News from Research

ROYAL CANIN

#5 - June 2012

Intro

Vet universities, vet practitioners and Royal Canin...A teamwork

Every day, the Royal Canin Research team works in partnership with these two major pillars of the veterinary world to make new breakthroughs to improve cat & dog health. The synergy between vet universities and vet practitioners is obvious and can lead to great discoveries in cat and dog nutrition and in pet care more generally. This new issue of "News from Research" celebrates the first birthday of this newsletter, and demonstrates that these great collaborations work!

New discoveries around major health issues such as dental diseases, IBD, overweight coming from the work of Residents or PhD students and consolidated by vet practitioners allow us to collect reliable information on cat and dog benefits.
We hope you will enjoy this new issue whether you read it in your private practice if you are vet practitioner, at your desk if you are a University Professor or in the Students Office if you are vet student!

Marie-Anne Hours (Scientific Support Manager - R&D) & Gregory Casseleux (Scientific Communication Manager - Europe)

Dental

A new method to measure dental plaque accumulation

Precise assessment of the extent of dental plaque coverage on tooth surfaces is essential in periodontal research. This new image-analysis system allows an accurate evaluation and monitoring of dental plaque deposition in dogs.

In veterinary medicine, the Logan & Boyce plaque index is the most commonly used method to assess the dental plaque coverage, but it has been shown that this index was inaccurate and modifications have been suggested to improve precision. This study was designed to validate a new method for dental plaque coverage assessment in dogs based on an image-analysis system.

Eight healthy dogs, weighing between 2 and 8 kg were involved. Firstly, a plaque disclosing solution was applied on the crown surface of the teeth. This dental plaque disclosing was followed by rinsing and gentle drying. Then, the image-analysis planimetric measure consisted of 3 successive steps:

- **Step 1:** Standardised pictures of the maxillary and of the mandibular arches of the dogs were taken.
- **Step 2:** Manual contouring of the crown surface was performed using Photoshop® CS4 extended and a graphic tablet.
- **Step 3:** Image analysis of disclosed plaque on crown surface was performed using a specific algorithm created with the MATLAB® software. Briefly, each pixel of the crown surface was identified as disclosed plaque or not, according to the colour Red Green Blue codes. An interface was also developed to calculate directly dental plaque surface / global tooth surface ratio.

Repeatability and reproducibility of the complete method (steps 1 to 3) were assessed on 9 teeth from 5 dogs (4 repetitions) for the repeatability and from 4 dogs (2 pairs of operators and 3 repetitions). The global method was found to be repeatable (Coefficient of Variation ±SEM: 8.38 ± 1.14 %). No difference was detected between the two pairs of operators for the means of plaque/tooth ratio (p=0.68, Wilcoxon test), that showed the reproducibility of the global method. The error due to the standardisation of the pictures taking (step 1) was measured on the plaque surface / tooth surface ratio. This error was 4.5 +/- 1.03 %, which demonstrates the precision of the method.

This study validated a new method of dental plaque coverage assessment that helps to quantify the dental plaque surface on the teeth, and that can be applied to monitor dental plaque kinetics.

Mariani C, Boutoille F, Calvez J, Soulard Y, Hennet P, Biourge V. Validation of a new method for the measurement of dental plaque accumulation in dogs based on an image-analysis system. Proc. of the 21th European Congress of Veterinary Dentistry, Lisbon, Portugal, 2012, 24-27th may

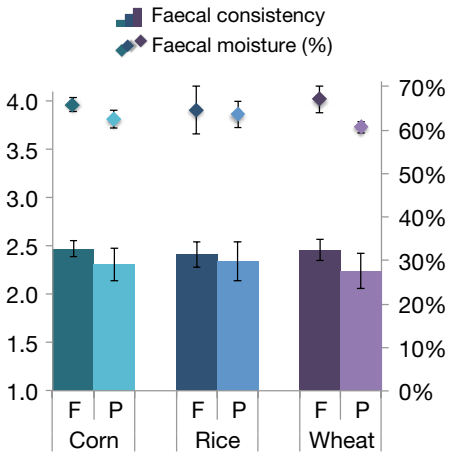
Intestinal

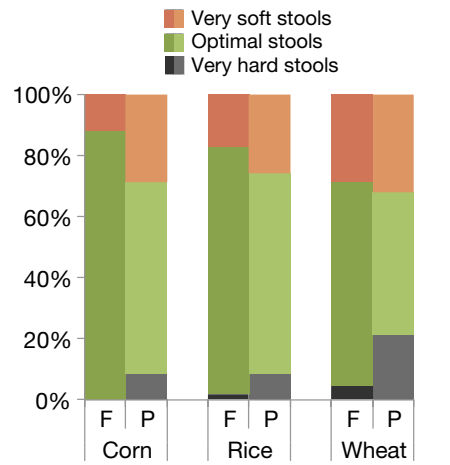
Faecal parameters are influenced by starch source and form, but also by body size

