



# Milk and meat producing animals in the world



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## **Sammanfattning**

Människor världen över använder huvudsakligen fem djurarter för produktion av mjölk: buffel, kamel, ko, get och får. För köttproduktion används även de mjölkproducerande arterna samt gris, fjäderfä, kanin och häst. Kor producerar största kvantiteten mjölk i världen och den största mängden kött kommer från gris. Asien har den största djurpopulationen för alla arter utom kamel som Afrika har fler av. Det som påverkar vilka djur som finns var i världen är klimat, förutsättningar för animalieproduktion, religion, kultur och ekonomi. Asiens stora djurpopulation kan förklaras av tät befolkning och gynnsamt klimat. Det vanligaste produktionssystemet för köttproduktion är så kallat jordlöst system och största delen av världens mjölk kommer från naturligt bevattnade kombinerade växtodlings och boskapsskötselsystem. Det finns också produktionssystem som baseras på betesmarker och dessa är vanligast i utvecklingsländer. Det är inte så lätt att exakt beskriva fördelningen av djur i världen eftersom statistiken är ofullständig.

## **Abstract**

People worldwide use mainly five animal species for milk production: buffalo, camel, cow, goat and sheep. For meat production, the milk producing species are used and also the additional species pig, poultry, rabbit and horse. Cow produces most milk in the world and the largest quantity of meat is produced of pig. Asia has the biggest animal population for all species except camel of which Africa has the most. Where in the world you find a specific animal species depends on the climate, conditions for animal production, religion, culture and economy. The big animal population in Asia can be explained by dense human population and favorable climate. The most common production system for meat production is landless system and the largest share of the milk in the world comes from rain-fed mixed crop-livestock farming system. There are also grass-land based production systems which is most common in developing countries. It is not easy to describe the exact distribution of animals in the world because the statistics are insufficient.

## **Introduction**

Domesticated animals have for a long time been very important for people all over the world. The animals supply us with food, leather, draught power and help us with other work, e.g. security. They also function as company in many ways and animals can be of religious or cultural value for people. The domestication of animals occurred due to cultural changes, so obviously they are part of mans development.

The first wild herbivore to be domesticated was the sheep. This probably took place in North-West Iran back in c. 10900 BP (Payne & Hodges, 1997). Today people all over the world use several domesticated herbivores for food production. The most common food producing animal is cattle (FAO, 2008) which man began to domesticate around 1000 years later than the sheep (Payne & Hodges, 1997). Cattle domestication had its primary centre in western Asia, between the Mediterranean and Iran, but later it also took place in the rest of the world, probably without any influence from western Asia. Other domesticated herbivores, e.g. buffalos and camels, were at first domesticated in defined regions (Mesopotamia and Arabia) and has not been spread to every part of the world.

The milk and meat producing animals belong to many different species and breeds. Where in the world you find specific species or even breeds, depends on the climate and the conditions for animal production. What people prefer to eat can depend on religion, what cultural and

social traditions there are in the region and economical or political factors. It is sometimes not possible to breed the same specie or breed in two different climate zones. Therefore, differences in the distribution of various animal species in separate parts of the world are likely.

The aim of this literature review is to give an overview of the milk and meat production in the world today. It will describe which kind of animals there are and what production systems that are used. I have mainly used information from Food and Agriculture Organization of the United Nations (FAO) found on the Internet because no published literatures discuss this subject.

## Figures and distribution of production animals

According to FAO (2008), people worldwide are mainly using five milk producing animal species: buffalo, camel, cow, goat and sheep. Table 1 shows the distribution of these species, in number of heads, over the regions in year 2006. The total milk production the same year for each specie was: cow; 550 million tonnes, buffalo; 80 million tonnes, goat; 13.8 million tonnes, sheep; 8.7 million tonnes and camel; 1.5 million tonnes. The most common milk producing animal is the cow which also produces most of the milk.

