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A Review of the Pork Cutout Estimation and Attributes of LMR Wholesale Pork Used in the Cutout Estimation

Research Commissioned by the:

Agricultural Marketing Service
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Project Lead Researchers:

Glynn Tonsor and Joe Parcell

Acknowledgements

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About the Principal Investigators

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Tonsor has broad interests and experiences, which span many issues throughout the meat-livestock supply chain. Through active research, engaged outreach with industry, and first-hand knowledge with livestock production, Glynn has economic expertise in an array of topics of economic importance to Kansas, U.S., and global stakeholders.

Tonsor has more than 135 peer-reviewed publications, provided more than 350 presentations to in-person audiences exceeding 40,000 attendees, conducted numerous educational webinars, and written a multitude of non-technical publications. He oversees the Meat Demand Monitor (MDM) project based at Kansas State University. Tonsor has testified to both state and federal governmental bodies. In addition to regularly engaging many agricultural media outlets, Tonsor has been interviewed or cited by broader outlets including the BBC News, CBS Evening News, Economist, National Geographic, Time, and The Wall Street Journal.

Joe Parcell, Ph.D., is a Professor in the Department of Agricultural Economics at Kansas State University, where he also directs the K-State Risk Management Center. Through using systems design in modeling decision processes, Joe's work focuses on risk management and policy solutions that lead to strategic opportunities for businesses and individuals to be innovative, resilient and profitable. He is a dedicated leader, teacher, mentor, and researcher with more than 25 years of academic and consulting experience. His research activities include risk assessment and mitigation, pricing analysis, marketing actions, financial assessment, strategic and operational planning, production choices, and systems solutions. Joe has more than 200 publications, and he has secured more than $5 million in extramural research funding. He received his B.A. in mathematics from the University of Northern Iowa and M.S. and Ph.D. from Kansas State University.

Alice Roach, MBA, is a research associate at Kansas State University. During her current and previous academic and consulting roles, she has conducted market research, assessed market opportunities, evaluated business concept feasibility, recommended marketing strategies and developed industry needs assessments. Much of her work has focused on collaborating with food production businesses to determine the viability of adopting vertical, or horizontal, integration into their business models and planning strategic marketing efforts. Her research interests include strategy, integrated marketing communications, financial analysis and project management. From the University of Missouri, she earned a B.S. in agricultural journalism and an MBA.

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EXECUTIVE SUMMARY

The U.S. Department of Agriculture's (USDA) Livestock Mandatory Reporting (LMR) has included wholesale pork reporting since 2013. Accordingly, USDA AMS (Agricultural Marketing Service) provides multiple products conveying price, supply, and export information on the wholesale pork market.

Despite a host of industry changes, no comprehensive external review of wholesale pork reporting has been conducted since the reporting began. The industry changes likely have wholesale pork-specific implications, and they further motivate this review. To that end, this report outlines findings from a study commissioned by USDA AMS.

Findings

Perhaps the most important overarching finding is all engaged industry stakeholders conveyed market-essential value follows from USDA AMS wholesale pork market reporting. Although this report outlines some areas for additional consideration or adjustment, stakeholders repeatedly voiced support for USDA AMS to continue wholesale pork market reporting.

Action Items for Consideration

The following bulleted list summarizes wholesale pork reporting recommendations for USDA AMS to consider. The full report includes additional supporting details and rationale.

1) Discontinue FOB Omaha reporting because it is no longer used by industry.
2) Evaluate prospect of less frequent (i.e., quarterly, monthly) but more detailed reporting for exports and specialty products.
3) AMS to implement ongoing evaluation of cut-level, daily small-trade volume. For a cut with occasional small-trade volume, set volume thresholds (i.e., 10,000 pounds or 20,000 pounds total for a day).
4) Clearly indicate when primal and composite carcass value computations use transactions other than those explicitly reported in most recent reports.
5) Consider mandating variety meats and greases reporting. We recommend USDA AMS and industry collaborate on a 12-month review of voluntary reporting for all qualifying trades. AMS can evaluate and substantiate the trade volume size impacts of mandating these products so that mandated reporting doesn't do more harm than good.
6) Some participants expressed concern about including labor, yields, and fabrication costs primal value estimates, but we find no substantial justification for changing this practice.
7) Continue voluntary collection of fabrication costs and yields.
8) AMS to periodically evaluate procedural changes that may enhance pork reporting given industry adjustments such as further product differentiation or segmentation that may thin traditional, negotiated trade.

CHAPTER 1: Wholesale Pork Price Reports and Study Objectives

Since 2013, the Livestock Mandatory Reporting (LMR) law has required qualified pork packers to submit information about qualified wholesale pork sales to the USDA Agricultural Marketing Service (AMS). However, no external review of wholesale pork reporting has been conducted.

This report was commissioned to capture user sentiment about wholesale pork reporting, conduct analyses to validate concerns and opportunities, and offer recommendations to AMS for how to improve data collection and reporting to match user needs and ongoing industry evolution. When developing recommendations, we balance the different perspectives of users with the data currently collected, AMS' capacity with respect to current law and resources to make changes, and the unintended consequences that changes to data collection and reporting could yield. Recommendations presented here are those of the report authors; they should not be attributed to AMS or a specific industry group.

1.1 About Wholesale Pork Reporting

According to the LMR law approved in 2013, the USDA AMS publishes daily, weekly, and monthly reports using sales transaction data packers submit as part of the LMR mandate.[1] AMS also collects voluntarily submitted data and publishes reports from this information. By combining information from the mandatory and voluntary data packers submit, USDA AMS calculates an estimated value and volume of six pork primals and a composite pork carcass cutout. The primals and cutout are computed by aggregating volume-weight product prices up to the primals. A similar step follows to arrive at the composite cutout.[2]

Not included in the estimated composite cutout would be costs incurred by processors for administration, economic depreciation, energy, and taxes. Parcell, Schulz, and Roach (2024) reported that an increasing percentage of hog marketing contracts are replacing an AMS-printed negotiated hog price with the AMS-printed composite cutout price.

Prior to 2013, packers voluntarily supplied wholesale pork cut transaction data. The 2013 law excluded mandated reporting of variety meats, tallow (i.e., grease), and proteins.

[1] The reports are as follows; note, reports assigned even numbers represent FOB plant reports, and those assigned odd numbers represent FOB Omaha reports:

- **Daily**: 600, 601, 602, and 603 along with reports based on voluntarily submitted data for pork and variety meats and tallows and protein
- **Weekly**: 680, 681, 610, 611, 620, 621, 630, 631, 640, 641, 650, and 651 along with reports based on voluntarily submitted data for byproduct drop value, variety meats, tallow and protein, and retail features. Note, the 680 and 681 comprehensive reports are not mandated.

[2] Yields used to convert products, and primals, into an estimated carcass cutout are derived from annual voluntarily supplied processor averages. For each year, AMS updates yields in January; the trade receives notifications in advance. Similar to yields, packaging and added value (e.g., cooked) costs are voluntarily supplied by processors. An estimated labor cost is also used to compute the composite cutout.

1.1. Study Objectives

The pork industry has changed significantly since the 2013 law requiring wholesale pork sales reporting took effect. The following list outlines some of the changes (in no particular order):

- Greater concentration at the processing and retail levels
- Increased growth in pork export markets, particularly Mexico
- Change in product or cut specifications to match new uses
- Change in subprimal yield rates given increase in hog weight
- Differentiated supply chains for products meeting requirements (e.g., housing)
- Decline in negotiated live-hog trade along with increased use of market hog pricing based on AMS-reported carcass cutout

These changes motivated this review of mandatory wholesale pork reporting. The study had the following interrelated objectives:

1) Seek feedback on concerns, enhancements, and future industry changes that may impact how the cutout is computed, used, and interpreted by producers, processors, agency personnel, market analysts, and association representatives. Engage these individuals through video calls and in-person engagements for comment.

2) Synthesize derivation of the cutout as now estimated to explore the following:
    a. Alternative estimates of the cutout with benchmark off the current cutout, including:
        i. Variations in yields
        ii. Variation in with and without fabrication costs
    b. Alternative specifications of the cutout considering value-added products
    c. Alternative presentation of the cutout to include statistically relevant ranges (i.e., upper 75% and lower 25%)

3) Explore the reliability of yields and fabrication costs used to compute the cutout by doing the following:
    a. Analyze historical variation and sensitivity to changes in yields and fabrication costs over time.
    b. Analyze the completeness of yield and fabrication cost information.

CHAPTER 2: Mandatory Reporting, Voluntary Reporting, and Data Reports

Wholesale pork mandatory reporting plays a critical role in price discovery and trend analysis. Industry participants use the information for conducting commerce (i.e., negotiations and contracts) and studying industry trends. Furthermore, the mandatorily reported wholesale data are supplemented by voluntary data to prepare a comprehensive pork cutout report, which intends to communicate primal and carcass values based on the underlying cuts. The following discussion details mandatory reporting, voluntary reporting, and the reports containing data reported by packers.

2.1 Law and Regulation

For nearly eight decades, the U.S. has had a framework for collecting and reporting livestock and meat prices. The intent has been to ensure all market participants have access to the data and can consider data points when making decisions. Voluntary price reporting has evolved over time. Exhibit 2.1.1 highlights some of the major changes in price reporting laws and regulations — with particular emphasis on changes relevant to pork and swine.

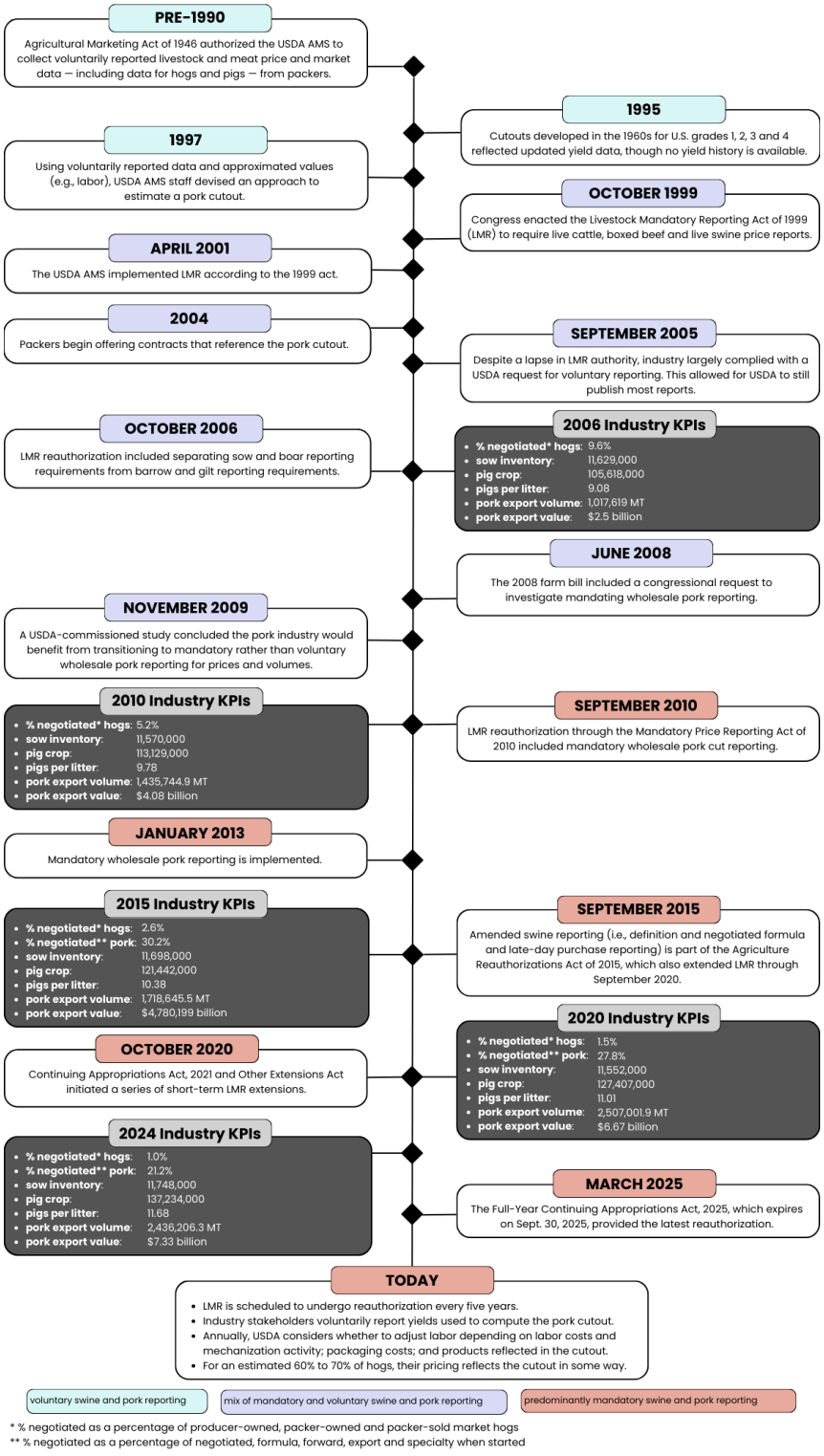
As the timeline shows, packers began to voluntarily report market data after implementation of the Agricultural Marketing Act of 1946. The law designated data collection authority to the USDA AMS (https://www.congress.gov/crs-product/R45777). Using the voluntarily submitted data, USDA AMS devised cutout formulas. From the 1960s to the 1990s, USDA AMS periodically revised the formulas to reflect updated yields, but no known archive exists to show how those yields evolved.

In 1997, USDA AMS staff invested time into preparing a pork cutout to represent a chilled pork carcass' value before the carcass undergoes further processing into primals and subprimals. Around this time, the industry shifted toward alternative marketing arrangements instead of cash or negotiated sales and purchases. When it became effective in 2001, the Livestock Mandatory Reporting Act of 1999 (LMR) required packers to submit swine, cattle, and boxed beef prices (https://www.congress.gov/crs-product/R45777).

Not until the Mandatory Price Reporting Act of 2010 did mandatory reporting legislation include wholesale pork. The law took effect in January 2013. Since that time, packers have been subject to mandatory wholesale pork reporting (https://www.congress.gov/crs-product/R45777) for most parts of the hog sold from packers.

Some components used to compute the cutout hinge on voluntarily reported information. For example, packers do not have a mandate to submit data pertaining to yields, fabrication costs, variety meats and greases, but they generally provide this information to AMS.

Exhibit 2.1.1. Notable Events in LMR and the Broader Pork Industry[3]



[3] Sources: https://www.congress.gov/crs-product/R45777, https://www.ams.usda.gov/rules-regulations/mmr/lmr/background, https://www.congress.gov/bill/116th-congress/house-bill/8337/text, https://www.everycrsreport.com/reports/R48517.html#_Toc196813364, https://www.congress.gov/bill/119th-congress/house-bill/1968/text

Traditionally, mandatory reporting legislation undergoes reauthorization about every five years. In cases when policymaking delays prevent a full reauthorization, Congress has often opted for extending previously approved legislation. Most recently, the Full-Year Continuing Appropriations and Extensions Act, 2025 extended the price reporting mandate through September 2025 (https://www.everycrsreport.com/reports/R48517.html#_Toc196813364).

Federally inspected packers that process at least 100,000 barrows and gilts annually or at least 200,000 sows and boars annually must submit qualified transactions to USDA AMS. On weekdays, packers submit this information two times a day — an hour before USDA AMS releases a morning and afternoon report. In addition to the daily reports, USDA AMS also provides weekly summary reports.

2.2 Changes in Industry Practices

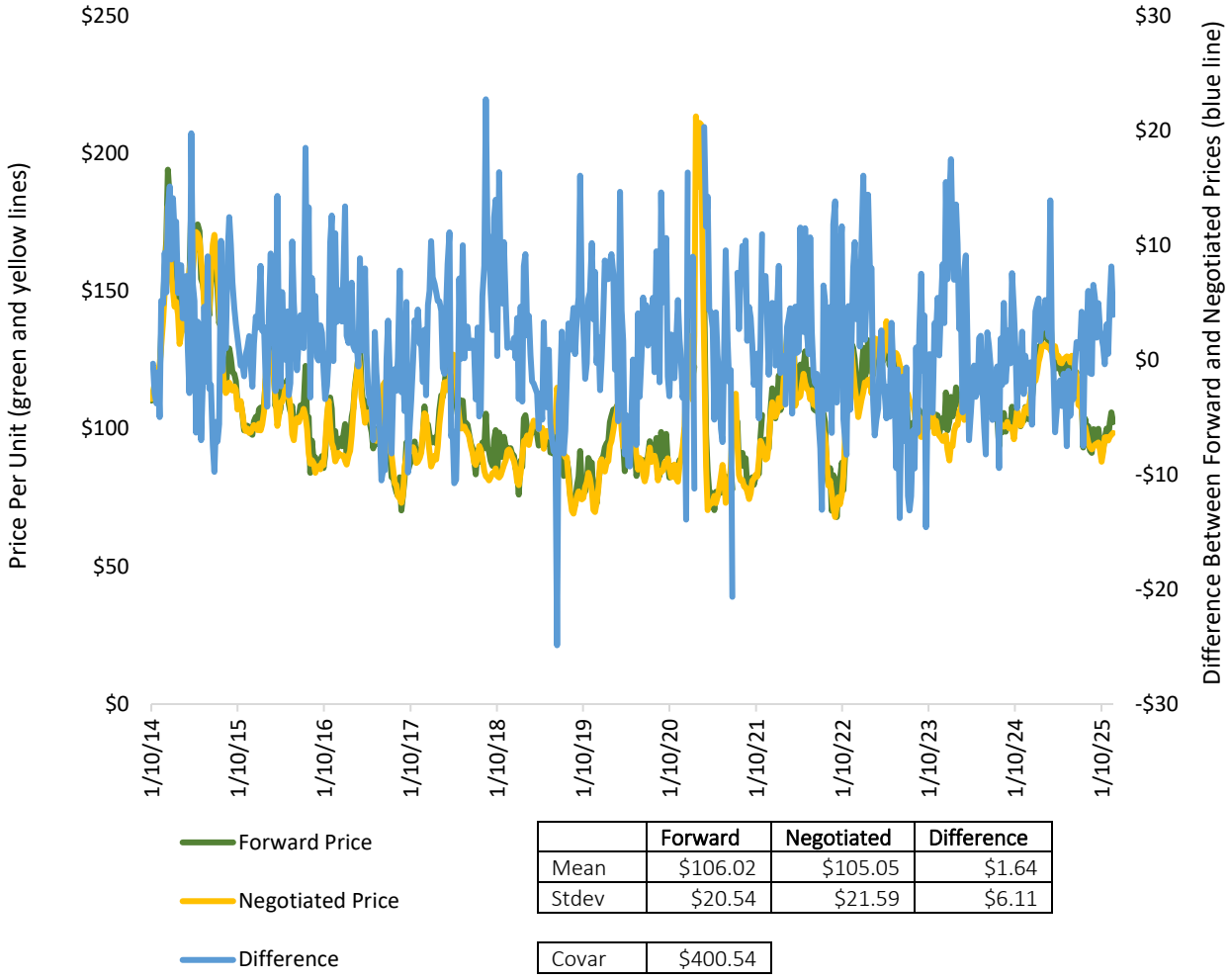
LMR has evolved as the swine and pork industry has experienced its own change. In addition to noting LMR's progression, Exhibit 2.1.1 shares multiple key performance indicators (i.e., negotiated volumes, industry size, exports) for the pork industry at critical intervals — recent years that have included LMR reauthorizations or extensions. The following discussion details more about how these and other variables reflect a changing pork industry.

2.2.1 Wholesale Pork Marketing Methods

Negotiated transactions refer to cash or spot transactions, whereas forward contracts set the price for livestock based on a publicly reported price (https://www.congress.gov/crs-product/R45777). The following charts, using data appearing in LM_PK630 and LM_PK610 reports, describe differences between FOB plant negotiated and forward prices for six pork subprimals. For four of the six subprimals, the forward price average exceeded the negotiated price. Price differentials may reflect product or other differences beyond sole differences in marketing methods employed.

For the vacuum-packaged quarter-trimmed loin, Exhibit 2.2.1.1 compares forward and negotiated prices recorded between Jan. 10, 2014, and Feb. 28, 2025. Throughout this period, forward prices slightly bested negotiated prices. The difference averaged $1.64 (<2%) while the standard deviation of the price difference was $6.11.

