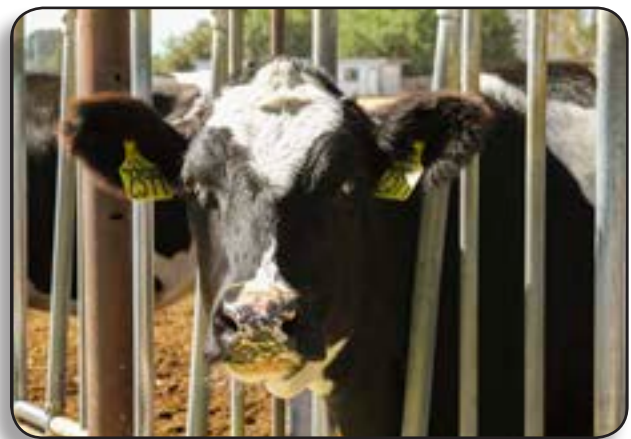


# Dairy Cattle and Veal Production

## Introduction

The dairy industry in the United States has changed dramatically over the past 75 years. Since the 1940s the number of dairy farms in the country has dropped from over 4 million facilities to about 65 thousand farms. The total number of dairy cows in the U.S. has also dropped by 75%, from approximately 25 million cows to approximately 9 million cows.

Also since the 1940s, the total number of herds in the United States has grown smaller, but the number of cows in each herd has grown larger. It is estimated that the average U.S. dairy houses about 150 cows. However, there is a wide range among individual dairies with Midwestern dairies tending to be smaller averaging about 90 cows per herd and large dairy herds out west averaging about 1,000 cows per herd. If calves are raised on site as replacements, then a good proportion of the animals on the dairy will be replacement heifers of varying ages. For such dairies, the total number of cattle on the dairy can be roughly estimated by multiplying the number of cows being milked by two.

