	97,579
New York	5,900	23,599	10,029	9,440	106,194	8,850	71,976	235,988
North Carolina	3,333	13,330	5,665	5,332	59,985	4,999	40,657	133,300
North Dakota	1,161	4,646	1,974	1,858	20,905	1,742	14,169	46,455
Ohio	5,989	23,954	10,181	9,582	107,795	8,983	73,061	239,543
Oklahoma	4,030	16,120	6,851	6,448	72,540	6,045	49,166	161,199
Oregon	4,177	16,706	7,100	6,682	75,178	6,265	50,954	167,062
Pennsylvania	5,499	21,996	9,348	8,798	98,982	8,249	67,088	219,961
Rhode Island	333	1,331	566	533	5,991	499	4,060	13,313
South Carolina	2,223	8,893	3,779	3,557	40,018	3,335	27,123	88,928
South Dakota	1,805	7,221	3,069	2,889	32,497	2,708	22,026	72,215
Tennessee	5,287	21,147	8,988	8,459	95,163	7,930	64,499	211,473
Texas	13,193	52,773	22,429	21,109	237,480	19,790	160,959	527,734
Utah	2,451	9,806	4,168	3,922	44,127	3,677	29,908	98,060
Vermont	752	3,007	1,278	1,203	13,534	1,128	9,173	30,075
Virginia	5,320	21,279	9,044	8,512	95,756	7,980	64,901	212,791
Washington	5,137	20,546	8,732	8,219	92,458	7,705	62,666	205,463
West Virginia	1,745	6,981	2,967	2,792	31,412	2,618	21,291	69,806
Wisconsin	3,287	13,150	5,589	5,260	59,175	4,931	40,107	131,499
Wyoming	1,661	6,644	2,824	2,658	29,897	2,491	20,264	66,438
U.S Total	191,455	765,819	325,473	306,327	3,446,185	287,182	2,335,748	7,658,189

6.1.11 Aquaculture

State (All Numbers are in Short Tons)	Corn	Corn DDGs	Corn Gluten Feed/Meal	Wheat	Soybean Meal	Cottonseed Meal	Wheat Middlings and Wheat Bran	Soybean Oil
Alabama	19,480	19,467	-	-	47,566	24,658	14,304	1,299
Alaska	-	-	-	-	-	-	-	-
Arizona	145	71	167	-	702	89	377	15
Arkansas	4,287	4,217	318	153	11,304	5,341	3,563	288
California	1,784	1,020	493	939	6,087	1,292	2,878	177
Colorado	196	47	333	670	1,673	60	688	24
Connecticut	-	-	-	1	1	-	-	-
Delaware	1	-	-	-	4	-	2	-
Florida	1,063	963	133	352	3,203	1,220	1,054	78
Georgia	1,112	1,110	-	295	2,927	1,407	818	74
Hawaii	395	378	-	-	1,134	479	318	28
Idaho	172	47	-	4,480	3,613	60	302	21
Illinois	666	662	19	-	1,679	838	514	44
Indiana	75	-	167	-	534	-	327	11
Iowa	107	102	-	2	310	130	85	7
Kansas	176	150	167	-	784	189	334	13
Kentucky	430	427	167	-	1,431	541	487	29
Louisiana	272	220	-	-	673	279	272	22
Maine	1	-	-	-	9	-	3	-
Maryland	74	-	333	1,057	1,276	-	492	11
Massachusetts	49	-	-	2	124	-	106	7
Michigan	129	126	-	925	979	160	99	8
Minnesota	56	-	-	4	181	-	120	7
Mississippi	36,929	36,901	167	-	90,486	46,741	27,288	2,464
Missouri	411	403	-	547	1,450	510	314	27
Montana	-	-	-	-	-	-	-	-
Nebraska	50	47	333	2	838	60	374	3
Nevada	-	-	-	-	-	-	-	-
New Hampshire	-	-	-	-	33	-	-	-
New Jersey	1	-	-	-	9	-	3	-
New Mexico	25	-	-	1	62	-	53	4
New York	55	-	167	808	1,074	-	285	7
North Carolina	727	567	1,513	1,315	5,869	719	2,273	60
North Dakota	-	-	-	-	-	-	-	-
Ohio	566	506	1,000	7	3,509	641	1,502	41
Oklahoma	176	126	-	-	435	160	200	15
Oregon	181	181	-	618	880	230	133	12
Pennsylvania	218	185	667	875	2,557	234	873	16
Rhode Island	-	-	-	-	-	-	-	-
South Carolina	6	-	-	-	21	-	12	0
South Dakota	1	-	-	1	9	-	3	-
Tennessee	353	339	-	-	867	429	279	24
Texas	1,797	1,496	167	-	4,829	1,895	1,910	142
Utah	-	-	167	359	598	-	167	-
Vermont	-	-	-	-	-	-	-	-
Virginia	119	94	3	427	600	119	125	10
Washington	-	-	-	984	639	-	-	-
West Virginia	80	79	-	536	523	100	61	5
Wisconsin	177	24	-	1,277	1,188	30	346	23
Wyoming	-	-	-	1	1	-	-	-
U.S. Total	72,543	69,956	6,479	16,633	202,672	88,611	63,343	5,017

