Possibilities of disruptive selection in dachshunds, based on earthdog trial scores

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Abstract: Dachshunds are highly popular both historically and nowadays. They're bred for hunting and their work is still necessary, mainly on blood tracks and in controlling red fox and badger populations. On other hand, the waste majority of these breeds are kept as family pets today, and in that role the same traits, what are essential for successful earthdog work are disadvantageous. We've obtained 156 earthdog trial results of 73 dogs, from eight events for modelling selection possibilities. As pedigree data of the dogs wasn't suitable for determining it, we've used heritability values near $h^2 = 0,2$ published for other populations, but to the same traits. The selection gain for hunting eagerness to the next generation would be between 4.23–4.65 scores (max. 100) with different selections pressures, while – 9.19 scores for pet purposes. In case of barking endurance future earthdogs could improve with 6,4 seconds, while dachshunds kept as companion animals could bark 8.89 s less when once started, if the population participated on trials had been a breeding stock.

Keywords: dachshund, hound work, family pet, selection gain

Introduction

Dachshunds form a separate breed group, compounding of nine breeds, according their coat type and size (chest circumference). These breeds are traditionally popular in Hungary, especially smooth and wire coated standard varieties, which, respectively occupied the second and the forth place last year among all dog breeds, based on puppy pedigree registrations.

Dachshund-like dogs appeared in Europe in the XV–XVI. century, according to the needs of hunting, so tracking abilities and den work already had been a requirement for them (Nappe, 2013). Dachshunds had to have great insticts and will to hunt, catch the prey, bark for giving signs to the hunter while work independently (Tabel and Tabel, 2018), which personality traits are just the opposite of a naturally calm, obedient dog. Among the versatile hunting utilzations of dachshunds the most special one, the earthdog work requires the most courage, drive, independence and vocalisation from the dogs. Earthdog trials with human-made dens are used in Germany as performance test for dachshund until 1890 (Diezel and Mika, 1910). Tests and trial for gundogs and hounds used in practice worldwide quite similarly provide useful quantitative data by scoring the performance traits for estimating heritabilities, breeding values and the outcome of selection (Wilsson and Sundgren, 1997, Schmutz and Schmutz, 1998, Brenoe et al, 2002, Lindberg et al, 2004).

However, a great extent of dachshunds are kept by private owners not intending to use them for hunting (Baranyiova et al, 2007), and their ratio even increased in recent years, next to the change of the expectation of that owners – living mostly in urban environments – toward the behaviour of the dog. These requirements – like being calm, come right after called – often contradict to the natural seeking, exploring behaviour of hounds (Stephens-Lewis and Schenke, 2023). In a study by Serpell and Hsu (2005) dachshunds achieved the lowest scores with high standard deviation to trainability from eleven breeds, others mostly gundog and working dog breeds, relying on the handler more during their traditional work. Dachshunds clustered in a group of dogs with high scores for aggression, separation anxiety and reactivity, while low for trainability (Wilson et al, 2018), and placed in the top third among breeds for being reactive and prone to excessive barking (Hart and Miller, 1995). Serpell and Duffy (2014) also suggested dachshunds showing the highest level of vocalisation, attention seeking and prey drive. Those traits are considered as behaviour problems for family pet dogs, and next to causing welfare issues often led for abandoning the dog. Therefore selecting against those behaviours, which are useful in working hounds would be required in a pet subpopulation.

Materials and Methods

163 earthdog trial results, originating from 73 dachshunds on eight events held were obtained from the Hungarian Dachshund Owner's Association. Data contained the sex and date of birth of the dogs, as well as date of the trials held, next to the results (full score, and for some events the time results for the three phases: barking, prey found, digging through, fetch).

Earthdog trials in human-made dens consist of three phases. I the first phase dachshunds have to go in the den after a red fox or a badger released there before. It's favourable when dogs bark both at the entrance of the den and through the whole search. An obstacle

from pebbles is made inside the den, through which the dog must dig through, that is the second step scored. In the third phase a shot game or a fur is placed within the den, and the dog have to try to take it to the surface.

Data was recorded a transformed for analysis in an Excel worksheet, statistical analysis was performed by Prism. The population of dachshunds competing in theses trials were considered as a mating unit for simulation purposes, and heritability values for courage and loudness, reported by Kasarda et al. (2007) for a recent Slovakian dachshund population were used.

Results and discussion

The results of the dogs from the trials are summarized in Table 1.

Table 1 Descriptives for scores and time results of dachshunds in Hungarian earthdog trials 2022–2023

Items	Score n = 156	Barking (s) n = 46	Digging through(s) n = 40	Apport (s) n = 31
Population	78.37 ± 28.66	56.7 ± 38.8	69.4 ± 47.6	86.1 ± 71.9
Median	90	42	52	57
Dogs	77.48 ± 26.94	72.5 ± 46.3	87.9 ± 52.3	84.4 ± 79.4
Bitches	75.95 ± 27.24	49.3 ± 32.0	50.9 ± 34.5	85.9 ± 69.4

Age of dachshunds competing was between 1–9 years, mean value 3.4 ± 2 years. There's a mild positive correlation ($r = 0.1821$, $p \leq 0.05$) between the age of the dogs and their scores, so older animals show a bit better overall performance. Bednarek and Slawinska (2021) also found older dachshunds being more successful in more performance traits – including vocalisation and obedience – on tracking competitions. This result is in concordance with Gonzalez Martinez et al. (2011), who found a bit higher level of aggression in older dogs, as that is needed for earthdog work. Time results didn't correlate with age significantly.