Exhibit 2.2.1.1. 1/4 Trimmed Loin VAC Forward versus Negotiated Price Difference, 2014-25
(Source: USDA AMS)

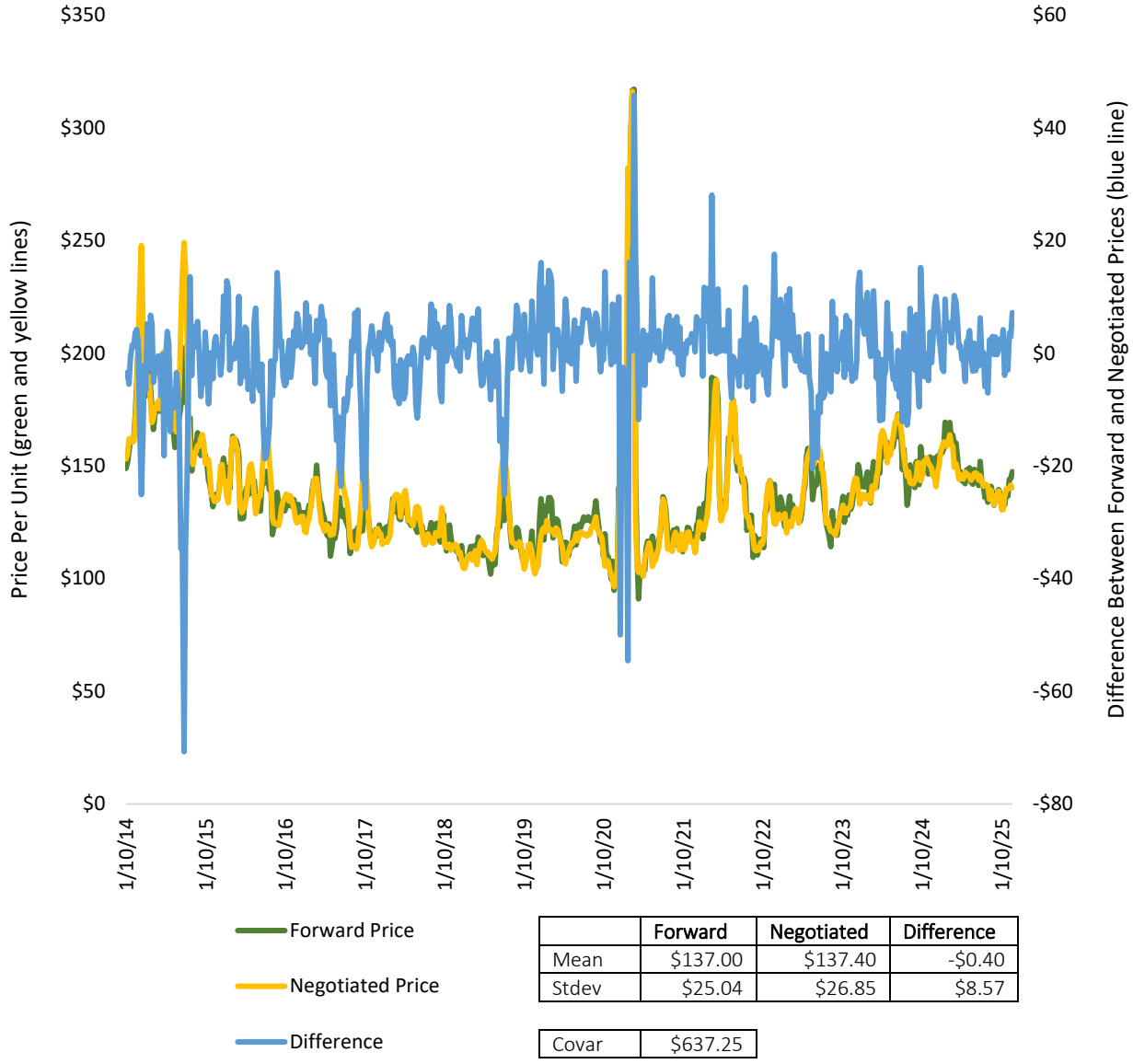


	Forward	Negotiated	Difference
Mean	$106.02	$105.05	$1.64
Stdev	$20.54	$21.59	$6.11

Covar	$400.54

Another loin subprimal, the boneless CC strap-on averaged slightly greater negotiated prices than forward prices from January 2014 to February 2025. See Exhibit 2.2.1.2. The difference was an average $0.40 (<1%). The $8.57 standard deviation for the price difference suggests slightly greater variability in forward and negotiated prices for the boneless CC strap-on subprimal compared with the vacuum-packaged quarter-trimmed loin. Among the six subprimals included in this forward-versus-negotiated price analysis, the boneless CC strap-on loin had the greatest standard deviation for the forward and negotiated price difference, which suggests higher variability.

Exhibit 2.2.1.2. Boneless CC Strap-On Loin Forward versus Negotiated Price Difference, 2014-25 *(Source: USDA AMS)*

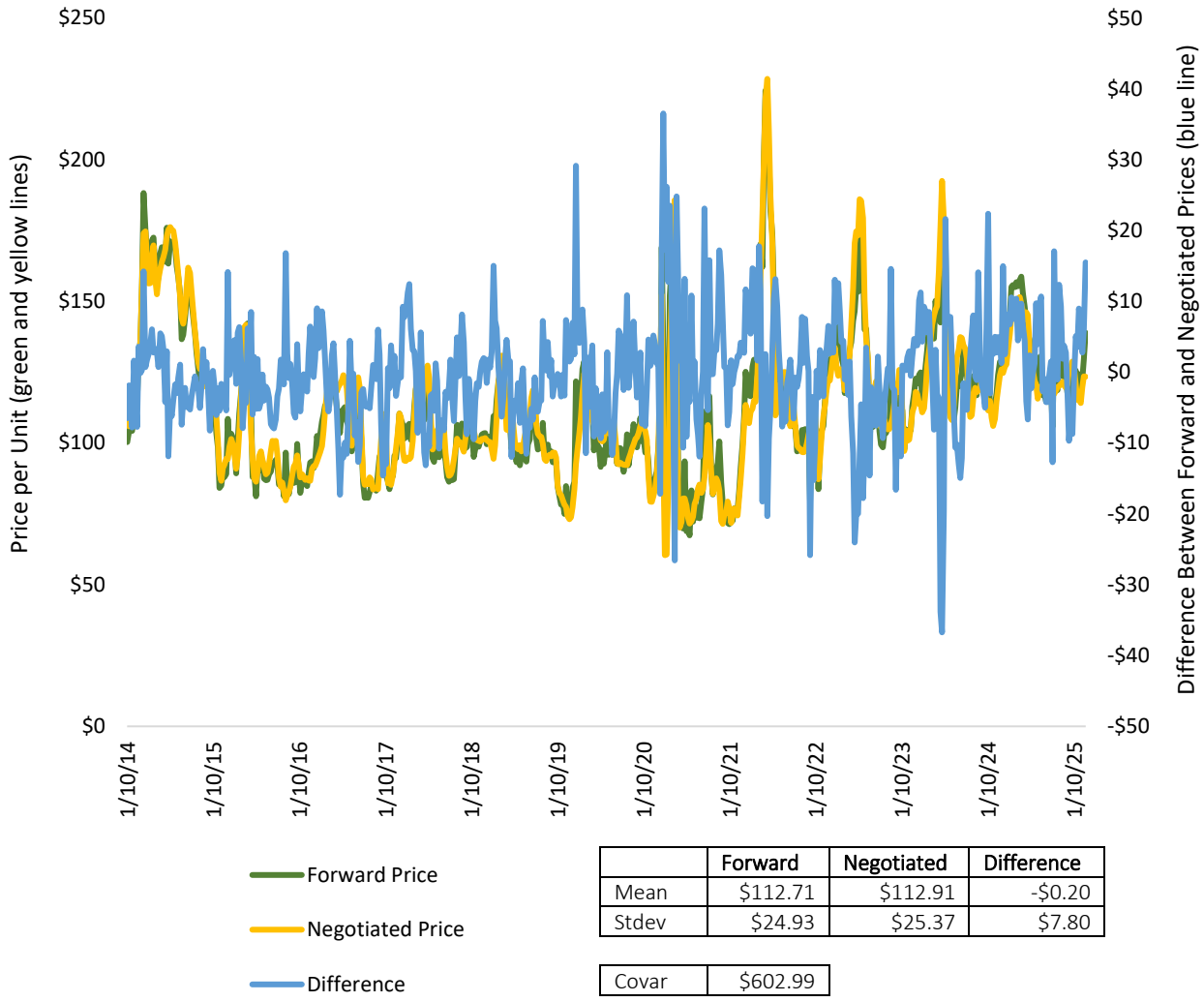


	Forward	Negotiated	Difference
Mean	$137.00	$137.40	-$0.40
Stdev	$25.04	$26.85	$8.57

Covar	$637.25

The vacuum-packaged quarter-trimmed butt represents one of the pork butt subprimals with yields considered in the pork cutout. From January 2014 to February 2025, the forward price for this subprimal averaged $112.71. The negotiated price averaged $112.91 — $0.20 more than the forward price. Exhibit 2.2.1.3 shows the price difference trend between 2014 and 2025.

Exhibit 2.2.1.3. 1/4 Trim Butt VAC Forward versus Negotiated Price Difference, 2014-25
(Source: USDA AMS)

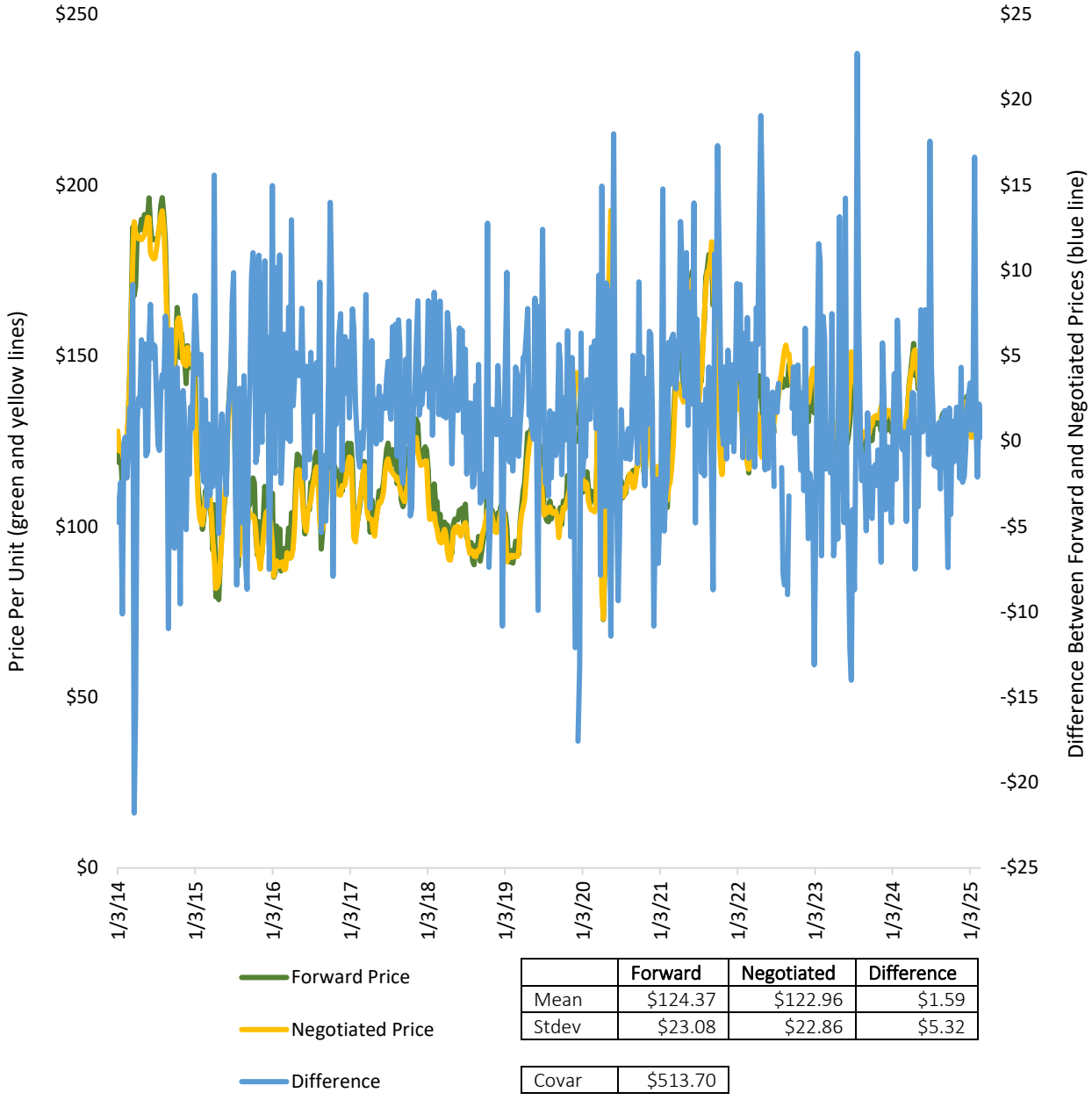


	Forward	Negotiated	Difference
Mean	$112.71	$112.91	-$0.20
Stdev	$24.93	$25.37	$7.80

Covar	$602.99

Derived from a pig's shoulder area, vacuum-packaged picnic cushion meat had a $124.37 forward price average from January 2014 to February 2025. Negotiated product was less valuable during this period by $1.59 per unit on average (Exhibit 2.2.1.4).

Exhibit 2.2.1.4. Picnic Cushion Meat VAC Forward versus Negotiated Price Difference, 2014-25 *(Source: USDA AMS)*

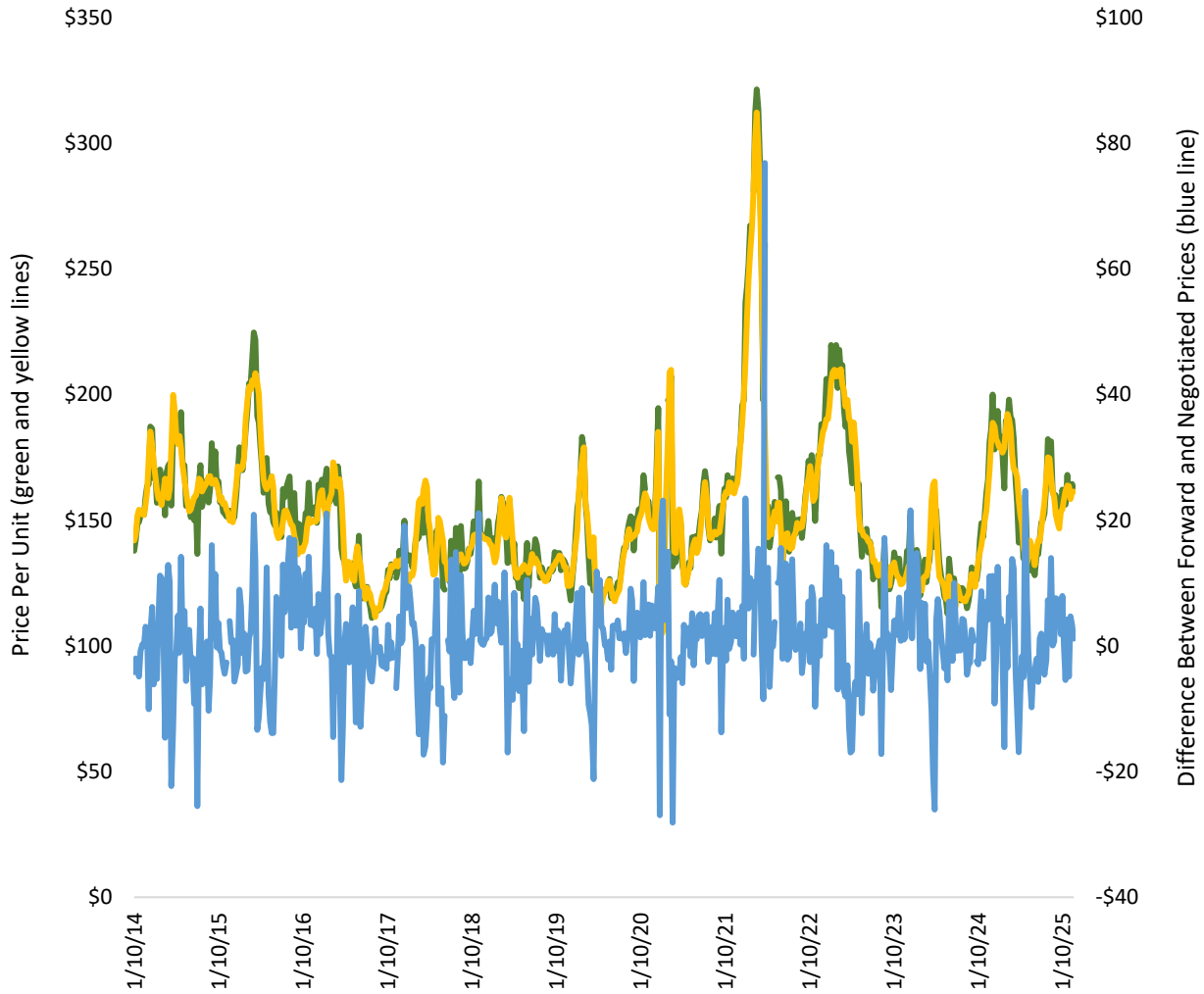


	Forward	Negotiated	Difference
Mean	$124.37	$122.96	$1.59
Stdev	$23.08	$22.86	$5.32

Covar	$513.70

Exhibit 2.2.1.5 charts the trend in forward and negotiated trimmed spareribs – MED prices from January 2014 to February 2025. On average, forward prices were greater than negotiated prices. The difference averaged $1.05.

Exhibit 2.2.1.5. Trimmed Spareribs - MED Forward versus Negotiated Price Difference, 2014-25 *(Source: USDA AMS)*

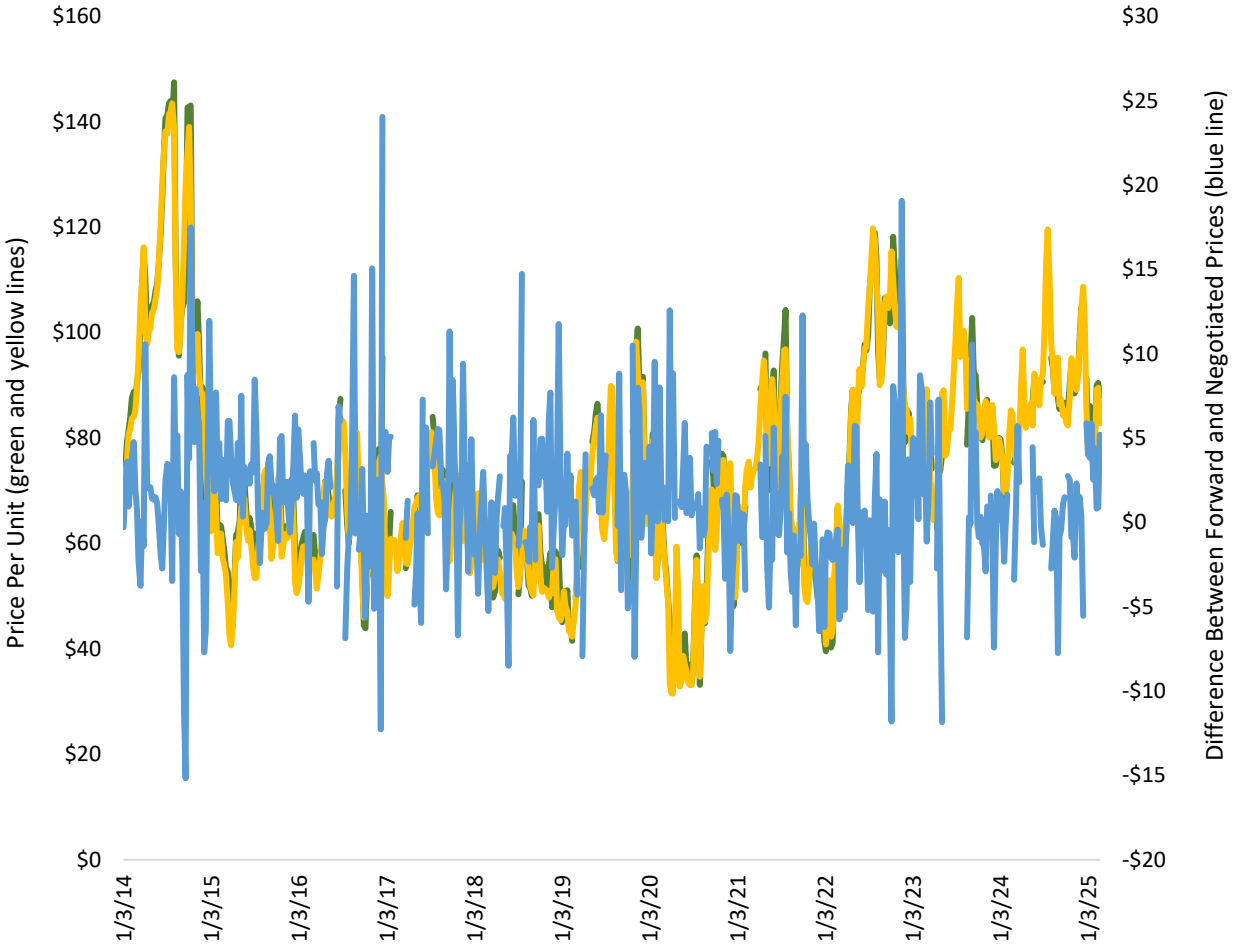


	Forward	Negotiated	Difference
Mean	$152.05	$151.09	$1.05
Stdev	$28.36	$27.05	$8.23

Covar	$727.35

In the pork cutout, the ham primal represents nearly a quarter of the composite cutout volume (the relative value contribution varies over time). Exhibit 2.2.1.6 tracks the forward and negotiated price trends for one ham subprimal, the 23- to 27-pound trimmed selected ham. Forward prices averaged $1.25 per unit greater values than the negotiated prices.