Table 1. Number of the different milk producing animals in the world year 2006, in millions (after FAO, 2008)

<b>Continent</b>	<b>Cow</b>	<b>Sheep</b>	<b>Goat</b>	<b>Buffalo</b>	<b>Camel</b>
Africa	55.0	56.1	54.3	1.6	4.6
Asia	85.4	104.8	88.8	50.3	0.6
Europe	43.5	30.1	10.2	0.2	-
America	51.2	1.4	7.3	-	-
Oceania	6.2	-	0.001	-	-
<b>Total world</b>	<b>241.3</b>	<b>192.4</b>	<b>160.6</b>	<b>52.1</b>	<b>5.2</b>

All milk producing species are also included in the meat producing species. However, for this purpose eight additional species are used. Table 2 illustrates the meat producing species that can be found, how much meat each species produces and how many animals there are in the world.

Table 2. Meat quantity, in million tonnes and number of meat producing animals, in million heads year 2006 (after FAO, 2008)

<b>Species</b>	<b>Meat quantity</b>	<b>Number of animals</b>
Pig	105.6	1352
Chicken	73.1	48798
Cattle	61	297
Sheep	8.6	539
Turkey	5.8	631
Goat	4.9	384
Duck	3.8	2639
Buffalo	3.2	23
Goose and guinea fowl	2.5	637
Rabbit	1.6	1052
Horse	0.8	49.9
Camel	0.3	1.5
Bird (others)	0.1	58

The most common meat producing animal worldwide is chicken which produces the second largest quantity of meat. The animal that produces the most meat is the pig. Cattle produce the third largest quantity of meat, but they are only on the 9<sup>th</sup> place in number of heads which of course is explained by their big size. In addition to the milk producing animals, different birds represent five of the meat producing species and also rabbits and horses, but limitations left no space to discuss these species in this paper.

## **Pig**

Asia has the largest pig population with 837 million animals and 83% of them are in China (FAO, 2008). In Europe, there are 287 million pigs and Germany is the country with most pigs; 48 millions. After Europe, in number of pigs, is America; 204 million and about 50% of them are found in the USA. Africa has 16.4 million pigs and the country with most pigs is Nigeria; 4.6 millions. In Oceania, there are 8.3 million pigs. Most of them, 5.4 millions, are in Australia. On average, a pig in Asia gives 74 kg meat per animal and in Europe and America these numbers are 86 and 85 kg meat per animal, respectively. A pig in Africa produces 51 kg meat whereas a pig in Oceania produces 63 kg meat. This means that even though Asia has three times as many pigs as Europe, this region only produces about two times more meat quantity than Europe. Pig production is very much based on hybrid and high producing exotic breeds (Seré & Steinfeld, 1995). This genetic material is widely traded internationally and extinction of traditional breeds is a fact when pig production is getting more intensive.

## **Poultry**

Chicken is the most common type of poultry in the world followed by duck, but with a strikingly lower number of animals (FAO, 2008). Turkey is of a much smaller number than duck but it produce more meat because it is physically a bigger bird. Chicken meat is mainly produced in Asia and America and the quantity were 19 million tonnes in both regions in year 2006. In Europe, 7.2 million tonnes chicken meat were produced this year and in Africa 3 million tonnes. Oceania only produced 0.5 million tonnes of chicken meat year 2006. The intensive chicken production is, as for the pigs, very much based on hybrid and high producing breeds (Seré & Steinfeld, 1995). However, in developing countries it is also common with backyard farming, which probably is a source of wide genetic resources.

## **Cattle**

The most common milk producing animal in the world is the cow, both according to number of animals and quantity of milk (FAO, 2008). As a meat producing animal, cattle is the 9<sup>th</sup> most common specie based on number of animals, but it produces third largest quantity of meat. Asia has 35% of the dairy cows and 32% of the beef cattle in the world. Europe has 18% of the dairy cows and 16% of the beef cattle. In Africa, 23% of the dairy cows and 10% of the beef cattle can be found and Oceania has 3% of the dairy cows and 4% of the beef cattle. America has 21% of the world dairy cows and 38% of the beef cattle.

In southern and eastern Asia, most of the world cattle population is located, see figure 1 (FAO, 2008). The countries with most dairy cows in southern Asia are India; 36.6 million, Pakistan; 7.5 million and Bangladesh; 3.9 million cows. China is the country in eastern Asia with most dairy cows; 10.6 million, followed by Japan with 1.1 million dairy cows. Beef cattle are mostly found in eastern Asia but also southern Asia has big beef cattle populations. The countries in eastern Asia with most beef cattle is China; 52 million and Japan; 1.2 million

beef cattle. In southern Asia it is India that has most beef cattle; 13 millions and Pakistan, Bangladesh and Iran have 2.5 million beef cattle each.

