



# Beef Cattle Production

## Introduction

Modern domestic cattle evolved from a single early ancestor, the aurochs, and remains of domesticated cattle dating to 6,500 B.C. have been found in Turkey and other sites in the Near East. Domestication of cattle followed sheep, goats, pigs, and dogs. Early cattle were multi-purpose, providing meat, milk, and labor to their owners. Currently in the U.S., cattle are selected more for the single purpose of meat production, or in some cases, production of milk as well.

The Beef Cattle Industry is not a single entity. In contrast to other intensive animal agriculture systems, very little vertical integration exists in the beef cattle industry. As a result, each phase of production is operated by different individuals. Throughout the country, beef cattle are raised under a tremendous variety of different management inputs, environmental settings, and production intensities.



Bruce Hoar, UC Davis WIFSS



# Cattle Terminology

A variety of terms are commonly used in the beef industry. Having a functional knowledge of these terms is important when communicating with beef cattle producers.

Backgrounder Operation (also referred to as a 'stocker' or 'grower' operation) A type of beef cattle rearing operation in which weaned younger/lighter weight steer calves and weaned heifer calves that are not being kept as future breeding cows are raised to about 12 to 16 months of age while grazing on inexpensive feed sources such as grass or other forages. Animals develop lean muscle mass and increased body frame/size prior to entering a feedlot while on these operations.

Bull An intact, sexually mature male bovine that is intended for breeding purposes.

Beef cattle Cattle that are intended for meat production.

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

Cattle Fed in Confinement for Slaughter One of the use classes for beef cattle defined by the FDA; it refers to beef and dairy breed cattle that are confined in group pens and fed a high-energy diet until the time of slaughter.

Cow-calf Operation A type of beef cattle operation with the purpose to produce calves that will become either future breeding cows or breeding bulls, or calves that will be raised for meat production. The goal of a cow-calf operation is to have each cow produce and raise one calf per year.

Culling Removal of an animal from a herd usually for health or production reasons.

Cattle Grazing in Backgrounder Operation



Jeff Vanuga, NRCS

Cow Calf Operation



Jeff Vanuga, NRCS



Fed Cattle Steers and heifers that have been fed concentrates while on a feedlot.

Feeders Weaned calves grazing pasture that have reached sufficient weight and maturity to go to a feedlot to be placed on a high energy ration for finishing; they are generally older, weigh more, and carry more condition (finish) than stocker cattle ('stockers'). Feeders are categorized within the FDA beef cattle use class definition of 'Growing Cattle on Pasture or in Dry Lot'.

Feedlot (or Finishing) Operation A confinement production operation in which beef cattle (or dairy cattle that are being raised for beef production) are raised to market (slaughter) weight while being fed high concentrate diets on a feedlot (or 'feedyard'). Feedlots range in size from less than 100-head capacity to many thousands. While at a feedlot, cattle are grouped into pens where they can socialize and exercise. The period of time that cattle are on a feedlot is referred to as the "finishing phase." The diets fed to cattle on feedlots are usually a cereal grain, commonly corn, wheat, or barley, and cereal grain by-products such as distillers' grains. Cattle (heifers or steers in feedlots) typically remain on a feedlot from 90 to 180 days before being sent to a processing facility at 18 to 22 months of age. At which point the cattle will have reached 'market weight' and weigh approximately 1200 to 1400 lbs (545 to 637 kg).

Finishing Period The final feeding stage of cattle on a feedlot prior to animals reaching market weight.

First-calf Heifer After giving birth to its first calf, a replacement beef heifer may be referred to as a first-calf heifer.

Grass-Fed/Grass-Finished Beef Beef that comes from cattle that have been raised primarily on pasture forages; also refers to cattle that are fed pasture forage as opposed to cattle that are raised on a feedlot being fed high concentrate diets.

Feedlot or Finishing Operation



Jeff Vanuga, NRCS

Grass Finished Beef



Kate Jewell, Creative Commons



Grower Operation (also referred to as a ‘stocker’ or ‘backgrounder’ operation) A type of beef cattle rearing operation in which weaned younger/ lighter weight steer calves and weaned heifer calves that are not being kept as future breeding cows are raised to about 12 to 16 months of age while grazing on inexpensive feed sources such as grass or other forages. During this time animals develop lean muscle mass and increased body frame/size prior to entering a feedlot.

