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CASE STUDIES OF SUPERMARKETS AND FOOD SUPPLY CHAINS IN LOW-INCOME AREAS OF THE NORTHEAST:

KENT COUNTY STORE 1, DELAWARE

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Introduction

As part of a collection of EFSNE projects that examined distribution systems, 11 store case studies were conducted to gain a better understanding of stores serving low-income areas and their role in the regional food system of the Northeast. The cases are an effort to record important characteristics of the participating stores and their supply chain partners. This case describes a supermarket and with it the supply chains of two of the eight foods in the EFSNE project's market basket, which served as a focal point for many of its research activities. Case study interviews were conducted between 2013 and 2014. Fictitious names are used to maintain confidentiality of the study participants.

Place: Kent County, DE

Kent County is the southernmost county in Delaware, located on the Delmarva Peninsula. It is relatively sparsely populated with a population of 167,477 (Table 1). The economy is largely driven by agriculture and the county's miles of ocean beaches, which are a strong tourist attraction.

The median household income is $53,375, somewhat lower than the state median of $60,231. Persons below poverty level for the same time period is 12.8 percent, just greater than the state average of 12.0 percent. The community in which the case study store is located is a small city with a population of 18,931.

The Economic Census reports 25 grocery stores, excluding convenience stores, in Kent County which is approximately 1.5 grocery stores per 10,000 residents (Table 1). In addition to grocery stores, the county has three supercenters and wholesale clubs and 58 convenience stores. These plus the grocery stores total approximately 5.1 grocery, convenience, supercenter, and club stores per 10,000 residents.

Supermarkets and other grocery stores sell a variety of foods, such as canned and frozen foods; fresh fruits and vegetables; and fresh and prepared meats, fish, and poultry. Supermarkets are traditionally defined in the food retail industry as large grocery stores having $2 million or more in annual sales. Convenience stores or food marts (except those with fuel pumps) primarily engage in retailing a limited line of goods that generally includes milk, bread, soda, and snacks.

TABLE 1: Demographic and Food Environment Statistics for Kent Store 1

	Community zip code	Kent County	Delaware
DEMOGRAPHICS			
Population and Age			
Population[1]	18,931	167,477	917,060
Median age[1]	41.9	36.8	39.1
Less than 5 years of age[a,1]	7.6%	6.6%	6.1%
Average household size[1]	2.58	2.74	2.63
Education			
High school degree or higher[a,1]	82.6%	86.0%	88.0%
Bachelor's degree or higher[a,1]	20.0%	22.7%	29.4%
Race and Ethnicity			
African American or Black[a,b,1]	15.1%	27.0%	23.2%
Hispanic[a,c,1]	10.8%	6.4%	8.6%
Poverty and Program Participation			
Poverty rate[a,1]	12.8%	12.9%	12.0%
Food insecurity rate[a,2]	13.1%	12.6%	21.4%
Share SNAP recipients[a,d,1,3]	N/A[e]	21.4%	16.6%
Income			
Median household income[1]	$53,375	$55,169	$60,231
FOOD ENVIRONMENT			
Grocery stores[f,4]	2.64	1.49	1.81
Convenience stores[f,4]	6.87	3.46	1.23
Warehouse club, and supercenters[f,4]	0.53	0.18	0.13

Notes:

[a] Percentage of entire population.

[b] Alone or in combination with other races.

[c] Of any race.

[d] Calculated by dividing the number of SNAP recipients by the population.

[e] Data not available at the zip code level.

[f] Number per 10,000 people.

Sources:

[1] American Community Survey 5-Year Estimate, 2010 - 2014, copied from http://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml on April 27, 2016.

[2] Food insecurity, 2013, FeedingAmerica.org, downloaded from http://www.feedingamerica.org/hunger-in-america/our-research/map-the-meal-gap/data-by-county-in-each-state.html on April 27, 2016.

[3] Small Area Income and Poverty Estimate, July 2013, downloaded from http://www.census.gov/did/www/saipe/data/model/tables.html on April 27, 2016.

[4] County Business Patterns Database, 2013, downloaded from https://www.census.gov/econ/cbp/download/13_data/ on April 29, 2016. Currently online at https://www.census.gov/data/datasets/2013/econ/cbp/2013-cbp.html.

> “Most of the products it sells are private label brands with few national brands.”

Kent Store 1

Kent Store 1 is independently owned but is a licensed member of a chain of supermarkets.[1] The owner owns seven other stores. This store has been in business for about 10-15 years and is a small store with a limited number of food items. Most of the products it sells are private label brands with few national brands. In addition, the products are displayed still on pallets, reducing labor needed to shelve products and reducing the need for shelving fixtures themselves. These features enable the store to sell products at extremely low prices.

The store is about 14,000 square feet, 4,000 of which is backroom storage. It averages about $70,000 in weekly sales or $3.64 million annually. It has 15 full- and part-time employees.

TABLE 2: U.S. Store Operations versus Kent Store 1

	Kent Store 1	2013 U.S. average
Store selling area	10,000 sq ft	33,250 sq ft
Weekly sales	$70,000	$318,462
Weekly sales per sq ft of selling area	$7.00	$9.58
Weekly sales per full-time equivalent employee	$4,666 est.	$4,423

Source: Progressive Grocer, “81st Annual Report of the Grocery Industry.” April 2014.

The store orders almost all of its products from Integrated Wholesaler. This wholesaler has a distribution center located in Maryland about 160 miles away. The store has little control over what it carries. What it gives up in control, it gains in operations efficiencies. Although it has little control over buying directly from local businesses, there is some leeway each month for special opportunities. It can buy a few local produce items, such as local sweet corn, watermelons, and cantaloupes. The store manager stated that he would rather buy local when able as the product is not always about price but quality. The manager also stated that recently he was able to get local watermelon for $2.49 during the season when the warehouse has it for $3.99. The store purchases from 20-25 suppliers.

[1] The store manager was interviewed in 2013. Although this case study is written in present tense, it is meant to provide a snapshot in time. The authors make no claims that the data reflect anything other than the situation at that time.

The manager estimated that eight percent of the store's sales were in produce and 20-25 percent in meats. These departments operate with gross margins of 30-35 percent for produce and about 30 percent for ground beef.

