

Dairy production

About 150 million households around the world are engaged in milk production. In most developing countries, milk is produced by smallholder farmers, and milk production contributes to household livelihoods, food security and nutrition. Milk provides relatively quick income for small producers and is an important source of income.

Over the past decades, part of developing countries in world dairy production has increased. This growth is mainly due to the increase in the number of dairy animals rather than to the increase in productivity per head. In many developing countries, dairy productivity is constrained by poor quality food resources, disease, limited access to markets and services (e.g. health, credit, and training), and low genetic potential of dairy animals for milk production. Unlike developed countries, many developing countries have hot and / or humid climates which are not favorable for milk production.

Some developing countries have a long tradition of milk production, and milk or dairy products have an important role in the diet. Other countries have recently developed significant milk production. Most of the countries with a long dairy tradition are located in the Mediterranean region and the Near East, the Indian subcontinent, the savanna regions of West Africa, the highlands of East Africa and parts of 'South and Central America. Countries that do not have a long tradition of milk production are in South Asia (including China) and in the tropics with high ambient temperatures and humidity.

Did you know

- Over the past three decades, global milk production has increased by more than 59 percent, from 530 million tonnes in 1988 to 843 million tonnes in 2018.
- India is the world's largest producer of milk, with 22 percent of world production, followed by the United States of America, China, Pakistan and Brazil.
- Since the 1970s, milk production has developed mainly in South Asia, which is the main engine of milk production growth in the developing world.
- In Africa, milk production is growing more slowly than in other developing regions, due to poverty and - in some countries - unfavorable climatic conditions.
- The countries with the highest milk surpluses are New Zealand, the United States of America, Germany, France, Australia and Ireland.
- The countries with the largest milk deficits are China, Italy, the Russian Federation, Mexico, Algeria and Indonesia.

Dairy animals

World milk production comes almost entirely from cattle, buffaloes, goats, sheep and camels. Other less common dairy animals are yaks, horses, reindeer and donkeys. The presence and importance of each species varies considerably between regions and countries. The key elements that determine the presence of dairy species on farms are forage, water and climate. Other factors can influence the presence of a particular dairy species such as market demand, food traditions and the socio-economic

characteristics of each household (for example, poor families tend to rely more on small children. ruminants).

Although cattle farming can take place in a wide range of environments, other dairy species allow milk to be produced in adverse environments which often cannot support another type of agricultural production. Sheep are used to produce milk in semi-arid regions around the Mediterranean, goats in regions of Africa with poor soils, mares in the steppes of Central Asia, camels in arid lands, buffaloes in humid tropics; and yaks in high mountain areas such as the Tibetan Plateau.

In developing countries, dairy animals are often raised in subsistence systems and small farms. These animals generally have multiple uses and can grow and produce in harsh conditions, such as harsh environments with low input intensity, and minimal management. They are well adapted to local conditions, but have low genetic potential for milk production.

Did you know

- Cattle produce 81 percent of world milk production, followed by buffaloes with 15 percent, goats with 2 percent and ewes with 1 percent; camels provide 0.5 percent of world production. The remaining part is produced by other dairy species such as equines and yaks.
- About a third of milk production in developing countries comes from buffaloes, goats, camels and sheep. In developed countries, almost all milk is produced by cattle.
- Cattle produce about three-quarters of milk production in sub-Saharan Africa, almost 60% in Asia and almost all in Latin America.
- Milk from species other than cattle accounts for 40 percent of milk production in Asia, 25 percent in Africa, 3 percent in Europe and 0.5 percent in the Americas, it is almost non-existent in Oceania.

Cattle

Compared to other dairy animals, cattle have many advantages in terms of ease of milking, udder size, milk storage capacity and milk yield. In fact, cow's milk constitutes the largest share of world milk production. There are many more dairy cows in developing countries than in developed countries, but animals in developing countries often have lower milk yields and shorter lactation periods. The poor performance in small dairy farms in developing countries is the result of several factors such as climate (high ambient temperature and humidity), poor quality forages, feed rations poorly supplemented with concentrates, low genetic potential of multipurpose animals for milk production (in addition to milk and meat, these cattle are also used for animal traction), and the high incidence of disease.

In developing countries, most milk is produced by smallholder herders of local or indigenous breeds of cattle, but in peri-urban areas improved or crossbred cows are increasingly used to meet the growing urban demand for milk and dairy products. Native breeds are well adapted to local conditions (eg climate, available food and water resources, endemic diseases and parasites), but have low milk production and

generally need to be milked with the calf. Most of the breeds native to the tropics are of the zebu type (*Bos indicus*) characterized by its hump and dewlap. The most common dairy breeds of zebu are Sahiwal, Red Sindhi, Tharparkar, Kankrej, Gir, Kenana and Butana. The native *Bos taurus* cattle are found in the tropics of West Africa and Latin America, and include the N'Dama and Criollo breeds.