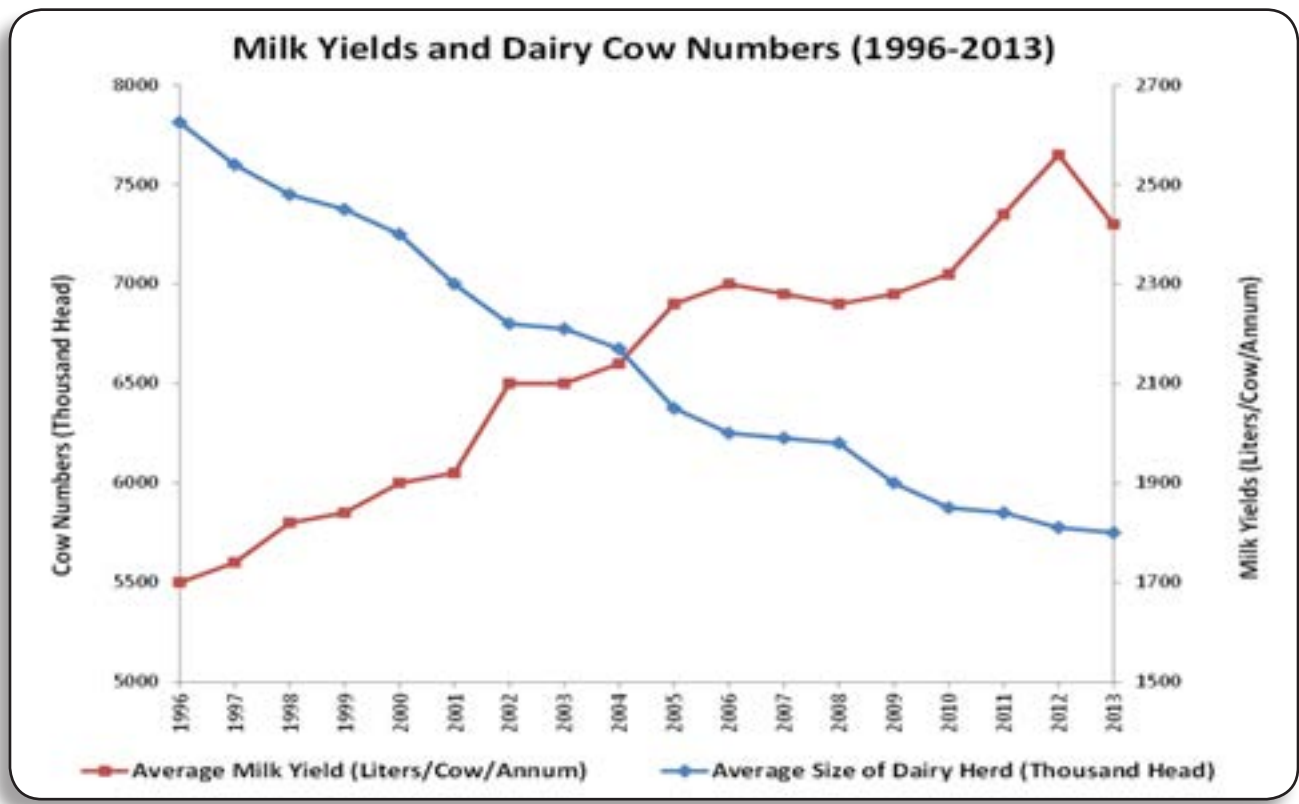


Torrey Johnson

While both the number of dairy farms and the number of dairy cows in the U.S. has dropped dramatically, the total amount of milk produced in the U.S. has climbed from 54 billion kilograms to 84 billion kilograms (Figure 1). This increase in milk production is due to a 5-fold increase in the amount of milk produced per cow. There can be great variability in milk production from herd to herd with herd averages ranging from less than 14,000 pounds of milk per cow, per year, to more than 23,000 pounds of milk per cow per year. The average U.S. dairy cow makes about 20,000 pounds of milk every 12 months, about 2,300 gallons, or 14 times her body weight.

The dairy and veal industries are intricately linked. The following information about dairy and veal production are general practices that apply to most operations. The relationship between these two industries will be described in the section on life cycles. Among individual dairies there is some variability and sometimes there are extreme differences in practices from one dairy to another.

Figure 1: Milk Yields and Dairy Cow Numbers



USDA

# Dairy Terminology

When communicating with dairy and veal producers, it is important to have a functional understanding of common terminology used in these industries.

Artificial Insemination (AI) The introduction of semen passed through a straw and pipette into the cow's reproductive tract for the purpose of achieving pregnancy. The use of AI provides dairy farmers with the ability to breed cows for specific traits in future animals. This is achieved by inseminating cows with semen from bulls that have been selected for specific desirable traits.

Bulk Tank A large tank used for cooling and storing milk at a cold temperature until it can be picked up by a milk hauler for transport to a creamery. Bulk tanks are usually made of stainless steel and must be cleaned after each milk collection.

Bulls Male cattle that have not been castrated and are fertile. Bulls can be extremely dangerous and can cause serious injury or death to personnel when appropriate safety precautions are not taken when working around these animals

Calf A young bovine, either male or female, up to one year of age.

Clean-up Bull A breeding bull that is used to naturally inseminate heifers and cows that do not become pregnant by means of artificial insemination.

Colostrum The first milk produced by a cow following calving. Colostrum has higher concentrations of proteins, fats, vitamins and antibodies (immunoglobulins) compared to milk that is used for human consumption.

Cull Cows Cows that are removed from the herd for health or production reasons.

Dairy Calves Female or male dairy cattle being fed a ration that includes milk or liquid milk replacer and which are not intended for veal production; one of the 3 classes of 'non-lactating dairy cattle' defined under current federal guidelines.

Dairy Cow Female dairy cattle that are intended for production of milk for human consumption.



Jeff Hall, UC Davis WIFSS

Dry Cow Therapy or Treatment An intramammary antibiotic that is administered into each teat at the beginning of the dry period to prevent udder infections that could develop during the dry period and/or treat active infections that are present at the time of drying-off.

Dry Dairy Cows Female dairy cattle that had previously lactated, but which are not currently producing milk (i.e., cows that are between lactations; the period of time between two lactations is also referred to as the 'dry period' (see below).

Dry Period Approximately two months before she is due to calve again, a lactating dairy cow stops getting milked and is allowed ~60 days to gain back weight that may have been lost during lactation; the udder is also able to repair and regenerate secretory mammary gland tissue during this time before the next calving and resumption of routine daily milking.

Extralabel Use of a prescription medication or supplement that is not in accordance with the directions on the manufacturer's label. Extralabel use can only be done by a producer under the direction of a licensed veterinarian with whom there is an established Veterinarian-Client-Patient relationship.

First-Calf Heifer After giving birth to its first calf, a replacement dairy heifer is commonly referred to by producers as a first-calf heifer.

Formula-Fed Calf A calf raised to about 16 to 18 weeks of age on an all liquid diet. The majority of veal marketed in the U.S. is formula-fed. Also called milk-fed or special-fed veal.

Fresh Cows Dairy cows that have recently calved.

Lactating Dairy Cows Female dairy cattle that are producing milk.

Lactating Cow Treatment/Therapy An intramammary antibiotic that is designed for use during the normal lactation period.

Milk Fed Veal Calf A bull calf that is raised on milk replacer for about 16 weeks before slaughter.

Dry Cow Treatment



Jeff Hall, UC Davis WIFSS

Dairy Calves



Jeff Hall, UC Davis WIFSS

Lactating Dairy Cow



Keith Weller, USDA ARS

Non-Formula Fed Veal A calf that has been weaned from milk-replacer at about two months of age and has transitioned to a solid food diet of hay and/or grain. Non-formula fed veal will be marketed at up to 700 pounds. This class represents a very small fraction of the total veal marketed in the U.S.

Pre-Ruminant An animal with a rumen that is not yet anatomically or functionally mature.

Replacement Dairy Bulls Intact male dairy cattle intended for reproductive purposes such as natural breeding or for collection of semen for use in artificial insemination (AI); one of the three classes of 'non-lactating dairy cattle' defined under current federal guidelines.

