earthanimal.com
203-557-3322

PREFERENCE TESTS: WISDOM & COMPETITOR DOG FOODS

by:
Timothy J. Bowser, Ph.D., P.E.
PetMech, LLC
Stillwater, Oklahoma

Context:
Earth Animal Ventures wants to determine preference for their Wisdom pet food products compared to each other and competitor products. Two-sided paired tests were conducted to discover if any difference existed between pet food samples. The test protocol was patterned after the ISO 5495:2005 Standard "Sensory analysis -- Methodology -- Paired comparison test". Fourteen pet dogs and their owners participated in a series of in-home tests.

Test Objective:
Determine pet preference between samples. PetMech did not have any prior knowledge concerning the direction of difference; therefore the test was two-sided.

Number of and Characteristics of Assessors:
We wanted to be at least 95% certain that a high proportion of pets would be able to perceive a difference between the two samples. α was fixed at 0.05 and p_d at 40% (% of expected pets that could distinguish the difference between samples). However, to conclude wrongly that no difference existed would result in additional costs to conduct additional tests. Consequently, the β value was fixed at 0.10. According to the Standard, at least 66 observations were required. It was decided to recruit 14 pets and conduct 6 observations per pair of samples for a total of 84 observations. Pets known to eat dry foods, to discriminate foods, and to take treats from their owner's hand were selected for the test. Table 1 lists the members of the pet panel and their characteristics.

Table 1. Pet panel members and their characteristics.

#	Name	Breed	Sex	Age yrs.	Weight lbs
1	T'Challa	Pit/Lab mix	M	2	75
2	Hillary	Beagle	F	12	30
3	Cookie	Kelpie	F	12	28
4	Layla	Labrador Retriever	F	3	70
5	Reena	Lab mix	F	2	50
6	Bethany	Labrador Retriever	F	15	80
7	Olive	Golden Doodle	F	2	50
8	Hemi	Great Pyrenees/Great Dane	M	2	120
9	Sadie M.	Beagle	F	4	35
10	Lucy	Schnauzer	F	11	20
11	Sadie B.	Golden Doodle/Lab mix	F	3	51
12	Ziggy	Shih Tzu	M	14	13
13	Zoey	Shih Tzu	F	12	11
14	Zeke	Great Dane	M	5	135

About the Samples:
Product samples consisted of Earth Animal Wisdom Chicken and Turkey formulas and four other products purchased from commercial sources (see figure 1 and table 2). Competitor products selected were among the best brands with similar characteristics of the Wisdom products. Pet foods were packaged into small, 1-oz. plastic, food-grade cups

(odorless HDPE) prior to testing (see figure 2). The cups were provided and filled by PetMech and sized to hold the appropriate amount of pet food to be delivered to each pet for individual tests. We wanted a small amount of food for each test (to reduce satiation), but an amount that was large enough to represent the characteristics of the given pet food. Five pairs of products were tested as follows:

The sample pairs tested were A/B A/C, A/E, B/D, and B/F
Where:

A = Wisdom Chicken	B = Wisdom Turkey
C = Honest Kitchen Clusters, Chicken	D = Honest Kitchen Clusters, Turkey
E = Ziwi Peak Chicken	F = Fromm4 Star Game Bird

Figure 1. Photo of packages of competitor products tested: C, E, D, and F pet food packages (left to right)

Table 2. Products tested.

Product	Sample ID	Source	Lot #	Use by
Wisdom Chicken	A	Earth Animal	18351 T16	NA
Wisdom Turkey	B	Earth Animal	18351 T16	NA
Honest Kitchen Clusters, Chicken	C	amazon.com	0350A8	08/06/21
Honest Kitchen Clusters, Turkey	D	amazon.com	0130A8	07/15/21
Ziwi Peak Chicken	E	amazon.com	29604	11/2021
Fromm4 Star Game Bird	F	amazon.com	NA	10/10/2021

Figure 2. Pet food packaged into small cups for testing. Cups were assembled into test kits that included data sheets and numbered, marked plates.