Growing Cattle on Pasture or in Dry Lot (includes ‘stockers’ and ‘feeders’) – An FDA beef cattle use-class definition that refers to weaned beef or dairy breed cattle that are maintained on pasture or in a dry lot, receiving the majority of their diet from forage.

Heifer A female bovine from the time of weaning until the time of first calving.

Lactating Beef Cows An FDA beef cattle use-class definition that refers to lactating beef breed female cattle that are nursing calves intended for meat production. Milk from lactating beef cows is NOT intended for human consumption.

Market Weight The weight at which an animal is harvested for meat production. For beef cattle raised on a feedlot operation, market weight is typically reached at 18-22 months of age at 1200 to 1400 lb (545 to 637 kg).

Non-Lactating Beef Cows An FDA beef cattle use-class definition for female beef cattle that had previously nursed calves, but which are NOT currently producing milk.

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

Purebred Cattle Cattle whose ancestors over many generations are derived from a recognized breed.

Lactating Beef Cow and Calf



Lynn Betts, NRCS

Purebred Charolais Bull



Robert Scarth



Replacement Beef Bulls An FDA beef cattle use class definition that refers to intact male beef breed cattle intended for reproductive purposes.

Replacement Beef Heifer An FDA beef cattle use class definition that refers to female cattle that are intended for reproduction to produce calves intended for meat production. The term 'heifer' specifically refers to a female bovine from the time of weaning until the time of first calving.

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.

Seedstock Operation A type of beef cattle operation whose goal is to produce purebred cattle for the purpose of genetically improving a particular breed. Such herds are usually small, and produce bulls and replacement females for sale to cow-calf producers.

Slaughter Cattle An FDA beef cattle use class definition that refers to cattle grazing on pasture and suitable for slaughter.

Steer A castrated bovine male.

Stockers Weaned cattle of either beef or dairy breeds that are maintained on pasture or a dry lot and receive the majority of their diet from forage prior to entering a feedlot. Stockers are usually younger, weigh less, and are of lower condition (finish) than 'feeders'. Stockers are typically sent to a feedlot at 12 to 16 months of age. Stockers are categorized within the FDA beef cattle use class definition of 'Growing Cattle on Pasture or in Dry Lot'.

Slaughter Cattle



Bob Nichols, NRCS

Stocker Operation (also referred to as a 'backgrounder' or 'grower' operation) - A type of beef cattle rearing operation in which weaned younger/lighter weight steer (castrated male) calves and weaned heifer calves that are not being kept as future breeding cows are raised to about 12 to 16 months of age while grazing on inexpensive feed sources such as grass or other forages. During this time animals develop lean muscle mass and increased body frame/size prior to entering a feedlot.



Suckling Calves An FDA beef cattle use class definition that refers to immature, pre-ruminant cattle (including dairy breeds intended for meat production), maintained with and dependent upon their dam for nourishment. Veal calves are NOT considered suckling calves.

Veal Calves An FDA beef cattle use class definition that refers to immature cattle, including beef and dairy breeds, that lack a functional rumen and that are intended for meat production. Veal calves are recognized as a distinct regulatory class from suckling calves because of their handling, housing, and proximity to slaughter.

Weaned Cattle An FDA beef cattle use class definition that refers to beef or dairy breed cattle that are maintained on pasture and receive the majority of their diet from grazing on pasture.

Weaning The process of transitioning a calf away from a diet containing milk or milk replacer to an all solid feed diet or ration. Most beef calves are weaned from their dams at 6 to 10 months of age weighing 450 to 700 pounds.

