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Abstract

The study was carried out to determine the differences in the chemical content of several varieties of adult cat food available in Bangladesh.Three different brands of adult cat food were collected from study area.The samples were chemically analyzed in triplicate for moisture, dry matter (DM), crude protein (CP), crude fiber (CF), ether extract (EE), and total ash (TA) in the Animal Nutrition Laboratory at Chattogram Veterinary and Animal Sciences University, Chattogram, Bangladesh. The mean values of the adult cat foods revealed that DM, CP, CF,EE and TA were 93.62%, 30.93%, 1.76%, 7.49%, and 6.9%, respectively for different brands.The percentage of proximate component examined in the laboratory differed slightly from the labeled value of the all brand. Overall, all the brands met or exceeded the minimum standard.

Keywords: proximate analysis, adult cat food, companion animal

Chapter 1: Introduction

Currently, cats are typically treated like other members of the household. Around 370 million cats were kept as pet's worldwide (Global dog and cat pet population 2018). The precise number of cats in Bangladesh is not known. The pet food industry is undergoing rapid change because of increasing owner awareness (Jagoda and Wioletta.,2021). Since cats are essentially carnivores, they typically eat animal products like meat, chicken, and fish. Cat food is currently adapted to the cat's age, lifestyle, physical activity, and breed size. Some pet owners feed their animals leftovers, but this causes several health issues for cats, including vomiting, allergies, obesity, and a lack of vitamins, minerals, and other nutrients. People are now constantly preoccupied with their professional lives. As a result, they prefer ready-made commercial cat food rather than homemade food for their pets.

So today, it is acceptable to feed domestic cats with food that is manufactured especially for them which is divided into two major types 1) dry food 2) wet food. Many cat owners are fed the same food for too long. In Bangladesh the available cat foods are Lara, Whiskas, Smart heart, Bonacibo, Reflex, Friskies, Jungle, Felix, Nekko etc.

As consequence of humanizing domestic animals, cat owners emphasize the importance of choosing food from a trustworthy food producer. That is why it is necessary to evaluate the quality and major nutrients in cat food. For ensuring sound health of cat, proper nutrient ratio and let owner to know about the food it is necessary to estimate the nutrient component of this food. "Proximate analysis is a system of expressing the nutrient composition of feed. The principle of analysis is to separate the nutrient present in the feed stuffs into various fractions, as proximate principles,which are six i.e. moisture, ash, crude protein, ether extract, crude fibre and nitrogen free extract"(VISHAL MUDGAL.,2012).So, the aim of this study is to estimate the nutrient

component of some branded cat foods available in Bangladesh and to compare with the mentioned nutrient percentage of those food produced by the respective company.

Chapter 2: Materials and Methods

2.1. Collection of sample

Cat food collected from pet local market of Bangladesh. The sample was brought to the laboratory and ground to obtain a uniform size and kept in an airtight plastic bag.

2.2. Preparation of sample

Sample were grinded uniformly to make it homogenous powder. Later onit was mixed properly and exposed to shade to cold down for sampling.

2.3. Analysis of sample

Chemical analysis of sample were carried out in triplicate for moisture, dry matter(DM), crude protein(CP), crude fiber(CF), nitrogen free extract (NFE) and total ash in the Animal Nutrition Laboratory, Chattogram Veterinary and Animal SciencesUniversity, Chattogram, Bangladesh.

2.4. Estimation of Dry Matter and Moisture

In oven the Petridis was dried which was regulated at 105 c and was cooled in a desiccator and weighted. 10 gm of food sample was weighted into the Petridis and kept into the oven for 24 hours. The Petridis was removed from the oven with metal tong. After that it was cooled in desiccator and the final weight was taken after getting constant weight.

$$\%DM = \frac{\text{initial weight} - \text{final weight}}{\text{sample weight} \times 100}$$