State (All Numbers are in Short Tons)	Meat and Bone Meal	Feather Meal	Meat Meal	Bloodmeal	Fishmeal	Soy Protein Conc	Wheat Gluten Meal	Lecithin	Poultry Fat	Fish Oil	Other Ingredients
Alabama	-	-	9	-	54	909	57	4	3	1,303	907
Alaska	-	-	-	-	-	-	-	-	-	-	-
Arizona	111	-	167	-	153	7	-	-	-	37	69
Arkansas	212	47	448	22	409	199	7	14	86	392	351
California	328	288	764	133	1,520	86	44	89	378	619	1,066
Colorado	222	205	529	95	890	10	89	68	270	341	493
Connecticut	-	0	0	0	1	-	0	0	0	0	1
Delaware	-	-	3	-	2	-	-	-	1	-	0
Florida	88	109	248	50	1,030	50	647	83	147	280	334
Georgia	-	90	89	42	240	52	14	28	120	192	209
Hawaii	-	-	-	-	447	19	574	45	-	66	54
Idaho	-	1,373	1,268	634	3,707	8	269	427	1,796	1,821	2,466
Illinois	12	-	36	-	22	31	-	-	5	47	34
Indiana	111	-	170	-	155	4	-	-	1	33	66
Iowa	-	0	18	0	97	5	115	9	6	15	9
Kansas	111	-	176	-	130	8	-	-	3	36	44
Kentucky	111	-	170	-	203	20	115	9	1	59	52
Louisiana	-	-	9	-	33	13	-	-	3	22	40
Maine	-	-	6	-	3	-	-	-	2	-	0
Maryland	222	327	635	151	1,472	4	50	101	428	483	667
Massachusetts	-	0	0	0	29	2	0	0	1	8	30
Michigan	-	284	274	131	748	6	44	87	374	379	497
Minnesota	-	1	28	1	89	2	58	5	9	13	33
Mississippi	111	-	182	-	133	1,723	-	-	4	2,486	1,740
Missouri	-	168	188	77	544	19	141	61	229	254	317
Montana	-	-	-	-	-	-	-	-	-	-	-
Nebraska	222	0	346	0	273	2	57	5	4	52	49
Nevada	-	-	-	-	-	-	-	-	-	-	-
New Hampshire	-	-	-	-	87	-	115	9	-	8	4
New Jersey	-	-	6	-	3	-	-	-	2	-	0
New Mexico	-	0	0	0	15	1	0	0	0	4	15
New York	111	248	419	114	800	2	38	76	331	353	483
North Carolina	1,009	403	1,918	186	2,167	34	62	124	537	788	1,020
North Dakota	-	-	-	-	-	-	-	-	-	-	-
Ohio	667	2	1,044	1	770	26	59	6	15	181	197
Oklahoma	-	-	3	-	30	8	-	-	1	15	35
Oregon	-	190	175	88	496	8	29	58	248	260	338
Pennsylvania	444	268	947	124	1,178	10	41	83	360	456	580
Rhode Island	-	-	-	-	-	-	-	-	-	-	-
South Carolina	-	-	9	-	7	0	-	-	3	0	2
South Dakota	-	0	6	0	4	-	0	0	2	0	0
Tennessee	-	-	6	-	10	16	-	-	2	24	24
Texas	111	-	185	-	466	85	230	18	5	180	280
Utah	111	110	268	51	399	-	17	34	144	166	213
Vermont	-	-	-	-	-	-	-	-	-	-	-
Virginia	2	131	124	60	358	6	20	40	171	181	247
Washington	-	302	279	139	849	-	46	93	395	395	527
West Virginia	-	165	158	76	493	4	25	51	217	221	291
Wisconsin	-	393	384	181	1,300	8	60	121	520	537	775
Wyoming	-	0	0	0	1	-	0	0	0	0	0
U.S. Total	4,319	5,106	11,694	2,357	21,817	3,388	3,025	1,748	6,821	12,706	14,561

