AgWest FARM CREDIT

Industry Perspectives

Dairy

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Dairy

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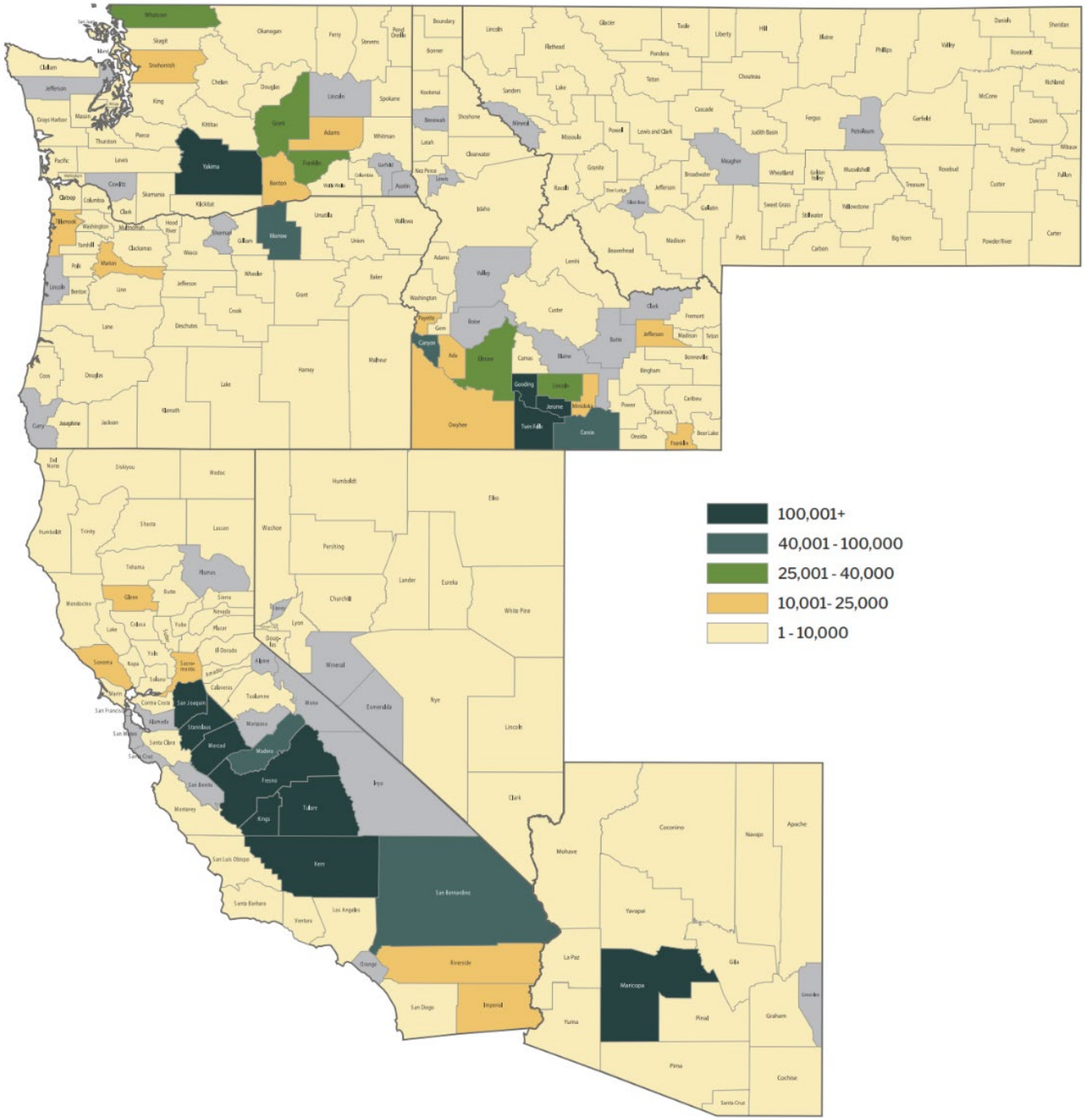
Introduction

Dairy is an important commodity in the West, where the climate, land and available feed draw dairy producers to the region. Dairies supply cooperatives and other processors with raw milk. Cooperatives and independent processors then bottle milk and make a large array of dairy products such as cheese, yogurt, butter and powdered milk. These products are then sold locally, nationally and globally.