Replacement Dairy Heifers Female dairy cattle from the time of weaning until the time of first calving; one of the 3 classes of 'non-lactating dairy cattle' defined under current federal guidelines.

Rumen The largest compartment of the forestomach in a mature ruminant animal and the site of microbial fermentation that is required to produce useable nutrients from consumed feed materials that would otherwise be indigestible. The rumen is anatomically joined to the reticulum to form a 'reticulorumen' that precedes the next two compartments (omasum and abomasum (the true stomach of a ruminant)). The abomasum corresponds to the stomach of a human being.

Teat Sealant A paste that is infused into the end of each teat following dry cow treatment. Such products are used to seal the end of the teat to prevent introduction of infectious agents into the udder during the dry period.

Veal Calves Immature beef and dairy breed cattle that lack a functional rumen and that are intended for meat production. Veal calves are considered as a distinct regulatory class from suckling calves because of their handling, housing, and proximity to slaughter.

Voluntary Waiting Period A two to three month period of time following calving before which a cow is not rebred by AI or allowed to have exposure to a bull. During this time, the cow's reproductive system is allowed to recover before being rebred. Also during this time, lactation begins and milk production will reach its peak. After the voluntary waiting period is over, the cow will be bred back again. A cow will be milked during most of the pregnancy.

Weaning The process of transitioning a calf away from a diet containing milk or milk replacer, to an all solid feed diet or ration.

Teat Sealant Being Applied To Dairy Cow



Heather Johnson, UC Davis WIFSS

Withdrawal Interval Describes a withdrawal period for a drug that has been used in an extralabel manner.

Withdrawal Period The period of time that is required to elapse following the administration of an approved animal drug before which milk can be sold for human consumption, and/or the animal can be slaughtered for human consumption. The withdrawal period is necessary to ensure that tissue and/or milk residues of a drug have fallen below a federally approved concentration limit, such that the animal and/or its milk are safe for human consumption. The withdrawal period is sometimes referred to as withdrawal time.

## Breeds

### Holstein



Jeff Vanuga, NRCS

One similarity between dairy herds all across the U.S. is the preponderance of a single dairy breed: the Holstein. Favored for high milk production, Holsteins represent the vast majority of all dairy cows in the country.

### Jersey



Tim McCabe, NRCS

The second most common breed is the smaller Jersey, which is favored by some producers for its higher milk fat and protein content; these differences make Jersey milk highly valued for cheese production.

### Other Breeds



Wikimedia

All of the other breeds, such as the Brown Swiss (pictured left), Ayrshire and Guernsey each make up a very small fraction of the total number of cows in the U.S. dairy population.

# Feeding and Operations

Dairies are classified by the way cattle in a particular herd are fed and housed. Most of the dairy operations in the U.S. are classified as conventional and tend to be large-herd operations. In conventional operations, feed grown on the farm or purchased elsewhere is brought to the cows. Typical examples of cow feed include hay (which is grown, cut, dried, harvested and baled in the field for later feeding to cows), and corn silage (which is made from chopped and fermented corn that is stored in silos or plastic bags before being fed to cows).

Less common than conventional operations are grazing or pasture operations. On these farms, rather than bringing the feed to the cow, the cows are brought to the feed in the pasture. Because there are relatively few places in the country where true grazing is available year-round, grazing operations comprise only a very small fraction of the dairy farms in the U.S.

Many operations take advantage of intermittent pasture by allowing grazing when it is available and then feeding cows indoors during seasonal, inclement weather. About a third of U.S. dairy operations utilize this management style. These tend to be small farms that house very few of the total number of dairy cows in the U.S.

Feed Truck Bringing Feed to Cows



Jeff Vanuga, NRCS

Cows in Pasture Operation



Jeff Vanuga, NRCS

# Housing

Dairy cattle require proper housing throughout their lifetime in order to maintain safety and health. Dairy farmers typically use different types of housing depending on the age and the stage of the animals' life cycle and region in which they live.

## Calves



Jeff Hall, UC Davis WIFSS

The majority of dairy operations in the U.S. house calves in individual pens or hutches typically made of plastic or wood. Raising calves in individual hutches has some health benefits including individual feeding and less opportunity for transfer of diseases between calves. Calves can also be raised in groups, although this is less common than the use of individual calf hutches or pens.

## Adults

For adult lactating cows, there are three major types of primary housing:

### Tie Stalls/Stanchion



Damien Hardy

Approximately half of dairy farms in the eastern U.S. maintain lactating cows in a "Tie Stall" or "Stanchion" type of housing system. This housing type combines housing and milking at one location; such stalls are the most common type of housing in the eastern U.S. In a tie stall/stanchion operation, cows are restrained in a bedded stall, with an area for eating and drinking in front of them and a manure collection channel behind. The milking system used in this system can be fixed or portable but in either case the cows are milked while standing in the Tie Stall.

### Free Stall



NRCS

In this type of housing there are individual stalls with metal pipe partitions between stalls, and cattle are not confined to one particular stall. Cows can move around freely and have access to feeding areas and water troughs. Nearly three-fourths of U.S. dairy operations with 500 or more cattle are free stall operations.

