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## **Hormonal influence on the dog's behavior**

The way a dog's brain works is affected by its genes. The brain, in turn, affects the production of the hormones. Therefore, hormonal influence on a dog's behavior should, in fact, fall under genetic influence. However, I have taken it as a separate article due to its importance.

Hormones are produced by glands belonging to the endocrine system, that include the pituitary gland, thyroid gland, parathyroid glands, pancreas, adrenal glands, ovaries and testes.

Hormones affect behavior, but also the other way around, behavior affects the hormonal production. In other words, hormones are interdependent with behavior through a process that is technically called 'biofeedback'. For example, when a dog undergoes physical or mental stress such as sudden pain or fear its body reacts by producing certain hormones. It does so by, first, releasing the adrenocorticotrophic hormone (ACTH) through the pituitary gland. This will cause an increase of excitability or anxiety in the dog. Then, as a consequence, the adrenal gland reacts by releasing corticosteroids that will moderate this excitable or anxious state of mind, and so, prepares the animal to stand its ground. Normally both hormones control each other through biofeedback. But when higher corticosteroid levels occur for a longer period of time, either due to own production or administered as pills or injection, it can unbalance this biofeedback process and an increase of aggressive behavior in the dog may be the result.

With this biofeedback process in the back of our minds we can positively influence our dogs' behaviors towards more stable and reliable ones once they have turned into adults. It has been found that puppies, that on a regular basis have been pulled away from the nipple and held gently in the hands for a brief moment (say once or twice a day), will cope better with stress situations later in their lives. Also interesting is that puppies that have been exposed to all sorts of stimuli in their early lives, and thus have experienced several biofeedback processes in their little bodies, will grow up into bigger animals with bigger brains being able to cope better when placed in unfamiliar or unexpected situations. When confronted these animals will not freeze or flee but instead they will investigate and examine their surroundings. This practice of biofeedback should already start at the breeders!

Also controlled by biofeedback, to some extent, is the sex hormone testosterone. Studies have shown that those who have won a competition have increased testosterone levels in their blood while the testosterone levels of those who lost the game are decreased. The extra testosterone will give the winner more confidence and helps maintaining its dominant position. Reduced testosterone levels, on the other hand, decreases this chance. This is an important reason why children, who are physically and mentally not yet strong enough to authorize dogs, should not play games where the chance for the dog to win is quite high.

Imbalances in the endocrine system can be a root-cause for several types of behavior problems in dogs. In people emotional disturbances can be found such as mood swings,

spontaneous aggression, depression, hyperactivity and personal changes. These disturbances are displayed in dogs in similar ways. Fortunately, treatment of endocrine imbalances is often successful through administration of hormones together with behavior modification programs. However for this, the dog-owner first need to recognize the problem as such, then s/he should be willing to put the time and effort in the treatment, and thirdly, s/he should have the financial back-up in order to be able to pay the bills for this treatment. And above all, lack of sufficient stimulation in the early lives of dogs can never be 'repaired' for 100% later in their lives. Therefore, prevention is better than a cure!

Prevention starts at the breeders and all other dog-owners that (once in a while) breeds a litter with their dog. They are responsible for the genetic mental and physical health of their animals, but also for the biofeedback process in the puppies first weeks of lives. They should prevent physiologically inferior dogs, as they are more likely to produce offspring with serious endocrine imbalances and, lack of biofeedback provides not only smaller brains it produces dogs with unstable and unreliable behavior. Dogs that can become down-right dangerous for human society. Once the puppy goes to its new home, the responsibility shifts to its new owner/s. But more about this in the article "Environmental influences on the dog's behavior".

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