**Source:**

* **animalsmart.org/animal-science**

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2. Animal Science
3. What is animal science?
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6. Some animal scientists work with sheep!
7. Animal science is the study of animals that live alongside humans. Around the world, humans rely on animals for food, fiber, labor and companionship. Animal scientists help us understand and manage these animals.
8. What do animal scientists do?
9. Animal scientists work with farm animals, wildlife, laboratory animals, pets and zoo animals. They study these animals to help keep them healthy and productive.
10. Animal scientists help put food on our tables. Animal scientists work with farmers to improve animal breeding, growth and nutrition. When animals grow well and stay healthy, farmers can produce more meat, milk or eggs for our consumption. Animal scientists also work with farmers to decrease the environmental impact of animal agriculture.
11. Animal scientists study animal products after harvest. They check meat quality or screen milk for pathogens. Advances in food safety increase the world’s supply of nutritious food.
12. Animal scientists also keep us clothed. In cold climates, people rely on wool to stay warm. Animal scientists work to keep animals like sheep and alpacas healthy.
13. Animal scientists study animals to ensure safe and effective use for labor and recreation.
14. Animal scientists protect human health. It is important for scientists to study how diseases spread between humans and animals. Animal scientists can also use animals as models for humans. Studying fetal development in sheep, for example, can help us understand fetal development in humans.
15. Animal scientists also keep our pets healthy. They tackle issues like pet obesity and breeding. And zoos rely on animal scientists to establish breeding programs, nutrition programs and help preserve exotic wildlife.
16. Learn about the different fields of animal science
17. Hot topics in animal science

* [Animal Smart](http://animalsmart.org/home)>
* [Animal Science](javascript:%20void(0))

**What is animal science?**



Some animal scientists work with sheep!

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[Learn about the different fields of animal science](http://animalsmart.org/animal-science/the-fields-of-animal-science)  
  
[Hot topics in animal science](http://animalsmart.org/animal-science/hot-topics)

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1. [**http://animalsmart.org/animal-science/the-fields-of-animal-science/breeding-and-genetics/important-terms-in-breeding-and-genetics**](http://animalsmart.org/animal-science/the-fields-of-animal-science/breeding-and-genetics/important-terms-in-breeding-and-genetics)

(Important terms in Genetics and Breeding)

**Important terms in genetics and breeding**

Animal biotechnologies are tools used in genetic selection. Scientists and animal breeders use biotechnology to produce healthier animals, make breeding easier and to produce more food for people. Animal breeders can improve the breeding process through techniques like artificial insemination, cloning and genetic engineering.

**AI**

**Artificial insemination (AI)** is when animal breeders place semen from a male animal into a female animal. The sperm from the semen meets with the female’s egg and a baby animal begins to develop. Artificial insemination makes it possible for breeders throughout the world to introduce the best traits into their herds, even though males with those traits might not live nearby.

Producers have accomplished a lot by using AI. Although AI is now commonplace in animal breeding, it was initially viewed with skepticism. Some people feared that AI was unnatural and would lead to problems in baby animals, but later research showed that AI was safe and useful. *Seventy percent of all dairy cows in the United States are bred using AI, as are virtually all turkeys and chickens*. Artificial insemination has been used to improve **environmental sustainability** and **food production**. Over the last 100 years, advances in the genetics, nutrition and management of U.S. dairy cows have resulted in a greater than four-fold increase in milk production per cow and a three-fold improvement in production efficiency. **Production efficiency** in dairy cows is the amount of milk produce for each pound of feed a cow eats. About half of this increase in production efficiency came from the use of AI to improve genetics.

As a result, a much smaller population of dairy cows is currently providing milk for U.S. consumers. This means dairy cows have less of an impact on the environment because fewer cows need less land, food and water.

**Cloning**

Cloning is another **form of** **biotechnology** used in animal production. Identical twins are an example of naturally occurring cloning. In recent years, scientists have figured out how to make clones in the lab.

The first mammal to be intentionally cloned from an adult cell was [a sheep called Dolly](http://www.sciencedaily.com/articles/d/dolly_the_sheep.htm) in 1996. Dolly was created using the technique of *somatic cell nuclear transfer*. In animal cells, the nucleus is the part of the cell that stores genetic material. To make Dolly, scientists transferred the nucleus from one cell into an unfertilized egg that had had its own nucleus removed. That egg was then implanted into the womb of a **surrogate mother** **sheep** where it grew into Dolly. The production of Dolly showed for the first time that genes in the nucleus of a mature animal cell can change back into genes for growing a baby animal.

In the United States, the consumption of meat and other products from cloned animals was approved by the [Food and Drug Administration](http://www.fda.gov/) (FDA) in 2006, and *no special labeling is required*. Food from clones is no different to food from non-cloned animals.

**Genetic engineering**

Genetic engineering is another useful tool in animal production. Genetic engineering introduces new genes to the food animal population. Animal breeders are interested in using this technology to increase animal productivity, improve resistance to diseases and parasites, and make food more nutritious. Genetically engineered animals are regulated by the FDA under the [Food, Drug and Cosmetics Act](http://www.fda.gov/regulatoryinformation/legislation/federalfooddrugandcosmeticactfdcact/default.htm).

Currently, there are no genetically engineered food animals approved for sale in the United States, but there are some animals awaiting approval. A company called AquaBounty has requested FDA approval to market a growth-enhanced Atlantic salmon that is capable of growing faster (but not larger) than standard salmon. As of June 2012, a decision regarding this request to approve the [“AquAdvantage” salmon](http://www.aquabounty.com/products/products-295.aspx) is still pending.

