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# Cow-Calf Beef Production in Mexico

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## Abstract

Mexico often exports over a million head of cattle annually to the United States. These animals, primarily intended for U.S. stocker and/or feeder operations, all pass through a cow-calf production system of one form or another in Mexico. This report outlines cow-calf production types, beef production systems, and geo-climatic influences on beef production in Mexico. The authors of this report also evaluate factors affecting Mexican beef production, such as patterns of landownership, major diseases and parasites in cattle production, changes in export regions, and changes in domestic consumption as they pertain to cow-calf production. Amid changes in consumer demand and the continuous challenges pertaining to Mexico's cattle export market, production practices at the cow-calf level may pinpoint opportunities and constraints within the domestic beef markets of both Mexico and the United States.

**Keywords:** cow-calf, Mexico, beef production, cattle

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# Introduction

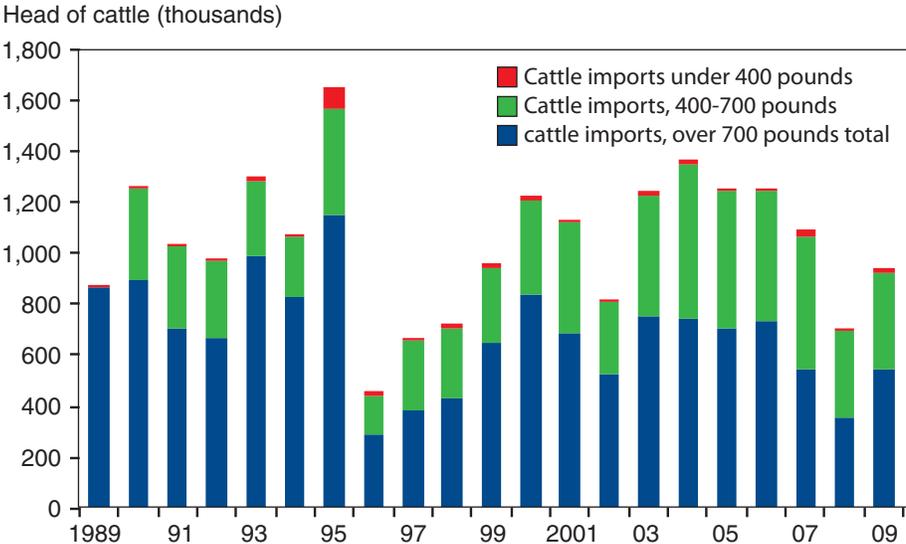
Cattle production provides vital economic activity for the large expanse of nonarable land in Mexico, and the United States is the primary export market. Cattle raised for export in Mexico represent, on average, more than half of all U.S. cattle imports. In 12 of the years between 1989 and 2009, Mexico exported over a million head of cattle, mostly steers and heifers for feeding, to the United States (fig. 1).

Exports of Mexican cattle fluctuate seasonally, depending on weather conditions and the availability of forage for grazing. Cattle exports tend to peak in the early spring (February-March) and late fall (October-November), as forage conditions deteriorate (fig. 2). Lighter weight feeder and stocker cattle<sup>1</sup> are exported since the United States has the comparative advantage in feeding cattle and growing cattle on available forages.

Recent shifts in cattle-exporting regions reflect longer term changes in the industry. Improved quality, combined with improved health status in several regions and a generally strong demand for Mexican cattle in the United States in the past decade, has led to increased exports from more Mexican States. Mexico's ability to remain a strong cattle exporter to the United States, however, depends principally on the health and quality of the cattle and breed characteristics. Cattle intended for export to the United States typically originate from cow-calf operations in Mexico as stocker/feeder animals. Improvements in cattle quality and management practices at the cow-calf level will increase the number of cattle that meet changing consumer demand in Mexico and are suitable for export to the United States.

<sup>1</sup> Stocker cattle are weaned calves intended for sale as commercial feeder cattle, but have not yet been placed in the feedlot.

Figure 1  
**Cattle exported from Mexico to the United States, 1989-2009**

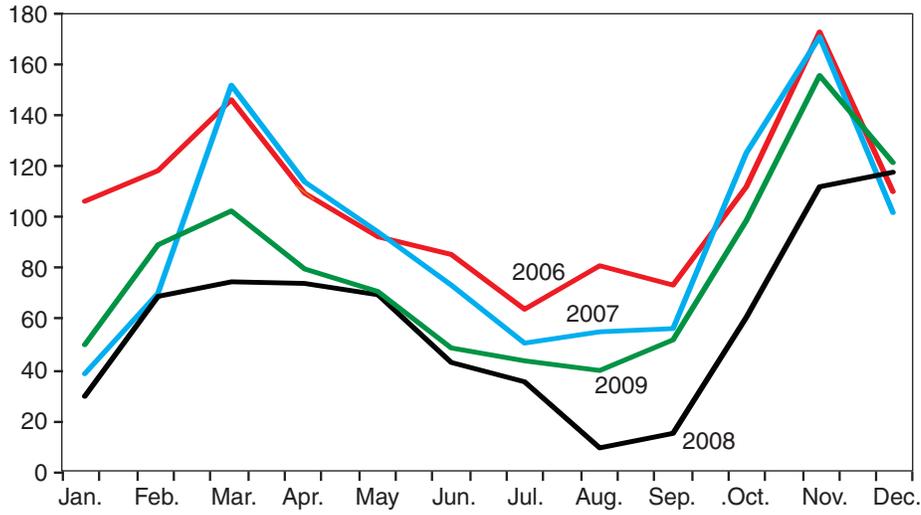


Source: USDA, Economic Research Service.