### Dry Lot



Torrey Johnson

A dry lot is an outdoor pen typically augmented with shade structures. About one-third of dairies in the western U.S. (California, Idaho, New Mexico, Texas, and Washington) are dry lot operations.



# Milking

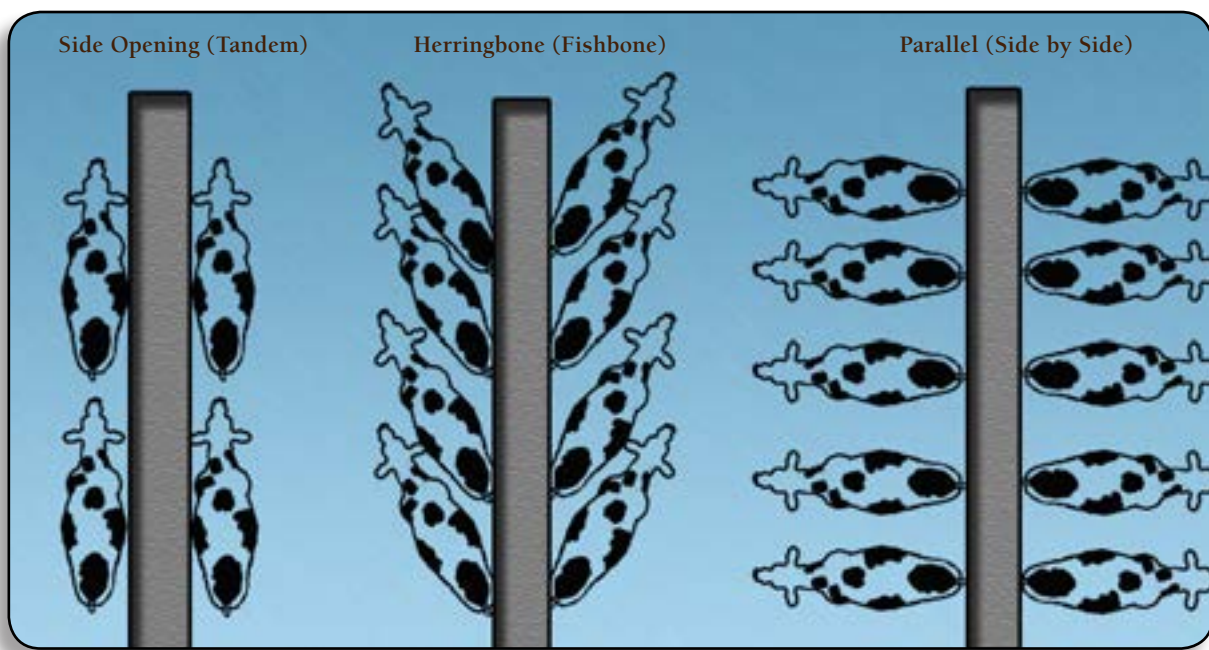
Directly related to how cows are housed is how they are milked. There are two general types of milking facilities: tie stall/stanchion and parlor. In tie stall/stanchion operations, cows are typically milked while standing in their individual stall. In parlor milking systems, cows are walked multiple times per day to a dedicated milking area (parlor). While approximately 60% of dairy operations use tie stall/stanchion milking systems, over three-fourths of cows in the U.S. are milked in parlors. Many factors go into the choice of parlor used, including frequency of milking, available labor, need to treat cattle individually while in the milk parlor, and cow numbers. There are several common styles of milking parlor used by dairy operations in the United States today.

Side Opening (Tandem) Parlor - Less than 10% of operations and less than 5% of dairy cows in the U.S. are milked in a side opening (tandem) type of parlor. These are more suited to operations with up to about 400 cows where there is a high level of management and more individualized care for cows while in the parlor. Cows are milked from the side in this system.

Herringbone (Fishbone) Parlor - Approximately 50% of operations and 50% of cows in the U.S. are milked in a herringbone (fishbone) parlor. In this system cows are milked while standing on an elevated platform in about a 45-degree angle facing away from the milker. In this system cows are milked from the side.

Parallel (Side by Side) Parlor - In this system cows stand on an elevated platform at a 90-degree angle facing away from the milker who must milk the cows from between the rear legs of the cow. The advantage to this system is that the distance between animals is shorter and reduces walking distance for the milkers.

Common Styles of Milking Parlors



WIFSS UC Davis

Rotary (Carousel; Turnstile) Parlor—In this type of parlor, cows move onto a rotating platform, facing either inward or outward depending on the system. While this system is typically more costly to construct, the actual day to day milking procedures are more automated and more efficient. As such, this system is best suited to large herds (>1000 cows). This system does not easily allow for individualized cow treatment.

## Identification

Keeping track of which dairy cows are healthy and profitable requires animal identification and accurate record keeping. The majority of U.S. dairy farms identify individual cattle with ear tags. Other, less commonly used identification methods include neck chains or collars, leg bands, photographs or sketches, branding, tattoos, and electronic systems such as bar coding, radio frequency identification (RFID), and pedometers. Some dairies use more than one identification method. A very small number of small dairy operations with relatively small herds in which the farmer can identify each animal individually do not use any form of recorded animal identification.

