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MEASURING EMOTIONAL PALATABILITY





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After having been classically focused on intake comparisons, the measurement of pet foods' palatability performance is opening onto new and rich perspectives. Pet food market trends show that the concept of palatability, defined so far as an organoleptic concept, is extending to new dimensions. Indeed, the evolution to pet parenting, with the increase of the pet-owner emotional bond, forces market players to consider the 'pet owner - food - pet' triangular relationship when evaluating their product performance. Palatability does not only deal with pet centered preferences anymore, but also with the pet owners' perception of his pet's feeding satisfaction.

DIANA Pet food experts already developed new methods to objectively define and measure the "Emotional Palatability" performance of a pet food. Based on the measurement of percentage of ration eaten, refusals, emptied bowls, speed of consumption... the Liking test and the Panelis Happiness Index™ allow evaluating the palatability performance of a diet with innovative behavioral and consumption criteria that reflect meaningful patterns in the owners' perception of a diet's palatability and of pets' enjoyment.

To go further in the assessment of pet food emotional palatability performance, DIANA Pet food measurement experts used innovative tools such as consumption kinetics and video recording to develop additional relevant criteria taking both pet behavior and pet owner satisfaction into account.

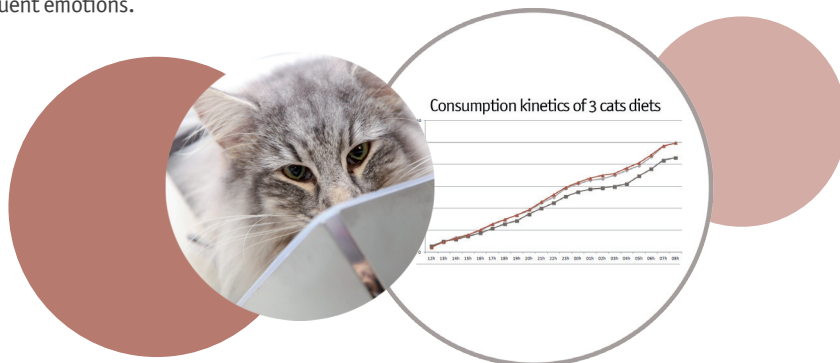


WHAT CONSUMPTION KINETICS CAN TELL YOU ABOUT EMOTIONAL PALATABILITY

Classical methods to measure how animals appreciate food consist in measuring the food intake. The amount of food eaten by the animal during the meal is indeed one of the first criteria that will be perceived by the owner as a sign of palatability. Furthermore, **the way the animal consumes its food over time** is another indicator of pet food palatability performance that can be perceived by owners. The analysis of relevant criteria obtained from kinetics of consumption allows characterizing precisely the food consumption profile over a period of time and studying how food characteristics can modify it. It allows an in-depth evaluation of the food's palatability performance by giving additional information such as food attractivity, which is meaningful for the owner in his perception of pets' enjoyment and his own consequent emotions.

> Defining the right criteria

Specific cat palatability trials were conducted in Panelis, DIANA Pet Food expert center in palatability measurement, in order to select relevant criteria from consumption kinetics analysis. To get closer to the consumption conditions of cats at home, **individual kinetics of consumption were monitored during newly implemented sequential monadic evaluations conducted over several days, with automatic feeding systems.** Around 100 dry foods with different characteristics (range level, formulation, palatant nature...) were compared. For each diet, monadic trials were conducted together with versus trials in order to assess the correlation and the differences between monadic criteria and consumption ratio, and to understand the impact of products' attributes on the construction of the kinetics of consumption.





A dozen behavioral criteria were studied as well as their relation to the two-pan tests consumption ratio results and to the food characteristics. Data from individual kinetics were statistically analyzed using a mixed model (SAS®), with the individual animal effect as a random variable. The trials were performed according to a presentation design so as to reduce environmental effects. For each test the number of cats consumption kinetics registered was higher than 30 to perform statistical analyses on the chosen criteria. The results led to the identification of **several criteria that could be relevantly used to deeper characterize palatability performance considering both pet and owner.**

● **Attractivity**

Food attractivity is crucial for pet owners: the animal should not take too long to taste a food after preparation otherwise it can be perceived as not palatable. Extracted from the consumption kinetic analysis, **the percentage of cats visiting feeding stations at the beginning of the test**, ie the first thirty minutes after the distribution of the food, was selected as a relevant criterion to evaluate food attractivity.

In below example, two super premium dry cat diets (diet 1 and diet 2) were assessed in a monadic sequential trial. The mean amount of food eaten at the end of the trial and the attractivity level of the two products were registered and compared.

