# Characterizing Wisconsin's Food Systems from Production to Consumption: A Reference Document

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Final Draft
August 24, 2007

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Acknowledgements

This document was made possible thanks to the contributions of many individuals and organizations, beginning with the Department of Homeland Security for providing generous funding and the Wisconsin Office of Justice Assistance for administering those funds.

Additional and sincere acknowledgement is given to Robin R. Schmidt for her initial conceptualization of this project and professional guidance throughout. For their excellent review and comments on content: Jeffrey Swenson, William Walker and Terri Wenger of the Department of Agriculture, Trade and Consumer Protection; Kevin Wagner, USDA Inspection; Ron Kean, University of Wisconsin; Tom Theiding of the Wisconsin Farm Bureau; Matt Joyce and Matt Mathison of the Wisconsin Milk Marketing Board; Pat Stonger of Daybreak Foods; Nick George of the Midwest Food Processors Association; and Brandon Scholz of the Wisconsin Grocers Association. Any errors of fact or omission are exclusively credited to the author.

## Introduction

Food production in the U.S. is at once a highly dynamic and complex business and yet for most consumers, ease of access to food in retail settings has largely disconnected them from understanding this process. High consumer confidence in the quality and safety of the foods we buy suggests that the public has a great deal of trust in industry and the regulatory process; however, the ability of government to effectively respond to a food-related emergency is wholly dependent upon its understanding of how the food system works along the continuum from farm to table. This report provides an initial documentation of Wisconsin's food system -- including directories of the state's largest producers, processors and warehouses – for government agencies to reference in the development of emergency food response planning.

The term "food system" is used frequently in discussions about nutrition, food, health, community economic development and agriculture. The food system includes all processes involved in keeping us fed: growing, harvesting, processing (or transforming or changing), packaging, transporting, marketing, consuming and disposing of food and food packages. It also includes the inputs needed and outputs generated at each step. It is important to note that the food system operates within and is influenced by social, political, economic and natural environments. Each step is also dependent on human resources that provide labor, research and education. However, for the purposes of this document, Wisconsin's food system is narrowly focused on simply identifying the major food production sectors, their production trajectories and key players within them.

Wisconsin is home to over 1,000 food processing firms and has made growing the food processing cluster a top state economic development priority. This is largely due to the significance of agriculture to the state's economy, in that 10% of Wisconsin's total income or $51.5 billion dollars is generated from agriculture. The ubiquitous cheesehead is a beacon for the state's monumental dairy industry, which is the largest sector of the state's agricultural economy. Milk production and the dairy industry alone contribute more than $20.6 billion annually to the state's economy. A vibrant produce industry has kept Wisconsin among the top 5 processing states for both canned and frozen fruit and vegetable products.

The economic and cultural significance of Wisconsin's agriculture and food processing industry cannot be overstated, and to that end government and private industry are critical partners in maintaining its safety and integrity. This document reflects the collaborative contributions of experts in both private industry and government in Wisconsin, with the goal of achieving a preparedness plan to serve all citizens of the state should an unforeseen event impact the state's food economy.

## The Dairy Industry

Statutory Definitions:

Fluid milk product: means cream, sour cream, half and half, whipped cream, concentrated milk, concentrated milk products, skim milk, flavored milk, buttermilk, cultured buttermilk, cultured milk, vitamin and mineral fortified milk or milk products, and any other product made by adding any substance to milk or any of these products

Grade A Milk: for fluid consumption or processing

Grade B Milk: can only be used for manufactured products such as cheese or butter

Milk Producer: any person who owns or operates a dairy farm and sells or distributes milk (aka: dairy farmer)

Receiving Station: means a facility which is designed for the receipt and bulk storage of milk, and which is used to receive or store milk in bulk. It does not include a processing plant or a facility used to distribute pasteurized milk in bottled or packaged form to consumers.

Dairy Plant: includes receiving and transfer stations – anyplace where a dairy product is manufactured or processed for sale or distribution

Dairy Processing Plant: means a dairy plant engaged in pasteurizing, processing or manufacturing milk or dairy products.

Transfer Station: means a facility which is designed and used solely to transfer milk from one bulk transport vehicle to another without intervening storage

Milk hauler: means any person, other than a milk producer hauling his or her own milk only, who transports milk or fluid milk products to or from a dairy plant or a collecting point.

Bulk milk tanker: means a mobile bulk container used to transport milk, fluid milk products, whey or whey cream in bulk from a dairy farm, or to or from a dairy plant in this state. "Bulk milk tanker" includes a mobile bulk container which is permanently mounted on a motor vehicle or which is designed to be towed by a motor vehicle. "Bulk milk tanker" does not include a mobile bulk container which is used by a milk producer solely to transport that producer's own milk.

Milk Distributor: a person who distributes milk or a fluid milk product. It does not include dairy plant, milk hauler, milk producer or a RFE.

Milk Marketing Board: In 1983, The Wisconsin Milk Marketing Board (MMB) was established by dairy producers in Wisconsin to increase the demand for raw milk and milk products. The MMB is funded entirely by Wisconsin dairy producers, and establishes a mandatory state milk marketing order to help affect demand for dairy products made from Wisconsin milk. The MMB differs from other professional trade

groups in that it does not perform lobbying services, but is funded by producer checkoff dollars to focus its efforts on market and commodity research, building brand awareness and greater demand for Wisconsin-produced dairy products.

## Milk Production

Introduction

For more than 160 years, agriculture has been the state's signature industry with dairy comprising the largest segment of Wisconsin's agriculture. The economic value of dairy is very significant to Wisconsin, generating $20.6 billion annually. The dairy industry accounts for nearly 40% of all Wisconsin's agriculture jobs, employing 160,000 people or approximately 4.6% of the jobs in the state (Wisconsin Milk Marketing Board). The total impact of milk alone is $6.4 billion in industry sales, slightly more than 80,400 jobs and nearly $1.8 billion in total income (Deller). Milk production in Wisconsin reached its highest volume for the state since 1992 (Mathison), reflecting the robust expansion of the industry in response to value-added opportunities such as specialty cheese production. The interconnection between dairy farmers and milk processors such as cheese manufacturers is of such significance that milk production and processing can be considered components of a single system.

Wisconsin is home to 14,042 licensed dairy farms and 1.2 million dairy cows, producing some 23.4 billion lbs. of milk per year, or 2.1 billion lbs. per month (Cisler; Mathison). Of these farms, approximately 500 have 500+ milk cows and produce 50% of the state's total milk production per year (Cisler). Some 82% of Wisconsin's dairy herds are comprised of less than 100 cows, while only 6% have 200 or more cows. In terms of feeding management, the mean herd size on a grazing farm is 48 cows, while on stored feed farms there is an average of 108 cows (CIAS).

It is important to note that within the state, there is a significant relationship between the dairy and beef industries in that retired dairy cows enter the beef production stream at about 30 months of age, at which point they are slaughtered and processed for specific markets (such as jerky or burger patties for fast food restaurants) (Swenson). Another point of entry for dairy cows into the beef industry is the diversion of young Holstein bulls from dairy to beef production. According to the 2007 USDA Market News, dairy cows and bulls accounted for 14.1% and 1.6%, respectively, of total weekly slaughter (USDA).

Regulation

In Wisconsin, any and all dairy plants that handle and sell any milk product (fluid milk, dairy products or cheese) are licensed and inspected by DATCP's Division of Food Safety (DFS), 1-4 times annually. The USDA and FDA will also conduct inspections, with a chance for regulatory overlap. This is often the case when a dairy plant that produces some types of "non-fluid milk products" (including some varieties of cheese and butter) voluntarily applies to the USDA for additional inspection. These USDA inspections are then done in addition to DATCP's DFS inspections, giving the plant the advantage of having the USDA shield on their product. Additionally in Wisconsin, a dairy plant that produces *any* "non-fluid milk products" (specifically, any variety of cheese, butter, ice cream, etc.) may be inspected by FDA once each year or less. These FDA inspections are in addition to any DFS or USDA inspection (Barnett).

Grading

Grade A dairy farms are inspected regularly to ensure that Grade A conditions are maintained in the production of milk, e.g., cleanliness of the facility and of the cows, suitability of the milking parlor and sanitary handling (and cooling) of the milk. Furthermore, specific bacteriological limits are placed on Grade A milk, including standard plate counts for bacteria, maximum somatic cell counts and maximum limits on coliform and laboratory pasteurized counts. While there is negligible qualitative difference between grades A and B milk, there are licensing restrictions about how each grade can be used in the processing of specific products. Grade A milk is used exclusively in the production of fluid drinking milk, dairy cream and for all yogurts. Cheeses, frozen dairy products, and other processed dairy foods use both grades A and B (Cisler).

Before milk leaves the farm, weighing, grading and sampling is conducted by the milk hauler. If all required conditions are met for appearance, odor and temperature, haulers will approve the milk for shipment and it will proceed to the dairy plant (DATCP).

Moving Through the System

A. The Farm*:* In Wisconsin, dairy farms are inspected two times per year to maintain their compliance with proper structural, operational, and sanitation requirements. Dairy farmers usually perform 2-3 milkings per day, and immediately cool the raw milk from body temperature to below 45°F (7°C). Raw milk is stored at the farm under refrigeration until picked up by insulated tanker trucks at least every other day (Barnett; Cisler; IFT).

