



Principles Of Pet Food Palatability: The Evaluation

Leading with Technical Expertise - White Paper

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Whisker-Twitching, Chop-Licking Good!

Considering the investment that a team of researchers, including product developers, nutritionists, food scientists and process engineers, put into new pet food innovation, the new product is only considered a success if the end consumer – the pet – enjoys and readily consumes the food! The reality is, pet food brands typically have only one chance to win over the pet parent for a repeat purchase. This is a tall order for us in the pet food industry, as our goal is ultimately focused on optimum nutrition and food safety. If the new product is not also enticing and delicious, then the pet will not eat the food offered, and we have therefore not successfully done our job as a Research & Development (R&D) team.

Palatability, as defined by Tobie et al., (2015) is related to how readily a food is accepted and measured in terms of its attractiveness and consumption. Taste, aroma, texture, nutrition and environment are the key attributes that profoundly influence the feeding experience. All these attributes are emotionally connected from the pet's reaction to what is offered in their bowl, and to the pet parent's perception of how their pet enjoyed their meal.

How then, do we in industry evaluate if a food is not only **palatable** and **acceptable**, but also **enjoyable** for our pets? This white paper will review the current evaluation tools used in the pet food industry to measure these attributes. Let's dig in!

Tools & Measurements

Over the years the pet food industry's approach to evaluating palatability, acceptability, food preference and enjoyment has evolved, with new concepts and technologies continually being researched. Why are these studies valuable? While we may receive many emotional cues from our pets, their ability to articulate and communicate their flavor, texture and food preferences are limited. Unfortunately, food refusal by the pet, and the resulting disappointment by the pet parent, are the most immediate indicators of product to market failure.

There are several primary tools used in the pet food industry to evaluate food palatability in terms of food preference, acceptability and enjoyment, with expected advantages and disadvantages to each. As described by Aldrich and Koppel (2015), acceptability could be defined as the "consumption" of an adequate number of calories in a food item to sustain weight and performance, whereas the "preference"



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of a food is the incremental or graded choice for one food over another and infers that each are being compared.

Paired Preference Testing

Also referred to as a two-bowl test, paired-preference trials compare two moderately differing foods simultaneously offered side-by-side, with the goal in determining if there is a difference detected between Diet A vs. Diet B. Typically the test is performed over two days with 20 animals, however the statistical results are strengthened when more animals or more test days are used. The bowls are switched on the second day to avoid any considerations such as preferred bowl location that the animals may have while eating. The bowls are either removed when one diet is completely consumed or after a set period of time. This two-bowl test methodology would typically be used for research purposes to directly evaluate an identifiable variable difference between the two diets; for example, a research trial where one ingredient or flavor enhancer is replaced with another.

During the study, the research technicians observe and record each animal's reaction and response to the foods. Individual animal data collected during the trial includes First Approached, First Tasted and Amount Consumed. From there, the following evaluations are made, as described by AFB researcher, Stacey Schlanker (2017):

Consumption Ratio (CR) = Amount of Diet A Consumed ÷ Amount of Diet B Consumed

Intake Ratio (IR) = Amount of Diet A Consumed ÷ (Amount of Diet A + Diet B Consumed)

The results are statistically analyzed to determine if a preference is indeed found between the two diets. It is a popular argument that the Consumption Ratio of 2:1, or an Intake Ratio of 0.667 for one diet indicates a clear preference.

This methodology may allow for a rapid determination of palatability, but it does not control for satiety effects (the feeling of fullness) or food interactions between the two products offered (Araujo & Milgram, 2004). Further, this type of preference assessment does not appropriately represent a home feeding environment, as pet parents would not normally present two food choices at one time to their pets for consideration.



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Monadic Testing

The two-bowl test described above had been an industry standard for many years until researchers began seeking a method that would better translate to a home-feeding environment. The goal of this Monadic or one-bowl methodology is to measure the acceptability of each diet, and if the animals consumed enough of each food offering to meet their caloric needs. The test measures the consumption and acceptability of the food offered on Day 1, compared to an alternate food offered on Day 2. This would be similar to a pet parent purchasing a new food for their pet, and observing at meal time how the food was accepted and consumed compared to the previously offered meal. The switchback of the two foods offered could continue for sequential days in order to provide more data in determining a preference. Intake Ratio (IR) and Consumption Ratio (CR) evaluations are completed to determine the acceptability and possibly, the preference, of one diet over the other.

Acceptability

Where the Monadic testing methodology not only measures the intake of a food, it allows for a comparison of the food consumption and intake ratios of one food to another. A single-food Acceptability test is simply offering the animals one diet for consumption over a period of one to three days, to determine if the food is adequately consumed to meet their caloric needs. In other words, did the food attributes result in observed overall food consumption and enjoyment? This type of assessment is often used if the product under evaluation does not have a comparable target in the market. As well, a researcher could choose this test to identify a possible concern with a diet such as texture, aroma, off-flavor or negative digestive feedback (Aldrich and Koppel, 2015). The results are reported in total percent (%) consumed, indicating if enough food was to meet the animal's caloric needs.