Nationally, California is the number one milk producing state followed by Wisconsin (second), and Idaho (third); Washington state ranks 10th, Arizona 14th, Oregon 18th, and Montana 37th. Globally, the United States ranks second in milk production behind the European Union.

Milk cows by county within AgWest territory



Source: USDA Census of Agriculture, 2022.

Dairy production

State	Milk Cows	Total Production *(Billion Lbs.)*	Milk Per Cow *(Lbs. per Head)*
Arizona	191,000	4.7	24,364
California	1,710,000	40.2	23,863
Idaho	674,000	16.8	25,228
Oregon	117,000	4.5	20,943
Washington	258,000	6.2	24,120
Montana	10,000	0.2	23,333
Western Total	2,960,000	72.6	24,527*

Source: USDA NASS. *Weighted average by number of cows.

Arizona

Arizona dairies produced 2.18% of total U.S. milk production. Cattle are one of the "5 Cs" Arizona is known for (the other Cs include Copper, Cotton, Citrus and Climate). The 191,000 dairy cows were responsible for $969 million in milk production value during 2023. Dairy products are one of Arizona's top agricultural commodities, comprising more than a fourth of the state's the total agricultural product sales. United Dairymen of Arizona holds a large portion of the milk under a co-op structure, mostly producing Class I and Class IV milk products.

California

California is the top dairy-producing state in the U.S. and home to 1.71 million dairy cows. Dairy products were the number one valued commodity for the 2023 crop year, with dairies accounting for $8.13 billion in cash receipts. Tulare County is the largest dairy-producing county in the U.S., containing 495,000 milk cows, and often ranks as the top ag producing county by sales in the entire nation. Central California has a high concentration of dairy digestors that convert methane from dairy manure into energy. California is structured with a strongly prevalent co-op structure, and an estimated 75 - 80% of the milk is sent to these processors.

Idaho

In 2023, cash receipts from dairy products produced on Idaho farms amounted to $3.4 billion. Dairy ranked as the largest single sector in the state's agriculture industry.

Idaho is home to 325 dairy operations with an estimated 674,000 milk cows. The majority of these cows (>70%) are in the Magic Valley, which includes Jerome, Gooding, Twin Falls, Cassia and Minidoka counties. The Treasure Valley, located in the Boise area, is home to about 14% of Idaho's milk-cow herd. Idaho was the seventh most efficient state for production per cow and the highest ranking in the western U.S.

Idaho dairies produced 16.8 billion pounds of milk in 2023. Most of Idaho's milk production goes toward cheese manufacturing. Surpassed only by California and Wisconsin, Idaho is the third-largest manufacturer of natural and processed cheese in the United States, producing more than 1.0 billion pounds of cheese in 2023.

Washington

Dairy products represent the second-largest agriculture sector in Washington, surpassed only by apples. Dairy products accounted for $1.33 billion of receipts in 2023. Washington ranks 10th in the U.S. in terms of total milk production, and 12th in milk cow efficiency. Washington has approximately 419 dairies with Yakima being the largest county. Yakima is home to 38% of Washington's cows, and Whatcom County is the second largest with 17% of the state's milking herd.

Oregon

The dairy industry in Oregon produced 2.5 billion pounds of milk in 2023, and this production is valued at $597 million. Morrow County in northern Oregon contains 35% of all milk cows in the state. Other major dairy counties include Tillamook, Marion, Yamhill, Klamath and Polk by herd size in descending order.

Montana

Dairy is a relatively minor industry in Montana, with 10,000 dairy cows. Most of Montana's livestock sector focuses on beef cattle. According to the 2022 Census of Agriculture, Montana has 273 farms with milk cows with few large dairy operations in the state.

Value chain

The dairy value chain involves production, transport, processing, packaging and marketing. In the West, independent companies or vertically integrated businesses conduct each of these steps.