Conducting the Test:

Pet owners received five test kits labeled appropriately for each pair tested. The kits contained everything required to perform a two-choice test on the two products. Every test kit included 12 plastic cups of products (six cups of one product and six cups of another), six marked plates and instructions. During the preference tests, pets were presented two samples of pet food that were removed from the plastic cups and placed on the plate as indicated in the instructions. The two samples on the plate were presented to the pet as shown in figure 3. An example of an instruction/score sheet from the test is shown in figure 4). Two separate test sheets were developed for each pair combination to organize the presentation of samples in a balanced, pseudo-random manner. Results of the test are shown in table 3.

Figure 3. Example of presentation of food to pet on clean, labeled plate.

PREFERENCE TEST DATA SHEET
Completed forms due: June 20, 2020

DATE:_____ TIME: _____

OWNER: _____ PET: _____

Preference test data collection table

trial #	left side	right side	choice	eat? (yes or no)	
				B	D
1.	B	D			
2.	B	D			
3.	D	B			
4.	B	D			
5.	D	B			
6.	D	B			

Anything unusual (please describe):

Comments:

Purpose of the test: to determine the pet's preference for one product over the other. The manufacturer of the pet food wants to know if pets have a preference between foods. Six trials are used to determine the repeatability of the test. Product locations (left or right) are changed at random in case the pet has a preference for eating food presented in a particular manner.

Instructions:

1. Select a time for the test when your pet is not distracted.
2. Place the samples on the numbered plate in the labeled section for each sample. Present the plate to your pet as shown in the table. The writing on the plate faces you.
3. Record the pet's choice (the treat that he/she was the most interested in) in the "CHOICE" column in the table.
4. Record if the pet ate one or both foods in the last column "EAT?" in the table (enter YES or NO). If the pet partially ate the food, enter a YES.
5. Try to complete the entire table in one or two sessions. If your pet is distracted, then complete when possible. Call Jodi when forms are complete to arrange for pickup (269-9796).

Figure 4. Example instruction/score sheet. Six were provided (one for each pair of foods tested) for each pet tested.

Table 3. Final results of the paired comparison test. The first row identifies the pair of pet foods tested. Results for the pair are given in the column below. Second row "x" is the number of times that the most popular pet food was selected for that test. Third row lists the letter of the most frequently selected choice. The fourth row "n" is the number of tests conducted for the pair. Fifth row "Pc" is the ratio of x/n. Sixth row "Pd" is the proportion of pets that were able to discriminate between samples. Seventh row gives the standard error "sd" for the estimate of Pd. The last rows give the upper and lower 95%, 80% and 60% confidence limits for the Pd estimate.

Pair		A/B	A/C	A/E	B/D	B/F
Max choices	x	52	65	48	56	63
Max choice letter		A	A	A	B	B
Number of tests	n	84	84	84	84	84
Pc (ratio of max choices to n)	Pc	0.62	0.77	0.57	0.67	0.75
Proportion of distinguishers	Pd	0.24	0.55	0.14	0.33	0.50
Standard error	sd	0.11	0.09	0.11	0.10	0.09
95% upper C.I.		44.6%	72.7%	35.5%	53.5%	68.5%
95% lower C.I.		3.0%	36.9%	-6.9%	13.2%	31.5%
80% upper C.I.		37.4%	66.4%	28.1%	46.5%	62.1%
80% lower C.I.		10.2%	43.1%	0.5%	20.2%	37.9%
60% upper C.I.		32.8%	62.5%	23.4%	42.0%	58.0%
60% lower C.I.		14.9%	47.0%	5.2%	24.6%	42.0%

Analysis of results:
84 observations were made using in-home testing methods with 14 pets for preference of pet food. Based on the results and the information given in table A.3 (partially shown below and taken from ISO 5495:2005) when n = 84, the number of responses to achieve α of 0.05 must be less than or equal to 51 (the number given in the table) to conclude that no meaningful difference existed between the samples. We received 52, 65, 48, 56 and 63 responses respectively.