% Moisture = 100 - % DM

2.5. Estimation of Crude Protein (CP)

5 gm of sample was weighed and taken into a digestion tube. Then one spoonful of catalyzer mixer (KOH, NaOH, Se) was added there. 10 ml concentrated H2SO4 was also added and the digestion flask was placed in Kzeldhal Digestion Set. After that heat was increased gradually and continued until clear residue (45 min to 1 hr) is formed. The flask was removed from the digestion set and then cooled. 10 ml 2% boric acid solution, 2 drops mixed indicator were taken in a conical flask. The conical flask was fitted in the collection arm of distillation set. 50 ml distilled H2O was added in the digestion tube and fitted in the distillation flask. 40 ml of 40% NaOH was added there and the distillation was continued up to 100ml. Then it was titrated against 0.1 N HCl. Titration was continued until the color was changed into pink. Then the reading of titration was taken.

$$\%CP = \frac{(\text{Titer} - \text{blank}) \times \text{Normality of HCL} \times 14.007 \times 6.25}{\text{Sample weight (g)}} \times 100$$

2.6. Estimation of Crude Fiber (CF)

2.0 gm sample was weighed accurately and taken 125 ml 1.25% H2SO4 solution in the beaker. 3-5 drops N-Octanol were used as antifoaming agent. Then the sample was boiled until constant volume (30 min.). After that the sample were washed with water 3 times to ensure it acid free and then added 125 ml 1.25% NaOH and 3-5 drops N-Octanol added as antifoaming agent. Then boil the sample until constant volume (30 min.) Then discard the supernatant and wash with 1% HCl solution to make acid free. Drying the sample at 105degreeCelsius and cooled in desiccator. Burn the sample until no smoke. Then the sample with crucible was cooled and transferred to the muffle furnace. After that sample was ignited at 550-600°C for 6-8 hours until white

ash is produced. Then the ash was weighed and the value was deducted to get fiber weight.

$$\% \ CF = \frac{\text{Weight of crucible, CF and ash - Weight of crucible and ash}}{\text{Weight of sample}} \times 100$$

2.7. Estimation of Ether Extract(EE)

For each brand, a 2gm sample was weighed and put into the thimbles. The tops of the thimbles were then sealed with cotton before they were put into the extractor. The extractor was then installed and ether was poured till siphoning. Then ether was poured again, this time using half as much as before. The samples were then boiled for 6–8 hours at 40–60 degrees Celsius. The flask was taken apart and dried on a water bath after the extraction was finished. The flask was then placed in a hot air oven and boiled to a constant weight at 100°C. The flask was then weighed to determine the amount of ether extract after being cooled in a desiccator.

$$\% \ EE = \frac{\text{Weight of flask with ether extract} - \text{weight of flask}}{\text{Weight of sample}} \times 100$$

Chapter 3: Results

3.1. Dry matter calculation

Brand 1

Id no	Empty petri dish	Sample weight	Sample + petri dish	Total dry matter	average
1	43.3497	10g	52.6662	93.165%	
2	65.8492	10g	75.1520	93.028%	93.073%
3	66.6609	10g	75.9693	93.028%	

Brand 2

Id no.	Empty Petri dish	Sample weight	Sample+ Petridis	Total dry matter	average
1	38.6144	10g	47.8537	92.393%	
2	38.9505	10g	48.2305	92.80%	92.690%
3	38.5222	10g	47.8101	92.879	

Brand 3

Id no.	Empty Petridis	Sample weight	Sample+ Petridis	Total dry matter	average
1	36.9921	10g	46.3882	93.961%	
2	45.1530	10g	54.5580	94.05%	94.097%
3	48.4043	10g	57.8325	94.282%	

3.2. Total Ash calculation

Brand 1

Id no.	Empty crucible weight	Sample weight	Sample +crucible weight	Ash	Average
1	25.6277	3g	25.8199	6.40%	
2	17.3928	3g	17.5858	6.43%	6.42%
3	25.6358	3g	25.8286	6.42%	

Brand 2

Id no.	Empty crucible weight	Sample weight	Sample +crucible weight	Ash	Average
1	19.2088	3g	19.3830	5.80%	
2	21.4123	3g	21.5882	5.86%	5.81%
3	19.3499	3g	19.5229	5.76%	