Large breed dogs are known to have a lower digestive tolerance than smaller ones. This could be due to a lower starch ileal digestibility, leading to a higher fermentative activity in the colon. The aim of this study was thus to assess if the form of different starch sources could impact faecal characteristics in small and large breed dogs.

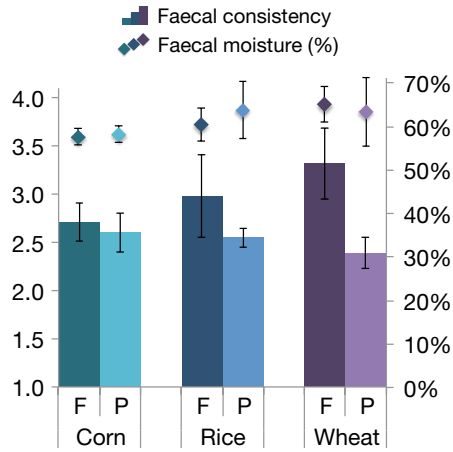
Five Miniature Schnauzers and 5 German Shepherds were included in the study. Six iso-formulated , only varying in the source (wheat, corn or rice) and form (flour or purified) of starch were tested. Each diet was successively fed for 2 weeks, in a crossover design. Faecal quality was scored daily, from 1 (hard) to 5 (liquid) and was considered optimum when ranging from 2.25 to 2.5. Fermentation by-product (Short Chain Fatty Acids, lactate and ammoniac) concentrations were measured in fresh faeces. Effects of diet or breed on faecal parameters were statistically tested.

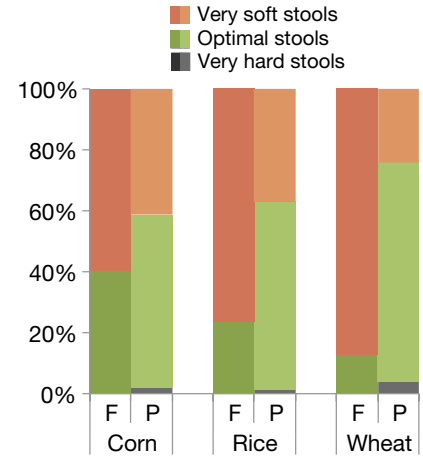
Influence of starch source on faecal consistency, faecal moisture and optimal stool frequency in Miniature Schnauzers.





Influence of starch source on faecal consistency, faecal moisture and optimal stool frequency in German Shepherds.





Influence of form and source of starch:
Purified starch led to stools with better consistency, lower moisture and lower concentration of fermentative end-products. When starch was purified, the effect of the source was negligible. In contrast, when used in the form of flour, corn and rice led to stools of better quality than wheat.

Influence of breed:
In Miniature Schnauzers, starch form did not affect faecal consistency or frequency of optimal stools, even though episodes of constipation were observed with diets formulated with purified starch.

ROYAL CANIN

On the contrary, in German Shepherds, faecal quality was significantly affected by the form of starch. In these dogs, purified diets resulted in higher frequency of optimal stools compared to flour diets, and tended to improve faecal consistency. Compared to Miniature Schnauzers, German Shepherds always presented softer stools and higher concentration of fermentative by-products, especially when fed diets containing flour.

From these results, the form and the source of starch appear to be important factors to take into account to improve faecal characteristics. The use of purified starch presents a great interest in diets designed for large or sensitive dogs in order to improve fecal consistency, and to reduce fecal water content and large intestine fermentative activity.

Goudez R, Weber M, Biourge V, Martin L, Leray V Dumon H, Nguyen P. Influence of different forms of starch sources in expanded dry diet on stools characteristics in dogs differing in body size. Proc. of the 12th AAVN Clinical Nutrition and Research Symposium 2012.

Intestinal S100A12...a name to remember

This protein could be used as a marker for Inflammatory Bowel Disease in dogs.

