LABOKLIN

LABOR FÜR KLINISCHE DIAGNOSTIK GMBH & CO. KG

NEWSLETTER 2/2009

Dear dog breeder,
here you find our second newsletter on genetics in dogs. This version is dedicated to genetic fingerprints and parentage testing as well as to genetics on coat colours. All of these issues are undoubtedly easy to perform using the genetic methods. Results generated are both extremely secure as well as affordable nowadays due to modern technologies. We hope you will enjoy the information we put together!

Dr. Elisabeth Müller

DNA-Profiles

The underlying principle of DNA profiles is that looking at various highly variable regions within the genome in an individual will result in very unique patterns that are both: extremely specific for each individual and unchangeable throughout life. These variable regions within the genome are called microsatellites. Starting with a buccal swab or a blood sample a DNA profile will be performed and listed within a DNA data base. LABOKLIN hands on profiles according to the ISAG (international society of animal genetics), thus providing you with data that are internationally accepted and usable to compare with results from other labs within the ISAG group. Thus, offspring from animals living and analysed in different countries can be examined without troublesome and costly analytic repeats. ISAG standard is accepted by all animal genetic specialists. Probability of two not related animals to show the same genetic pattern using this method is 1 to 1 billion.

DNA data base

Most important advantage of DNA data bases is the possibility to identify an animal with highest possible security. Each molecular fingerprint is recorded for an individual and can be used for comparison of a newly established one when e.g. the chip of the animal is destroyed or lost and the identity is not otherwise proven. This comparison with an existing data base is easy and secure and possible even when both examinations are not carried out in the same lab providing that both labs use the same set of microsatellites (e.g. being ISAG members).

DNA bases on top of simple data bases give the chance to look for newly described mutations and carry out genetic analysis without the need to ask for new samples. Research is made easy this way.

Parentage verification

For each DNA location a pair of two allels characterizes an individual animal. Knowing that one of them will originate from the mother, the other from the father a comparison of probable parents and offspring can reveal matching or mismatching results. The probability of a concluded parentage is given to be extremely high (nearly 99.9 %).

Breed mapping

Unimaginable for long – breed mapping by comparison of highly variable gene segments is now available for several breeds. When is there a need: In stray animals for instance sometimes there is the need or the urge to know by new owners. Main principle again is the genetic fingerprint. In a second step the individual profile is compared with the pool of the questionable breed. Cluster analysis then rules in or out the possibility of the individual pattern to belong to a certain breed.

Important to know: so far the test is limited to the breeds we have filed in our data base (different Collie breeds, different Poodle breeds, Parson Russell Terrier, Labrador Retriever, Rottweiler, American Staffordshire Terrier, Newfoundlands, Doberman Pinscher, Standard Bullterrier, Boxer, Landseer, German Shepherd and German Wirehaired Pointer). We do broaden our panel of breeds constantly though.

Important as well: The test is of use for purebreds as well as for mongrels.

D-97688 Bad Kissingen · Steubenstraße 4
Tel. +49 971 72020 · Fax +49 971 68546
info@laboklin.de

CH-4058 Basel · Riehenring 173
Tel. +41 61 3196060 · Fax +41 61 3196065
labor.basel@laboklin.ch

A-4040 Linz · Rosenstraße 1
Tel. +43 732 717242 · Fax +43 732 717322
labor.linz@laboklin.at

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Parentage verification with missing parents / proof of relationship in siblings

Quite frequently one of the parents is missing when the genetic proof of parentage is needed. Conventional tests don't give a satisfying result in these cases. Sometimes only relationship of siblings is to be proven since both parents are missing.

In these cases like always DNA profiles need to be established of the animals in question. This is followed by a comparison with the DNA of the relatives that are at hand. Complex math formulas established and validated for these cases are applied to give probabilities of a set relationship (likelihood ratio for being related versus being not related).

Background of this type of calculation is knowledge of the frequency the different alleles occur within nonrelated animals in one breed. Right now in this field we work with: Airedale and Bedlington Terrier, Boxer, German Shepherd, Doberman Pinscher, Golden and Labrador Retriever, Newfoundlands, Parson Russell and Parson Jack Russell Terrier as well as Rottweilers. Since our list of breeds is constantly completed further please do not hesitate to ask.

Coat colours in dogs – when should one test?

I most dog breeds e.g. Labrador Retriever there exist three basic colours: black, red/yellow and brown/liver. These three colours are determined by the B Locus and the E Locus- in some breed additionally by the A Locus. Thus the coat colour of the puppies is not always easy to foresee. Genetic testing can help to calculate chances of a preferred colour in puppies.

E Locus: here we differentiate between dominant E (black) and recessive e (red or yellow) with only e/e animals being red/yellow. Animals with E/e or E/E turn out to be black even though E/e animals can pass on the recessive e to the offspring.

Brown/liver is bound to the B Locus. While the dominant B is responsible for black (B/B and B/b animals) the recessive b causes brown/liver (b/b animal). In combination with the E Locus red/yellow (e/e) overrules B, so e/e animals stay red resp. yellow, B will only influence the colour of nose and foot pad.

Thus, a black dog can carry red/yellow being E/e and even brown/liver (being genetically B/b). Mated with a similar dog two black dogs can have offspring with differing coat colour. A brown/liver dog will not carry black with the B Locus (always being b/b), it can carry red/yellow though (E/e) and pass on the information for red/yellow so in rare cases the offspring will turn out to be red or yellow. Red/yellow dogs always are e/e on the E Locus, irrespective of any other genetic information for coat colour.

In some breeds the coat colour is influenced further by different other Loci whereas the A Locus is resulting in fawn/sable, black and tan or tricolour. Other genes are responsible for variations independent from basic colours like black mask, dilution, brindle or Merle. Further reading is suggested e.g. on our homepage www.laboklin.com. Additionally we are always happy to give advice by phone or email.

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