The manager reported that sales the past year fluctuated as another store opened down the road. Sales initially dropped, although the drop appears to be temporary as sales have recently risen to levels prior to the new store opening. Other than this year, sales in the last three years have stayed the same. The store manager estimates sales growing in the next three years by 10-15 percent.

Interestingly, when asked "What external factors impact your ability to be in business in the community," the store manager only thought of positive factors and not negative. These positive factors included lower prices at the store compared to other stores and population growth in the market area.

The store manager described only one significant external factor that limits his ability to procure regionally produced foods. Suppliers have to have an account before the store can buy from them. The store will not buy from farmers who happen to stop by with product for sale. However, this is normal procedure for the majority of grocery stores in the U.S.

The manager indicated there was nothing that limited his ability to sell healthy foods.

Market basket items – Apples and Ground Beef

Apple sales are about 35 percent of produce department sales, second only to bananas which are about 40 percent of produce department sales. The produce department is small and carries the most popular apple varieties, Galas, Red Delicious, Golden Delicious, Pink Lady, Paula Reds, and Honeycrisp.

Kent Store 1 sells 73-75% and 85% lean ground beef. The ground beef is ordered from Integrated Wholesaler's distribution center (DC) and comes in 10-pound tubes which is then reground to the desired consistency in the store and packaged in foam trays. The store also sells two-pound and five-pound chub tubes. Sales of the 73-75% ground beef are the most popular, although the store assistant believes the 85% lean also sells well and that people "really notice" when the store runs out of it.

The manager orders all of the store's ground beef from Integrated Wholesaler's DC in MD. He does get some special beef items from a meat supplier in MD (about 10 percent of other beef cuts).

The meat manager orders online on Integrated Wholesaler's system manager. Orders are placed twice per week. Deliveries are on a semi-trailer which carries mixed loads from the DC.

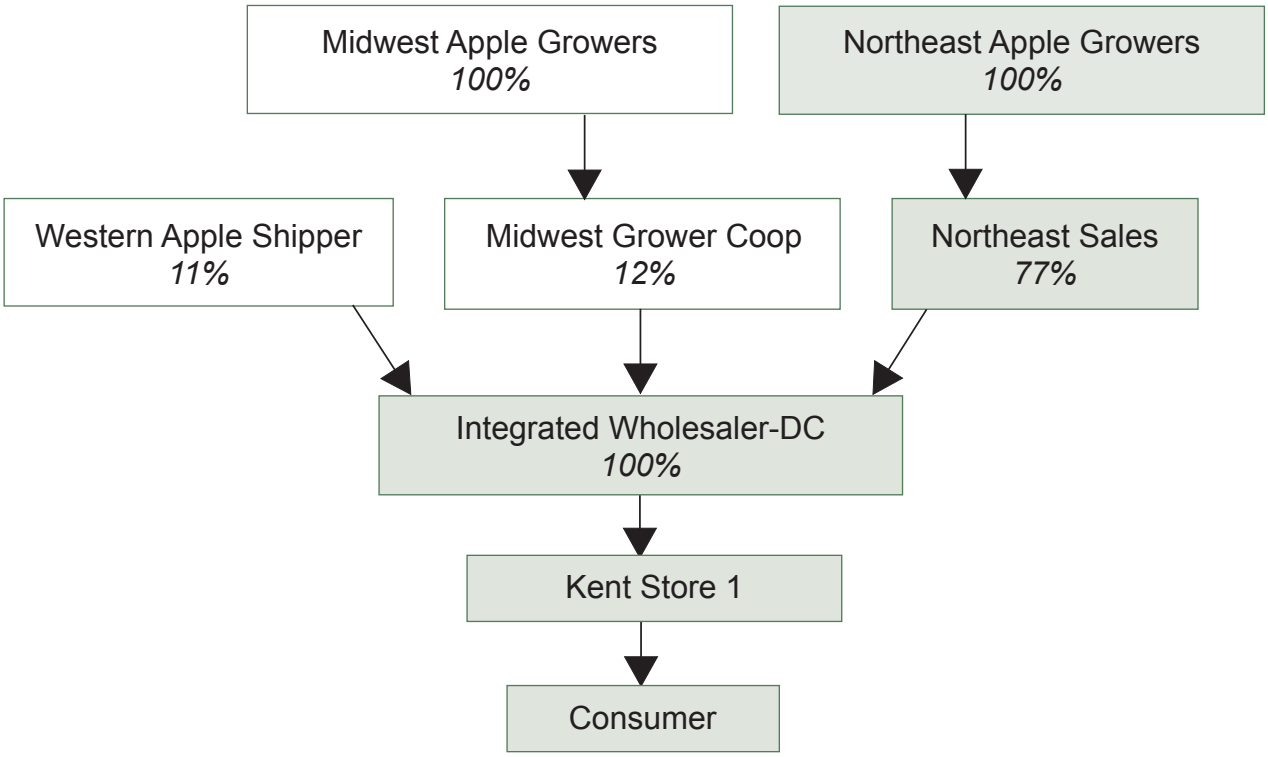
Supply Chains

We trace the supply chains of two of our market basket products sold by Kent Store 1, apples and ground beef, to determine the sources of these foods and the extent of regional food system participation. We define a regional supply chain as one where the product is produced, or grown, in the Northeast region.

Product 1: Apples

Figure 1 depicts the general supply chain for Kent Store 1's apples. Starting with the store and tracing back, the boxes indicate what percent of the next member of the supply chain's apples it provides. For example, the chain's distribution center with Integrated Wholesaler provides 100 percent of the store's apples, while Northeast Sales provides 77 percent of the wholesaler's regional DC's apples. Western Apple Shipper and Midwest Grower Coop (Midwest GC) provide the remaining 23 percent of the regional DC's apples.

FIGURE 1: Apple Supply Chain for Kent Store 1



Note: Shaded boxes represent supply chain members located in the Northeast Region. Numbers in boxes represent the percent of the next member's supply.
Source: Author's calculations based on case interviews.

Regional Supply Chain

Northeast Apple Growers

Many apple growers in the Northeast use sales agents or shippers to market their apples. Integrated Wholesaler, the store's apple supplier, purchases apples from Northeast Sales who acts as a sales agent for a number of growers in the Northeast. Northeast Apple Grower 1 (NAG1) is one of the growers that supplies Northeast Sales and is used here as a representative of the apple growers in this supply chain.