Table A.3 — Maximum number of correct or consensual responses required to conclude that two samples are similar, based on a paired test [4), 5)]

n	β	p_d					n	β	p_d				
		10 %	20 %	30 %	40 %	50 %			10 %	20 %	30 %	40 %	50 %
18	0,001	—	—	—	—	—	60	0,001	—	—		—	33
	0,01	—	—	—	—	—		0,01	—	—	—	33	36
	0,05	—	—	—	—	9		0,05	—	—	32	35	38
	0,10	—	—	—	9	10		0,10	—	30	33	36	40
	0,20	—	—	9	10	11		0,20	—	32	35	38	41
24	0,001	—	—	—	—	—	66	0,001	—	—	—	—	37
	0,01	—	—	—	—	12		0,01	—	—	33	36	40
	0,05	—	—	—	12	13		0,05	—	—	35	39	43
	0,10	—	—	12	13	14		0,10	—	34	37	40	44
	0,20	—	—	13	14	15		0,20	—	35	39	42	46
30	0,001	—	—	—	—	—	72	0,001	—	—	—	37	40
	0,01	—	—	—	—	16		0,01	—	—	36	40	44
	0,05	—	—	—	16	17		0,05	—	—	39	43	47
	0,10	—	—	15	17	18		0,10	—	37	41	44	48
	0,20	—	15	16	18	20		0,20	—	39	42	46	50
36	0,001	—	—	—	—	—	78	0,001	—	—	—	40	44
	0,01	—	—	—	18	20		0,01	—	—	40	44	48
	0,05	—	—	18	20	22		0,05	—	39	43	47	51
	0,10	—	—	19	21	23		0,10	—	40	44	48	53
	0,20	—	18	20	22	24		0,20	—	42	46	50	54
42	0,001	—	—	—	—	21	84	0,001	—	—	—	44	48
	0,01	—	—	—	21	24		0,01	—	—	43	48	53
	0,05	—	—	21	23	26		0,05	—	42	46	51	55
	0,10	—	—	22	25	27		0,10	—	44	48	52	57
	0,20	—	22	24	26	28		0,20	—	46	50	54	59
48	0,001	—	—	—	—	25	90	0,001	—	—	—	48	53
	0,01	—	—	—	25	28		0,01	—	—	47	52	57
	0,05	—	—	25	27	30		0,05	—	45	50	55	60
	0,10	—	—	26	28	31		0,10	—	47	52	56	61
	0,20	—	25	27	30	33		0,20	45	49	54	58	63
54	0,001	—	—	—	—	29	96	0,001	—	—	—	52	57
	0,01	—	—	—	29	32		0,01	—	—	50	56	61
	0,05	—	—	28	31	34		0,05	—	49	54	59	64
	0,10	—	27	30	32	35		0,10	—	50	55	60	66
	0,20	—	28	31	34	37		0,20	48	53	58	62	68

Table A.3 from ISO 5495:2005. See the ISO standard for the entire table, which spans multiple pages.

Conclusions:

A/B Wisdom Chicken/Wisdom Turkey
Pet dogs preferred A over B at the 95% Confidence Level

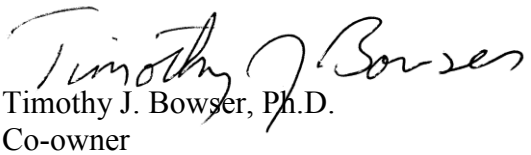
A/C Wisdom Chicken/Honest Kitchen Clusters, Chicken
Pet dogs preferred A over C at the 95% Confidence Level

A/E Wisdom Chicken/Ziwi Peak Chicken
Pet dogs preferred A over E at the 80% Confidence Level

B/D Wisdom Turkey/Honest Kitchen Clusters, Turkey
Pet dogs preferred B over D at the 95% Confidence Level

B/F Wisdom Turkey/Fromm4 Star Game Bird
Pet dogs preferred B over F at the 95% Confidence Level

In general, dogs ate all of the samples presented during tests. This indicated that all of the products tested were interesting and acceptable to the pets enrolled in the taste panel.



Timothy J. Bowser, Ph.D.
Co-owner
PetMech, LLC
1010 West Osage Drive
Stillwater, OK 74075
www.PetMech.com