In Home Use Test (IHUT)

A valuable, yet under-used methodology to evaluate pet food acceptability and palatability is the In Home Use Test (IHUT). In this type of assessment, the animal's response to the meal offered results in a more realistic outcome, being in the home environment vs. a laboratory or kennel. This is most commonly used by established consumer packaged goods companies (CPG's) for the human food market, to determine if the product demonstrates enough success to proceed to launch. Developing such a program for pet food requires a strong screening process to ensure the animal population is in good health with no behavioral challenges, no food sensitivities, allergies or nutritional ailments, and the animals are of healthy weight



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and body condition score (BCS). Further, the pet parents participating in the study should show no food biases and be willing to be objective relative to their review of the product offerings and their associated attributes. An advantage in this type of testing is the ability to trial the test product(s) across a variety of animal breeds and environments.

Typically, the test products are shipped to the home of each test subject along with feeding instructions, in addition to a survey of questions for the pet parent(s) to respond to. The goal is to seek honest, transparent and relevant feedback regarding the food options offered. Among the challenges are that the results coming from a home setting may vary relative to the animal's acceptance towards the foods, their feeding regime, differences in their typical diet or the perception of the feeding experience by the pet parent (Aldrich and Koppel, 2015). It is important to be mindful that these animals do not have any training and the testing conditions are less controlled (Tobie et al., 2015). However, in home data is can be extremely valuable when seeking to understand consumer insights, but with a strong animal population and study protocol.

The use of an IHUT study is an excellent way to evaluate pet parents' reactions to the product cosmetics, and learn about their perception of palatability through pet-centric criteria (Tobie et al, 2015). This aids an R&D team to improve upon a product or provide guidance to new developments. In a study performed by Diana Pet Food (Larose Forges, 2020), a key finding was that pet parents can identify and correctly interpret their animals' behaviors during a meal, which in turn had an excellent correlation with the diets' palatability levels as measured through food consumption.

What Do The Results Tell Us?

Depending on the study hypothesis, a **win** of a specific test variable is always welcomed! However, it is quite possible that a **parity** result, at a minimum, is desired. The outcome of a parity result in a preference or acceptability test does not mean the two products offered are considered equal or the same by the animals, but may simply mean that they "liked" the products equally with no strong preference for one or the other. This is commonly the desired outcome when feeding one brand vs. another, when seeking to understand how the product will perform in the market against other competitors. However, in R&D testing, researchers often want a more discernible understanding of the variable in question. Therefore, a statistical preference one way or another can lead to further insight, and ultimately, more research. In other words, sometimes a parity result leaves the study inconclusive!



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No One Test Is Best!

In all methodologies described above, contributing factors such as environment, number of animals, animal dynamics, health condition, breed, age and metabolism, the feeding environment, seasonal effect, the food provided prior to the trial, the number of trial days and many more considerations, all can impact the feeding response and final trial results. Similarly, one single feeding behavior of an animal is not sufficient to predict their food enjoyment nor the food's performance (Larose Forges, 2020). For these reasons, we at Simmons Pet Food caution against making a key business or product decision based on one palatability trial. The palatability success of a product is very dependent on the repeatability of the results and product consistency, thereby a strong design of experiment (DOE) surrounding the product initiative should be developed.

Beyond these most common tools and measurements, there are several other innovative test methods that have been developed in an effort to better understand food preferences by our pets. Some examples include olfaction (the sense of smell) research such as the false-bottom bowl method, published by Pétel et al. (2018). This test enabled the influence of odor on dog behavior to be isolated from that stimulated by vision, taste or textural parameters. Similarly, concerning olfaction, Hall et al. (2017) presented a modified two-bowl test using an olfactometer technique for the evaluation of odor preferences. In this study, the test successfully discerned preferences between selected pet food products, however the odor preference assessment showed an absence of preferences for the odors of the same pet foods.

Further to this, tests have been developed using cognitive and reinforcement tools to determine preferences. Araujo and Milgram (2004) developed a cognitive palatability assessment protocol in which the dogs were able to associate a particular object with a preferred food. Another variation of the two-bowl test was published by Rashotte et al. (1984) as an operant lever-press test, in which the animals were trained to press a lever with their nose based on their food choice. While clear preferences can be determined by many of these methodologies, a lengthy training period is required, as well as the need to first identify dogs with higher functioning cognitive ability (Aldrich & Koppel, 2015). There are clearly many innovative and creative opportunities for further research in developing methods and models, which would provide additional insight to pet food preferences!

In Summary

Depending if a brand is launching a new product, seeking a competitive advantage in the market or looking to improve a current product offering, the primary tools described in this paper allow for not only a quantitative but also a qualitative assessment of palatability. The results of these trials are extremely valuable for us as an industry, to better understand how we tailor our products to the animals' liking and



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preferences. Thus, we aim to achieve success from your brand perspective and, of course, food enjoyment for our pets.

Our Commitment – Leading with Technical Expertise – Leah and Jarrod are here to provide guidance and insights – do not hesitate to connect with us at Simmons Pet Food, pfccomments@simfoods.com. We would love to hear from you and be part of your pet's nutrition solution!

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