BIO111 sample Rubric, Report, and References

On these pages:

Laboratory Report Rubric

	4 (A)	3 (B)	2 (C)	1 (D)	0 (F)
Introduction	Includes: 1. A purpose for the experiment and the experimental question 2. Explains why the experimental question is important to answer 3. Gives enough background for the reader to understand the topic 3. Presents findings of numerous studies to show what we already know about the topic 4. Gives enough information from past studies to explain the hypothesis and predictions 5. Briefly introduces the study	Some aspects are missing such as: - not enough background information - not enough results from previous studies - introduction is generally lacking in depth	Several aspects are missing such as: - not enough background information - not enough results from previous studies - introduction is lacking in depth - information does not back up hypotheses / predictions	Introduction is lacking in many areas such as: - not enough background information is given - no previous studies are cited - it is not clear how the hypotheses or predictions were determined	Topic is unclear and not introduced. Experimental questions are not given.
Hypothesis	1. Hypothesis is based on research and/or sound reasoning (as outlined in the introduction) 2. Hypothesis is an informed answer to the experimental question 3. There is a scientific basis to the hypothesis 3. Hypothesis is not confused with a prediction i.e. does not include expected results but rather is an informed 'yes/no' answer to the experimental question	Hypothesis is stated and is correct but there are some errors such as: - the hypothesis does not include the reason for the hypothesis - the hypothesis does not match the information in the introduction	Hypothesis is stated but no scientific reasoning is given. Hypothesis includes results / is confused with the prediction.	Hypotheses are poorly stated and no scientific reasoning is given. The hypothesis is lacking in clarity, is not explained, and/or is confused with the prediction.	No hypothesis is stated.
Prediction	1. Predictions are based on the hypotheses 2. Predictions state the actual results expected if the hypothesis is true. Hypothesis and predictions are not confused with each other.	The prediction matches the hypothesis but does not the results/data that are expected if the hypothesis is true.	Predictions do not clearly match the hypothesis or experiment and are unclear.	Predictions are incorrect, unclear, and not linked to the expected results.	No predictions are given.

Methods	Methods are: 1. Described clearly in a step-by-step process that could be repeated by another classmate. It is very clear what was done. 2. Are written in the past tense and tenses are not interchanged 3. Do not include 'we' or 'I' 4. Reasons are given where appropriate. 5. All materials are clearly listed.	Methods are clearly described but there are some errors, e.g.: - Some steps are missing or unclear - Reasons are not given where appropriate - Not written in the wrong tense.	Methods are lacking in several details and contain other errors such as are written in the past tense or contain incorrect information.	Methods are largely unclear: it is not clear what was done and why.	Methods are irrelevant, missing, or completely unclear.
Results	1. Results and data are clearly recorded. 2. Both the raw data and summary statistics such as means and ranges are reported and graphs presented where appropriate. 3. Data are analyzed and organized so it is easy for the reader to see trends. 4. All appropriate units and labels are included in tables and graphs.	Results are clearly recorded but could be improved: - some units or labels are missing - analysis is attempted but could be clearer - some summary statistics are missing - there are errors on graphs or in tables	Some results or data are missing or are unclear. Trends or findings are unclear or not presented. Analysis is lacking.	Results are unclear and data are missing. No attempt at presenting results clearly. No analyses where needed.	Results and data are not presented.
Discussion	1. Hypotheses are rejected or accepted based on the results. 2. Predictions are stated as correct/incorrect 3. Data is summarized and used to draw conclusions and conclusions follow data (not guesses or leaps of logic). 4. Findings of <u>several</u> other studies are reported and compared to results. It is clear if the results match the literature. 5. Reasons for the results are discussed. 6. Methods are critiqued in terms of whether they produced accurate	Some points are lacking: - Hypotheses are not rejected or accepted - results are not compared to several other studies. It is unclear if the results match the literature - the results are not properly interpreted - methods are not critiqued - no biological	Discussion is lacking in several of the areas outlined, for example: - conclusions are not linked to the experiment - no attempt at explaining results - no comparison to the scientific literature.	Discussion is attempted but is lacking in many areas and/or unorganized.	Discussion is very poorly attempted or not attempted at all.