Average performance of dogs and bitches didn't differ, however, the time result of the first phase did (Mann–Whitney test, $p \leq 0.05$), where bitches were faster. Bednarek and Slavinska (2021) found male dachshunds performing better on wild boar trials, but on earthdog trials Kasarda et al. (2007) didn't find a difference in the two sexes, similar to our results.

We've calculated as a simulation what selection can an be achieved by disruptive selection for a subpopulation of dachshund for earthdog work, and for an other subpopulation for pet purposes, where those performance traits required for hunting- eagerness/courage and loudness/excessive barking – success can be considered as behaviour problems.

By defining a selection minimum for modelling we tried to define the ratio of population kept for breeding (p) according to reality. So couldn't set SM for the working stock to the

highest score possible, as in dogs only 3 dachshunds out of 35 did achieve 100 score, which would mean p = 0.086, in bitches could keep 5 animals out of 60, p = 0.083. On the other hand, there're only 2–2 dachshunds achieving 0 scores, so using only those bitches for pet purposes would mean an extremely low ratio of breeding animal prospects from the parent stock. Therefore kept the maximum score only in dogs, and chose the median value, 90 scores as selection minimum in bitches for hunting stock, and bitches bellow 80 scores were selected in the model for being the parents of the family pet offspring. Population average for trial score was 75.35 scores in dogs and 75.95 scores in bitches.

Barking is an important performance trait in working dachshunds, serves useful information for the hunter both in den work, both during tracking. Meanwhile, considered as a bad behaviour for pet owners. Population average was 72.47 s barking in dogs, range 19 s–169 s, while 15–120 s, with mean 49.31 s in bitches.

The possible outcome of disruptive selection is summarized in Table 2.

Table 2 Modelling disruptive selection based on earthdog trial results

Items	Earthdog trial score, eagerness		Time for barking, loudness (s)	
	For hound work	For family pet	For hound work	For family pet
Selection minimum (dogs, bitches)	≥ 100 dogs ≥ 90 bitches	≤ 0 dogs ≤ 80 bitches	≤ 80 dogs ≤ 40 bitches	≤ 30 dogs ≤ 30 bitches
Ratio of animals kept for breeding	p = 0.086 dogs p = 0.25 bitches	p = 0.06 dogs p = 0.48 bitches	p = 0.18 dogs p = 0.48 bitches	p = 0.18 dogs p = 0.28 bitches
Selection differential in dogs and bitches	24.64 dogs 20.26 bitches	-75.35 dogs -20.89 bitches	47.96 dogs 22.4 bitches	-49.47 dogs -48.33 bitches
Mean SD	22.45	-48.12	35.18	-48.9
Heritability	Courage h^2 = 0.191 (Kasarda, 2007)		Loudness h^2 = 0.182 (Kasarda, 2007)	
Selection gain per generation	+4.23 scores	-9.19 scores	+6.4 s	-8.89

Conclusions

Next to conformation, behaviour and personality traits are the most important in performance the of any working dog, and if animals are not selected consciously based on that traits, behaviour trends to change quite rapidly (Svartberg, 2005). The scoring system used for tests and trials in gundogs and hounds, similar worldwide offers a quite useful tool to work with these quantitative traits in selection and breeding.

The work of dogs in wildlife management cannot be replaced with anything else, and two crucial steps in it are finding a wounded game by tracking and controlling the population of vermins, to which dachshunds are mainly used. Therefore a part of dachshund population must be tested for the traits required for this application, for not loosing their inherited ability. It is crucial for preserving the original hunting dachshunds that breed clubs have to administrate and collect the trial results in a standardized way, and allow breeding professionals to use them, together with ancestry data of the dogs for measuring heritabilities, and further use data in selection.

However, the trend, that a great extent of populations of original working dog breeds are kept as family pets cannot be changed (e.g. Baranyiova et al, 2007). Continental gundog and hound breeds didn't differ to working and show types – as English breeds did –

decades ago, so officially all animals have to be selected for being able to be used for their original work during hunting. As working trials are not compulsory for dachshunds being allowed to be bred from, of course, reality differs. Instead of not taking into consideration behaviour traits at all in selection, those dogs, who produce poorly on earthdog trials could be chosen as parents for future pet dachshunds, as their phenotype is coincides with the requirements (King et al, 2009, Yamada et al, 2019, Stephens-Lewis and Schenke, 2023) of an ideal family pet. The data obtained from earthdog trials can successfully help in defining the possible selection gain.

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