Median versus Mean hip scores

The Mean
The word 'mean' is synonymous with 'average', and therefore the breed mean score (BMS) within a breed is the sum of all the scores of the dogs examined within a given time period divided by the number of dogs in that group. The BVA's advice has traditionally been to breed only from dogs with scores below the BMS, and latterly this was revised to 'well below the BMS'. However, due to a mathematical quirk, the mean (average) SCORE is not the same as the score of the average DOG! This is because the scoring system is such that good hips score low and bad hips score highly. The high scores of a few dogs with severe changes will increase the BMS disproportionately and give a false impression of the average hip status in the breed; it will appear to be worse than it in fact is.

Here is an example:
Fourteen dogs from the same breed are hip scored and receive scores of 0, 1, 2, 3, 4, 4, 5, 5, 6, 6, 7, 8, 11 and 106. The total of these scores is 168 and the mean (average) score is 168 / 14 = 12. However, this score is higher than the scores of all but one of the dogs; it has been raised by the single dog with the very high score of 106. The thirteen dogs with scores of 0 to 11 appear to be better than average and only the dog with a score of 106 would be excluded from breeding.

The Median
The median is a figure in mathematics at which an equal number of items are both higher and lower. It therefore represents the middle of the population, or the average item. Because of the way in which the scores are given (higher scores = worse hips) the breed median will always be *less* than the breed mean over the same period of time.

Taking the dog example again, the median is the score at which there are an equal number of higher and lower scores. The median therefore represents the score of the 'average dog', the dog in the middle of the population with regards to its hips. The median score here is 5, as there are 6 dogs with lower scores (better hips) and 6 dogs with higher scores (worse hips). It therefore makes sense to breed only from dogs with hip scores below or at the <u>median</u> in order to improve or keep the current hip status. The dogs with scores of 6 to 11 are *better than the breed mean score* but are actually in the *worse half of the breed* and would not be recommended for breeding. **Using the median as the cut-off point rather than the mean therefore applies more appropriate and rigorous selection pressure.**

Summary

It must be appreciated that selection of dogs for breeding based on hip scores is not an exact science, since environmental as well as genetic factors are involved in determining the nature of the hip joints. However, the best chance of producing offspring with good hips is to use only parents with low scores, considering the <u>median</u> as the ideal cut-off rather than the mean. The BVA's advice is now revised to make selection of breeding stock easier and medians as well as the means are published.