

The Story Of... Wheat

More of the world's farmland is devoted to wheat than to any other crop. At the end of the twentieth century, close to 570 million acres, or one-sixth of all the arable land on the planet, was used to grow wheat. Six hundred million tons are produced annually around the world, 60 kilograms of which will be consumed by the average American every year.



The domestication of wheat marked a dramatic change in the development and evolution of human civilization, as it enabled the transition from a hunter-gatherer and nomadic pastoral society to a more stationary agricultural one. Yet this extraordinary seed-bearing grass, which alongside rice provides 41% of the calories consumed across our globe, was originally native to just a tiny region of western Asia.

Neolithic: Stone Age

Domesticated by the earliest **Neolithic** farmers in the hills and valleys of Syria, Jordan, Turkey and Iraq (the Fertile Crescent) over 13,000 years ago, wild-growing wheat has since changed beyond recognition. In the wild, as it still grows in those places today, wheat evolved to shatter its seed pods in the late summer breeze, which spread the seeds far and wide.

But the act of human harvesting, using bare hands or primitive sickles, favored those rare mutant plants whose seed pods were less likely to shatter. These plants had softer & larger grains, which were more appetizing. By subconsciously selecting, favoring, and re-planting these mutant seeds, humans were unwittingly transforming the plant's dominant DNA — and created an entirely new species. The larger and softer the grains, the easier the seedlings grow in cultivated fields. The less likely the wheat ears shatter in the wind, the more likely the seed will be harvested and collected by humans.

Wheat spread rapidly, and was a critical element of European success, both at home and abroad. Designed to thrive in temperate climates, it was easily exported to North America, South America, the Cape of South Africa and the south-east corner of Australia. Wherever wheat was successful, colonial farmers could establish a model European society — although this prosperity was often achieved at the expense of indigenous populations.

In recent years, plant scientists have begun making hybrids of wheat with some of their wild relatives from the Middle East and elsewhere. Using these hybrids, they have bred wheat varieties that are increasingly resistant to droughts, heat, and pests. Most recently, molecular biologists have been identifying the genes in the DNA of plants that are responsible for their advantageous traits so that these genes can be incorporated into other crops. These advances rely on an understanding of evolution to analyze the relationships among plants and to search for the traits that can be used to improve crops

Modern wheat, the product of ancient genetic engineering, symbolizes the success of the European model — success dictated by a fluke of botanical geography.

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2879753/>

The Story Of... Rice

Almost half the world's population is dependent on rice for their daily survival – this includes practically all of Asia, where the cereal grain has been a staple since the earliest days of Neolithic farming.

Antiquity: quality of being ancient



The origins of rice have long been debated. The plant is of such **antiquity** that the exact time and place of its first development will perhaps never be known. Pottery shards bearing the imprint of both grains and husks of a cultivated rice species were discovered in the 1960s in Thailand. Rice plant remains from 10,000 BCE. (12,000 years ago) were discovered in Spirit Cave on the Thailand-Myanmar border. In China, extensive archeological evidence points to the middle Yangtze and upper Huai Rivers (in Eastern China) as the two earliest places rice was domesticated in the country. Rice and related farming implements dating back at least 8,000 years were found there and rice cultivation seems to have spread down these rivers over the following 2,000

years. The domestication of rice ranks as one of the most important developments in history. Rice has fed more people over a longer period than has any other crop.

Related to wheat and other wild-growing cereal grasses, the plant grows to around four feet and thrives in submerged land in the coastal plains, tidal deltas and river basins of tropical, semitropical, and temperate parts of the world. When rice seedlings are 25 to 50 days old, they are transplanted to a paddy that has been enclosed and submerged under 2 to 4 inches of water. This water must remain in the field throughout the growing season.

Some academics have argued that the need for organized, reliable irrigation in the cultivation of rice may have influenced the political destiny of Asian cultures — significantly the rapid historical development of a centralized Chinese state. Irrigated lowland rice, which makes up three-quarters of the world rice supply, is the only crop that can be grown continuously without the need for rotation and can produce up to three harvests a year—literally for centuries, on the same plot of land. Farmers also grow rice in rain-fed lowlands, uplands, mangroves, and deep-water areas.