Beef Calf



Gary Kramer, NRCS

## Beef Cattle Breeds

At least 250 breeds of beef cattle are recognized worldwide. Despite this high number of breeds, beef cattle are broadly classified as to whether they are descendants of two early lineages: European cattle (the so-called “Taurine” cattle derived from Eurasian subspecies) or zebu cattle (characterized by a humped back and prominent dewlap (fold of skin at the lower neck and between the front legs)) derived from Indian subspecies that are known for having heat tolerance. Cross breeding of cattle is used extensively to provide hybrid vigor in the offspring and to improve growth rate, reproductive efficiency, and certain carcass/meat characteristics. Over 60 beef cattle breeds can be found in the United States; six common breeds are described below:

### Angus



Bruce Hoar, UC Davis WIFSS

The most predominant breed in the United States and first imported to the U.S. from Scotland around 1878. This breed is very popular, as it is adaptable to a variety of conditions, and is born without horns (also known as “polled”). Both Black and Red Angus are common.



### Brahman



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A breed of zebu cattle, imported from India, and noted for their extreme tolerance to heat and resistance to insects.

### Charolais



Adrian Michaels, Wikimedia

This breed is typically white and was introduced to the U.S. from France in the 1940's.

### Hereford



Sarah Smith, Creative Commons

Classically appear as red-coated with a white face. Both horned and polled varieties are found in the U.S. This breed originated from southern England.

### Limousin



Kate Jewel, Creative Commons

Another French breed of beef cattle, and noted for having lean, tender meat.

### Santa Gertrudis



C. Goodwin, Wikimedia

This breed was developed on the King Ranch in southern Texas and is a result of breeding Brahman bulls with Beef Shorthorn cows. They are very adaptable to harsh climates.



# Production System and Life Cycle

The beef production systems can be divided into 4 types of operations: cow-calf, backgrounder (also called 'stocker' or 'grower'), feedlot, and seedstock.

The life cycle starts on a cow-calf operation with the purpose to produce calves that will become either future breeding cows or breeding bulls, or calves that will be raised for meat production (Figure 1). The goal of a cow-calf operation is for each cow to produce and raise one calf per year. Most beef cattle herds rely on natural breeding, therefore a set of bulls are maintained for breeding purposes. The cows are bred during the breeding season and calves are born after about a nine month gestation period. Birth weight of calves are typically 60 to 100 pounds. The cow-calf phase runs from birth to weaning which usually occurs when the calf is approximately 6 to 10 months of age and weighs 450 to 700 pounds.

