PROJECT GENOMIC BREEDING VALUES

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BERNESE MOUNTAIN DOGS

PROJECT GENOMIC BREEDING VALUES BY SSV, BERNESE MOUNTAIN DOGS

Objectives & significance

Explanations:
"With this project, the SSV has the following objectives:"

- Analysis for hereditary factors responsible for longevity, histiocytic sarcoma, hip dysplasia & ellbow dysplasia
- practical realisation of genetic examinations to guide the breed using transparency of the relevant risk dispositions
- continous improvement of the analysis
- Healthy sustainment of mountain dogs

GENOMIC EXAMINATIONS BY THE SSV

1

DATA CAPTURING

DATA STORAGE

DATA MAINTENANCE

since 1978

2

BLOOD SAMPLE COLLECTION,
BLOOD SAMPLE PROCESSING,
BLOOD SAMPLE WAREHOUSING

DNA-EXTRACTION

since 1996

3

Breeding with genomic breeding values

ITEMIZATION OF GENOMES AT RELEVANT "PLACES" OF HEREDITARY DISPOSITIONS

EXAMINATION OF GENOMIC PROFILES USING SNP-CHIPS

NEXT-GENERATION-SEQUENZING

CALCULATION OF "CORRELATIONS"

since 2011/2012

Explanations: "The genomic examination is based on three pillars:

1. Data capturing , data storage, data maintenance

2. Blood sample collection, blood sample processing, blood sample warehousing & DNA-extraction

3. Breeding with genomic breeding values

In called SNP-chips or next-generation sequencing.

(Further details by Prof. Dr. Distl)

Afterwards the calculation of the "correlations" takes place. This is a relationship between an attribute and a specific genetic constellation expressed by a numerical value."

GENOMIC EXAMINATIONS BY THE SSV

1. **PHENOTYPE DATA OF <u>REFERENCE</u> POPULATION**

GENOMIC PROFILES

CALCULATION OF CORRELATIONS

2011/2012

Explanations:

"Until 2011 / 2012 the calculation of genomic breeding values was based on phenotype data like age, hip dysplasia or elbow dysplasia of dead dogs.

That is why we talk about the reference population with the reference breeding value.

The breeding values describe a risk or a chance of the appearance of a specific attribute within a population. It is a statistical size for a population.

It is not a genetic test nor a single animal forecast."

Genomic breeding value

Describes a risk/chance for the appearance of a specific characteristic

<u>within one population</u>

No genetic test – no single animal forecast

GENOMIC EXAMINATIONS BY THE SSV

Genomic breeding value

CALCULATION OF CORRELATIONS

2.

PHENOTYPE DATA OF TEST POPULATION

GENOMIC PROFILES

since 2012

DR. NORBERT BACHMANN

Explanations:

"Since 2012, the genomic test was offered to breeders. This is why we talk about the test population."

GENOMIC EXAMINATIONS BY THE SSV

PHENOTYPE DATA OF REFERENCE POPULATION

GENOMIC PROFILES

1. CALCULATION OF CORRELATIONS

Genomic breeding value

2. CALCULATION OF CORRELATIONS

PHENOTYPE DATA OF TEST POPULATION

GENOMIC PROFILES

Explanations:

"After the mentioned phenotype data are known: how old became a test dog, why did he die or which hip- or elbow ranking did he get. Those test dogs can again be the base for new calculations and therefore increase the reference population.

As a result, the genomic examinations can continuously be "reviewed" and optimized.

For this purpose it is very important that the occurrences (attributes) are gathered until death including the test candidates' causes of death.

A genomic test is not particularly meaningful without this subsequent gathering and review based on genotype data since we want to breed long-living dogs and not only good "numbers"."

TRANSMISSION OF „RISK VALUES“ TO BREEDERS

PRACTICAL REALISATION OF THE TEST RESULTS FOR BREEDERS‘ BREEDING DECISSION

CLARIFICATION & INFORMATION BY THE SSV

Verification of the breeding success

Statistical evaluation within the Population

Explanations:

“Since the aim of the genomic breeding values’ calculation is the breeding of longer-living dogs, it is necessary that the calculated values are communicated to the breeders and that they know the values of as many dogs as possible. The highest possible transparency has to be created.

