

Heritability of behavioral traits

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About Erling Strandberg (SE)

Erling Strandberg is professor in animal breeding and genetics at the Swedish University of Agricultural Sciences (SLU) in Uppsala. He got his PhD in dairy cattle breeding but has worked with many other species since then, including dogs.

He is also responsible for the Masters course in Disease Genetics, and teach in some other courses: BSc courses in animal breeding and in dog genetics.

Background

- Professor in animal breeding and genetics, SLU, 2003
- Associate professor (Docent) SLU, 1997
- PhD in Animal Breeding (AgrD) SLU, 1991
- Master of Science (Dairy Science) University of Wisconsin-Madison, 1983
- Master of Science in Agriculture (Animal Science) SLU, 1982

Abstract

Estimates of heritability of behavioral traits in the Rhodesian Ridgeback.

Dog mentality is important for all dogs owners, regardless of the breed of the dog. The majority of dogs today are considered family members, living in our homes and participating in everyday activities. Many companion dogs are on a daily basis exposed to situations that can cause stressful and fearful reactions, for example, being left home alone or exposed to heavy traffic, sudden noises or strange objects. It is, however, quite difficult to measure the dog's everyday behavior and therefore we usually use a behavioral test or assessment, where we try to standardize the situations and the evaluation as much as possible.

The Dog Mentality Assessement (DMA) has been used in Sweden since 1989 to describe mentality in dogs. Although DMA was intended for working dogs it has become very popular and also dogs of many other breeds have participated. However, it was less well suited for several breeds and to fill the need for a behavioral assessment for non-working breeds, a new assessment, BPH, was developed and started 2012.

The aim of this study was to estimate heritabilities (h²) for mentality traits for 5 breeds: Rhodesian Ridgeback

(RR, n=493), Labrador Retriever (LR, n=491), Nova Scotia Duck Tolling Retriever (NSDTR, n=425), Staffordshire Bullterrier (SBT, n=343), and American Staffordshire Terrier (AST, n=298).

From the over 250 markings on the score sheet, 6 summarizing mentality traits were defined across the 5 breeds using exploratory factor analysis. Average h² for all traits within breed varied from 0.29-0.38. Hostility had the highest h² across breeds but also the largest variation (0.38, range 0.18-0.62). Confidence had more consistently high h² (0.36, range 0.22-0.45). The other four traits (Playfulness, Sociability, Curious and Confident, and Positive and Energetic) had average h² of around 0.3, with range from 0.10 to 0.59.

RR had the highest average heritabilities and the estimates varied the least (0.38, SD 0.03) whereas NSDTR had the lowest heritabilities (0.29, SD 0.06). Standard errors ranged from around 0.10 for the largest breeds to about 0.15 for the smallest. These results show that the traits defined in the new BPH have at least as high h² as the traits in DMA.

We have just recently reached about 500 described dogs for Rhodesian Ridgeback and the first results from BPH will be presented.

Table 1. Heritabilities for traits in BPH for five breeds.

Trait	RR	LR	NSDTR	SBT	AST
Average (SD)	0.38 (.03)	0.33 (.10)	0.29 (.06)	0.34 (.15)	0.33 (.20)
Playfulness	0.42	0.19	0.27	0.34	0.15
Confidence	0.41	0.31	0.39	0.22	0.45
Sociability	0.33	0.37	0.31	0.41	0.25
Hostility	0.36	0.47	0.25	0.18	0.62
Curious and Confident	0.37	0.23	0.23	0.25	0.47
Positive and Energetic	0.38	0.39	0.26	0.59	0.10

Behavior and Personality Assessment in Dogs (BPH)

With permission from The Swedish Kennel Club

BPH is a behavioral assessment aiming to contribute to better knowledge about the mentality and personality of dogs, all dogs. It should be helpful for breed clubs, breeders and dog owners having a tool which helps to describe the personality of the dog, whether it is

a potential breeding dog, pet or working dog. For a person considering to buy a dog, BPH can also give a description of the general mentality of various breeds and of the parents of the litter of interest. Every BPH-described dog contributes with a piece of information that increases our understanding and knowledge about the behaviour of a specific breed and of dogs in general.

The BPH takes about 30 minutes. It consists of 7 parts and the aim is to give a summary of how the dog reacts in and handles various situations. This could be about meeting strangers, playing, searching for food and surprises. If desired, the dog's reaction to gun shot can also be described. After finishing the track, the observer will provide an oral summary of the dog's reactions and gives a subjective description of its personality.

The dog must be at least one year old, but there is no upper limit. It must have known identity and be vaccinated. No preparation or training is necessary and there is no minimum requirement for obedience level.

The Swedish Kennel Club (SKK) is the organisation mainly responsible for the BPH. SKK educates the observers and carry out quality assurance of the observers and the sites of BPH. Breed clubs and regional Kennel clubs arrange BPH based on the rules of SKK.

SKK is responsible for registering and publishing all BPH results.

The parts of BPH

1. Stranger

An unknown person, the test leader, approaches the owner and the dog. The dog's greeting behavior, tendency to anxiety or avoidance, the need to assert itself or show submissiveness and if the dog rejects the

contact attempt by aggression is noted.

2. Playing with object

Both the owner and the test leader plays with the dog. This part has two aims; partly to describe the will to play with an object, and partly to describe the attitude of the dog in playing.

3. Food interest

The dog is given the opportunity to take treats, both of its own favorite kind and of a standardized kind, from cans with lids that are either open or secured to various degrees. The aim is to describe how willing the dog is to work to get its treats and the general food interest. The intention is also that this part will pick the dog's general persistence in solving a problem. The dog's tendency to contact the owner is also noted.

