

Forage Finished Beef

an ARGENTINEAN PERSPECTIVE



- **Population**
38,592,000
- **Capital:**
Buenos Aires
13,239,000
- **Area - square km.** 2,780,400
- **GDP per capita**
U.S. \$10,500
- **Cattle ranches**
250,000

Argentina is one of the world's leading exporters of beef, most of which is traditionally raised and finished on pasture. About 54 million head of cattle are raised in Argentina with 7% of those finished in feedlots, and the balance finished on forage. The majority of ranches lie in the provinces of La Pampa and Buenos Aires, as shown on the map. Argentina's 2005 beef exports are about 680,000 metric tonnes; primarily to the European Union.

The country's climate is temperate. Average seasonal lows are minus 3° Celsius and highs are 37° Celsius. Argentina's land mass is four times the size of Manitoba, and its growing regions vary significantly. Stocking rates, pasture species selection and feeding strategies are unique to each region based on its rainfall, frost-free period and soil composition.

Recently, large tracts of pastureland have been converted to cropland, largely for growing corn, soybeans and sunflowers. The loss of pasture acres has pushed ranchers to include more corn and other feed in finishing rations.

While there are marked differences, the conditions, challenges, livestock genetics, pasture species and management are very similar to Manitoba cattle production. Producers interested in finishing cattle on forage can certainly draw on the experiences of Argentine producers.

When comparing Manitoba to Argentina's growing conditions, it's important to note some significant differences. Argentina's cattle production area sits 36° south of the equator; about the same distance as Oklahoma is north of the equator. Average precipitation varies significantly across each region, from as low as 250 mm (10 inches) per year in western La Pampa, to as much as 1,000 mm (40 inches) per year in northeast La Pampa. Frost-free periods vary too, from 6 months in the west to 8 months in the east. However, a prairie-like deep freeze never occurs.

Argentina's soil is mainly volcanic deposits and sand. Pasture production and corresponding

Argentina is the second largest country in South America after Brazil. The capital, Buenos Aires, is located on the east coast of Argentina. It is one of the biggest cities in the world, with a population of over 13 million.

The beef and cattle industry is an important part of Argentina's agricultural sector. In 2005, the value of live-weight cattle production reached \$4.7 billion; the estimated value of processed beef (carcass weight) was \$5.8 billion.

Currently, there are around 250,000 cattle ranches in Argentina, of which approximately 10% are considered large (more than 500 head). Large ranches account for 55% of the country's total cattle stock (approximately 54 million head).

Although most Argentine cattle are grazed on pasture, in recent years much of the country's traditional pastureland has gradually been replaced by cropland (corn, soybeans, and sunflower). To maintain beef production on less land, many ranches are using corn and other feeds for fattening during the last two or three months prior to slaughter.

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Top photo: 60 days from kill. **Bottom photo:** steer on the left is less than ideal, the steer on the right is good for forage finishing; small frame, wide in the gut, with short, narrow canon bones.



stocking rates can range from as high as 2.5 animal units (AU) per hectare (1.01 AU/ac) to as low as 0.1 AU/ha (0.04 AU/ac) across one growing region (e.g. La Pampa). Soil conditions generally improve further north and east through the country.

While Argentina's climate is more moderate than the Prairies, pasture management techniques are similar to those used by Canadian graziers. Fencing, watering site locations and infrastructure are all designed to maximize pasture production. Native ranges make up a large portion of the western area of the country, while more productive land in the central areas is used for both pasture and cropland.

Species raised on Argentine pastures are similar to those in Manitoba. Most pastures consist of alfalfa (fall dormancy rating ranges from 5 to 8, depending on the region), brome and fescue species, and are in production 4 or 5 years before weed and disease pressures take over. Due to variable soil quality and carefully planned crop rotations, fertilizer response is mixed and not widely used. Pastures are grazed 2 to 3 times at the vegetative stage and usually mowed after the first grazing to even-out re-growth and reduce weed pressure.

The size of cattle operation varies from an average 300 to 500 head in La Pampa, to 1,000 head in northern Buenos Aires. Feedlots are mainly found throughout the southern pothole region. The land is less productive, but also has a shallow water table, leading to growing environmental concerns. Feedlot finishing is in the minority in Argentina. Only 7% (approximately one million head) of cattle are finished in feedlots annually.