The aim is a practical realisation of the test results for breeders‘ breeding decisions.

A constant verification of the breeding success is very important. Therefore, a constant statistical evaluation takes place within the population.

The genomic breeding values/- examinations need an explanation in a manner that is comprehensible for non-professionals. The breeders have to be regularly advised about the genomic breeding values’ significance. As head of this project I serve as a permanent contact for the breeders. The SSV organizes regular information events about the genomic breeding values.”

INTERMEDIATE RESULTS (AS OF 07/15)

2015

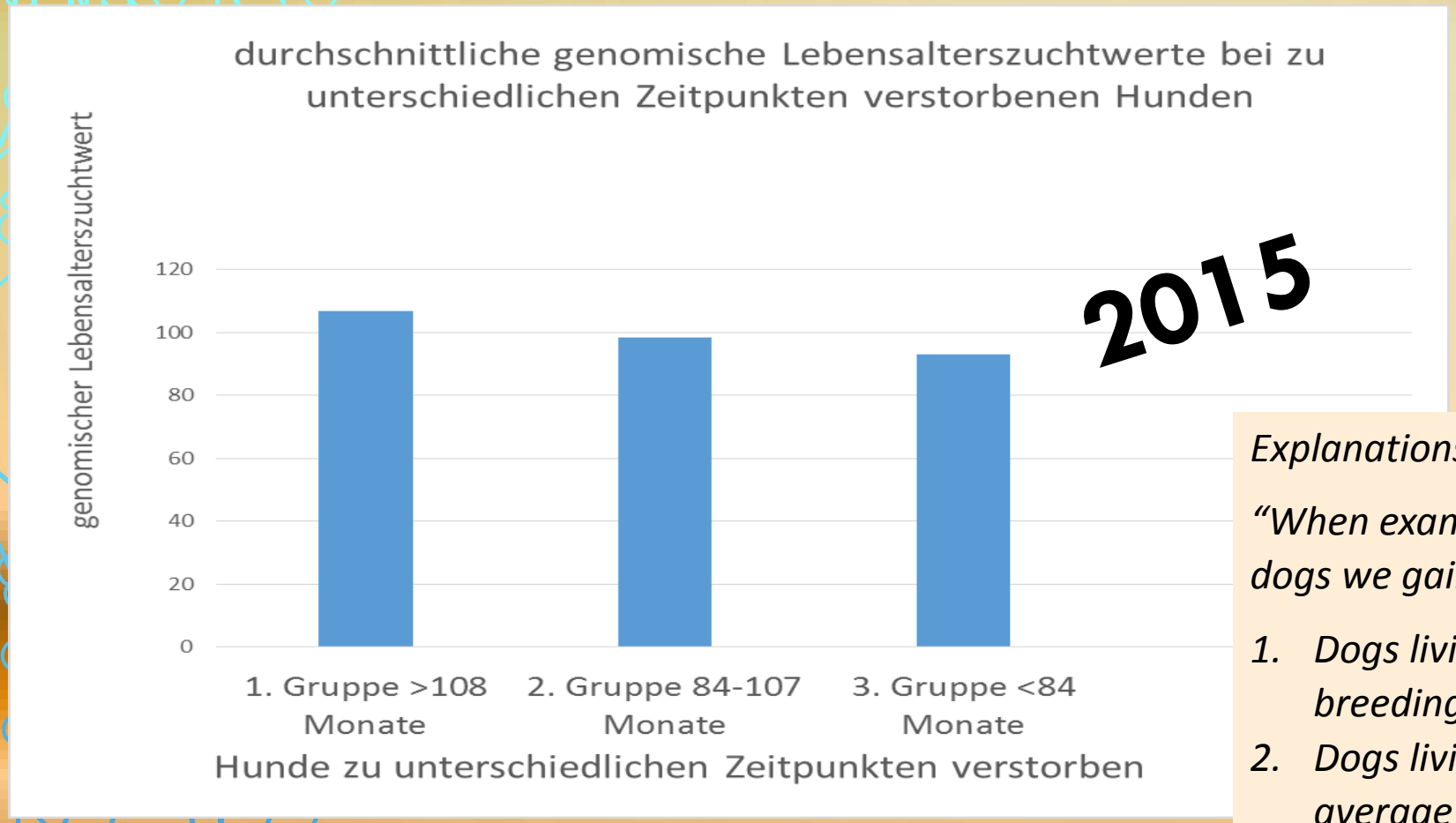
- INTRODUCTION OF THE GENOMIC TEST ON A VOLUNTARY BASIS 2012
- 729 GENOMICALLY TESTED DOGS
- 565 ENTERED IN DOGMAS
- 243 OF THOSE ARE DEAD
- PUBLICATION OF THE RESULTS FOR AGE , HIP DYSPLASIA, ELBOW DYSPLASIA SSV-PRETEST (HISTIOCYTIC SARCOMA , MH) (APPLIED FOR DOGBASE / MEMBERS' VOTE)