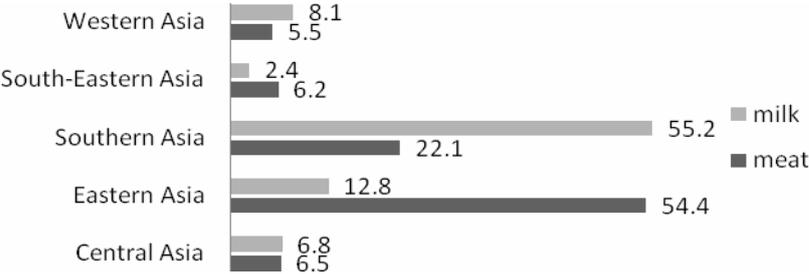


Figure 1. Milk and meat producing cattle in Asia year 2006, in millions (after FAO, 2008).

In Africa, most of the cattle are in eastern and northern Africa (see figure 2). The number of dairy cows reported to FAO year 2006 is exactly the same as number of beef cattle in this region. The country with most cattle reported to FAO year 2006 was Sudan in the north, with 15 million dairy/beef cattle followed by Ethiopia in the east, with 8 million dairy/beef cattle. Kenya and Tanzania (in the east) had about 5 million dairy/beef cattle each.

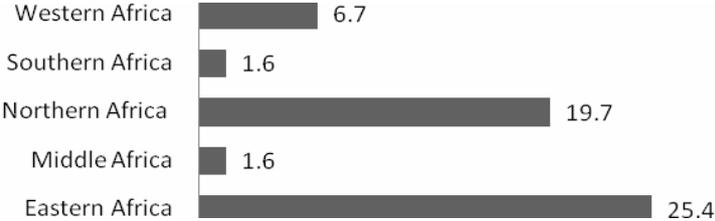


Figure 2. Milk or meat producing cattle in Africa year 2006, in millions (after FAO, 2008).

The European parts with most dairy cows and beef cattle are eastern Europe followed by western Europe (see figure 3). Russia is the European country with most cattle; about 10 million each of dairy cows and beef cattle. In western Europe, Germany has most dairy cows; 4.3 million and closely after is France with 3.9 million dairy cows, but France has also 5.1 million beef cattle whereas Germany only has 3.8 million. Southern and northern Europe has almost the same number of dairy cows but there are more beef cattle in the southern parts than in the north. In southern Europe it is Italy; 1.8 million dairy cows and 4 million beef cattle and Spain; 1 million dairy cows and 2.6 million beef cattle, that has the biggest cattle populations. In northern Europe, United Kingdom has most milk and meat producing cattle; about 2.5 million of each, followed by Ireland; 1.1 million dairy cows and 1.8 million beef cattle. Sweden has 400 000 dairy cows and 460 000 beef cattle.

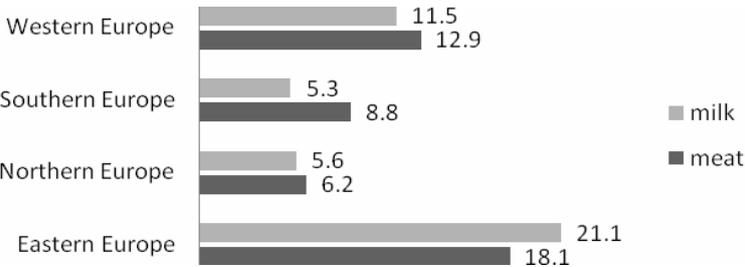


Figure 3. Milk and meat producing cattle in Europe year 2006, in millions (after FAO, 2008).

In America, most cattle are found in South America, both for milk and meat production (see figure 4) and the most important country is Brazil followed by Argentina (FAO, 2008). Brazil has 20.5 million dairy cows and 36.5 million beef cattle whereas Argentina only has 2 million dairy cows and 14.4 million beef cattle. In North America it is the USA that has most cattle; 9 million dairy cows and 33.9 million beef cattle. Canada has 1 million dairy cows and 4.2 million beef cattle.