B. Licensed Milk Haulers: there are approximately 450 licensed milk haulers in the state, and are defined as any person, other than a milk producer hauling his or her own milk only, who transports milk or fluid milk products to or from a dairy plant or a collecting point (DATCP). The duties of milk haulers include weighing, sampling and grading the milk they collect from dairy farms, and by law no dairy plant shall receive any milk prior to the weighing and sampling conducted by a licensed milk hauler (DATCP). Following each shipment, milk haulers are required to clean and sanitize their tankers in a fully enclosed heated wash station, in accordance with state administrative code (ATCP 82.02).

C. Transfer Stations: Milk haulers will tank raw milk to these collection points, where smaller truck deliveries of milk are compiled into large tankers to be taken to dairies. This is an efficiency point in the system, with turnover of raw milk in a matter of hours (Cisler; Mathison).

D Receiving Stations / Dairy Plants: Within every dairy plant is the receiving station, also referred to as a reload station. The receiving station is comprised of the actual intake dock and silo, and every dairy plant must have one. It is important to note that receiving stations can be transfer stations but not all dairy plants are used as transfer stations (Cisler; Mathison).

When the milk arrives at the dairy plant, it is checked again to meet quality standards such as temperature, total acidity, flavor, odor, tanker cleanliness, and must contain no antibiotics. A sample may also be tested for components (fat, protein, and solids-not-fat content). The components in the milk will vary according to time of year, breed of cow, and feed supply. Payment for the milk is

based on components, volume, and quality parameters to determine the amount of money received for the shipment (IFT; Wittenberger).

Once the load passes these receiving tests, it is unloaded into large refrigerated storage silos at the processing plant. All raw milk must be processed within 72 hours of receipt at the plant, where raw milk is processed into various dairy products, including bottled fluid milk, powdered milk, cheese, yogurt, sour cream, and butter (IFT).

Wisconsin licenses 350 dairy plants, with approximately 100 of these being small cheese shops where cheese is cut and wrapped. Another 100 are licensed to further process the cheese into spreads and other cheese products. Another 120 of these licensed dairy plants make natural cheese from raw milk and the final 30 make other dairy products such as butter, cream and yogurt. Our largest dairy plants processing fluid milk include:

1. Verifine Dairy Products Co., Sheboygan
2. Golden Guernsey Dairy, Waukesha
3. Kemps LLC, Cedarburg
4. Morningstar Foods, Richland Center
5. Kwik Trip Dairy, LaCrosse
6. Lamers Dairy Inc., Appleton
7. Morning Glory Dairy, DePere
8. Foremost Farms USA (provides the largest milk supply in the state, but most of their milk plants produce cheese)

E. Warehousing: Given the highly perishable nature of dairy products, most dairy plants do not warehouse their products on site (i.e.: Grade A milk products such as fluid milk, cottage cheese, yogurt, etc.), and those that do will warehouse products for no longer than 8-10 days in a production cycle. It is more common for dairy products to move immediately after processing into the marketing stream via distributors and buyers, and placed directly onto the shelves of retail food establishments (RFEs) (Cisler; Mathison)

F. Distribution: Large distributors such as Roundy's or WalMart will acquire milk directly from dairy plants, while smaller retail food establishments will contract with a private distributor to have deliveries made to them

G Retail Food Establishments: dairy products can take several routes into the consumer stream:

1. Industrial = primarily contracting with one major customer
2. Food Service = this involves 4-5 items on a truckload to a distributor such as Sysco.
3. *Retail = this involves several dozen items on a truck destined for numerous stores on a route. Most of the milk processed in Wisconsin is primarily for retail consumption.

## Cheese Production

Introduction

Cheese is a multi-billion dollar business in Wisconsin and the main focus of the state's dairy industry. More than 90% of the cheese produced in the state is marketed beyond its borders (DAD). While Wisconsin's dairy industry produces some 2.0 billion lbs. of milk per month, more than 90% is used in the state's 115-120 cheese plants to produce a wide variety of cheeses. With an output of more than 2.4 billion pounds of cheese annually, Wisconsin ranks first in cheese production nationally and accounts for over 25 percent of all domestic cheese (Wisconsin Milk Marketing Board). In keeping with the state's dairy record set in 2006, Wisconsin's cheese production also reached a new record that year at 2.47 billion lbs., up 2.6% from the previous year (Mathison).

More than a third of the cheese produced in the state is Mozzarella, followed by cheddar and other Italian varieties. A notable shift in Wisconsin's cheese industry is the rapid increase in specialty cheese production, which has more than tripled since 1996 to 387 million lbs/year, or 15.7% of the state's total cheese production. Specialty cheese is a "subjective term used to classify cheeses of exceptional quality, notably unique or produced in quantities of less than 40 million pounds per year. Cheeses that are combinations of different cheese types also may be referred to as specialty. For example, Blue/Brie is a soft-ripened specialty cheese with a blue vein mold throughout" (Wisconsin Milk Marketing Board).

Regulation

In Wisconsin, any and all dairy plants that handle and sell any milk product (fluid milk, dairy products or cheese) are licensed and inspected by Wisconsin DATCP's Department of Food Safety (DFS), 1-4 times annually. The USDA and FDA will also conduct inspections, with the potential for regulatory overlap. This is often the case when a dairy plant that produces some types of "non-fluid milk products" --such as varieties of cheese and butter -- voluntarily applies to the USDA for additional inspection. These USDA inspections are then done in addition to DFS inspections, and give the plant the advantage of having the USDA shield on their product. Additionally in Wisconsin a dairy plant that produces *any* "non-fluid milk products" (specifically, any variety of cheese, butter, ice cream, etc.) may be inspected by FDA once each year or less. These FDA inspections are in addition to any DFS or USDA inspections (Barnett).

Grading

The grading of cheese products is performed by the DFS and is conducted at the wholesale level of distribution. Grading is based on standard quality requirements pertaining to each variety of cheese such as milkfat and moisture content, as well as texture.

Moving Through the System

A. Production: The 115 cheese plants described by our Milk Marketing Board are those plants receiving milk to make natural cheese. Cheese can be made from whole, lowfat, skim, buttermilk, cream,

whey, non-fat dry milk or a combination of these; however, it takes approximately 10 lbs. of milk to make 1 lb. of cheese (Wisconsin Milk Marketing Board).

The process begins with milk shipments being tested and standardized for fat and protein levels, followed by pasteurization. Coagulant and starter are added to the milk to form curds and develop flavor. When formed, curds are cut, heated and stirred to achieve the desired texture, and the whey is drained off. The process of salting and "knitting" (manipulating) the curds will produce different types of cheeses – for example stretching them will create mozzarella; stacking and turning them will create cheddar. Curds are then put into molds, which vary depending upon the type of cheese being made. Finally, many types of cheeses are given a brine bath to help them form a rind before being taken to a ripening room. The ripening process varies greatly depending upon type of cheese; very hard cheeses such as Dry Jack, aged Cheddar or Gouda will ripen for 6 months to a year or more, while young cheeses such as ricotta will ripen for much shorter lengths of time (Wisconsin Milk Marketing Board).

It is important to note that cheese plants are not homogenous in their processing activities; while many make natural cheese from milk, a number of cheese plants acquire natural cheese and further process it by shredding, slicing, and/or cooking it to make processed cheese products (such as spreads).

Our largest cheese plants in order of rank are:

1. Foremost Farms, USA (a large milk producer, but most of their plants are cheese plants)
2. Alto Dairy Cooperative, Waupun (this is the largest cheese plant east of the Mississippi River)
3. Saputo Cheese USA, Inc.
4. Land O' Lakes, Kiel
5. Associated Milk Producers Inc., Portage
6. Grande Cheese Company, Brownsville
7. Trega Foods, Little Chute
8. Mullins Cheese, Mosinee
9. Sartori Food Corp., Plymouth
10. Ellsworth Cooperative Creamery, Ellsworth
11. BelGioiso Cheese, Inc., Denmark
12. Nasonville Dairy, Inc., Marshfield
13. Churny Company (Kraft), Wausau
14. Wisconsin Dairy State Cheese Co., Monroe
15. Klondike Cheese Co., Monroe
16. Burnett Dairy Cooperative, Grantsburg
17. Arla Foods, Inc., Kaukauna
18. Cady Cheese Factory, Inc., Wilson
19. Baker Cheese Factory, Inc., St. Cloud
20. Park Cheese Company, Inc., Fond du Lac

B. Warehousing: While some larger cheese plants provide all of their own warehousing, others contract with companies specializing in cheese warehousing. Either way, the length of time cheeses are stored can vary greatly, from a few weeks to ten years depending upon the type of cheese (specialty versus young cheese). However, the vast majority of cheese is aged for less than a year. Major warehousing includes:

1. Atlas Cold Storage
2. WOW Logistics
3. Oshkosh Cold Storage
4. Northland Cold Storage
5. Wisconsin Aging and Grating

C. Retail Food Establishments: As for other dairy products, cheese takes several routes into the consumer stream:

a. Industrial = primarily contracting with one major customer
b. Food Service = this involves 4-5 items on a truckload to a distributor such as Cisco.
c. *Retail = this involves several dozen items on a truck destined for numerous stores on a route. Most of the cheese processed in Wisconsin is primarily for retail consumption.

## Major Milk Plants

Foremost Farms USA

Golden Guernsey Dairy

Kemps LLC

Kwik Trip Dairy

Lamers Dairy Inc.