Explanations:

"Three years after the start of the first test candidates' examinations I want to present the first intermediate results."

DR. NORBERT BACHMANN

INTERMEDIATE RESULTS (AS OF 07/15)

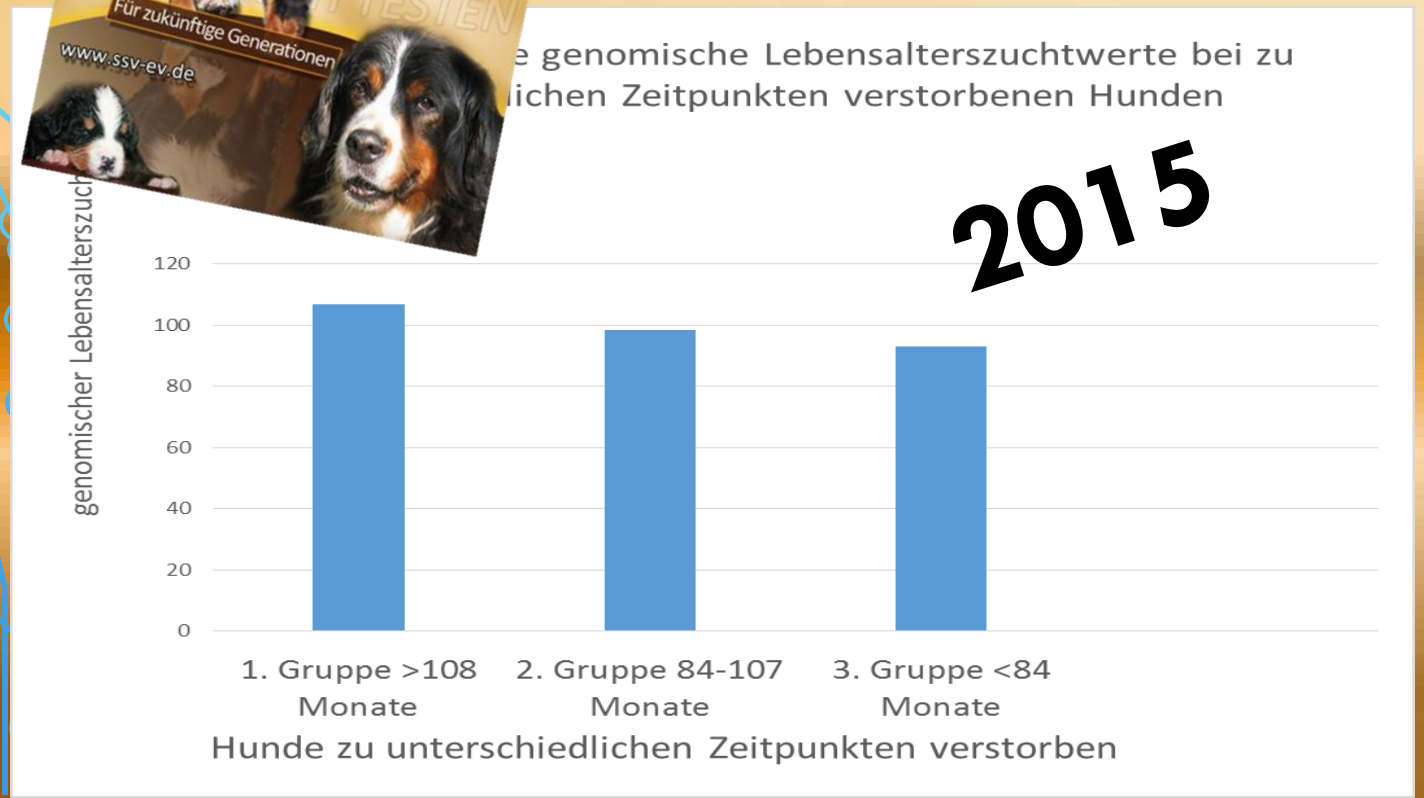


Explanations:

"When examining the breeding values for age of dead dogs we gained the following results:

1. *Dogs living more than 108 months have an average breeding value for age of 106,9.*