	results. Improvements are suggested.	reason for results is given			

Following instructions and errors	NA	NA	All of the instructions were followed.	One instruction was not followed, such as group results were reported instead of class results.	Instructions were not followed. It is clear that the guidelines provided were not followed.
Presentation, spelling and grammar	The report is well-formatted and presented professionally. There are no spelling, grammar or formatting errors.	Some errors in style and formatting and/or some spelling or grammar errors such typos, capital letters misplaced, formatting errors / inconsistencies.	Several errors in formatting, spelling, and grammar. Poorly organized or formatted.	Many errors in formatting, spelling, grammar and organization. It is clear that the report was not proofed.	Presentation is poor and detracts from the report. Many errors.
Citing and referencing	Many sources are used and cited in both the introduction and discussion to support background statements and the results and conclusions. All citations are referenced, citations are correctly formatted within the text and in the bibliography.	Some errors with citing. Some information is not cited or supported within the introduction and discussion.	Several errors with citing. Information is poorly cited and many statements are not supported.	Little attempt at citing information. Many errors in within-text citations and in bibliography.	Sources are not cited or information is plagiarized.

Sample lab report: food preferences of domestic dogs

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BIO101

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Introduction

Purpose

The purpose of this experiment is to determine whether domestic dogs (*Canis lupus familiaris*) have a preference for raw meat or commercial dry meat-flavored kibble.

Background

The domestic dog descended from wild gray wolves *(Canis lupus)* approximately 15,000 years ago (Drake, et al., 2015). Wolves are carnivores and well adapted to eat a purely meat-based diet (Sillero-Zubiri & Gottelli, 1995). The domestic dog is considered to be the same species as the gray wolf (*Canis lupus)* (Reeder & Wilson, 1992) and many dog breeds resemble wolves in appearance, behavior and diet (Fox, 1971; Boitani & Ciucci, 1995; Svartberg & Forkman, 2002; Bradshaw, 2006). However, most domestic dogs depend on their owners for their food which is often dried, shelf-stable foods such as kibble that are designed to meet their nutritional needs (petM.D. LLC., n.d.). Dried foods help prevent dental problems (Hennet, et al., 2007) and are cheaper than raw food. It is becoming more popular for owners to feed their dogs a raw meat diet (Freeman, et al., 2013) because many owners feel that this is more 'natural' and healthier for their pets (Michel, 2006). A raw meat diet is closer to the diet of wolves but has drawbacks such as contamination from bacteria and health problems from eating bones and an imbalanced diet because of inexperienced owners (Freeman, et al. 2013; Fredriksson-Ahomaa, et al., 2017). Diet is strongly linked to a dog's health and lifespan (Kealy et al., 2006) so it is important to determine which diet a dog should be fed.

Because domestic dogs are recently descended from wolves, we think that dogs will show a preference for raw food over highly processed kibble. Dogs have an excellent sense of smell, can taste well, and have flavor preferences (Houpt & Smith, 1981; Horowitz, 2010; Finlay, 2017) and so

it is likely that dogs will prefer the taste and smell of raw meat over kibble. This experiment aims to determine if dogs prefer raw meat or meat-favored dry food by testing which food dogs will choose to eat when given a choice of both. We assumed that the food the dog eats the most of is the food that the dog prefers.

Hypothesis

Because of their close ancestry to wolves and because dogs are carnivores, dogs will show a preference for raw meat over meat-flavored dry food ('kibble') because it is closest to the food dogs evolved to eat.

Prediction

If dogs prefer raw meat to meat-flavored kibble then we predict that dogs will eat more raw meat than meat-flavored kibble when presented with both foods at the same time.

Materials and methods

Materials *(listed per trial)*:

- Two stainless steel dog bowls, 10-inch diameter
- 500g raw beef (brisket) cut into 2x2 inch cubes
- 500g beef-flavored kibble (Happy Dog brand)
- 2x2 meter piece of carpet
- Electronic balance with tray (1kg capacity)
- Adjustable dog collar

Experimental methods

This study was performed in September of 2019 in The Shire, Middle Earth. Pet owners were recruited via an advertisement in local newspapers and the online sites Craigslist and Facebook. Only healthy adult dogs between the ages of 1.5 and 8 years were included in the study. In total, 12

dogs were recruited and results were gathered from 10 dogs because two dogs were removed due to poor dental health that may have impacted the results of the study. The breeds of the 10 dogs were the following: 4 ‘mixed breed’; 2 Chihuahua; 1 Border Collie; 1 Labrador Retriever; 1 Australian Cattle Dog.