Figure 2

**Cattle exports from Mexico to the United States follows a seasonal pattern**

Head of cattle (thousands)



Source: USDA, Economic Research Service.

## Geo-Climatic Production Regions

Mexico is divided into four climatic areas: arid, semi-arid, temperate, and tropical (fig. 3). Tropical areas can be further divided into humid and dry tropics. Cattle are produced in virtually all of Mexico's climatic environments (fig. 4), with production systems and costs dependent on climate. The productivity of each cattle production system—or costs to achieve a given level of productivity—varies from region to region.

### Arid

Approximately 20 percent (about 41 million hectares) of Mexico is arid. Most of the arid land is located in the States of Baja California, Baja California Sur, Sonora, Chihuahua, and Coahuila, with smaller proportions in Durango, Nuevo León, San Luis Potosi, and Zacatecas. Arid lands range from desert areas completely devoid of vegetation to areas of desert scrub (chaparral) dominated by shrub species with some grass and forbs.<sup>2</sup> Some of these chaparral areas contain plant species of good palatability and nutritional quality, but forage production is low. The four primary cow-calf production systems in Mexico (described later) can be adapted to arid regions. In addition to water, one of the principal limitations to production in arid regions is the extensive area needed for grazing. Stocking rates are very low in arid areas, ranging from 25 to more than 50 hectares per animal unit,<sup>3</sup> and supplemental feed is essential for more intensive production. The arid climate also favors a moderate cow size. The large Continental<sup>4</sup> breeds, with higher daily energy requirements than smaller breeds, may be challenged to find sufficient

<sup>2</sup> Forbs are herbaceous plants that are not grasses.

<sup>3</sup> An animal unit (AU) is 1,000 pounds of grazing animal. A 1,000-pound cow with calf constitutes 1 AU.

<sup>4</sup> Continental and British breeds are two categories of *bos taurus* breeds of cattle. While both categories originated from Europe, the British breeds, specifically originating from the British Isles, are smaller in size, mature early, and have increased fleshing and marbling ability. The larger Continental breeds are leaner, more muscular, and, as with the British breeds, vary in adaptability to hot climates.

Figure 3

### Geo-climatic regions of Mexico



Source: Food and Agriculture Organization (FAO), 2005.

Figure 4

**Beef cattle are not uniformly distributed among Mexican States**



Source: INEGI Censo Agropecuario, 2007.

forage. The breeds that do best in the arid regions of Mexico are the smaller British breeds, which may have some Zebu<sup>5</sup> cross.

**Semi-arid**

Semi-arid climate is found in about 28 percent of Mexico, adjacent to the arid areas in the North and stretching farther down the central mesa. The highest proportions of semi-arid land (to total State area) are found in Aguascalientes, Chihuahua, Guanajuato, Hidalgo, Oaxaca, San Luis Potosi, Tamaulipas, and Zacatecas. Smaller proportions are found in Sonora, Durango, México, Puebla, Coahuila, and Jalisco. Semi-arid areas typically include short-grass prairies with some mixture of forbs and shrubs (fig. 5). Like the arid regions, forage production on semi-arid land is seasonal and characterized by a short rainy season in the summer and fall, followed by a 6- to 7-month dry season. Forage quality remains relatively good in the dry season, but careful pasture management is required to ensure adequate quantities of forage. Stocking rates range from 12 to 25 hectares per animal unit. A protein supplement is usually required in the dry season as well as an energy supplement when forage quantity is limited. Cow size is not as limited as for arid land, but the reproductive performance of large Continental breeds will decrease quickly with nutritional shortages. Many large operations producing cattle for export to the United States are located in the arid and semi-arid States of Mexico.

<sup>5</sup> In the minds of many U.S. producers, Zebu is synonymous with Brahman cattle. In fact, Brahman (or more specifically, American Brahman) is only one of several *bos indicus* breeds used in semi-tropical and tropical climates in the Americas. Zebu breeds used in Mexico include Brahman, Nelore, Gir, Indubrasil, and Guzerat. These breeds share a number of phenotypic characteristics, including the distinctive hump and pendulous hide. However, each of these breeds can be distinguished by color patterns, horn shape, and ear configuration. For example, Indubrasil cattle have extremely long pendulous ears (part of their heat adaptation) and are very distinguishable from Brahman cattle.

Figure 5

**Production of *VacaNorte* cattle on semi-arid rangeland in Chihuahua**



Source: Derrell Peel, Oklahoma State University.

## Temperate

Mexico's mountainous interior accounts for 23 percent of the area characterized by a temperate climate. Temperate climates are widespread, with nearly every State having some temperate area, and extend from the Sierras in Chihuahua to the highlands of Chiapas. Most of the temperate climate area is in the interior part of central Mexico. High proportions of temperate climate areas are found in Tlaxcala, México, Michoacán, Guerrero, Jalisco, and Hidalgo. The temperate climate region is divided between forested mountains and cultivated valleys.

Beef production plays a relatively small role in this region compared with crop production and other livestock production activities. Also home to over 60 percent of the Nation's population, large quantities of dairy, pork, poultry, and egg production occur in the temperate region. Compared with the other climatic regions, many beef operations in the temperate region are small and are operated in conjunction with farming and other activities. Large tracts of extensive range are not common. Many cattle are produced with relatively little permanent pasture and require large proportions of crop residues and byproduct feeds. Stocking rates in the temperate region range from 4 to 12 hectares per animal unit. Production costs are moderate in the region, but productivity is often low because of generally fewer management practices. Climate, disease, and pest problems are less severe in the temperate areas, but the annual dry period leads to nutritional stress that Zebu cattle are better suited to sustain than British or Continental breeds, especially in the more southern States of Mexico.