Specialty dairy breeds such as Friesian and Jersey have high milk yields, but are less suited to harsh environments and require high levels of management, feeding, housing, and veterinary care. If these conditions are not provided, improved dairy cows cannot express their genetic potential. In recent decades, bulls from specialized dairy breeds have been used to crossbreed with native cows in order to obtain animals that combine high milk yields and adaptation to the local environment.

Did you know

- Cow's milk production is declining in developed countries, as are the number of farms and dairy animals, but productivity per cow is increasing. In developing countries, production is increasing, as well as the number of lactating cows.
- Average milk yields vary widely between countries, mainly due to differences in production systems (eg, animal feed, breeds). In countries such as Afghanistan, Bangladesh, Ethiopia and Nigeria, the average milk yield of cows is less than or equal to 500 kg / year. In countries where the dairy sector is developing, such as the Islamic Republic of Iran, Peru and Viet Nam, the average milk yield of cows is over 2000 kg / year.
- In many countries in Asia, milk is becoming the main product of cattle breeding.
- The main producers of cow's milk are the United States of America, India and China.
- The Holstein-Frisonne is the most common breed of cattle in the world; it is present in more than 150 countries.
- Specialized dairy breeds (*Bos taurus*) are used almost exclusively in temperate and developed regions; most cattle in developing countries, especially in humid tropics, are of the zebu type (*Bos indicus*).
- The countries with the largest number of dairy cows are India, Brazil, China, Ethiopia and Pakistan.

Buffaloes

The water buffalo (*Bubalus bubalis*) contributes an important part of world milk production and is the main dairy species in several countries. Buffaloes are mainly reared by small producers in developing countries, who keep one or two animals on mixed crop-livestock farms. Water buffaloes are classified into two subspecies: river buffalo and swamp buffalo. River buffaloes constitute about 70 percent of the world's water buffalo population. The milk of river buffaloes constitutes a substantial part of total milk production in India and Pakistan and is also important in the Near East. Marsh buffaloes are smaller and have lower milk yields than river buffaloes. They are mostly found in East Asia and are mainly bred for animal traction.

River buffaloes generally produce between 1,500 and 4,500 liters of milk per lactation period. They have a significantly longer productive lifespan than cows, producing calves and milk until they are 20 years old. The many factors that limit the commercial production of buffalo milk include the higher age of females at first calving, the seasonality of estrus, the extended interval between calvings and the long dry period.

In recent decades, breeding programs - particularly in Bulgaria, China, Egypt, India and Pakistan - have attempted to improve the milk production of river buffaloes. The best-known dairy buffalo breeds include Murrah, Nili-Ravi, Kundi, Surti, Jaffarabadi, Bhadawari, and Mehsana.

Did you know

- The world buffalo population is around 207 million head: over 97 percent live in Asia, 2 percent in Africa, especially Egypt, 0.7 percent are in South America, and less than 0, 2 percent in Australia and Europe.
- The countries with the largest number of dairy buffaloes are India, Pakistan, China, Egypt and Nepal. Pakistan, Egypt and Nepal have more dairy buffaloes than dairy cows.
- Water buffaloes are the main source of milk in South Asia.
- The largest producers of dairy buffalo are India and Pakistan, where buffaloes produce more milk than cows.

Small ruminants

In developing countries, sheep and goats are often kept in marginal environments characterized by scarcity of pasture and unfavorable climatic conditions. They are the dairy animals of poor populations due to the lower capital investment and production costs required, and the rapid generational turnover of animals (and therefore earlier milk production compared to other dairy species), short gestation periods and the production of milk in quantities suitable for immediate consumption by households (thus reducing problems of storage and marketing of milk). Women are generally more involved than men in the rearing of small ruminants.

Goats have a higher milk yield than sheep. They are considered the “poor man's cow” and are the main source of milk and meat for many farmers in the tropics. Goats are common in arid and semi-arid areas and are usually kept in small herds of two to 10 animals. Goat's milk is widely produced in West Africa, but also in the Caribbean and Central Africa, generally for household consumption, although it is sometimes marketed within the community. Compared to that of dairy cows, the lactation curve of goats is flatter, with a smaller peak and greater persistence. In some cases, the lactation curve may have two peaks due to seasonal fluctuations in feed availability.

Although most dairy goats are raised in developing countries, breeding programs are concentrated in Europe and North America. Genetic selection of dairy goats has resulted in a dramatic increase in milk yields and the length of the lactation period. Specialized dairy goat breeds that are used in developed countries therefore have a higher genetic potential for milk production than local breeds in the developing world.

In recent decades, specialized breeds have been exported to many developing countries, and crossed with local breeds in an attempt to improve milk production. The most common breeds of dairy goats are the Saanen, Anglo-Nubian, Toggenburg, Alpine, and West African Dwarf.