Each dog was fasted for 10 hours before the experiment took place. Dogs were placed in the ‘sit’ position and held by their owner until the dog appeared relaxed and not distracted. Two bowls, one filled with 500g of raw beef and the other with 500g of beef-flavored kibble, were placed 1 foot apart on a 2x2 square of carpet; the bowls were placed 3 feet in front of the front paws of the dog. The dog was then led by a collar and allowed to sniff each bowl of food before being returned to a ‘sit’ position three feet from the bowls. This was to enable the dog to be aware of what food was in each bowl and the dog was not allowed to touch the food during this time. The owner then released the dog. Once the dog began eating from any of the bowls a timer was set for 30 seconds. After 30 seconds the bowls were removed and the remaining food in each was weighed to the nearest gram. All materials were disinfected between use and individual dogs completed only a single trial each.

Results

Seven of the 10 dogs ate more meat-flavored kibble than raw beef meat and three of the dogs did not eat any of the raw meat compared to only one dog not eating any kibble (Figure 1). Seven of the 10 dogs ate more than half of the dry kibble but only one dog ate more than half of the raw meat provided (Figure 1). Across all dogs, over twice as much kibble was eaten than raw meat (Figure 2).

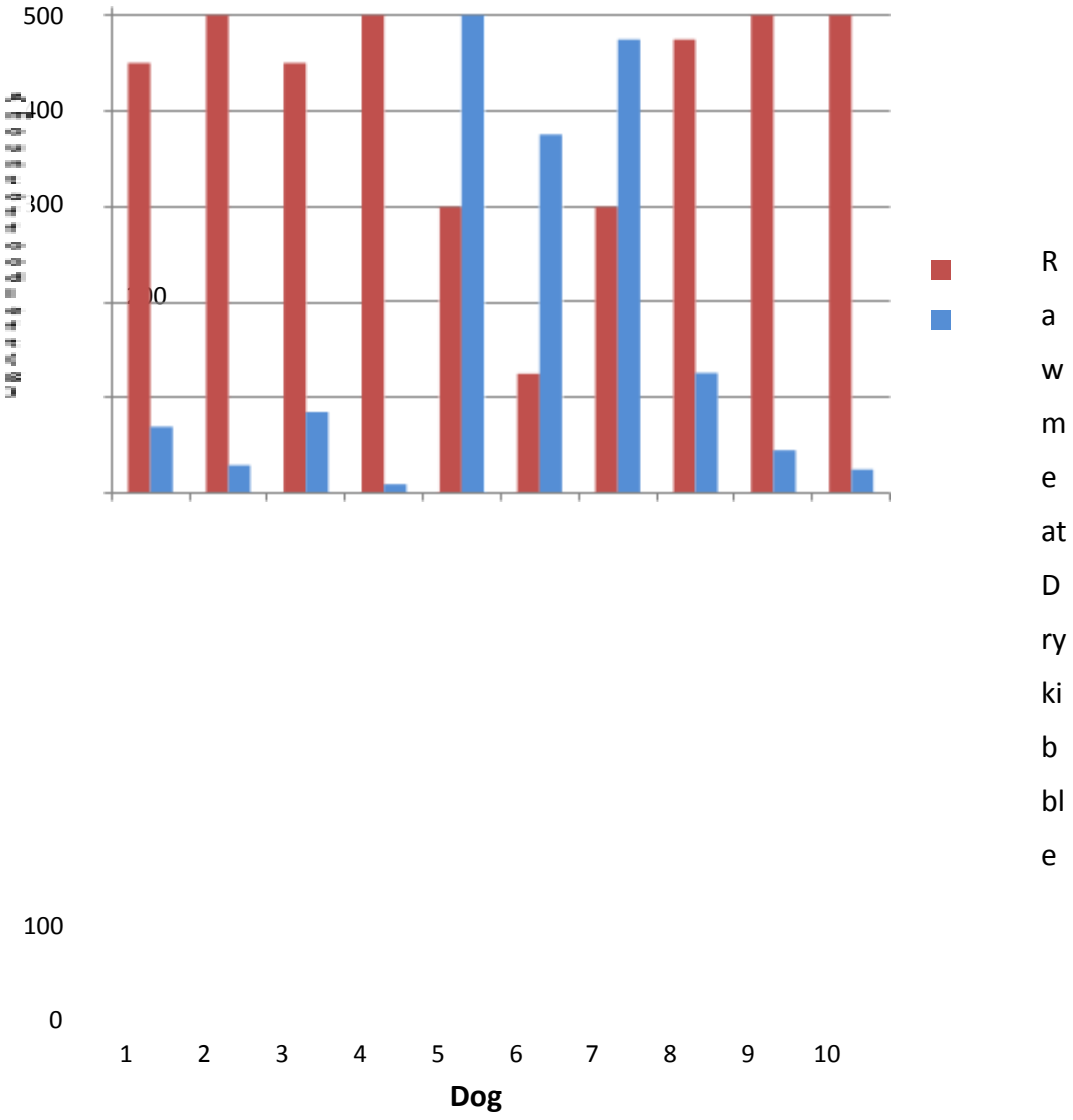
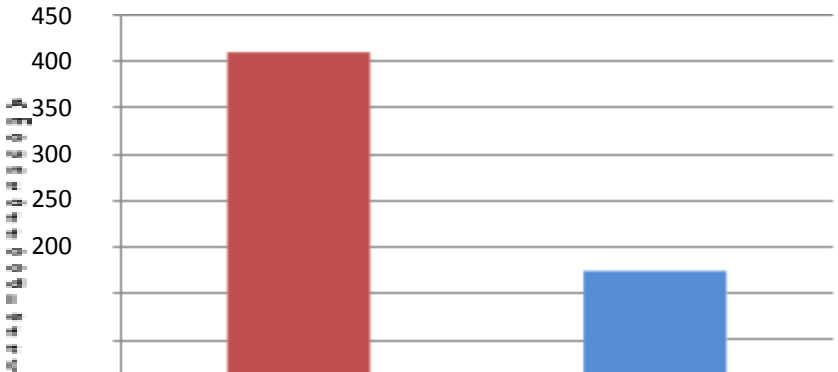