Exhibit 2.2.1.6. 23-27# Trimmed Selected Ham Forward versus Negotiated Price Difference, 2014-25 *(Source: USDA AMS)*



	Forward	Negotiated	Difference
Mean	$73.45	$72.78	$1.25
Stdev	$20.48	$19.88	$4.29

Covar	$407.26

In general, the findings from this subset of subprimals are consistent with what we expect from the difference between forward and negotiated prices. Packers assume input supply risk when entering in forward sales and, therefore, receive a risk premium over negotiated sales.

2.2.2 Confidence in Daily Negotiated Trade Prices Over Time

Pork cut contracts typically use some form of USDA AMS-reported wholesale pork cut negotiated price as a base price. Therefore, in order to conduct effective commerce, the buyer and seller must have confidence in USDA AMS-reported negotiated cut prices. We analyzed the confidence in price discovery over time using a statistical derivation of a minimum volume (loads) necessary for prices to fall within a specific range with 90% confidence.

Exhibit 2.2.2.1 summarizes the findings for five cuts each evaluated during 2014, 2017, 2021, and 2024. Data from 2021 were chosen because the year fell during the pandemic. Price ranges of +/- $0.50, +/- $1.00, and +/- $2.50 were analyzed in columns 6, 7, and 8, respectively. Data in these columns represent the minimum number of loads necessary to expect with 90% confidence the actual price range during a given day will be within the expected ranges specified. Values in columns 6, 7, or 8 that are lower than values in column 3, which are the actual average daily loads traded, signify sufficient trade to meet accuracy expectations. Values in columns 6, 7, or 8 that are higher than values in column (3) signify insufficient trade to meet accuracy expectations.

For example, the derind belly 13-17# price in 2024 to trade +/- $0.50 with 90% confidence requires a minimum of 7.55 loads daily. This compares to the average of 11.41 loads per day (column 3) observed during 2024.

For three of the five cuts, confidence in accurate price discovery is high. For derind belly 13-17#, confidence is moderate. Price confidence is improving over time for this cut. For jowl - skinned combo, confidence is low. Generally, the data show consistent accuracy over time and indicate the negotiated trade is not devolving over time. Finding that cut-level confidence generally remains consistent or improves over time is important for continued efficient commerce, significant supply chain disruptions such as COVID-19.

This analysis was conducted using daily data. A parallel assessment could be done with weekly data, which would perhaps be less impacted by inner-week variations, as some commerce sufficiently aligns with weekly USDA AMS reporting frequency.

Exhibit 2.2.2.1. PK602 Report Price Confidence in Negotiated Trade for Select Cuts Over Time *(Source: USDA AMS)*

					Loads/day for accurate price discovery at 90% confidence and stated spread below		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cut	Year	Mean daily actual loads traded	Mean Price ($/cwt)	Price variance (first differenced prices)	+/- $0.50	+/- $1.00	+/- $2.50
Derind Belly 13-17#	2014	5.97	$159.43	$69.72	6.97	1.74	0.28
	2017	7.98	$172.48	$36.38	3.64	0.91	0.15
	2021	5.41	$203.84	$105.61	10.56	2.64	0.42
	2024	11.41	$156.48	$75.46	7.55	1.89	0.30
Jowl-Skinned Combo	2014	1.07	$66.42	$86.57	8.66	2.16	0.35
	2017	0.52	$50.72	$108.56	10.86	2.71	0.43
	2021	0.83	$94.98	$439.21	43.92	10.98	1.76
	2024	2.02	$84.60	$330.00	33.00	8.25	1.32
23-27# Trmd Selected Ham	2014	15.53	$104.24	$10.50	1.05	0.26	0.04
	2017	15.21	$64.68	$2.73	0.27	0.07	0.01
	2021	32.90	$70.65	$5.25	0.53	0.13	0.02
	2024	29.36	$89.04	$4.78	0.48	0.12	0.02
Picnic Cushion Meat Vac	2014	8.03	$161.85	$12.49	1.25	0.31	0.05
	2017	9.77	$110.57	$6.00	0.60	0.15	0.02
	2021	8.31	$141.02	$15.10	1.51	0.38	0.06
	2024	8.47	$132.35	$7.22	0.72	0.18	0.03
1/4 Trim Butt VAC	2014	26.72	$146.50	$4.26	0.43	0.11	0.02
	2017	23.84	$102.76	$4.40	0.44	0.11	0.02
	2021	25.12	$118.93	$20.73	2.07	0.52	0.08
	2024	20.87	$126.38	$7.52	0.75	0.19	0.03

Note: Dates with no reported trade were excluded to minimize price variance. Jowl-skinned combo had more than 33% of daily observations without trade. Therefore, price variation observed for jowl-skinned combo is large partially due to large temporal gaps between reported trade. The statistical formula known as Chebyshev's inequality is used to arrive at volume thresholds in columns (6) – (8).

2.2.3 Wholesale Product Evolution

As products have evolved, USDA AMS has adjusted its data reporting. By primal, Exhibit 2.2.3.1 notes the wholesale price data series the agency added or discontinued since the 2013 law took effect and required qualified pork packers to submit qualified wholesale pork sales information to the USDA AMS. The agency reports wholesale pork volume data in loads for the same data series — with the exceptions noted by asterisks. This observation reflects AMS adjusting to industry practices.

Missing from this list are several products not reflected by the cutout. They include portion-control cuts; cuts with flavorings other than those normally added; and pork products that have been cured, smoked, cooked, or tray-packed (https://www.youtube.com/watch?v=klV6h0XknIg).

Exhibit 2.2.3.1. Changes in Wholesale Pork Price Data Series Reporting by USDA AMS
(Source: USDA)

Status	Primal	Product	Year
Discontinued	Belly	Skin-on Belly 8-10# Boxed, wholesale price	2019
Discontinued	Belly	Skin On Belly 16-18# Boxed, wholesale price	2019
Discontinued	Belly	Skin-on Belly 20-25#, wholesale price	2022
Discontinued	Belly	Skin on Belly 16-18# Boxed, FZN, wholesale price	2024
Discontinued	Butt	1/4 Trim Butt Paper, FZN, wholesale price	2014
Discontinued	Butt	1/8 Trim Butt Paper, FZN, wholesale price	2018
Discontinued	Butt	1/8 Trim Butt 1 Pc VAC, FZN, wholesale price	2023
Discontinued	Ham	27 & up Bone In Hams Combo, wholesale price	2015
Discontinued	Ham	5 Muscle Ham to Blue Boxed, wholesale price*	2015
Discontinued	Ham	2PC Boxed, wholesale price	2015
Discontinued	Ham	Collared Ham Boxed, FZN, wholesale price	2018
Discontinued	Ham	5 Muscle Ham to Blue, wholesale price	2018
Discontinued	Ham	4 Muscle Ham to Blue Boxed, wholesale price	2019
Discontinued	Ham	17-20 Ham Boxed, FZN, wholesale price	2020
Discontinued	Ham	Collared Ham Boxed, wholesale price	2020
Discontinued	Ham	Roll Out Hams Rolled & Tied, wholesale price	2020
Discontinued	Ham	3 Muscle Ham to Blue Boxed, wholesale price	2021
Discontinued	Ham	17-20 Boxed Vac Pack, FZN, wholesale price	2022
Discontinued	Ham	20-23 Hams Sknd/Defatted Boxed, wholesale price	2022
Discontinued	Ham	Outsides Boxed, wholesale price	2022
Discontinued	Ham	20-23 Ham Boxed, FZN, wholesale price	2024
Discontinued	Ham	Knuckles Boxed, wholesale price	2024
Discontinued	Jowl	Skin-On Boxed, FZN, wholesale price	2020
Discontinued	Loin	1/8 Trimmed Loin Paper, FZN, wholesale price	2020
Discontinued	Loin	1/4 Trimmed Loin Paper, FZN, wholesale price	2021
Discontinued	Loin	Butt Tender, wholesale price	2021
Discontinued	Loin	Whole Bnls Strap-on, wholesale price	2022
Discontinued	Loin	Butt Tender, FZN, wholesale price	2023
Discontinued	Loin	Tenderloin, 1 pc vac, FZN, wholesale price	2024
Discontinued	Picnic	SS Smoker Trim Picnic Paper/Poly, FZN, wholesale price	2018
Discontinued	Spareribs	BBQ Style Spareribs, Poly, FZN, wholesale price	2016
Discontinued	Spareribs	St Louis Spareribs, COMBO, wholesale price	2020
Discontinued	Spareribs	Trmd Spareribs - MED, Poly, FZN, wholesale price	2022
Discontinued	Spareribs	BBQ Style Spareribs, Combo, wholesale price	2022
Added	Belly	Derind Belly 13-17# boxed, FZN, wholesale price	2014
Added	Belly	Skin On Belly 16-18# Boxed, wholesale price	2017
Added	Belly	Skin on Belly 16-18# Boxed, FZN, wholesale price	2017
Added	Belly	Derind Belly 17-19# Boxed, FZN, wholesale price	2023
Added	Butt	1/8 Trim Butt 1 Pc VAC, FZN, wholesale price	2014
Added	Ham	Collared Ham Boxed, FZN, wholesale price	2014
Added	Ham	5 Muscle Ham to Blue Boxed, wholesale price*	2014
Added	Ham	Insides (RED) Combo, wholesale price	2014
Added	Ham	Outsides (RED) Combo, wholesale price	2014
Added	Ham	Knuckles (RED) Combo, wholesale price	2014
Added	Ham	Lite Butt (RED) Combo, wholesale price	2014

Added	Ham	Inner Shank Boxed, wholesale price	2014
Added	Ham	17-20 Ham Boxed, FZN, wholesale price	2017
Added	Ham	Knuckles Boxed, wholesale price	2017
Added	Ham	Lite Butt Boxed, wholesale price	2018
Added	Jowel	Skin-On Boxed, FZN, wholesale price	2015
Added	Loin	B-In CC, Tender-in, FLON Loin, wholesale price	2014
Added	Loin	B-In CC, Tender-in, FLON Loin, FZN, wholesale price	2014
Added	Loin	Bnls CC Strap-on, 1/2 cut, wholesale price	2014
Added	Loin	Bnls CC Strap-on, 1/2 cut, FZN, wholesale price	2014
Added	Loin	Bnls CC Strap-off, 1/2 cut, wholesale price	2014
Added	Loin	Bnls CC Strap-off, 1/2 cut, FZN, wholesale price	2014
Added	Loin	Whole Bnls Strap-on, wholesale price	2014
Added	Loin	Boneless Sirloin, Combo, wholesale price	2014
Added	Loin	1/4 Trimmed Loin Paper, FZN, wholesale price	2020
Added	Picnic	SS Smoker Trim Picnic Paper/Poly, FZN, wholesale price	2015
Added	Spareribs	BBQ Style Spareribs, Poly, FZN, wholesale price	2015

* No volume data reported from 2013 to 2024.

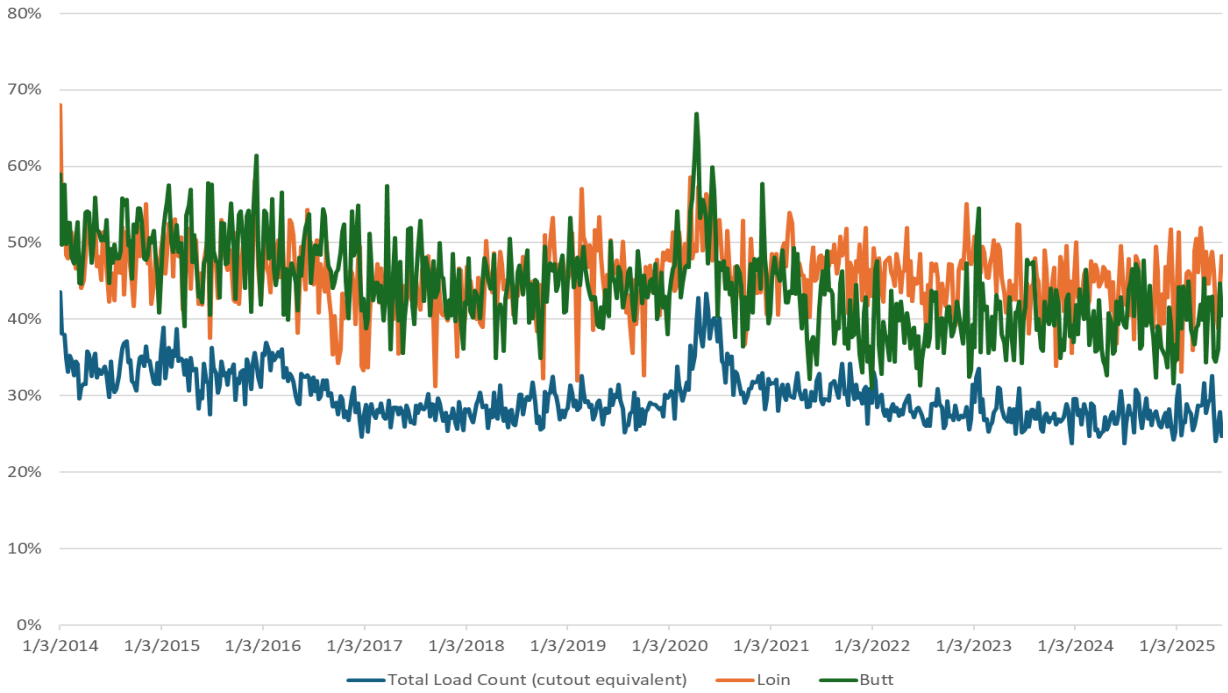
2.2.4 Negotiated Trade and Individual Cut Trade Volume

The extent to which the industry uses negotiated transactions for pork varies by primal and subprimal. Exhibit 2.2.4.1 illustrates that negotiated trade has represented a greater proportion of trade for the picnic and rib primals compared with the ham and belly primals. Still, negotiated trade's share for the picnic and rib primals declined from 2014 to 2025 — from commonly 50% to 70% of trade to 40% to 60%. For the ham and belly primals, negotiated trade has more commonly represented 10% to 30% of trade.

Exhibit 2.2.4.1. % Negotiated Trade for Select Primals, Weekly: Picnic, Rib, Ham and Belly
(Source: USDA AMS)

When comparing negotiated trade used for loin and butt primals, Exhibit 2.2.4.2 shows that the loin primal has been slightly more likely to have negotiated transactions than the butt primal in recent years. Since 2021, roughly 30% to 50% of loin and butt trade has been negotiated transactions.

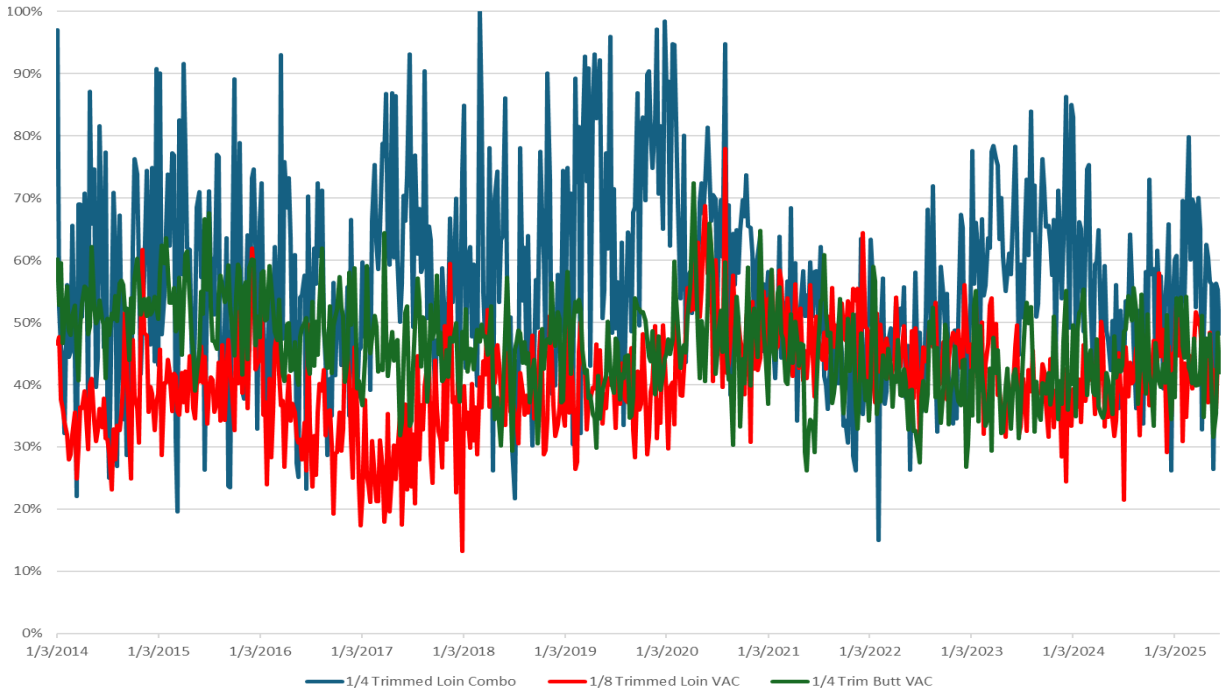
Exhibit 2.2.4.2. % Negotiated Trade for Select Primals, Weekly: Loin and Butt
(Source: USDA AMS)



Of the loin and butt cuts provided in Exhibit 2.2.4.3, ¼" trimmed loin combo has most commonly had negotiated transactions. Before 2021, negotiated transactions represented more than 90% of this cut's trade in some weeks. In more recent years, negotiated transactions for the ¼" trimmed loin combo have been less common.

In contrast, eighth-trimmed loin VAC transactions before 2021 less commonly used negotiated trade compared with 2021 to present. In recent years, the extent of negotiated transactions for the ¼" trimmed butt VAC cut have been similar to that for the 1/8" trimmed loin VAC.

Exhibit 2.2.4.3. % Negotiated Trade for Select Wholesale Subprimals, Weekly: Loin and Butt Cuts *(Source: USDA AMS)*



Trade for the two picnic cuts tracked in Exhibit 2.2.4.4 — the SS smoker trim picnic VAC and picnic cushion meat VAC — has more commonly had negotiated transactions than the ¼" trimmed boneless butt VAC cut also shown in the chart.