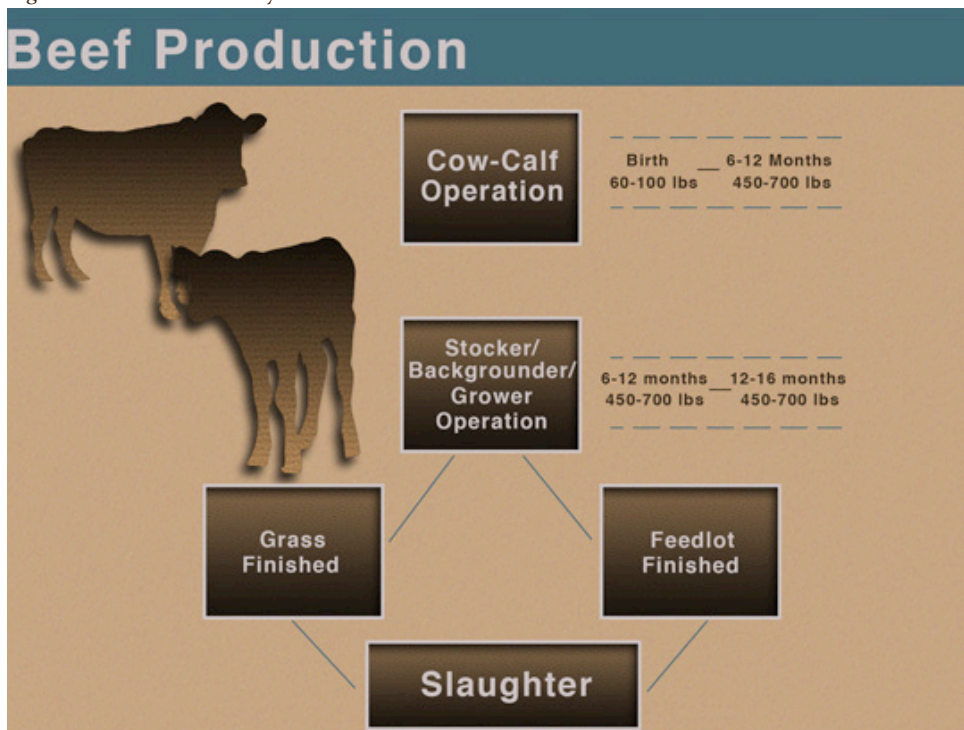
Cow Calf Operation



Gary Kramer, NRCS

At weaning, some female calves will remain in the herd as replacement heifers and will be bred at approximately 15 months of age to deliver their first calf at two years of age.

Figure 1. Beef Production Cycle



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Steer calves and most heifer calves not being kept as future breeding cows will leave the herd of origin between six and twelve months of age. Those calves that are younger/lighter weight are typically raised as 'stockers' and will enter stocker operations where they are raised to twelve to sixteen months of age. During this time, cattle are grazed on inexpensive feed sources such as grass or other forages and develop lean muscle mass while increasing body frame and size prior to entering a feedlot. Stocker operations exist on many different forage types in geographically diverse areas of the U.S. and include wheat fields of Oklahoma, grasses in the Flint Hills of Kansas, lush pastures of southern Florida, and corn stalks in Iowa. Changing weather patterns and market conditions (e.g., high corn prices) have major impacts on stocker operations.

Stockers



Scott Bauer NRCS

The final phase in beef production is the feedlot where cattle have a three to six month 'finishing period'. Feedlots can range in size from small farmer-feeders with 20 or fewer animals to large scale feedlots with a capacity of 100,000 or more animals. The purpose of a feedlot is to increase the animal's body weight and add fat (referred to as marbling) to edible tissues to provide consumers with a taste and texture they desire from beef. This is accomplished by feeding cattle high energy concentrated diets. Diets are typically based on a cereal grain, usually corn, wheat, or barley, and cereal grain by-products such as distillers' grains. Feeder cattle (heifers or steers in feedlots) will remain in feedlots anywhere from 90 to 180 days before being sent to a processing facility at 18 to 22 months of age. At this time cattle have reached 'market weight' weighing approximately 1,200 to 1,400 pounds.

Finishing on a feedlot



Jeff Vanuga NRCS

Of increasing popularity amongst U.S. consumers is beef that has been 'grass-finished' or 'grass-fed'. Producers of grass-fed beef raise their cattle on grass pasture until they reach market weight instead of sending cattle to a feedlot for final finishing. Because the energy densities of grasses are lower than cereal grains, it takes longer for grass-fed beef to reach market weight compared to cattle raised on a feedlot.

'Seedstock' operations represent a relatively small subset of the beef industry. These operations function to produce purebred cattle for the purpose of genetically improving a particular breed. Such herds are usually small, and produce bulls and replacement females for sale to cow-calf producers.



# Feeding

Beef cattle, like other ruminants, possess a multi-compartment forestomach that allows otherwise indigestible fibrous plant material such as dry hay and corn stalks to be digested by bacteria and protozoa living in the forestomachs in such a way that such feeds are converted into useable nutrients for the animal. On cow-calf and stocker operations, profitability is dependent on availability of inexpensive feed sources, primarily pasture or other grazing land. Cattle can utilize feed of lower quality that would not be appropriate for consumption by non-ruminant animals such as pigs or chickens. Mineral and protein supplements are also provided to ensure that all the nutritional requirements of the cattle are met. During periods of the year when plant growth is not sufficient, additional feeds, such as grass or alfalfa hay, is provided.

Cattle Feeding



Jeff Vanuga, NRCS

On feedlot or finishing operations, cattle are housed in pens of usually between 100 to 125 other animals. High energy cereal grain-based diets are incorporated into the diet or 'ration' to allow for high growth rates of between 2.5 to 4 pounds per day. Such high growth rates are achieved by feeding diets that are 70 to 90% grain; these diets allow cattle to gain ~1 pound for each 6 pounds of feed that is consumed. Cattle are usually fed twice per day into feed bunks that allow sufficient space for all cattle to eat simultaneously. Constant access to water is provided usually via water troughs or through automatic watering bowls.

