

## **Report on the VOHC Digital Scoring Project Session at the September 16, 2017 Nashville Veterinary Dental Forum**

1. **Colin Harvey, VOHC Director**, gave a brief overview of the purpose of the project and activities to date, including progress made at the [Malaga European Veterinary Dental Forum in May 2017](#).
2. It was recognized that the Inspektor Research Systems **Quantitative Light-induced Fluorescence (QLF)** camera and software is a practical objective scoring method that has been validated for scoring the extent of plaque in dogs and cats.
  - a. This system has now been accepted by VOHC as an approved method for scoring **extent of plaque** in dogs and cats.
  - b. There are issues of reliability of the QLF camera that will be reviewed by Inspektor.
3. The **VOHC scoring project effort** is now turning its attention to five issues:
  - a. Whether to use a disclosing agent prior to photographing the teeth.
  - b. Extending the system to include both plaque and calculus.
  - c. Extending the system to include consideration of thickness in addition to extent of coverage.
  - d. Determining the optimal minimal number of teeth to be scored when calculating the mouth mean score.
  - e. Whether to incorporate a weighting system based on tooth size.
4. **Use of a Disclosing Agent:** The original QLF system does not use a disclosing agent – the fluorescence occurs as a result of presence of porphyrins produced by plaque bacteria. The area of plaque disclosed by a dye as seen on QLF images is much larger than the area that fluoresces in the same tooth before the dye has been applied. Calculus that has been brushed free of plaque fluoresces, whether or not a disclosing agent is used. While use of a disclosing dye is not an essential component for QLF scoring, disclosed plaque is much more visible to the naked eye, providing effective visual confirmation of presence of plaque. But does keeping a record of QLF images of disclosed teeth make any sense if the plaque or calculus scores differ significantly from those on the undisclosed images, and the undisclosed images are the images used for data analysis?
5. **Inclusion of Calculus: Extent of calculus** can be readily assessed in QLF images if plaque is brushed off the surface.
6. **Thickness of Plaque and Calculus.** It was agreed that further discussion of this topic needs to await specific discussion with Elbert Waller from Inspektor Research Systems. In the informal post-presentation discussion, Dr. Dale Scherl noted that Hill's Pet



The effect of using particular subsets was examined by reviewing the % reduction in plaque or calculus resulting from the three statistically validated bilateral subsets. Bilateral subset 3 showed the largest variation, having 6 of the 9 largest tooth variations, including one of 26%. Bilateral subset 2 differed from the full VOHC set by a maximum of 9.6%. Although subset 3 was validated using the  $r_i$  of  $\geq 0.90$  standard, the larger differences in % reduction resulting from use of subset 3 suggests taking a more conservative position, by adopting a recommendation to use subset 2 (12 teeth). All but one of the % reduction per tooth for the 12 tooth subset were equal to or slightly greater than the % reduction for the full VOHC tooth set, suggesting minimal risk that the mouth mean will produce a % reduction lower than that calculated from the full VOHC set data.

Different %reduction from current VOHC Tooth Set?									
Comparison of % Reduction, Control vs Test.									
	Plaque, Company A			Calculus, Company A			Calculus, Company B		
	Trial 1	Trial 2	Trial 3	Trial 1	Trial 2	Trial 3	Trial 1	Trial 2	Trial 3
VOHC Set	46	32	19	63	48	46	61	67	58
B1 Set	48	33	19	65	49	48	61	68	59
B2 Set	49	35	18	62	48	46	59	66	55
<b>B3 Set</b>	<b>47</b>	<b>35</b>	<b>14</b>	<b>56</b>	<b>43</b>	<b>41</b>	<b>58</b>	<b>66</b>	<b>55</b>
Largest % difference	7%	9%	26%	11%	10%	11%	5%	1%	5%

The comparative data for the Bilateral 12-tooth % reduction and Unilateral 8-tooth % reduction in the nine data sets are:

% Reduction	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7	Trial 8	Trial 9	Mean of all 9 trials
Full VOHC set	46	32	19	63	48	46	61	67	58	<b>48.9</b>
Bilateral 12-tooth set	49	35	18	62	48	46	59	66	55	<b>48.7</b>
Unilateral 8 tooth per side set.	49	38	16	66	49	49	62	70	54	<b>50.3</b>

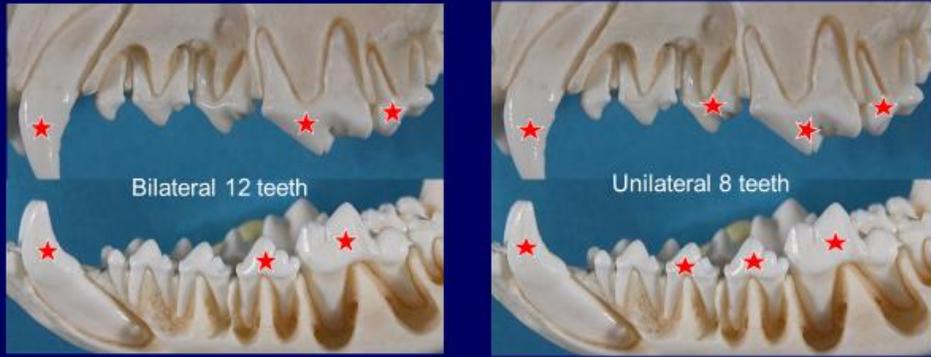
*(This table includes data for the unilateral 8-tooth set, which were not included in the Forum presentation).*

The bilateral 12-tooth set averaged almost exactly the same as the full VOHC set, and the unilateral 8-tooth set averaged slightly higher than the full VOHC set; these results suggest that there will not be a problem with inherent under-counting (and thus possible failure to reach the VOHC standard which may have been reached when using the full VOHC tooth-set) when using either set compared with the full VOHC set. This had been recognized as a potential problem at the Malaga meeting.

**Recommended Tooth subsets for use in VOHC trials:**

### Statistically Acceptable Tooth Sets

Tooth Set	Number of teeth scored	Upper						Lower		
		I3	C	PM3	PM4	M1	M1	PM4	PM3	C
VOHC Subset BILATERAL dog set 2	12		X		X	X	X	X		X
VOHC Subset UNILATERAL dog set 1	8		X	X	X	X	X	X	X	X



The image shows two photographs of dog skulls. The left skull is labeled "Bilateral 12 teeth" and has red stars on 12 teeth. The right skull is labeled "Unilateral 8 teeth" and has red stars on 8 teeth.

The Harvey presentation then moved away from considerations of scoring to issues of safety relating to chew treats. VOHC is considering requiring mechanical testing and solubility/digestibility testing data when a chew treat is submitted for VOHC review. Slides on this topic are included in the .pdf file of the Nashville PowerPoint presentation. A draft proposed policy will be developed and circulated to interested parties for comment.

An open informal discussion session was held immediately following the formal presentation. Some issues were clarified, but no additional recommendations were adopted.