Exhibit 2.2.4.4. % Negotiated Trade for Select Wholesale Subprimals, Weekly: Butt and Picnic Cuts *(Source: USDA AMS)*

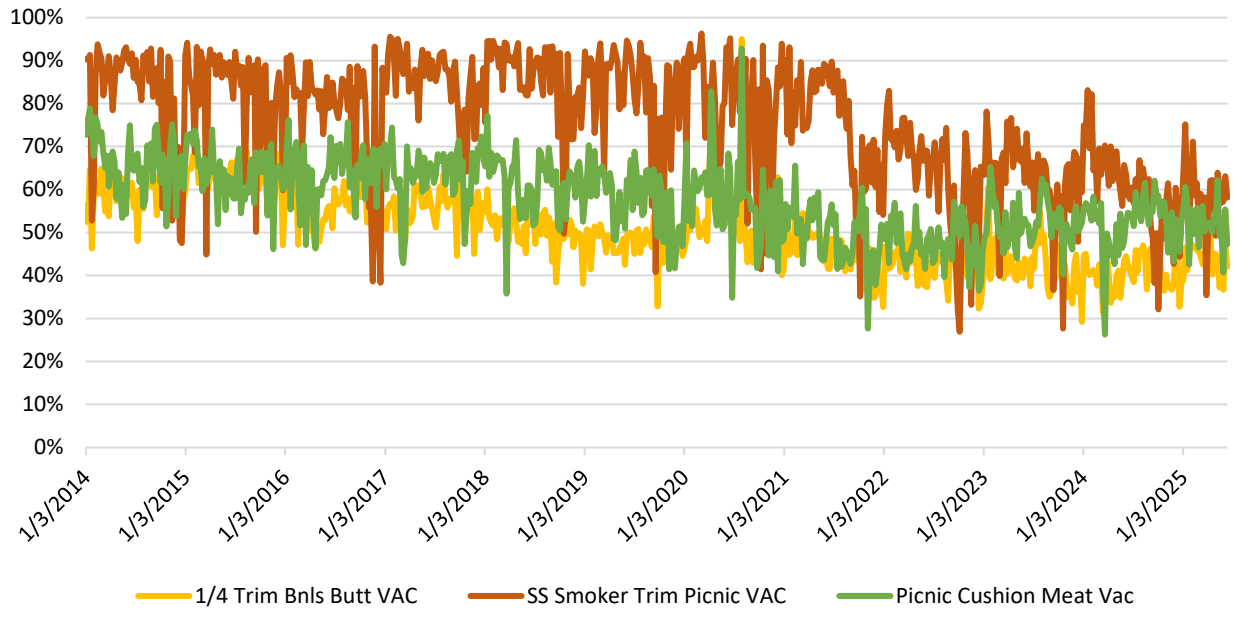
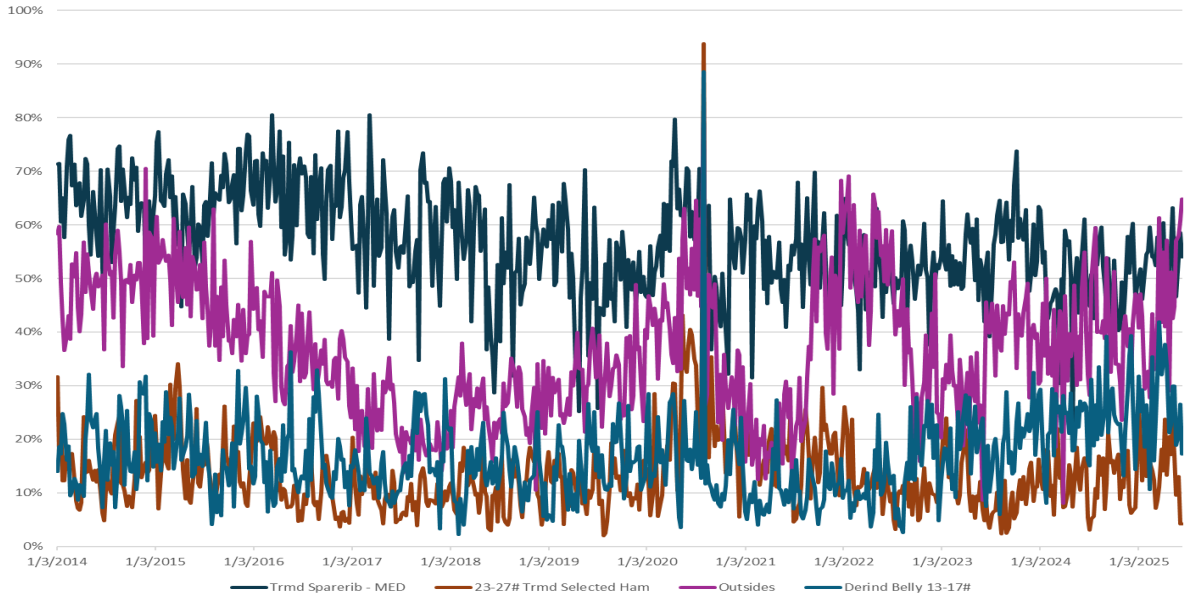


Exhibit 2.2.4.5 shows changes in the negotiated share of trade for several spareribs, ham and belly cuts. The trimmed spareribs – medium and outsides cut, which is part of the ham primal, were more often transacted on a negotiated basis than the 23- to 27-pound trimmed selected ham or 13- to 17-pound derind belly.

Exhibit 2.2.4.5. % Negotiated Trade for Select Wholesale Subprimals, Weekly: Spareribs, Ham and Belly Cuts *(Source: USDA AMS)*



2.2.5 Illustrative Deep Dive – Case of Wholesale Loin Category

The loin is a primal regularly reported by USDA AMS and historically has had elevated market interest. Here, we demonstrate example market insights enabled from USDA AMS-reported data. Although loin serves as an example, similar and deeper exercises are likewise feasible.

Using loin data reported by AMS in LM_PK602 (National Daily Pork Report FOB Plant – Negotiated Sales – Afternoon) from January 2013 to March 2025, one can download a data file containing 130,939 "observations." Here, some "observations" are blanks to reflect no reported trade by USDA AMS on a given day. Note, the "observation" counts are higher in 2025 as AMS has added loin product or cut items (i.e., more possible data rows per day) since it began wholesale pork reporting in 2013; see Exhibit 2.2.2.1.

To illustrate some loin-specific insights, consider the 2013 (i.e., mandatory price reporting implementation) versus 2024 (i.e., most recent, complete calendar year) periods, which Exhibit 2.2.5.1 summarizes. The number of possible reported transactions ("observations") totaled 8,400 in 2013 versus 10,965 in 2024. This increase reflects more possible loin product or cut items consistent with industry evolution.[4] 2013 had 46% prevalence of no reported trade (i.e., a blank entry reflecting either no trade occurring or print suppression due to confidentiality) versus 58%

[4] Pork production in 2023 totaled 23.39 billion pounds, and it reached 27.85 billion pounds in 2024.This is a 19.3% increase. The increase in number of records read was 30.5%.

in 2024. The increase in no reported trade prevalence likely reflects combined impacts of sparse actual trade (i.e., recalling more products tracked in 2024) and elevated frequency of hitting confidentiality thresholds. This trend itself motivates periodic price reporting reviews such as the review provided by this study.

Exhibit 2.2.5.1. Hedonic Modeling Analysis of Wholesale Loin Category, 2013 versus 2024 (Base Product for Comparison is ¼" Trimmed Loin VAC)

Year	**2013**			**2024**		
Number of Observations Read	8,400			10,965		
Number of Observations Used	4,513			4,604		
Number of Observations with Missing Values	3,887			6,361		
Adjusted R-Square	0.969			0.9283		
RMSE	10.31			12.14		
Dependent Variable Mean	154.80			149.50		
Variable	*Parameter Estimate*	*Standard Error*	*P-Value*	*Parameter Estimate*	*Standard Error*	*P-Value*
Intercept	113.5761	1.0097	<.0001	103.5904	1.1001	<.0001
Pounds	-0.00000364	0.0000	0.0008	-0.00000855	0.0000	<.0001
FEB	2.0717	0.7867	0.0085	5.7528	0.8788	<.0001
MAR	2.1376	0.7642	0.0052	13.6112	0.8861	<.0001
APR	-0.8381	0.7562	0.2678	21.1535	0.8711	<.0001
MAY	10.4939	0.7560	<.0001	28.0233	0.8766	<.0001
JUN	21.3424	0.7832	<.0001	25.0725	0.8878	<.0001
JUL	13.8518	0.7639	<.0001	18.5806	0.8595	<.0001
AUG	8.8431	0.7546	<.0001	14.8585	0.8588	<.0001
SEP	5.3013	0.7754	<.0001	15.5431	0.8694	<.0001
OCT	3.1055	0.9137	0.0007	12.5151	0.8510	<.0001
NOV	-1.2589	0.7861	0.1093	8.0120	0.8764	<.0001
DEC	-3.8681	0.7752	<.0001	6.5223	0.8804	<.0001
1_4_Trimmed_Loin_VAC__FZN	-7.0620	1.4522	<.0001	-7.8784	2.3641	0.0009
1_4_Trimmed_Loin_Paper	41.0821	10.3524	<.0001	-7.8046	12.1865	0.5219
1_4_Trimmed_Loin_Paper__FZN	*omitted*			*omitted*		
1_4_Trimmed_Loin_Combo	-11.3545	1.0135	<.0001	-9.5189	1.1021	<.0001
1_8_Trimmed_Loin_VAC	6.5299	0.9470	<.0001	6.4646	1.0822	<.0001
1_8_Trimmed_Loin_VAC__FZN	-9.3416	2.0789	<.0001	-7.9184	2.3354	0.0007
1_8_Trimmed_Loin_Paper	14.8725	1.0433	<.0001	20.6977	1.2828	<.0001
1_8_Trimmed_Loin_Paper__FZN	0.9234	3.7394	0.805	*omitted*		
1_8_Trimmed_Loin_Combo	1.6236	1.4077	0.2488	-8.9238	4.1442	0.0313
BIcc_TendIn_Loin_VAC	54.9734	0.9952	<.0001	42.0200	1.1526	<.0001
BIcc_TendIn_Loin_VACfzn	24.3986	7.3421	0.0009	7.0082	4.6864	0.1349
BIcc_TendIn_Loin_Combo	28.6816	2.2408	<.0001	37.4123	4.3888	<.0001
BIcc_TendIn_FLON	*omitted*			34.5634	1.1511	<.0001
BIcc_TendIn_FLONfzn	*omitted*			19.8224	3.6309	<.0001
Bnls_CC_Strap_on	39.5810	0.9526	<.0001	33.3852	1.0764	<.0001
Bnls_CC_Strap_on__FZN	29.8440	1.2147	<.0001	16.7773	1.7110	<.0001
Bnls_CC_Strap_off	60.4297	0.9610	<.0001	55.0651	1.0762	<.0001
Bnls_CC_Strap_off__FZN	39.8073	1.3002	<.0001	24.6781	1.7957	<.0001
Bnls_CC_Strap_on_12c	*omitted*			39.9887	1.3886	<.0001

Bnls_CC_Strap_on_12cFZN	*omitted*			9.7751	6.1421	0.1116
Bnls_CC_Strap_off_12c	*omitted*			59.2607	1.7070	<.0001
Bnls_CC_Strap_off_12cFZN	*omitted*			20.9152	4.6867	<.0001
Whole_Bnls_Strap_on	*omitted*			*omitted*		
Boneless_Sirloin	4.4434	0.9569	<.0001	13.3892	1.1085	<.0001
Boneless_Sirloin__FZN	-6.7937	1.1777	<.0001	5.4630	2.0629	0.0081
Boneless_Sirloin__Combo	*omitted*			12.3926	1.3421	<.0001
Bone_in_Sirloin	-34.3069	0.9528	<.0001	-26.5483	1.1314	<.0001
Bone_in_Sirloin__FZN	-43.7016	1.7833	<.0001	-38.4363	1.8975	<.0001
Blade_Ends	-35.5045	1.0348	<.0001	-23.8001	1.2560	<.0001
Blade_Ends__FZN	-47.6611	2.3920	<.0001	-27.2127	2.6418	<.0001
Tenderloin	133.4839	0.9963	<.0001	56.7049	1.1455	<.0001
Tenderloin__FZN	102.2582	1.3492	<.0001	35.1157	2.6418	<.0001
Tenderloin__1_pc_vac	161.5000	1.3148	<.0001	75.3649	2.1173	<.0001
Tenderloin__1_pc_vac__FZN	*omitted*			*omitted*		
Butt_Tender	57.9735	1.9066	<.0001	*omitted*		
Butt_Tender__FZN	23.2238	4.2912	<.0001	*omitted*		
Backribs_2up	100.9588	0.9807	<.0001	111.1461	1.1135	<.0001
Backribs_2upFZN	94.9191	1.1672	<.0001	105.0433	1.5404	<.0001
Backribs_2up_1pcVAC	119.7531	1.0123	<.0001	108.6475	1.1427	<.0001
Backribs_2up_1pcVACfzn	110.4613	1.0855	<.0001	111.7780	1.2415	<.0001
Riblets	-48.6588	6.0120	<.0001	-6.3818	2.7534	0.0205
Riblets__FZN	-40.2930	1.0561	<.0001	-12.7270	1.6269	<.0001

Among data available for AMS-reported loin transactions (4,513 cases in 2013 and 4,604 cases in 2024), simple hedonic regression models can easily be estimated to document price differentials across reported loin products or cuts. Here, we run models separately for 2013 and 2024 and include controls for monthly seasonality and reported volume to derive simple average premium-discount estimates. Exhibit 2.2.4.1 summarizes model results where we specify the ¼" trimmed loin VAC product as the base item of comparison.

Applying our hedonic modeling approach in 2013 (n=4,513; RMSE=$10.31) estimates an average discount of $7.06 for ¼" trimmed loin VAC frozen product and an average premium of $6.53 for the 1/8” trimmed loin VAC product. In turn, this suggests the 2013 market valued fresh product (within the ¼" trimmed sector) by $7.06 more than frozen and valued more finely trimmed product by $6.53 more. As another example, tenderloin sold on average for $133.48 more than ¼" trimmed loin VAC in 2013. Further, frozen tenderloin sold at a discount averaging $31.23 to fresh tenderloin ($102.26 versus $133.48).

Extending this hedonic analysis to 2024 reported transactions (n=4,604; RMSE=$12.14) indicates the market valued fresh product (within the ¼" trimmed sector) by $7.88 more than frozen and valued more finely trimmed product by $6.46 more. The rather consistent premium-discount relationships are notable but do not hold in all cases, which motivates periodic assessment. For instance, tenderloin in 2024 sold on average for $56.70 more than ¼" trimmed loin VAC - a much lower differential than in 2013. Further, frozen tenderloin in 2024 sold at a discount averaging $21.59 to fresh tenderloin ($35.12 versus $56.70).

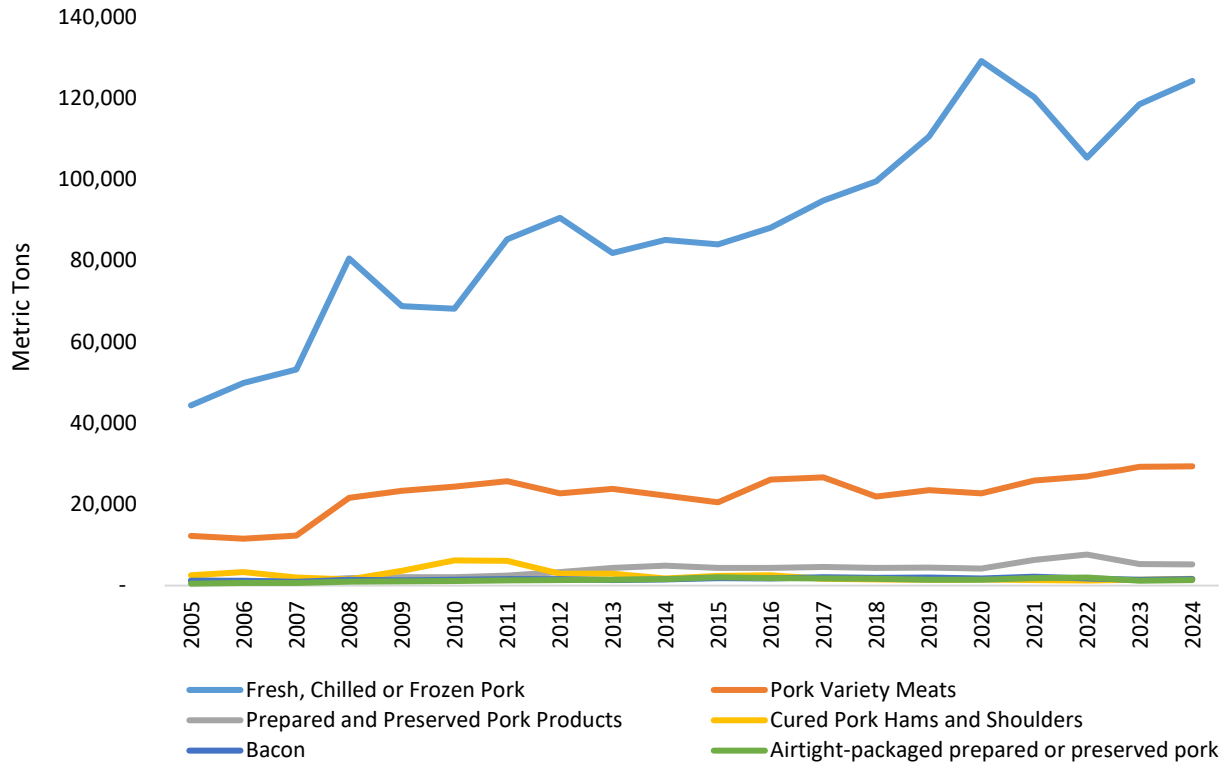
The higher root mean squared error in 2024 than 2013 is not surprising and reflects wider price variation in underlying data — likely consistent with extended loin product differentiation. Further, browsing premiums and discounts across the loin products examined here reveals substantial price differentials, even on average much less within years and across distributional points. This illustrates wide product-level price variation that underpins computed primal and composite cutout valuations. Although this observation is not unique to loin, it is important.

While a multitude of additional hedonic analyses are feasible from AMS-reported information, we include this short example solely to demonstrate market insights enabled to users who elect to take AMS-provided information and dig in deeper.

2.2.6 Pork Export Volumes

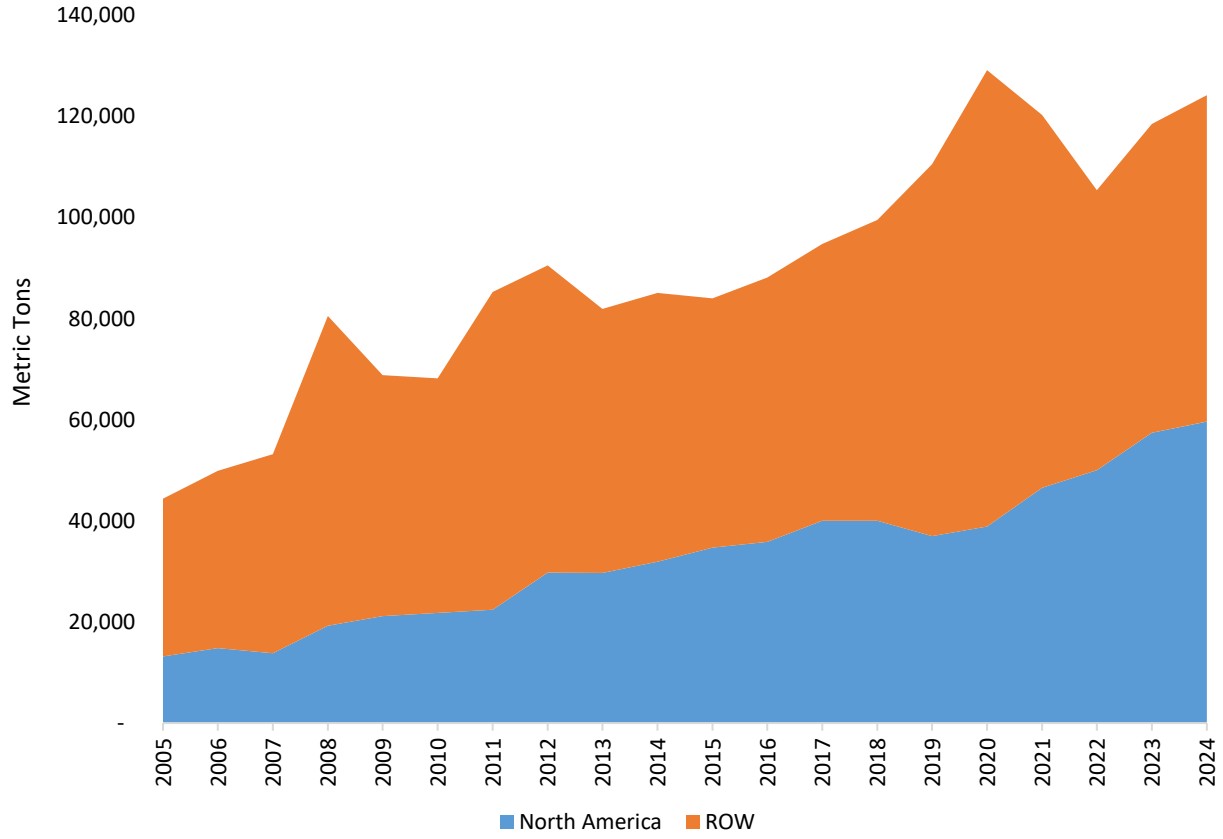
Fresh, chilled and frozen pork — a category that includes carcasses, half carcasses, hams, shoulders and other pork meat — has represented the greatest share of U.S. pork export volume. From 2005 to 2024, Exhibit 2.2.6.1 tracks the trend in pork exports by product category. The next most significant product category for pork exports has been variety meats, though those exports haven't accelerated to the extent observed for fresh, chilled and frozen pork. Prepared and preserved pork products, pork hams and shoulders, bacon and airtight-packaged prepared or preserved pork have been more minor export categories (USDA Foreign Agricultural Service).

Exhibit 2.2.6.1. U.S. Pork Exports *(Source: USDA Foreign Agricultural Service)*



Of total fresh, chilled or frozen pork exported in 2024, 52% reached markets other than those in North America. See Exhibit 2.2.6.2. North American and rest-of-world trade grew for this product category between 2005 and 2024 (USDA Foreign Agricultural Service).