## **Dry Tropics**

Dry tropics make up about 16 percent of the total land area of Mexico. Dry tropical regions are characterized by annual frost-free temperatures and high rainfall, but they also experience a seasonal arid pattern. Dry tropics are distributed widely across Mexico, with large concentrations in the Yucatan Peninsula, including the States of Yucatán and Campeche; the northern Gulf Coast, including northern Veracruz and Tamaulipas; and much of the Pacific Coast, including parts of Sinaloa, Nayarit, Colima, Guerrero, Oaxaca, and Chiapas.

The dry tropics provide a challenging beef production environment due to the heat, disease, and pest factors common to tropics but with the added burden of a dry season, which results in reduced forage quality and quantity. The stocking rate in dry tropical regions is generally 3-6 hectares per animal unit. All calf production practices are possible, but production of higher quality cattle for export means increased costs for feed and pest/disease control. In the tropical areas of Mexico, the climate and production environment strongly favor the use of Zebu cattle.

## **Humid Tropics**

The humid tropics are characterized by high annual rainfall and green vegetation and account for the remaining 13 percent of Mexico's land area. Biomass production is high, and thus, stocking rates are high, ranging from 1 to 3 hectares per animal unit. Forage quality is relatively low, resulting in lower animal productivity unless supplemental feed is provided. Heat and humidity, combined with severe disease and pest problems, make Zebu cattle preferable in this region.

## Major Mexican Cattle Diseases and Parasites

Cattle producers in Mexico face a wide variety of production challenges, including diseases and pests. Aside from significant economic and trade impacts, several of the major Mexican cattle diseases and parasites also represent serious human health threats.

*Bovine Tuberculosis* (TB) is the primary disease that limits Mexico's access to export markets for cattle. TB is endemic in the country, though reasonably well controlled in most areas. Mexico has supported a Federal TB eradication program since 1971 and, in conjunction with individual States, has made substantial progress, particularly in the northern States, where cattle production is often focused on calves for export. TB remains widespread in concentrated areas of dairy production in the northern States, threatening the status of surrounding areas of beef cattle production. In other parts of the country, isolated regions have achieved a TB status that permits cattle exports, but that status is difficult to maintain because of surrounding endemic areas. Although TB affects the productivity of cows for meat or for milk production, the effects are so subtle that many producers fail to recognize the impacts, making voluntary cooperation in eradication programs difficult. TB is a zoonotic disease that threatens human health as well.

*Brucellosis* is currently endemic and widespread in Mexican cattle. The prevalence of brucellosis prevents exports of breeding animals, but its biggest impact is on productivity. The disease reduces reproductive performance but, like TB, usually does not affect the overall health of infected animals. The principal impact of the disease is spontaneous abortion in cattle; since the disease often goes undetected or undiagnosed, the disease's impacts are often underestimated. In addition to the Federal TB eradication program, Mexico also has a Federal brucellosis eradication program, but it requires greater resources and progress in implementation has been slow. Brucellosis is also a zoonotic disease, threatening humans, primarily through consumption of unpasteurized milk and dairy products.

*Rabies*, also a zoonotic disease, occurs throughout Mexico and affects a wide range of wildlife and domestic animals (especially dogs), as well as people. Rabies in cattle occurs primarily in Mexico's tropical areas and is typically spread through the bites of vampire bats, often resulting in significant losses, particularly of young animals. In recent years, educational programs have helped producers identify the specific habitat of vampire bats (as opposed to the various other insectivorous bats in the region) and implement more effective control of the bats, sharply decreasing the rabies incidence in cattle in some regions.

Mexico is host to several species of *ticks*, including those that cause tick fever (*babesiosis* or cattle fever). Ticks are widespread in cattle across Mexico, but tick loads (tick density on animal) are particularly heavy in tropical areas. Aside from direct disease impacts, heavy tick loads impact productivity. During wet periods, when tick infestations are highest, cattle must be treated every 10-14 days with an acaricide. Acaricide-resistant ticks are increasingly common, leading to greater concern about the effectiveness of current tick control measures.

## The Mexican Landscape and Cow-Calf Production

Mexico's cow-calf industry encompasses a wide array of production activities that vary according to a diverse set of economic motivations, political and legal environments, and cultural adaptations. Cow-calf enterprises produce meat, milk, breeding stock, animals for work, and animals for recreation, including fighting bulls and rodeo cattle. These diverse enterprises are supported by beef production in climatic conditions ranging from tropical to desert. Given these many factors, Mexican cow-calf production is classified by product, by region, by management system, and by animal type.

Mexico offers extensive forage resources, and over half of its 196 million hectares are used for livestock production. Cattle consumed the most forage in 2007, with a total inventory of over 23 million head, but 9 million head of swine, 7 million head of sheep, and 4 million head of goats also compete for forage resources (table 1). Forage resources include forbs and shrub species in arid regions, semi-arid and temperate native range that extends into forested areas, and tropical grazing areas, some that are available only seasonally due to the presence of standing water. Cattle producers also make extensive use of crop residues and byproduct feeds, including sugarcane bagasse, citrus pulp and waste, brewer's grains, and discarded food products.

Table 1  
**Mexican livestock inventory, by species and type, 2007**

Species/type	Number (head)
Total cattle	23,316,942
Total swine	9,021,192
Sows	1,070,716
Total sheep	7,305,578
Ewes	1,886,856
Sheep for wool	2,724,157
Total goats	4,124,201
Does	1,140,297
Milking goats	323,034
Total equine	2,143,934
Horses	1,328,524
Mules	234,009
Donkeys	581,401
Total poultry	356,824,337
Hen chickens	118,019,090
Broilers	159,946,197

Source: 2007 Censo Agropecuario.

