

BREEDING FOR BEHAVIOR

By Dr. Derek Conte

When a dog looks at you, he looks into your right eye to read your emotions better, just as humans do. When we pet our dogs, we experience spikes in oxytocin levels which decreases stress, lowers heart rate and blood pressure, and extends human life. Oxytocin is the hormone released when a mother breast feeds her baby and is responsible for human bonding. Dogs are extraordinarily well-tuned to humans. And we are equally tuned into them. Humans can delineate six different dog barks and sounds based on frequency, tonality and interval. Wolves, by contrast, only bark as a warning. Though chimpanzees are closer to humans genetically, dogs actually think more like humans, looking more to humans for cues, like pointing. Chimps do not follow pointing cues. Dogs even follow the direction humans look for cues. One Border collie has even developed a vocabulary of 340 words.

Such were the fascinating facts revealed on Nova's recent show called, "Dogs Decoded", which focused on how wild canines became tame enough to co-exist so harmoniously with humans starting about 10,000 years ago. The show centered on a concept called, "Flight Distance," the distance a human could approach a wolf before it ran away. It has been theorized, that when human populations swelled dramatically during the agricultural revolution, early trash dumps drew hungry wolves, some of which were less fearful of humans than others; their 'flight distance' being less. With direct wolf/human contact, the domestication process began. Experiments of human-raised wolves show wolves never make eye contact, play, or engage with humans socially, like dogs do, so environment doesn't seem to be the best impetus for domestication. How long did this process take; and by what mechanisms?



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In 1959, Soviet scientist, Dmitri Belyaev, began experiments with Silver (Siberian) foxes to discover the process of wolf domestication. The premise was to selectively breed the foxes for behavior. He interbred foxes that were least aggressive, fearful, and smallest flight distance. Belyaev felt that behavior was driven by physiology and selecting for tameness would yield noticeable genetic changes. (See: Wikipedia-Domesticated Silver fox)

The results were stunning. In three generations the aggressive behavior began to disappear. By the 8th generation, the fox cubs actually began to show affection. Physiologically, the foxes showed much lower levels of adrenaline, a hormone associated with fear impulses and aggressive behavior, and began to come into heat semi-annually rather than annually. Astoundingly, as the trend for tameness continued, physical changes started to appear. The natural black coat gave way to a spotted or even pure white coat of fur, tails now curled, ears became floppy and limbs even became shorter. These changes mimicked those in wolf-to-dog domestication.

50 years and 50 generations later, the trend continues with startling new insights. When tame cubs were placed with aggressive mothers, the mother's temperament did not influence the cub's tame nature. Conversely, when aggressive cubs were placed with tame mothers, the cubs remained aggressive. Further, when embryos of aggressive mothers were transplanted into the wombs of tame mothers, the genetically aggressive cubs were born true to their aggressive natures. In November of 2005, the journal Current Biology reported that 2,700 genes now differed between the tame foxes and foxes found in the wild.

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