Morning Glory Dairy

Morningstar Foods (subsidiary of Dean Foods, Inc.)

Verifine Dairy Products Co (subsidiary of Dean Foods, Inc.)

## Major Cheese Plants

Alto Dairy Cooperative

Foremost Farms USA

Grande Cheese Company

Lake Country Dairy,

Land O'Lakes

**Major Cheese Processors**

Note: these companies purchase other WI and out-of-state cheese products and further processes into processed cheese or packaged natural cheese (either brand name or private label).

Schreiber Foods, Inc.

Sargento Foods Inc.

Great Lakes

Marathon Cheese Corporation

Masters Gallery Foods, Incorporated

**Cold Storage Warehouse Contact Sheet**

Note: primarily for cheeses and dairy products other than fluid milk

Atlas Cold Storage

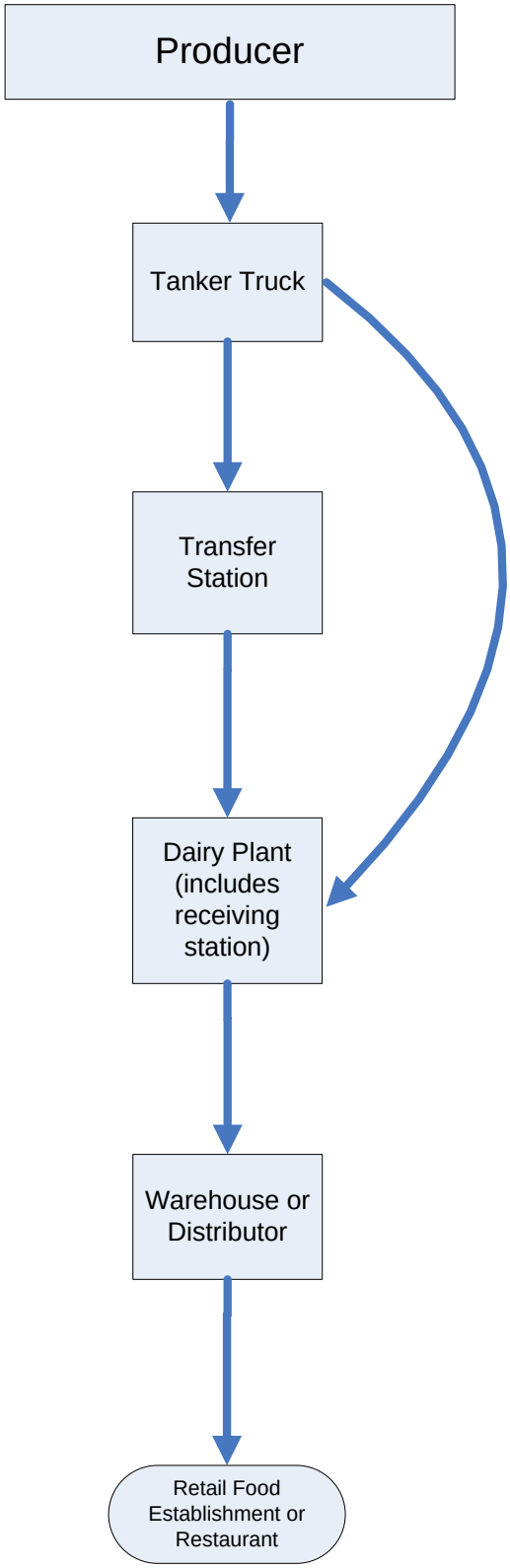
Northland Cold Storage

Oshkosh Cheese Inc

Wisconsin Aging and Grading

WOW Logistics

# Milk Pathways



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## The Meat Industry

Introduction

Meat processing in Wisconsin is dominated by beef cattle, followed by hogs, poultry and to a much lesser extent sheep. A 2007 DATCP industry profile identifies meat processing as the state's 4th largest manufacturing industry, with a total economic impact of $12.3 billion (Deller)

Beef

According to the Wisconsin Beef Council there are approximately 12,700 beef producers in the state, producing 265,000 head of beef cattle (WAS) – or an average herd size of 20.88 cattle – earning the state a ranking of 31st in the nation for beef cow numbers (Swenson) With regard to beef, Wisconsin is largely a processing state, and in this context imports the bulk of its beef cattle from, in order of rank: Iowa, Illinois, Minnesota, Nebraska, South Dakota and California. Considering the breadth of beef cattle management activities, the influx of cattle into Wisconsin's beef industry is extremely diffuse; in 2006 cattle came from 38 states to be harvested, fed in lots or added to the breeding herd (Swenson). It is estimated that on any given day there are upwards of 200 truckloads of beef cattle entering the state, with approximately 36 animals per truckload (Van Lannen). In terms of raw production numbers, in 2006 the state processed a total of 2.52 million head of beef cattle, or 2.1 billion lbs for market (Swenson).

The Smithfield Beef Group of Green Bay, the nation's 5th largest beef processor and the largest in the state, provides a model for understanding how beef is processed in Wisconsin. While the company acquires a large portion of its cattle from Minnesota, Iowa, and North and South Dakota, it is important to note that there is no solid supply chain for beef cattle in Wisconsin. This is due to many factors including natural events such as drought, which impact market prices on local and regional scales, creating an ever-changing landscape for beef cattle procurement (Van Lannen).

In terms of numbers, the Smithfield plant in Green Bay receives 75-80 truckloads of cattle per day (this translates into 2400 head of cattle processed daily). Approximately 1.2-1.5 million lbs. of frozen product is kept for 6 months in cold storage at the plant awaiting distribution, much of which includes tongue, heads and other parts often sold to markets abroad. Fresh product moves quickly, with approximately 1.8 --2 million lbs. (or 30,000 boxes) of meat remaining in coolers for up to 10 days, to be distributed to retail food establishments (Van Lannen). Byproducts of processing include tallow, which is rendered on-site and transported by railcar to various soap manufacturers in- and out-of-state; meat and bone meal for processing into feed for poultry operations; blood for manufacture into pig feed; and hides which are shipped to China and other Pacific Rim markets (Van Lannen).

It is important to note that within the state, there is a significant relationship between the dairy and beef industries in that retired dairy cows enter the beef production stream for specific markets (such as jerky or burger patties for fast food restaurants). Another point of entry for dairy cows into the beef industry is the diversion of excess young Holstein bulls from dairy to beef production (Swenson). According to the 2007 USDA Market News, dairy cows and bulls accounted for 14.1% and 1.6%, respectively, of total weekly slaughter (USDA).

Pork

In contrast to the beef industry, Wisconsin's 2300 pork producers raise significant numbers of pigs and hogs within the state, exporting the majority to other states for processing (Swenson; Vaassen). That said, Wisconsin ranks 18th in the nation in hog and pig production, having an inventory of 410,000 head (includes all breeding, feeding and market hogs) as of September 1, 2006 (WASS; Vaassen). The majority of Wisconsin's pork production operations are located in the southern third of the state, with the top five counties in production being Grant, Sauk, Dodge, Dane and Lafayette Counties.

Hogs are raised in barns in a multi-stage process at various locations in the animals' pathway from farm to fork. This process does vary with size and type of operation. The production process begins with a 114-day gestation period, followed by farrowing (birth). Both gestation and farrowing are typically located on one location. Pigs are weaned between 2-4 weeks of age, at which time they are shipped to an off-site nursery. Pigs remain in the nursery until they are around 8-10 weeks of age. At this time, they are shipped offsite to another producer or contractual owner for feeding and breeding (Vaassen). Known as feeder or finisher animals, hogs are either retained in Wisconsin or shipped to locations mainly in Iowa and Minnesota for this final production phase, and are ready for market at approximately 6-months of age or 270 lbs. (Vaassen). (In the U.S. the terms pig and hog both refer to the same species of swine, but hog is used as a generic term for all swine while the term pig refers to immature hogs.)

The majority of Wisconsin's hogs are destined for marketing in Iowa, Illinois and Minnesota (Vaassen). The Wisconsin Agricultural Statistics Annual Bulletin indicates that for 2006, Wisconsin produced 881,000 head of market hogs. While the bratwurst, sausage and specialty processors are prominent in Wisconsin, only a small percentage of hogs enter this portion of the processing stream in-state in what the industry considers to be smaller, niche markets. The major markets for Wisconsin's pork producers include Cargill, Meadowbrook Farms, Tyson, Swift, Hormel, Farmland and John Morrell (Vaassen).

Poultry

Broilers

Wisconsin's broiler industry is much less diverse than either the beef or pork industries, in that one major company – Gold 'N Plump -- dominates both production and processing as the largest broiler producer in the Midwest. The Gold 'N Plump operation maintains a weekly production of approximately 830,000 chickens. All of these birds are raised in Wisconsin within 40 miles of the Arcadia processing plant, contracted through various farmers who purchase, maintain and operate their broiler production facilities according to the company's exact specifications. In turn, Gold 'N Plump rents these barns from its contract farmers, establishing long-term relationships between the company and its farmers that promotes consistency in the quality of their chickens (Kean; Petz).

Depending upon the desired size of the broiler, the length of time chickens are kept will vary. For producers raising large birds (7-8 lbs.) the average time kept before slaughter is 50 days, although some operations have size specific requirements for shorter lengths of time before being taken to slaughter. In contrast to the smaller egg laying hens, broiler chickens are too large to be caged and are kept in enclosed barns where they roam free on litter or bedding (Kean).

