

KIBBLE SIZE (DIAMETER) AND ITS AFFECT ON FELINE PALATABILITY

SCIENCE & TECHNOLOGY, AFB INTERNATIONAL

OVERVIEW

Creating a product that satisfies a cat's preference can be challenging. Cats are obligate carnivores, which means they prefer higher protein diets over lower protein diets. They are more sensitive to spoiled food smells compared to dogs. The acidity of food can impact a cat's salivation. The texture of food also affects the acceptance of the food. Different breeds of cats have various ways of picking up their food with their tongue. Cats use their canines, premolars, carnassials, and molars, but they lack lateral jaw movement, making texture and size crucial factors in their food preference.

Researchers at AFB International wanted to determine if kibble size (diameter) also affects the palatability of dry cat foods. This feline palatability research was a continuation of the previous work conducted around kibble shape. These results can provide both operations and product implications for pet food manufacturers.

EXPERIMENTAL DESIGN

In previous research, AFB found that the "disc" was the most palatable shape when tested versus multiple other shapes (star, triangle, cylinder, and triangle-hole). In this study, the size of the disc was evaluated with all possible variables being controlled - material, equipment, measurement methodology, and one lot of kibble meal used to make all three diameters.

The meal was a grain-based, 34/13 (Protein/Fat) diet, ground through a #3 screen. An ExtruTech 575 was used to manufacture the finished kibble. All the diameters had the exact specifications for moisture and bulk density. All diameters were coated with the same lot and amount [5.0%] of poultry fat and with the same lot and amount (1.5%) of a premium dry cat palatability enhancer.

Variable(s) in the study - kibble size (diameter):



ANALYTICAL TESTING

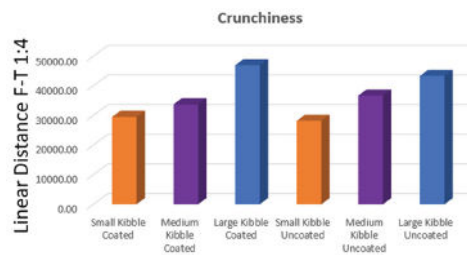
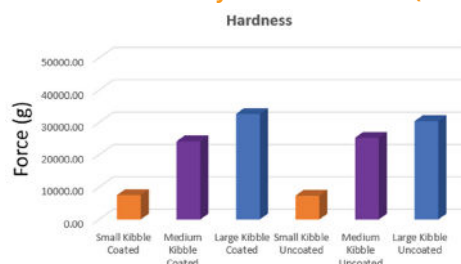
For this test, 3 different probes were selected:

TA-94: To evaluate how the kibble would react if the kibble was "crushed" by the entire carnassial/molar.

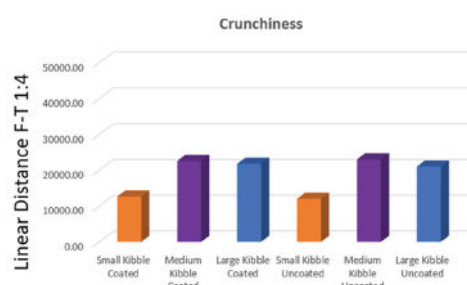
TA-52: To evaluate how the kibble would react if split by the canine(s).

TA-43: To evaluate how the kibble would react if split by the edge of the carnassial/molar(s). (used to evaluate hard kibbles for crunchiness)

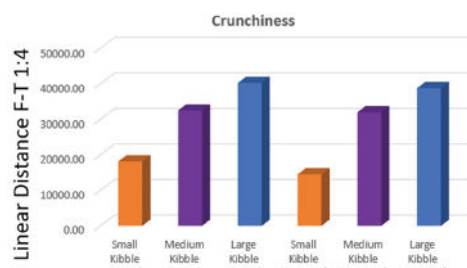
TEXTURE - Crushed by Carnassial/Molar (TA-94)



TEXTURE - Split by Canines (TA-52)



TEXTURE - Split by Carnassial/Molar (TA-43)



PERFORMANCE AND PAIRED PREFERENCE

For palatability testing, feeding trials were completed at AFB International’s Palatability Assessment Resource Center (PARC) with the same panel of 40 cats. Testing consisted of the two-bowl method paired comparison over two days. Each kibble diameter was tested against one another.

INTAKE RATIO

Intake Ratio of the three diameters were a parity (p -value greater than 0.05) to each other. Cats did not make a significant choice between the different diameters.

Ration A	Ration B	CR	IR-A	FC-A	p-Value
Cat Kibble Diameter - Small	Cat Kibble Diameter - Medium	1.1A	0.53	0.66	> .1
Cat Kibble Diameter - Small	Cat Kibble Diameter - Large	1.3A	0.57	0.68	> .1
Cat Kibble Diameter - Medium	Cat Kibble Diameter - Large	1.1A	0.53	0.52	> .1

ACCEPTANCE TESTING

Acceptance tests (2 days) of the three diameters were also parity (p -value greater than 0.05) to each other. Cats did not make a significant choice between the different diameters.

Ration A	Total Consumed (g)	Day 1 Consumed (g)	Day 2 Consumed (g)
Cat Kibble Diameter - Small	2573	1348	1225
Cat Kibble Diameter - Medium	2651	1409	1242
Cat Kibble Diameter - Large	2551	1196	1355

BEHAVIOR TESTING

1st Sniffing bout:

- Monadic: The duration spent sniffing the food first approached before tasting the food or being distracted.
- Paired: The duration spent sniffing the food first approached before choosing to explore the other food or losing interest in both foods.

1st Eating bout:

- Monadic: The duration a food’s flavor holds the cat’s initial focus before distractions become more interesting.
- Paired: The duration a food’s flavor holds the cat’s initial focus before exploring the other option by taste or smell.

Paired Trials	Small Vs. Medium	Small Vs. Large	Medium Vs. Large
1st Approach to Taste	Medium	Large	Medium
1st Sniffing Bout	Small	Small	Tie
1st Eating Bout	Medium	Large	Large
Fewer Rejections	Tie	Tie	Tie
Consumption	Medium	Large	Large
Enjoyment	Medium	Large	Large
Leaves Less	Small	Large	Medium
Fewer Negatives	Medium	Small	Medium

Fewer Rejections:

The food with fewer occurrences where cats sniffed or licked a food and did not eat the food.

Enjoyment:

- Food focus relative to the time food is available (for wet food, includes Uptake and Savoring).

Leaves Less:

- The food that had fewer occurrences of cats turning away from the food.

Negative responses:

- Total recoils, headshakes, dropping food, tongue protrusions, mouth gapes.

CONCLUSION

After conducting analytical tests for performance and behavior, we found that as the diameter of the kibble increased, both its crunchiness and hardness increased when tested on a Carnassial/Molar model. However, in paired preference or consumption tests, cats did not show a statistical preference for the larger kibble. When considering attraction, sustained interest, and handling, cats did tend to choose the larger kibble.



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