There are several other identification types that may be present on dairy cattle in addition to individual identifications. These include, but are not limited to, brucellosis tags or tattoos that are applied following vaccination; back tags applied at sale barns or slaughter facilities; brands; and temporary identification systems commonly used to mark cows that have been treated with drugs, or for other identification purposes.

Dairy Cows being milked in a Rotary parlor



Gunnar Richter

Dairy Cow with Ear Tag and Neck Chain



Jeff Hall, UC Davis WIFSS

Temporary marking systems may include leg bands typically applied to rear limbs so that milkers can easily identify treated cattle or livestock marking sticks/chalk commonly applied to the hip area or tail head. It is extremely important that any temporary marking systems used to identify animals treated with drugs be clearly visible to milkers who can be alerted to the presence of a treated cow in the milking parlor since milk from cattle that have been treated with antibiotics will have to be kept separate from milk of non-treated cows until appropriate withdrawal times have been observed.

## Record Keeping

It is critically important for farmers to have established control systems in order to avoid drug residues in milk. The Food and Drug Administration, Center for Veterinary Medicine's Compliance Policy Guide, "CPG Sec. 615.200 Proper Drug Use and Residue Avoidance by Non-Veterinarians", provides guidance concerning proper animal identification and record keeping to avoid drug residues in animals used in food production. Recommendations include identifying and tracking animals to which drugs were administered in order to preclude the sale of edible animal tissue, milk, or eggs containing illegal residues. Identification may be by specific animal identification, pen or lot, quarantine or segregation, or other means. Additionally, FDA recommends maintaining a system of medication or treatment records that, at a minimum, identifies the animal(s) treated (individual animals, pens, lots, etc.), the date(s) of treatment, the drug(s) administered, who administered the drug(s), the amount administered, and the withdrawal time prior to slaughter (and when milk, eggs, etc. can be used, if appropriate).

Dairy Cow with Temporary Markings and Leg Band



Jeff Hall, UC Davis WIFSS



Lynn Betts, NRCS

Proper identification of individual animals also allows the dairy farmer to more accurately keep track of health and production records for each individual cow. There are a number of systems that are commonly used. These include hand-written records, on-farm computer records and subscription to the National Dairy Herd Improvement Association (or DHIA). The DHIA is a national database that keeps track of milk production by testing cows on the farm every month. Nearly half of U.S. dairy farms are currently subscribed to the DHIA tracking system. However, DHIA participation is not required by FDA and the records solely produced by this system may not be sufficient to address medication or treatment record recommendations in CPG 615.200. Most methods of recordkeeping can be very effective if managed carefully. Many U.S. dairy farms use handwritten records. Larger dairies may be more likely to use on-farm, electronic recordkeeping systems.

The format of identification and record keeping is not important as long as an established control system is in place to allow farmers to track treatment of animals to avoid the risk of violative drug residues appearing in the human food supply.

## Life Cycle of Dairy Cattle

Dairy Calves Depending on the management system of the dairy, a calf will be allowed to nurse colostrum directly from its mother, fed by hand from a bottle, or fed by a tube passed through the esophagus directly into the stomach to ensure the calf receives the full amount of colostrum necessary for optimum health. After it nurses or is hand-fed colostrum, a calf is typically separated from its dam (mother) within 12 hours following birth and is placed into a small calf pen or enclosure allowing for individual feeding of milk or milk replacer, and administration of medical care if needed. The fate of the calf will then depend on whether it is a heifer or a bull calf.