Large processing plants receive deliveries of live birds from their contract farmers, where birds are slaughtered, processed and packaged for either the retail or food service industries. In addition, whole rotisserie chickens are processed and shipped to distributors from the Arcadia location. The remaining 40%-50% are slaughtered, and then taken by refrigerated truck to the larger processing facility in Cold Spring, MN. where most of the trays of chicken purchased by consumers in retail outlets are assembled. Once they are packaged for retail most of them are moved to the Gold 'N Plump distribution center in Cold Spring, MN. Warehousing at its two processing locations is very limited; once the product is labeled, it is palleted and shipped to various retail outlets, usually within hours (Petz).

Wisconsin's small broiler producers raise anywhere from 25 to 200 chickens at a time, requiring about 6-8 weeks until they reach market size. This short cycle allows them to raise multiple flocks through the summer. Because of their size, most small producers aren't able to afford the equipment and facilities to have a licensed or inspected facility, thereby limiting their market to processing facilities within an easy driving distance from their farms (Kean).

Ducks

Like the broiler industry, the production and processing of ducks in Wisconsin is narrowly defined by a single company, Maple Leaf Farms, headquartered in Milford, Indiana. Maple Leaf Farms is a highly integrated business, operating its own hatchery, feed mill (a Wisconsin feed mill is located in Burlington) and distribution facilities. The company contracts with approximately 150 producers in Indiana, and 14 producers in Wisconsin. The company-owned farms in Indiana operate multiple barns at each location, allowing for large flock sizes of 12,000-14,000 ducks, and those with multiple flocks may have as many as 100,000 ducks. Wisconsin's contract farms are much smaller enterprises, with average flock sizes between 6,000-9,000 ducks (Deatsman).

A typical contract farm in Wisconsin will have one barn housing a 2-stage process, meaning the farmer can cycle two flocks at different developmental stages under one roof. One end of the barn houses the nursery flock (for approximately 1 week) and the other end of the barn serves as a finishing end, where mature ducks await processing. Farmers allow ducks to roam freely on litter or bedding flooring within enclosed barns, however, they are confined to these barns to protect them from exposure to avian diseases. Ducks grow for 6-7 weeks in these barns, and are then transported to the Franksville, WI processing plant (Deatsman).

The Wisconsin processing facility for Maple Leaf Farms is located in Franksville, WI, and is a unique operation in that after slaughter, all ducks are graded and sorted by weight, immediately packed on ice and transported to Indiana where an automated cut-up system finishes the processing. All packaging and distribution takes place out of the Milford, Indiana location, and a number of those packaged ducks return to Wisconsin via the retail and specialty food markets. The greatest volume of distribution occurs geographically in urban and coastal regions, and in the retail, food services, and specialty markets. Maple Leaf's largest accounts include Super WalMart, SuperValu, and food service providers Sysco and U.S. Food Service (Deatsman).

Pheasants

McFarlane Pheasants of Janesville, WI, is the nation's largest pheasant production company. The company houses a main production facility on site consisting of multiple brooder barns and several acres of large outdoor pens where pheasants are kept. In addition, McFarlane Pheasants also contracts with a number of pheasant producers in Wisconsin and Illinois, with average flock sizes of several thousand birds. Pheasants are produced for several different markets: hunting, hobbying, and meat (Lawton). McFarlane Pheasants has several divisions:

1. Hatchery: an average of 1.5 million chicks are raised primarily for hunting stock, and sold as day-old chicks worldwide. A large volume of chicks are sold to be raised by hunting groups and enthusiasts in Iowa, Minnesota and the Dakotas. The company keeps about 165,000 of those chicks for the following year's breeder flock. It is important to note that a significant number of eggs are sold worldwide to hunting groups as well (Lawton).

2. Hunting birds: the company's Brooder Department buys chicks from the hatchery to raise in the outdoor pens; once the birds reach 21 weeks of age they are sold as mature hunting birds. The bulk of the hunting bird operation is on site (Lawton).

3. Meat Production: although this is a much smaller part of the business both in terms of volume and sales, McFarlane Pheasants raises white pheasant for retail markets. The company contracts out white pheasant production to several farmers in Wisconsin and Illinois, raising a total of about 200,000 birds annually. White pheasants are reared much the same as broilers, raised on litter in large pens in enclosed barns. They are butchered at 16 weeks of age (Lawton).

The pheasant production industry in general is not highly integrated, though due to its size McFarlane Pheasants may be considered more highly integrated than its counterparts in that all specialty cuts (dressing), packing and shipping are done by the company on site. However, McFarlane purchases its feed from ADM or Cargill rather than operating its own feed mill; it works with independent veterinarian services rather than an in-house veterinarian; and the butchering is done off-site at a nearby meat processing facility. The meat division makes most of its sales to brokers and large distributors such as Sysco, who resell the product to retail and specialty food outlets. The company's pheasant meat will leave the region via Chicago O'Hare airport and is destined to brokers in major cities including Dallas, New York and San Francisco (Lawton).

Turkey

Wisconsin's turkey production and processing is dominated by the nation's second largest turkey company, Jennie-O Turkey Store, which has locations in both Minnesota and Barron County, Wisconsin. The Barron, WI location houses a feedmill, a hatchery and one of the company's two largest processing plants (Solheid).

The Jennie-O Turkey Store operation is highly vertically integrated. Eggs are obtained from company-owned breeder farms or from outside suppliers and hatched in the hatchery in Barron. Once the poults are hatched they are

returned to commercial growing farms to mature in enclosed barns. These farms may be company-owned farms or contract farm operations. Birds roam freely in these barns among same-age flocks. Depending on the size of the farm, it may house multi-age flocks in various barns on site. Jennie-O Turkey Store coordinates the transportation of live birds to its processing plant, where 26,000 birds are processed daily. Total annual production at all Jennie-O Turkey Store facilities is approximately 1.2 billion live pounds (Solheid). At the Barron plant, birds are slaughtered, processed (formed into raw or cooked products such as fresh pack trays, burgers, shaved deli turkey breast, etc.) and packaged for distribution. There is no significant long-term cold storage on site, as product is moved with rapid and regular turnover (Solheid).

The bulk of processed turkey products moves into the retail stream immediately, although for larger or long-distance distribution, private cold storage facilities are likely used. Jennie-O Turkey Store has a nationwide market and includes SuperWalMart, SuperTarget, SuperValu, Roundy's and many regional chains among its major clients in Wisconsin (Solheid).

Sheep

The lamb and mutton (adult sheep meat) industry in Wisconsin is relatively small; in 2006 only 16,000 or so sheep and lamb were processed, ranking Wisconsin 14$^{th}$ in the nation for number of sheep harvested, and 8$^{th}$ in the nation for the number of farms with sheep (Swenson). Sheep producers breed and raise their animals in the state, with the common practice of selling their live animals at auction to be processed out-of-state primarily to the east coast of the U.S. where there is greater demand for lamb (Swenson). Sheep and lamb producers primarily sell their animals through the Equity Livestock Sales Association, one of several major auction markets in the state held via internet auction (Swenson).

In Wisconsin, the sheep industry is dominated by Pin-Oak Ridge Farm, a direct marketer of lamb under their *Wisconsin* Lamb trademark. Pin-Oak Ridge Farm distributes to over 40 stores and restaurants in the Madison area, Southeastern Wisconsin, Chicago and nationwide.

The Regulatory Process

There are approximately 450 meat plants in Wisconsin; the statutory term "establishment" may be used interchangeably with "meat plant" and "processing plant" to capture the range of processing and retail activities permitted by the terms of licensing. Roughly 300 of the state's meat plants are state inspected plants, and another 90-145 of them are federally-inspected (USDA) (Larson). State-inspected plants are constrained to intrastate markets; federally inspected plants have interstate and international contracts, and for that reason they are the largest meat processing facilities in Wisconsin. Of the total number of federally-inspected plants, only 26 of them slaughter live animals. The remaining 100 or so do further processing and retail, selling carcasses, carcass portions and smaller cuts to state-inspected meat plants, specialty processors and direct-marketing to restaurants and retail food establishments (RFEs).

Inspection

Inspection protocols are the same for both state- and federally-inspected facilities. Depending upon the size of the facility, meat plants provide slaughtering and wholesale services, and many of them retail meat and meat products to the public as well. Inspected meat processing involves multiple scales of production, from the custom animal slaughtering and processing of small numbers of animals for the personal

consumption of the owner or the owner's clients, to commercial accounts both within and beyond state boundaries.

Uninspected facilities have a very short chain of production involving the slaughtering and processing of a small number of animals not intended for market. An example includes hobby farmers slaughtering one or several animals per year for personal consumption or to give to friends and family.

Moving Through the System

1. Transportation: The transportation of live animals from farms to meat plants occurs daily, with three possible routes.

    a. hauled directly by the producer
    b. purchased directly off the farm by a buyer
    c. hauled to an auction market by the producer; livestock at auction to buyers/order buyers, then hauled on semi to a processing facility (also called meat plant or establishment).