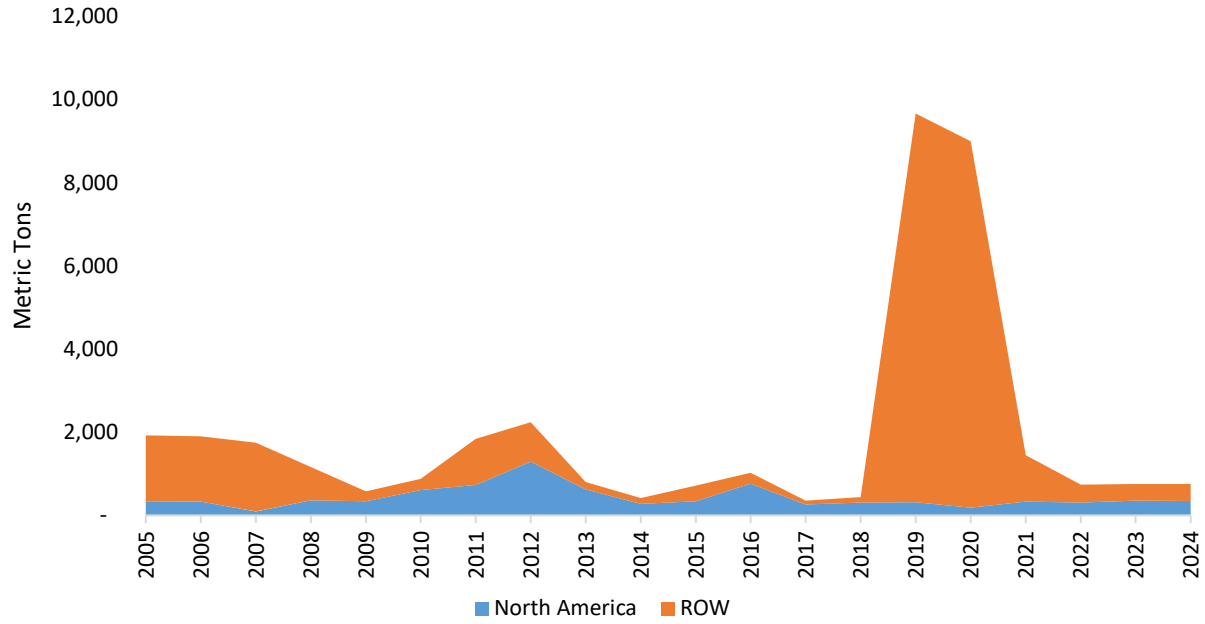
Exhibit 2.2.6.2. Destinations for U.S. Exports of Fresh, Chilled or Frozen Pork
(Source: USDA Foreign Agricultural Service)



With respect to carcass and half-carcasses trade alone, Exhibit 2.2.6.3 presents the trend in these exports from the U.S. to North American countries and the rest of the world. From 2018 to 2021, the rest-of-the-world trade increased significantly.[5] Since then, carcass and half-carcass trade has moderated. The North American share of carcass and half-carcass exports in 2024 was 46% (USDA Foreign Agricultural Service).

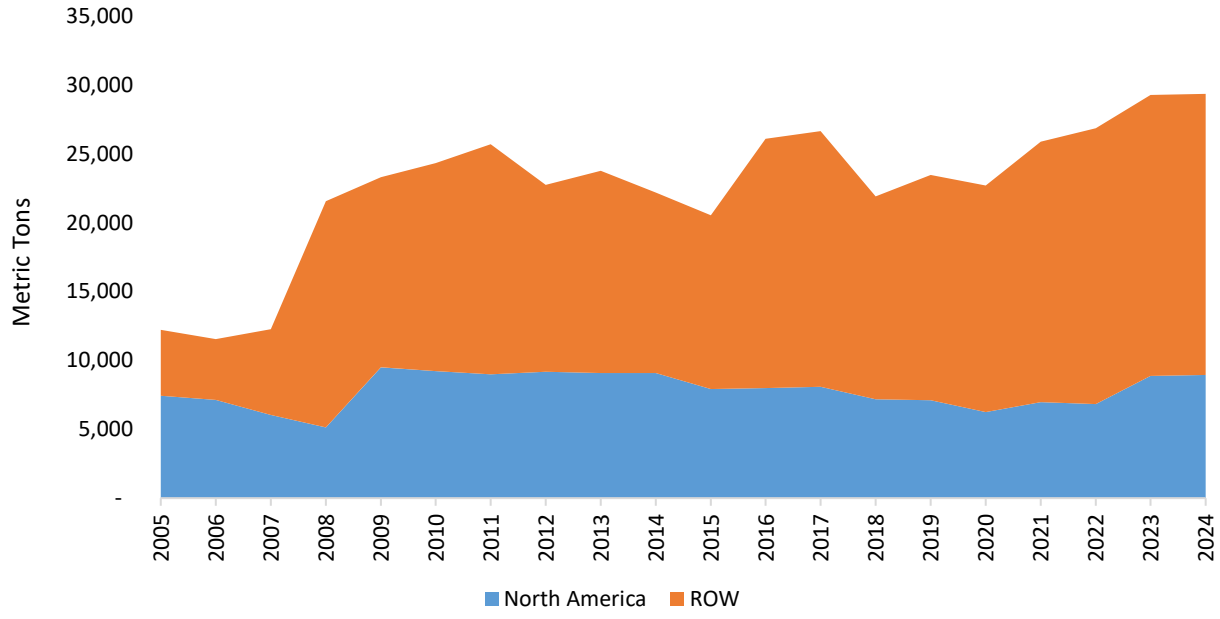
[5] Smithfield reportedly drove the surge by shipping carcasses to China, which had lost a sizable part of its domestic hog herd to the African swine fever (https://www.reuters.com/article/us-china-swinefever-smithfield-foods-foc/at-smithfield-foods-slaughterhouse-china-brings-home-u-s-bacon-idUSKBN1XF0XC/).

Exhibit 2.2.6.3. Destinations for U.S. Exports of Pork Carcasses and Half-Carcasses
(Source: USDA Foreign Agricultural Service)



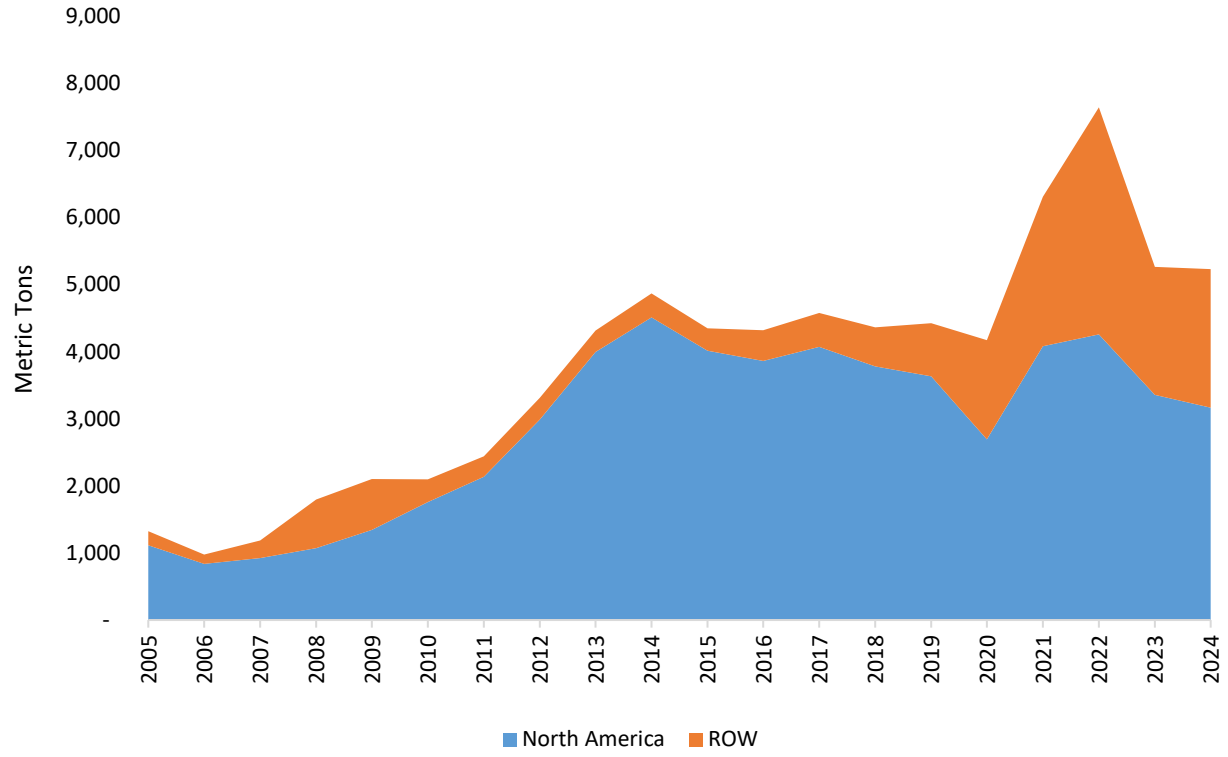
Relative to fresh, chilled and frozen pork, variety meats have more likely found export destinations outside of North America. Exhibit 2.2.6.4 shares that U.S. pork variety meats, including offal, tongues, skins, feet and intestines, jumped between 2007 and 2009. Rest-of-the-world exports drove pork variety meats export growth for the U.S. In 2024, North America represented 30% of U.S. pork variety meats exports (USDA Foreign Agricultural Service).

Exhibit 2.2.6.4. Destinations for U.S. Exports of Pork Variety Meats
(Source: USDA Foreign Agricultural Service)



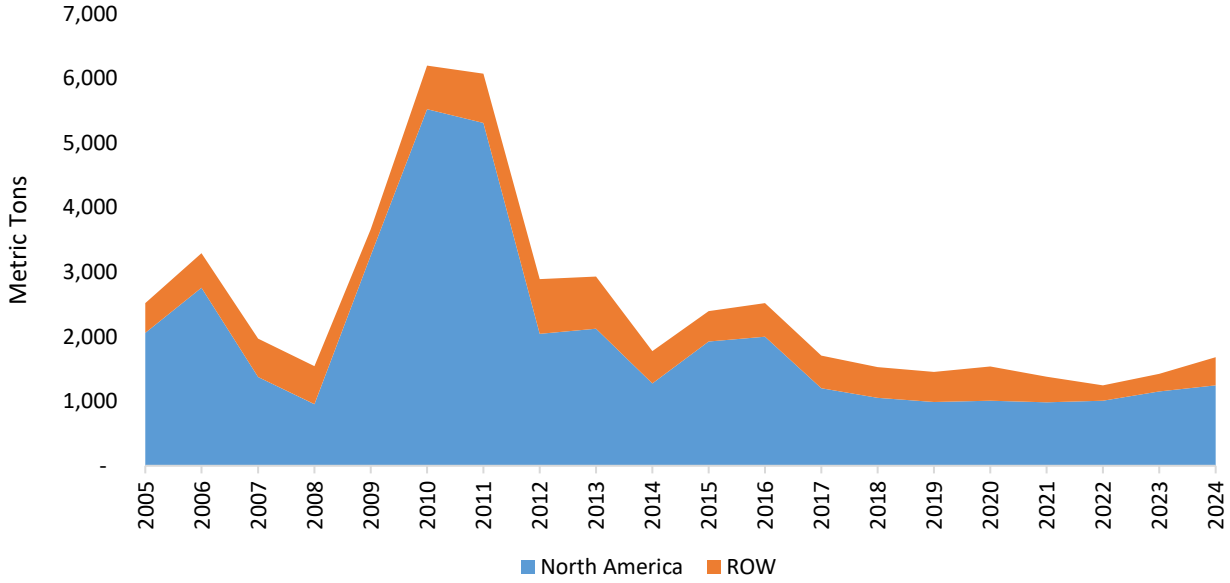
For prepared and preserved pork products, hams and bacon, North America has captured a greater share of U.S. exports than the rest of the world. Prepared and preserved pork product exports from the U.S. did grow between 2005 and 2024. Exhibit 2.2.6.5 shows they peaked in 2022 — largely due to more sales to rest-of-world countries beyond North America. Note, the prepared and preserved category includes meat part of mixtures, ham and shoulder cuts and products that include cereal and vegetable ingredients (USDA Foreign Agricultural Service).

Exhibit 2.2.6.5. Destinations for U.S. Exports of Prepared and Preserved Pork Products
(Source: USDA Foreign Agricultural Service)



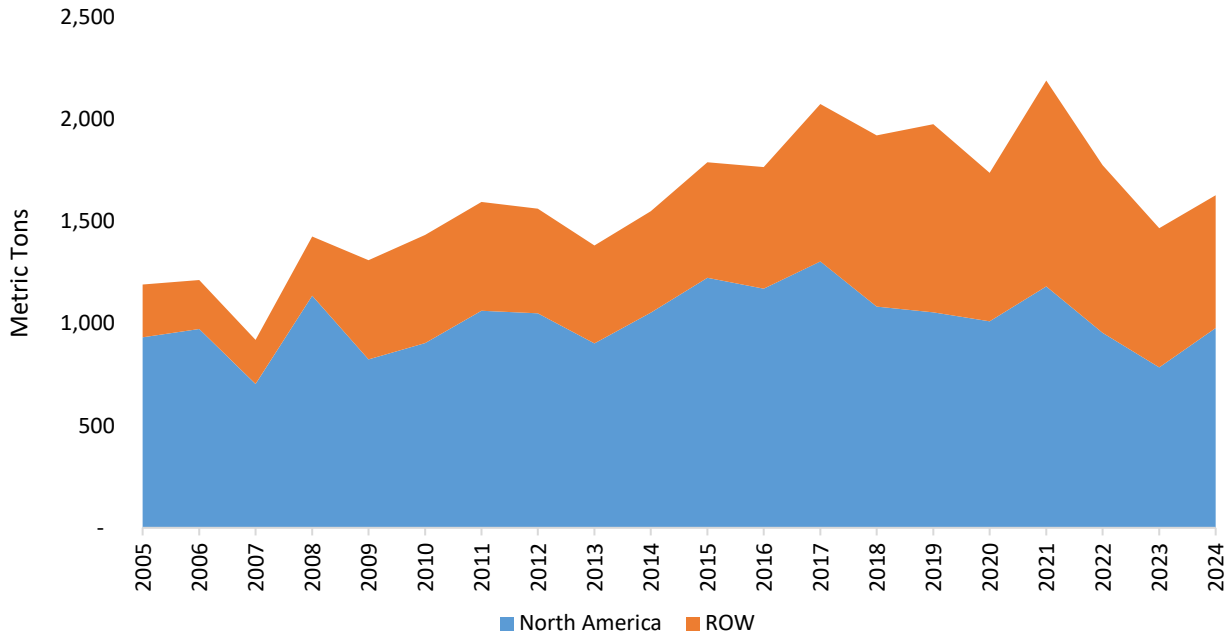
Between 2005 and 2024, ham and cured pork exports from the U.S. peaked earlier during the observation period — the late 2000s and early 2010s. Exhibit 2.2.6.6 shows these exports have held steady levels during the past few years. Most of the hams exported from the U.S. have reached North American markets (USDA Foreign Agricultural Service).

Exhibit 2.2.6.6. Destinations for U.S. Cured Hams/Shoulders Exports
(Source: USDA Foreign Agricultural Service)



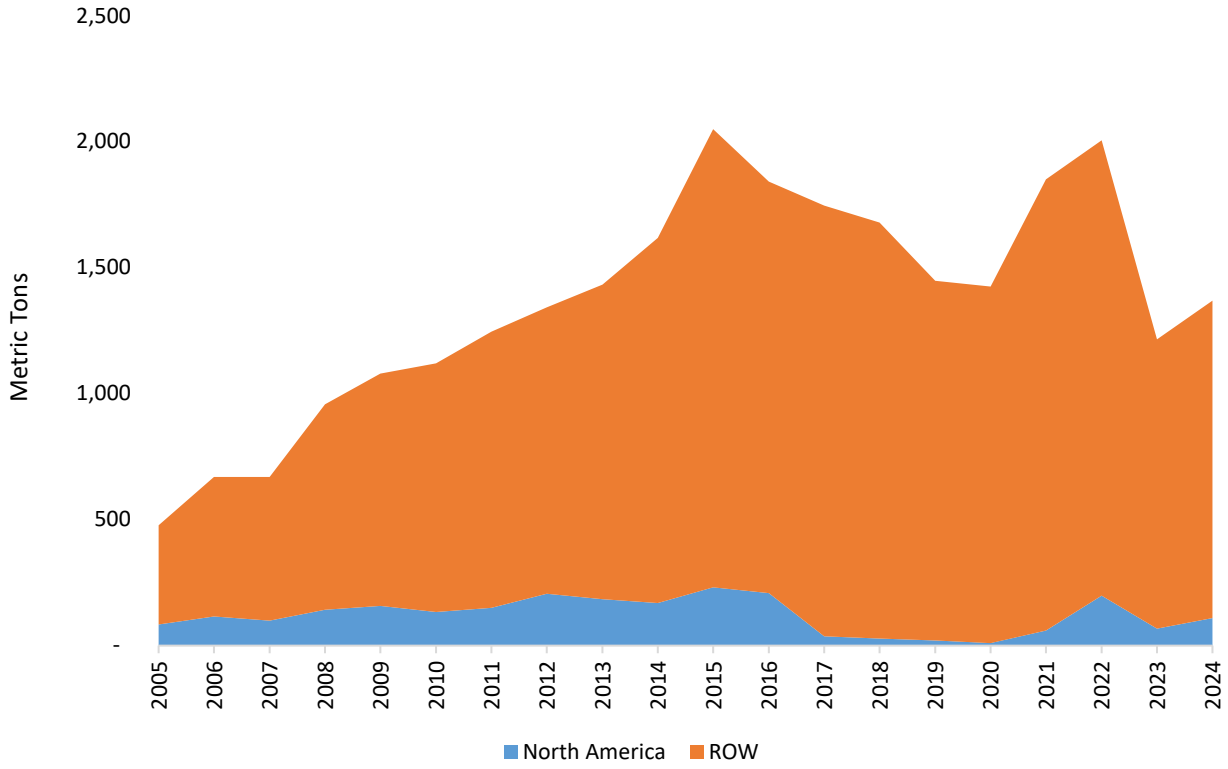
Although North American countries import more bacon from the U.S. than the rest of the world, growth in rest-of-world use of U.S. bacon did allow this category's exports to grow from 2005 to 2024. Exhibit 2.2.6.7 shows the relatively minor role rest-of-the-world markets had in U.S. bacon exports early during this observation period compared with more recent years. During 2024, 40% of U.S. bacon exports went to markets other than those in North America — up from 22% in 2005 (USDA Foreign Agricultural Service).

Exhibit 2.2.6.7. Destinations for U.S. Cured Bacon Exports
(Source: USDA Foreign Agricultural Service)



Much like the U.S. has depended on rest-of-world trade for pork variety meats, countries outside of North America also have historically purchased more airtight-packaged prepared and preserved pork products. Exhibit 2.2.6.8 shows U.S. exports of these products has grown — predominantly due to countries not in North America (USDA Foreign Agricultural Service).

Exhibit 2.2.6.8. Destinations for U.S. Exports of Airtight-Packaged Prepared or Preserved Pork *(Source: USDA Foreign Agricultural Service)*



Observations:

1. Between 2013 and 2018, U.S. swine carcass exports, including fresh, chilled, and frozen carcasses, averaged more than 11,350 metric tons per year. Exports spiked in 2019 and 2020 to 175,500 metric tons and 163,400 metric tons, respectively. Since then, carcass exports have moderated. They annually averaged 13,650 metric tons from 2022-24.
2. Ham and variety meats accounted for 87% of U.S. pork exports to rest-of-the-world countries. For variety meats, feet have driven much of this category's growth.
3. For the U.S., ham trade with North American countries carries importance. In 2024, North American imports of U.S. ham were more than 70% of all U.S. ham exports.

