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Can People Distinguish Pâté from Dog Food?

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Abstract

Considering the similarity of its ingredients, canned dog food could be a suitable and inexpensive substitute for pâté or processed blended meat products such as Spam or liverwurst. However, the social stigma associated with the human consumption of pet food makes an unbiased comparison challenging. To prevent bias, Newman's Own dog food was prepared with a food processor to have the texture and appearance of a liver mousse. In a double-blind test, subjects were presented with five unlabeled blended meat products, one of which was the prepared dog food. After ranking the samples on the basis of taste, subjects were challenged to identify which of the five was dog food. Although 72% of subjects ranked the dog food as the worst of the five samples in terms of taste (Newell and MacFarlane multiple comparison, $P<0.05$), subjects were not better than random at correctly identifying the dog food.

Introduction

What qualifies as food fit for human consumption is culturally defined. In some cultures, grasshopper, snake, dog, and horse are on the menu. Elsewhere, these healthy protein sources provoke disgust. There has also been a substantial flexibility of diet within cultures over time. Lobster, once considered fit only for fertilizer and slave food in 18th Century North America, is consumed there today as an expensive delicacy.[5] Such cultural evolution is ongoing, with comestible goods constantly moving into or out of fashion. We investigated the potential of canned dog food for human consumption by assessing its palatibility alone.

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[5] History of the Lobster, The Lobster Institute, University of Maine, http://www.lobster.um.maine.edu/index.php?page=52

The diet of domestic dogs in most of the world consists of scraps, the by-products of human food preparation and consumption. Indeed, the close overlap between the diet of *Canis familiaris* and *Homo sapiens* may have been crucial for its evolution as a human companion species (Bradshaw 2006). Commercialized dog food is a recent phenomenon, becoming popular only in relatively wealthy industrialized nations since the mid-20th Century (Michel 2006). Nonetheless, it has grown rapidly into a $45 billion industry.[6] Intense competition for market share has kept the price of dog food low relative to comestible goods for human consumption, even those derived from very similar meat industry by-products such as liverwurst and Spam.

In spite of its attractive price, commercial dog food is left virtually untouched by human consumption. One valid concern is the risk of food poisoning. The discovery in 2007 that several brands of commercial pet food were contaminated with melamine, an industrial fire retardant that can cause renal failure, caused widespread concern (Barboza 2007). However, partly as a result of this scandal, "organic" pet foods have gained significant market share. For example, Newman's Own® Organics Premium Pet Food is made exclusively from "human grade" agricultural products.[7]

But even if dog food is safe for human consumption, it must overcome considerable prejudice. Part of the barrier is the perception that dog food is unpalatable. The pet food industry has invested decades of research and development to make their products more appealing to the humans who must purchase and handle their products (Bradshaw 1991). Human volunteers have been used to compare the taste qualities of pet food formulae (Pickering 2008). The aim has been to reduce feelings of disgust while owners serve the food to their pets, rather than to make it more palatable for human consumption, but the result is the same. The diet and lifestyle of dogs in the industrialized world has converged with that of humans (Schaffer 2009). Could dog food be approaching acceptance as comestible good fit for humans?

Assessing the intrinsic palatibility of dog food is a first step in answering this question. Controlling for bias is a challenge. Expectation has a large effect on the hedonic tone of food. There are many levels at which expectation can have its effects, and many

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[6] Euromonitor International, 2007.
[7] http://www.newmansownorganics.com/pet/faqs

mechanisms have been proposed (Deliza & MacFie 1991). The effects can be subtle and depend on when information is gained relative to consumption (Lee, Frederick, & Ariely 2006). Measuring the hedonic tone free of bias requires a double-blind trial (Goldstein *et al.* 2008).

We predicted that in a double-blind taste test, subjects would be unable to identify dog food among 5 samples of meat products with similar appearance and texture, thus allowing them to assess palatibility independent of prejudice. We hypothesized that, if the dog food were ranked favorably relative to human comestible goods with similar ingredients, it should be considered fit for human consumption.

Materials and Methods

The dog food tested was Canned Turkey & Chicken Formula for Puppies/Active Dogs (Newman's Own® Organics, Aptos, CA).[8] The four meat products used for comparison were duck liver mousse ("Mousse de Canard," Trois Petits Cochons, New York, NY), pork liver pâté ("Pâté de Campagne," Trois Petits Cochons, New York, NY), supermarket liverwurst (D'Agostino), and Spam (Hormel Foods Corporation, Austin, MN)[9]. Each product was pulsed in a food processor to have the consistency of mousse. Samples were allocated to serving bowls, labeled A - E, garnished with parsley to enhance presentation, and chilled in a refrigerator to 4°C. To allow one researcher (Bohannon) to perform a double-blind trial, the preparation was carried out by the coauthors (Goldstein and Herschkowitsch).

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[8] Ingredients: Organic Turkey, Water Sufficient for Processing, Chicken Liver, Organic Chicken, Ocean Whitefish, Organic Brown Rice, Carrots, Flaxseed, Oat Bran, Tricalcium Phosphate, Dried Kelp, Guar Gum, Carrageenan, Potassium Chloride, Sea Salt, Minerals (Iron Amino Acid Chelate, Zinc Amino Acid Chelate, Cobalt Amino Acid Chelate, Copper Amino Acid Chelate, Manganese Amino Acid Chelate, Sodium Selenite, Potassium Iodide), Vitamins (Vitamin E, A, B12, D3 Supplements, Thiamin Mononitrate, Biotin, Riboflavin Supplement). Nutrition: 8% protein, 7% fat, 29 Kcal/oz.

[9] Ingredients: Pork, Ham, Salt, Water, Sugar, Sodium Nitrite. Nutrition: 12% protein, 27% fat, 85 Kcal/oz.