NAG1 has been operating for over 100 years. It employs about 75 full-time and 85 part-time people. The part-time employees are mostly seasonal.

It farms about 600 acres of apple orchards with average annual sales of about $7 million, depending on the crop year and prices. It grows and packs apples and sells 80 percent of its apples through Northeast Sales. It sells the remainder through another sales agent with some residual sales for cider. Sales are from mid-August through late May/early June. The reason for using two agents is that each agent serves a slightly different geographic customer base. Using two agents also helps to diversify risk.

> "[Northeast Apple Grower 1] sells to the best markets that give the greatest returns, whether or not those markets are within the region."

In general, NAG1 sells 25 percent of its apples in New York State, 50 percent in the rest of the Northeast, and the remainder nationally. It is not necessarily interested in selling more apples within the state or the region. It sells to the best markets that give the greatest returns, whether or not those markets are within the region.

The farm carries GlobalGAP food safety certification as well as Primus Audit for the packing shed. It sells only its own apples and does not purchase apples from other growers.

Northeast Sales arranges sales and transportation, and takes responsibility for receiving payment from customers. For these activities, NAG1 pays them eight percent of the farmgate price as sales commission.

Orders from Northeast Sales are received by fax along with email communications. NAG1 believes that electronic ordering using Electronic Data Exchange (EDI) or an online ordering platform is costly as well as difficult to implement, because of the difficulties transmitting apple quality characteristics using these methods.

NAG1 believes that sales and marketing is much more effective when growers' sales are coordinated through an agent as opposed to every grower being its own marketer and sending false signals to the market or fragmenting the industry. In addition, a sales agent can consolidate production from many growers to sell to large accounts, such as Wal-Mart and Publix, that are otherwise too large for individual growers to supply.

The sales agent coordinates a complex supply network and transportation logistics from multiple growers. Trucks often

drive to multiple packing houses to pick up products to fill an order or to make sure the truck is full to maximize transportation efficiency. In addition, if there is more than one customer's order on the truck, it has to be loaded onto the truck according to each customer's order and in order of dropoff location.

Northeast Sales

Northeast Sales is a sales agent for a number of growers and grower cooperatives in New York State. It manages accounts, coordinates product and arranges transportation for its growers. It works with growers in the different growing regions in the state which helps diversify production risk and seasonality as well as being able to offer varieties best suited to specific growing regions.

It ships an estimated one-third of New York's fresh apple crop to retail, wholesale, food service and terminal markets in the U.S. It also exports and imports apples.[1] The packers that use Northeast Sales as their agent are all certified by "Good Agricultural Guidelines," Global Standard for Food Safety, and GlobalGAP Audit with Postharvest.

Integrated Wholesaler orders apples twice per week or weekly depending on need. Orders are placed online. Orders are about two-thirds of a tractor-trailer, so Northeast Sales will fill the rest of the truck with other customers' orders. Delivery is included and prices are established weekly.

Integrated Wholesaler-Distribution Center

All the apples sold by the store come from one of Integrated Wholesaler's DCs that is located 160 miles away. The store orders apples twice per week from the DC using the chain's online ordering system. Orders are delivered to the store on a tractor trailer and delivery is charged to the store.

Integrated Wholesaler provides circulars, special promotions, in-store merchandising, and other services to the store.

Bagged apples, 3-, 5-, and 8-lb bags, represent 80-90 percent of the chain's overall apple sales. Northeast Sales provides 75-80 percent of the apples for Integrated Wholesaler DCs located in the Northeast, including the one that services Kent Store 1, but it only provides 10 percent of Integrated Wholesaler's total apples nationally. In general, when a company has multiple DCs and multiple suppliers of the same or similar product, it tries to minimize transportation by assigning suppliers to the DC or DCs that are closest to the supplier.

In addition to buying from Northeast Sales, this DC in the Northeast buys from Western Apple Shipper year-round. And it buys from Midwest Apple Growers as long as supplies last, which is about 8-9 months.

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[1] Company website

Regional Comparisons

In this section, we compare the performance of the regional apple supply chain starting with Northeast Apple Grower 1 to the non-regional supply chains, starting with growers in Washington and Michigan.

Table 3 shows the price margin[2] per three-pound bag of apples received by each member of various supply chains. For example, NAG 1's price per three-pound bag of Red Delicious apples is $1.22, which is the price margin at the first point of sales. The price margin for the sales agent is $0.11. We note that the margin is what is left to pay for all other business expenses and profits. It is not an indication of profitability.

In addition, it shows the percent of the retail price received by each member calculated from the member's price margin. The producer share of the retail price is greatest for NAG 1 and the smallest for Western Apple Shippers. NAG 1 receives $1.22 per three-pound bag or 30.6 percent share, excluding sales agent fee and transport, of the total retail value. The price margins and percentages of retail price for the remaining segments of the supply chain, Integrated Wholesaler and Kent Store 1, are combined as we could not obtain sufficient data to calculate for each member. The delivery or transportation charges from the DC to the store are $700 per truck and estimated as $0.05 per three-pound bag. Transportation costs per bag from the grower-shipper to the DC are greater in the national supply chains than in the regional supply chain.

TABLE 3: Allocation of Retail Price in Kent Store 1's Apple Supply Chains

	Northeast Growers (Red Delicious)		Western Apple Shipper (Red Delicious)		Midwest Apple Growers (Red Delicious)	
Supply chain member	Price margin ($/3lb bag)	% of retail price	Price margin ($/3lb bag)	% of retail price	Price margin ($/3lb bag)	% of retail price
Producer-packer-shipper	$1.22	30.6	1.19	29.8	1.21	30.3
Sales agent fee[1]	0.11	2.7	NA	NA	NA	NA
Transportation	0.12	3.0	0.45	11.3	0.21	5.3
Integrated Wholesaler-delivery-Kent Store 1[2]	2.55	63.8	2.35	58.9	2.57	64.4
Total Retail Price	3.99	100.0	3.99	100.0	3.99	100.0

Notes: NA indicates "not applicable"

[1] Fee is 8 percent of the f.o.b. price for Northeast growers

[2] Price margins and percentages of retail price for these supply members are combined as insufficient data were obtained to calculate for each member.