Mexico's beef industry has faced minimal competition from the crop production sector given the country's limited availability of arable land. Traditionally, most beef was forage-finished and utilized forages from nonarable lands, and the feeds produced on cropland were mostly alfalfa and feed grains used for dairy, poultry, and swine production. In the last decade, a rapidly growing consumer preference for fed beef (animals are fed in feeding operations similar to U.S. feedlots and produce a higher-quality beef carcass) has resulted in increasing demand for feed grain and high-quality forage resources by the beef industry. This relatively new demand for cultivated feeds—combined with growth in dairy, pork, and poultry production—has intensified the competition between food grains, feed grains, and forage production in Mexico's crop production sector (Mejia and Peel, 2009). Amid the potential for rising feed costs, increased competition in the livestock sector, and continued changes in consumer demand for beef, improvements in cow-calf management and production practices may determine the strength of Mexico's beef industry, as well as that of its cattle exports.

## Land Ownership and Livestock Production

Based on a complicated tenure system, Mexico's land can generally be divided into two sectors: private and social. Private lands are what remain of the haciendas that existed at the beginning of the 20th century. Most of the ranches that form the commercial beef cattle industry are known as "pequeña propiedad," or small land holdings. Nearly 80 million hectares, just under 40 percent of Mexico's arable land area, is considered private land. In 2007, over 105 million hectares remained in the social sector, with about 32 percent, or 33.6 million hectares, in parcels and most of the remaining portion (69.3 million hectares) in common land, or "ejidos" (INEGI). Although Article 27 of the Mexican Constitution was modified in 1992 to establish a process for adjudicating ejido land ownership rights so the land could be bought, sold, leased, or mortgaged, common lands still account for nearly 60 percent of the land used for livestock production in Mexico.<sup>7</sup>

Historically, ejido lands have been managed differently than private lands and, in many cases, the ejido cattle production units are much smaller than the private ranches. Traditional ejido agricultural production has often focused on crop farming, with livestock production treated as a complementary or residual activity, resulting in less management intensity in livestock production compared with the private sector. In many instances across Mexico, ejido lands have been overutilized for livestock and forest production, deteriorating quality and productivity (Cartron, Ceballos, and Felger, 2005). Ejido beef production is also often focused on subsistence production using crop residuals and byproducts as livestock feeds.

The inability to sell or lease ejido land has greatly reduced the cost or opportunity cost for the use of grazing resources. The observed differences in productivity and economic costs make questions regarding the use, management, and productivity of these lands important for the overall potential of the beef industry. The distinction between ejido and private land may decrease over time, at least regarding productivity and costs of production, but only in regard to the parcelized ejido lands. The questions surrounding the disposition of the common ejido lands will continue to affect Mexican cattle production until the issues can be resolved.

<sup>7</sup> In reality, unofficial markets for ejido lands were used almost from the inception of the ejido system. Although not strictly legal, ejido parcels were often leased between ejiditarios and private producers. In the debate over the value of privatizing ejido lands, gains may be limited, in part, because unofficial uses and activities blurred the distinction between ejido and private land (Heath, 1992).

## The Mexican Cattle Industry: By the Numbers

Table 1 provides an overview of the inventory of livestock by species according to Mexico's 2007 Census of Agriculture. The census reported 23.3 million head of cattle in Mexico on some 1.13 million production units (farms and ranches), resulting in an overall average herd size of 21 head. Roughly a third of production units had fewer than 5 head of cattle, and no additional information was collected on these units. The remaining two-thirds of the production units had a total inventory of 22.1 million and an average herd size of 29 head. The total cow herd in Mexico was 8.7 million, of which 37 percent were beef cows, 34 percent dairy cows, and 28 percent dual-purpose beef and dairy cows (table 2).

Table 2  
**Mexican cattle inventory, by class, age, breeding,  
and management system, 2007**

Category	Total (head)
Total	23,316,942
<5 head/production unit <sup>1</sup>	1,207,313
<b>Class</b>	
Bulls	616,820
Cows	8,671,516
Dairy	2,966,117
Beef	3,238,922
Dual-purpose	2,466,477
Feeders/on-feed/replacements	12,571,993
Work (tracción)	249,300
<b>Age</b>	
<12 months	6,732,250
1-2 years	4,296,529
2-3 years	3,897,912
>3 years	7,182,938
<b>Breeding</b>	
Corriente	3,712,561
Cross-bred	12,210,003
Purebred	6,187,065
Registered	1,121,336
<b>Management system</b>	
Free range	12,885,647
Controlled grazing	4,437,930
Confined	3,083,930
Semi-confined	1,702,534

<sup>1</sup>Production units reporting fewer than 5 head of cattle—representing 5.2 percent of the total cattle inventory—were not questioned about class, age, breeding, or management system. The remainder of the table is based on a total cattle inventory of 22,109,629 head.  
Source: 2007 Censo Agropecuario.

The census identified cattle for three quality categories: “corriente,” crossbred, and purebred. Within the purebred category there was also a designation for registered purebred animals. Corriente, in this case, means typical or common and refers to animals of mixed breeding with unimproved genetics.<sup>8</sup> Corriente cattle vary by region in Mexico and may include Spanish genetics, but usually consist of various nondescript beef, dairy, and/or Zebu breed influences. Corriente cattle are typically designated as dual-purpose, but may include some beef cattle as well. Roughly 16 percent of Mexican cattle are classified as corriente (table 2). Most of the 5.2 percent of (backyard) cattle not included in the classification may also be corriente, making the overall total 20 percent or higher. Crossbred cattle account for 52 percent of all cattle in Mexico and include most of the dual-purpose cattle and some beef cattle. Crossbred breed types vary regionally: those in the northern States include British and Continental breeds, often with some Zebu influence, while in the central and tropical areas most are dual-purpose cattle that are crossbred dairy and Zebu breeds. Purebred animals represent 27 percent of the total cattle inventory, with nearly 5 percent of the total registered as purebred animals. This category includes most dairy animals and some beef animals. Purebred dairy animals are typically Holsteins, and the purebred beef animals include at least some representation of most beef breeds.