Mean amount consumed per product
(Pvalue=0,18)

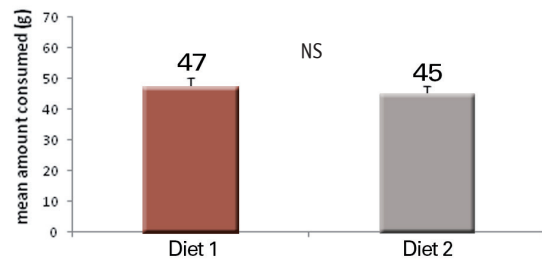


Figure 1 : Mean amount of food eaten for the 2 diets at the end of the trial

NS=p>0.05, *=p≤0.05, **=p≤0.01, ***= p≤0.001

Attractivity
(Pvalue = 0,01)

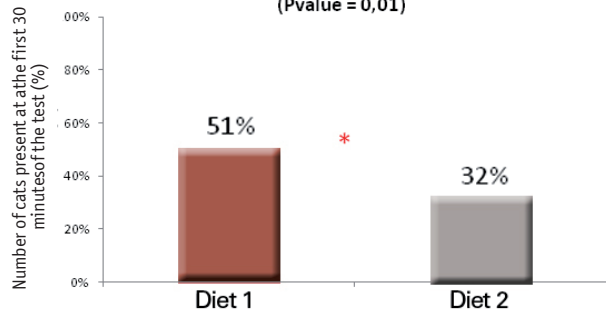


Figure 2: Number of cats present at the first thirty minutes of the test compared to the total number of cats performing the test

NS=p>0.05, *=p≤0.05, **=p≤0.01, ***= p≤0.001



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Figure 1 shows no significant difference in consumption between the two diets. However, the attractivity of diet 1 was significantly higher (51% of the cats present at the beginning of the test versus 32%), highlighting a superior interest for this product. Although overall consumption of both diets tends to be similar, the owner would probably perceive diet 1 as more palatable since his cat would come earlier to taste the product.

● Consumption per passage

When talking about dry kibbles, cats' owners commonly feed their cat once but cats divide their meal in several ones. The amount of food consumed during each of these feeding events is another indicator that owners use to evaluate the palatability performance of the product.

Owners are generally particularly attentive to their pet consumption during the first meal following the preparation time. **The amount of food eaten during the first event** is thus crucial. This criterion is most of the time correlated to the overall quantity of food eaten at the end of the meal however it may happen that some products with a high consumption at the first meal are less consumed during the following feeding events.



The percentage of cats with at least one feeding event with low consumption is thus an additional relevant owner-oriented criterion to evaluate palatability performance. Indeed, although they do not watch all the feeding events of their animals, owners could easily notice when their cats come to the bowl without eating or consuming very few. This could lead to a negative perception of the product performance.

In below example, consumption kinetics of two cat super premium dry diets (diet 3 and diet 4) were compared using sequential monadic evaluation. The total mean amount of food consumed per product but also the mean amount of food consumed at the first feeding event, and the percentage of cats with at least one feeding event with low consumption (ie equal or below 2g) were compared.

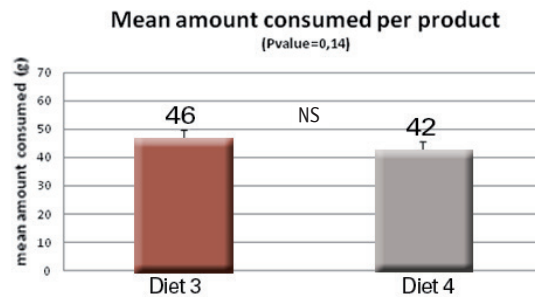


Figure 3 : Mean amount of food eaten for the 2 diets at the end of the two-day test

NS= $p > 0.05$, *= $p \leq 0.05$, **= $p \leq 0.01$, ***= $p \leq 0.001$

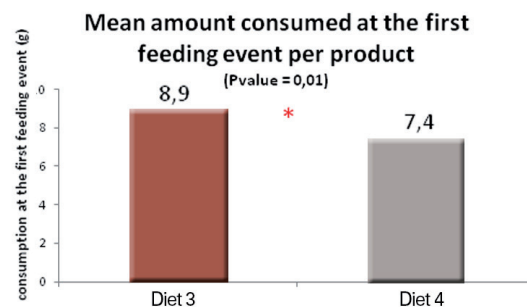


Figure 4 : Mean amount of food eaten for the 2 diets at the first feeding event of the two-day test