Source: Author's calculations based on case interviews.

[1] Price margin is defined here as the sale price minus the purchase price.

Table 4 shows estimates of the distance and fuel utilized to get apples from various producers to the retailer. Apples from Washington travel the most miles and use the most total fuel per hundredweight compared to the other supply chains. Apples from NAG 1 travel the fewest miles and use the least fuel across supply chain segments.

TABLE 4: Food Miles and Fuel Use in Kent Store 1's Apple Supply Chains

	Food miles	Truck miles[1]	Truck capacity	Fuel use[2]	Fuel use per cwt shipped
Supply chain segment	*number*		*cwt*	*gallons*	
Regional: Northeast Growers to Kent Store 1					
Northeast Growers to Integrated Wholesaler DC	235	235	400	39.1	0.10
Distribution Center to Kent Store 1	160	160	400	26.7	0.07
All segments	395	395	400	65.8	0.16
Non-Regional: Midwest Apple Growers to Kent Store 1					
Midwest Growers to Distribution Center	573	573	400	95.5	0.24
Integrated Wholesaler DC to Kent Store 1	160	160	400	26.7	0.07
All segments	733	733	400	122.2	0.31
Non-Regional: Western Apple Shipper to Kent Store 1					
Western Growers to Integrated Wholesaler DC	2,585	2,585	400	430.9	1.08
Integrated Wholesaler DC to Kent Store 1	160	160	400	26.7	0.07
All segments	2,745	2,745	400	457.6	1.15

[1] Truck miles are equal to food miles when apples travel over 150 miles. Trucks on trips longer than 150 miles will return with a backhaul.
[2] Trailer trucks used by growers to transport apples to the distribution center and to the store have a capacity of 40,000 pounds and obtain 6 mpg.
Source: Author's calculations based on case interviews.

Prospects for Expansion of Regional Food System: Apples

Kent Store 1 obtains its apples from Integrated Wholesaler's DC, which gets approximately 77 percent of its apples from Northeast Sales. It buys the remainder from the Midwest and from Washington. The portion from each region will vary according to prices and the quality of the crop from each region. Purchasing from different regions also provides some risk insurance in case Northeast Sales runs short. Expanding the percent from the Northeast may be possible if shippers in the Northeast have the varieties that consumers demand and have competitive prices

for this low-price retailer. Northeast Sales still has a more limited supply of apples in the summer, however, and the DC will need apple suppliers who can supply them with apples in the summer before the next harvest.

Table 5 presents estimates of the value-added activities by each member of the various supply chains. Members that are located in the Northeast are shaded gray. We weight the member's retail price share (see Table 3) by the proportion of the store's total apples that they provide (see Figure 1) to calculate the extent of total regional participation in the supply chain. Table 5 summarizes the extent of members' participation in the supply chains as well as the total extent of regional value-added activity in the apple supply chains.

The regional supply chain provides 77 percent of the value-added activity of Kent Store 1's total apple supply chains. However, other members of the store's apple supply chains, including Integrated Wholesaler and the store itself, are located in the region. Their value-added activities are, therefore, conducted in the region. When we calculate the value-added activities from the Midwest and Western supply chains, we include the wholesaler and store activities in the regional value-added activities in Table 5.

The sum of all regional activities from all supply chains is estimated at 91.3 percent, which means 91.3 percent of the value-added activities from the store's apple supply chains are being conducted in the region.

"...91.3 percent of the value-added activities from the store's apple supply chains are being conducted in the region."

TABLE 5: Extent of Regional Value-Added Activity in the Kent Store 1's Apple Supply Chains

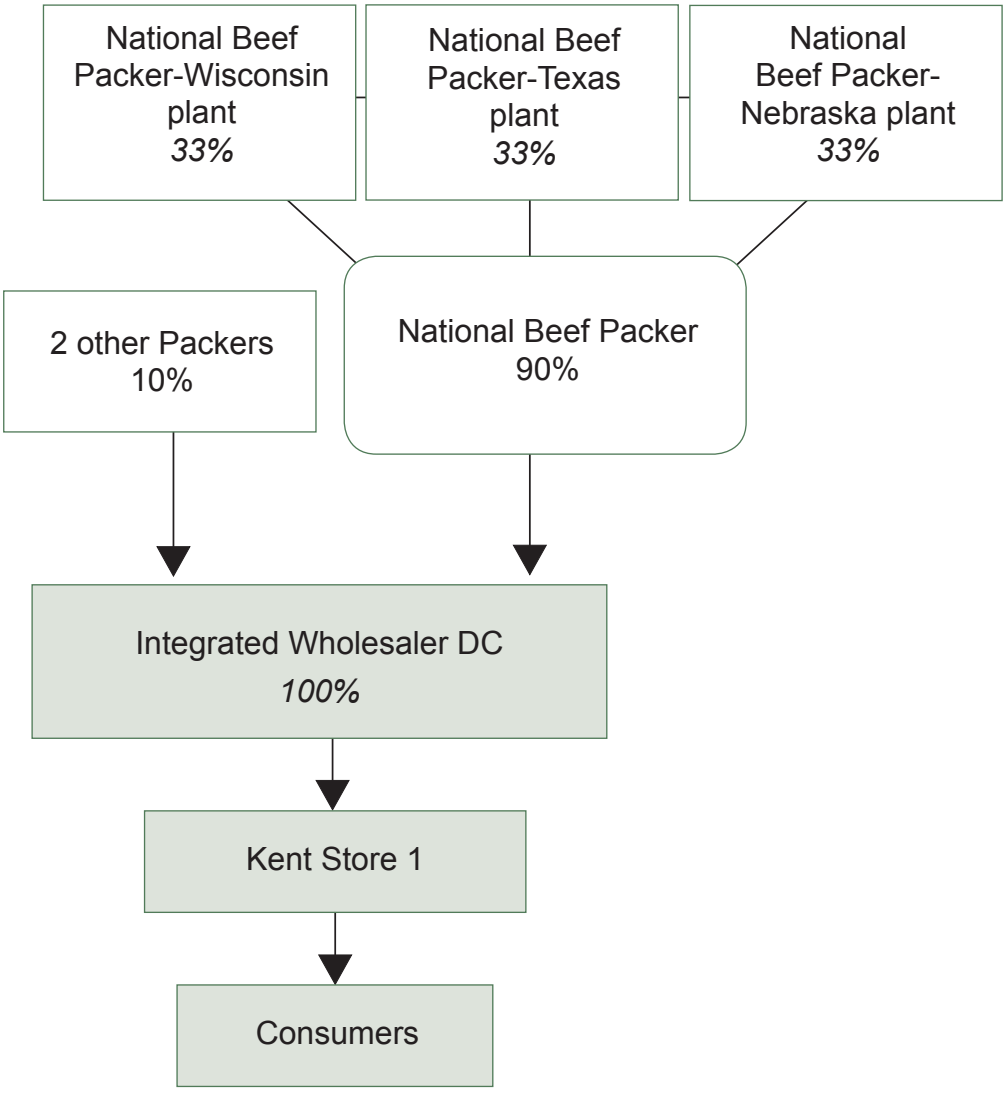
Supply chain segment	Percent of retailer's apple supplies	Value-added[1]	Value-added retained by supply chain member	Extent of regional value-added activity[2]
	%	*% retail price*	%	%
Regional: Northeast Apple Grower 1 to Kent Store 1				
Northeast Growers[3]	77	30.6	23.6	
Sales agent fee		2.7	2.1	
Transportation		3.0	2.3	
Integrated Wholesaler DC -delivery-Kent Store	100	63.8[4]	49.1	
All segments	77	100.0		**77.0**
Non-regional: Midwest Growers to Kent Store 1				
Michigan Growers	12	30.3	3.6	
Transportation		5.3	0.6	
Integrated Wholesaler DC -delivery-Kent Store	100	64.4[4]	7.7	
All Segments	12			**7.7**
Non-regional: Western Growers to Kent Store 1				
Western Growers	11	29.8	3.3	
Transportation		11.3	1.2	
Integrated Wholesaler DC -delivery-Kent Store	100	58.9[4]	6.5	
All segments	11			**6.5**
Added-value contained in region				**91.3**