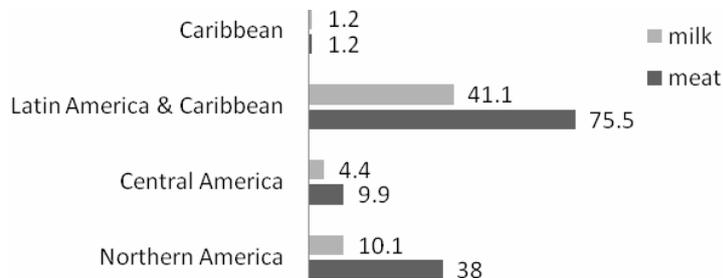


Figure 4. Milk and meat producing cattle in America year 2006, in millions (after FAO, 2008).

The two countries with most milk and meat producing cattle in Oceania are New Zealand and Australia (FAO, 2008). New Zealand has most reported dairy cows; 4 million whereas Australia reported 2 million dairy cows. Australia has more beef cattle than New Zealand; 8.4 million beef cattle and New Zealand have 3.8 million beef cattle.

Number of cattle breeds in FAO DAD-IS database is 3023 (FAO-DAD-IS, 2008). This number includes breeds both intended for milk production and breeds for meat production. Breeds with the same name are frequently observed in different countries and these are especially breeds intended for meat production, e.g. Charolais and Simmental. The most widespread milk producing breed is Holstein, which can be found in 52 countries spread in all main parts of the world. Furthermore there are more breeds that have Holstein as part of their name or are crosses with this breed. Seré and Steinfeld (1995) wrote that temperate breeds perform well in the tropical highlands of Andes in South America (except at very high altitudes) but local breeds do have an important role because farmers do not have the possibility to invest in more expensive animals. Local breeds are also more common in arid regions. Thus in more intensive systems, such as temperate system in New Zealand, highly selected breeds are used. In both humid and arid tropics, an important share of the cattle is of Zebu breeds (*Bos indicus*). In the tropical Latin America, Criollo cattle (which are of *Bos taurus* type) were the main animal for many years, introduced by the Spaniards, but Zebu breeds have now taken over. In Australia, British cattle breeds has also been replaced by Zebu, but in Africa trypanotolerant *Bos taurus*, mainly the N'Dama breed, is still important even though Zebu is the most common type.

## Goat

Goat is mainly used for meat production. It is also used in dairy production, but to less extent. Most of the goats worldwide are found in Asia and Africa, see figure 5 (FAO, 2008). Europe and America has approximately the same number of goats, whereas Oceania only has an insignificant number. In developing countries, 96% of the milk and meat producing goat populations are found and 4% are found in developed countries. India is the country in the world with most goats; 29.7 million for milk production and 47.5 million for meat production. In Africa, Sudan has most goats with 24 million dairy goats and 13.3 million for meat production. Brazil is the country in America with most goats; 4.5 million for milk production and 2.6 million for meat production. Moreover, Mexico has a big goat population for meat

production; 2.5 million goats, but for milk production the number is only 850 000 goats. In Europe, Greece has the largest number of goats; 4.5 million for milk production and 5.6 million goats for meat production. Goat milk is mainly used to make cheese (Petrocelli, 2005).

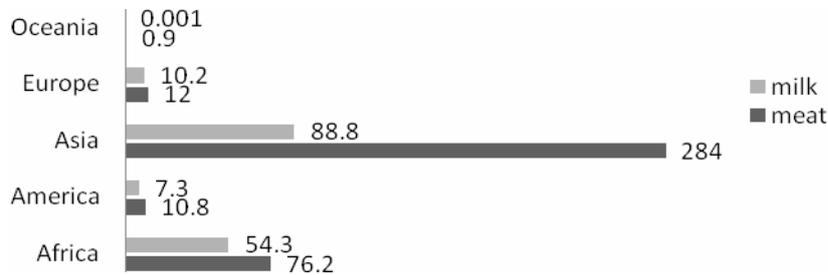


Figure 5. Milk and meat producing goats in different regions year 2006, in millions (after FAO, 2008).