Rice's importance has spread beyond central Asia. Just like wheat, rice has become an integral element of a successful agricultural package around the world. From early, perhaps separate, beginnings in different parts of Asia, the process of diffusion has carried rice in all directions and today it is cultivated on every continent except Antarctica.

Rice is rich in nutrients and contains a number of vitamins and minerals. It is an excellent source of complex carbohydrates—the best source of energy.

So-called wild rice, which can reach 10 feet in height, grows in shallow marshes and along the shores of streams and lakes throughout North America. Natural stands of wild rice were a staple for Midwestern Native Americans, but the species was never domesticated by them, and never provided the basis of a complex, agricultural economy.

Within the last 2,000 years, dispersal and cultivation of the cultivated rice varieties in new habitats have further accelerated the diversifications process. Today, thousands of rice varieties are grown in more than 100 countries.

http://www.irri.org/index.php?option=com_k2&view=item&layout=item&id=9081

The Story Of... Corn

Corn, or maize (from the Native American, 'masa') is one of the most widely distributed food plants in the world – exceeded in acreage only by wheat. Today, corn is grown virtually everywhere, from Russia, to South America, with a corn crop maturing somewhere in the world every month of the year. It is the most important crop in the United States, which produces about half the world's total tonnage.

Tonnage: capacity of a merchant vessel



Corn's wild ancestor, teosinte, is native to southern Mexico, and formed the staple of the earliest agricultural communities throughout the Americas. From its origins in Central America (modern day Mexico) about 10,000 years ago, the crop spread up the western coast to North America, and penetrated the jungles of Panama and Colombia to reach

the fertile terraces of the Inca Empire in the South. Corn is perhaps the most *completely domesticated* of all field crops. Its existence and spread for centuries has depended exclusively on the care of humans. It could not have existed as a wild plant in its present form.

Like other cereal crops, the process of domestication has fundamentally changed the genetic structure and behavior of the plant. Where ripe cobs of teosinte grew no larger than a human thumb, maize plants can now reach over twenty feet in height, with cobs growing ten inches long.

The crop was taken by European colonists of the New World, and exported back to Europe and to other colonies beyond. At first, corn was only a garden curiosity in Europe, but it soon began to be recognized as a valuable food crop. Within a few years, it spread throughout France, Italy, and all of southeastern Europe and northern Africa. By 1575, it was making its way into western China, and had become important in the Philippines and the East Indies. Thanks to its preference for steady rains and its long growing season, corn has been particularly successful throughout southern and tropical Africa, where corn seed, or mealies, are pulped and boiled into porridge or mash. Corn also provides the basis for flatbreads around the world, including tortillas, hominy grits, corn flakes and, of course, popcorn.

Today, corn is used for many things that you may not be aware of. Some industrial uses of corn include filler for plastics, packing materials, insulating materials, adhesives, chemicals, explosives, paint, paste, abrasives, dyes, insecticides, pharmaceuticals, organic acids, solvents, rayon, antifreeze, soaps, and many more.

Corn also is used as the major study plant for many academic disciplines such as genetics, physiology, soil fertility and biochemistry. It is doubtful that any other plant has been studied as extensively as has the corn plant.

http://agron-www.agron.iastate.edu/Courses/agron212/Readings/Corn_history.htm

The Story Of... Sorghum (Millet)

Sorghum, also known as millet, is a robust, tall cereal grass which grows wild throughout Tropical Africa and was the staple cereal for the earliest African agricultural communities.



Sometimes growing as high as 15 feet, sorghum is especially valued in hot and arid regions of the world, for its natural resistance to drought and heat. Its grains are usually mashed into a pulp, boiled and eaten.

High in carbohydrates, sorghum offers less protein than maize, rice or wheat, and those communities who rely on this staple sometimes suffer nutritionally as a result.

Sorghum is the fourth most important cereal crop behind wheat, rice and corn, and is grown throughout the arid and semi-arid tropics.

Anthropological evidence suggests that hunter-gatherers ate wild sorghum as early as 8000 BCE. The domestication of sorghum has its origins near the modern day border of Ethiopia and Sudan, beginning around 4000–3000 BCE (about 6,000 years ago). Sorghum was adopted by the migrating farmers of the tropical Niger-Congo and Sahel regions, and combined with their wet-tropical crops such as African yams and oil palms. Tolerant to both drought and flood, it has become adapted to poor soils and can produce grain where many other crops would fail.