[1] This column contains the % margins of retail revenue from Table 2 above.
[2] This column captures all regional activity in the Northeast within each supply chain (excludes supply chain activity outside of the Northeast).
[3] Northeast Growers represents Northeast apple growers selling to Kent 1's DC through Northeast Sales.
[4] Includes price margin of transportation from distribution center to store.
Note: shaded rows indicate that the supply chain member is in the NE region.
Source: Author's calculations based on case interviews.

Product 2: Ground Beef

Figure 2 depicts the general supply chain for Kent Store 1's ground beef. Starting at the store and tracing back up the supply chain, the boxes upstream indicate percent of ground beef purchases of the downstream member. For example, the DC provides 100 percent of the store's ground beef. About 10 percent of other beef cuts are purchased from other suppliers but ground beef is not.

FIGURE 2: Ground Beef Supply Chain for Kent Store 1



Note: Shaded boxes represent supply chain members located in the Northeast Region. Numbers in boxes represent the percent of the next member's supply.

Source: Author's calculations based on case interviews.

National Beef Packer

National Beef Packer is one of the largest meat processors in the U.S. Most of its plants are concentrated in the Midwest. In addition to its Midwest plants, it has a plant on the East Coast and a plant on the West Coast.

Integrated Wholesaler

Integrated Wholesaler headquarters buys 93%, 85%, 81%, and 73%, lean ground beef in chubs for the entire chain. The 93% and 85% are "source" grinds which means they come from specific cuts of meat, such as the sirloin. The 81% and 73% lean come from any number of trims from any cut which are adjusted to come in at the desired level of lean to fat.

The DC purchases the following ground beef per week to replenish inventories:

- 85% - 30 boxes/week or about 10 percent of purchases
- 81% - 90 boxes or about 30 percent of purchases
- 73% - 175 boxes or about 60 percent of purchases

Hardly any 93% lean ground beef is sold, although they carry it for stores that demand the product.

The DC receives deliveries three times per week and the product comes in 10-pound chubs. The plant has an E. coli test-and-hold program and product is a maximum of seven days old when it arrives at the DC.

National Beef Packer is the primary supplier to the DC, although the DC uses two other major beef companies to fill out its supplies. National Beef Packer will ship from any of its plants as it sees fit. Therefore product can come from any of their Midwest plants. National Beef Packer has a plant in Pennsylvania, but the DC does not receive any product from there.

Orders are placed three days a week and are communicated by email, although some communication occurs by phone when necessary. The final order is placed by electronic data interchange (EDI). The ordering process starts with a "preorder" case count sent to the packer three months prior to shipping. The final order is made 10 days prior. The final order may be plus or minus 10-15 percent of the preorder and usually is for about 9,000 pounds per order. The ground beef order is placed on a mixed load with other meat cuts and is about 50 percent of the load.

Integrated Wholesaler buys f.o.b. and pays for freight separately; however, both the order and the freight are listed on the same invoice. The freight charge is monitored by headquarters each quarter, and freight is not a profit center for National Beef Packer.

Prices are usually negotiated weekly from the USDA-Agricultural Market News reports, although sometimes they may be negotiated daily. Prices fluctuate widely throughout the year. In addition the price spread between the 85% and 73% lean ground beef will vary between 10 cents – 45 cents per pound. No contracts are used.

Regional Comparisons

In this section we examine the structure of the ground beef supply chain. The supply chains are all non-regional, thus a comparison with a regional model is not possible.

Table 6 shows the price margin[3] per pound of ground beef received by each member of the primary national supply chain. In addition, it shows the percent of the retail price received by each member, using the member's price margin. For example, the beef slaughtering plant and packer member in the supply chain is National Beef Packer. Its price margin for one pound of 73% ground beef is 64.2 percent which pays for the cost of goods sold, in this case the cattle supplying the feedlot and/or plant. The price margin for the retailer in the same supply chain is 31.3 percent. We note that the price margin is what is left to pay for all other business expenses and profits. It is not an indication of profitability.