## Sheep

The superior field of application of sheep is meat production in all regions, see figure 6 (FAO, 2008). Most sheep are found in Asia, both when it comes to milk and meat production. The country with the biggest sheep population is China with 41 million dairy sheep and 168 million sheep for meat production. Africa has the second largest sheep population and most of them are found in Sudan; 27 million dairy sheep and 9.3 million for meat production. In Europe, the numbers of meat producing sheep are almost the same as in Africa but the dairy sheep are fewer. The country in Europe with most dairy sheep is Greece with 7 million, but for meat production, Spain has the largest number of sheep; 20 million, followed by United Kingdom which has 16 million meat producing sheep. Oceania only has sheep for meat production and Australia and New Zealand has about 30 million sheep each. In America, most of the meat producing sheep are found in Brazil; 4.8 millions, followed by Argentina; 4.6 millions, whereas Bolivia has most dairy sheep; 1.2 millions. Bravo (2005) reported that sheep production as the most profitable livestock system in Mexico due to the meat as a result of sheep meat being consumed as the traditionally dish “Barbacoa”. Sheep milk is mainly used for manufacture of cheese (Sarti *et al.*, 2005), one example is the famous Greek cheese “Feta”.

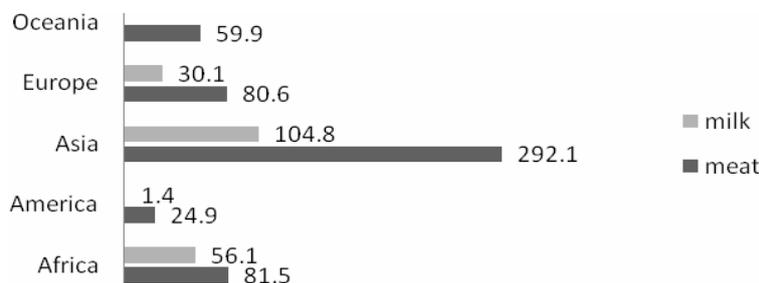


Figure 6. Milk and meat producing sheep in different regions year 2006, in millions (after FAO, 2008).

## Buffalo

There are only countries in Asia, Africa and Europe that have reported milk producing buffalos to FAO, and the USA has reported meat producing buffalos (FAO, 2008). The superior amount of the buffalos is in Asia with 95.5% of the world buffalo population. In Africa, 4.2% are found, in Europe 0.2% and in America 0.1%. India has the biggest buffalo

population with about 33 million dairy buffalos and 10.8 million meat producing buffalos. India also produces most buffalo milk and meat in the world and the quantity is about 52 million tonnes of milk and 1.5 million tonnes of meat (FAO, 2008). These statistics shows that it is in the South and South-East part of Asia were most of the buffalos can be found. In Africa, Egypt has reported about buffalos. Number of animals for milk production is 1.6 million and for meat production 1.5 million.

Three countries in southern and eastern Europe have to FAO reported to have milk and meat producing buffalos in 2006; Bulgaria, Greece and Italy. Italy has the biggest amount of these animals; about 154 000 dairy buffalos and 5000 meat producing buffalos. Thereafter is Bulgaria, but with a strikingly lower number of animals; about 4000 dairy buffalos and 2000 meat producing buffalos. Greece has 150 dairy buffalos and 450 buffalos for meat production. Borghese (2005) reported that buffalos are well adapted to hot and humid climate and therefore makes a good production animal in the Tropic Zone. The milk is consumed both as fluid milk, cheese and other dairy products. In Egypt, the milk is mainly used to make a product called “Queshta Mosakhana” of the floating cream after boiling the milk. In Bulgaria and Greece, the buffalo milk is mainly processed into yoghurt and in Italy buffalo milk is used to make mozzarella cheese, both for the national and international market.

## **Camel**

Milk and meat producing camels are mostly found in Africa and Asia and they are ten times fewer than the buffalos (FAO, 2008). There is one country in Europe reporting meat producing camels and that is Russia with 1000 camels. Six countries in North and Central Asia have to FAO year 2006 reported about milk producing camels and additional five countries reported meat producing camels. It is Saudi Arabia in Asia that has the biggest populations with 360 000 animals evenly distributed between milk and meat production. Year 2005 also United Arab Emirates reported to have 185 000 milk producing camels. Jianlin (2005) reported that camel is a multipurpose animal and therefore crucial to economy of the poorest pastoral people in dry and cold Central Asia, dry and hot Middle East and North and East Africa. Sudan, with 1.3 million milking camels and 215 000 camels for meat production, is the country in Africa that had the largest camel population year 2006, but the statistics from year 2005 also includes Somalia with 2.2 million milk producing camels (FAO, 2008). Egypt has quite a large number of meat producing camels (130 000) but none for milk production.