Production

Livestock and feed are the main inputs for dairy production: heifer calves, springers (heifers close to calving) and cows. Bull calves are generally sold as "day-old" calves and raised as beef animals. Most dairies use artificial insemination (AI) techniques and bulls are kept only to breed cows when AI is unsuccessful.

Dairies have two options for sourcing cows. They can raise heifer calves to maturity, or they can purchase mature cows. Once a cow or springer freshens (calves and begins producing milk), she can produce milk for approximately 305 days, with peak milk occurring during the first 100 days after calving. Average production is between 65-85 pounds per head per day and varies based on region, feed, breed and seasonal weather conditions.

Tulare County in California, the Magic Valley of Idaho, and the Yakima Valley of Washington are the largest dairy hubs in the United States. For dairies in cold climates, production tends to decrease in winter months as cows dedicate more energy to staying warm. On the other hand, dairies in warm climates experience increased expenses and decreased production during the summer to keep cows cool and comfortable. Feed rations vary by location depending on the crops and water supply available. Higher-quality feed rations can increase milk production levels, as can cow breed. Holsteins, for example, produce significantly higher milk quantities than Jerseys.

Feed is a key component in milk production. Rations for lactating dairy cows are formulated based on crude protein and net energy for lactation. To achieve maximum production, rations are also balanced for effective fiber, non-structural carbohydrates, ruminal un-degraded protein, soluble protein and other nutritional characteristics of the feed. Alfalfa hay and protein meals (soybean, canola, and cottonseed meals) are the major sources of protein. Grain and silage are sources of energy and protein. Adequate levels of minerals, such as salt, are also important. These ingredients are fed to cows as a total mixed ration (TMR). Some dairymen have the technology to track each cow's feed consumption. The collected data offers insight into feed conversion and milk components. Pasture-based dairies are still common but tend to be smaller and provide mixed rations during the winter.

Dairies have several sources of income; milk sales account for the largest portion of revenue. The sale of cull cows, heifers and bull calves also contributes to dairy income.

Beef integration

Dairy cattle are beginning to make a big impact in the beef industry and dairymen are exploring how they can further supplement income through new beef-involved business plans. Rather than selling off young dairy calves as day olds, many producers are choosing to raise and finish the calves. Crossbreeding traditional dairy breeds, such as Holsteins, with beef breeds, such as Black Angus, or artificially inseminating beef calves into dairy cows is a popular new strategy. This has improved parturition due to natural lower birth weights and increased calf carcass value.

Beef ranchers are already seeing the effects of more cattle entering the feedlots. Beef prices fluctuate more often with new market competition increasing supply. Dairymen have many comparative advantages in raising beef calves and are in the market to stay.

Marketing and supply chain

Transport

Milk is collected from dairies in large, insulated tanker trucks. Large dairies ship several trucks per day, whereas smaller dairies may ship milk every two days. In some regions, independent trucking companies ship milk from farms to processors. Producers pay for shipping and processors coordinate where milk is sent.

Processing, packaging, and marketing

Processors range from small independent creameries serving niche markets to cooperatives and privately owned processors.

Small creameries may be vertically integrated producers or have a contracted agreement with a dairy. These processors bottle milk or make relatively small batches of artisanal dairy products, such as cheese. These small operations generally market their products to local consumers.

Co-ops process and market a significant amount of milk in the AgWest territories. These processors source milk from member/owner dairy farmers and use the milk in a wide array of products. Through their product mixes, co-ops may differentiate themselves through two marketing streams. The first is branded consumer products, such as fluid milk, cheese, butter, cottage cheese, cream cheese and ice cream which are marketed widely to consumers through retail outlets. Products may be packaged under the co-op's brand or co-branded with another company. The second marketing stream is dairy ingredients, primarily milk powder and cheese. Co-ops sell these commodities to food manufacturers who in turn make value-added products. Co-op business models can also offer better milk prices to members and consumers.

Private processors purchase milk from co-ops and directly from producers. Processing facilities are generally specialized (a cheese, yogurt or powder plant) as part of a geographically diverse product mix.

