**ABSTRACT**

Canine hip dysplasia (CHD) is an abnormal development of the hip joint. Laxity is increased; hips are partially or totally luxated, the femoral head is abnormal and deformed and finally osteo-arthrotic changes become visible. It is a multi-factorial disorder, meaning both genetic and environmental factors influencing the outcome of the disease.

Final scoring is based on subjective evaluation of subtractions and on measurement of certain morphological traits of the hip joint. Measurable traits are the Norberg Angle, the absolute distance of the femoral head centre to the dorsal acetabular edge and the femoral coverage, being the part of the femoral head that is covered by the acetabulum. All these are mentioned in literature and used as help in scoring hip quality. Although these are measurements, they are often estimated. One of the reasons that there are no tools available to measure e.g. the femoral coverage being a non-linear measurement. Also, with the oncoming digital era, measuring will only be possible using adequate software. In this study, we report the measuring of traits related to the quality of hips using a specially designed image analysing program. We measured not only the traits reported in literature and used as reference and used as help in scoring hips, but also some new ones.

**METHODS AND MATERIALS**

At first, radiographs of sedated dogs that were either positive or negative for degenerative joint disease (DJD), were looked for. Only radiographs of acceptable radiological quality (see fig 1) and positioning (see left radiograph fig 2) were retained. This was done because difference in positioning can affect measurements, as is visible in the figure 2, showing two radiographs of the same dog with a different position.

**RESULTS**

It was clear out of the statistical analysis (ROC – curve analysis) that the laxity insensitive measurements had no significant influence on the presence or absence of DJD. Only some of the laxity sensitive measurements, such as the Norberg angle (Fig 3), the distance between the femoral head centre and the dorsal acetabular edge (Fig 4) and the non-covered part of the femoral head (linear, perimeter and area; Fig 3 and 5) are capable to discriminate between hips with or without signs of DJD, as can be seen in table 1. Additional results show that using Digimizer, the CV for measuring the Norberg Angle decreases to 2 % compared to the 4 % when using conventional callipers. The CV for NC-FH² is 9%.

**DISCUSSION and CONCLUSION**

Digimizer is a very useful tool. It allows not only to measure with a higher reproducibility, but also to measure areas and perimeters which can not be achieved with conventional callipers. Another interesting feature is the possibility to obtain corrected measurements immediately. Literature always reports absolute, non - corrected measurements.

The Norberg Angle can discriminate between hips with or without DJD, but all measurements related to the DJD, including laxity insensitive measurements, had no significant influence on the presence or absence of DJD. Only some of the laxity sensitive measurements, such as the Norberg angle (Fig 3), the distance between the femoral head centre and the dorsal acetabular edge (Fig 4) and the non-covered part of the femoral head (linear, perimeter and area; Fig 3 and 5) are capable to discriminate between hips with or without signs of DJD, as can be seen in table 1. Additional results show that using Digimizer, the CV for measuring the Norberg Angle decreases to 2 % compared to the 4 % when using conventional callipers. The CV for NC-FH² is 9%.