NS= $p > 0.05$, *= $p \leq 0.05$, **= $p \leq 0.01$, ***= $p \leq 0.001$

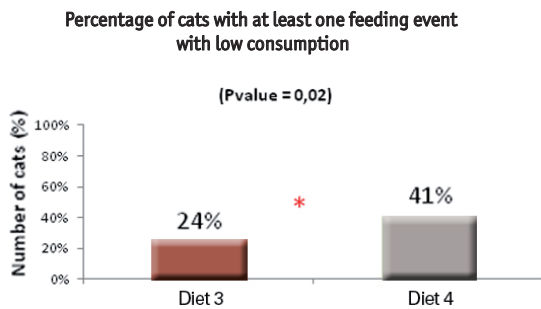


Figure 5: Number of cats with at least one feeding event with low consumption compared to the total number of valid cats performing the test
NS=p>0.05, * =p≤0.05, **=p≤0.01, ***= p≤0.001

The total amount of food consumed was similar for both products (figure 3). However, the consumption at the first feeding event was significantly higher for diet 3 (figure 4). Kinetics additionally show that a higher number of cats had at least one feeding event with low consumption with diet 4 (figure 5). Although the quantities of food eaten were equivalent at the end of the test, the differences between the consumption kinetics of both products could lead the pet owner to consider diet 3 as more palatable than diet 4.

These results exemplify that focusing only on intake ratios is a too restrictive approach today and demonstrate the interest of studying additional innovative criteria related to consumption. These examples are only a partial illustration of the richness of consumption kinetics' analysis. The distribution of feeding events per diet in versus testing conditions, the number of feeding events per diet in monadic conditions, the observation of consumption curves on an hour base... are among the other new criteria confirmed as relevant for performance measurement.

Beyond this criteria related to consumption, DIANA Pet Food experts have also studied new behavioral criteria in direct link with the emotional dimension of pet foods' performance.



VIDEOS: WATCH AND SEE HOW HAPPY THEY ARE

The acute analysis of pet behavior during meal is another powerful way to assess the emotional palatability performance of a food.

It has already been shown that specific behaviors including **facial and body reaction can be expressed in relation to the taste of the food.** Taste reactivity patterns had been described after cats received diets differing in their level of palatability by Van den Bos et al (2000). Patterns where cats licked and sniffed the feeding bowl, licked their lips and groomed their face were considered positive while patterns where cats licked and sniffed the food and licked their nose were considered aversive. In a recent study, demonstration was made that the time spent to sniff the food, suggesting cat hesitation to eat for the owner, was negatively correlated with palatability (Becques et al, 2014).

● Around the meal

In order to identify relevant behavioral clues of palatability performance that could be perceptible by owner, DIANA Pet Food experts conducted several studies in Panelis catteries using video recording. In these researches, cats' behavior was not only studied during the meal, but also before and after it. Indeed, **pet behaviors preceding meal are known to be essentially turned toward the pet owner** with solicitations contributing to a positive palatability perception (Bradshaw et al, 1996). **After the meal, grooming behaviors observed are correlated to palatability and satiety** (Van den bos et al, 2000). The observation of cat behavior "all around the meal" allows a more precise assessment of the overall emotional performance of the food.

Behavioral criteria assessed in Panelis were associated with pet owners descriptions of animal satisfaction obtained through a preliminary marketing survey conducted with 300 pet owners to assess the specific behaviors linked to petfood palatability.

Hereafter are the results of a study conducted at Panelis using video recording in order to compare the feeding behavior of cats when fed wet or dry food. A wet super premium cat food (wet) and a dry super premium cat food (dry) were evaluated by 22 cats through monadic short meal method.



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● Meal preparation, the first step of emotional palatability

For each trial, cats were first individually placed for 15 minutes next to an animal technician preparing the bowl. During this time, cat behavior was qualified every five minutes according to scan sampling method and three patterns were defined. Table 1 presents the characteristics of the patterns observed during the trial, as well as the corresponding interpretations of these behaviors made by owners during the consumer study.

Table 1: Cat behavior patterns observed during meal preparation

Pattern	Characteristics	Interpretation by owners*
«Excited»	Cat looked at the bowl, moved and appealed to the animal technician preparing food	+ Cat really interested by the food
«Attentive»	Cat sat and observed calmly the preparation of the meal	Neutral Cat not really interested by the food
«Without interest»	Cat continued his activities without taking into account the preparation of the food	- Cat not at all interested by the food

* according to consumer study

Figure 6 shows the repartition of behavior patterns between cats during the preparation of the meal according to feed type.

