

Topic Page: [Breeding](#)

Definition: **breeding** from *Philip's Encyclopedia*

Process of producing offspring, specifically the science of changing or promoting certain genetic characteristics in animals and plants. This is done through careful selection and combination of the parent stock. Breeding may involve cross-breeding or inbreeding to produce the desired characteristics in the offspring. Scientific breeding has resulted in disease-resistant strains of crops, and in animals that give improved food yields. See *also* gene; genetic engineering



Image from: [To increase the genetic diversity of U.S. corn.... in Encyclopedia of 20th Century Technology](#)

Summary Article: **breeding**

From *The Columbia Encyclopedia*

in agriculture and animal husbandry, propagation of plants and animals by sexual reproduction; usually based on selection of parents with desirable traits to produce improved progeny. In conventional breeding, progeny inherit genes for both desirable and undesirable traits from both parents. Breeders conserve desired characteristics and suppress undesirable ones by repeatedly selecting meritorious individuals from each generation to be the parents of the next. This process leads to a population expressing a combination of inherited traits that distinguishes it from the rest of the species. In plants, such a population is described as a variety or cultivar; in livestock, it is called a breed. Purebreds result from one or more generations of inbreeding, or mating of close relatives, such as brother to sister or offspring to parent (backcrossing).

Inbreeding produces families or lines with increasing degrees of genetic uniformity, or homozygosity, in successive generations. In highly homozygous families, dominant genes are uniformly transmitted and expressed; recessive genes are also more likely to be expressed, and to produce undesirable traits, including loss of general vigor and fertility. In some plants, such as wheat, that are naturally self-fertilizing and homozygous, deleterious traits are readily eliminated by natural selection; there is no loss of vigor.

In naturally cross-pollinated or open-pollinated plants, and in animals, loss of vigor in inbred lines can be restored by outbreeding to unrelated or distantly related lines; a first-generation hybrid is more vigorous than either of its purebred parents. Animal breeders exploit the phenomenon of hybrid vigor, or heterosis, in producing crossbred cattle, sheep, swine, and other domestic animals. Much of the corn (*Zea mays mays*) grown in the United States and other agriculturally developed countries is the hybrid of two different inbred lines, or the double-cross hybrid of four inbred lines.

Selective breeding developed with the domestication of useful species during the Neolithic period: the oldest known remains of cultivated crops and domestic animals show signs of purposeful improvement. For centuries, selective breeding proceeded empirically. Beginning in the 18th cent. various breed associations formed to register purebred herds and flocks and keep track of pedigrees. Plant breeders collected seeds and documented their genealogies. The basic principles of heredity, originally published by the Austrian biologist Gregor Mendel (see Mendel, Gregor Johann) in 1866, were rediscovered in 1900.

With subsequent discoveries in genetics, and progress in artificial insemination and other breeding

techniques, plant and animal breeding have become increasingly scientific. More recent advances in biotechnology and genetic engineering allow breeders to transfer specific genes and gene complexes among plants and animals, bypassing the limitations of conventional sexual reproduction. Knowledge of genomes and the techniques of genetics also enhance conventional breeding: In marker-assisted breeding, genetic markers are used to identify the desired characteristics in a plant while it is a seed or seedling, reducing the time needed to find the most promising individuals with those traits. Seeds and seedlings selected using marker-assisted breeding must still be grown and evaluated and then subjected to field trials in a variety of growing regions to determine their ultimate value.

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