Figure 1: Amount of raw meat (red bars) and dry kibble (blue bars) left after 30 seconds.



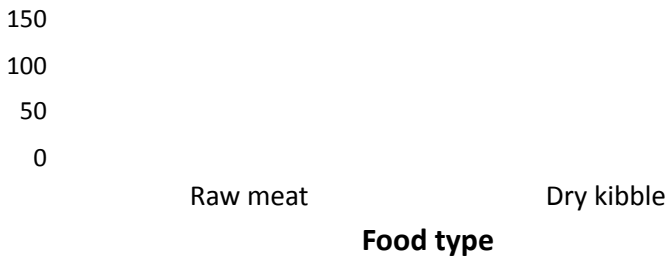


Figure 2: Average amount of raw meat (red bar) and dry kibble (blue bar) left after 30 seconds across all ten dogs.

Discussion

This experiment aimed to find out whether domestic dogs have a preference for raw meat or meat-flavored dry kibble. Overall, dogs ate more kibble than raw meat (Figures 1 and 2). This suggests that dogs prefer kibble to raw meat. The hypothesis that dogs would prefer raw meat to kibble and the prediction that dogs would consume more raw meat than kibble when given both foods were rejected: the results suggest the opposite.

There are several reasons why dogs may prefer dried kibble to raw meat. Firstly, most domestic dogs are fed dried kibble and not raw meat and therefore probably associate dried kibble more with a food source. Dogs have been shown to have the same preference for raw meats as wolves if they are raised in the same way (Rao, Range, Kadletz, Kotrschal & Marshall-Pescini, 2018) so it is likely that the preference for kibble was because these domestic dogs had been raised on this diet. Many dogs have been shown to take a considerable amount of time to adjust to a raw diet, especially when they have been raised on dried foods (Brown, 2019). A better experiment would be to use dogs that were already used to eating both raw meat and kibble. Secondly, dogs have been shown to have a preference for high-fat foods (Hall, Vondran, Vanchina & Jewell, 2018) and the meat we used was very lean whereas the kibble had a high-fat content, and so this may have also caused the preference for kibble in this experiment.

Houpt & Smith (1981) report that in a laboratory setting dogs strongly prefer fresh meat to cereal- based foods. The difference in our findings may be due to our methods and we may have

failed to identify the true preferences of dogs. It may be that our sample of dogs did not properly represent the typical preferences of dogs – the dogs may have indeed preferred raw meat but chosen to eat the kibble because they were more familiar with it over raw meat. Only a small number of dogs were used in the study and some were very small breeds (Chihuahuas) and so the meat pieces may have been too large. Ideally, both the kibble and meat pieces should have been identical sizes. The raw meat was cut into 2x2 inch cubes and these may have been too large for smaller dogs. Also, meat typically takes longer to eat than smaller kibble pieces and this may have caused some bias in the amount of raw meat vs. kibble that dogs were able to consume in 30 seconds.