Table 3 lists the top 10 States for total cattle inventory, total cow herd, beef cows, and dual-purpose cows, highlighting some important regional differences in cattle production in Mexico. Dual-purpose cows are located primarily in the south and central regions, plus coastal areas of the northwest. The top States for dual-purpose cows include Veracruz, Jalisco, Chiapas, Sinaloa, Guerrero, and Sonora. Beef cows are typically located in the north, including the States of Chihuahua, Sonora, Tamaulipas, Nuevo Leon, and Coahuila. Jalisco is the only major beef cow State in the central region.

The Mexican cattle production system relies on open range, controlled grazing, confined production, and semi-confined production. Nationally, 55 percent of all cattle are produced using open range (or open grazing) systems. Open grazing tends to be more important in the northern States and is associated with beef cattle production. Controlled grazing accounts for 19 percent of cattle production. Confinement is used typically in dairy production and

<sup>8</sup> The terms criollo (native) and corriente (common) are often used interchangeably, and each may be used several different ways and have different meanings when applied to various situations. Cattle still exist throughout Mexico that descended from the Spanish cattle originally brought to Mexico in the 16th and 17th centuries. These cattle are properly called criollo or native cattle. In the Sierras of Chihuahua and Durango, for example, these cattle are the corriente or rodeo cattle that are exported to the United States. In the United States, Texas Longhorn cattle and Florida Cracker cattle are remnants of the same Spanish cattle genetics. In other cases, the term criollo may be applied to local cattle from indeterminate genetics, but generally imply cattle of mixed Zebu and dairy genetics. Thus, the definition of criollo cattle depends on the location. These cattle are invariably light muscled with low milking ability and low reproductive rates, but may range from small to large in frame size.

Table 3

**Top 10 Mexican cattle producing States**

Total cattle		Total cows <sup>1</sup>		Beef cows		Dual-purpose cows	
State	Head	State	Head	State	Head	State	Head
Veracruz	2,454,171	Veracruz	1,040,769	Chihuahua	363,336	Veracruz	428,554
Jalisco	1,931,546	Jalisco	949,252	Sonora	289,573	Jalisco	252,820
Chihuahua	1,708,887	Chihuahua	625,987	Tamaulipas	243,742	Chiapas	175,188
Chiapas	1,406,419	Sonora	507,795	Jalisco	242,097	Sinaloa	162,435
Sonora	1,351,642	Chiapas	489,321	Nuevo Leon	223,850	Guerrero	149,208
Durango	1,232,525	Durango	459,491	Coahuila	221,001	Sonora	134,018
Tamaulipas	1,054,831	Sinaloa	400,235	Veracruz	204,944	Zacatecas	125,493
Michoacan	1,004,538	Coahuila	389,312	Durango	187,936	Durango	111,574
Sinaloa	964,712	Michoacan	345,208	Tabasco	140,069	Michoacan	109,589
Tabasco	957,761	Guerrero	341,934	Sinaloa	118,651	Oaxaca	97,820

<sup>1</sup>Includes specialized dairy cows.

Source: 2007 Censo Agropecuario; INEGI.

beef feedlots, accounting for 13 percent of cattle production. Semi-confinement is used for some dairy and dual-purpose production and accounts for 7 percent of cattle production.

The reported age distribution of the 2007 cattle inventory includes 6.7 million head of cattle that are younger than 12 months of age. Using this number as an estimate of the calf crop and dividing it by 8.7 million cows suggests an average calf crop of 78 percent. This estimate may overstate the actual calf crop percentage if the calf inventory includes calves from heifers not included in the cow inventory. More importantly, the calf inventory also likely includes calves from cows that were not included in the cow inventory, such as “backyard” cattle or residual cattle kept by subsistence farmers. Adjusting the calf crop estimate to include some proportion (ranging from 50 to 80 percent) of backyard cattle reduces the estimated calf-crop percentage to a range of 70 to 73 percent.<sup>9</sup> Additionally, it is reasonable to assume a significantly higher calf-crop percentage for dairy cattle, and a further adjustment using an assumed dairy calf-crop percentage provides an estimate of the nondairy (beef plus dual-purpose) calf crop percentage. For example, using an assumed 90 percent calf crop for dairy cattle (with the backyard cattle adjustment) results in an estimated nondairy calf-crop percentage of 61 percent. The true nondairy calf-crop percentage is likely between 60 and 67 percent as a national average. The average undoubtedly varies by region, ranging from as low as 50 percent in some regions to perhaps 75 percent in others.

## Cattle Production Technology and Management

The 2007 census also provided information about the production practices and technology used in Mexican cattle production. Information was reported by cattle numbers and/or production unit. For example, 90 percent of all cattle (on 92 percent of production units) received vaccinations. Other cattle production practices of note include:

- 82 percent of all cattle (on 82 percent of production units) were treated for parasite control, mostly dipping vats (79 percent);
- 28 percent of all cattle (on 25 percent of production units) were given a balanced ration;
- 4.6 percent of all cattle (on 4.3 percent of production units) were impregnated via artificial insemination; and
- 0.35 percent of all cattle (on 0.6 percent of all production units) were impregnated via embryo transfer.