2. Meat Plants (used interchangeably with processing plant; the statutory name for meat plant is establishment): Live animals are not regulated until they enter the wholesale process at the meat plant, where animals are slaughtered and butchered, processed into consumer cuts, and then boxed. At the largest facilities, rapid processing allows upwards of 1500 animals to be processed per 8-hour shift. Large meat plants warehouse meat in cool storage on-site for the purposes of dry-aging the meat, for storing carcasses awaiting processing, or for storing boxed, packaged meat awaiting distribution. Boxed, packaged meat can remain in on-site storage for up to several weeks before entering the distribution chain (Swenson). Boxed meat products are distributed either directly through large wholesale contracts with retail food establishments (RFEs) and restaurants, or to buyers and distributors who in turn sell the meat products to smaller RFE operations. It is important to distinguish that federal or USDA-inspected meat plants produce and warehouse the largest volumes of raw meat product. Our largest federal meat plants include:

    a. Cargill-Taylor, Milwaukee (Beef)
    b. Smithfield Processing Plant, Green Bay (Beef, 5th largest in the nation)
    c. American Foods Group, Green Bay (all)
    d. Gold n'Plump, Arcadia (Poultry / broilers)
    e. Hormel Plant, Beloit (Midwest's largest integrated turkey plant)
    f. Oscar Mayer Plant, Madison (Beef and pork processor)
    g. UW Provision, Middleton (all)
    h. Johnsonville, Sheboygan Falls (Pork)
    i. Abbeyland, Abbotsford (Pork, esp. sausages)

In contrast to the large federal establishments, specialty meat plants (also called specialty processors) comprise a large percentage of the state-inspected licensed establishments. Specialty processors will buy meat from federally inspected plants to process into foods such as bratwurst, sausages, bologna, jerkeys, egg rolls and pizza for purchase in locations as varied as local delicatessens, convenience stores and full-service grocery store outlets. Because these meat plants cater to specialty meats wholesalers, they neither generate nor store large volumes of any one product (Swenson).

3. Distribution Centers:

a. Roundy's (includes Pik'n Save and Copps)
b. SuperValu
c. Certco (supplies smaller independent grocery stores)
d. Aldi
e. Fresh Brands, Inc. (includes Piggly Wiggly)
f. Great Lakes Foods
g. Maplewood, Green Bay
h. Custom Meats, Marathon
i. Stoneridge Meat and Country Market

## Major Meat Plants

Abbeyland Foods Inc.

American Foods Group (manufactures various meat products for food service and retail)

Breakbush Brothers (processed chicken)

Cargill-Taylor (beef, especially cows and bulls from dairy)

Gold n'Plump (Broilers / Poultry)

Hormel Plant (turkey)

Johnsonville Sausages LLC

Oscar Mayer Plant (beef and pork processing)

Smithfield Processing Plant (formerly Packerland; also processes cattle from dairy)

UW Provision (all meat)

## Distributor and Warehouse Contacts

Aldi

Certco

Custom Meats of Marathon (large retail food establishment)

Fresh Brands, Inc.

Great Lakes Foods

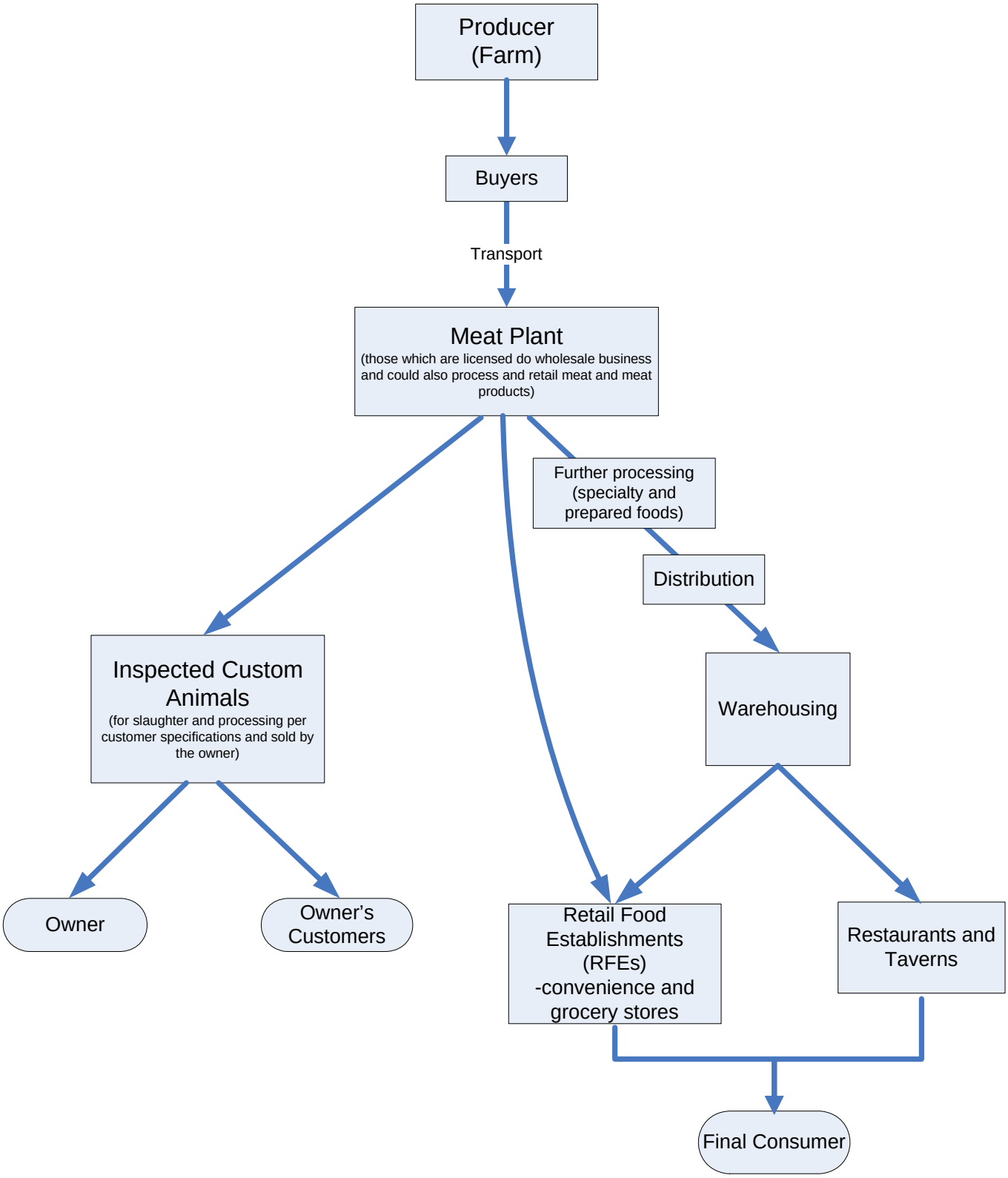
Maplewood Packing Inc.

Roundy's

Stoneridge Meat and Country Market, Inc. (large retail food establishment)

SuperValu

# Meat Flowchart



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## The Egg Industry

Introduction

Commercial egg producers in Wisconsin generated $39,702,000 in annual income and yielded more than 1 billion eggs during 2005, ranking the state 24th among the nation's egg producers (NASS). However, Wisconsin is characterized as an egg deficit state, in that our producers do not yield enough eggs to meet statewide demand. In response, Wisconsin imports eggs from Iowa, Ohio, Indiana, Minnesota and Illinois (Wenger).

Wisconsin's egg producers house 4.86 million birds, with the largest individual producers maintaining between 1 and 1.3 million laying hens on their farms (NASS). However, it is common for a large corporate operation to contract with individual farms whose total number of laying hens approaches 2 million. Most egg producers in the state maintain between 20,000 and 70,000 laying hens on a single farm. Geographically, the state's largest production facilities are located in the southern third of the state, and as can be expected, our largest processing facilities are also found in this region (Pederson).

Vertical integration distinguishes the poultry industry from other animal production industries in that egg producers own and manage nearly every aspect of their business – the rearing of birds, feeding, housing, husbandry, and in some cases the packaging and marketing of their product -- and thus are able to tightly control their entire production process (Stonger).

The Regulatory and Grading Process

The regulation of eggs can be divided in to two product categories: shell (or table) eggs, and liquid egg product.

1. Shell eggs: The regulation and grading of shell eggs is contracted to the DATCP Division of Food Safety (DFS) by the USDA's Grading Branch of Poultry Programs. As the primary inspection agency, DFS performs a dual inspection function: for shell eggs, it conducts annual inspections of hatcheries, and quarterly inspections of egg processing plants. For food processing facilities, DFS conducts inspections approximately every 8-months or annually to regulate for compliance of codes and to issue licenses (Wenger).

   Shell egg handlers include firms with "over 3,000 layers that grade and pack their own eggs, firms that grade and pack eggs from production sources other than their own (grading station), and firms that are hatcheries. At least once each quarter, a State of Federal shell egg surveillance inspector visits each registered packing plant to verify that shell eggs packed for consumer use are in compliance, that restricted eggs are being disposed of properly, and that adequate records are being maintained. Hatcheries are visited at least once annually for the same purposes." (www.ams.usda.gov, 2007).

It is important to note here that 3000 layers would constitute an extremely small operation, and that most commercial operations are much larger to the extent that 500,000 layers is considered a small operation. While hatcheries are included in the regulatory language, hatchery eggs are not normally marketed to consumers as these eggs are usually fertilized and incubated to produce more chickens (Wagner).

Regulation includes the category of "restricted eggs", which are defined as "eggs with cracks or checks in the shell, dirty eggs, incubator rejects, and inedible, leaker, or loss eggs. Cracked and dirty eggs may be shipped to an official egg products plant for processing and pasteurization. Otherwise, restricted eggs must be either destroyed or diverted for use as other than human food" (AMS, 2007).