Milk pricing and marketing infrastructure

Dairy producers receive varying milk prices depending on the milk components (fat and protein). Contractual agreements establish specifics for what the bottler or processor requires in their supply. The milk price includes adjustments for component content and quality. Milk quality is essentially a measure of overall herd health and management as expressed by somatic cell count, which indicates the proportions of bacteria in milk.

The baseline for component content in the industry is 3.5% butterfat and 3% protein. Dairies generally receive a price premium when tests of their product confirm butterfat content of 3.5% or more. The composition of feed rations can increase butterfat levels, as can cow breed. Jerseys, for example, produce significantly more butterfat than Holsteins. Dairies may also receive premiums for product with somatic cell counts of 200,000 or less per milliliter.

Most states participate in the Federal Milk Market Order (FMMO), which governs local prices under 11 regional FMMO areas. California, Arizona, Washington, most of Oregon, and North Idaho participate in the FMMO, while Montana and Southern Idaho do not.

Milk marketed under the Federal Milk Order is priced in one of four categories:

- Class I: fluid milk for consumption (pints, gallons, chocolate milk, etc.)
- Class II: soft products (ice cream, yogurt, cottage cheese, etc.)
- Class III: cheese (American and all others)
- Class IV: butter and powdered milk

A blend price is paid to producers in a market area according to the pooled government order. The pool price is based on a weighted average price of Class I, II, III, and IV milk use within the milk-order boundary. In Washington and Oregon, which are FMMO states, milk prices are based on a blend of all milk classes.

For example, the blend price paid in Washington and Oregon has been based on a use of 29% Class I, 7% Class II, 37% Class III, and 27% Class IV milk. The portions fluctuate each month based on use. The milk pool also varies monthly depending on prices. For example, when Class III prices are higher, the pool will have a higher portion of Class IV. This occurs because farmers can receive a better price independently for their Class III milk. The reverse also applies – higher Class IV prices result in more Class III milk in the marketing pool. In broad terms, states that market under the FMMO receive higher prices than dairies in Idaho due to the upward pricing influence of fluid milk. However, the reverse is true when cheese prices are high relative to other milk classes. In southern Idaho, the milk price is calculated according to cheese yield, or a blend of Class III and Class IV prices, because the milk is generally purchased for the components needed to make cheese.

Industry drivers

Global markets

Eight major dairy commodities are traded in international markets:Whole milk powder (WMP)

- Whey powder
- Cheese
- Skim milk powder (nonfat dry milk, or SMP)
- Butter
- Lactose
- Casein
- Condensed milk

China is the largest importer of most dairy products, particularly whole milk powder (WMP) and whey. Mexico is a major importer of skim milk powder (SMP) and France and China, respectively, lead in butter imports. The European Union, U.S., Japan, and China are the top cheese importers. In 2023, the U.S. imported more than $1.8 billion worth of cheese products, while also exporting cheese products worth $2.2 billion. Countries both importing and exporting dairy products is common and allows international buyers to balance domestic supply and demand, access a variety of products, and capitalize on international market opportunities.

The European Union is the largest exporter of dairy products, followed by New Zealand and the United States. Export demand in international markets remains a significant driver for Western dairies, with monetary exchange rates having a significant impact on dairy market.

Regulation

Capital requirements to conform to new rules and regulations are a dairy industry driver. In Washington, proposed rules concerning nutrient (manure) management may necessitate additional lagoon capacity and a larger land base to spread manure. California producers are subject to the Climate Risk Carbon Initiative and Low Carbon Fuel Standard. Methane digesters are becoming more common. Over 100 dairies have added a digester to their operation. Currently, many of the changes are voluntary, but as time continues, more stringent restrictions may be implemented to reach the emissions goal.

Breeding livestock genetics and replacement

Improved breeding protocols and the use of sexed semen (semen for a specified gender of calf) have created an abundance of high-quality heifers in replacement programs. While a cull rate of 35% or more might have been alarming in the past, it is more typical today as the consistent supply of heifers is allowing operations to maximize efficiencies and still maintain herd size.

Beef integration

Dairy cattle are making a big impact in the beef industry and dairymen are exploring how they can further supplement income through new beef involved business plans. Rather than selling off young dairy calves as day old's, many producers are choosing to raise and finish the calves. Crossbreeding traditional dairy breeds, such as Holsteins, with beef breeds, such as Black Angus, or artificially inseminating beef calves into dairy cows is a popular new strategy. This has improved parturition due to natural lower birth weights and increased calf carcass value.