## **Climate and livestock production systems**

The climate in a region is an important factor of what livestock production that is practiced in that region. Areas close to the equator, from 25° N to 25° S, has a tropic climate which is characterized by hot and humid weather all year around (Cheers, 1999). These regions usually have luxuriant rainforests and intensive agriculture. The Tropic Zone includes most of Africa, southern Asia, northern Australia, Central America and South America. Regions further away from the equator have hot summers and mild winters. Beyond the Tropic Zone, in both directions, are the Temperate Zones, which are characterized by large weather variations depending on season. The North Temperate Zone includes Europe, northern Asia and North America. The South Temperate Zone includes southern Australia, New Zealand, southern South America and South Africa. Arid climate, characterized of deserts, occur in Subtropics and Temperate Zones. Lack of rain makes these regions dry with almost no vegetation. Hot deserts are found in a belt from northern Africa (Sahara) over Middle East to North-West India and also in central parts of Australia.

There are several systems for keeping animals. Livestock production systems are often described as family or commercial agriculture (Petrocelli, 2005). This difference is based on if the labor is family members or employees. The definitions vary between countries, but are based on farm size, number of animals, feeding system, type of labor and degree of investment. The production systems can further be classified into extensive, semi-intensive and intensive systems. Extensive systems are simple and the animals live off pasture as the only feed source, i.e. no feeding with supplements, such as concentrates. Bravo (2005) reported that this production system may have a lower environmental impact and gives safer animal products than intensive system because of low inputs of fertilizers, antibiotics, hormones etc. This category includes pastoralism and ranching. Pastoralism is when people live and move together with their grazing animals, most practiced in developing countries. Ranching is when grazing animals are alone on big pastures, which is more common in developed countries. Pastoralism is often a small scale production system, but the herds can still be very large, while ranching most often is a large scale production system (Seré & Steinfeld, 1995). An important difference between pastoralism and ranching is that pastoralism requires little physical capital but intensive labor whereas ranching needs more capital but relatively little labor (Otte & Upton, 2005). Other characteristics of extensive systems, especially in developing countries, are low productivity, consumption of products in the neighbor area and a wide range of genetic types of the animals (Petrocelli, 2005). Waste-product feeding is another type of extensive production system, often used for pigs and poultry.

Semi-intensive systems are characterized by feeding the animals with pasture and concentrates as a supplement. This system can either be used in limited periods only (for increased growth) or during the whole life of an animal. Intensive production systems occur more in developed countries than developing countries. The animals are then fed with manufactured concentrates and forage and the system requires housing of the animals, health programs and hand feeding etc. making production costs high. Other characteristics are the use of artificial insemination, specialized breeds, e.g. Holstein in dairy production, and higher production levels.

In a description of the world livestock production systems, Seré and Steinfeld (1995) categorize livestock production system into “solely livestock production system” and “mixed farming systems”. Solely livestock production system is further divided into “grassland-based” and “landless” (landless is when feed is introduced from outside the farm). The two systems grassland-based and mixed farming are found all over the world and the same system can vary depending on the climate zone. Mixed-farming systems (crops-livestock) can either be rain-fed or irrigated. Grassland-based systems for meat production are most common in Central and South America and the developed countries. Meat production by mixed rain-fed farming systems is most common in developed countries and Asia. It is the dominant system for meat production in most of North America, Europe and North-East Asia. Mixed irrigated systems are most common in Asia and industrialized countries. This system does not contribute much of the total meat production worldwide, but the livestock in this system are however important for draught power and their dung is used as fertilizers.

Landless system, i.e. when feed is introduced from outside the farm, is first of all found in developed countries as intensive meat production system, but can also be found in Asia and eastern Europe (Seré & Steinfeld, 1995). Monogastric species, mainly pigs and chickens, are more common than ruminants in this system. Of the global monogastric meat production about 50% is produced in landless system. Cattle held in landless system are found in eastern

Europe and some developed countries. Landless sheep production is only found in western Asia and northern Africa. Seré and Steinfeld (1995) did not include milk production in the analysis of ruminant landless system because the border between this system and land-based milk production is blurred because roughage is required when producing milk (to have healthy cows) and the roughage is often produced on the farmers own land.