2.3 Variety Meats and Byproducts Reporting

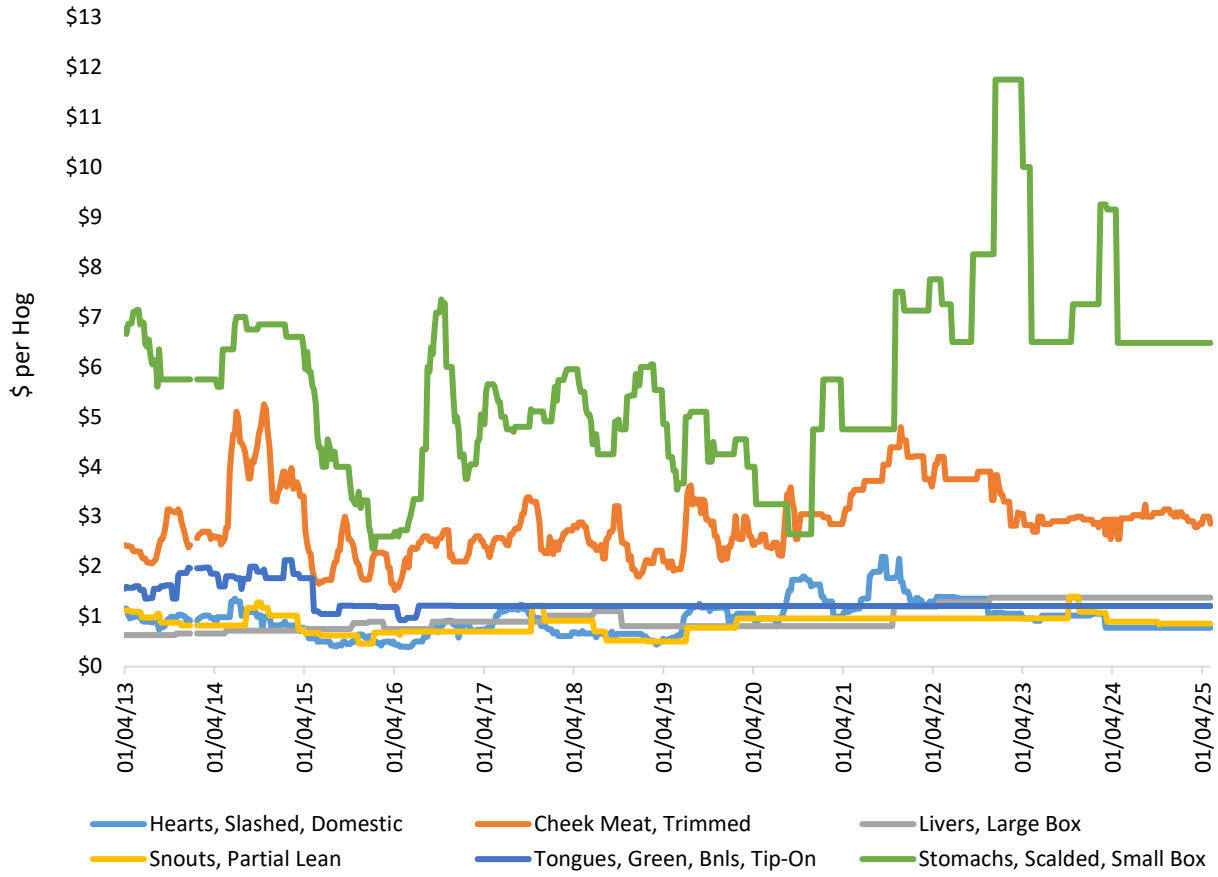
Packers have a choice to submit market data for variety meats they handle. Exhibit 2.3.1 tracks the value of several pork variety meats from January 2013 to February 2025. Stomachs and cheeks have carried the greatest values. Over time, the stomach value has increased more than

the cheeks value. Hearts, snouts, tongues and livers have had relatively low values. Per hog, they each have recently contributed no more than $2 in value.

Several of the price series change infrequently. This raises two questions: do transactions go unreported, or are transactions so specialized reporting would divulge confidential information?

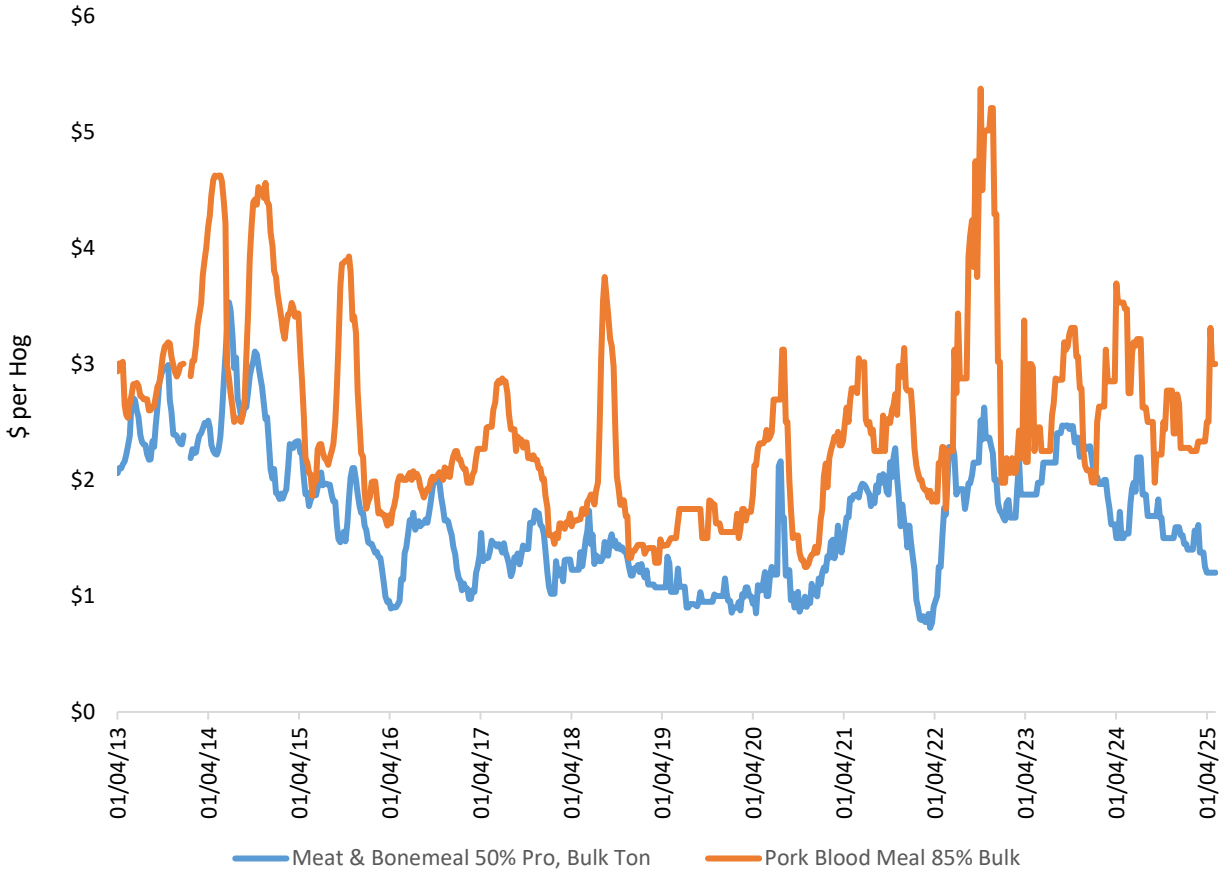
From our market analysis, we feel there is sufficient qualifying unreported volume such that mandating variety meat sales reporting would add robustness to these series, even if on a less frequent basis of reporting (e.g., monthly) to aid ability of AMS to report.

Exhibit 2.3.1. Pork Variety Meats Value, January 2013 to February 2025
(Source: USDA Agricultural Marketing Service)



On a voluntary basis, packers may also share prices for animal fats and protein meals (e.g., bonemeal). When fat and protein byproduct datapoints are available, USDA AMS includes the price summary in its daily Tallow and Protein Report. Exhibit 2.3.2 presents the price trend for pork protein byproducts. Between January 2013 and February 2025, pork bloodmeal generally carried a premium relative to meat and bonemeal. With a few exceptions, bloodmeal values per hog ranged from $1 to $5. In contrast, the meat and bonemeal value ranged from $1 to $3 per hog. The bloodmeal was 85% protein compared with 50% protein for the meat and bonemeal. Both of these series appear to vary sufficiently to not benefit significantly from mandated reporting.

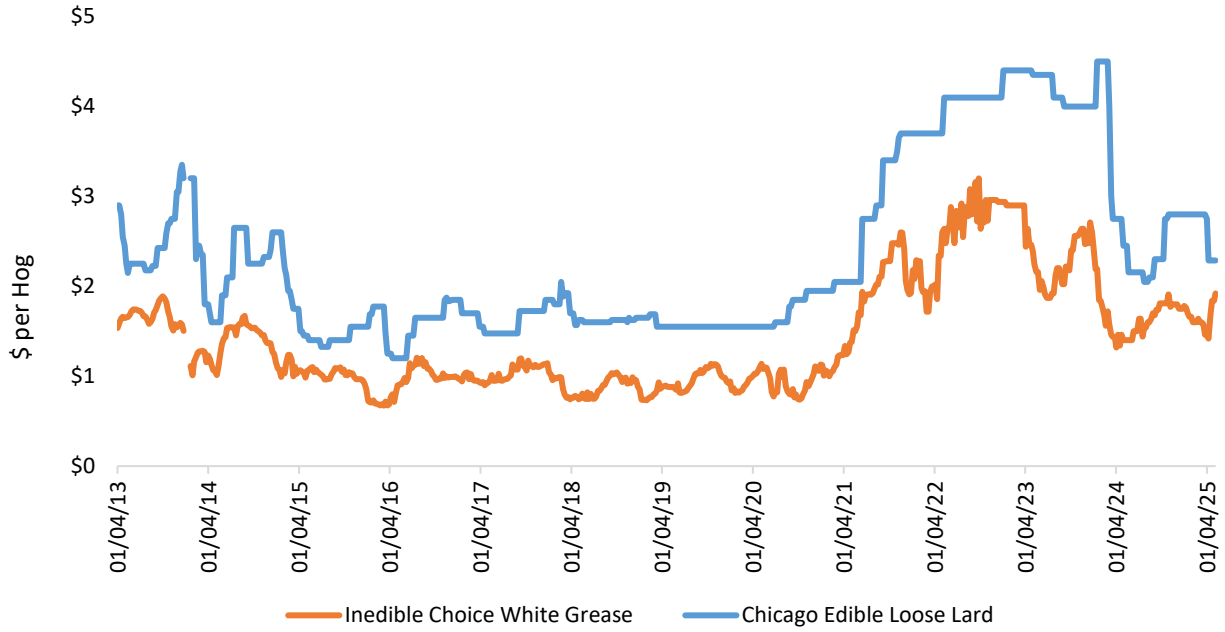
Exhibit 2.3.2. Pork Blood and Bone Meals Value, January 2013 to February 2025
(Source: USDA Agricultural Marketing Service)



With respect to fat byproducts, Exhibit 2.3.3 shows that inedible white choice grease carried a lower value from January 2013 to February 2025 than Chicago edible loose lard. Since 2021, prices for both fat byproducts have appreciated. Prices have tended to range from $2 to $4 per hog for inedible white choice grease compared with $3 to $5 per hog for Chicago edible loose lard. Prices have recently retreated from highs experienced during 2022 and 2023. The edible loose lard price is prone to large gaps with unreported data.

Whether mandated reporting works for fat byproducts depends on this component's share of the composite cutout. According to the 2024 USDA pork carcass cutout user's guide, fat yield percentages are as follows for various pork primal styles: loin, 3.66% (⅛" trimmed loin); butt, 2.97% (⅛" trimmed butt); picnic, 3.4% (SS smkr trim); ham, 8.49% (insides, outsides, knuckles); ham, 8.34% (muscle ham to blue); and belly: 1.45% (derind belly).

Exhibit 2.3.3. Pork Fat Byproducts Value, January 2013 to February 2025
(Source: USDA Agricultural Marketing Service)



Summing the values reported for variety meats, fat byproducts, and protein byproducts communicates the extent to which these goods collectively contribute to a carcass value, even if they are voluntarily reported under LMR. Per hog, this collective value has tended to range from $21 to $24 in recent months (Exhibit 2.3.4). The correlation coefficient between the sum of variety meat, fat and blood and bone meal values and the FOB plant – negotiated sales cutout was 0.72 from January 2013 to February 2025.

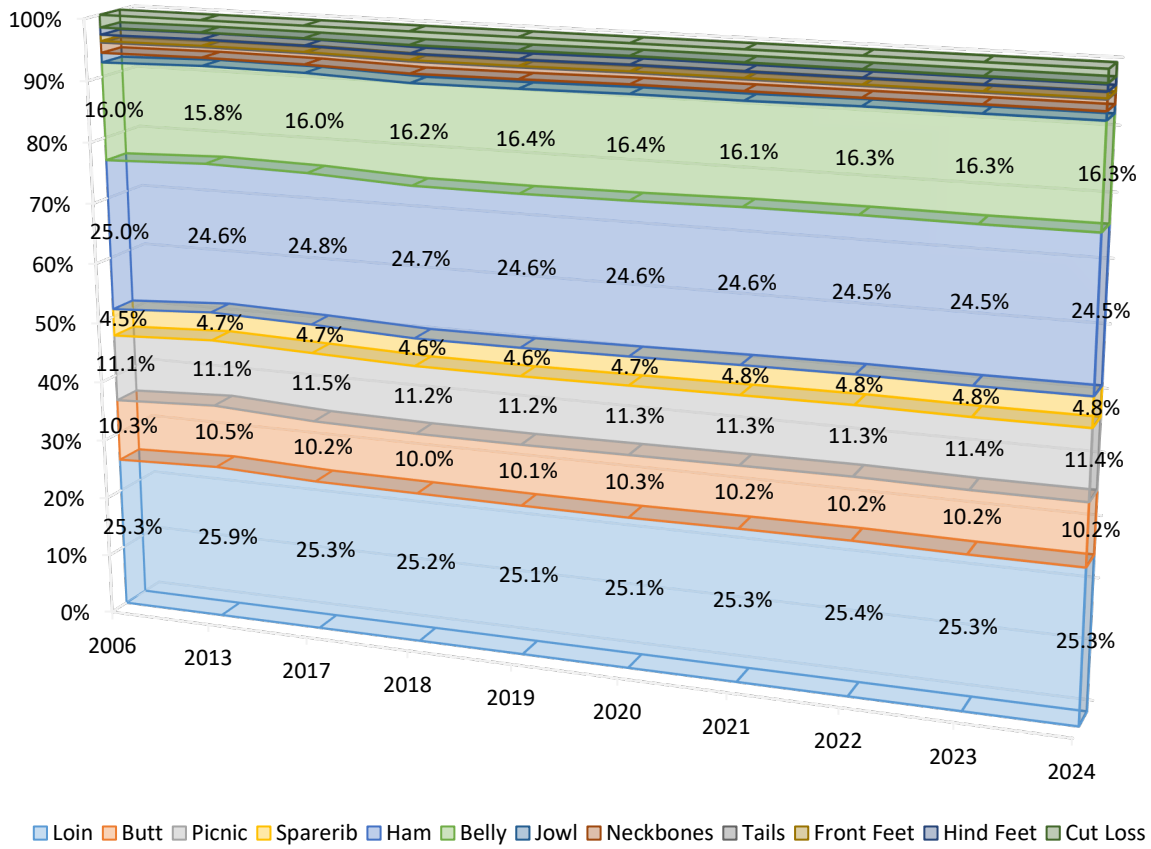
Exhibit 2.3.4. Sum of Variety Meats, Fats and Blood and Bone Meals Value, January 2013 to February 2025 *(Source: USDA Agricultural Marketing Service)*

2.4 Yield and Cost Adjustments

Packers voluntarily report yields used to estimate the pork cutout. USDA provides a standardized form that packers use to submit yield data.

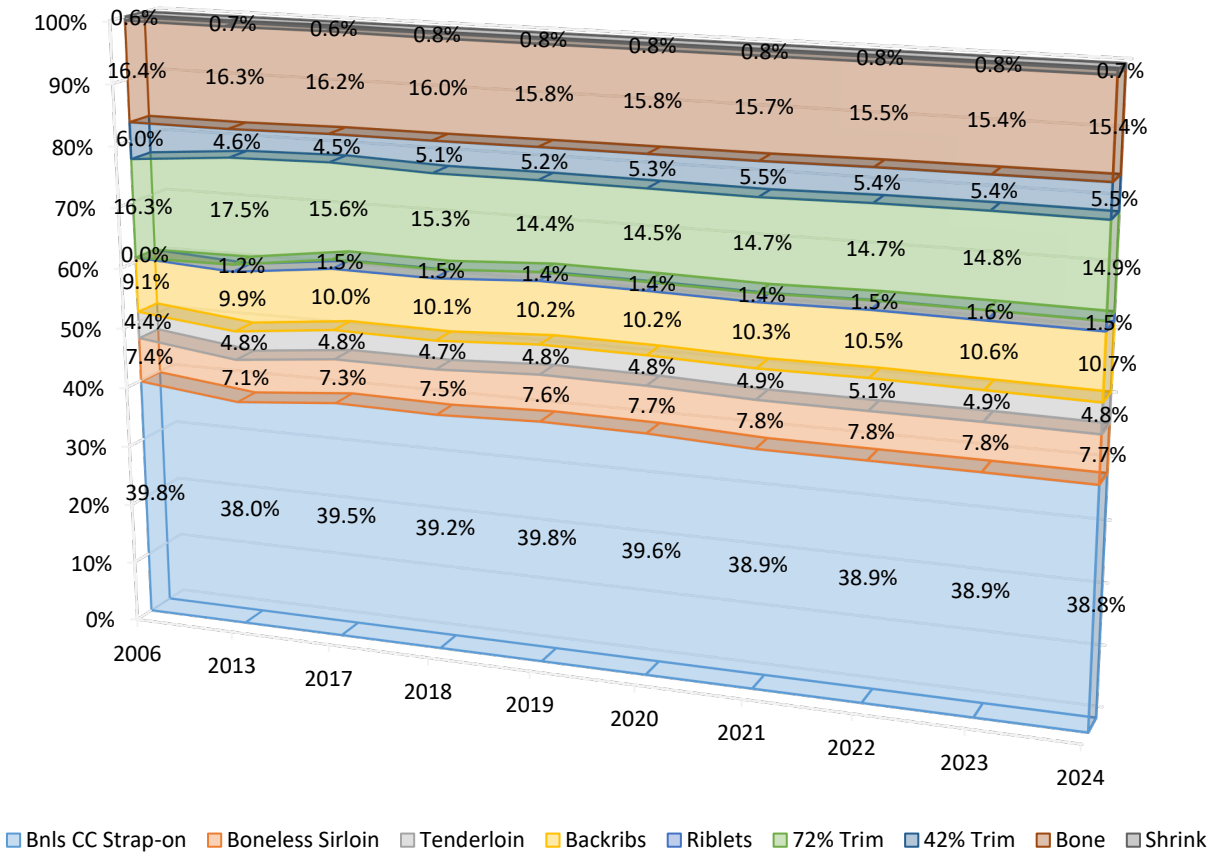
By the first Monday of a new year, USDA AMS makes the necessary yield adjustments based on packer yield submissions (https://www.youtube.com/watch?v=klV6h0XknIg). Exhibit 2.4.1 shares the yields USDA AMS released in multiple years when it updated the yields. Collectively, the loin and ham have represented nearly half of the composite cutout (https://www.ams.usda.gov/sites/default/files/media/LMRPorkCutoutHandout.pdf).

Exhibit 2.4.1. Primal Yield to Carcass by Year Updated *(Source: USDA AMS, (https://www.ams.usda.gov/sites/default/files/media/LMRPorkCutoutHandout.pdf)*



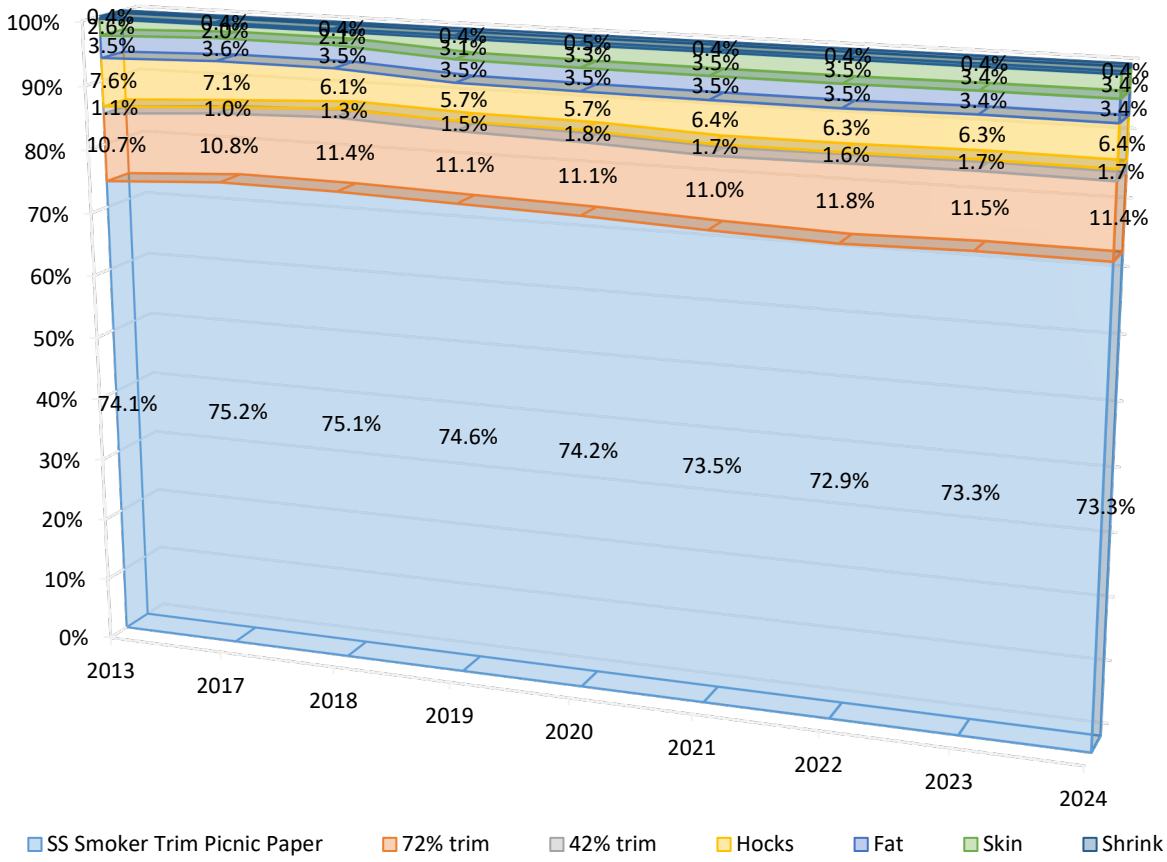
The following charts summarize changes in yields used to convert subprimals into primals. Exhibit 2.4.2 shares yields for the boneless CC, strap-on loin. According to the yield data, the most significant components were consistent over time: boneless CC strap-on, bone, and 72% trim. Yields for all three were smaller in 2024 than in 2006, but the changes were slight. Cuts such as the boneless sirloin and backribs had yields increase over time (USDA AMS).

