Student Sheet

How Breeding Shapes Your Dog's Personality by: Rebecca Sweat

Have you ever wondered why your toy poodle follows you around the house like a shadow? Or why your beagle can't resist going over to your neighbor's backyard and exploring? Or why it seems that your golden retriever could play fetch with a stick for hours on end? You may not have encouraged these behaviors. In fact, you may even have tried to discourage them. But somehow they persist: Your dog naturally seems to have certain personality traits. The reason is selective breeding.

Simply put, this means breeding an animal for a certain purpose or trait. Suppose, for example, you have a litter of puppies and you need dogs to herd sheep. "The first step would be to take that litter and without any training whatsoever, put them around the sheep and see which dog pays the most attention to the sheep," explains Rolan Tripp, a veterinarian in La Mirada, Calif., and an affiliate professor of applied animal behavior at Colorado State Veterinary School. "The second step would be to breed that dog to another of the opposite sex with the same natural talent." Chances are, the next generation would also have these tendencies.

Animals are also bred for physical traits. For example, you might breed only the biggest dogs to the biggest dogs, or only long-haired dogs to long-haired dogs. "You would start by breeding two animals together that have a certain look," says Sarah Wilson, pet behavior consultant and co-author of *Paws to Consider* (published by Warner in 1999). "Of their offspring, you select the puppy or kitten that is closest to your goal. Then you would breed that animal to another with similar characteristics. With each generation, you'll have less and less variation."

Traditionally, dogs were bred primarily for certain functions, such as hunting, retrieving or herding. Bernese mountain dogs, with their thick coats and strong limbs, were bred to guard herds and flocks in the mountains. Bloodhounds and basset hounds, with their natural talent for following a scent, were bred for scent-tracking jobs. Greyhounds, with their slim bodies and long legs, were capable of great speed and thus were bred for racing. Rottweilers, with their strong bodies and naturally assertive personalities, were bred for jobs as guard dogs.

The key to understanding selective breeding in dogs, Tripp says, is to look at the instincts of the dog's ancestor, the wolf. "During a hunt, certain wolves specialized in different aspects of the hunt," he explains. "Through selective breeding, dogs were bred who performed certain parts of the hunting ritual, without the conclusion (killing). The best smellers were bred together, those with the best sight were bred together, those that ran the fastest were bred together, and this resulted in distinct dog breeds."

Sighthounds were those best at tracking prey animals by sight. Bloodhounds lead the hunt by smell. Pointers and setters selected specific targets. Shepherd dogs herded prey animals and directed the prey's movements. Terriers dug up prey animals escaping underground. Retrievers specialized in retrieving the prey and bringing it back to the den. Each breed had a specific job to do, and all had their aggression inhibited genetically.

Certain wolves, however, specialized in doing the actual killing of the prey animals, and these are the ancestors of dogs such as Rottweilers, chows, pit bulls and akitas. These breeds are genetically programmed to be aggressive – which may be just what is needed for a police dog or guard dog.

Of course, many of these breeds have been in existence for hundreds or thousands of years, as is the case with bloodhounds, greyhounds and Rottweilers. Over the last century or two, there has been a lot of fine-tuning, especially as far as physical traits. “A hundred years ago, dogs were bred primarily for performance, but today they are being bred more for their appearance,” says Karen Overall, director of the Animal Behavior Clinic at the University of Pennsylvania’s School of Veterinary Medicine. “Today we’re breeding mostly for size and shape: we’ve shrunk dogs, we’ve made them bald, we’ve made them hairier, we’ve made them fuzzier, or we’ve made them giants.”

Selective Breeding and Hybridization by Lauren Willoughby

Through processes known as selective breeding and hybridization, farmers and other plant breeders create crops that have many desirable characteristics and few undesirable ones. For the most part, the desired outcomes of these procedures are either an increased yield or better quality crops. Some of the characteristics that are bred for are: bigger flower blooms, better taste, richer color and increased tolerance to heat, cold or drought.

Selective breeding uses plants that exhibit the most desirable traits to pollinate for seed. The future crops that are produced from this seed are in some way better than the original plant. Hybridization is the process by which a breeder combines desirable traits from two or more varieties to produce a plant that will be self-pollinated. This plant is superior to its parents in many respects.