Animals held in grass-land based systems are primarily ruminants and these systems are mainly found in dry regions of both Tropical and Temperate Zones, in both developed and developing countries (Otte & Upton, 2005). Mixed farming production system is getting more common all over the world as result of increased number of livestock, but cultivation of crops is dependent on water. It is more common with rain-fed than irrigated mixed farming systems. Landless livestock systems with pigs and poultry are mainly practiced in developed countries as large scale commercial systems but it is also increasing in developing countries. In Sub Saharan Africa, grassland based production (mainly pastoralism) is prevalent in the arid or semi-arid areas, but most milk and meat are produced from mixed rain-fed farming system. Moreover, in arid and humid regions and in the temperate highlands in East Africa, mixed farming is practiced. Large areas with permanent pasture can be found in the Near East and North Africa with arid or semi-arid climate, mostly used for sheep and camels. However, also here are the majority of ruminant livestock held on irrigated mixed farms. Pig and poultry production is limited in Sub Saharan Africa but landless poultry production is getting more popular in North Africa.

In South Asia, most of the land is arid or semi-arid and much of the crop land is irrigated (Otte & Upton, 2005). All ruminant production systems are mixed rain-fed or irrigated farming systems. In East and South-East Asia is most of the land classified as temperate. Here are also most of the livestock productions in mixed rain-fed or irrigated farming systems, but pigs and poultry are more common than ruminants. In South Asia are most of the cow production systems mixed irrigated or rain-fed. In East and South-East Asia, where the climate is temperate, it is also most common with mixed system, but both milk production and consumption are low in this region (Otte and Upton, 2005). Milking cows in Central Asia are mainly found in irrigated crop lands close to industrial areas (Svitojus *et al.*, 2005).

In South America, about one third of land that supports livestock production is arid (Otte & Upton, 2005). The extensive grassland of the region called “Pampas” is very good for keeping cows in ranching systems, but the most common production system in South America is rain-fed mixed farming system. Landless production with poultry and pigs is expanding rapidly, particular in Brazil.

To sum up, most of the global meat is produced in landless system and world total milk production is primarily produced in mixed rain-fed system (Seré & Steinfeld, 1995). Globally the mixed rain-fed system in temperate and tropical highland is the most important source of animal products, providing 39% of the beef production, 24% of the sheep production and 63% of the cow milk.

## **Religion and diet**

Food has a central part in many religions and religious dietary rules are common. These rules originate from health and safety concerns, ethical issues involving killing of animals and also environmental issues regarding the animal production systems (Kepos & Waibel, 2008). Food and religion have evolved together. According to the Book of Genesis in the Bible, humans

were given a plant-based diet when the world was created, but today Protestants have very few dietary restrictions and consider that God made all animals and natural products to enjoy humans. About 33% of the human world population is Christians and are spread in all regions, but mostly in Europe and America (Cheers, 1999). The dietary laws of Judaism dictate the slaughter and removal of blood from meat before it can be consumed (Kepos & Waibel, 2008). Pigs, rabbits and animals from the sea; lobster, shrimps and clams are avoided. Jews have also laws about the preparation of food and drinks, e.g. it is not allowed to eat meat and dairy products at the same meal, or even on the same plate, because these products should not come into contact. Judaism has about 14 million members which correspond to 0.3% of world population (Cheers, 1999). Islam has dietary laws and the permitted food is called “Halal”, whereas the forbidden food is called “Haram”. In the last category, pork and birds of prey is included. Islam is the second biggest religion, with 20% of the human world population as members (Cheers, 1999). Most of the Muslims are found in West Asia, North Africa and East Europe.

About 13% of human world population is Hindus and 6% are Buddhists. Hinduism is most common in India and Buddhism is mostly practiced in East and South Asia (Cheers, 1999). Many Hindus and Buddhists are vegetarians (Kepos & Waibel, 2008). Hindus do not eat food that can “slow down spiritual or physical growth”. It is not forbidden to eat meat, but pork, fowl, ducks, snails, crabs and camels should be avoided. The cow is a sacred animal to Hindus and therefore it is forbidden to eat beef but other products from this animal, such as milk and yogurt, are considered good to eat because it “promotes purity of the mind, spirit and body”. Buddhists should abstain from all beef products but some do eat fish.