In addition, the USDA/FSIS regulates non-graded eggs, specifically those categorized as "nest-run." Nest -run eggs are "…those which are packed as they come from the production facilities without having been washed, sized and/or candled for quality, with the exception that some checks [egg showing minor cracks without leakage], dirties [eggs with debris adhering to the shell], or other obvious undergrades may have been removed." (Code of Federal Regulations, Title VIV, Section 590.5).

An important distinction between state graded and USDA graded eggs is that USDA's AMS Poultry Division Grading Branch also provides USDA grading to those producers requesting it. This is a fee for service program, but the service gives the producer the USDA Grade A shield on their packaging to designate additional assurance of egg quality. USDA Grace A indicates that a federal grader was on site spot checking quality (Wagner).

2. Liquid Eggs: In the case of liquid egg production facilities, the USDA maintains exclusive inspection jurisdiction.

<u>Moving through the system</u>

A. Farm

1. <u>Production</u>: Egg producers purchase their layer stock (i.e., day-old leghorn chicks) from hatcheries who deliver chicks to the producer within one to two days of hatching. At arrival, chicks are either placed in typical layer pens or reared in a pullet house. When a flock (group of hens) first enters egg production, 50 to 60 percent of the hens will be laying eggs at 18 to 22 weeks of age. The average hen lays approximately 5-6 eggs per week (Stonger; Wenger).

2. When the flock has passed its peak production at about 72 weeks of age, producers commonly decide to force-molt the flock in order to achieve a higher level of egg production (forced molting manipulates the birds' natural process of losing feathers and halting egg production; by forcing a simultaneous molt the farmer can better manage the cycle of egg production). Following a molt, the hen's production rate usually peaks slightly below the previous peak rate and egg quality is improved.

   The majority of hens are between 100 and 130 weeks of age when they reach the end of their egg production cycle, and are likely sent to a spent hen facility. After the flock vacates the layer house, the house may be stripped of all organic matter and sanitized before another flock enters the house, although cleaning procedures will vary among operations based on individual circumstances and management plans (Stonger; Wagner).

B. Processing

There are two primary methods of egg collection in layer facilities: in-line, and off-line. In either case, hens lay eggs onto an angled wire floor which rolls the egg toward the front of the cage onto a nylon belt. The belt transports eggs out of the house either to the egg processing facility or to storage cooler. Since the processing facility and cooler remove eggs from the house, based on hourly demand, eggs may reside on the belt for as long as 12 to 14 hours but most are collected within a few hours post-lay (Pederson; Wagner).

a) The in-line facility characterizes all of Wisconsin's largest producers. In–line facilities move eggs directly from the layer house to the egg processing facility. Once the eggs enter the egg processing center, usually within minutes or up to several hours post-lay, they are washed, visually inspected (checked for eggshell problems, cracks, and blood spots), and then graded for packaging based on a system of grading AA, A, B, and Loss Quality standards. Practically all shell eggs that are marketed are graded (Wagner).

b) Off-line facilities are used in smaller operations, differing from the in-line process in that eggs are transported out of the house directly to a simple packing head which places them on 30-egg flats with or without washing, and are taken to an egg cooling room. In this method, the eggs remain in the cool room for up to two to three days, after which they are transported to an egg processing facility by refrigerated truck (Kean; Wagner). Off-line operations can be comprised of several off-line producers working collectively, and off-line facilities can simultaneously be located on a farm with in-line facilities (Wenger).

In either type of facility, eggs used for further processing are taken to breaker machines, either on-site (in large operations) or at a processing facility (most egg breaking operations are using ungraded eggs right out of the barns). Depending upon type, breaker machines can process between 30,000 – 144,000 eggs/hour, separating the albumen (whites) from yolks. Pasteurization is increasingly done at the site of production in larger facilities where liquid egg is kept in 4000-100,000 lb. silos. Liquid egg product is also trucked in tankers, loads weighing just under 50,000 net, to food plants for pasteurization and further processing. Processing involves any one or combination of the following: filtering, mixing, stabilizing, blending, pasteurizing, cooling, freezing or drying, and packaging into products including liquid, frozen, dried and hard-boiled eggs. Egg products include whole eggs, whites, yolks and various blends with or without non-egg ingredients (Wagner).

C. Transportation

While some of the transportation is owned and operated by the larger egg production plants, most producers contract out the shipping of their eggs to food plants or retail outlets. Large distributors (such as WalMart) own and operate their own transportation and will purchase their eggs directly from their contract producers. Smaller distributors, including Madison's Certco and independent RFEs, will often contract with transporters to deliver pallets of eggs along a route. One major transporter for egg producers in southern Wisconsin is Gulickson located in Deerfield (Stonger).

## Major Egg Producers

Cold Spring Egg Farm

S&R Egg Farm

Creekwood Farms

Reedsburg Egg Company

Daybreak Food, Inc

Echo Lake Foods

Egg Innovations

Primera

Abbotsford Egg

## Distributor and Warehousing Contacts

Aldi

Certco

Fresh Brands, Inc.

KwikTrip

Roundy's

Reinhart Foods

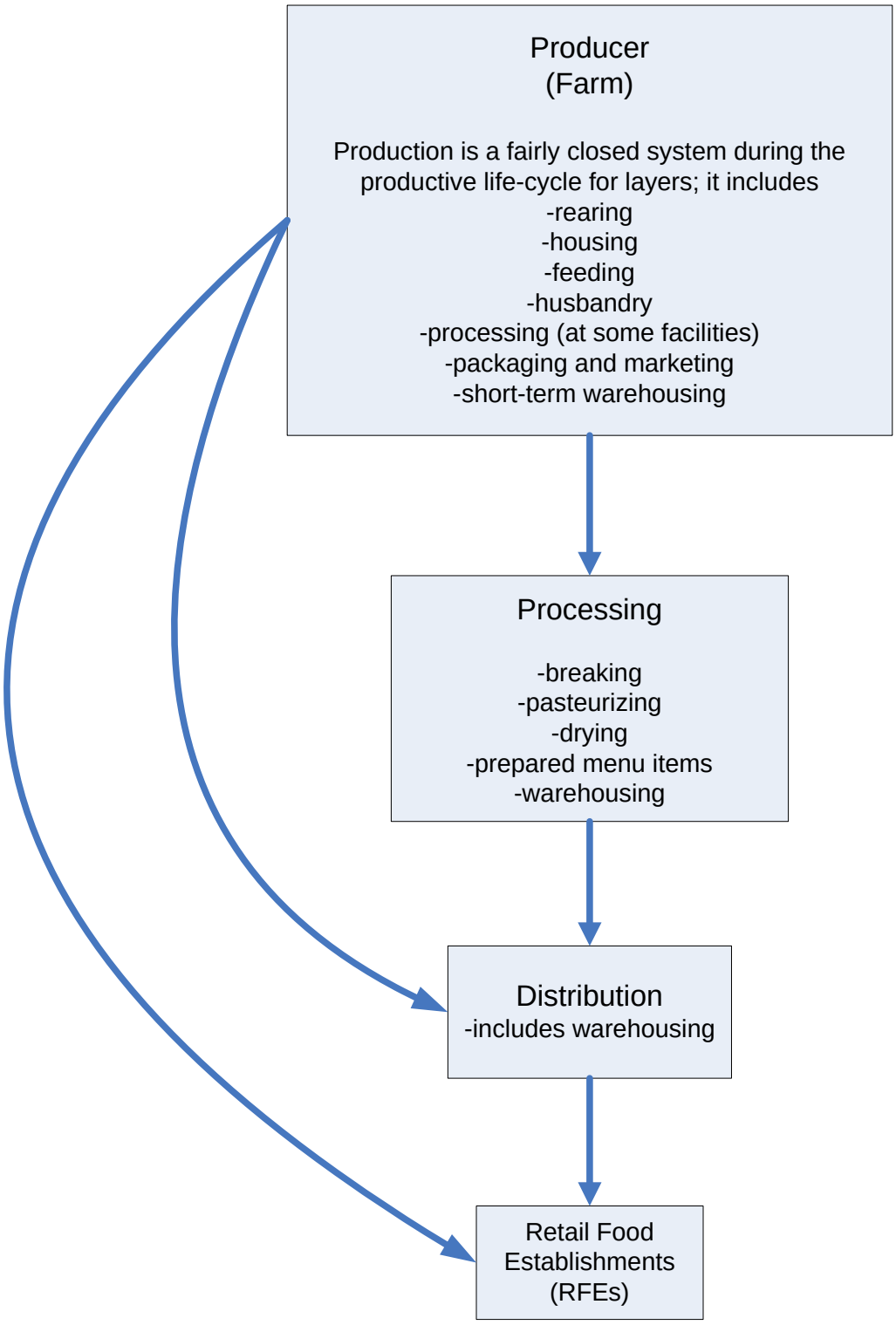
SuperValu

Sysco

Wal-Mart Distribution Center

Wisco Farms

# Egg Production and Distribution



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## The Produce Industry

Statutory Definitions

"Vegetable producer" means a person who grows processing vegetables in this state.

"Processing vegetables" means vegetables grown or sold for use in food processing, regardless of whether those vegetables are actually harvested or processed as food. "Processing vegetables" includes sweet corn grown or sold for use in food processing, but does not include grain.