The forage chain

Unlike Manitoba producers, many ranchers in Argentina rotate 4 or 5 years of pasture production with 4 or 5 years of annual crops (e.g. corn, soybeans, sunflowers, peanuts). Winter annuals may also be included in the rotation for 1 to 2 years. There are some native ranges and long term pastures as well. Current cropping margins are much higher than beef, putting pressure on ranchers and raising land costs and rents dramatically.

Cattle in Argentina are largely finished on alfalfa-grass mixed pastures. Bloat is very rare, accounting for less than 1% of livestock deaths. In some instances, ranchers do use a bloat-control agent, but it's costly.



A typical pasture is seeded with 5 to 7 kg/ha (6.3 lb/ac) of alfalfa, 2 to 3 kg/ha (1.8 to 2.7 lb/ac) of a brome-like species or orchard grass, plus 3 kg/ha (2.7 lb/ac) of tall fescue. White clover is sometimes used, and triticale is often used as a cover crop. The fall dormancy rating of the alfalfa is usually higher (higher producing, but shorter lived), due to the planned shorter life of the pasture. In some areas, or when a pasture is slated for a 5 to 7 seven year lifespan, a more dormant variety is chosen.

Fertilizer is not commonly applied to pastures, except at seeding time. Diammonium phosphate (DAP) and mono ammonium phosphate (MAP) are applied at seeding on some ranches at a rate of 150 kg/ha (135 lb/ac).

Cattle may be fed hay and silage in the winter months, depending on the season and availability. In some areas, the quality of the hay is half of what the land produces as pasture and is therefore not an efficient use of the land. Supplementing with corn may be done at various times during the feeding cycle, but it adds significantly to the cost of the animal and is generally avoided. Pen feeding to get a group of cattle caught-up in weight is done to create a more homogeneous group of cattle. Corn is sometimes used to graze livestock in a dry year rather than harvesting it for grain. Sorghum is used as a stop gap if pastures are not ready in time. Sorghum, however, does not have the energy required to finish cattle. Argentina does have copper and selenium deficiency problems in some areas and both are often supplemented.

Beef herds

The cattle breeds most commonly seen in Argentina are British breeds. The herd mix differs by region, but Red and Black Angus, Hereford and Black Baldy types make up the majority of the beef herds. In some areas, exotic breeds, such as Braford (a breed originally developed from Hereford/Brahman bulls) are crossed with Cebu and Brahman cows.

The cattle best suited for forage finishing are small framed, wide in the gut with short, narrow canon bones. While most cattle found on Argentine farms are of the same British breeds as Manitoba, they are usually much smaller.

The typical breeding season is in the spring/summer (November to January) and lasts for 2 to 3 months.

Calving takes place in late winter and early spring (July to September). Steers are castrated to improve production and manage breeding. Missed castrations can be discounted at the market if a whole trailer load of them is delivered. Heifers are not payed because forage quality has more influence on gains than removing the reproductive organs.

Calves are usually weaned at about 6 months, weighing between 100 and 250 kg (220 to 550 lb). In years when fat cattle prices are much higher than replacement cow costs, (e.g. 2008), calves are sometimes weaned at 3 months and the cows are fattened for slaughter. Early weaned calves would typically be pen-fed for 15 days to a month, then grazed on sorghum, and then moved to alfalfa-grass mixed pasture until they reach about 100 to 150 kg (220 to 300 lb). Steers take between 12 and 14 months to finish on pasture, making them about 18 to 19 months old, at kill. Steers destined for the domestic market are finished at 380 to 400 kg (830 to 880 lb). Those for the export market are heavier, finishing in the 400 to 450 kg (800 to 900 lb) range.

Heifers and cows are bred using bull service and artificial insemination is rare. A typical breeding season would see three two-year old bulls servicing 100 cows. Heifers are bred at 15 months and are monitored at calving. Cows, for the most part, are left to calve on their own. Any cow not in calf is immediately culled, fattened and sold. Cows

Photo below: These steers are 300 to 400 kg (600 to 800 lb).



will average 6 to 7 calves in their lifetime.

The majority of animals slaughtered are steers (33%), followed by young steers (19%), cows (18%), heifers (15%), calves (13%) and bulls (2%). Steers reach kill weight between 380 and 400 kg (830 to 880 lb), heavier if destined for the export market.

