



Genetic and environmental factors affecting behaviour test results in Rottweilers

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Behaviour test



- Annually approximately 1 300 dogs are tested in the official Finnish canine behaviour test
 - Rottweilers comprise 10-25% of all annually tested dogs
- In test a dog is presented with a range of different situations and dog is observed by two trained judges
- Nine traits are evaluated based on dog's reactions:
 - Courage, sharpness, defence drive, play drive, nerve stability, temperament, hardness, affability, reaction to gunfire
- Evaluation scale for individual traits ranges from +3 to -3
 - Combines both the amount of a reaction as well as it's desirability

Aim of the study



- To estimate the genetic parameters of temperament traits measured at the Finnish canine behaviour test in Rottweilers
- To study the environmental effects that might affect the test results of the dogs

Data



- Finnish Rottweiler Club provided:
 - Pedigree data on all Rottweilers registered in Finland
 - Behaviour test data on all tested Rottweilers in Finland
- Approximately 600 to 1000 Rottweilers registered annually in Finland
- 2 300 behaviour tested Rottweilers since 1976
 - 1 100 males and 1 200 females
- Dogs tested between 2 and 6 years → official age limits
- Tested dogs originated from 459 sires and 868 dams
 - Tested offspring per sire: 1 – 56
 - Tested offspring per dam: 1 – 17
- Each dog tested only once

Methods



- Original scores were transferred to a scale from 1 to 6
 - 1 = smallest reaction, 6 = strongest reaction
 - I.e., to describe only a dog's reaction, not how desirable it is
- Restricted Maximum Likelihood (REML) and VCE5

Model



- Studied traits were described with a mixed animal model, that included the fixed and *random* effects of:
 - Sex (male or female)
 - Testing age (<2.5 years, 2.5-3, 3-3.5, 3.5-4, 4-5, >5 years)
 - Testing year-testing season effect (seasons March-May, June-August and September-December)
 - *Evaluating judge (50 different judges)*
 - *Test location (108 different locations)*
 - *Breeder effect (1 to 164 tested dogs/breeder)*
 - *Additive genetic effect of tested animal*
 - *Random environmental effect*

Results (1)

Distribution of original scores



	+3	+2	+1	-1	-2	-3
Courage	0.1%	16.7%	59.2%	22.4%	1.5%	0.1%
Sharpness	30.4%	5.9%	63.0%	0.3%	0.2%	0.2%
Defence drive	47.9%	10.9%	33.1%	7.3%	0.4%	0.3%
Play drive	24.4%	51.9%	4.1%	17.7%	1.8%	0.0%
Nerve stability	0.2%	17.6%	78.5%	3.4%	0.3%	0.0%
Temperament	31.3%	55.7%	7.2%	5.5%	0.4%	--
Hardness	25.4%	0.3%	55.1%	--	18.7%	0.5%
Affability	52.5%	40.8%	5.5%	0.9%	0.1%	0.2%
Gunfire reaction	81.1%	17.4%	0.4%	1.2%	--	--

= Desirable score for Rottweilers

Results (2)

Fixed effects



- **Sex** affected significantly all traits except temperament, affability and reaction to gunfire
 - Males scored higher than bitches for courage, sharpness, defence and play drives and hardness
- **Age** had statistically significant effect on courage, hardness and affability
 - Older dogs scored higher for these traits
 - Note: dogs only tested once in lifetime → not possible to follow development of scores of same dog over time
- **Testing year- season** affected significantly courage, defence drive, play drive, nerve stability and affability

Results (3)

Random effects (% of σ_p)



Trait	Test judge	Test location	Breeder	Genetic effects
Courage	8%	0%	16%	7%
Sharpness	1%	1%	17%	10%
Defence drive	0%	2%	17%	7%
Play drive	3%	0%	18%	13%
Nerve stability	0%	1%	18%	4%
Temperament	1%	0%	18%	8%
Hardness	1%	0%	19%	11%
Affability	0%	2%	19%	5%
Reaction to gunfire	1%	15%	0%	12%

Results (4)

Correlations between traits



- Genetic correlations:
 - Strong and positive (> 0.70) between **courage**, **nerve stability** and **hardness**, and **courage** and **play drive**
 - Strong and negative (> -0.60) between **affability** and **sharpness**, and **affability** and **temperament**
 - Other genetic correlations mostly moderate and positive
- Phenotypic correlations:
 - Much weaker than corresponding genetic correlations = strong genetic relationships not visible on phenotypic level

Discussion (1)



- Breed standard for Rottweilers states that they should have **”high courage and moderate hardness”**
 - 0.1% of tested dogs scored ideal for courage
 - 25.4 % of tested dogs scored ideal for hardness
- Rottweilers should also have **“excellent nerve stability”**
 - 17.6% of tested dogs scored ideal for nerve stability
- Room for improvement? Or time to update breed standard?

Discussion (2)



- Need to correct results for **sex and age** when comparing different dogs
- **Judges** have effect both through their own personal opinions as well as by inconsistent evaluation
 - Less judges and regular training for them
- **Testing places** have effect both through their individual designs as well as by random inconsistencies
 - Standardisation needed (esp. gunfire)
- **Official test scoring** now confusing and inconsistent
 - Should be changed into "less-more" evaluation from "good-bad" evaluation

Discussion (3)



- **All traits had a genetic basis**, although heritability estimates were low
 - Possible to change by breeding into desired direction
 - But: all available information needs to be utilised effectively in breeding value estimation for better accuracy = BLUP
- High genetic correlations between **courage, hardness and nerve stability**
 - Largely describe the same thing in a dog
 - Difficult to separate in test evaluation?
 - Or all indicating the same underlying personality trait?

Thank you for your interest!

- Any questions?



(all Rottweiler photos from Wikipedia)