For production units only, the following information is provided:

- 60 percent used salt/minerals;
- 16 percent used a controlled breeding season;
- 32 percent used pasture rotation;
- 3.9 percent used technical assistance; and
- 1.8 percent participated in the Federal genetic improvement program.<sup>10</sup>

<sup>9</sup> For the last 10 years, the U.S. calf crop as a proportion of the January 1 NASS cattle inventory has averaged 89 percent.

<sup>10</sup> Introduced in 2003, the Programa de Producción Pecuaria Sustentable y Ordenamiento Ganadero y Apícola (PROGAN) seeks to enhance productivity and technology adoption among livestock and apicultural producers. The program provides funding for herd and genetic improvements provided that cattle ranchers meet criteria for animal health standards and management practices.

## Types of Beef Cow-Calf Production

Three main commercial beef cattle production activities exist in Mexico: cattle for export, domestic beef production, and dual-purpose beef and dairy production. These categories ignore specialized milk production (dairies, mostly confinement operations), purebred beef production, draft animals, and specialty activities, such as production of rodeo cattle and fighting bulls. These activities contribute meat to the beef industry secondary to their principal focus.

### Cattle for Export

Cattle for export (mostly to the United States) are produced mainly in the northern third of Mexico on larger ranches and increasingly are being marketed directly to U.S. buyers from the ranch. Cattle for export are primarily of British/Continental breeding, generally with no more than three-eighths Zebu influence. Historically, steers were exported to the United States, while heifers remained in Mexico to be sold into the domestic market either for meat production or as breeding stock. Recently, the increased feasibility and lower costs of spaying heifers are such that, when U.S. cattle prices are cyclically high, a substantial number of heifers are also being exported. All female cattle destined for stockering and feeding must be spayed before entering the United States.<sup>11</sup>

Tamaulipas and Chihuahua has traditionally been the largest cattle-exporting State (table 4). Chihuahua and Coahuila together provide about 72 percent of total Mexican cattle exports to the United States. Export origins, however, have changed over time and can be disrupted by regional health status. For example, in previous years, the State of Durango accounted for roughly 15 percent of Mexican cattle exports, but more recently has averaged less than 2 percent due to health restrictions. When traditional export cattle sources are restricted, other regions make up some of the difference. Recently, exports have increased from northeastern Mexico, including Tamaulipas and northern Veracruz. Cattle from northeastern Mexico have generally been of somewhat lower quality than those from traditional exporting regions. However,

<sup>11</sup> Spaying heifers is the surgical removal of ovaries (ovariectomy), thus removing the primary source of estrogen and eliminating the ability of the heifer to reproduce. Spaying stocker and feeder heifers is a management tool that maintains them in an “open” state, preventing pregnancy in feedlots and the need to check for pregnancy.

Table 4

#### Major Mexican cattle-exporting States, 2006-2008

State	Percent of total exports
Chihuahua	43.40
Tamaulipas	17.03
Coahuila	11.26
Sonora	6.95
Nuevo Leon	4.95
Zacatecas	4.38
Sinaloa	2.08
Durango	1.85
Campeche	1.06
Other States	7.04
Total	100.00

Source: INEGI, 2006-08.

a general improvement in cattle quality in many regions has narrowed the differences in quality; as a result, more cattle are suitable for export now than in the past.

## **Domestic Beef Production**

Much of the beef production in the temperate and tropical areas of Mexico is destined for the domestic market. The pronounced differences between the domestic beef industry and the export industry arose partly for historical reasons and partly due to lack of proximity to the U.S. market. Mexican climate and management systems tend to favor a higher use of Zebu genetics, resulting in cattle less desirable to U.S. markets. Historically, calves from both beef and dual-purpose cattle systems were grown and finished on pasture, producing a traditional grass-fed beef. Today, many of those calves move into a semi-intensive or confinement finishing system to produce fed beef for the domestic market.

## **Dual-Purpose Production**

As the name suggests, dual-purpose operations produce both beef and milk. One of the advantages of dual-purpose production is the ability to emphasize either beef or milk production, depending on prevailing market conditions. Most notably, in the temperate and tropical regions of Mexico, dual-purpose production is accomplished with crossbred Zebu and dairy-type cattle, traditionally Brown Swiss. For example, some producers maintain dual-purpose cows that are well adapted to the local environment, but use beef breeds to produce a beef-oriented terminal cross calf, or animal that will not be used for breeding purposes and genetic improvement. In contrast, Zebu cattle are crossed with Holstein or other dairy breeds for dual-purpose production when milk production is emphasized over beef production (fig. 6). In some regions, formerly dual-purpose cattle producers are specializing more in either beef or dairy production.

## **Backyard Cattle Production**

“Traspatio” or backyard animals are not a significant component of the commercial beef cattle industry in Mexico, but they represent a sizable potential for improvement and increased production. The backyard sector complicates production for the domestic beef market because it is difficult to document how traspatio production contributes to total slaughter rates and rural beef consumption. It is useful, however, to consider the types of animals included in this group and their role. As previously noted, 1.2 million head of cattle (5.2 percent of the total cattle inventory in 2007) are in production units with fewer than 5 head. The census figures imply that these farms have an average of 3.2 head per production unit. Most of these cattle are part of family herds for subsistence farmers, and the majority of the cattle are kept for milk production or possibly as draft animals. In many cases, beef production is not the primary focus, and excess or cull animals are used for home consumption only occasionally.

Figure 6

**Dual-purpose cow raised for domestic meat/milk production in Veracruz**



Source: Derrell Peel, Oklahoma State University.