Exhibit 2.4.2. Subprimal to Primal Yields: Boneless CC, Strap-on Loin to Loin, 2006 to 2024 by Year Updated *(Source: USDA AMS)*



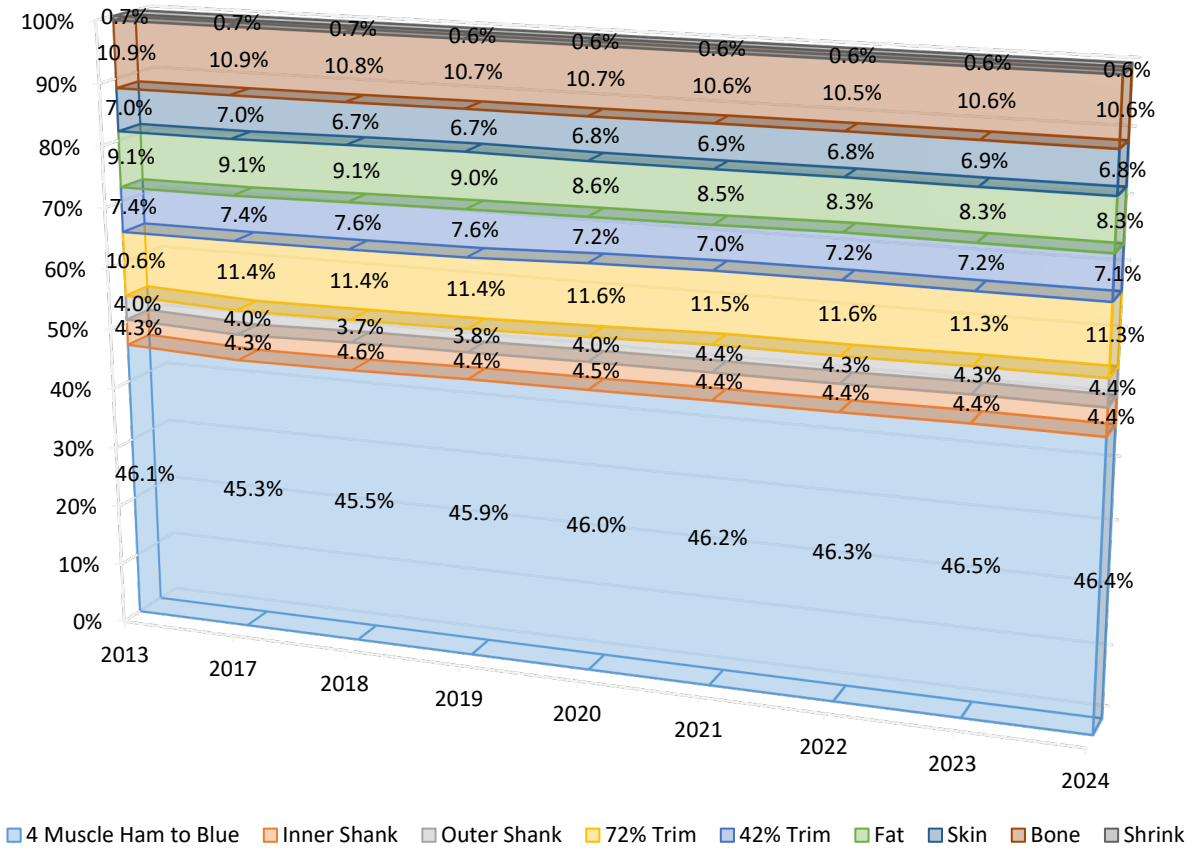
For the SS smoker trim picnic paper, its yields to the picnic primal also changed modestly. Exhibit 2.4.3 shows yields for the SS smoker trim picnic, hocks, and fat declined slightly. They increased most for the 72% trim and skin (USDA AMS).

Exhibit 2.4.3. Subprimal to Primal Yields: SS Smoker Trim Picnic Paper to Picnic, 2013 to 2017 by Year Updated (Source: USDA AMS)



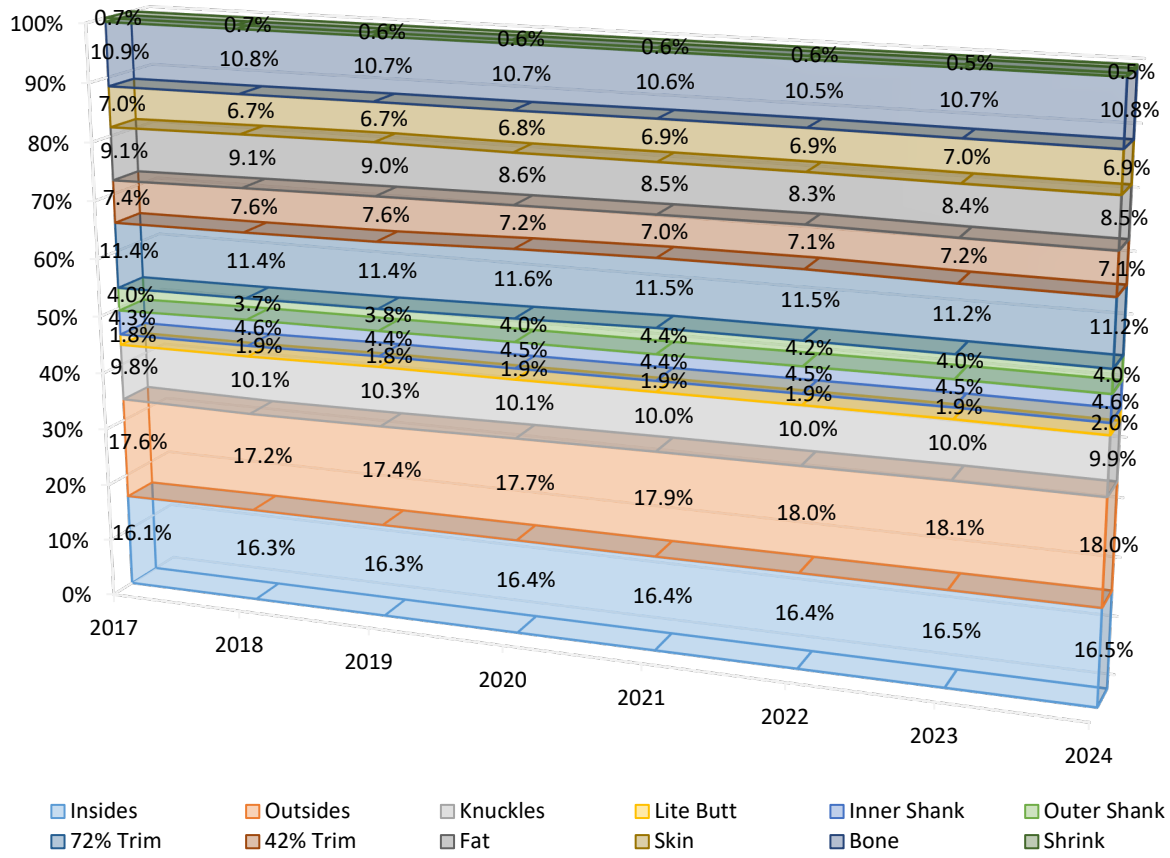
A ham subprimal, the 4 muscle ham to blue yields were stable in years when the cutout yields had updates between 2013 and 2024. Exhibit 2.4.4 shares that yields for none of the cuts changed by more than 1 percentage point. Those that did see the greatest change were for the 72% trim and fat (USDA AMS).

Exhibit 2.4.4. Subprimal to Primal Yields: 4 Muscle Ham to Blue to Ham, 2013 to 2024 by Year Updated *(Source: USDA AMS)*



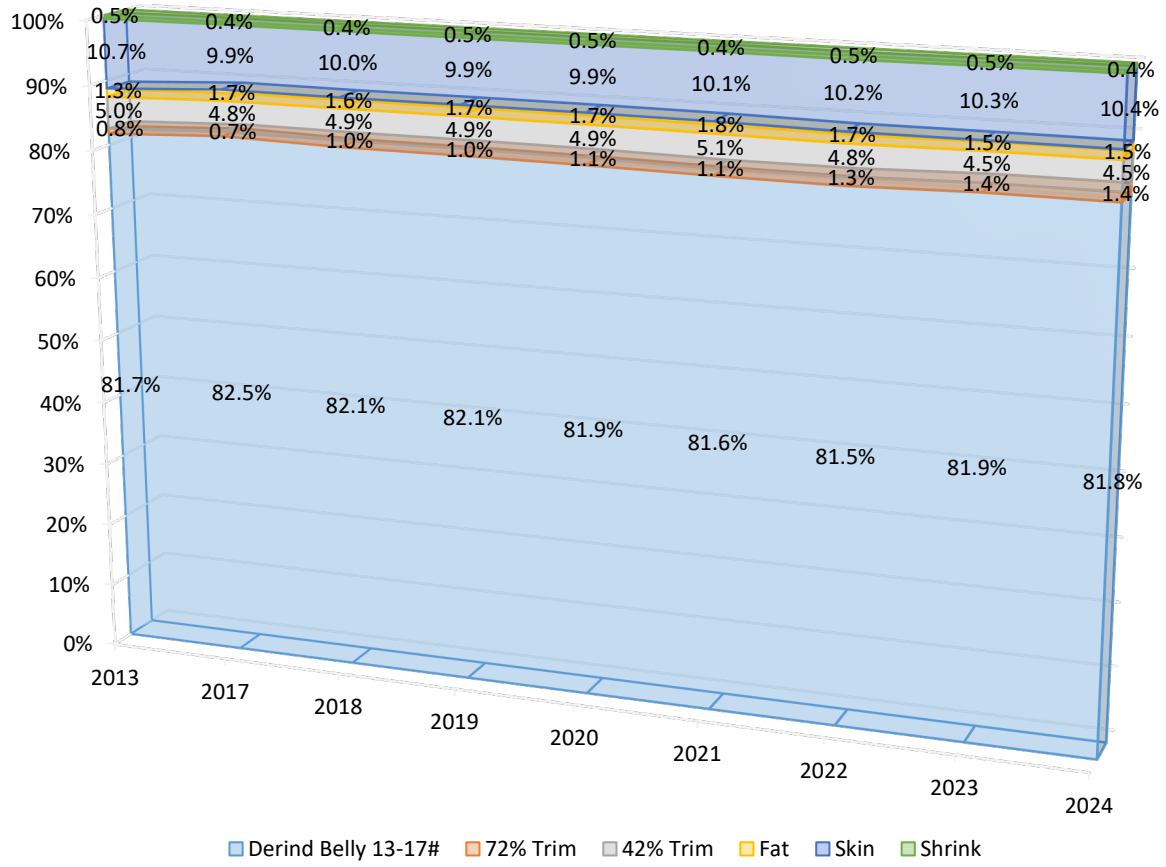
Yields for the insides, outsides, and knuckles to ham primal changed very little between 2017 and 2024. See Exhibit 2.4.5 (USDA AMS).

Exhibit 2.4.5. Subprimal to Primal Yields: Insides, Outsides or Knuckles to Ham, 2017 to 2024 by Year Updated *(Source: USDA AMS)*



The 13- to 17-pound derind belly yields were consistent from 2013 to 2024. They varied only by 0.1% in 2013 and 2024. Exhibit 2.4.6 shares the cut yields for the 13- to 17-pound derind belly to belly primal. The other cut yields also didn't have drastic changes. The 72% trim and fat yields increased slightly, and the 42% trim, shrink, and skin decreased slightly (USDA AMS).

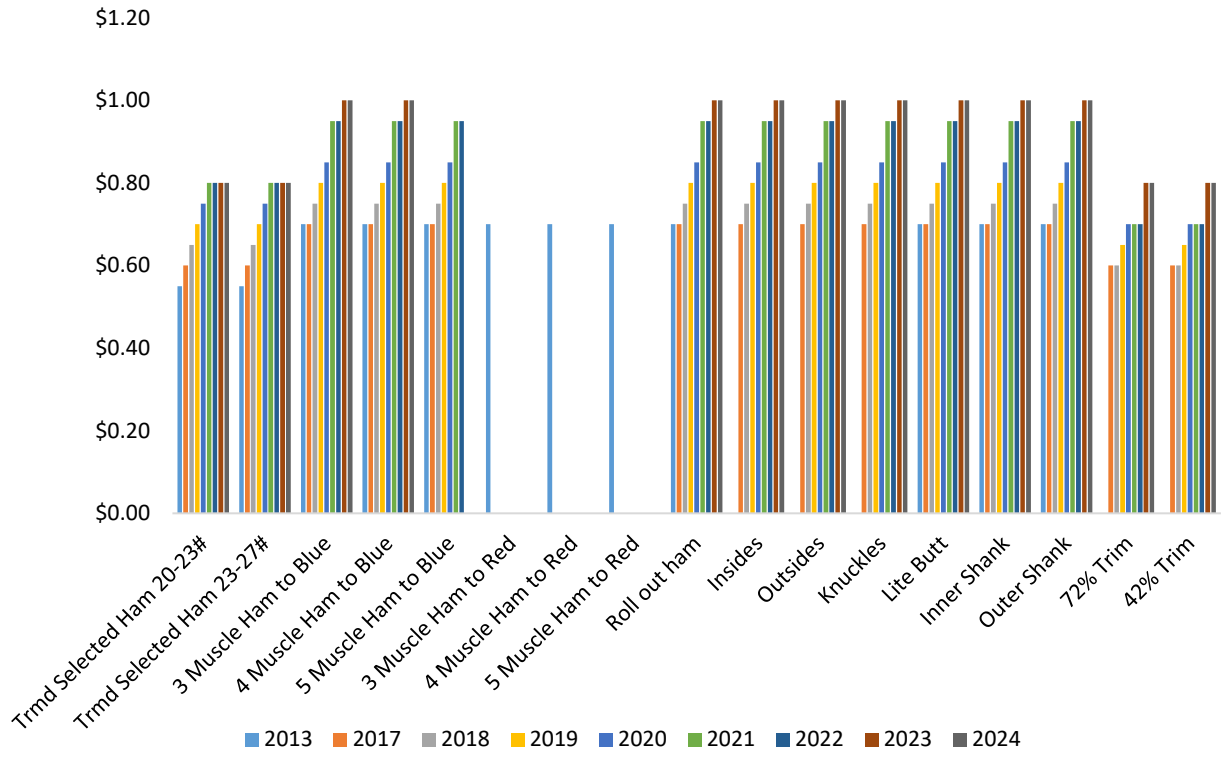
Exhibit 2.4.6. Subprimal to Primal Yields: Derind Belly 13-17# to Belly, 2013 to 2024 by Year Updated *(Source: USDA AMS)*



Reviewing the voluntarily reported yields broadly reveals average yields vary little over time. This finding indicates a change in yield has little impact on price level changes over time. Thus, buyers and sellers who hold differing opinion on yields can account for their difference through a price adjustment (e.g., negotiated cut price + $1).

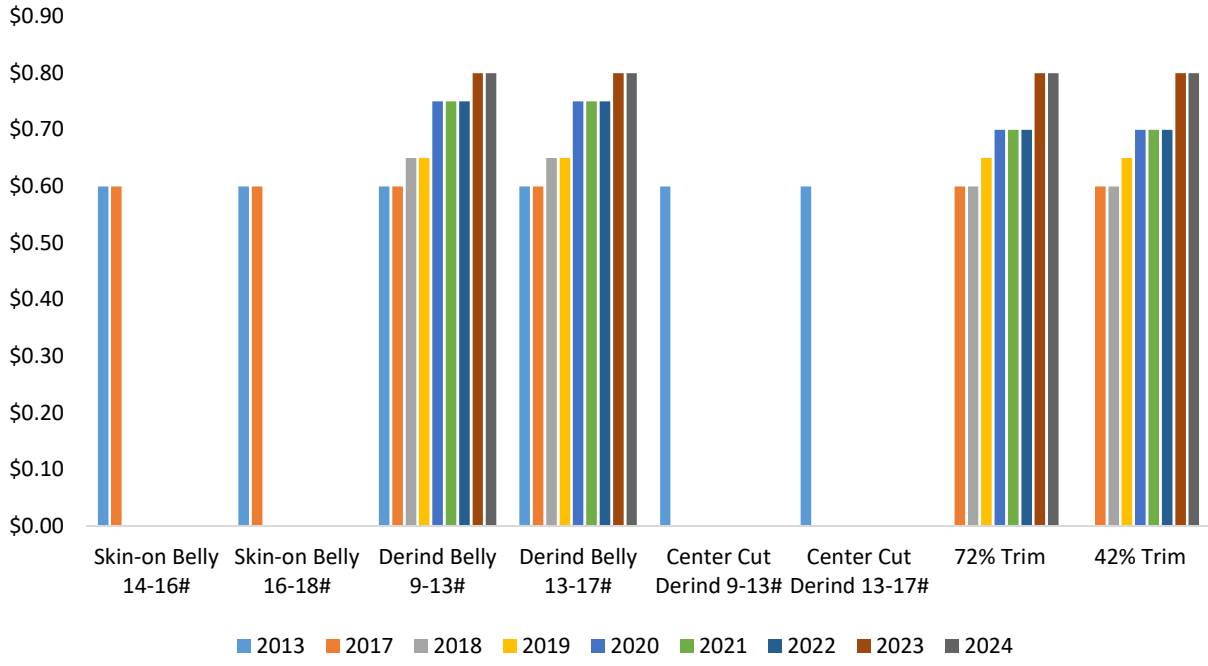
In terms of packaging costs, they also did not tend to shift drastically when USDA AMS updated cutout yields. Exhibit 2.4.7 shares packaging costs for the ham subprimal. Roughly $0.30 was the greatest appreciation in a cut's packaging costs from 2013 to 2024 (USDA AMS).

Exhibit 2.4.7. Ham Subprimal Packaging Costs, 2013 to 2024 *(Source: USDA AMS)*



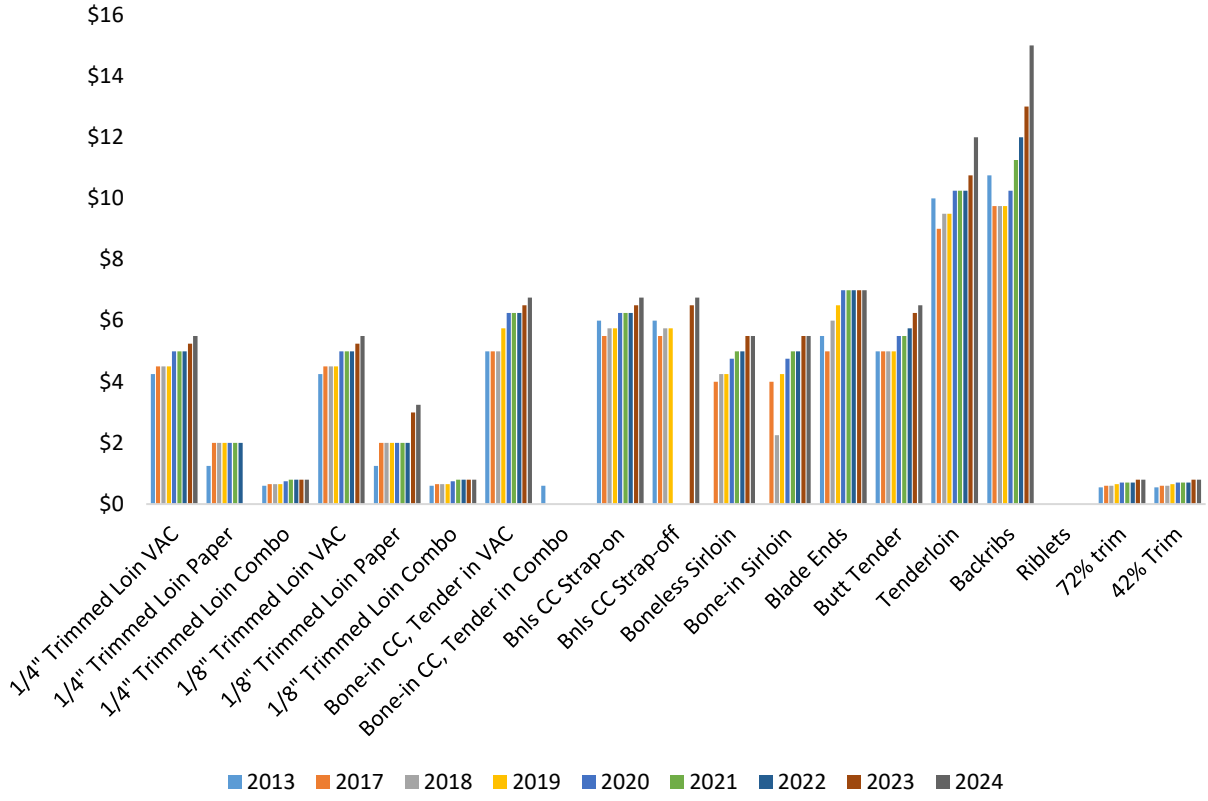
For the belly subprimal, packaging costs for cuts did increase over time. Exhibit 2.4.8 shows the total increase in packaging costs for a cut was about $0.20 (USDA AMS).