TABLE 6: Allocation of Retail Price in Kent Store 1's Ground Beef Supply Chains

	National Beef Packer (73% lean)		**National Beef Packer** (Ground round as proxy for 85% lean)	
Supply chain member	Price margin ($/lb)	% of retail price	Price margin ($/lb)	% of retail price
National Beef Packer[1]	1.66	64.2	2.24	70.2
Transportation[2]	0.10	3.9	0.10	3.1
Distribution Center-delivery-Kent Store 1[3]	0.83	31.9	0.85	26.7
Total Retail Price	2.59	100.0	3.19	100.0

[1] USDA-AMS Market News Service.
[2] Estimated from industry interviews
[3] Price margins and percents of retail price for these supply members are combined as insufficient data were obtained to calculate for each member.
Notes: - indicates "not applicable"
Source: Author's calculations based on case interviews and USDA-AMS Market News Service.

Table 7 shows the distance and fuel used to get ground beef from the meat packing plants to the retailer. The ground beef is shipped from three plants which are located in Milwaukee, Wisconsin, Dodge City, Kansas, and Friona, Texas. The food miles in Table 6 are a simple average of the miles from each plant to the distribution center.

[3] Price margin is defined here is the sale price minus the purchase price

TABLE 7: Food Miles and Fuel Use in Kent Store 1's Ground Beef Supply Chain

	Food miles	Truck miles[1]	Truck capacity	Fuel use[2]	Fuel use per cwt shipped
Supply chain segment	*number*		*cwt*	*gallons*	
National Beef Packer to DC	1,213	1,213	400	202.1	0.51
Integrated Wholesaler DC to Kent Store 1	160	160	400	26.7	0.07
All segments	1,373	1,373		228.8	0.57

[1] Truck miles are equal to food miles when beef travels over 150 miles. Trucks on trips longer than 150 miles will return with a backhaul.
[2] Miles per gallon (mpg) for trailer trucks used for shipping beef from the processing plant to the distribution center have a capacity of 40,000 pounds and obtain 6 mpg
Source: Author's calculations based on case interviews and USDA, Agricultural Marketing Service.

Prospects for Expansion of Regional Food System: Ground Beef

The meat processor receives a high share of the retail price. The revenue share pays for the value-added activities, which include feeding out cattle as well as the slaughter, handling, storage, grading, packing, sales, and shipping as well as profits.

Kent Store 1 does not buy any regional production in this supply chain for ground beef. However, the retailer Kent Store 1 performs regional value-added activities centered around the distribution center and retail store. We weight the member retail price shares (see Table 6) by the proportion of Kent Store 1's ground beef that they provide (see Figure 2) to calculate the extent of total regional participation in the supply chain. Table 8 summarizes the extent of members' participation in the supply chain as well as the total extent of regional value-added activity.

The sum of the regional activity is 28.7 percent, which means 28.7 percent of the value-added activities from Kent Store 1's ground beef supply chain is being conducted in the region.

TABLE 8: Extent of Regional Value-Added Activity in the Kent Store 1's Ground Beef Chain, 73% Lean

	Percent of retailer's ground beef supplies	Value-added[1]	Value-added retained by supply chain member	Extent of regional value-added activity[2]
Supply chain segment	%	% price margin	%	%
Meat processor	90	64.2[3]	57.8	
Transportation		3.9	3.5	
Integrated Wholesaler DC-delivery-Kent Store 1[3]	100	31.9	28.7	
All segments	100	100.0	90.0	28.7
Added-value performed in region				**28.7**

[1] This column contains the % margins of retail revenue from Table 5 above.
[2] This column captures all regional activity in the NE within each supply chain (excludes supply chain activity outside of the Northeast).
[3] Includes transportation margin from DC to store.
As default, the retailer percent is 100%.

Note: Shaded rows indicate supply chain members located in the Northeast.
Source: Author's calculations based on case interviews.

Key Lessons for Kent Store 1

Kent Store 1 is a small supermarket located in a city of Kent County, Delaware. The product supply chains described in this case are apples and ground beef.

The Store and Its Environment

Effect of size and economies of scale

- The store is small and less than a third the size of the average supermarket; however, it is designed for highly efficient operations with low labor costs, displaying product on pallets and eliminating the labor needed to shelve products. The store has a limited assortment of products and most of them are private label brands.
- By being a low-cost operator, Kent Store 1 competes by offering extremely low prices.
- The store gains economies of scale by being a licensed member of an integrated wholesale-retail chain. It purchases almost all of its supplies from one of Integrated Wholesaler's distribution centers.

Effect of ownership structure

- Although the store is owned by an individual proprietor, it is under a licensed agreement with Integrated Wholesaler. The license stipulates most operations and limits purchasing outside of the distribution center assigned to the store. The store manager reported that special purchasing opportunities are

available to the store. He is able to buy some produce locally as long as the vendor is registered with Integrated Wholesaler.
Market Basket Supply Chains
Effect of regional production/industry

- The Northeast supplies the majority, 77 percent, of the store's apples. The Northeast produces a significant amount of apples. In addition, Northeast Sales works with enough apple growers to be able to coordinate the large volumes needed by the Integrated Wholesale DC.
- Conversely, the store does not have any regional supply chain for ground beef, and all of the ground beef is sourced from outside the region.

Market Basket Supply Chains

Extent of regional value-added activity

- 91.3 percent of all value-added activity along Kent Store 1's apple supply chain is produced in the region. This includes 77 percent of the apple volume grown in the region plus value-added activities contributed by the DC and the store itself.
- Although none of the ground beef sold in the store is produced or slaughtered in the Northeast, value-added supply chain activities are conducted in the region by Integrated Wholesaler and by the store itself. These activities are estimated at 28.7 percent.
    - We see that even for supply chains in which the origin is very far away there is a lot of value-addition going on in the Northeast. This is important because this translates into economic activity in the Northeast due to the distribution and retailing system.

Effect of geography/distance

- Despite the fact that the Northeast does not supply any ground beef to the store, the mileage for transporting ground beef from various packing plants in the Midwest is about half that of transporting apples from the West, 0.57 gallons per hundredweight versus 1.15 gallons per hundredweight respectively.
    - The biggest competitive factors for the Northeast farms are most likely the costs of transportation and proximity to market. These have been the biggest factors for decades, but because of increased transportation costs, government regulations on trucking, and deteriorating transportation infrastructure, these factors have become more important in the cost equation.[4]

[4] Edward W. McLaughlin, Kristen S. Park, Gerard F. Hawkes. *Produce Industry Procurement: Changing Preferences and Practices*. Extension Bulletin 2015-10. Charles H. Dyson School of Applied Economics and Management, Cornell University, Ithaca, NY. 2015.

