The genetics of field trial results in UK Labrador Retrievers

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Introduction

> Labrador Retrievers are used extensively as gun dogs in UK

> They participate in field trials run by local clubs

> This study was designed to investigate the factors which influence the results of trials

> The genetics of gun-dog trial results also investigated

The trait analysed

> Place (1st to 5th) transformed to an underlying normal scale, adjusted for size of trial

> Trials of different levels (Novice, All Aged, Open) equated

> Trait transformed to same mean and SD as raw place data

> NB 1st place is better than 2nd – low scores better than high

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Data set

> Results of all reported trials in Kennel Club Stud Books for the last 3 years (2013-15)

> Trends over time investigated by adding results from 2006

> Hip and elbow score EBV

> Eye test results

> Full UK pedigree back to 1970s (1.1 million dogs) plus inbreeding coefficients

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Genetic analysis

> Mixed model fitted in ASReml (Gilmour *et al.*, 2009)

> Fixed effects – sex, coat colour, eye test result

> Covariates – age (months), inbreeding coefficient, hip and elbow EBV

> Random effects – additive (5-generation pedigree), permanent environmental (animal as diagonal matrix), residual

Results

Basic statistics

> 3,322 records from 1,335 dogs in 550 trials

> 2,124 males dogs -1,198 females

> 2,250 yellow dogs - 1,062 black - 10 chocolate

> Age ranged from 11 to 116 months

Trait	Mean	SD	Skew
Number of dogs per trial	16.5	4.89	
Age (m)	45.9	18.2	
Inbreeding coefficient	0.08	0.026	
Raw place	2.77	1.53	0.33
Transformed Place	2.78	1.17	-0.49

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Fixed effects and covariates

> Sex *** - B 2.67   @2.88 (adjusted means at age 60 months)