2. *Dogs living between 84 and 107 months have an average breeding value for age of 98,4.*
3. *Dogs living less than 84 moths have an average breeding value for age of 92,9."*

CONCLUSIONS:



⇒ HIGH AGE
⇒ HIGH GENOMIC LIFE VALUE

Explanations:

"Therefore, the intermediate result meets our expectations.

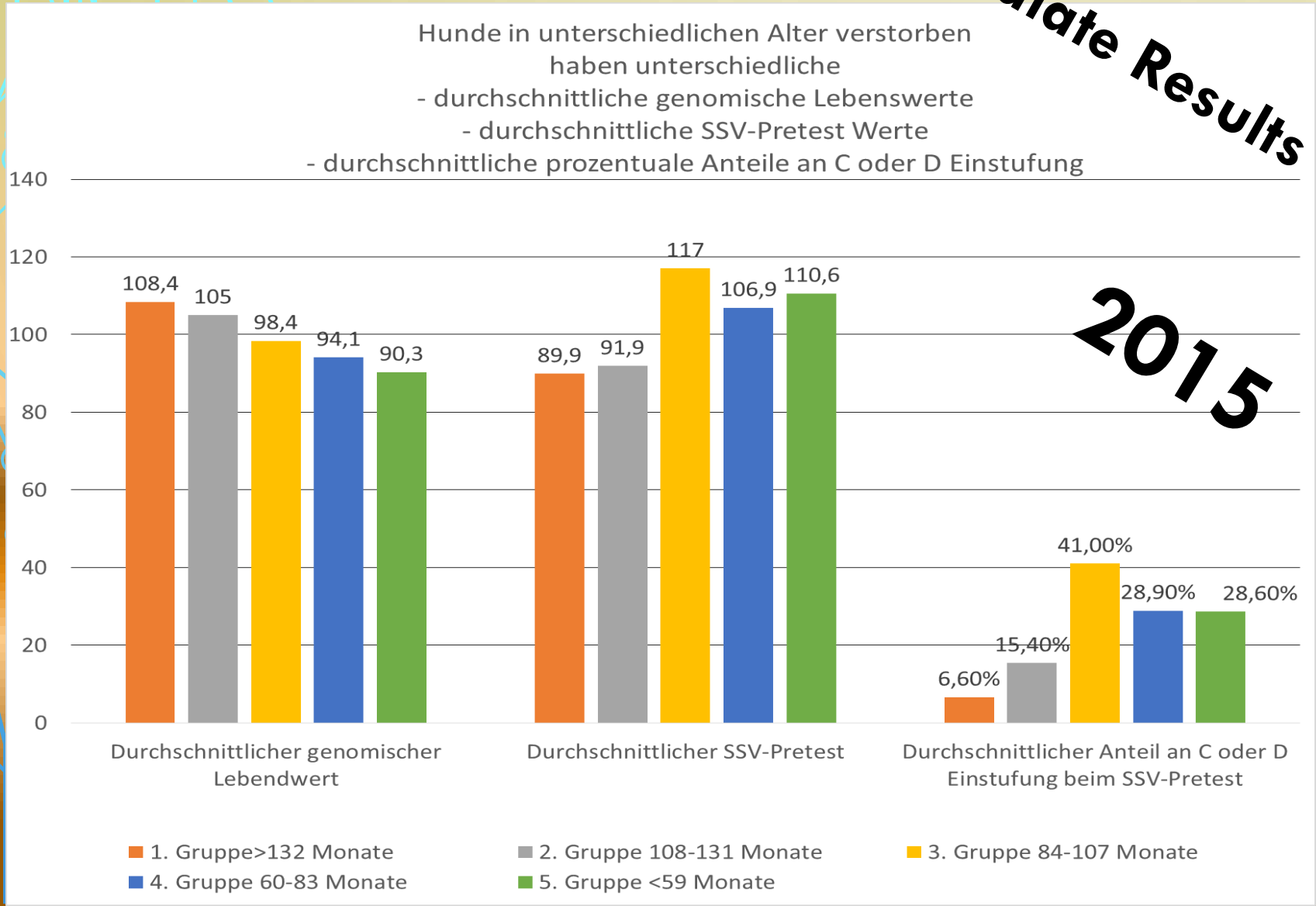
We can draw the following conclusions:

A high age means a

high genomic life value.

In case the curve runs similarly linear in the next 3 to 5 years when a majority of the test candidates will be dead, we can for sure claim the genomic breeding value for age a suitable breeding instrument to increase the life expectancy."

Summary Intermediate Results



Explanations:

"When regarding the intermediate results of the SSV-pretest for histiocytic sarcoma concerning the reached age, the group of dogs who died between the age of 84 and 107 months had the highest calculated risk to fall ill with HS.

Dogs who died really early with an age below 84 months the calculated risk for HS was even lower but still on a high level.

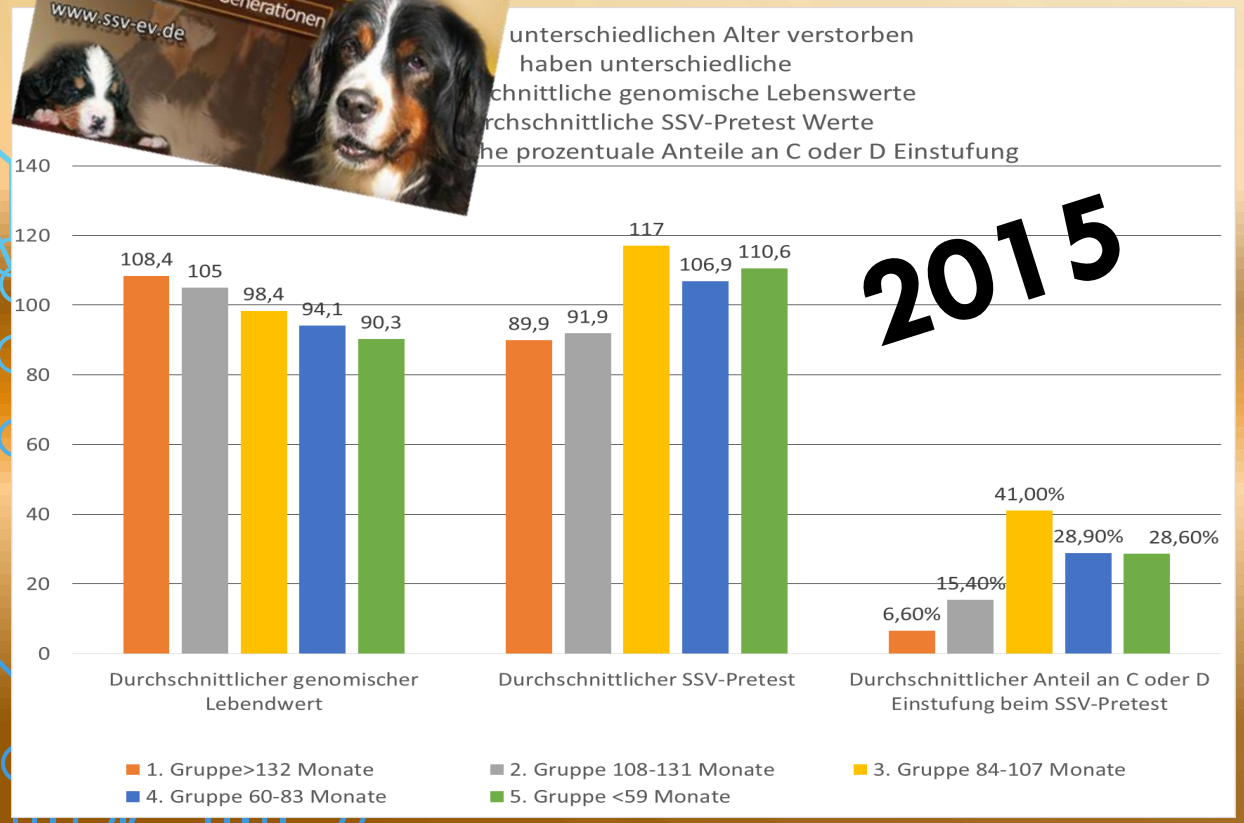
The lowest risk of falling ill with HS was calculated for the dogs who lived more than 108 months.