"Food processing" means the manufacture or preparation of food for sale through the process of canning, extracting, fermenting, distilling, pickling, freezing, baking, drying, smoking, grinding, cutting, mixing, coating, stuffing, packing, bottling or packaging, or through any other treatment or preservation process. "Food processing" includes the activities of a bakery, confectionary or bottling establishment, and also includes the receipt and salvaging of distressed food for sale or use as food. "Food processing" does not include any of the following:

1. Activities covered under a dairy plant license.
2. Activities covered under a meat or poultry establishment license.
3. The retail preparation and processing of meals for sale directly to consumers or through vending machines if the preparation and processing is covered under a restaurant permit or other permit.
4. Activities inspected by the federal department of agriculture under 21 USC 451 to 695 and 21 USC 1031 to 1056.
5. The extraction of honey from the comb, or the production and sale of raw honey or raw bee products by a beekeeper.
6. The washing and packaging of fresh fruits and vegetables if the fruits and vegetables are not otherwise processed at the packaging establishment.

"Food warehouse" means a warehouse used for the storage of food, and includes a cold-storage warehouse, frozen-food warehouse and frozen-food locker plant. "Food warehouse" does not include:

1. A warehouse used solely for the storage of grain or other raw agricultural commodities

2. A retail food establishment, restaurant or other retail facility at which food is stored on a temporary basis incidental to retail preparation or sale.

“Service inspections of farm products” Upon request or for grading or certification purposes, inspect animals, plants, farm products, food products and agricultural commodities, as defined in s. 96.01 (3). Inspection may include examination, diagnosis, sample collection and analysis, weighing and testing and the supervision of any of those activities. Facilities, equipment, vehicles and vessels used in the production, processing, storage or distribution of the animals, plants, farm products, food products or agricultural commodities may be inspected. Inspection and certification may be performed in cooperation with any federal agency. To enable any such inspection and certification service, the department may charge uniform fees and may bring an action to recover the fees, including reasonable costs of collection.

## Vegetable Production

Introduction

According to the 2006 findings by the National Agriculture Statistical Service, Wisconsin ranked third overall in the nation for the production of processing vegetables, with the state's biggest crops being snap beans, potatoes, sweet corn, green peas and carrots (NASS). With the exception of potatoes, vegetable crops in the state are almost exclusively destined for processing plants where they are canned, and to a lesser extent frozen (Carter; George).

Because they are less likely to be grown under contract and have a more diverse production trajectory, potatoes are treated as a unique crop within the produce industry. This is underscored by the fact that potatoes are more economically significant than processing vegetables to the state's overall produce industry, earning $1.62.billion (2.4%) in farm cash receipts in 2005 compared to $616 million (0.9%) for all other vegetables (WASS).

Regulation

Produce is not regulated until it enters a processing facility, where regulation will differ depending upon specific food processing methods used as defined in WI Statutes ATCP 70. Inspection of processing facilities is conducted by the State's Division of Food Safety, approximately twice per year (DATCP) (Owens).

Grading

The U.S. Department of Agriculture's Marketing Service has established U.S. grade standards as measures of quality for many canned and frozen vegetables. USDA also provides an inspection service which certifies the quality of processed vegetables based on these U.S. grade standards. The inspection service is voluntary and paid for by the user. Under the program, processed vegetables are inspected by highly trained specialists during all phases of preparation, processing, and packaging. The grade standards are used extensively by processors, buyers, and others in wholesale trading to establish the value of a product as:

> **U.S. Grade A** Grade A vegetables are carefully selected for color, tenderness, and freedom from blemishes. They are the most tender, succulent, and flavorful vegetables produced. The term "fancy" may appear on the label to reflect the Grade A product.
>
> **U.S. Grade B** Grade B vegetables are of excellent quality but not quite as well selected for color and tenderness as Grade A. They are usually slightly more mature and therefore have a slightly different taste than the more succulent vegetables in Grade A.
>
> **U.S. Grade C** Grade C vegetables are not so uniform in color and flavor as vegetables in the higher grades, and they are usually more mature.
>
> Other names may be used to describe the quality grades of canned or frozen vegetables: grade A as "Fancy," Grade B as "Extra Standard," and Grade C as "Standard.

Moving Through the System

A. Farm

1. Processing Vegetables: In Wisconsin, virtually all vegetables grown for processing are under contract such that processors rent the land from farmers and provide the initial capital inputs such as seeds, fertilizers and pesticides. Most farms are located within a 20-mile radius of the processing plants with whom they contract; it is highly unusual for distances between contract farms and plants to exceed 75 miles, although there are a few cases where this distance is exceeded (George). While farmers are responsible for minimal maintenance, it is the processing plant that governs stringent guidelines about how and when seeds are planted, and the means by which crops are maintained and harvested. Harvesting is a fully automated process with a rapid turn-around between harvest and processing. In a matter of hours, processing vegetables can move from harvest to can or freezer package ready for distribution. Because nearly all vegetables and potatoes headed for processing are contracted, producers face less of a market risk.

   Wisconsin's processing vegetable industry is largely defined by 4 major producers (or packing sheds) who formally arrange deals with brokers to sell their produce to buyers.

   Major Wisconsin Processing Vegetable Producers (in order of rank):
   1. AgriLink Foods, Green Bay
   2. Hartung Brothers Farms, Arena
   3. Borzynski Farms, Racine
   4. Weekly Farms, Plainfield

2. Potatoes: Because they take a very different path than processing vegetables from farm to market, Wisconsin's potatoes are unique among all harvested crops. The most significant distinction between potatoes and processing vegetables is that most potato farmers do not grow under contract, but rather store their potatoes and sell in response to market conditions. Those farmers opting to contract their crops reduce their risks but are held to set prices. Potatoes are a high-input, high-profit crop, and are less expensive early in the season when farmers often sell off their harvest to avoid the risks associated with long-term storage. Less risk-averse producers will store their crop for longer periods, and sell when low supply and high demand will yield maximum return for potatoes (Carter).

   Potatoes are stored in climate-controlled facilities either on the farm or off-site from post-harvest through spring, when most of them are marketed (Carter). Additionally, potatoes have multiple points of entry into the market: 50% of the annual crop is destined for fresh market produce in retail food establishments such as grocery stores and restaurants. Another 20% of the crop is sold to potato chip processing companies (the largest of these being Jays and the Frito Lay Company). The final 20-30% of the crop is shipped to food processing plants both in-state and out-of-state, where potatoes undergo various form of processing into canned, frozen or dehydrated product (Carter).

Major Wisconsin Potato Producers
1. RDO Farms (largest in U.S.)
2. Heartland Farms
3. Wysocki Produce, Bancroft
4. Paramount Farms
5. Okray Family Farms, Plover

B. Transportation: Processing vegetables are moved from harvest to processing facility as quickly as possible to maintain quality of product. Transportation is almost always contracted by the processing plants with private carriers

C. Processing: The processing industry is divided into two areas of operation: the raw products division, which involves the purchasing of seed, procuring farmer contracts, crop maintenance and harvesting, and ensuring the transportation of the harvest from field to plant. The manufacturing division oversees the cleaning, sorting, canning/freezing of the vegetables, as well as the storage of those deliverables in warehouses on-site, and their distribution to various retail outlets.

The initial work in preparing canned or frozen vegetables begins with automated sorting by size, followed by washing and peeling of vegetables such as carrots, beets and potatoes. Vegetables are then moved onto conveyer belts where plant workers do any additional peeling, cutting or cleaning necessary prior to preparation for the various styles (whole, cut, sliced, etc.). Finally, prepared vegetables are either canned or frozen.

1. Canning: because Wisconsin's processing industry came of age when canning was the industry standard, most of Wisconsin's vegetables continue to be canned rather than frozen. When they enter the automated canning process, vegetables are placed into sterile cans or glass jars, which are then filled with measured amounts of prepared vegetables and brine or liquid, and sealed. Sealed cans and jars are then cooked under carefully controlled conditions of time and temperature to assure that the product will store safely without refrigeration. After they have cooled, cans and jars are labeled, packaged and stored in climate-controlled warehouses until they are shipped to market (Carter; USDA).

2. Freezing: prior to packaging, vegetables destined for the freezer are first blanched (slightly pre-cooked) to aid in the preservation of their appearance, texture and flavor for longer periods of time in storage. Blanched vegetables are then frozen, and finally packaged into polyethylene bags of various sizes or packaged into retail-sized fiber cartons. Most frozen product moves into the distribution stream quickly, into private cold storage facilities or into retail freezer space (USDA).

Major Wisconsin Processors (in order of rank):
1. Seneca (canning, freezing)
2. Lakeside (canning, freezing)
3. Del Monte (canning)
4. McCain (canning)
5. Allen (canning, freezing)
6. Birds Eye (canning, freezing)

It is worth noting that within the processing industry there exists a small but active group called co-packers. Co-packers manufacture and package foods for other companies to sell, many of which may be specialty lines. These products range from nationally-known brands to private labels. Entrepreneurs choose to use the services of co-packers for many reasons, as they can provide a variety of services in addition to manufacturing and packaging products – including helping in the formulation of the product. The co-packer may function only as a packer of other companies' products or may be packing for their own product. The range of services available from a co-packer will vary depending on the size and experience of the co-packer and the type of facilities and the capacity of their plant, but it is generally the case that they are small operations that handle small orders and are not equipped to store product on-site (George).