> Colour NS

> Eye test NS

> Age (4th order polynomial) ***

> Inbreeding coefficient NS

> Hip and elbow EBV NS

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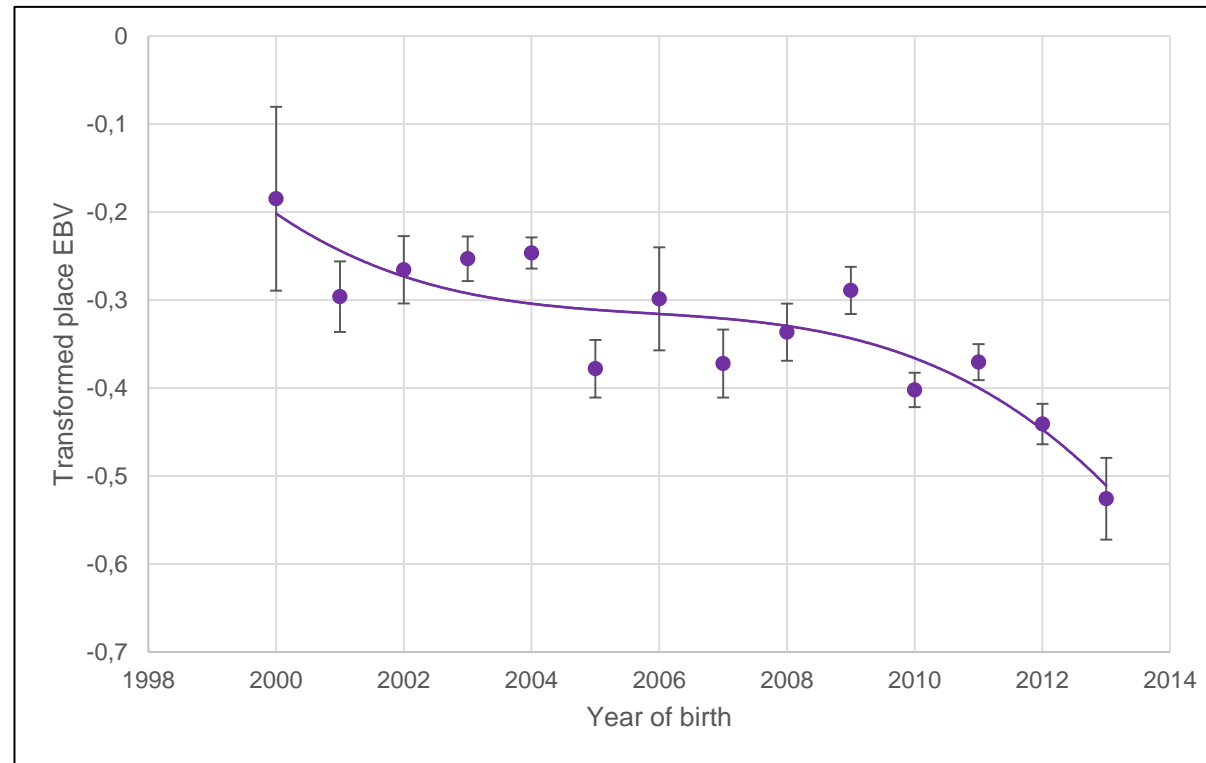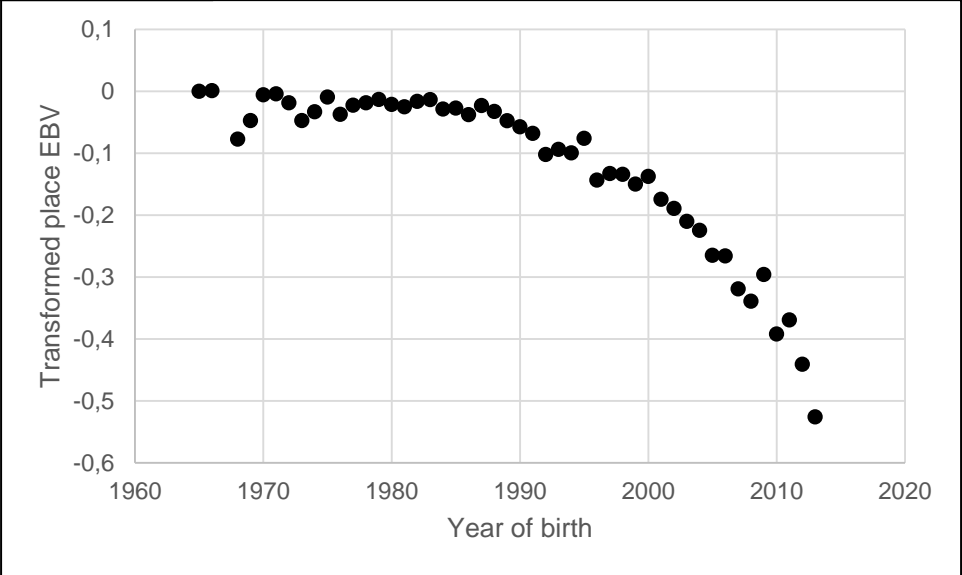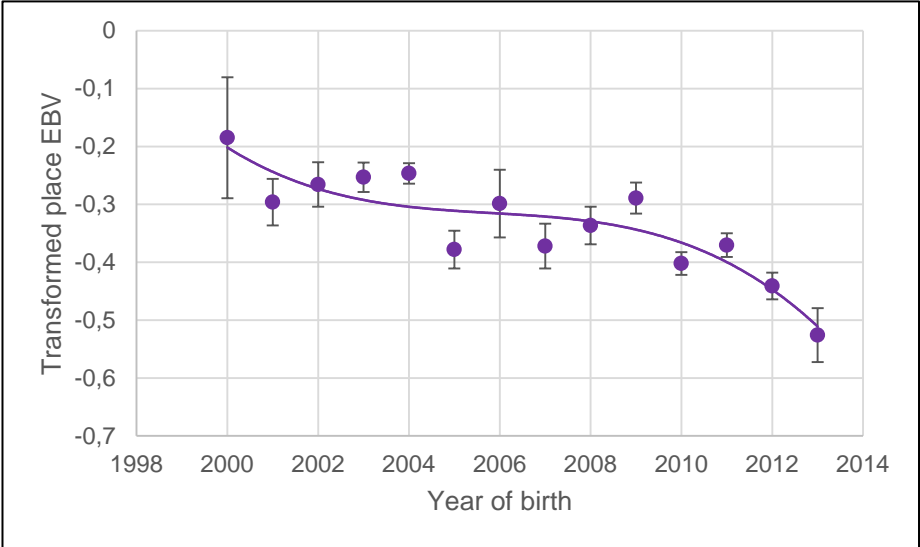
Effect of age on transformed place
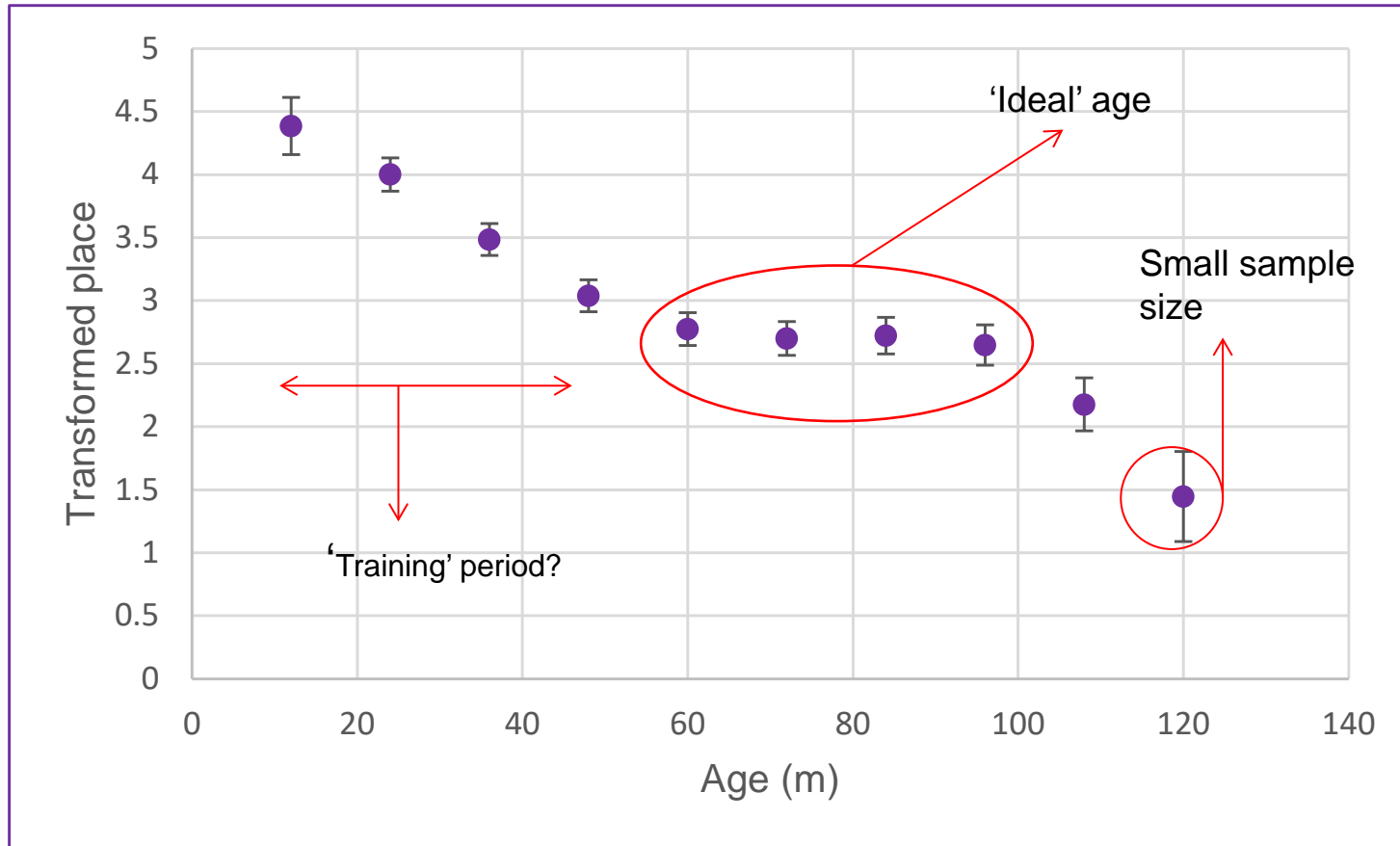
Variance components and genetic parameters

Trait	Residual	Permanent environment	Additive	Heritability	Repeatability
Raw place	2.29	-	0.062	0.03 ± 0.013	-
Transformed place	0.660	0.252	0.233	0.20 ± 0.044	0.42 ± 0.021

Mean EBV by year of birth (dogs with data)

Mean EBV by year of birth (dogs with data and dogs in pedigree)

Conclusions

> Transformed place data can be used to investigate factors affecting gundog trial performance

> Age and sex affected performance

> The trait is heritable

> No health trait or inbreeding affected performance

> Genetic merit in the population is improving

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Acknowledgements

Dr Tom Lewis at the Kennel Club

Field trial tests

- Retrievers are tested on their game finding ability and the speed and directness of the retrieve.
- Judges will be looking for
  - quick pick ups and fast returns
  - natural nose and marking ability
  - quietness in handling
  - Control
  - drive
  - style