In conclusion, we found that domestic dogs had a strong preference for meat-flavored kibble over raw meat, which differs from the findings of other studies. We believe that our finding was because the dogs were raised on a diet of kibble and were unfamiliar with raw meat. A future study would be to compare preferences of dogs that are familiar with both types of food to be able to find the true preference of domestic dogs.

References

Boitani, L. and Ciucci, P. (1995). Comparative social ecology of feral dogs and wolves. Ecology & Evolution 7: 49-72.

Bradshaw, J. W. (2006). The evolutionary basis for the feeding behavior of domestic dogs (Canis familiaris) and cats (Felis catus). *The Journal of nutrition*, *136*(7), 1927S-1931S.

Brown, S. (2009). *Unlocking the Canine Ancestral Diet: Healthier Dog Food the ABC Way*. Dogwise Publishing.

Drake, A. G., Coquerelle, M., & Colombeau, G. (2015). 3D morphometric analysis of fossil canid skulls contradicts the suggested domestication of dogs during the late Paleolithic. *Scientific reports*, *5*, 8299.

Finlay, K. (2017, March 17). Can Dogs Taste? akc.org/expert-advice/lifestyle/can-dogs-taste/

Fox, M. (1971). *Behaviour of wolves dogs and related canids*. Dogwise Publishing.

Fredriksson-Ahomaa, M., Heikkilä, T., Pernu, N., Kovanen, S., Hielm-Björkman, A., & Kivistö, R. (2017). Raw meat-based diets in dogs and cats. *Veterinary sciences*, *4*(3), 33.

Freeman, L. M., Chandler, M. L., Hamper, B. A., & Weeth, L. P. (2013). Current knowledge about the risks and benefits of raw meat–based diets for dogs and cats. *Journal of the American Veterinary Medical Association*, *243*(11), 1549-1558.

Hall, J. A., Vondran, J. C., Vanchina, M. A., & Jewell, D. E. (2018). When fed foods with similar palatability, healthy adult dogs and cats choose different macronutrient compositions. *Journal of Experimental Biology*, *221*(14), jeb173450.

Hennet, P., Servet, E., Soulard, Y., & Biourge, V. (2007). Effect of pellet food size and polyphosphates in preventing calculus accumulation in dogs. *Journal of veterinary*

dentistry, *24*(4), 236-239.

Horowitz, A. (2010). *Inside of a dog: What dogs see, smell, and know*. Simon and Schuster.

Houpt, K. A., & Smith, S. L. (1981). Taste preferences and their relation to obesity in dogs and cats. *The Canadian Veterinary Journal*, *22*(4), 77.

Kealy, R. D., Lawler, D. F., Ballam, J. M., Mantz, S. L., Biery, D. N., Greeley, E. H., ... & Stowe, H. D. (2002). Effects of diet restriction on life span and age-related changes in dogs. *Journal of the American Veterinary Medical Association*, *220*(9), 1315-1320.

Michel, K. E. (2006). Unconventional diets for dogs and cats. *Veterinary Clinics: Small Animal Practice*, *36*(6), 1269-1281.

petM.D. LLC. (n.d.). Dry or Wet Food? How to Choose the Best for Your Pet. Retrieved from https://www.petmd.com/dog/nutrition/evr_multi_dry_versus_wet_food

Rao, A., Range, F., Kadletz, K., Kotrschal, K., & Marshall-Pescini, S. (2018). Food preferences of similarly raised and kept captive dogs and wolves. *PloS one*, *13*(9), e0203165.

Reeder, D. M., & Wilson, D. E. (1992). *Mammal species of the world: a taxonomic and geographic reference* (No. 599: 57.06 MAM).

Shug, A. L., & Keene, B. W. (1991). *U.S. Patent No. 5,030,458*. Washington, DC: U.S. Patent and Trademark Office.

Sillero-Zubiri, C., & Gottelli, D. (1995). Diet and feeding behavior of Ethiopian wolves (Canis simensis). *Journal of Mammalogy*, *76*(2), 531-541.

Svartberg, K., & Forkman, B. (2002). Personality traits in the domestic dog (Canis familiaris). *Applied animal behaviour science*, *79*(2), 133-155.

Swanson, K. S., & Schook, L. B. (2006). Canine nutritional model: influence of age, diet, and genetics on health and well-being. *Current Nutrition & Food Science*, *2*(2), 115-126.