Brand 3

Id no.	Empty crucible weight	Sample weight	Sample +crucible weight	Ash	Average
1	19.2170	3g	19.4541	7.90%	
2	18.5740	3g	18.8642	9.67%	8.54%
3	19.1602	3g	19.4016	8.04%	

3.3. Crude Fiber calculation

Brand 1

Id no.	Empty crucible weight	Sample weight	Sample +crucible weight	CF	average
1	42.2933	2g	42.3248	1.57%	
2	33.5809	2g	33.6117	1.54%	1.37%
3	30.2910	2g	303112	1.01%	

Brand 2

Id no.	Empty crucible weight	Sample weight	Sample +crucible weight	CF	average
1	42.3763	2g	42.4127	1.79%	
2	33.5929	2g	33.6300	1.855%	1.85%
3	41.6794	2g	41.7176	1.91%	

Brand 3

Id no.	Empty crucible weight	Sample weight	Sample +crucible weight	CF	average
1	30.5071	2g	30.5476	2.02%	
2	42.0682	2g	42.1122	2.2%	2.07%
3	18.9186	2g	18.9583	1.985%	

3.4. Ether Extract calculation

Brand 1

Id no.	Empty jar weight	Sample weight	Sample + glass jar weight	EE	average
1	73.9774	2g	74.1328	7.77%%	
2	74.1822	2g	74.3373	7.76%%	7.63%
3	73.9773	2g	74.1244	7.35%	

Brand 2

Id no.	Empty jar weight	Sample weight	Sample + glass jar weight	EE	average
1	74.5031	2g	74.6434	7.02%	
2	73.9824	2g	74.1383	7.79%	7.26%
3	74.5037	2g	74.6435	6.99%	

Brand 3

Id no.	Empty jar weight	Sample weight	Sample + glass jar weight	EE	average
1	74.1839	2g	74.3314	7.38	
2	74.5053	2g	74.6547	7.47%	7.59%
3	74.4055	2g	74.5641	7.93%	

3.5. Total Crude Protein calculation

Brand 1

Id no	Initial reading	Final reading	Sample weight	Normality of HCL	CP	Average
1	0	18	5g	0.1%	31.52%	
2	18	35.2	5g	0.1%	30.12%	30.93%
3	0	17.8	5g	0.1%	31.16%	

Brand 2

Id no	Initial reading	Final reading	Sample weight	Normality of HCL	CP	Average
1	0	17	5g	0.1%	29.76%	
2	17	33.6	5g	0.1%	29.06%	29.41%
3	0	16.8	5g	0.1%	29.41%	

Brand 3

Id no	Initial reading	Final reading	Sample weight	Normality of HCL	CP	Average
1	16.8	35.6	5g	0.1%	32.92%	
2	0	18.5	5g	0.1%	32.39%	32.45%
3	18.5	36.8	5g	0.1%	32.o4%	

Results of the proximate analysis of cat foods revealed that the mean values of DM%, CP%,CF%, EE%, and TA% were 93.62%, 30.93%, 1.76%, 7.49%, and 6.9%, respectively for different brands. All the brands met the minimum standards.

Chapter 4: Discussion

Diets of cats have changed because of domestication (Devnath et al., 2021). Pets are treated as family members by 63% of owners in united states (AVMA; 2012). People now realize that pets need proper nutrition in their diets as human for better health because they realize anthropomorphism in their pets (Buff et al., 2014). Pet foods are processed in a way to maintain the nutritional integrity of ingredients which help them to regulate the vital function of their body. Cat diets usually contain dehulled cereal grains eg.Corn, wheat, oats, barley; soyabean product, eg. soyabean meal animal product, eg. Meat, meat and bone meal, fish meal, milk product, eg. Dried whey, dried skimmed milk, fat and oil, groundnut cake, vitamin and mineral supplements, adequate clean water (Akinrinmade F and Akinrinde AS, 2011). National research council and American association of feed control officials confirm the nutritional conformity of these products (NRC.,1993; AAFCO.,2013).

As Demand of cats are increasing as companion animal day by day, so that demand of cat food are also increasing by their owners.