Diagnosis and treatment of inflammatory bowel disease (IBD) in dogs can be challenging. Faecal markers of the disease correlating with clinical severity would be very useful for the clinician. Faecal calprotectin concentration was already evaluated in dogs with chronic enteropathy[1]. Other neutrophilic proteins, like S100A12, are considered useful tool for the detection of active gastrointestinal inflammation in humans. However no study has evaluated interest of S100A12 in canine IBD. The objective of this work was to measure faecal S100A12 concentrations in dogs with IBD and to correlate these concentrations to clinical and histological markers of disease severity.

Faecal samples were collected from 29 dogs with IBD and 70 healthy control dogs. Faecal S100A12 concentration was measured by an in-house ELISA, and was compared between dogs with IBD and healthy controls. The correlation of faecal S100A12 concentrations was assessed thanks to:

- A clinical activity index, (CCECAI* scoring system);
- An endoscopic and histologic scoring system using a 4-point semi-quantitative grading system(0=inactive, 1=mild, 2=moderate, and 3=severe changes).

Faecal S100A12 concentrations were significantly higher in dogs with IBD compared to healthy controls. The concentration of this protein correlated with the severity of endoscopic disease in the duodenum, but not in the stomach, and had a trend to correlate with the endoscopic disease activity in the colon. Faecal S100A12 concentrations were not associated with the severity of histological changes in the stomach, duodenum, or colon, but tended to be higher if histology revealed a neutrophilic component of the inflammatory infiltrate. They also showed a trend towards correlation with the CCECAI score.

*CCECAI: Canine Chronic Enteropathy Activity Index, (from Allenspach et al, 2007).

This study showed that faecal canine S100A12 concentrations are increased in dogs with IBD compared to healthy dogs and correlate with endoscopic disease severity. Further studies are under way to evaluate the mucosal expression of S100A12 in dogs with IBD and to assess faecal S100A12 concentrations in response to treatment.

Heilmann RM, Grellet A, Allenspach K, Lecoindre P, Day MJ, Procoli F, Grützner N, Suchodolski JS, Steiner JM. Fecal S100A12 concentrations are increased in dogs with inflammatory bowel disease. Proc. of the 2012 ACVIM forum. New Orleans, Louisiana

1: Grellet A, Heilmann RM, Feugier A, Lecoindre P, Hernandez, Freiche V, Peeters D, Suchodolski JS, Grandjean D, Steiner JM. Faecal calprotectin concentration in adult dogs with and without digestive troubles. Proc. 21th ECVIM Congress. Sevilla 2011: 192