Beef ranchers are already seeing the effects of more cattle entering the feedlots. Beef prices have dropped with new market competition increasing supply. Dairies have many comparative advantages in raising beef calves and are in the market to stay.

Labor and robotics

Dairy production is labor intensive and heavily dependent on low-cost labor to support growth. Historically, the U.S. dairy industry has relied on migrant laborers from Mexico and Latin American countries. Challenges with immigration policy in recent years have led to labor shortages and rising labor costs. Ultimately growth is constrained in key dairy-producing areas across the United States.

Robotic milking is a growing solution to the problems of rising labor costs and labor shortages. Robotic milking systems, also called Automatic Milking Systems (AMS), became widely available to dairy producers in the early 1990s and were popular in Europe before gaining popularity in the United States. Due to increasing labor costs and constraints on labor

supply, commercial operations are exploring ways to adopt robotic milking systems. While milking each cow, AMS machines also collect data for quantity and quality. Low production can signify early if an animal's health is struggling, even before symptoms are visible. Producers have also noted their cows prefer and are soothed by AM systems and tend to produce higher quantities.

There are three types of robotic milking systems.

- Single stall unit: uses one robotic arm for each stall, the most common system.
- Multiple stall unit: uses one robotic arm for two or more milking stalls.
- Automatic Milking Rotary (AMR): uses a rotating platform that may vary in size and employs multiple robotic arms, depending on the size of the platform. Each robotic arm on an AMR may have a specialized function compared to the stall units, where a single robotic arm handles multiple functions. These robots reduce the need for workers to handle animals directly, however, they are increasing the need for skilled technicians and data analysists.

Appendix A

Best practices

Dairy producers implement various strategies to remain competitive and position their businesses for long-term success. This section details best practices used by AgWest dairy producers.

Strong operational management

Successful operators fully understand their production capacity and costs and have a specific management plan to balance production levels, costs and market returns. Dairy producers implementing the following proven best practices are well positioned for ongoing prosperity and future growth.

Financial management:

- Establish a liquidity reserve in the form of cash or equities in cows and feed. These liquidity reserves will enable an operation to survive through sustained periods of volatility.
- Maintain the integrity of the top half of the balance sheet. Do not use cash reserves for long-term purchases or capital improvements and closely monitor working capital.
- Reduce leverage, which is a key to long-term survivability. On a market-based balance sheet, leverage under 50% should be maintained, while less than 40% is preferred.
- Consider the impact of every potential expansion on management, leverage and cash reserves.
- Prepare budgets and be accountable to those budgets. The operation's management team convenes regularly to review performance. Producers are aware of operational performance on a month-to-month basis.
- Have a good understanding of break-evens and use data to make decisions. Thou shalt know thy costs.
- Evaluate cash flow and look for ways to continually lower capital needs.
- Understand and assess counterparty risk. Know your customers and input suppliers.
- Develop a comprehensive permanent commodity price risk management plan. With continued volatility in both milk price and input costs, producers need to take advantage of all available tools to lock in profitable margins and protect their operation from undue risk.
- Frequent calls with a CPA, commodity risk hedging firm and lender provide valuable current market data.
- Consider engaging in a risk management program. There are options to utilize futures, options and insurance plans. Dairy Revenue Protection (DRP) is a federally subsidized insurance program that allows producers to protect their gross revenue from milk sales. One of the key components to DRP is that it allows producers to lock in a revenue guarantee on a futures milk price without capping the potential for upward gains in the market. An important attribute of DRP is the lack of margin calls that may be associated with the use of futures and options, especially with the increase in interest rates. DRP has been very effective in the last few years to allow producers to take full advantage of high prices while protecting from lower prices.

Herd management:

- Maintain herd replacement programs with a heifer-to-cow ratio ranging from 80% to 100% if a cost-benefit analysis supports the raise-on-farm versus purchase decision.
- Understand the costs and benefits of a full heifer program relative to purchasing replacements.