Fat of cat food increases the palatability of the food and it is a excellent source of dietary calories and energy as well as it helps to absorb fat soluble vitamins. Cats are capable of consuming both saturated and unsaturated fat because they have less risk of coronary artery diseases, heart disease and strokes compare to human. Besides,Cats are resistant to some diseases like hypercholesterolemia, atherosclerosis is parallel to human Functional fat are another source for maintaining healthy skin and coat, provide better gut system as well as renal system.It also helps in better reproductive performance,control different type of inflammation in the body and play important role in the development of neurological system.Most of the owner prefer dry food for the storage and advantage of feeding (Samuelson AC and Cutter GR., 1991).

The manufacturing value given in the different cat food was CP minimum 30%,CF maximum 3%, moisture maximum 10%, Total Ash maximum 9%, Ether Extract minimum 10%.In our study it was observed that the CP% was 30.93% which issimilar to labeled value.The CF% was 1.76%which is in the range of labeled value. EE was 7.49% which is below to the labeled value. Total Ash was 6.9%which is in the range of labeled value. It was observed that there were little difference between the labeled value provided by manufacturer and the analyze value.

In a Nigerian study, it was found that the label value of commercial cat food available in Nigeria and the analyze value of the food was almost same in case of DM and CP but EE and CF value were different (Akinrinmade F and Akinrinde AS.,2011). In our study in laboratory analysis it was found that moisture % was 6.38% which iswithin the range of labeled value (max 10-12%). In case of CP% the analyzed value was 30.93% which is almost similar to labeled value (min 30%). Protein plays important role for the growth of cat's body. The cat owners must watch especially the cp content in their cat food to cover the daily needs of essential amino acids (Kronfeld DS., 1982). From the laboratory test , it was observed that EE% was 7.49% which is below to the labeled value (min 10%).In a different study it was said that diets for household animals played an important role in contributing to palatability and texture of food(Bauer JE., 2006).

Canine and feline diets are supplemented with fiber to boost gastrointestinal fullness while consuming less calories (Devnath et al., 2021). High fiber diets increase stool volume. Cats are less inclined to consume large, soft feces, which can be advantageous when treating coprophagia. In our study the CF% was found 1.76% which is in the range of labeled value (max 3%).Despite the fact

that the intestinal enzymes of cats cannot convert dietary fiber to a monosaccharide unit for absorption in the small intestine, however The microorganisms in cats large intestines can digest a portion of fiber. They produce short chain fatty acid and other end products through fermentation of bacteria (Devnath et al.,2021).Short chain fatty acids are another important energy source and it was said that these fatty acids act on epithelial cells of GIT and these source of fibers helps to maintain the health of gut system of cats body (Alvarez and Sanchez., 2006)

According to one study, CF aids in modifying bowel movement, altering immunological function, gut bacteria composition, dilution of caloric density, weight reduction, and indirectly alleviating the incidence of obesity and diabetes mellitus in the pet population (De Godoy et al., 2013). It was also reported that High fiber content may impair the digestion and assimilation of other nutrients. Minerals are the sole inorganic elements, accounting for just 4% of an animal's total body weight (Linda et al., 2011).The diet must have the necessary minerals to support life and preserve good health.The cat needs the ideal quantity of calcium and phosphorus, however the ideal ratio has not yet been identified in ration.The cat need salt in the same amount as humans (Koehn CJ.,1942).

Conclusion

For the betterment of cat health, balanced food is very important. For commercial food, it is also very important to look after the nutritional value those are claimed by the manufacturer. All the cat foods that we analyzed met the nutritional requirements with the manufacturer's labeled claim. For details study, we need further detailed analysis of more cat foods.

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Biography

I am S.M. Ashraful Karim, from Chattogram. I passed Secondary School Certificate examination in 2013 (G.P.A-5.00) and Higher Secondary School Certificate examination in 2015 (G.P.A-5.00). I am a student of 22nd batch and now I am an intern student under the Faculty of Veterinary Medicine in Chattogram Veterinary and Animal Sciences University. In the future I would like to work in the field of veterinary Sector.