Exhibit 2.4.8. Belly Subprimal Packaging Costs, 2013 to 2024 *(Source: USDA AMS)*



Compared with the ham and belly subprimals, the loin has had greater packaging costs for cuts. Exhibit 2.4.9 charts the packaging costs trend from 2013 to 2024. Cuts with the most significant packaging costs have been the tenderloin and backribs. Their packaging costs did decline slightly from 2013 to 2018 but then began to increase in years when USDA AMS updated cutout yields. For backribs, the difference between the lowest and highest packaging costs was roughly $5.

Exhibit 2.4.9. Loin Subprimal Packaging Costs, 2013 to 2024 *(Source: USDA AMS)*



In general, we find packaging costs increase over time at about the rate of inflation. Year-to-year changes are less common, which is consistent with sticky prices where packers prefer not to constantly adjust prices up and down according to what could be short-term exogenous disruptions to packaging markets.

Observations:

1. Yield, fabrication costs, and labor costs have not changed much year-to-year.
2. The process by which AMS chooses which packer yields and fabrication costs to include in the yearly average is not completely transparent or clearly documented but seems to capture the majority of domestic hog processing.

2.5 Daily Minimum Volume Threshold Effects

A few industry participants expressed interest in understanding the implication of imposing minimum volume thresholds (total volume for a day) on cuts. A minimum threshold would

exclude small-volume trades. Some industry participants expressed concern that small-volume trades may contain embedded transaction costs that artificially elevate prices. During large-volume trading days, the small-volume trades get aggregated into larger trades.

Evaluating whether price differs between small- and large-volume trades requires reviewing the primary data, which were not accessible for this project. Instead, we analyzed the impact on "printing prices" frequency had minimum thresholds been in place for a subset of cuts between 2013 and mid-March 2025. Exhibit 2.5.1 reports results from this analysis, which used daily data. Note, a parallel assessment could be done with weekly data.

Importantly, on dates with 0 pounds reported, it's impossible to know whether a day had no trade or whether the trades were unreportable due to confidentiality restrictions. For some cuts, we can observe that 6.79% to 33.55% of possible trade days don't have price and volume reported.

For four of the five cuts analyzed, we find that imposing thresholds generally would minimally impact reportable days. The exception is jowl-skinned combo; for it, even a 10,000-pound threshold would reduce the number of reportable days by 19.2%. For the other four cuts, a 10,000-pound minimum threshold would at most decrease the number of reportable days by 0.3% (i.e., this is the effect for derind belly 13-17#).

Exhibit 2.5.1. Decrease in Reported Days Due to Daily Negotiated Total Reported Pounds Being Below Threshold*
(Data source: USDA AMS)

			Threshold imposed					
		Days analyzed	120k lb.	80k lb.	40k lb.	20k lb.	10k lb.	0 lb.
Derind Belly 13-17#	No. of days below threshold		796	457	269	232	218	210
	% of ====>	3094	25.73%	14.77%	8.69%	7.50%	7.05%	6.79%
	% after removing zero days		18.9%	8.0%	1.9%	0.7%	0.3%	0.0%
Jowl-Skinned Combo	No. of days below threshold		2967	2800	2423	2095	1631	1038
	% of ====>	3094	95.90%	90.50%	78.31%	67.71%	52.71%	33.55%
	% after removing zero days		62.3%	56.9%	44.8%	34.2%	19.2%	0.0%
23-27# Trmd Selected Ham	No. of days below threshold		109	53	22	15	10	10
	% of ====>	3094	3.52%	1.71%	0.71%	0.48%	0.32%	0.32%
	% after removing zero days		3.2%	1.4%	0.4%	0.2%	0.0%	0.0%
Picnic Cushion Meat Vac	No. of days below threshold		115	20	6	3	3	3
	% of ====>	3094	3.72%	0.65%	0.19%	0.10%	0.10%	0.10%
	% after removing zero days		3.6%	0.5%	0.1%	0.0%	0.0%	0.0%
1/4 Trim Butt VAC	No. of days below threshold		3	3	3	3	3	3
	% of ====>	3094	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
	% after removing zero days		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

* Selected data off PK602 afternoon report

2.6 Primal Estimation

Wholesale pork data submitted through LMR undergoes audits by USDA AMS personnel. The audits, which must be complete within the hour between packers reporting data and USDA AMS publishing cutout reports, allow for verifying and possibly correcting values that appear questionable (https://www.youtube.com/watch?v=klV6h0XknIg).

Observations:

1. Primal estimates include some data reported at the cut level due to confidentiality. This creates some industry confusion because users are unable to replicate changes in the primal price reported by AMS (i.e., uncertain about whether the difference is due to adding excluded data or no cut price data).
2. If AMS discontinued yield and fabrication costs, then it's unclear how strongly correlated the two series would be.

2.7 Composite Carcass Cutout Estimation

USDA AMS periodically updates a "User's Guide to USDA's Pork Carcass Cutout."

Narrower Recommendations:

1. We encourage this effort to continue as it provides data users with valuable information and background on AMS procedures. Our suggestion is reinforced in importance given the clear, wide use of composite cutout values by market participants.
2. We encourage AMS to extend this document to more clearly discuss how primal and composite carcass cutout values as multiproduct aggregates are derived from a combination of products that are individually reported (i.e., printed in AMS reports) and products that are not reported (i.e., censured due to confidentiality or other reasons).
3. If AMS discontinued yield and fabrication costs, then it's unclear how strongly correlated the two series would be.

CHAPTER 3: Industry Reflections

Beyond the data-driven insights outlined in Chapter 2, a central aspect of this project was gathering feedback from industry stakeholders. Accordingly, we interviewed numerous groups who provided sentiment on various wholesale pork reporting details.

Interviewees consistently said sustaining USDA AMS efforts in wholesale pork reporting is essential and paramount. Although they shared example areas for possible adjustment, industry stakeholders engaged for this project unanimously shared that USDA AMS wholesale pork reporting is critical to modern business operations and market intelligence. To that end, stakeholders encouraged periodic wholesale pork reporting reviews such as this study.

This chapter further summarizes stakeholder views and comments, and it lists recommendations

3.1 Dual Reporting - FOB Omaha and FOB Plant

Currently twice daily, USDA AMS releases negotiated sales reports for FOB plant and FOB Omaha. Some stakeholders recall historical precedent for why both FOB plant and FOB Omaha were originally reported, but they predominantly use FOB plant reports. Some shared concerns about confusion stemming from reporting FOB plant and FOB Omaha. Further, some comments included concern about associated unintended consequences of reporting both.

Recommendation:

1. We suggest discontinuing FOB Omaha reporting and solely report FOB plant.

3.2 Specialty Items

USDA AMS introduced the specialty report in 2019 in response to industry evolution and wider product differentiation. The agency reports market information for a variety of specialty products. Information used to produce the specialty report does not become part of the comprehensive report and is growing in overall value. Stakeholders generally felt that further product differentiation will occur.

Recommendations:

1. We recommend that USDA AMS continue to monitor specialty products to assess when reporting more granular data is possible.
2. We suggest that USDA AMS conduct a study to assess the impact of including specialty products when computing primals and the composite cutout. Perhaps it is feasible to release both reports with and without specialty products included. The frequency of such reporting could be less often than daily.
3. We recommend that USDA AMS assess the viability and value of additional reports for specialty markets. Such reports could be perhaps less frequent (i.e., monthly, quarterly, or annual) but offer deeper data reporting.

3.3 Negotiated versus Forward and Formula Transactions

As shown by the key performance indicators provided in Exhibit 2.1.1, a host of changes have occurred in the broader pork industry. Among them is a decline in negotiated marketing methods and growth in forward and formula transaction prevalence.

Recommendation:

1. By cut, we recommend for USDA AMS to continue monitoring the number of negotiated transactions for signs of thinly traded pork products and cuts. This will better position USDA AMS to adjust practices if or when negotiated transaction volumes necessitate reporting change(s).

3.4 NAFTA/Rest-of-World

As noted repeatedly, the U.S. hog and pork industries are unique relative to the broader U.S. meat-livestock industry in several ways. One example is the high prevalence of wholesale ham market activity tied to Mexico. This specific situation underpins the NAFTA — rather than just U.S. — and ROW reporting approach as it would be challenging to derive a ham primal value and subsequent composite cutout specific to U.S.-only trade.

Recommendation:

1. We recommend no changes and suggest that USDA AMS continue the current NAFTA and rest-of-world reporting approach.

3.5 Variety Meats and Greases

We found strong, but not unanimous, industry interest in mandating reporting of variety meats and grease products. Because these products are now only voluntarily reported, it's unknown what impact may follow from mandated reporting. Possibly, less reporting will result if this reporting were mandated due to confidentiality protocols that would be implemented.

Recommendation:

1. Consider mandating variety meats and greases reporting. We recommend USDA AMS and industry collaborate on a 12-month review of voluntary reporting for all qualifying trades. AMS can evaluate and substantiate the trade volume size impacts of mandating these products so that mandated reporting doesn't do more harm than good.

3.6 Fabrication Costs and Yields

Fabrication costs and yields are a voluntarily reported component of wholesale pork reporting. These variables impact reported composite cutout values, and though they are not mandated to be provided, they are clearly used heavily by market participants. This use appears to have grown notably since the wholesale pork reporting mandate began in 2013. This is a clear

testament to the value of USDA AMS efforts in wholesale pork reporting, and it necessitates ongoing attention to factors such as fabrication costs and yields.

Recommendation:

1. We recommend USDA AMS to enhance transparency of how fabrication costs and yields are derived and periodically gather industry feedback.

3.7 Report Release Times

Currently, USDA AMS releases multiple market reports as part of its broader wholesale pork reporting effort. These reports have their own release schedule.

Recommendation:

1. We recommend USDA AMS continue its current report release timing and schedule.

3.8 Export

Wholesale pork reporting is rather unique in its NAFTA and rest-of-world approach. As noted in Exhibit 2.1.1, export volumes and value have expanded since 2013. It seems likely that the mix of countries importing U.S. pork products will continue to evolve and lead to market effects of industry interest.

Recommendations:

1. We recommend no major changes to export pork reporting.
2. We suggest USDA AMS monitor the relative volume and value compositions across countries importing U.S. pork. The effort could result in adding periodic (i.e., monthly, quarterly) reports to summarize associated changes.
3. We suggest adding documentation on if or how USDA AMS and the USDA Foreign Agricultural Service pork export reporting differ to clarify and guide accurate interpretation by users.

3.9 Primal and Cutout Reporting

It is important to appreciate that primal and composite cutout reporting is not mandated. It is a service provided by USDA AMS. Industry stakeholders clearly conveyed they found immense value in USDA AMS continuing to report primal and composite cutout values.

Recommendations:

1. We recommend USDA AMS conduct a study that would assess the impact of including specialty products when computing primals and the composite cutout.
2. We recommend USDA AMS provide additional documentation to clearly describe how aggregate values (i.e., primals and composite cutout) are derived from a combination of

reported and not reported product- or cut-level market transactions. Industry supports USDA AMS to continue this practice but desires additional documentation.

3. Broader — perhaps congressional — support could be provided to help sustain USDA AMS efforts to continue primal and composite cutout reporting that industry values.

CHAPTER 4: Summary

This chapter summarizes the observations and recommendations provided in this report. Recommendations are provided in no particular order of emphasis for AMS consideration.

4.1 Observations

The following summary highlights observations about the carcass cutout and its derivation. These points originate from publicly reported data analysis and conversations with industry stakeholders, who consistently voiced that they widely used composite cutout values.

Mandatorily Reported Data

1. Over time, more wholesale cut transactions have been facilitated by forward contracts or formulas, but the quantity of hog production has increased sufficiently to mostly hold steady the percentage of negotiated trade to total pounds of pork.
2. As buyers have demanded different cuts and hogs have increased in size, wholesale products have evolved to reflect these changes. AMS has adjusted reporting accordingly.
3. At the producer-packer level, changes in base price specification motivated producers and packers to increasingly reference the composite cutout price in live hogs' base price formulation.
4. For the most part, confidence in daily pork cut price accuracy has held steady, to improved, over time.

Wholesale Pork Exports

1. Between 2013 and 2018, U.S. swine carcass exports, including fresh, chilled, and frozen carcasses, averaged more than 11,350 metric tons per year. Exports spiked in 2019 and 2020 to 175,500 metric tons and 163,400 metric tons, respectively. Then, swine carcass exports moderated — averaging 13,650 metric tons per year from 2022 to 2024.
2. Ham and variety meats accounted for 87% of U.S. pork exports to rest-of-the-world countries. For variety meats, feet have driven much of this category's growth.
3. For the U.S., ham trade with North American countries carries importance. North American imports of U.S. ham were more than 70% of all U.S. ham exports in 2024.

Voluntarily Reported Data

1. For some variables, no data were reported for long periods, so data users lack a clear picture of how supply-demand changes affect prices.
2. Sometimes, variety meats, greases, and proteins have few buyers.
3. Most of the voluntarily reported categories are heavily impacted by export markets.

Yields, Fabrication Costs, and Packaging Costs

1. Yields, fabrication costs, and labor costs have not changed much year to year.

2. The process by which AMS chooses packer yields and fabrication costs to include in an annual average is not completely transparent, but it seems to capture the majority of domestic hog processing.

Primals and Cutout

1. Primal estimates include some data reported at the cut level due to confidentiality. This creates some industry confusion because stakeholders are unable to replicate changes in the primal price reported by AMS (i.e., is the difference due to using excluded data or due to no cut price data?).
2. If AMS discontinued yield and fabrication costs, then it's unclear how strongly correlated the two series would be.

Imposing Daily Volume Thresholds

1. USDA AMS personnel should evaluate volumes at the cut level and set thresholds (e.g., 10,000 pounds, 20,000 pounds) for typical high-volume traded cuts with occasional (e.g., below 0.05%) trades below the threshold.
2. As voiced by several industry participants, on days a cut doesn't trade, it's difficult to determine the cut value used for primal and cutout calculations. If there is no trade, then USDA AMS uses the price from the most recent day with a price printed. If there is trade but it's not reported due to confidentiality, then the cut price on that day is still used in the primal and cutout calculations.
3. Given the extent of nonreported information observed across these five cuts, there is validity to AMS indicating when there is no trade and the most recent printed price is used for the primal and cutout calculations.

Primal Estimation

1. Primal estimates include some data reported at the cut level due to confidentiality. This creates some industry confusion because users are unable to replicate changes in the primal price reported by AMS (i.e., uncertain about whether the difference is due to adding excluded data or no cut price data).
2. If AMS discontinued yield and fabrication costs, then it's unclear how strongly correlated the two series would be.

Composite Carcass Cutout Estimation

1. We encourage carcass cutout estimation to continue as it provides data users with valuable information and background on USDA AMS procedures. Our suggestion is reinforced given market participants' clear, wide use of composite cutout values.
2. We encourage USDA AMS to extend its carcass cutout user's guide to more clearly discuss how primal and composite carcass cutout values as multiproduct aggregates are derived from a combination of products that are individually reported (i.e., printed in AMS reports) and not reported (i.e., censured due to confidentiality or other reasons).

3. If USDA AMS discontinued yield and fabrication costs, then it's unclear how strongly correlated the two series would be.
4. As buyers have demanded different cuts and hogs have increased in size, wholesale products have evolved to reflect these changes. USDA AMS has adjusted reporting accordingly.

4.2 Recommendations

Stemming from this study's observations, the following recommendations offer ideas for how USDA AMS may approach the composite cutout and process used to estimate it going forward. This list — presented in no particular order — includes points USDA AMS may consider changing and those that already work effectively.

- **Discontinue Reporting FOB Omaha.**

  Because industry tends to not use the FOB Omaha report, we suggest discontinuing it.

- **Evaluate Impact of Less Frequent But More Detailed Reporting.**

  As pork product differentiation continues and specialty product volumes perhaps grow, it may become more feasible to add periodic assessments with deeper information on these markets. For instance, a quarterly report for specialty markets may provide more details (e.g., distributional information) than currently offered in less frequent reports.

- **Consider Mandating Variety Meats Reporting.**

  Consider mandating variety meats and greases reporting. We recommend USDA AMS and industry collaborate on a 12-month review of voluntary reporting for all qualifying trades. AMS can evaluate and substantiate the trade volume size impacts of mandating these products so that mandated reporting doesn't do more harm than good.

- **Set Volume Thresholds to Report Trade.**

  Our understanding is that confidentiality concepts apply when wholesale pork trade is reported but no further, explicit consideration to volumes are made. Differences exist among no trade occurring, trade occurring but not sufficiently clearing confidentiality protocol for USDA AMS to report, trade occurring that clears confidentiality protocols but is limited in volume, and trade occurring that clears confidentiality protocols and is robust and not limited in volume. In the last two cases, USDA AMS would likely report trade, but these scenarios differ in the extent to which "thin volumes" may be involved.

  Accordingly, we suggest examining the impact of establishing minimum volume thresholds (e.g., 10,000 pounds, 20,000 pounds — perhaps varying by pork product in a documented way).

- **Indicate When Estimates Use Values Other Than the Most Recently Reported.**

  Industry stakeholders expressed some uncertainty about whether primal and composite computations used values other than those listed in the most recent USDA AMS-published reports. Perhaps footnotes can be added to reports conveying the percentage — likely on a volume-weighted rather than raw transaction count basis — of primal and composite cutout volumes that correspond with transactions observed by USDA AMS but not reported at the product level.

- **Measure Sensitivity of Primal and Composite Carcass Value.**

  We suggest USDA AMS evaluate how primal and composite carcass value respond to the following scenarios:

  1. Discontinue labor cost adjustment.
  2. Change yield percentages.
  3. Include specialty product trade.

- **Continue Voluntary Collection of Fabrication Costs and Yield.**

  Fabrication costs and yields affect the composite cutout value estimated by USDA AMS. Market participants clearly use these variables, and they submit this information voluntarily. Potential room for improvement stems from enhancing transparency of how fabrication costs and yields are derived and periodically gather industry feedback.

- **Internally Assess Reporting Percentile Information to Describe Price Distributions.**

  In August 2021, USDA AMS initiated a new report titled "National Weekly Cattle Net Price Distribution" (LM_CT215). This fed cattle report segregates volumes purchased in $2 +/- increments. Similarly, USDA AMS has published a similar net price distribution report for hogs since January 2010 (LM_HG215).

  We recommend USDA AMS examine feasibility within wholesale pork reporting of not simply providing minimum and maximum values that depict the complete range in the market. We would argue that reporting 15th and 85th percentiles (or interquartile; 25th and 75th percentiles) is more informative to stakeholders and hence encourage USDA AMS to consider this enhancement. Alternatively, reporting volumes in $5 +/- increments may be more feasible.

- **Proactive Assessment.**

  We recommend AMS periodically and proactively evaluate procedural changes that may enhance reporting given ongoing industry adjustment. For instance, further product differentiation or segmentation may thin traditional, negotiated pork trade necessitating AMS adjustment to sustain high quality of wholesale pork market reporting.

APPENDIX A: Live Hog Trade and Pricing Methods

Negotiated live-hog sales declined by 86.11% from 2002 to 2022 — roughly 13.17 million head in 2002 to 1.7 million head in 2022. Data from 2002 show that negotiated sales were used for 14.65% of all hogs reported compared with 1.48% in 2022. This change corresponded with more formulated live-hog transactions to reference the composite cutout (i.e., AMS report PK 680).

Exhibit A1 shows the share of monthly hog volume (i.e., percentage of head count) by sale type. It reinforces the drop in negotiated purchases and illustrates the staying power that formulas (e.g., swine or pork market formula, other market formula) have had for transacting hogs. Packer-owned hogs have also become more common. They accounted for 38.7% of 2022's total barrow and gilt volume. They represented 28.3% of market hogs in 2016 (Meyer, 2019).

Exhibit A1. Packer Origination of Barrows & Gilts by Method Since LMR Began
(Source: USDA AMS Livestock Market News Mandatory Price Reporting Data Mart)