State (All Numbers are in Short Tons)	Total	Total Corn- Related	Total Soy- Related	Total Processed Plant Byproducts	Total Animal Byproduct Meals	Total Fats and Oils	Vitamins and Minerals
Alabama	130,020	38,947	47,566	39,019	63	2,609	1,816
Alaska	-	-	-	-	-	-	-
Arizona	2,110	382	702	466	431	53	76
Arkansas	31,658	8,822	11,304	9,064	1,137	780	551
California	19,987	3,297	6,087	5,154	3,034	1,263	1,151
Colorado	6,904	577	1,673	1,506	1,942	703	503
Connecticut	5	-	1	1	1	1	1
Delaware	12	1	4	2	5	1	0
Florida	11,133	2,159	3,203	3,273	1,526	588	384
Georgia	8,817	2,222	2,927	2,533	461	414	260
Hawaii	3,937	773	1,134	1,371	447	139	72
Idaho	22,463	219	3,613	5,110	6,982	4,065	2,474
Illinois	4,610	1,347	1,679	1,352	71	96	65
Indiana	1,652	241	534	327	436	44	70
Iowa	1,018	209	310	331	116	37	14
Kansas	2,321	493	784	523	417	52	52
Kentucky	4,253	1,024	1,431	1,144	484	98	72
Louisiana	1,856	492	673	551	42	46	53
Maine	24	1	9	3	9	2	0
Maryland	7,782	407	1,276	1,599	2,807	1,021	671
Massachusetts	360	49	124	107	31	15	33
Michigan	5,249	255	979	1,227	1,436	849	503
Minnesota	607	56	181	182	119	34	35
Mississippi	247,355	73,997	90,486	74,030	426	4,954	3,463
Missouri	5,657	813	1,450	1,511	976	570	336
Montana	-	-	-	-	-	-	-
Nebraska	2,719	430	838	493	842	64	51
Nevada	-	-	-	-	-	-	-
New Hampshire	255	-	33	115	87	17	4
New Jersey	24	1	9	3	9	2	0
New Mexico	179	25	62	53	15	8	16
New York	5,373	222	1,074	1,132	1,693	768	485
North Carolina	21,291	2,808	5,869	4,368	5,683	1,509	1,055
North Dakota	-	-	-	-	-	-	-
Ohio	10,739	2,072	3,509	2,209	2,484	242	223
Oklahoma	1,204	302	435	359	33	32	44
Oregon	4,127	363	880	1,010	948	578	346
Pennsylvania	10,118	1,069	2,557	2,024	2,962	915	590
Rhode Island	-	-	-	-	-	-	-
South Carolina	61	6	21	12	16	4	3
South Dakota	27	1	9	4	10	2	0
Tennessee	2,375	692	867	708	16	51	40
Texas	13,795	3,459	4,829	4,035	762	345	365
Utah	2,803	167	598	542	939	344	213
Vermont	-	-	-	-	-	-	-
Virginia	2,837	216	600	691	676	402	252
Washington	4,648	-	639	1,030	1,569	883	527
West Virginia	3,085	159	523	722	892	494	295
Wisconsin	7,342	200	1,188	1,713	2,258	1,200	784
Wyoming	3	-	1	1	1	1	0
U.S. Total	612,794	148,977	202,672	171,611	45,293	26,292	17,949