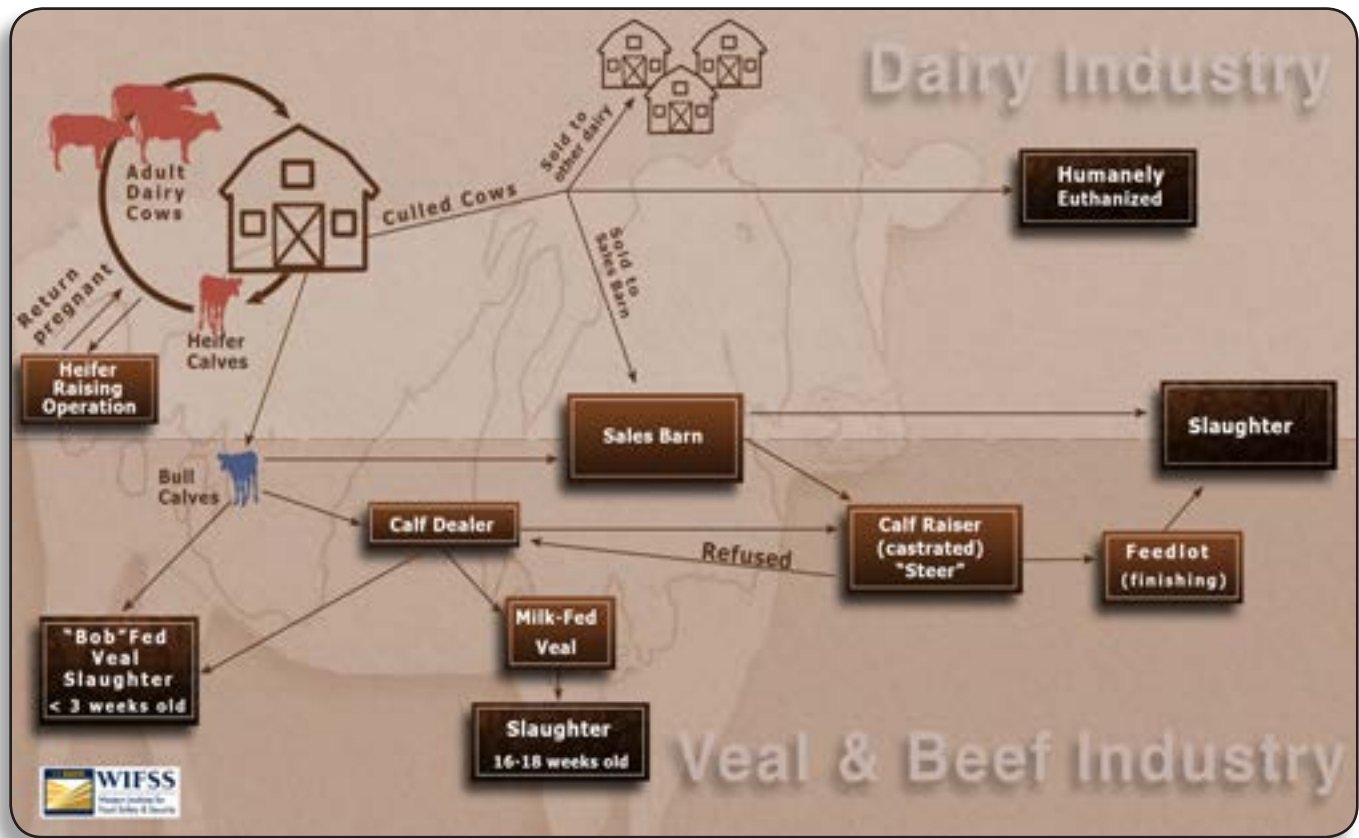
Scott Bauer, NRCS

Females: Heifer calves and adult dairy cows As future milk cows, female calves are considered to be replacement animals for older cows that leave the dairy for a variety of reasons including illness, injury, and/or productivity. On many smaller farms, these replacement heifers will be raised on the dairy farm where they were born. Alternatively, some larger farms will send its heifers to an off-site facility known as a heifer ranch where they will be raised. Once they have become older, heifers will be returned to the farm of origin. The ages at which heifers are returned vary, but often this happens when they have reached puberty or have become pregnant (Figure 2).

Either on the dairy farm or at a heifer ranch, heifers will be fed milk replacer for approximately 2 months before being weaned and transitioned to an all solid feed diet. Weaning ages differ from dairy to dairy, but typically weaning occurs at around 8 weeks of age or older.

A heifer will reach sexual maturity between fourteen and eighteen months of age, depending on the breed. At this time, the heifer will be bred by either artificial insemination (AI) or by exposure to a breeding bull. Some U.S. dairies use only AI, and many use a combination of AI and a clean-up bull. The average gestation period for dairy cows is 9 months.

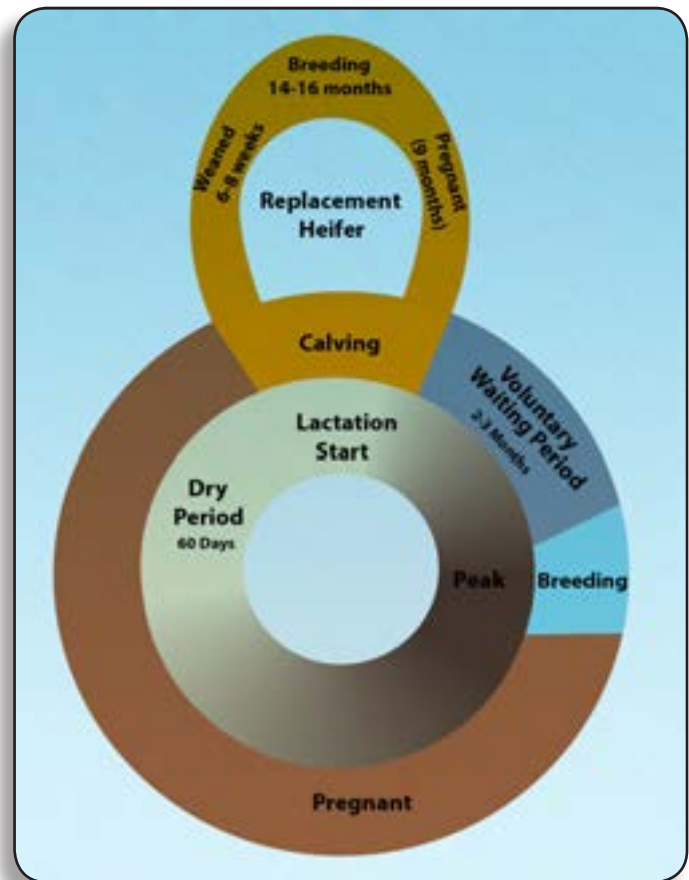
Figure 2 - Movement of Cattle in the Dairy and Beef Industry