Analyze every aspect of the business to identify areas that can be cut to control expenses or modified to improve operating efficiency. Examples include evaluation of the heifer program, capital spending (necessity or want), labor strategies, barn efficiency, merits of milking twice vs. three times per day, etc. Fluid milk consumption is declining; however, consumers are incorporating more dairy products into their diet. Milk processors are more interested in milk components than water quantity. Adding different dairy breeds with high butterfat to the herd or breeding for stronger components will increase milk value in the market.

Environmental risk management:

- Establish a land base adequate to dispose of all waste. Consider alternatives to land application, such as manure digesters.
- Connect with local regulatory agencies to implement a nutrient management plan or explore other environmental monitoring techniques.
- Understand regulations and permitting processes to avoid legal liability that could jeopardize the viability of operations.
- California producers face a different landscape in environmental management. Approximately 100 dairies have installed methane digestors to decrease their emissions and benefit from the production of natural gas.
- What does a waste management action plan look like? What programs are they involved in?

Feed:

- Manage feed costs by contracting feed with custom growers, hedging or controlling a captive feed base on long-term leased or purchased ground. As feed is typically the largest single expense to a dairy operation, management of this cost is critical.
- Examine feed rations relative to feed component costs to assure the feed ration is as economical as possible for the level of desired milk production and herd health.

Appendix B

Glossary

Alfalfa: A leguminous crop for forage or hay used in livestock feeding

Baler: A piece of machinery that compresses and binds hay/alfalfa into bales to feed cows

Biosecurity: Any of a broad range of practices enforced at a dairy farm to prevent transmittal of pathogens from other sources by feed, cattle, people or other animals

Butter: Made by churning or shaking pasteurized cream until the butterfat separates from the remaining fluid, called buttermilk

Blend price: A minimum weighted average price paid to producers based on the Federal Milk Orders. The blend price may be adjusted for butterfat content and plant location.

Bovine: A distinct family of ruminant mammals, referring to cattle

Bull: A sexually mature, uncastrated bovine male

Bulk tank: A large, insulated container that is used to store and cool milk quickly to 2° to 4°C (35° to 39°F)

Bunk: A feed trough or feeding station for cattle

Bunker: A flat rectangular structure used to store forages

Butterfat: The fat that is found in milk; also referred to as milk fat

Calf: A young male or female bovine

Cheese: Made from heating, draining and pressing curds

Cooperative: A firm that is owned by its farmer-members, is operated for their benefit, and distributes earnings based on patronage (volume of milk).

Cow: A mature female bovine that has borne a calf

Cull: To remove a cow from the herd

Curds: The white solid that forms when milk coagulates (clumps together) in the cheese-making process

CWT (cwt): Abbreviation for hundredweight, or 100 pounds

Dairy cow: A bovine from which milk production is intended for human consumption

Dairy steer: A neutered male of any of the dairy cattle breeds. "Dairy steers" are raised for meat production and usually managed like beef cattle.

Dam: Mother or female parent in a pedigree

Days-in-milk: The number of days a cow has been milking since the last freshening (calving)

Dry cow: A cow that is not lactating or secreting milk after it has completed a lactation period following calving, or a cow that is pregnant and has been taken out of the milking string to allow the cow to prepare itself for freshening

Electronic feeders: Stations in which cows are fed specified amounts of feed by a computer that recognizes their unique electronic identification transponders

Federal Milk Order: A classified pricing system based on Grade A milk use. The four categories are:

- Class I: fluid milk for consumption
- Class II: soft products (ice cream, yogurt, cottage cheese, etc.)
- Class III: cheese
- Class IV: butter or powdered milk

Feed/feed ration: Nutritionally balanced mixture of hay, grain, silage, vitamins and minerals prepared for and fed to cows

Flat barn: An area for milking cattle where the person milking is on the same level as the cow. May be used with a pipeline or bucket milking system. Generally, the same area is used for cow housing.