ROYAL CANIN

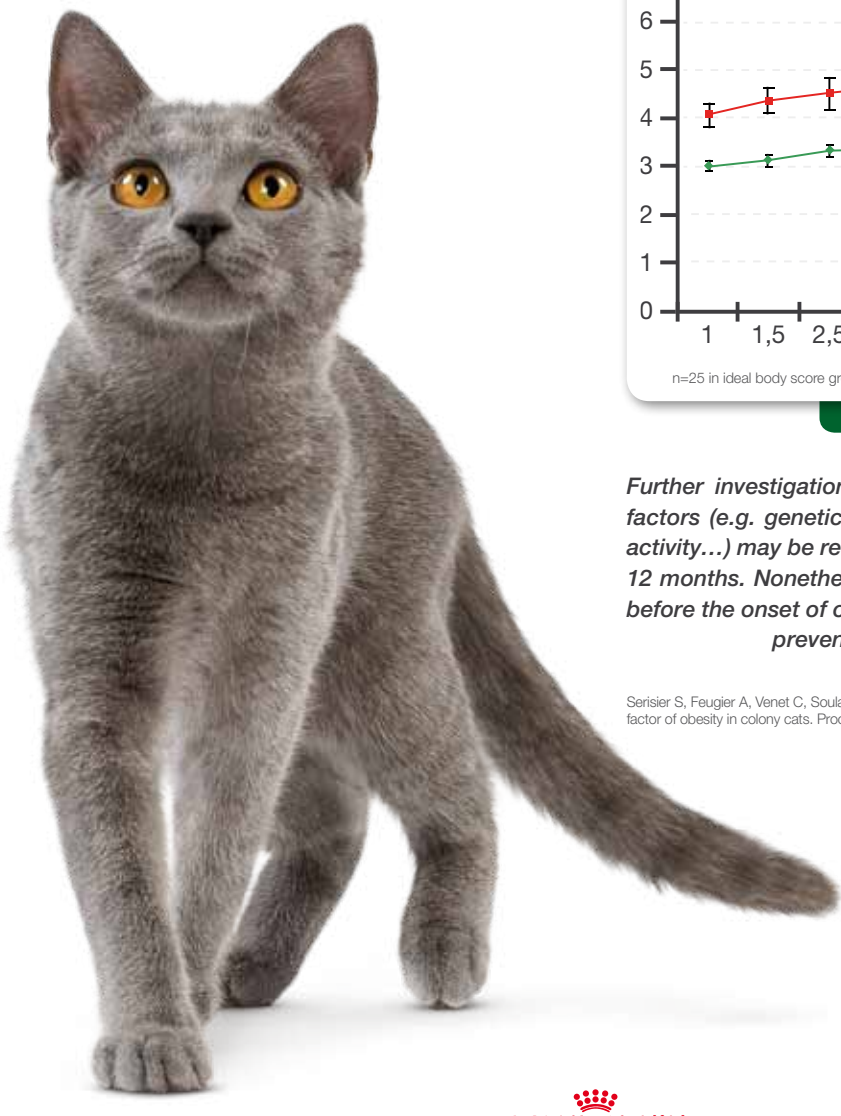
Obesity-Satiety

Body weight at one year of age: a predictive parameter for cat obesity?

A 8.5 year longitudinal study in 80 cats identified body weight at 1 year of age as a main risk factor for the development of overweight in cats.

This retrospective study involved 80 cats representing 14 different breeds, with 36 males and 44 females. Of these cats, 36 were determined to be overweight (Body condition score BCS > 5/9), whilst the remaining 44 were in ideal body condition (BCS= 5/9). Data were collected over a 8.5 year period, during which cats were fed ad libitum with various types of dry food, and the effects of various factors (including age, breed, gender, neutered status, daily food intake, as well as body weight at 1 year of age) on weight status were assessed.

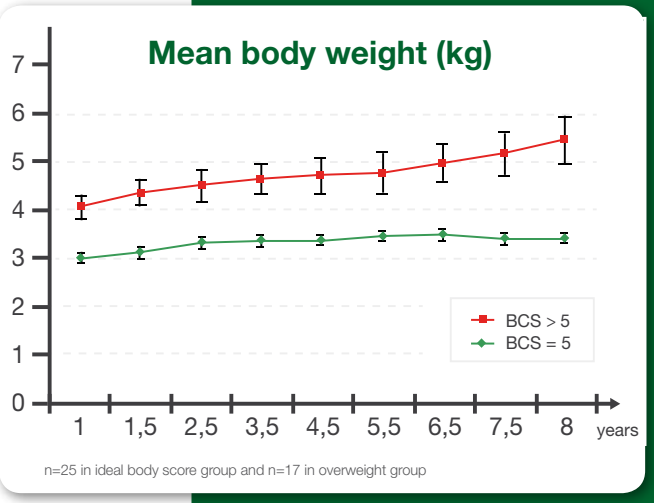
In this population, the main significant variable that predicted the likelihood of being overweight as an adult were food intake and body weight at 1 year of age. A statistical model was then created to assess changes in body weight and food intake between 1 and 8.5 years of age where data was available (42/80 cats).



Body weight increased significantly with age only in the overweight group (BCS>5 at 8.5 years of age), whilst food intake did not change with age in either group. Interestingly, when body weight at 1 year of age was included as a covariate in the statistical model, no differences in either body weight or food intake were noted, suggesting that most effects could be explained by body weight at 12 months.

Finally, given the importance of this factor, changes in body weight from 3 months to 1 year were assessed where data was available (16/80 cats). The percentage of body weight change between 3 months and 1 year of age appeared as a risk factor for being overweight in adulthood. This suggests that the difference between groups at 8.5 years of age originates from growth.

Evolution of mean Body weight over 8.5 years of 42 cats :



n=25 in ideal body score group and n=17 in overweight group

Further investigations are necessary to understand which factors (e.g. genetics, rate of growth, food intake, physical activity…) may be responsible for body weight differences at 12 months. Nonetheless, identifying at-risk cats at this age, before the onset of obesity, could enable strategies aimed at preventing feline obesity to be better targeted.

Serisier S, Feugier A, Venet C, Soulard Y, Biourge V, German AJ. A 8.5 year longitudinal study to identify risk factor of obesity in colony cats. Proc. of the 2012 ACVIM forum, New Orleans, Louisiana.

ROYAL CANIN