6.2 Appendix B, Estimated 2020 Animal Feed Consumption Tables

6.2.1 Estimated 2020 Baseline Animal Feed Consumption Tables

Ingredient (All Numbers are in Short Tons)	Broilers	Layers	Turkeys	Beef Cows and Bulls	Cattle on Feed	Dairy Cows	Market Hogs	Sows	Total
Corn	34,657,175	10,588,144	6,125,065	1,179,699	33,963,361	14,578,587	33,112,074	5,951,349	140,155,454
Corn Silage	-	-	-	15,722,161	36,450,280	53,964,872	-	-	106,137,312
Other Hay	-	-	-	21,100,302	12,937,090	21,406,527	-	-	55,443,919
Alfalfa Hay	-	-	-	3,412,515	2,725,038	38,236,623	-	-	44,374,176
Soybean Meal	17,477,649	3,012,693	3,532,678	20,021	62,364	2,676,880	5,975,102	1,610,204	34,367,591
DDGs	2,899,304	1,601,720	328,503	1,491,791	10,437,107	7,118,397	4,207,846	637,763	28,722,432
Wheat Middlings and Wheat Bran	714,151	711,711	-	-	-	-	3,165,691	572,341	5,163,893
Corn Gluten Feed/Meal	-	-	-	693,794	1,156,124	897,050	1,882,113	143,042	4,772,123
Canola Meal	495,274	-	-	16,720	1,863,718	2,011,722	199,461	-	4,586,894
Meat and Bone Meal	175,314	264,444	891,415	-	-	1,303,836	734,937	12,577	3,382,523
Limestone	660,621	1,715,487	54,880	68,366	55,848	-	455,745	111,257	3,122,204
Soybean Seeds	-	-	-	-	-	3,077,590	-	-	3,077,590
Cottonseed	-	-	-	4,372	1,567,652	1,332,624	17,557	-	2,922,206
Wheat	482,697	-	-	28,568	326,509	-	1,349,164	299,645	2,486,583
Inedible Tallow	-	-	-	-	-	1,893,701	-	-	1,893,701
Sorghum	449,198	71,486	22,043	-	928,210	-	242,527	42,649	1,756,115
Choice White Grease	-	-	-	-	-	-	1,304,897	220,849	1,525,746
Almond Hulls	-	-	-	-	-	1,473,533	-	-	1,473,533
Cottonseed Meal	1,046,733	186,011	9,184	78,096	81,187	-	-	-	1,401,212
Hominy Feed	-	-	-	-	-	-	1,311,950	52,611	1,364,561
Miscellaneous Byproduct Feeds	360,134	31,170	41,706	-	-	856,847	-	-	1,289,858
Dicalcium phosphate	377,841	199,332	4,592	71,335	4,667	-	294,931	71,999	1,024,697
Meat Meal	427,673	-	7,501	-	-	-	545,956	-	981,130
Yellow Grease	630,373	10,657	158,233	-	-	-	-	-	799,262
Soybean Oil	274,094	131,164	-	-	-	385,451	-	-	790,708
Soybean Hulls	-	-	-	-	-	658,834	-	81,310	740,144
Rice Mill Feed	-	-	-	-	-	-	592,152	-	592,152
Bloodmeal	331,772	-	1	-	-	203,793	51,003	-	586,568
Salt	261,285	54,280	15,004	22,676	-	-	158,211	38,622	550,077
Barley	206	1,584	20	208,277	253,881	-	2,788	-	466,756
Feather Meal	52,677	-	125,251	-	-	143,572	97,731	-	419,232
Potato Peels	41,555	75,926	170	-	286,246	-	-	-	403,897
Potassium Chloride	-	-	-	309,139	-	-	-	-	309,139
Lysine	153,635	-	19,107	-	-	-	100,492	24,532	297,766
Vitamins	161,632	51,797	4,987	-	-	-	39,416	9,622	267,454
Potato Pulp	41,555	75,926	171	-	136,129	-	-	-	253,782
DL Methionine	173,671	20,986	25,771	-	-	-	13,983	3,413	237,824
Sunflower Meal	-	-	-	-	-	97,924	19,322	-	117,247
Potato Tubers	28,946	75,926	128	-	-	-	-	-	105,001
Minerals	32,326	10,359	-	-	-	-	-	-	42,686
Phytase	32,326	7,105	-	-	-	-	-	-	39,432
Threonine	9,028	-	2,362	-	-	-	20,977	5,121	37,488
Oats	-	-	-	-	-	-	32,405	-	32,405
Millet	-	-	-	-	-	-	142	-	142
Fishmeal	-	-	-	-	-	-	-	-	-
Valine	-	-	-	-	-	-	-	-	-
Total	62,448,847	18,897,909	11,368,771	44,427,833	103,235,411	152,318,363	55,928,572	9,888,907	458,514,613