As sorghum farming spread, the farmers used disruptive selection to increase certain positive characteristics of the plant. These improved sorghum types were spread via the movement of people and trade routes into other regions of Africa, India (approx. 3000 years ago), the Middle East (approx. 2800 years ago) and eventually into the Far East (approx. 1600 years ago).

Sorghum has recently appeared in food products in the U.S. because of use in gluten-free food products. Sorghum is an excellent substitute for wheat for those who cannot tolerate gluten. Sorghum is used to make both leavened and unleavened breads. Various fermented and unfermented beverages are made from sorghum. It can be steamed or popped and is consumed as a fresh vegetable in some areas of the world. Syrup is made from sweet sorghum.

Sorghum is also used for building material, fencing, floral arrangements, pet food and brooms. The natural tolerance sorghum has to lands difficult to farm and harsher environmental conditions, its versatility as a food and feed grains, and its ability to produce high yields, ensure its important role in the lives of millions of people throughout the world.

The Story Of... Cattle

The most symbolic livestock animal of the all-conquering Eurasian agricultural package, the modern cow is descended from an ancient wild ancestor that was native throughout Europe, Asia and North Africa at the end of the Ice Age, and domesticated by the earliest Neolithic farmers around 8000 years ago.



The archaeological record for the domestication of wild forms of cattle indicates that the process occurred independently at least twice and perhaps three times. One form of wild cow, the humpless cow was probably domesticated somewhere in the Fertile Crescent about 8000 years ago. These cows were traded across the planet, and appear in archeological sites of northeast Asia about 5000 years ago. Evidence for the domestication of the humped cattle has been discovered at a site in the Indus Valley of Pakistan around 7000 years ago. Scholars are divided about the likelihood of a third domestication event, in Africa. There is evidence to suggest that there was domesticated cattle in what is now modern day Algeria about 6500 years ago, and perhaps in Egypt as far back as 9000 years ago. If these remains of cows from Egypt were in fact of domesticated cattle, then they represent the first event of domesticating cattle.

Cows fit the very specific criteria that humankind needed upon first domestication. They were not too flighty, they breed well in captivity, they grow at a good pace, they are not aggressive, and they require a low maintenance diet. Our ancestors chose wisely – cows provide just about all of our basic needs from milk, meat and muscle.

Cattle were not the first large mammals to be domesticated by humans – they were probably beaten to the punch by goats and sheep – but it is the humble cow, and her partner, the ox, who have made the *greatest* impact on agricultural productivity around the world.

Cattle are the most versatile domesticated animals on the planet. When killed for meat, their carcass yields oil, fat, bone, twine and other useful materials, while their hides give us leather for clothes, shoes and shelter. During their lifespan they provide milk, which can be turned into cream, butter, cheese and yogurt; they can bear heavy loads, or pull plows and carts; they tolerate being tethered to other animals and improve their load-bearing capacity as a result; they provide tons of nutritious fertilizer and consume some of the by-products of arable farming. Before the industrial revolution, beasts of burden like the humble cow were the most powerful machines on the planet.

Today there are about 1.5 billion cows in the world. In many many different countries humans and cows have formed close relationships. In England, dairy farmer Mark Evans spends all of his waking time with his cows, milking, feeding, and otherwise nurturing them. The African Masai tribe believes that all cattle were given to them from the great god N'gai at the beginning of time — a belief which today remains at the heart of their culture. India is home to a quarter of the world's cow population. One major reason for this is that India's majority Hindu community reveres cows and considers them to be "second mothers."

<http://www.pbs.org/wnet/nature/episodes/holy-cow/introduction/1812/>

The Story Of... Goats

Domesticated nearly 11,000 years ago in the Zagros mountains of modern-day Iran, goats are arguably the oldest farmyard animal in the world.



Recent mtDNA research suggests that all goats today are descended from a handful of animals and may have been domesticated in a handful of different places. Archaeological data suggest two distinct places of domestication: the Euphrates river valley at Nevali Çori, Turkey in the Fertile Crescent (11,000 years ago) and the Zagros Mountains of Iran (10,000). Other possible sites of domestication include the Indus Basin in Pakistan 9,000 years ago).