Backyard animals are not primarily used for meat production, chiefly because beef animals require large amounts of feed resources and a rather lengthy time to mature before slaughter. Subsistence farmers are likely unable to use beef carcasses for family meat supplies as refrigeration is often unavailable. Such families often rely on smaller livestock species (sheep, goats, swine, and poultry) for meat. Thus, a substantial proportion of backyard cattle are likely females and the calves produced are sold as calves.

States with the highest proportion of backyard production animals that were excluded from the census include some States with relatively few animals, such as Tlaxcala and the Federal District (Mexico City). Several other States, however, including Mexico, Oaxaca, and Veracruz, have significant numbers of backyard cattle.

## Cow-Calf Production Systems

Based on management and product considerations, four Mexican cow-calf production systems can be defined and profiled: VacaNorte, semi-intensive, traditional, and Criollo. Production occurs in a continuum of systems, but these classifications generally cover the range and principal differences in types of production. Table 5 compares the production characteristics of each system. The different classes of production are not explicitly tied to regions or climates, and all are found to varying extents in all locations. However, some production classes tend to be heavily associated with particular geographic regions.

Table 5  
**Characteristics of Mexican cow-calf production systems**

	VacaNorte	Semi-intensive	Traditional	Criollo
Cow mature weight	450 kg	435 kg	415 kg	400 kg
Milking ability	Medium/high	Medium	Medium/low	Low
Weaning weight:				
Steers	180 kg	160 kg	140 kg	120 kg
Heifers	162 kg	144 kg	126 kg	108 kg
Average weight	171 kg	152 kg	133 kg	114 kg
Calving (percent) <sup>1</sup>	70-80	60-70	50-60	40-55
Calf death loss (percent) <sup>2</sup>	4	5	8	10
Weaning (percent) <sup>3</sup>	71	61	47	35
Culling (percent) <sup>4</sup>	10	10	8	7
Frame size <sup>5</sup>	Medium/large	Medium/large	Variable	Variable
Muscle thickness <sup>6</sup>	No. 1 – 1 ½	No. 1 ½ – 2	No. 2 ½ – 3	No. 3 – 4
Genetics	High	Medium/high	Medium	Low
Health management <sup>7</sup>	High	Medium/high	Medium/low	Low
Supplementation <sup>8</sup>	Good	Medium	Salt/minerals only	Salt/none
Pasture management	Good	Good/medium	None	None

kg=Kilograms.

<sup>1</sup>The percentage of calves born to cows bred with or exposed to breeding bulls.

<sup>2</sup>The percentage of calves stillborn or that die before weaning.

<sup>3</sup>The percentage of calf crop weaned from the total number of cows bred or exposed, representing a cumulative measure of breeding, calving, and reproductive efficiency in the herd.

<sup>4</sup>The percentage of cows removed from the herd due to death, infertility, low productivity, and advanced age.

<sup>5</sup>Indicates the size of the animal's skeletal structure and has implications for nutrient requirements, reproduction, and other characteristics of animal performance.

<sup>6</sup>The ratio of muscle to bone at a given degree of fatness. Four muscle thickness grades are currently used (No. 1, No. 2, No. 3, and No. 4), from thickest to thinnest, respectively.

<sup>7</sup>Refers to management practices recommended to aid in the prevention and treatment of infectious diseases and in parasite control.

<sup>8</sup>Refers to protein, energy, and/or mineral supplements; the recommended management practice can vary according to production system and forage considerations.

Source: Derrell Peel, Oklahoma State University.

Calves for export to the United States are a principal output of “VacaNorte” production system. Products include No. 1 calves (generally British or Continental crossbred animals with less than three-eighths Zebu influence) and No. 1½ calves (British or Continental cross with up to one-half Zebu influence). As the name suggests, this system tends to be used mostly in the arid/semiarid northern part of Mexico, but it can also be used throughout the temperate part of Mexico. Application of the system in the tropics is limited. Use of improved genetics (with much British/Continental influence) results in good reproductive rates and increased weaning weights, both of which result in the highest average productivity per cow among all four systems (see table 5). The larger body size and milking ability of a cow means increased nutritional requirements and cattle that are maintained in better body condition year round. Productivity in this system is relatively high, but management requirements are also high. Increased productivity is accomplished with better grazing management, improved/irrigated pastures, and supplemental feeds. Productivity drops quickly in the nutritionally deficient tropical environments, except in cases of very intensive (and expensive) management. Heat-related challenges in the tropical regions requires the introduction of Zebu genetics, limiting the use of this system for export production in tropical regions.

A “semi-intensive” production system differs from VacaNorte principally because of differences in the final product. Oriented to dual-purpose production or beef production for the domestic market, this system uses more Zebu breeds than the VacaNorte. Calves from this system are generally No. 2 in muscle (less muscle than VacaNorte) and medium to large in frame size. In general, however, this system requires the same level of management as the VacaNorte system, with regard to improved genetics and better health and nutritional management. This system results in slightly larger cattle (compared with traditional production systems) and improved reproductive performance. Overall productivity is less than for VacaNorte systems because of smaller animal size, lighter muscling, and slightly lower reproductive rates. Recently, the increased use of terminal cross beef breeds has created a more heavily muscled calf for domestic markets or for export.

The “traditional” cow-calf system produces a lower quality product than the semi-intensive system, as seen in the slightly lighter muscling and smaller frame size. The principal difference between traditional and semi-intensive production is the level of management. Traditional production is characterized by a wide range of production activities and low levels of health and nutrition management. Productivity is substantially lower in the traditional system than in semi-intensive, but so too are production costs, with limited use of purchased inputs, especially supplemental feed. The traditional system relies less on genetic improvement and is based on local or regional genetics.