# Lactation

Lactation begins immediately following calving. The first milk that is expressed from the udder after calving and during the first several days of lactation is called colostrum and has higher concentrations of protein, fat, vitamins and antibodies (immunoglobulins) compared to regular milk. The antibodies in colostrum come from the mother's body. On many dairies, unused colostrum is saved for feeding to other calves or stored frozen for future use. Colostrum is vitally important to the health of a calf because the high levels of immunoglobulins in colostrum help provide the calf with the ability to resist infections. When fed to calves during the first 24 hours of life, the antibodies in colostrum are absorbed from the calf's gut into its bloodstream. Without the important immune support function provided by immunoglobulins in colostrum, calves become much more susceptible to developing a variety of diseases, and if they do get sick, such calves are usually much more likely to be given drugs to treat such diseases. Colostrum is not sold for human consumption and most dairy cows produce far more colostrum than is needed by one calf.

Figure 3 - Breeding and Lactation Cycle



WIFSS UC Davis

Milk from recently fresh cows is withheld from the bulk tank for approximately four days following calving to ensure that colostrum is not accidentally collected into the bulk tank and sold for human consumption. Often, milk from cows during the first three to four days following calving is commingled and fed to calves.

After the voluntary waiting period is over, the cow will be bred again usually by AI.

Fresh cows (those that have just calved) may be segregated from the rest of the herd for a period of days to make sure that they are not experiencing any complications following calving. After this designated fresh period is over, a cow will be introduced into the main milking herd to enter the normal milking cycle on the dairy. On many dairies, cows are often grouped based on age and/or milk production and fed specific rations to meet the metabolic needs necessary to support the level of milk production in a particular group.

A dairy cow will be milked during most of her pregnancy and will typically produce milk for about ten months. On most dairies cows are milked between two and three times per day. In a typical lactation, milk production increases very rapidly, peaks around two months following calving, and then slowly decreases. A dairy cow will stop being milked about two months before she is due to give birth.

This two month period, after milking has stopped and before the next calf is born, is known as the dry period. During this time, the cow is able to gain back weight that may have been lost and the udder is able to repair and regenerate secretory tissue (Figure 3).

At the beginning of the dry period, the farmer may administer antibiotics that are infused into each teat. This practice is known as dry cow treatment and is done to assist in clearing any udder infections that might have developed during lactation and to prevent new udder infections that develop during the dry period.

The entire cycle of breeding, calving and milking is repeated throughout a dairy cow's life. The average U.S. dairy cow has a calf approximately every 13 months and will complete three to five of these cycles during her lifetime prior to leaving the herd (Figure 3).

A dairy cow will leave the herd for a number of reasons (Figure 2). There is a relatively low on-farm mortality rate for dairy heifers and cows, but it is possible for an animal to become sick or injured and die or need to be humanely euthanized. Most dairy cows are removed from the herd (culled) and sold for slaughter or to another farm. The reasons for culling vary, but the most common reasons are reproductive problems, mastitis or other udder health problems, poor production or lameness. The cull rate is between 25% and 33% of the cows on an average dairy. Culled cows are then replaced by replacement heifers.

Males: Bull Calves Steers and Bulls (Figure 2)

The majority of male calves, or bull calves, born on a dairy will ultimately be sold for slaughter. Depending on when it is sent to slaughter, a bull calf's life span is between 3 weeks and 18 months. If it is slaughtered within 3 weeks of birth, it is called bob veal. Bull calves may be sold and raised on milk replacer for about 16 weeks and marketed as milk fed veal. Frequently male dairy calves are castrated and sent to a calf raising operation. Once castrated these calves are



Jeff Hall, UC Davis WIFSS

called steers and will eventually be sent to a feedlot for 'finishing' where they are raised until about 18 months of age on a diet of mostly grain. The grain diet increases the fat content of the meat to produce the tender, marbled beef desired by consumers. Rarely, bull calves will be retained on the dairy as replacement breeding bulls.

# Life Cycle of Veal Calf

The veal industry is very closely tied to the dairy industry. Veal calves are defined differently by the United States Department of Agriculture, with a focus on meat production, and the Food and Drug Administration, with a focus on drug metabolism. For production purposes, the USDA –Food Safety and Inspection Service defines different classes of veal calves by using age and weight at slaughter. In general, the USDA defines a calf as being no more than 750 pounds live weight. Bob veal calves are those calves slaughtered at three weeks of age or younger. Formula-fed, milk-fed, or special-fed veal are calves raised to about 16 to 18 weeks of age on an all liquid diet. The majority of veal marketed in the U.S. is formula-fed. Non-formula fed veal are calves that have been weaned from milk-replacer at about two months of age and have transitioned to a solid food diet of hay and/or grain. Non-formula fed veal will be marketed at up to 700 pounds. This class represents a very small fraction of the total veal marketed in the U.S.



