Breeding Better Buddies

ACT GROUP 3.079
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How to use DNA to breed for better health whilst taking into account the breeder's perspective and ethics?

High amount of inbreeding and hereditary diseases
Profiles

BOUVIER DES FLANDRES
BOE4

STABYHOUN
NVSW

SAARLOOS WOLFDOG
AVLS

WETTERHOUN
NVSW
Genetics Background

• Genetic diversity is related to inbreeding

• Years of inbreeding leads to inbreeding depression

• Inbreeding depression is decreased vitality and decreased fertility
SNP chips are used to analyse DNA differences between individuals:

- Identify certain traits
- Multiple diseases
- Parentage and heterozygosity of the dog
Genetics

DNA USAGE

LIMITATIONS OF SNP CHIPS

- How do you know you have the right SNPs
- Diseases are breed specific
- Expensive
- Is it ethical?
Genetics: Outcrossing

- Outcrossing brings new genes into a population → lower inbreeding
- Mating with a different breed
- Selecting a breed
  - Trade-off between genetic diversity and conservation (of the breed)
- Backcrossing
  - Drip method
  - Return with original breed, higher genetic diversity
Genetics • LOOK-ALIKES

• Dogs that in all aspects conform to the breed standard, but are not registered in the pedigree
• SNP-chips define the breed purity
  ▪ 50k chips is already used
• Increase population numbers with 'reservoir'
• Add new genes into the population
• Without losing the desired traits
Genetics

- Quantify dogs in a population for their likelihood of passing desirable/undesirable genetics to their offspring compared to others in the population.

- Look at country that has EBV (Sweden and UK) → use these dogs for breeding.

- SNP chips + EBVs = gEBVs
  - Applied directly at birth
  - Score complex diseases

![Genetics Diagram]

**GENETICS**

**ESTIMATED BREEDING VALUES**

- Quantify dogs in a population for their likelihood of passing desirable/undesirable genetics to their offspring compared to others in the population.

- Look at country that has EBV (Sweden and UK) → use these dogs for breeding.

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![Diagram of dog genetics]
Genetics

Genetic Management

• Mean kinship
  ▪ Average relatedness of individual to the population
  ▪ Can be determined with DNA data (good for those with incomplete pedigree)
  ▪ Overuse should be avoided

• Optimal contribution
  ▪ Combination of mean kinship and estimated breeding values

EBVs - Mean Kinship = Optimal dog for breeding
  ▪ Software already available
Breeders' Perspective
REGULATIONS AND INVOLVED PARTIES

- Raad van Beheer
- Basic regulations
- Breeding association
- Plans (e.g., outcross)
- Inform

- FCI + foreign kennel clubs
- Additional regulations
- Plan of approach
Breeders' Perspective

COSTS

- Financial costs of breeding
  - Many different costs
- Different branches require different costs
- Worries about costs
  - Breeders that follow rules → more expensive puppies
Breeders' Perspective

METHODS

• Interview
  ◦ Raad van Beheer
  ◦ Breeding associations
• Questionnaire
  ◦ Bouvier: 62
  ◦ Saarloos: 77
  ◦ Stabyhoun: 92
  ◦ Wetterhoun: 15
  ◦ Total: 246 responses
Breeders' Perspective
USED OWN DOG FOR BREEDING

• Not many dogs are used for breeding
  ▪ Rejection based on appearance
  ▪ Not able to find a good home
  ▪ Not wanting to get rid of puppies

• Most puppies got a pedigree
  ▪ All wetterhoun got a pedigree
Breeders' Perspective

DNA

- Breeders are willing to collect DNA
  - Give information on potential diseases
- Breeders want to know results
- More information necessary
  - Goals
  - Methods
Breeders' Perspective

OUTCROSS

- Outcross is a dividing subject within breeders
  - Bouvier relatively negative
  - Saarloos & Wetterhoun mostly positive
Breeders' Perspective

BREEDING VALUES

- Confusion about the definition of breeding value
- Mixed results about breeding values
  - Bouvier & Stabyhoun → negative
  - Saarloos & Wetterhoun → positive
Ethics of DNA

DNA Ownership

Accessibility | Privacy | Who owns it?
**Ethics of DNA**

**DNA Profiling**

**Benefits**
- Owners can make a plan for their dog if it is at risk
- The data is important for breeding choices

**Challenges**
- Leftover dogs
- Dogs at risk might not get the disease

**Solution**
Have the DNA only accessible by the associations so the breeders only have to disclose information about the breed and not the specific puppies
Ethics of Health

Aesthetics versus Health

- How much it is valued
- Interconnected
- Not bred for the original intention

Health Trade-offs

- Stay realistic
- On what do you focus?
- Weighted index

Food for thought

“It is ironic that the human-dog bond is so highly valued in western developed nations that people will (knowingly and unknowingly) tolerate various types and degrees of harm to dogs in order to perpetuate their existence” - Croney (2019)
Recommendations

- Keep updating the databases regularly
  - Look into the gEBV
  - Use Sweden & UK for reference
- Consider look-alike reserve population
- Promote communication between breeders
- Organise breeders info markets
- Weighted disease index
Conclusion

We hope this guide gives some potential solutions, while keeping in mind the breeders' perspective and ethics.
Thank you for listening!

QUESTIONS?