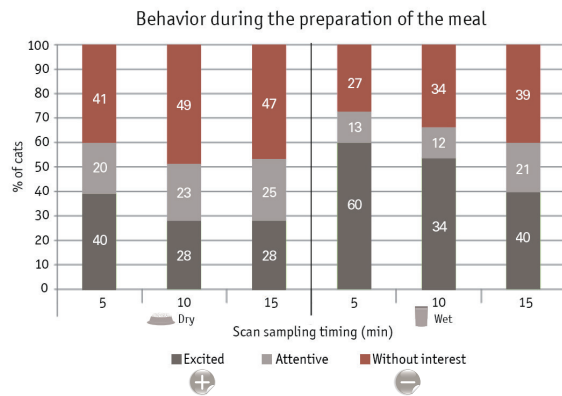


Figure 6 : % of cat being excited, attentive or without interest at each scan sampling (5, 10 and 15 minutes) for each kind of food

Results showed that cats were more excited -looking at the bowl, moving and appealing to the technician- during wet food preparation than during dry food preparation.

● During the meal, varied feeding patterns

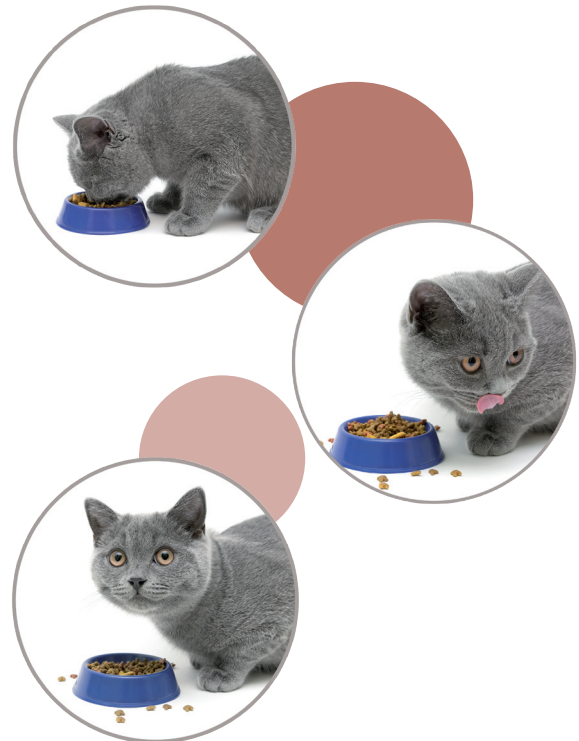
Cats were then placed in individual feeding box in presence of food for a maximum duration of 15 minutes. For each cat, the quantity of food eaten was monitored and various behavioral criteria were analyzed (table 2).

Table 2: Cat behavior criteria monitored during meal

Criteria	Measurement	Interpretation by owners*
Bowl licking	Time spent by cat licking the bowl	+ Animal satisfied by the meal
Cat Stretching	Number of times cat stretches himself around the bowl after eating	+ Animal satisfied by the meal
Latency time	Time between cat entry in the feeding box and first consumption	- Low animal's motivation to eat
Change of posture	number of times cat stands up	-
	number of times cat sits down	- Low animal's interest in meal
Head up	number of times cat raises his head and observes the environment after having sniffing or eating the food	-
Food sniffing	number of times spent around the bowl to sniff the food	- Animal's hesitation to eat

* according to consumer study

Comparing the quantity consumed being not relevant due to the difference in products nature, only behavioural analysis are detailed below. Figure 7 presents the repartition of behavior generating positive or negative perception by owner according to feed type. Latency time is expressed in seconds and other criteria are expressed as frequency. Indeed, since cats were free to away the feeding box before the end of the 15 minutes, the number of observation for these criteria was divided by the time spent in the feeding box by the cat. Means were then calculated for all the criteria.