6.2.2 Estimated 2020 with COVID-19 Impact Animal Feed Consumption Tables

Ingredient (All Numbers are in Short Tons)	Broilers	Layers	Turkeys	Beef Cows and Bulls	Cattle on Feed	Dairy Cows	Market Hogs	Sows	Total
Corn	33,175,137	10,232,383	5,991,694	1,179,960	33,364,446	14,623,823	33,258,387	5,945,402	137,771,232
Corn Silage	-	-	-	15,725,628	35,827,270	54,132,321	-	-	105,685,219
Other Hay	-	-	-	21,104,955	12,709,437	21,472,950	-	-	55,287,343
Alfalfa Hay	-	-	-	3,413,268	2,679,643	38,355,268	-	-	44,448,179
Soybean Meal	16,730,256	2,911,467	3,451,866	20,025	63,432	2,685,186	6,000,009	1,608,595	33,470,837
DDGs	2,775,322	1,547,903	323,159	1,492,120	10,165,885	7,140,485	4,224,440	637,126	28,306,438
Wheat Middlings and Wheat Bran	683,612	687,797	-	-	-	-	3,181,714	571,769	5,124,892
Corn Gluten Feed/Meal	-	-	-	693,947	1,137,682	899,834	1,889,772	142,899	4,764,135
Canola Meal	474,094	-	-	16,723	1,813,363	2,017,964	199,370	-	4,521,515
Meat and Bone Meal	167,817	255,559	871,895	-	-	1,307,881	734,601	12,564	3,350,318
Soybean Seeds	-	-	-	-	-	3,087,139	-	-	3,087,139
Limestone	632,371	1,657,846	53,410	68,381	54,381	-	455,537	111,145	3,033,073
Cottonseed	-	-	-	4,373	1,542,105	1,336,759	17,696	-	2,900,933
Wheat	462,056	-	-	28,575	320,976	-	1,356,375	299,345	2,467,327
Inedible Tallow	-	-	-	-	-	1,899,577	-	-	1,899,577
Sorghum	429,989	69,084	21,645	-	912,881	-	244,005	42,607	1,720,212
Choice White Grease	-	-	-	-	-	-	1,310,505	220,629	1,531,133
Almond Hulls	-	-	-	-	-	1,478,105	-	-	1,478,105
Hominy Feed	-	-	-	-	-	-	1,318,512	52,559	1,371,071
Cottonseed Meal	1,001,972	179,761	8,984	78,113	78,598	-	-	-	1,347,427
Miscellaneous Byproduct Feeds	344,734	30,123	40,924	-	-	859,506	-	-	1,275,287
Dicalcium phosphate	361,684	192,634	4,972	71,351	4,518	-	294,796	71,927	1,001,882
Meat Meal	409,385	-	7,414	-	-	-	545,707	-	962,506
Yellow Grease	262,373	126,756	-	-	-	386,647	-	-	775,776
Soybean Oil	603,416	10,299	154,778	-	-	-	-	-	768,493
Soybean Hulls	-	-	-	-	-	660,878	-	81,229	742,107
Rice Mill Feed	-	-	-	-	-	-	594,904	-	594,904
Bloodmeal	317,584	-	1	-	-	204,425	50,979	-	572,990
Salt	250,111	52,456	14,740	22,681	-	-	158,138	38,584	536,710
Barley	198	1,531	19	208,323	250,362	-	2,810	-	463,241
Feather Meal	50,425	-	122,130	-	-	144,018	97,687	-	414,259
Potato Peels	39,778	73,375	166	-	286,471	-	-	-	399,791
Potassium Chloride	-	-	-	309,208	-	-	-	-	309,208
Lysine	147,065	-	18,532	-	-	-	100,447	24,508	290,552
Vitamins	154,720	50,056	4,877	-	-	-	39,398	9,613	258,665
Potato Pulp	39,778	73,375	168	-	131,786	-	-	-	245,108
DL Methionine	166,244	20,281	25,648	-	-	-	13,976	3,410	229,559
Sunflower Meal	-	-	-	-	-	98,228	19,314	-	117,542
Potato Tubers	27,709	73,375	126	-	-	-	-	-	101,210
Minerals	30,944	10,011	-	-	-	-	-	-	40,955
Phytase	30,944	6,867	-	-	-	-	-	-	37,811
Threonine	8,642	-	2,272	-	-	-	20,967	5,116	36,997
Oats	-	-	-	-	-	-	32,645	-	32,645
Millet	-	-	-	-	-	-	143	-	143
Fishmeal	-	-	-	-	-	-	-	-	-
Valine	-	-	-	-	-	-	-	-	-
Total	59,778,359	18,262,939	11,119,422	44,437,631	101,343,238	152,790,996	56,162,834	9,879,027	453,774,446