More than half of the world's sheep population is located in developing countries; sheep outnumber goats in regions with a colder climate. Sheep farming provides many products - milk, meat, skin, wool and manure - but most small producers in developing countries keep sheep for meat or for sale on the hoof. local markets.

Most dairy sheep are reared in the Mediterranean region, and most dairy sheep breeds are found in this region and in the Near East. Milk production and duration of lactation in dairy ewes are not comparable to those of dairy cows or goats, but ewes' milk production can be increased by stimulating milking (e.g., milking multiple times per day). Genetic selection of dairy ewes did not lead to significant improvements in milk production and lactation duration. Dairy sheep breeds include Awassi, East Frisia and Lacaune.

Did you know

- The Near East region has the highest production of goat and sheep milk per capita.
- About 96 percent of the world's goat population is found in Asia, Africa and Latin America. Asia accounts for the largest share, with around 52 percent of the total population.
- Most dairy goats are reared in the Mediterranean region, South Asia and parts of Latin America and Africa.
- The main producers of goat's milk are India, Bangladesh and Sudan.
- In India, over 90 percent of small ruminants are owned by landless and marginalized farmers.

Average goat milk yields vary considerably among large dairy producing countries. In Sudan the average milk yield of goats is around 64 kg / year, while in India it is over 165 kg / year.

- The main producers of sheep's milk are Turkey, China and Greece.
- Goat's milk contributes a significant share of total milk production in sub-Saharan Africa (12 percent) and parts of South, East and South-East Asia (excluding China).
- Sheep's milk is important in the Near East and North Africa (9 percent of total milk production) and in sub-Saharan Africa (5 percent).
- The countries with the most dairy goats are India, Bangladesh and Mali.
- The countries with the most dairy ewes are China, Sudan, Turkey and Algeria.

Camels

Camels are found in Africa and Asia and are mostly bred by nomads. There are two species of camels: Arabian one-humped camels or dromedaries (*Camelus*

dromedarius) - plains camels; and the two-humped Bactrian camels (*Camelus bactrianus*) - the mountain camels. Camels are raised for milk, meat, fiber (wool and hair), transport and other work; their manure is used as fuel. Milk is often the most important production and the staple food of nomadic populations. When nomads move in search of pasture, they can live in the desert for up to a month consuming nothing other than camel milk. Camels can produce more milk from consuming poor forage than any other dairy species. In northern Kenya, for example, camels produce much more milk than cattle. The value and benefits of camels in terms of milk, meat and fiber production are increasingly recognized. Camel milk products could not only provide more food for people in arid and semi-arid areas, but also provide nomadic herders with an important source of income.

As camel milk is normally produced in low input-low productivity systems, a yield of five liters of water per day is considered quite acceptable. Camels typically produce between 1,000 and 2,700 liters of milk per lactation period in Africa, but camels in South Asia are said to produce up to 12,000 liters per lactation. Camels reach their peak performance in the second or third month of lactation and produce milk for eight to eighteen months. Daily milk production during the rainy season is often twice that of the dry season. The lactation curve of dairy camels is similar to that of dairy cows, but camels have a longer lactation period. Dromedaries generally have a much higher milk yield than Bactrian camels and are increasingly being reared on intensive dairy farms.

Did you know

- Camels are bred for milk production in Africa and Asia.
- The world population of camels is estimated at 35 million head.
- In sub-Saharan Africa, camel milk accounts for about 5 percent of total milk production.
- Kenya is the largest producer of camel milk in the world, followed by Somalia and Mali.

Other animals

Yaks

The yak is a species of bovid which provides a livelihood for people living in very severe high mountain conditions and in great deprivation. The yaks live mainly on the "roof of the world", the name often given to the Tibetan plateau, and provide milk, meat, hair and down, skin, animal traction and dung (mainly used as fuel). The yak has physical and physiological characteristics that allow it to thrive at high altitudes (low oxygen content) and in extreme cold (temperatures as low as -40 ° C) and survive food shortages in winter.

The milk yield of the female yak often does not exceed the amount suckled by the calf and is not comparable to the milk yield of dairy cows. However, although the withdrawal of milk for human consumption may come at the expense of the calf, yak milk is important for households. In economic terms, milk is often the most important product of the yak. Yak milk is typically produced by smallholder farmers in traditional systems

where management is strongly influenced by climate and seasons. Lactation is seasonal and the females of the yak produce between 150 and 500 liters of milk; yields vary by breed and location. Lactation can usually continue for a second year without another calving. During the winter, females of the yak do not dry up and continue to produce a small amount of milk, with milk yields as low as 2 to 4 liters per month. In the second year of lactation, milk yields are between half and two-thirds of those in the first year. At present, there is no breed of yak that specializes in milk product.