1. [**http://animalsmart.org/animal-science/the-fields-of-animal-science/breeding-and-genetics**](http://animalsmart.org/animal-science/the-fields-of-animal-science/breeding-and-genetics)

Some info on: Genetics and Breeding

**Animal breeding and genetics**

Since animals were first domesticated, animal breeders have been using selective breeding to determine which animals will become parents of the next generation. Initially, this decision was based on the animals’ appearances. For example, when domesticating the wolf to generate the different dog breeds, parents were selected based on temperament. Different temperaments are helpful for herding dogs vs. guard dogs. Appearance is another important trait because some dogs are large and some are small. As scientific understanding of genetics improved, it became clear that animals inherit traits from their parents. Traits are passed on through genes, which are small bits of information in your cells.

Modern animal breeders use a lot of information to select which animals will become parents of the next generation. They consider the records they have kept for their animals. They might want to increase dairy cow milk production or wool production in sheep. The goal of their breeding program then becomes to produce animals that have these good traits.

Once an animal is born with a good trait, that trait can be passed to the next generation. Over time, more animals in the herd will be born with that good trait. This helps producers achieve their breeding goal. The process of selecting animals based on their genetics has helped advance agricultural productivity over the past 50 years.

A good example of genetic improvement is in poultry breeding. Between 1957 and 2001, poultry breeders selected traits to increase the body weight of broiler (meat) chickens. Due in large part to genetic selection, broiler body weight at eight-weeks of age has increased from 1.8 pounds to 6.9 pounds.

Improvements in poultry breeding have generated chickens that produce more meat for human consumption. Because today’s chickens grow faster and more efficiently, poultry producers can produce more chicken, using less feed and in a shorter amount of time. More productive chickens means more meat in the supermarket.

[Important terms in breeding and genetics](http://animalsmart.org/animal-science/the-fields-of-animal-science/breeding-and-genetics/important-terms-in-breeding-and-genetics)

[Careers in breeding and genetics](http://animalsmart.org/animal-science/careers/careers-in-animal-breeding-and-genetics)

1. [**animalsmart**](http://animalsmart.org/home)**.org/**[**animals-and-the-environment**](javascript:%20void(0))

**Animals & the Environment**

Much has been written in the popular press and in the scientific literature about the impact of livestock production on the environment. Quite a bit of media coverage depicts a negative connotation on animal agriculture, but that is not necessarily the case! This section covers details of the animal agricultural industry that may not be emphasized to the public.

**How does agriculture today compare with the past?**

There are currently over 7.5 billion people in the world and that number is expected to grow to almost 10 billion by the year 2050.  That’s a lot of people to feed! How will we be able to provide safe, nutritious food to all these people? Through advances and changes in the agriculture system throughout time.



Read more about the comparison of past and present agriculture [here.](http://animalsmart.org/animals-and-the-environment/comparing-agriculture-of-the-past-with-today)**What is "sustainable" agriculture?**

Sustainable farmers are very aware of the impact of their farming practices on the environment. For this reason, they try to limit their use of non-renewable resources. Not only does this help the environment stay healthy, but it also keeps the farmer from depending too heavily on resources that have limited supply. Sustainable farmers also try to find ways to utilize resources that are already available to him, such as manure.

Learn more about transforming manure into electricity and other agricultural sustainability adventures [here.](http://animalsmart.org/animals-and-the-environment/sustainable-agriculture)

**Nutrient excretion**

Animals are not and never will be 100 percent efficient at utilizing their feed for maintenance and growth.  While this is true, humans are far less efficient. Therefore, no matter what we feed animals, there will be manure (a combination of feces and urine) produced. This is often referred to as “waste” in the popular press, but in fact, animal manure is a valuable fertilizer to farmers. Come harvest time, the soil has been stripped of its necessary nutrients in order produce the crop being harvested.  These nutrients need to be replaced, and there are many methods for going about this.



Read more about nutrient excretion [here.](http://animalsmart.org/animals-and-the-environment/nutrient-excretion)

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1. **animalsmart.org/feeding-the-world**

**What is food security?**

[Email App](mailto:?subject=http%3A%2F%2Fwww.addthis.com%2Fbookmark.php&body=http%3A%2F%2Fwww.addthis.com%2Fbookmark.php)

Having food security means having a safe, plentiful food supply for all people. It is a huge goal, so animal scientists are working to improve the supply of animal products.

Food is scarce in many parts of the world today. The world population is predicted to grow from around [7.5 billion](https://www.census.gov/popclock/world) people today to 9.1 billion people by the year 2050. That means food security will be more important than ever.  
  
In animal agriculture, it is important to increase production efficiency. If farmers can produce more meat, milk and eggs, they can better feed the world. Improving animal breeding, nutrition and health means more food for humans. Animal scientists also study different animal diets. If animals can eat feedstuffs like [distillers grains](http://www.ddgs.umn.edu/), for example, we can use more grains for human food.



Once the food is produced, it is important to keep it from spoiling. Food security relies on proper food storage and handling. Animal scientists and meat scientists study how to stop pathogens from spreading to animal products.  [Click here to learn more about food safety.](http://animalsmart.org/feeding-the-world/food-safety)

The next step is to [get the food to people who need it](http://www.economist.com/blogs/feastandfamine/2012/05/food). Some regions of the world are more suited for agricultural production. It is important for countries with surplus food to export food to countries with a food deficit. Again, proper storage and handling are important for food transport. Some animal producers also export live animals. Animal scientists work with these producers to keep animals healthy during these shipments.

It is also important to minimize the impact of food production on the environment. Farmers need to make sure land, air and water are kept safe for generations to come.

[Learn more about sustainable agriculture.](http://animalsmart.org/animals-and-the-environment/sustainable-agriculture)