D. Distribution:

Players: Brokers and buyers are key intermediaries impacting both producers and distributors. On the production end, brokers perform sales for multiple farmers, although large operations will usually have their own brokers. Whether they are in-house or independent contractors, brokers are not exclusive to the producer – they often act as buyers for other smaller producers as well. More traditional buyers, on the other hand, are usually retail employees charged with the selection and purchase of an appropriate mix in a given food category, such as produce, dairy or meat. Most large buying entities such as Roundy's or WalMart purchase directly from food processors; regional and local grocery chains in Wisconsin and the Midwest will most likely deal with brokers (Carter; George; Scholz).

## Cranberry Production

Introduction

Cranberries are Wisconsin's most significant fruit crop both in terms of acreage and value, occupying more than 18,000 acres and generating more than $1.25 million dollars in 2005 (Lochner; WASS). On a broader scale, Wisconsin is the national leader in cranberry production, accounting for 3,750,000 barrels of fruit (1 barrel = 100 lbs of fruit) and 50% - 60% of the national crop (Lochner).

The Regulatory and Grading Process

The grading of cranberries is done by USDA inspectors when the fruit is packed fresh, either in the field or at receiving stations. Cranberries are graded for color, firmness, and uniformity of fruit, qualities which can vary from grader to grader. State regulation of cranberries begins at processing facilities where berries undergo freezing, juicing and canning (Lochner)

Moving through the System

A. Farm:

1. Production: Cranberries are grown on sandy, acidic soils where high water tables give the shallow root systems easy access to nutrients. Cranberry growers invest significant capital (around $30,000/acre) into their operations, which are complex systems involving reservoirs and pumps to ensure that precise movements of water flow into and out of the growing beds at specific times in the season (Lochner; Roper & Planer). Grown from cuttings, cranberry plants are hardy perennials that take 5-7 years to reach full berry production. Stock is either obtained from the cuttings of existing plants on site, or from various breeding programs (Rutgers or University of Wisconsin) which sell rooted plugs to farmers for easy row cropping.

Growing season: During the winter months, cranberry beds are flooded and quickly freeze, protecting the cranberry vines from desiccation and damage from extreme temperatures and winds. In the spring, water is drained from the bogs; once the vines bloom and fruit, from mid-summer through early autumn, there is no flooding. During the harvest cycle, farmers will flood the crop with 8-10 inches of water for ease of berry collection. Berries are mechanically removed from vines, corralled in the ponds and collected from the beds into trucks to be taken to processing facilities.

Wisconsin's Major Cranberry Growers

1. Habelman's Brothers
2. Cutler Cranberry Company
3. Walker Cranberry Company
4. Edlen Cranberry Company
5. Olson Brothers
6. Jacob Searles
7. Wetherby Cranberry

B. Processing: The majority of Wisconsin's cranberries are grown under contract with various processors, with more than 75% of the state's total harvest moving through the grower-owned cooperative Ocean Spray

(Lochner). 95% of the state's crop is processed, with larger growers performing initial cleaning and sorting on-site. Smaller growers harvest and usually move their berries to a receiving station where cleaning and sorting will be done. Cleaned berries move to receiving stations where they are graded, put into 1200-lb. bins to be frozen, and then shipped to processing facilities for further processing. The freezing process takes 28 days, and is done to increase the juice yield of the berries (Lochner).

Of the total annual harvest, approximately 3-5% of the cranberry crop is sold as fresh fruit. In Wisconsin, this process involves harvesting and boxing the berries, and storing them in heavily insulated or refrigerated buildings (usually on-site) for drying (Lochner; Roper & Planer).

Wisconsin's Major Cranberry Processors

1. Ocean Spray
2. Cranberries Unlimited (formerly Northland Cranberries)
3. Wisconsin Cranberry Cooperative
4. Alpine Foods

Out-of-state processors handling Wisconsin cranberries

1. Cliff Star Corporation (N.Y.)
2. Clement Papas (N.J.)
3. Deacus Corporation (MA)

C. Marketing / Distribution: Marketing cranberries in the United States is regulated by a federal market order that is authorized to limit the quantity of cranberries that can be marketed in a crop year. Under this order, Wisconsin growers also assess themselves to provide funds for research and generic promotion for the industry (Roper & Planer). Cranberries and cranberry products are distributed both nationally and internationally, through direct wholesale from processors as well as through retail food establishments such as supermarkets and convenience stores.

## Producer and Processor Directory

Agrilink Vegetable Co., Inc – processing vegetable producer

Borzynski Farms -- processing vegetable producer

Cutler -- cranberry producer

Edlen Cranberry – cranberry producer

Habelman's – cranberry producer

Hartung Brothers Farms – processing vegetable producer

Heartland -- potato producer (also sweet corn, canning peas and green beans)

Jacob Searles – cranberry producer

Okray Family Farms – potato producer

Olson Brothers – cranberry producer

Paramount Farms – potato producer

RDO Farms – potato producer

Walker Cranberry Company – cranberry producer

Wetherby Cranberry – cranberry producer

Weekly Farms – processing vegetable producer

Wysocki Produce Farm – potato producer

**Processors**

Allen Foods -- canning

Alpine Foods -- cranberries

Bird's Eye Foods – vegetable processor

Del Monte – vegetable processor, canning

McCain Food Services – vegetable processor, freezing; formerly Ore Ida

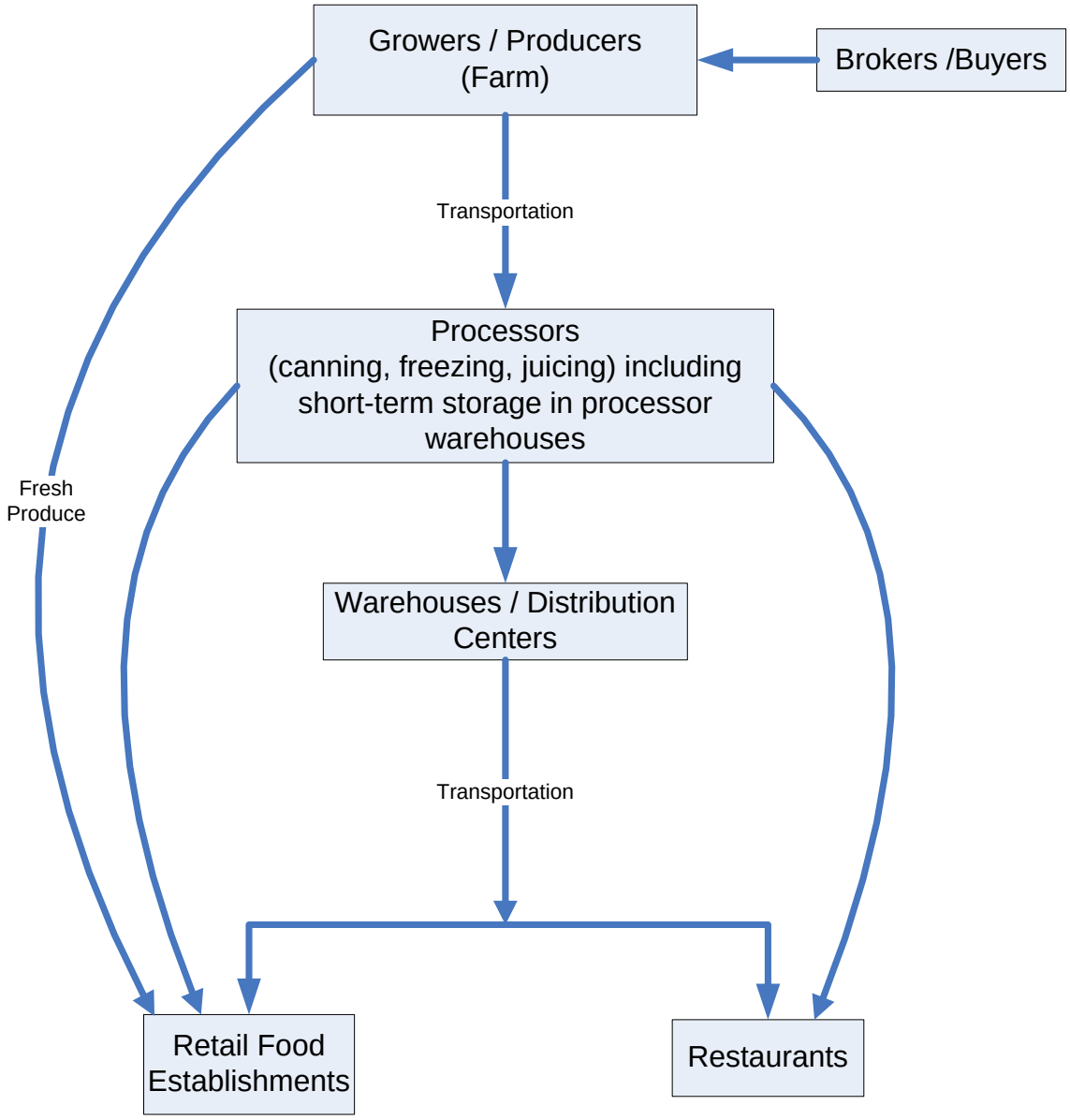
Richelieu Foods – vegetable processor, canning

Ocean Spray -- cranberries

Cranberries Unlimited (formerly Northland Cranberries) -- cranberries

Wisconsin Cranberry Cooperative -- cranberries

# Produce Flow Chart



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