Appendix

Apple Industry Profile

According to the 2015 National Agricultural Statistics Service (NASS) Survey, the Northeast region (from Maine south to West Virginia and Maryland) contains two out of the top five apple producing states. That same year the two leading production states were Washington and New York (Table A.1.).

TABLE A.1: Top Producing Apple States

State	Utilized Production
	million pounds
Washington	5,910
New York	1,350
Michigan	990
Pennsylvania	515
Virginia	195
California	145

Source: USDA, NASS. Noncitrus Fruits and Nuts: 2015 Summary. July 2016. http://usda.mannlib.cornell.edu/usda/current/NoncFruiNu/NoncFruiNu-07-06-2016.pdf.

Apples are the third leading item in sales in the retail produce department and are an important contributor to generating customer traffic and store profits (Table A.2). Therefore, retailers generally strive to keep fresh apples in the store year round with different varieties and selections of bagged and bulk apples. In order to do this they use apples supplied from different growing regions.

TABLE A.2: Top 5 Retail Produce Items

U.S. Retail Fruit Sales for 52 weeks ending December 26, 2015

	Average sales per store per week
Berries	$4,250
Citrus	$3,016
Apples	$2,961
Grapes	$2,881
Bananas	$2,690

Source: "FreshFacts on Retail: 2015." United Fresh Produce Association and Nielsen Perishables Group, January 2016.

Different growing regions sometimes specialize in different varieties that retailers wish to have available, such as Washington

Red Delicious apples. In addition, different growing regions provide retailers some risk insurance in case of regional crop failures. For instance, in 2012 Michigan produced only 10 percent of its average apple crop due to bad weather, but Washington production was normal and could provide retailers supplemental apples[5]. Other regions may have better growing conditions for producing organic apples than others, such as New York. In addition, apple inventories run low in July and August in most states, and retailers often need to purchase imported apples to supplement domestic supplies.

Northeast apple production accounts for 22 percent of utilized production in the U.S. (Table A.3.). Per acre yields are lower than national averages, but Northeast apple producers receive a higher per pound price for fresh apples than the U.S. average.

TABLE A.3: 2015 U.S. and Northeast U.S. Apple Statistics

Source	Variable	U.S.	Northeast	Northeast, % of U.S.
1	Bearing age acres, *acres*	315,180	78,730	25.0%
1	Yield per acre, *pounds*	31,700	19,309	60.9%
1	Utilized production, *million lbs*	9,924.40	2,192	22.1%
1	Value of utilized production, *$ thousands*	3,394,185	510,099	15.0%
1	Utilized production, fresh, *million lbs**	6,855.70	1,073	15.6%
1	Value of production, fresh, *$ millions**	3,085,971	380,573	12.3%
1	Grower price, fresh, *$ per lb* (*packing house door)**	0.45	0.56	124.4%
2	Retail price, *$ per lb* †	1.36	na	na
2	Fresh consumption per capita, *lbs*	17.2	na	na

*Numbers may be slightly higher since some NE states do not report these statistics to protect producer privacy.
†Retail prices are for Red Delicious apples. Grower price for marketing season 2014-2015.
Sources:
[1] USDA, NASS. Noncitrus Fruits and Nuts: 2015 Summary. July 2016. http://usda.mannlib.cornell.edu/usda/current/NoncFruiNu/NoncFruiNu-07-06-2016.pdf.[1]
[2] USDA, ERS, "Fruit and Nut 2015 Yearbook Table." Accessed January 19, 2017. https://www.ers.usda.gov/data-products/fruit-and-tree-nut-data/yearbook-tables/#Noncitrus Fruit.[5]

Overall, the Northeast U.S. apple industry is dominated by New York growers. According to the New York Apple Association,[6] the New York apple industry comprises approximately 690 growers. Apples are washed, graded, sized, packed, sold, and transported either by the growers themselves or by packer-

[6] New York Apple Association, http://www.nyapplecountry.com/about.

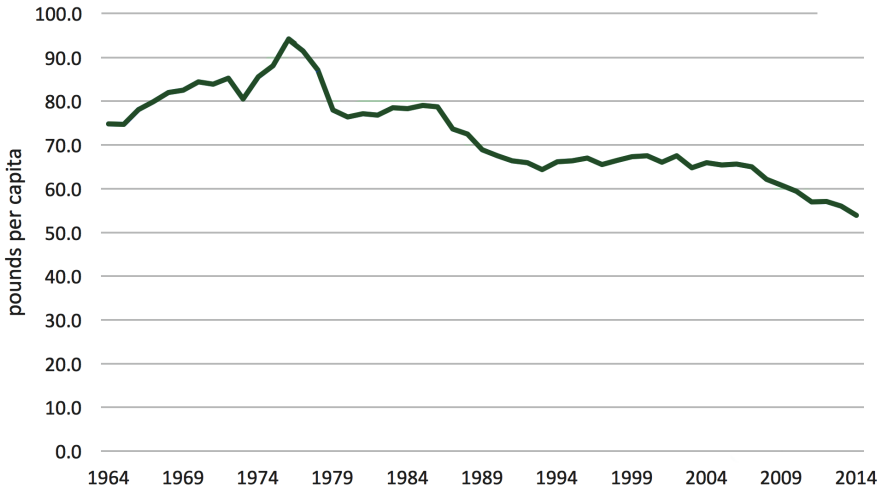
shippers. Companies purchasing apples include a large number of wholesalers, retailers, foodservice distributors, and foodservice establishments.

While apple growers and shippers in New York are smaller on average than those in the leading production area, Washington State, the industry in New York is sufficiently large and integrated to employ state-of-the-art production and post-harvest practices and cutting edge technologies. In addition, they are large enough to be important suppliers of the largest supermarket chains in the country.

Ground Beef Industry Profile

Per capita consumption of all beef has been declining since its highest levels in the mid-1970s (Figure A.1). The United States Department of Agriculture Economic Research Service (USDA-ERS) estimates that in 2014, after estimating retail weights from carcass weights, estimated per capita beef consumption[7] was 53.9 pounds. In 1976, per capita consumption was 94.1 pounds.