Production systems and feeding strategies

Two large-scale ranches, Nuevo Campo and El Castillo have found that the key to high weight gains on pastures is to graze high concentrations of soluble sugars. Soluble sugars in alfalfa peak during the vegetative to early flower stage (5 to 10%). Winter annuals typically have much higher levels (around 10 to 15%). This is the reason companion cropping alfalfa with a winter annual can maximize soluble sugars as well as protein. Both alfalfa (for protein) and winter annuals (for soluble sugars) are necessary to balance a finishing program and are usually planted in adjoining fields allowing animals to be moved between them. While the two types of crops are grown simultaneously, they are rarely seeded on the same field.

Below is an example of the selected forage by month for animals in the stocker and finishing phase at these two ranches:

Calendar: April to March													
Forage	A	M	J	J	A	S	O	N	D	J	F	M	
Rye or Oat	//	//	//	//	//	/				/	//	/	
Alfalfa	//	/				//	//	//	//	//	//		

Photo below: Alfalfa/grass pasture with 10 days of re-



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Record keeping is another important aspect of cattle production. Nueva Castilla, located in the Buenos Aires province, maintains detailed records on pasture production and average daily gains to track efficiency and assess the success of production changes on the farm (see table below). As an example, Nueva Castilla has classified its land based on productivity and determines its cattle inventory twice a year.

Historical Stocking Densities and ADG for Nueva Castilla:		
Years	Stocking Density (pounds live weight/ac)	Average Daily Gain (pounds/day)
1988 - 1993	385	593
1993 - 2002	491	523
2007	665	591
2008	1053	604

Other ranches, such as El Carmen, collect hand-clipped samples of pastures to benchmark yields and calculate grazing changes. At this ranch, pastures that thin out prematurely may be broadcast seeded with white clover to help with ground cover.

Production systems in Argentina are dynamic and tend to change weekly, if not daily, depending on weather or changes in pasture growth. Ranchers do tend to have a basic plan, but are always ready to augment the system as needed. Cattle may be moved daily or even after a half-day if necessary.

Ranches are split into several paddocks, ranging from 8 to 20 hectares (20 to 50) each. Pastures are allowed to rest a minimum of 20 to 25 days in the spring, but may be left closer to 40 or more days in the summer months, depending on the region and rainfall. The Nuevo Campo ranch aims for a 70% use of its pastures and will graze a paddock 6 to 7 times in a growing season. Other ranches may only do 2 to 3 passes in a year, depending on paddock size, pasture production and targeted rates of gain.

Feeding based on animal weight is key to production in Argentina. Some ranches allocate pastures at 2.5% body weight for older animals and 3 to 3.5% body weight for younger animals (percentage is calculated as DMI). Average daily gains vary depending on location, time of year and the animal's growth stage. A typical strategy is to wean calves at 80 to 90 days in fall weighing 75 to 110 kg (165 to 220 lb). The calves spend the wintering period gaining 600 to 650 g/day (1.0 to 1.4 lb/day) on a combination of winter pasture and pen feeding, with a target weight of 300 kg (660 lb) by spring. The yearlings then move to pasture with a target of 700 to 900 grams per day (1.5 to 2.0 lb/day) in the spring and 400 to 600 grams/day (0.9 to 1.3 lb/day) in summer. These rates of gain are necessary for the cattle to reach

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a market weight of 380 to 450 kg (840 to 900 lb) by fall.

Ranchers strive for uniform weights in cattle groups. Animals are weighed frequently to achieve this: on arrival or at weaning, and every 70 to 90 days after that, depending on the ranch. A smaller, benchmark group of animals is weighed every 30 days; pastures are allocated accordingly and supplementing or pen feeding may occur to keep animals at targeted rates of gain. For example, when calves arrive or are weaned, they may be separated into two groups: those lighter than 140 kg (280 lb) (heifers and younger calves) and those over 140 kg (280 lb). The lighter group is pen fed a ration high in grain corn (50%), sunflower meal pellets (30%) and corn silage (20%). The heavier calves would also be pen fed, but with a ration primarily of silage with some corn, screenings and sunflower meal. This type of feeding would see both pens reach approximately the same weight after 3 or 4 months, resulting in a larger, uniform group of calves.

Pen feeding does not necessarily require extensive permanent infrastructure. At least one ranch, Nueva Castilla in Buenos Aires, uses portable electric fencing and a feed bunk as its pen. This way, the roughly one-hectare-sized pen can be situated on sandy areas, hilltops or eroded knolls so that the manure and urine is deposited directly where it's needed most to improve future forage production. Pens are typically moved every two years.