The FDA defines specific use classes for beef cattle as it does for dairy cattle. These use classes are defined based on the type of diet that the animal is consuming, as well as the intended function of the animal. 'Suckling calves' are immature, pre-ruminant cattle (including dairy breeds intended for meat production) that are maintained with and dependent upon their dam for nourishment. 'Veal calves' are recognized as a separate use class defined as immature beef and dairy breed cattle that lack a functional rumen and that are intended for meat production. Veal calves are recognized as a distinct regulatory class from suckling calves because of their handling, housing, and proximity to slaughter. 'Weaned cattle' are beef or dairy breed cattle that are maintained on pasture and receive the majority of their diet from grazing on pasture. 'Stockers' refers to weaned calves that are grazing pasture to enhance growth prior to finishing and slaughter; they are usually younger, weigh less, and are of lower condition (finish) than 'feeders.' The term 'feeders' refers to weaned calves grazing on pasture that have reached a sufficient weight and maturity such that they can be placed on high-energy rations for finishing. Feeder cattle are usually older, weigh more, and have more condition (or 'finish') compared to stockers. 'Slaughter cattle' refers to cattle that are grazing on pasture and that are suitable for slaughter. 'Replacement beef heifers' are female cattle that are intended for reproduction to produce calves intended for meat production.



## Housing

The majority of cattle on cow-calf and stocker operations are raised outdoors. In inclement weather, some form of shelter such as barns, sheds, or windbreaks, and some form of bedding, will be provided for the cows and calves. Access to shade is necessary in climates with very high ambient temperature/ humidity. In arid climates sprinkler systems may be used in hot weather for cooling and dust control.

Large feedlots will confine cattle in pens to maximize feed intake and growth rates. Most pens will be outdoors, and therefore will have dirt floors, and bedding will be provided. Understandably, pen conditions can deteriorate significantly during times of inclement weather. The lots are usually paved if located in wet climates to minimize mud problems. Some feedlots will be located indoors, and will have slatted floors so that feces and urine can fall through and washed away.

Feedlot



Dr. Bruce Hoar, UC Davis WIFSS

## Identification

Animal identification is an extremely important aspect of animal traceability when it comes to disease control or outbreak investigations. According to the January 2013 'Final Rule on Traceability for Livestock Moved Interstate' published by the USDA, cattle that are required to be officially identified for interstate movement must be identified by means of either: an official eartag; a brand registered with a recognized brand inspection authority and accompanied by an official brand inspection certificate, when agreed to by the shipping and receiving State or Tribal animal health authorities; tattoos and other identification methods acceptable to a breed association for registration purposes, accompanied by a breed registration certificate, when agreed to by the shipping and receiving

Ear Tag



Dr. Bruce Hoar, UC Davis WIFSS



State or/Tribal animal health authorities; or a group/lot identification when a group/lot identification number (GIN) may be used. A GIN is the identification number used to uniquely identify a “unit of animals” of the same species that is managed together as one group throughout the preharvest production chain. When a GIN is used, it is to be recorded on documents that accompany the animals moving interstate, however, it is not necessary to have the GIN attached to each animal.

Keeping track of which cows are healthy and profitable requires records and animal identification. Nearly two-thirds of beef cattle operations use some form of individual animal identification (ID) on at least some cows, and almost 80% percent of cows have some form of individual ID. Plastic ear tags are the most common single type of individual cow ID for operations and individual cows. Other forms of ID include Brucellosis tag, hot-iron brand, ear tattoo, ear notch, freeze brand, and electronic ID or microchips.

## Culling (removal from a herd)

Cattle may be removed from a herd for a variety of reasons including health or production problems, infertility, and economic reasons (drought, herd reduction, market condtions).





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## Authors and Contributors:

Bruce Hoar, DVM, MPVM, PhD  
John Angelos, DVM

## Editors:

Amanda Arens, DVM, MPVM, PhD  
Juanita Humphrey

## Publication Design

Amanda Arens, DVM, MPVM, PhD  
Jeff Hall

## Graphic Design

Jeff Hall

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