6.2.3 Ingredient List for Ration Cost Optimization (RCO) Model and Prices

Ingredient List	2019 U.S. Average Price	2020 Baseline U.S. Average Price	2020 Estimated U.S. Average Price with COVID-19
U.S. Dollars Per Short Ton			
Alfalfa Hay	\$182	\$169	\$168
Alfalfa Meal	\$389	\$376	\$367
Alfalfa Pellets All	\$326	\$315	\$308
Almond Hulls	\$300	\$290	\$283
Barley	\$308	\$275	\$281
Bloodmeal	\$728	\$703	\$687
Bloodmeal-Porcine	\$728	\$704	\$688
Canola Meal	\$300	\$290	\$283
Choice White Grease	\$583	\$556	\$576
Corn	\$139	\$130	\$129
Corn Crude Oil	\$577	\$550	\$570
Corn DDGs	\$201	\$194	\$190
Corn Distillers Mod. Wet Grain	\$131	\$122	\$121
Corn Distillers Wet Grain	\$108	\$101	\$100
Corn Gluten Feed	\$165	\$154	\$153
Corn Gluten Feed Meal	\$449	\$434	\$425
Corn Gluten Meal 60% Pro	\$165	\$159	\$156
Cottonseed Meal	\$302	\$292	\$285
Cottonseed Whole	\$298	\$288	\$281
Feathermeal	\$418	\$404	\$395
Hominy Feed IL	\$179	\$167	\$166
Inedible Tallow	\$640	\$610	\$632
Meat and Bone Meal	\$258	\$249	\$243
Meat and Bone Meal- Porcine	\$279	\$270	\$264
Meat Meal	\$307	\$297	\$290
Millet	\$335	\$313	\$310
Oats	\$177	\$169	\$166
Other Hay	\$129	\$121	\$120
Rice Bran	\$185	\$172	\$171
Rice Hulls	\$79	\$74	\$73
Rice Milfeed	\$122	\$114	\$113
Rye	\$351	\$311	\$304
Sorghum	\$153	\$140	\$149
Soybean Hull	\$187	\$181	\$177
Soybean Meal	\$353	\$341	\$334
Soybean Meal High Protein	\$348	\$336	\$328
Soybean Oil	\$595	\$566	\$587
Sunflower Meal	\$245	\$237	\$232
Wheat	\$154	\$136	\$133
Wheat Bran	\$198	\$176	\$171
Wheat Middlings	\$146	\$129	\$126
Wheat Millrun	\$297	\$263	\$257
White Oats	\$289	\$275	\$271
Yellow Corn Hominy Feed	\$179	\$167	\$166
Yellow Grease	\$514	\$489	\$507

6.3 Appendix C, Subject Matter Experts

Name	Role	Company Name
Menghe Li, Ph.D.	Industry Expert - Aquaculture	Mississippi State University
Steven Hart, Ph.D.	Industry Expert - Aquaculture	Global Aquaculture Alliance
Terry Hanson, Ph.D.	Industry Expert - Aquaculture	Auburn University
Eric Bailey, Ph.D.	Industry Expert - Beef	University of Missouri
Michael Hutjens, Ph.D.	Industry Expert - Dairy	University of Illinois
James Lattimer, Ph.D.	Industry Expert - Equine	Kansas State University
Bart Borg, Ph.D.	Industry Expert - Swine	Standard Nutrition Services
Meghan Schwartz, Ph.D.	Industry Expert - Poultry	Schwartz Consulting Services, Inc
Andy Tauer	Industry Expert - Aquaculture	Indiana Soybean Alliance