Fluid milk: Milk that is sold at stores in the form of milk or cream

Forage: Crops high in fiber and grown especially to feed cattle. Includes grasses and legumes cut at the proper stage of maturity and stored to preserve quality

Freshening: When a cow gives birth and begins to produce milk

Fresh cow: A cow that has recently given birth to a calf

Fresh milk: Dairy products having original qualities unimpaired and those recently produced or processed

Grade A or Fluid Grade milk: Milk produced under sanitary conditions qualified for human consumption

Grain: Small, hard, dry seeds, with or without attached hulls or fruit layers, harvested for human or animal consumption. Examples include corn, wheat, soybeans and canola

Hay: Grass, legumes or other herbaceous plants that have been cut, dried and stored for use as animal feed

Haylage: Hay-silage. A type of moist feed prepared by chopping green alfalfa or grass, kept in airtight silos, and fed to cattle

Heifer: A young female bovine before she has given birth to a calf and started to produce milk

Holstein: Breed of dairy cow that is black and white in color

Herd: A group of cows; cattle

Homogenization: Process of breaking up fat globules into smaller particles to allow the fat to stay evenly distributed throughout the milk

Hundredweight: Equal to 100 pounds. The symbol for hundredweight is cwt.

Industrial milk: Milk that is sold for further processing into dairy products such as cheese, ice cream, etc.

Jersey: Breed of dairy cow that is usually brown in color

Lactate: To secrete or produce milk

Lactose: A sugar that is found only in milk

Lagoon: Storage pond for manure

Legume: A plant species that has seed pods that split along both sides when ripe. Some of the more common legumes are beans, lentils, peanuts, peas and soybeans

Low Carbon Fuel Standard (LCFS): Rule designed to reduce carbon output caused by transportation fuels, aiming to reduce reliance on fossil fuels and limit environmental impacts through 2030

Mastitis: An inflammation of the mammary gland (or glands), usually caused by bacteria

Raw milk: Milk that has not yet been pasteurized

Manure: Organic matter derived from cattle feces used as an organic fertilizer

Milk powder: Obtained by the partial removal of water from milk

Milk protein concentrate (MPC): Concentrated milk product that contains 40-90% protein

National Agricultural Statistics Service (NASS): USDA agency that conducts surveys and gathers data regarding U.S. and international agriculture

Parlor: The specialized area on the dairy farm where milking is performed. Parlors come in many types: flat barn, walk-through, herringbone, parallel, swing and rotary

Pasture: Plants, such as grass, grown for feeding or grazing animals

Pasteurization: The process of heating raw milk to a high temperature and cooling it rapidly to kill any natural bacteria that may be present

Pool price or pooling: The price paid by processors for milk based on category of use. Processors pay into or draw out of the pool based on their use of milk relative to market average use. Producers participating in the pool receive identical uniform blend prices, with adjustments for butterfat content and location of the plant to which the milk is delivered.

Processors: Dealers who commonly purchase raw milk then sell pasteurized milk and milk products

Robotic parlor: A completely automated system for milking cows that requires limited human contact

Separator: A centrifuge device used to remove fat from milk. Formerly used on the farm, but now used primarily at processing plants

Service: A term that is used to describe the event of artificial insemination

Short-bred heifer: A heifer that is confirmed pregnant and has been pregnant for 0-6 months

Silage: A type of moist feed prepared by chopping green forage, kept in airtight silos and fed to cattle

Silo: A storage facility for silage

Sire: Father or male parent in a pedigree

Skim milk powder (SMP): Obtained by removing water from pasteurized skim milk. Contains 5% moisture, 1.5% butterfat and a minimum milk protein content of 34%.

Somatic-cell count: The number of white blood cells (leukocytes) per milliliter of milk. A high concentration of somatic cells indicates possible mastitis infection

Springer: A heifer that is within 2-3 months of calving

Stall: A cow-housing cubicle

Teat: The appendage on the udder through which milk from the udder flows

Total mixed ration (TMR): The strategy of feeding complete mixed ration, which includes forages and concentrates

Throughput: The number of cows that can be milked in a parlor in a given period

Udder: The mammary gland of cows where milk is produced

Whey: Watery liquid that is left over when milk forms curds

Whole milk powder (WMP): Obtained by removing water from pasteurized, homogenized whole milk. Contains 26-40% butterfat, no more than 5% moisture and typically less than 27% protein.