FIGURE A.1: Per Capita Availability of Beef, Retail Weight



pork, lamb, and mutton). https://www.ers.usda.gov/data-products/food-availability-per-capita-data-system/food-availability-per-capita-data-system/#Food%20Availability

[7] Food availability estimates measure food supplies moving from production through marketing channels for domestic consumption. This data series provides estimates of per capita availability for hundreds of commodities. The food availability data series is a popular proxy for actual food consumption.-USDA-ERS. https://www.ers.usda.gov/data-products/food-availability-per-capita-data-system/food-availability-documentation/

Using data from the Beef Checkoff, Rabobank estimated ground beef consumption in 2012 to be 57 percent of all beef consumption.[8] This is an increase from the estimate of 50 percent by Davis and Lin (2005).[9]

By applying this estimate of ground beef usage to the per capita beef availability in 2014, ground beef consumption in 2014 can be estimated as 30.7 pounds per capita.

Ground beef has been gaining in popularity. One reason may be due to increasing beef prices. According to the Bureau of Labor Statistics' retail price reports, overall retail prices for beef have been increasing since the 2008 recession and increased more sharply in 2014. To help compensate, consumers have been shifting purchases from more expensive cuts to less expensive ground beef.

A second reason for ground beef's growing popularity may be due to shifts in consumer interest. Ground beef has gained status and is being featured on many restaurant menus, which have embellished the hamburger and given it style and distinction.[10] In addition, ground beef is very convenient, able to be prepared quickly and used in a variety of ways and also requiring fewer cooking skills.

The changes in prices and demands for certain cuts have led many in the beef industry to believe that the industry structure, management, and price incentives need to change soon in order to compete with other, less expensive meat options, such as chicken and pork.[11]

Production

The majority of ground beef comes from beef cattle. Ground beef can also come from dairy cattle, including culled cows and bulls along with feeder dairy steer.

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[8] "Ground Beef Nation: The Effect of Changing Consumer Tastes and Preferences on the U.S. Cattle Industry" Rabobank AgFocus, January 2014. Sourced from: https://web.extension.illinois.edu/oardc/downloads/52548.pdf

[9] Davis, Christopher G. and Lin, Biing-Hwan. *Factors Affecting U.S. Beef Consumption*. LDP-M-135-02. U.S. Department of Agriculture, Economic Research Service, October 2005. http://usda.mannlib.cornell.edu/usda/ers/LDP-M/2000s/2005/LDP-M-10-07-2005_Special_Report.pdf

[10] Herbert, David Gauvey, 2015. "What the hell has happened to the price of ground beef?" Quartz, July 2, 2015. http://qz.com/442037/what-the-hell-has-happened-to-the-price-of-ground-beef/

[11] Rabobank, 2014

The beef cattle industry is concentrated in the Midwest and Plains regions of the U.S. Cow herds range between the Mississippi and the Rockies, and feeder cattle feedlots are concentrated in the Southern and parts of the Northern Plains. These areas are conducive the feeding needs for each segment of the cattle industry as it is more costly to ship feed than it is to ship cattle.[12]

The dairy industry, however, is concentrated in the Lake States, West, and Northeast. This is due to a combination of factors, including the high cost of shipping fluid milk as well as the cost of shipping feed.

According to the USDA, 40 percent of the feeder cattle are fed and marketed from large feedlots with a capacity of 32,000 head or more. As the trend toward larger and fewer feedlots continues, the beef industry is also shifting toward vertically integrating from cow-calf and feedlot operations to processing operations.[13]

Estimates of the amount of ground beef derived from each class of cattle slaughtered are displayed in Table A.4 for the top five production states and the Northeast. According to the National Agricultural Statistics Service (NASS), the two leading ground beef production states are Texas and Nebraska. The Northeast does not contain any of the top five states, and only a few states in the Northeast have large-scale cattle slaughter plants. The Northeast does produce ground beef from the dairy industry, and Pennsylvania slaughters the most cattle within the Northeast.

TABLE A.4: 2010 Ground Beef Production by Class of Cattle

	Class of cattle						
	Steers	Heifers	Dairy Cows	Other Cows	Bulls	Farm Slaughter	Total
	1,000 pounds						
Top 5 states	1,075,440	726,233	344,249	165,211	24,332	2,957	2,338,422
Northeast[1]	35,963	8,389	180,546	8,845	2,264	2,053	238,060

[1] Data includes Virginia which is not in the study region for the Northeast.
Source: Cornell estimates from NASS, Cattle Inventory 2010 data

U.S. Beef Packers

Beef and dairy cattle are sent to beef packers where they are slaughtered and cut up. The Cattle Buyer's Weekly estimated that in 2015 the top four beef packers accounted for about 75 percent of the total pounds of beef slaughtered in the U.S.

The largest packer, Tyson, buys its cattle from independent feeders and ranchers who supply its beef plants in the Midwest, South and Pacific Northwest rather than owning or operating its own feedlots.[14]

However, some beef packers are vertically integrated and operate their own feedlots. For example, JBS, the number two leading beef packer, also owns the leading feedlot company JBS Five Rivers. Cargill, the number three leading packer, owns the fourth largest feedlot Cargill Cattle Feeders.[15]

Retail Sales

On average, ground beef sales were estimated to be 39.6 percent of all beef sales and approximately 17 percent of all meat department sales (Table A.5.). This is more than any individual cut of meat in the department. Retailers usually make their own ground beef from whole muscle parts and trimmings from other meats. The normal cuts used for this are sub-primal cuts such as the knuckle, eye round, and chuck. Some stores may take trimmings and ends from roasts and other cuts and grind them. Retailers can also buy large tubes of beef already ground, usually 10-pound tubes, to regrind in the store and package according to their needs.

TABLE A.5: Ground Beef Retail Sales

Product	2011 average Sales per store (52 weeks ending 2/25/12)	% of beef sales
Ground beef	$6,786	39.6 %

"Fresh beef: more than one-third of U.S. shoppers choose beef over the other proteins at the fresh meat counter." *Grocery Headquarters* June 2012: 90. *Business Insights: Essentials*. Web. 24 Oct. 2013.

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EB No	Title	Fee (if applicable)	Author(s)
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