The relation between religion and diet is complicated and it is not always like religious people do exactly as the book says (Ahlstrand, 2008). It is important to keep in mind that for example Hindus who say they are vegetarians also eat fish and that some Muslims eat sausage without caring about its content.

## **Discussion and conclusion**

Asia has the biggest animal population for all analyzed species, except camel. This is of course related to human population as this part of the world is the most densely populated, but also due to the climate. Asia houses the superior amount of buffalos, probably due to the tropic climate that characterizes a big part of Asia, which fits for buffalos. It may also be explained by religion, because India has most of the buffalos and Hinduism is most spread here (which forbids consumption of beef). On the other side, Hindus do consume dairy products from cow and India also has the largest beef cattle population in South Asia. India is also the Asian country that houses the biggest population of goats, so India is probably a region well suited for animal production. East Asia (China) has most of the Asian pigs, sheep and beef cattle.

Africa is the part of the world, after Asia, with most milk producing animals, but when it comes to pigs, poultry and beef cattle, America and Europe have more. One explanation for this might be that African pastoralists are more interested in continuous flows of food such as milk, dairy products or blood, rather than terminal products such as meat of slaughtered animals (Seré & Steinfeld, 1995). The number of dairy and beef cattle in Africa are exactly the same, which I think is strange even if the dairy cows also suits as beef cattle. Then it should be more of the beef animals because every milking cow gets several calves, of which a majority is slaughtered, most probable. At the same time, it depends on how the counted

animals are classified. Maybe a calf of a dairy cow, however, is classified as dairy cattle and not as beef cattle. Africa has the world largest camel population probably because camels are well suited for arid climate (Jianlin, 2005).

Europe has the largest pig population compared to any other region, except for Asia. Pig production requires landless intensive system to be economic profitable, and it is likely Europe that has the best technology for this production system and consequently many pigs. Europe also has more sheep and goats than America and Oceania, and more chicken than Africa and Oceania. America has more dairy cattle than Europe and Oceania, and also the largest number of beef cattle worldwide. Most of the beef cattle are found in Brazil, which probably is due to the very big grass-lands and good economy. Oceania has the smallest number of animals for all species, except for sheep for which it has more animals than America, but Oceania does not produce any sheep milk at all. It is also the smallest part of the world and least populated, which makes the low animal population logical.

There are more buffalos for milk production than for meat production in the world. For the other milk and meat producing species, the total number of animals is larger for the meat producing species than for the ones producing milk. However, for cow, goat and sheep the number of milk producing animals is, in some parts of the world, bigger than meat producing animals of the same species. This is probably a result of specialization of the production.

Monogastric species, such as pig and chicken, are more common in Asia, Europe and America than in Africa and Oceania. When analyzing where pigs are found, it is possible to distinguish a pattern between religion and existence of pigs, in a region. Pig population in West Asia, East Europe and North Africa is virtually non-existing due to Judaism and Islam (Seré & Steinfeld, 1995). According to Seré and Steinfeld (1995) are the monogastric local species threatened of extinction because other high producing exotic species are taking over. This may mostly concern pigs because chicken is more likely to be found in backyard farming, which is not influenced by a competitive market. To estimate number of chickens or other meat producing birds is probably difficult because backyard farming is common among these species. For example, I believe that people in Africa together produce more chicken meat than reported to FAO. The most common production system overall in all continents, is mixed farming systems (Seré & Steinfeld, 1995). In the developed countries in Sub-Saharan Africa, South America and Near East, the production system is more dependent on grassland-based ruminant system than in regions of South and East Asia. I do not agree with Bravo (2005) who reported that extensive production systems may have a lower environmental impact, because a lower productivity, as extensive production often brings out, requires more animals which certainly mean a higher impact on the environment.

The conclusion of this work is that it is not an easy task to map where in the world you find specific animal species or breeds. There are always exceptions, which cannot be specified. This paper is based on the statistics that countries worldwide have reported to FAO and the reliability of this information has been hard to estimate. There are most probable countries that have not reported animals even though they have big animal populations, for example Somalia, which reported 2.2 million camels year 2005 but none one year later. In the same way, the reported numbers can be questioned; how was the counting of the animals performed? In some cases, the same animal may be used both for milk and meat production and can have been counted more than once. However, I think and hope that this paper gives an overview of the world animal distribution as correct as possible.

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