Other important archaeological sites with evidence for the initial process of goat domestication include Syria (8000-7400 BCE), Israel (7500 BC), and Jordan (7600-7500 BC). (Also the Fertile Crescent.)

Beginning about 10,000-11,000 years ago, Neolithic farmers in what is now Iran and Turkey began keeping small herds of goats for their milk and meat, and for their dung for fuel, as well as for materials for clothing and building: hair, bone, skin and sinew.

The domestic goat of today is primarily a dairy animal, a large portion of its milk being used to make cheese and other by-products. One or two goats can supply enough milk to sustain a single family for a whole year.

For large-scale milk production, goats are inferior to cattle in the temperate zone, but vastly superior in colder and rougher climates. Goat flesh is edible, and some breeds, particularly the Angora and Cashmere, are raised for their wool. Common goat wool has also been used throughout history across the continent of Eurasia for basic linen, while young goats provide 'kid' leather.

Goats are easier to look after than either cattle or sheep. Notorious for eating a wide range of foods goats can clamber up steep inclines and digest even the toughest plant matter. They can also be penned in physical and climatic conditions which might be unsuitable for either cattle or sheep.

Nevertheless, throughout the Middle East, from the earliest days of livestock farming, flocks of goats have been partnered with flocks of sheep, since the grazing habits and by-products of both animals complement one another.

Playful and intelligent, the goat has been a mainstay of European and Asian culture for as long as the founder crops of wheat, rice and barley.

<http://www.mnh.si.edu/highlight/goats/>

The Story Of... Sheep

Evolutionary cousins of the goat, sheep are descended from a wild species which roamed the plains of the Fertile Crescent throughout the Neolithic period.



Sheep were probably first domesticated at least three separate times in the Fertile Crescent of western Iran and Turkey, Syria and Iraq. This occurred approximately 10,500 years ago, and involved at least three different subspecies of the wild mouflon (*Ovis gmelini*). Sheep were the first "meat" animals domesticated. The first sheep were domesticated for their meat, milk and skins. The sheep bred almost exclusively for their wool were first developed in Iran about 8000 years ago. The Persian Empire was dependent on sheep wool trading, and the wool (and sheep) spread rapidly through Africa and Europe.



Modern sheep on top, wild mouflon on bottom

But how did they first become domesticated? Archeologist Hans-Peter Uerpmann poses a scenario leading to domestication, that hunters might have brought orphaned animals back to their homes. Because mouflon are docile and cute as babies, they might have been kept at households long enough to reach sexual maturity and begin breeding. Sheep, course, were not simply bred for meat, but also provide milk and milk products, hide for leather, and later, wool.

Thinking about ancient people who decided to first domesticate the sheep, you have to put yourself in their shoes. The first reason for herding sheep (or goats for that matter), is to secure a regular supply of fresh meat. The hunter is dependent on the luck of the chase; if more animals are killed than can be immediately consumed, meals from the surplus will be increasingly unpleasant as the days go by. The herdsman, by contrast, can live with a ready supply of meat and a supply of dairy products as well.

Sheep mature very quickly, and many breed when they are just one and a half years old. They can weigh between 80 and 400 pounds and are farmed primarily for their thick, versatile wool. Milk, sheepskin and lamb are also valuable by-products, while their feces, rich in nutrients, can be almost as efficient fertilizer and fuel as cow dung. However, sheep can't bear loads or pull any kind of machinery.

Notoriously timid animals, and vulnerable to predators, great care has had to be taken by sheep-farmers throughout history. Their vulnerability has become almost a cliché, enshrined in the biblical analogies of the shepherd and his flock.

At the end of the twentieth century, there were estimated to be more than a billion sheep in the world. A mainstay of the Eurasian food package, they were exported successfully to other temperate parts of the world and have proved particularly popular in Australia and New Zealand – where they outnumber the local human population by 10 to 1.

The Story Of... Pigs

Domestic pigs are descended from wild relatives which still populate parts of Europe and Asia. The pig is of limited use compared to other Eurasian livestock and farmed primarily for its meat. Nevertheless, the pig is perhaps the easiest farmyard animal to look after, because, like humans, they are omnivorous (eating both animal and plant food) and will eat practically anything --including scraps from the kitchen.