Photo below: Portable pen.



While several ranches use pen feeding to increase average daily gain for a targeted marketing period, the practice is expensive. One ranch estimated that increasing steer weight from 160 to 270 kg (320 to 540 lb) by pen feeding provided a return on investment of 4%. In contrast, the same weight gain on pasture averaged a return on investment closer to 30%.

Calculating the true cost of production in Argentina is difficult, as many costs, such as land rents, taxes and opportunity

A closer look at Omega-3s and CLA

The National Institute of Farming Technology at the Anquil Experimental Station specializes in forage finished beef research. Among several ongoing research projects is a study looking at increasing Omega-3 fatty acids and conjugated linoleic acid (CLA) levels in beef. Recent findings suggest that cattle fed exclusively cool season plants (both grasses and annual crops) tend to have higher levels of Omega-3s and CLA than those fed legumes or warm season plants, such as corn and sorghum. The research shows cool season grasses as ideal for increasing CLA levels, because of their higher linoleic acid content.

Omega-3 fatty acids are important, as is the ratio of Omega-3 to Omega-6 within the meat. In this case, the ideal ratio should be no more than 4 to 1. Forage finished beef tends to have many more Omega-3 fatty acids and a more desirable 2 to 1 ratio of Omega-6 to Omega-3 fatty acids. Grain finished beef typically has a range between 14 to 1 and 18 to 1.

Animal size also plays a role in the level of Omega-3 fatty acid levels, as smaller, lighter animals tend to have higher Omega-3 levels. The research also shows that corn feeding in the first four months or the last five to nine months of the finishing period lowered CLA levels.

costs are not typically factored into the equation. The cost of production, from breeding to finishing, averages 18 cents (US) per pound in a dry year, and 13 cents (US) per pound in a more average year. As an example, a weaned calf was worth 39 cents (US) per pound live weight in 2007. At the time of this technology transfer mission, 8 to 10 year old bred cows were selling for \$340 (US), but the same cow, fattened, was selling for \$500 (US). In such conditions, calves are weaned early and cows are fattened and sold.

Processing and grading

Beef in Argentina is not graded by fat content, but by age and gender first, then by fat cover. This could be a product of the Argentine population's preference for very tender, young beef. Fat cover is not measured, but visually inspected. There are no minimum or maximum standards, however intramuscular fat is unfavorable. Fat cover on forage finished beef can have a distinct yellow colour.

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Argentina's beef grading system has two levels of classification, with the primary objective being to provide incentives for quality, especially tenderness. The classification system categorizes each animal as cow, heifer, or steer; then an additional grade of 1 to 5 is assigned. This system was designed by large retailers (who provide 17 to 20% of beef consumed) to add structure and financial incentive for higher quality animals. However, 80% of the beef consumed in Argentina is purchased in local butcher shops where buyers have little interest in this classification system.

Extensive management, tracking and record keeping extends beyond the pasture, and continues right through to slaughter. Argentina's National Sanitary and Quality Agri-Food Service (SENASA) is the federal government branch responsible for beef inspection and quality control. SENASA has also collaborated with private industry to develop a unique record keeping system that provides carcass information to each individual producer. For a fee, the producer can request the information on carcass weights, yields, and grading of their stock. This service is highly promoted for its ability to help herdsmen improve production and finishing rates. All animals born after 2006 are required to register with SENASA using two specific tags (one tag and one button). The tag lists country of origin, ranch name, calf number and security number; while the button records the producer name and ranch location.

Background

This factsheet is based on the Argentina Forage Finished Beef Technology Transfer Mission that took place in March of 2008. Complete details of the mission are printed in a comprehensive report available from Manitoba Forage Council or Manitoba Agriculture, Food and Rural Initiatives. Support for this initiative was provided by the Manitoba Functional Food Opportunities Program in partnership with the Manitoba Forage Council, Manitoba Agriculture, Food and Rural Initiatives and Agriculture and Agri-Food Canada's Greencover Canada Program.

Photo below: Examples of back fat thickness of forage finished beef carcasses and steak marbling.



For more information visit:

- Your local Manitoba Agriculture, Food and Rural Initiatives GO Centre or Office.
- The Manitoba Agriculture, Food and Rural Initiatives website: www.manitoba.ca/agriculture
- The Manitoba Forage Council website: www.mbforagecouncil.mb.ca
- Your Agriculture and Agri-Food Canada Office (PFRA)



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