Beef-only and dual-purpose production throughout Mexico may be either semi-intensive or traditional. Depending on the location and resources available, both systems may make considerable use of crop residues and byproduct feeds. In the traditional production system, crop residues (usually from contiguous farming activities) are the primary means by which cattle survive the annual dry season. These residues are often very low quality and, without additional (purchased) feed supplements, productivity will be low because the animal’s body condition deteriorates sharply when seasonal

forage supplies are limited. In semi-intensive production, crop residues are an effective means of lowering the cost of production by serving as a less expensive supplemental feed. Byproduct feeds—including sugarcane bagasse, citrus pulp and waste, brewer's grains, and discarded food products (tortillas, bread, snack chips, etc.)—have been used for many years by cow-calf producers and even more so by the feedlot industry in Mexico. Use of byproduct feeds varies regionally and seasonally, and by type of production system.

“Criollo” production encompasses a wide variety of cattle and activities, but the most critical economic characteristics of this category are low productivity, low management, and low costs of production. With the exception of the rodeo cattle produced in the north, products of this sector are low value or are completely outside the commercial market, with an emphasis on family milk production and draft use. Only occasionally do cull animals provide meat for home consumption. In many cases, Criollo production occurs where crop farming is the primary enterprise. Cattle may be fed a high proportion of crop residues and very little pasture.

## Cattle Marketing Systems and U.S. Exports

Cattle marketing practices vary by region and type of production system; however, marketing institutions for live cattle in Mexico are minimal. There is relatively little public reporting of stocker and feeder cattle prices, although there is a national system for reporting slaughter animal and carcass prices. Most stocker and feeder cattle are marketed in some form of direct purchase between buyer and seller, although the primary producer often sells to an intermediary, who is either a speculative trader or a buyer's representative. Most transactions are on cash (or spot) markets with limited use of forward contracts or other marketing arrangements. Price discovery mechanisms are generally informal and producers often sell with little knowledge of prevailing market conditions.

In traditional production systems where cattle are finished on pasture, cattle may be sold only at slaughter or perhaps when the cow-calf producer sells to a local producer to stocker/finish on pasture. In some cases, mostly in the temperate and tropical regions, cattle from larger ranches may be shipped to urban centers for slaughter or to a local buyer who will assemble loads from small producers for shipment to the urban center. Cattle may also be sold directly to a local slaughterhouse, often one or two at a time. As more slaughter facilities are established in more regions, cattle can be sold and slaughtered locally or regionally and moved to major metropolitan markets as chilled carcasses rather than as live animals.

In the principal cattle-exporting regions of the north, cattle for export may be shipped to the border and sold to traders there. Increasingly, large ranches with good quality cattle are selling through U.S. video auctions or directly to stocker or feedlot buyers in the United States. Although not common in most of Mexico, cattle auctions are used in the north, with weekly sales in Chihuahua, Durango, and Hermosillo. Since a high proportion of Mexico's northern cattle that are not exported are fed in feedlots, cattle are increasingly assembled and then shipped long distances from the north by local buyer representatives. In many instances, one or more intermediaries may be involved in such transactions. In some cases, local cattlemen's union facilities may serve as buying stations where producers can bring cattle to be bought by buyer representatives or traders.

Recent dramatic changes in consumer preferences have led to a substantial growth in cattle feeding in confinement and semi-intensive finishing systems using concentrate feeds. An increasing percentage of cattle are transported from southern Mexico to feedlots in northern or central Mexico, increasing shipping distances and costs related to stress on cattle. This trend suggests that there will be increased demand for assembly, transportation, and transfer-of-ownership functions in the marketing system.

## Outlook

The Mexican beef industry has been evolving rapidly over the last two decades, primarily as a result of changing consumer dietary preferences and global market impacts. In the 1990s, prolonged drought, coupled with the 1994 peso devaluation and subsequent limitations on capital access, led to Mexican herd liquidation. Cyclically high U.S. cattle prices through much of the next decade resulted in exports of feeder cattle at unsustainable rates. Simultaneously, changing consumer preferences in Mexico resulted in increased demand for beef and changes in the type and quality of meat produced, as well as changes in how it is marketed. Growing beef demand and changing consumer preferences for beef will most likely continue to result in a general increase in beef production in Mexico, especially with respect to cattle in feedlots.

The Mexican beef industry will also face tremendous challenges from both domestic and international competitors. Other domestic livestock industries offer consumers alternative products and compete with beef producers for feed and forage resources. International firms likewise compete against domestic producers for inputs (feed and cattle) and meat. Although beef demand (specifically, demand for fed beef) has increased significantly in recent years, demand for pork and poultry has also increased. The increased demand for feed grains in cattle-feeding operations, along with growth in other livestock sectors and increased competition between food and feed grains, could result in higher grain prices and more marketing outlets.

Such changes have significant implications for cow-calf producers and on overall resource use and production potential in the industry. The increase in total livestock production means greater competition with other types of food and fiber production for limited agricultural resources in the country. This competition will become an increasingly critical factor as the beef industry adopts more intensive production systems to produce fed beef.

Opportunities for improvement in Mexican cattle production, specifically the cow-calf phase, are evident. The adoption of basic animal production and management techniques would greatly improve production efficiencies and the quality of cattle produced, and help to position the Mexican beef industry for the coming decades. The greatest potential for improvement and increased competitiveness in Mexican beef production, however, may lie in improving cattle marketing channels and infrastructure, factors certain to foster efficiency in Mexican cow-calf production techniques.

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