Analogical to those results the percentage of highest risk classifications of the SSV-pretest (C and D) is very high for the dogs who died between the age of 84 and 107 months."

Conclusion:

for reaching a very high age > 9 years the SSV-pretest <u>alone</u> is not meaningful

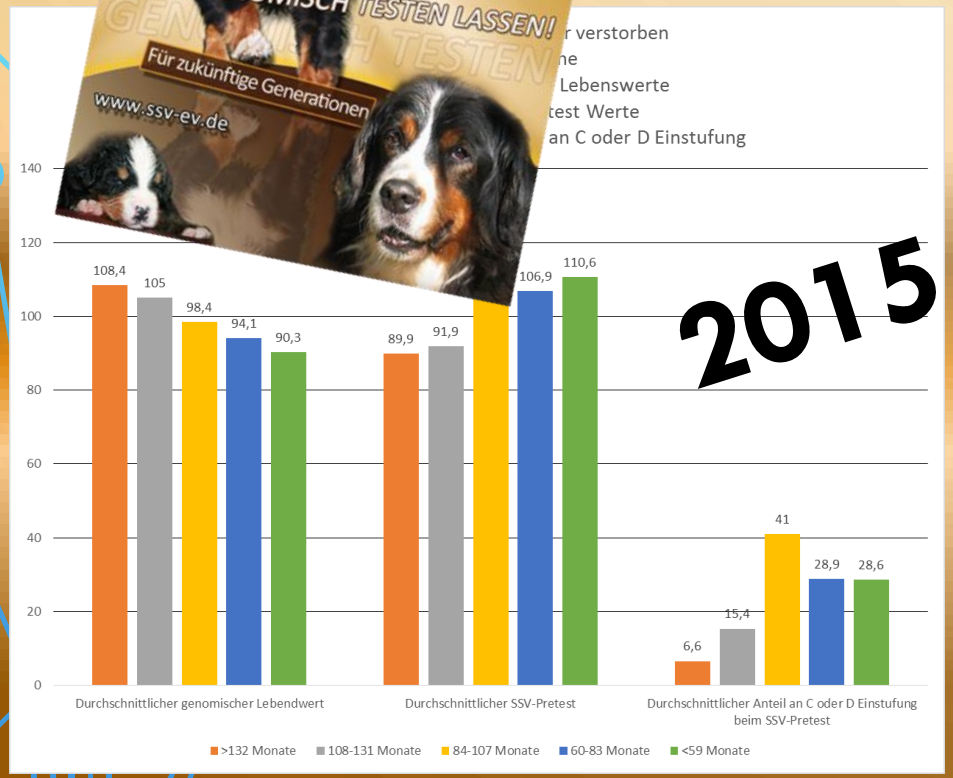
INTERMEDIATE RESULTS
(AS OF 07/15)



Explanations:

"Conclusion:
For reaching a very high age (> 9 years) the SSV-pretest <u>alone</u> is not meaningful enough."

INTERMEDIATE RESULTS (AS OF 07/15)



Explanations:

„Conclusion:

Die results of the SSV-pretest within the group 9 years

and older (reached age) as well as within the group „died under the age of 9“ are on a similar niveu.

Therefore a simultaneous consideration of the genomic breeding value for age is essential for the breeding progress.“

THANK YOU FOR YOUR KIND ATTENTION

DR. NORBERT BACHMANN