The experiment was carried out between 7:00 PM and 10:00 PM on 31 December 2008 in Brooklyn, New York[10]. After fully disclosing the aim of the experiment--to evaluate the taste of dog food--18 subjects volunteered. Subjects were college-educated male and female adults between the ages of 20 and 40.

The five sample dishes, A - E, were presented to subjects with a bowl of crackers ("Table Water Crackers," Carr's of Carlisle, UK). The identity of the samples, unknown to the researcher, was as follows. A: Duck liver mousse. B: Spam. C: Dog food. D: Pork liver pâté. E: Liverwurst. Subjects were asked to rank the "tastiness" of the samples relative to each other on scale of 1 (best) to 5 (worst). They were instructed to taste all of the spreads, in any order and as many times as necessary, in order to make a sound judgment. After the rankings were recorded on data sheets, subjects guessed which of the five samples they believed was the dog food.

Results

The dog food (sample C) was ranked lowest of the five samples by 72% (13) of subjects. The duck liver mousse (sample A) was rated as the best by 55% (10) of subjects. Between these extremes, the majority of subjects ranked Spam, pork liver pâté, and liverwurst in the range of 2nd to 4th place (see Table I and II).

The rankings were analyzed using the multiple comparison procedure described by Christensen *et al.* (2006). The absolute differences between summed rankings were compared to the threshold values for P=0.05 and P=0.01 levels of significance (see Table I and Table II).

The aggregate taste ranking of the dog food was highly significant (see Table III). The ranking difference between dog food and Spam was greater than the P<0.05 threshold, and the difference was greater than the P<0.01 threshold for all other samples. Subjects' preference for the duck liver mousse was also highly significant. The only sample that was not ranked significantly differently than the duck liver mousse (at the P<0.05 level) was the pork liver pâté.

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[10] For more details of the event, see http://www.sciencemag.org/cgi/content/full/323/5917/1006b

Only 3 of 18 subjects correctly identified sample C as the dog food (see Table IV). A Chi-Squared test did not support the hypothesis that the distribution of guesses was significantly different from random (X^2=0.433, *P*=0.9797).

Conclusions

Subjects significantly disliked the taste of dog food compared to a range of comestible meat products with similar ingredients. Subjects were not better than random at identifying dog food among five unlabeled samples. These two results would seem to be paradoxical. Why did the 72% of subjects who ranked sample C as worst in terms of taste not guess that sample C was dog food?

One possibility is that slight differences in appearance and texture skewed the guesses. While the distribution of guesses failed a Chi-Squared test of statistical significance, 44% (8) of subjects incorrectly chose liverwurst (sample E) as the dog food. As the texture of samples had been equalized with a food processor, it is possible that subjects were attempting to discern which sample was dog food based on taste, not texture. The explanation we find more compelling, however, is that subjects were primed to expect dog food to taste better than it does. As we assured subjects that the experience would not be disgusting, they might have excluded the worst-tasting sample from their guesses.

Regardless of the cause of the distribution of guesses, we can be confident that the comparison of taste was free of prejudice. Even with the benefits of added salt, a smooth texture, and attractive presentation, canned dog food is unpalatable compared to a range of similar blended meat products.

We conclude that, although human beings do not enjoy eating dog food, they are also not able to distinguish its flavor profile from other meat-based products that are intended for human consumption.

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A	duck liver pate
B	spam
C	dog food
D	pork liver pate
E	liverwurst

TABLE I: Raw data

	Ranking of samples					
Subject	**A**	**B**	**C**	**D**	**E**	**Which is dog food?**
1	1	4	3	2	5	E
2	1	4	5	3	2	D
3	5	2	1	4	3	E
4	1	2	5	3	4	B
5	2	4	5	3	1	B
6	1	5	4	2	3	E
7	2	4	5	1	3	E
8	1	2	5	4	3	E
9	1	4	5	3	2	D
10	2	1	5	3	4	A
11	3	2	5	1	4	C
12	4	2	5	1	3	E
13	1	4	5	4	4	E
14	1	5	4	3	2	C
15	1	4	5	3	2	C
16	3	2	1	5	4	E
17	3	4	5	2	1	B
18	1	3	5	2	4	B
sums:	34	58	78	49	54	

TABLE II: Distribution of rankings

		A	B	C	D	E
Ranking (n)	1st	10	1	2	3	2
	2nd	3	6	0	4	4
	3rd	3	1	1	7	5
	4th	1	8	2	3	6
	5th	1	2	13	1	1

		A	B	C	D	E
Ranking (%)	1st	0.56	0.06	0.11	0.17	0.11
	2nd	0.17	0.33	0.00	0.22	0.22
	3rd	0.17	0.06	0.06	0.39	0.28
	4th	0.06	0.44	0.11	0.17	0.33
	5th	0.06	0.11	0.72	0.06	0.06

TABLE III: Multiple Comparison

Critical Values for p = 18 panelists

P=0.05	CV = 4.3553p^0.5012	18.5422
P=0.01	CV = 3.6582p^0.5011	15.5699

Significance	P=0.01	P=0.05
Critical Difference	**24**	**18**

Differences between sample rankings

	A	B	C	D	E
A	*	**24**	**44**	15	**20**
B	*	*	**20**	9	4
C	*	*	*	**29**	**24**
D	*	*	*	*	5
E	*	*	*	*	*

Significant differences in **bold**

TABLE IV: Dog food identification test

Which sample is dog food?

Sample	identified as dog food	frequency	expected if random
A	1	0.06	0.2
B	4	0.22	0.2
C	3	0.17	0.2
D	2	0.11	0.2
E	8	0.44	0.2

Chi-Squared test

X2 = 0.433

2-tailed P value = 0.9797

* Not significantly different from random distribution