Cross-pollination occurs when the egg cell in a flower of one plant is fertilized by the sperm cell from another plant of the same species. This leads to a more varied offspring than that which results from self-pollination because it has a mixture of the traits of both of its parents. It ensures that a beneficial gene that occurs in a single plant will be transferred to numerous offspring in a relatively short amount of time. Plants that are cross-pollinated also generally produce more and better seeds. They are also more likely to be able to adapt to changes in their environment, whereas self-pollinated plants cannot, because they may contain traits that make them more successful in resisting climate changes or new predatory insects. Cross-pollination can occur naturally in numerous ways. Pollen from one flower can be transferred to another on the feet of insects such as bees, by the wind, or through birds or other animals. Many plants are equipped with mechanisms designed to encourage cross-pollination and discourage self-pollination.

Benefits of Selective Breeding by Jessica Raymond

The genetic enhancement of agricultural products may be one of the oldest human activities. Crops have been bred to improve yields, enhance taste, and extend the growing season. Each of the 15 major crop plants, which provide 90 percent of the globe's food and energy intake, has been extensively manipulated, hybridized, inter-bred and modified over the millennia by countless generations of farmers intent on producing crops in the most effective and efficient ways possible.

Here are a few of the current benefits. It is possible for better-tasting tomatoes to grow year round. Because the fruit softens more slowly, tomatoes bred through biotechnology can stay on vines longer before shipping to market and, in the meantime, gain added flavor and color. This benefit will potentially be possible with other fruits such as peaches, bananas and strawberries. Also, crops are becoming more environmentally friendly. Crops will be resistant to plant virus disease through a process of giving the plant a genetic "vaccine." That means farmers will require less chemical spray to control the spread of crop disease. Disease resistance will help crops such as squash, melons, bananas, cucumbers, lettuce, alfalfa and more. Plants like potatoes and cotton are able to resist

insects on their own. New varieties of these crops will produce natural substances to ward off destructive insects. The plants will produce their own Bacillus thuringiensis or "Bt," which currently is a popular home gardener's biological remedy to control insects. Crops are then more tolerant to herbicides. Soon, genetically modified crops such as cotton, corn, and soybeans will give farmers a choice to make fewer applications and to use more environmentally friendly herbicides, which will mean reduced overall chemical use and less damage to the environment.

Researchers hope to accomplish many more benefits by the year 2000. Biotechnology can make more foods healthier and more nutritious. Fruits and vegetables will contain higher levels of certain nutrients such as Vitamins C and E, and beta-carotene. These food components may help reduce risk of chronic diseases such as some cancers and heart disease. French fries and potato chips will contain less fat. A higher starch potato will mean fries and chips made from these potatoes will absorb less oil when fried. Better methods can be developed to identify and locate toxins, pathogens or contaminants in food.

There is also environmental protection; environmental stresses from frost to insects to plant diseases all demand responses from growers. Often there is little alternative but to use sometimes harsh chemical products to prevent dramatic crop losses. Biotechnology can increase the ability of many crops to withstand challenges in nature. Examples include the facts that more crops will be developed to ward off destructive insects and plant disease, reducing the need to use pesticides, breeding more herbicide, insecticide, and fungicide tolerant crops that will allow more selective application of agricultural chemicals, and plants enhanced to withstand low-temperatures and frost by modifying their production of linoleic acid.

These methods can potentially positively influence world food production in these ways: improved quality of seed grains, increased levels of proteins in forage crops, drought and flood tolerance, salt and metals tolerance, and heat and cold tolerance. Further, increased ability of crops to withstand environmental factors could allow farming in regions not suitable for food production now. Also, almost half of the $12 billion American farmers spend each year on fertilizer simply evaporates or washes away. Some plants, such as corn, might be modified to draw nitrogen from soil and air, thereby dramatically reducing the need for fertilizer.

The use of herbicides for controlling weeds or plants in crops has become almost a universal practice. Crop hybrids or varieties with resistance to the compounds would provide an attractive solution by allowing the compounds to be used without risk of damage to the crop. Using maize, researchers were able to create an invention that utilizes cell culture technology to isolate, characterize, and develop herbicide resistant maize lines which genetically transmit this herbicide resistance characteristic to their progeny. Thus, the problem with the crops is solved, herbicides that kill only the weeds can be used, and damage to the environment is limited. Further, less herbicide has to be used, and this practice lessens the amount of pollution