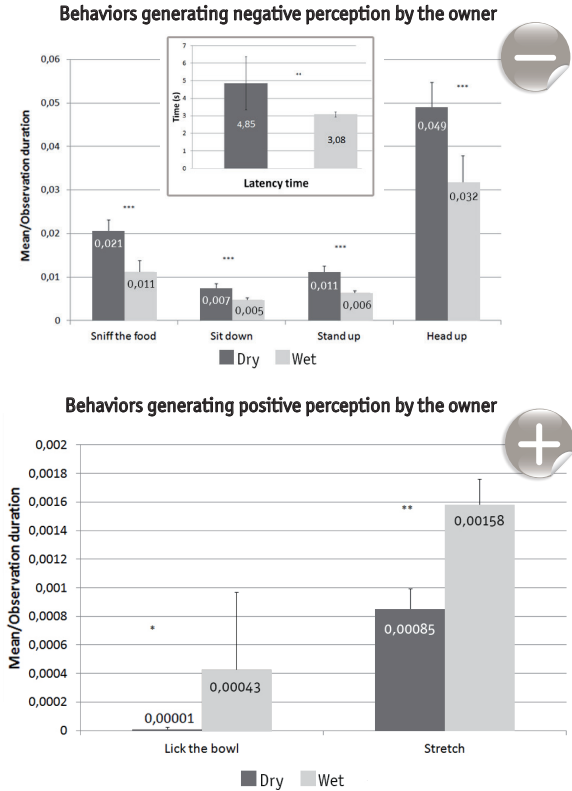


Figure 7: latency time and frequency of behaviours generating positive or negative perception by owner for each type of food
 NS=p>0.05, *=p≤0.05, **=p≤0.01, ***= p≤0.001

The analysis of behavior during meal showed that cats significantly began more quickly to eat wet food than dry food (lower latency time,). Cats were also more concentrated when eating wet food: they sniffed less the food, ate more with the head in the bowl, changed of position less often.Finally, cats fed wet food licked the bowl and stretched themselves more often at the end of the meal.

● **After the meal, feeling good**

Finally, cats were observed during one hour after the meal. Their behaviors were qualified every fifteen minutes according to scan sampling method and three patterns were defined (table 3).

Table 3: Cat behavior patterns observed after the meal

Pattern	Characteristics	Interpretation by owners*
«Grooming»	Cat grooms himself, licking all the parts of his body	+ Animal satisfied by the meal, satisfied
«Rest»	Cat rests, eyes closed	
«Active»	Cat starts again his activities : playing, moving, observing the environment...	- Animal still hungry

* according to consumer study

Figure 8 presents the repartition of behavior patterns between cats after the meal according to feed type.

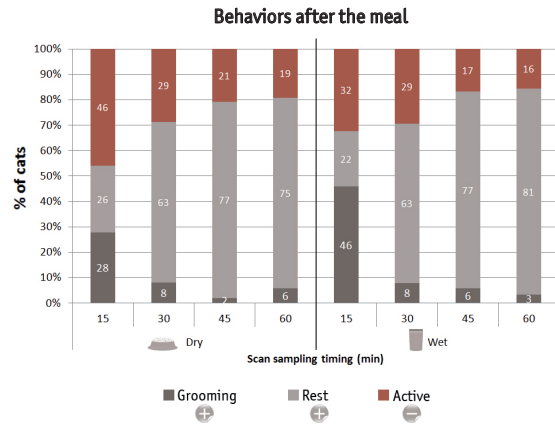


Figure 8 : % of cats who groom themselves, rest or still active after the meal, at each scan sampling (5, 10 and 15 minutes), for each kind of food

Cats fed wet food showed more grooming behaviors, reflecting satiety state, in the first 15 minutes after the meal, whereas those fed with dry food were more active after the meal.

The deep analysis of feeding behavior highlighted that cats eating wet food expressed more positive patterns than cats eating dry food. This significant difference was observed throughout the meal stages: during the food preparation, during the meal and after it. In this study, wet food seems to have a superior emotional palatability performance since it induces numerous cat patterns that meet pet owner expectations.

This study demonstrates that relevant **behavioral performance indicator can be objectively measured and interpreted using video recording.**



CONCLUSION

Meal time is increasingly considered by pet owners as a privileged moment to create emotional bonds with their animal. To make meal time a shared enjoyable moment, pet food manufacturers not only need to satisfy pets' appetite, they also need this satisfaction to be clearly perceptible by the owner.

DIANA Pet Food experts developed new palatability measurement methods based on accurate behavioral criteria specifically chosen as signals of animal enjoyment in pet owners' perception. The analysis of kinetics of consumption and video recording conducted in expert panels open up new perspectives for pet food palatability performance assessment. They add valuable information about the level of emotional palatability of a food.

These innovative methods allow supporting pet food manufacturers in their brands development and positioning. According to their target, manufacturers will develop foods with specific attributes that will not only impact the quantity of food consumed but also the way it is consumed, ensuring both pet and pet owner satisfaction.

→ References

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IF YOU NEED FURTHER INFORMATION, DO NOT HESITATE TO CONTACT THE AUTHORS



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