All domesticated pigs originated from the wild boar. Within that one wild species, more than 20 subspecies are known in different parts of its natural range, which has extended from the Great Britain and Morocco in the West to Japan and New Guinea in the East.

Archaeological evidence suggests that pigs were domesticated from wild boar as early as 14,000 years ago in the Near East in the Tigris River Basin, near modern day Iraq. There was also a separate domestication in China about 8000

years ago. Pigs have been central to Chinese culture ever since domestication and the country today is the world's leading producer of pigs. Prized in some parts of Europe for their ability to hunt precious truffles, the pig is also the only large domesticable mammal to have provided traditional sustenance to the farmers of Papua New Guinea.

Pigs were mostly used for food, but early civilizations also used the pigs' hides for shields, bones for tools and weapons, and bristles for brushes. Today, with around 1 billion individuals alive at any time, the [domesticated](#) pig is one of the most numerous large mammals on the planet.

Pigs are particularly valued as their self-sufficiency allows them to be turned loose, although the practice is not without its drawbacks. With managed rotational grazing techniques, pigs can be raised on pasture in an environmentally sustainable manner much like grazing sheep, goats and cows without a lot of additional food required.

They can survive well by scavenging on the same types of foods that humans and dogs can live on. In the wild, they are foraging animals, primarily eating leaves, grasses, roots, fruits and flowers

Contrary to popular assumption, pigs are in fact very clean animals. Their famous mudbaths are merely a way to cool themselves down, since pigs have no sweat glands at all. Domestic pigs seek out the company of each other and often huddle to maintain physical contact, although they do not naturally form large herds.

However, like other domesticated mammals, pigs have been responsible for transferring some diseases to the human population, thanks to the proximity in which Eurasian farmers have tended to live with their livestock. Human diseases suspected of having evolved from contact with pigs include influenza and scabies.

The Story Of... Horses

Domesticated in central Asia around five thousand years ago, the horse was instrumental to the development of Eurasian civilization. Unlike most other large mammals, it was not farmed for its meat, milk or hides. Instead, the horse was harnessed solely for its incredible strength – to pull plows, vehicles, and most significantly, to carry humans themselves



Although horses appeared in Paleolithic cave art as early as 30,000 BCE, these were truly wild horses and were probably hunted for meat. How and when horses became domesticated is disputed. New research indicates that domestic horses originated in the steppes of modern-day Ukraine, southwest Russia and west Kazakhstan about 6000 years ago, mixing with local wild stocks as they spread throughout Europe and Asia.

DNA analyses revealed little genetic variation among horses, suggesting that they descended from a small group of ancestors tamed in just a few places. But when historians and a team of fellow researchers recently collected maternal sample genomes from living horses in Asia, Europe, the Middle East and the Americas, a strikingly different picture emerged. The researchers found a high number of different lineages that we were able to identify—at least 18. This might mean that multiple female horse lines were domesticated in multiple locations of Eurasia, possibly including Western Europe.

Why would different groups in far-flung corners of the globe hatch similar schemes to forge domesticated partnerships with horses at roughly the same time? Taming these animals could generate the food surplus necessary to support the growth of human populations and the capability to expand and adapt into new environments or facilitate transportation. The fact that many wild horses were domesticated in different places shows how significant horses have been to humankind.

The date of the domestication of the horse depends to some degree upon the definition of "domestication." Some zoologists define "domestication" as human control over breeding, which can be detected in ancient skeletal samples by changes in the size and variability of ancient horse populations. Other researchers look at broader evidence, including skeletal and dental evidence of working activity; weapons, art, and spiritual artifacts; and lifestyle patterns of human cultures. There is also evidence that horses were kept as meat animals prior to being trained as working animals.

Without horses, the evolution of complex European economies and trading networks would have been unthinkable. Most significantly, the horse transformed the art of war. From the earliest horse-drawn chariots of the Hittite empire, to the bareback cavalymen of Attila the Hun, the warhorse has become synonymous with Eurasian military success.

Spanish horses were instrumental in the conquest of the New World. Neither the Aztec nor the Inca had ever seen humans riding animals before; the psychological impact of mounted troops was tremendous.

http://www.princeton.edu/~achaney/tmve/wiki100k/docs/Domestication_of_the_horse.html