4. Surprise

A silhouette of a person is raised suddenly in front of the dog when it is walking with its owner. Aggression and fear is noted but also the ability to overcome this adverse emotional experience and how engaged the dog is in handling the situation.

5. Sudden noise

A metal drum containing a chain, creating a loud noise, is rotated when the dog approaches. The dog can freely

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approach the drum to investigate. The aim is to describe fear of sudden noise but also the dog's curiosity in an unexpected situation.

6. Approaching stranger

A person in a wide coat, wide-brimmed hat and sunglasses approaches the dog slowly and in intervals. When the person has arrived at a certain distance, he/she turns around, faces away and stands still. The dog is allowed to approach to investigate and initiate contact. This part is attempting to measure the dog's reaction when meeting people that act, from the dog's perspective, in an unusual way.

7. Surface material

The dog and owner walks across a stretch with a new and previously unknown surface material. The intention is to measure the anxiety or uncertainty connected to walking on this new material

8. Gun shot (optional)

Two gun shots are fired about 50 meters from the dog and owner, one when both are in motion, one when both are standing still. The intention is to describe the dog's reaction to the sudden gun shot.

The Swedish Rhodesian Ridgeback Society (SRRS) recommends that Rhodesian Ridgebacks shall participate in this part of the BPH.

Whan does the BPH describe?

There are many behavior traits that are important not only for the dog's own welfare but also for us as dog owners. What kind of reactions the various stimuli in the BPH situation elicit in a certain dog depends on that dog's personality and behavior repertoire. All traits are not possible to describe, for instance because the relevant situation is difficult to mimic in a test or repeat in an identical way, or owing to practical time constraints. BPH is focusing on the following behavior groups.

1. Sociability

Sociability describes how social the dog is towards unknown people. This includes the tendency to initiate contact, how eagerly and how long it greets, and the degree of submissiveness. Interest in unknown humans is partly breed dependent and partly dependent on the dog's own personality. Breeds selected for working independently may not show the same engagement in contacts with people as breeds where good cooperation with humans has been selected for. The dog's own experiences, good or bad, also play a role.

2. Play interest

Play interest focuses on the dog's interest in playing, both with its own favorite object and with a object standardized for BPH. Both the owner and the test leader are playing with the dog. This part has two aims; partly to describe the will to play with an object, partly to describe the attitude of the dog in playing, which is not necessarily directly connected to interest in objects *per se*. Play interest and the way to play varies largely between breeds. Not all are interested in tug-of-war whereas others love it.

3. Food interest

Dogs with a healthy interest in food or treats are often easier to motivate in a training situation. Such a dog is often prepared to try to solve a problem several times in order to get the desired treat.

4. Owner contact

Owner contact describes the tendency of the dog to keep or initiate contact with its owner and to engage with the owner, e.g. in play. The dog may also seek support and help from the owner then encountering a problem it cannot solve directly. In the Food interest situation many dogs try to get help from their owners when they cannot open the can themselves.

5. Curiosity

An important part of the BPH is to get a good opinion about the curiosity of the dog. This is often a useful characteristic when training a dog, regardless of purpose. Curiosity means that the dog has the will to explore its surroundings and objects, both in known and unknown environments. If the dog has been scared, curiosity helps the dog to approach whatever elicited the fear and can help to overcome that fear.

6. Fear and insecurity

An insecure or anxious dog is living in constant preparation for something unpleasant to occur. The opposite is a self-assured dog that appears to have the situation under control. In-between these two extremes

there are several grades of fear and anxiety. Specific fears are common in dogs. They may be related to the surroundings (e.g. fear of walking on certain kinds of surfaces, grids etc) or towards people or other dogs (social fear).

7. Aggression or threat behavior

Many dogs occasionally show threatening or aggressive behavior. This is a natural part of the dog's behavioral repertoire but should not lead to that the dog appears

scary or problematic, neither by the owner nor by others. It is therefore important that dogs with excessive aggressive behavior are identified and that the observer explains to the owner his/her responsibility to correct or avoid such behavior.

Score sheet

During the BPH the observer fills out a standardized score sheet with several entries. The aim is to describe the behaviour of the dog, not to rate it as being good or bad. One or several scales are used to describe the behaviour in each of the 7 (8) situations. One scale may describe the intensity of the behavior while another describes how long the dog shows a certain behavior. A low value on the scale means that the dog shows the behavior only to a small degree or for a short time, and vice versa.

Results for various behavior variables

The results for various behavior variables are summarized both in tabular and graphic form. The same behavior is measured in several situations and the presented results are a summarized result. In the graph the individual dog's behavior is compared with the breed average.

Subjective description of the dog

After the BPH the observer also gives a subjective summary of the dog's behaviour and personality. The following categories are used:

- **Angry:** The dog easily becomes angry and shows aggressive behavior.
- **Energetic:** The dog is alert and reacts quickly on stimuli. Can be perceived as that the dog is always on edge.
- **Happy to meet unknown people:** Likes to be around people. Positively answers invites of contact from strangers and often initiates contact on its own.
- **Playful:** Often answers invitations to play and often invites to play on its own.
- **Loud:** Often reacts by barking in various situations. Can also whine while waiting for activities and being loud when greeting.
- **Curious:** Interested in anything that happens and wants to explore in a positive manner.
- **Secure:** The dog is self-assured and can handle situations that are potentially fear-eliciting, in a rational way.