Jeff Hall, UC Davis WIFSS

The FDA defines veal calves as immature cattle (either dairy or beef) intended for meat production that lack a functional rumen; such animals are considered to be pre-ruminating. The anatomical differences between mature cattle and pre-ruminant calves results in large differences in the way that drugs are metabolized and excreted. The growth and maturation of the rumen is a process that occurs as a calf begins to consume solid feed (typically alfalfa hay and a grain mix commonly called calf ‘starter’). A calf will have developed a fully functioning rumen by the time its diet is completely solid feed. Thus, when a calf is allowed to develop naturally through weaning and the introduction of solid feed is started at a young age, the rumen will develop normally, and the calf’s ability to metabolize and excrete drugs will change to that of a ruminating animal. In contrast, bob veal and formula-fed veal calves that are fed an all-liquid diet without the addition of any solid feed, do not develop a rumen and essentially remain as pre-ruminants. Suckling calves, which will be slaughtered later as mature animals, are a different class of calves than veal calves because their diet will eventually be transitioned to solid food and the rumen will develop normally as this transition occurs.

Most drugs have neither been tested nor approved for use in young calves, or calves that have not developed a mature, functional rumen. A particular veterinary drug label may emphasize this with warning text such as “A withdrawal period has not been established for this product in pre-ruminating calves. Do not use in calves to be processed for veal.” An example where immature animals excrete drugs more slowly than more mature animals is when phenylbutazone, an analgesic approved for use in horses, is administered in an extralabel manner. It can take a one-day-old calf four times longer to clear this drug from its system compared to a six month old calf.



# Veal Operations

The majority of veal operations currently use individual veal crates to minimize calf-to-calf contact and disease. Because of lack of public acceptance of this practice, the industry is being driven to adopt the use of group housing for veal production. The industry goal is to have all U.S. veal operations transition to group housing by 2018. Currently, about one third of veal operations in the U.S. house calves in groups. Most veal raising operations are located in the upper Midwestern parts of the U.S. in communities with a strong dairy industry. These operations are generally small family farms that house, on average, between 200 and 225 animals.

## Movement of Calves Through Veal Industry

Although the majority of veal calves originate from dairy farms, marketing channels for these animals can be complex and varied (figure 2). A bull calf leaving a dairy can be sent directly to slaughter (as bob veal) or to an auction yard. From the auction yard this animal will be purchased by another operation in the veal or beef production chain. A bull calf is frequently purchased from the dairy by a middleman calf dealer. The calf dealer may resell the calf as either bob veal or formula-fed veal. Alternatively, the dealer may sell larger, healthier looking calves to a calf raising operation where the calves will be castrated and raised as steers for a number of months before being shipped to a feedlot for finishing on a predominantly grain diet. Feedlot steers are typically slaughtered between eighteen and twenty months of age, at between 1,200 and 1,400 pounds. With the variability and frequent changes in ownership, tracing historical animal ownership through records can be extremely challenging.

Figure 2 - Movement of Cattle in the Dairy and Beef Industry



WIFSS UC Davis



# Acknowledgments

## Authors and Contributors:

Mike Payne, DVM, PhD  
John Angelos, MS, DVM, PhD, DACVIM

## Publication Design

Amanda Arens, DVM, MPVM, PhD  
Jeff Hall

## Editors:

Amanda Arens, DVM, MPVM, PhD  
Juanita Humphrey  
Heather Johnson, MS

## Graphic Design

Jeff Hall

## References:

Code of Federal Regulations (CFR) Title 21 Part 530: Extralabel drug use in animals.

Compliance Policy Guide (CPG) Sec. 615.200. Proper Drug Use and Residue Avoidance by Non-Veterinarians.

Dairy Cattle Identification Practices in the United States, 2007. Info Sheet. United States Department of Agriculture; Animal and Plant Health Inspection Service; Centers for Epidemiology and Animal Health; Veterinary Services. November 2007.

Facility Characteristics and Cow Comfort on U.S. Dairy Operations, 2007; United States Department of Agriculture; Animal and Plant Health Inspection Service; Veterinary Services; National Animal Health Monitoring System; December 2010

Food Animal Residue Avoidance Databank: [http://www.farad.org/regulatory/useclass\\_cattle.asp](http://www.farad.org/regulatory/useclass_cattle.asp)

A guide to colostrum and colostrum management for dairy calves.

[http://www.aphis.usda.gov/animal\\_health/nahms/dairy/downloads/bamn/BAMN01\\_Colostrum.pdf](http://www.aphis.usda.gov/animal_health/nahms/dairy/downloads/bamn/BAMN01_Colostrum.pdf)

Guidance for Industry #191. Changes to Approved NADAs — New NADAs vs. Category II Supplemental NADAs. U.S. Department of Health and Human Services. Food and Drug Administration. Center for Veterinary Medicine. November 19, 2009.

Reinemann, DJ. Milking Parlor Types. University of Wisconsin-Madison Milking Research and Instruction Lab. December 2003.