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Research Article

Nutritional and Aflatoxin Analysis of Cat Food

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Abstract:

The domestication of cats has been a lengthy and ongoing journey, with a significant transformation occurring in their dietary practices. In the wild, cats relied solely on hunting for sustenance, but with domestication, they began to eat food provided by humans. As obligate carnivores, cats require animal protein in their diet, which must be complemented with easily digestible components to ensure optimal nutrient absorption. In this study the dry cat food was analyzed for the nutritional and aflatoxins analysis. The purchased cat food was found to have protein level of 18.20 + 0.92% and the calculated energy was 386.40 + 1.22 Kcal/ 100g. The findings from the analysis were evaluated against the nutrient requirements established by the Association of American Feed Control Officials (AAFCO) and National Research Council (NRC). According to AAFCO and NRC guidelines, the minimum protein in adult cat food on dry basis should be 26% (min). However, it was found that aflatoxins (B1, B2, G1, G2) were absent in cat food. The cat food was found safe for the cat consumption on the basis of aflatoxins test.

Key words: Cat food; nutritional aspects; aflatoxins

Introduction

Pets are often regarded as part of the family, leading to the marketing and production of pet food that closely resembles that of human food, with health trends influencing pet food as well (Acuff et al., 2021). Among companion animals, domestic cats rank as one of the most popular globally (Mameno et al., 2017). Recent research indicates that approximately 35% of households in the United States own at least one cat (Pallotto et al., 2018). The pet food sector constitutes over 50% of the overall pet market, with the global pet food industry nearing $75 billion in value; the United States alone accounted for about $25 billion of this market in 2016 (Phillips-Donaldson, 2016).

Cat food manufacturers consistently strive to gain insights into consumer preferences and their willingness to invest in various ingredients. This effort aims to meet the expectations of cat owners, ensure profitability, and provide nutritionally balanced meals for cats. Individual dietary variations during a cat's kitten stage can lead to differing flavor preferences in adulthood (Pekel et al., 2020). For a cat's diet to be deemed complete and enjoyable, it must contain essential nutrients and appealing flavors that encourage feeding. A diet lacking in flavor, even if nutritionally balanced, may not be consumed optimally. To prevent potential issues with food intake, the palatability of cat food should be sufficiently high, which can be enhanced through the use of flavoring agents or natural ingredients. Typically, cat food is composed of wheat flour along with other components such as sugar, salt, fat, milk, baking powder, and various flavors (Obasi et al., 2012).

Taking into account the impacts of aging and age-related illnesses, dietary adjustments typically emphasize caloric density along with the levels of protein, fat, and phosphorus. While food formulated for adult cats is often perceived as having a moderate reduction in protein content, these cats may experience a diminished capacity to digest protein and changes in protein metabolism. Consequently, they may need a higher intake of dietary protein to preserve lean body mass. The incidence of overweight and obesity is most pronounced in middle-aged cats (ages 5-11), as many older cats tend to be less active (Pérez-Camargo, 2003; Summers et al., 2020).

Cats are fundamentally carnivorous, which means their diet primarily consists of animal-based products such as meat, poultry, and fish. Presently, cat food is formulated to cater to various factors including the cat's age, lifestyle, level of physical activity, and breed size. While some pet owners may choose to feed their cats leftovers, this practice can lead

to numerous health problems, such as vomiting, allergies, obesity, and deficiencies in essential vitamins, minerals, and other nutrients. In today's fast-paced world, many individuals are increasingly focused on their careers, leading them to opt for commercially prepared cat food instead of preparing homemade meals for their pets (Ashraf-ul-Karim, 2022).

Despite the growth of the pet food industry, there is a lack of comprehensive research focused on the nutritional composition of food in relation to the quality standards required by specific species (Hobbs, 2023). AAFCO cat food nutrient profiles indicate that the dry matter basis is set at 26%. This concentration is recommended for maintaining body weight, assuming an average caloric intake for cats at their optimal weight (AAFCO, 2014). The minimum protein concentration required for growth and reproduction has been declare at 26% dry matter, aligning with the growth recommendations set forth by the NRC (2006).

Therefore, this study aimed to assess the nutritional composition of super premium dry foods for adult cats, compare it with the information provided on the packaging, and evaluate the presence of aflatoxins.

Materials and Methods

The cat food in dry pellets from was purchased from super market of Lahore Pakistan for the analysis of given information of packaging. The cat food sample was sample was grinded to mesh size of 1mm and was kept at dry and cold place in the sealed plastic bags to maintain all the nutritional aspects of cat food.

Evaluation of Parameters

1. Nutritional Analysis

The analysis of the nutritional composition of cat food was conducted at the Food Department within the PCSIR Laboratories Complex in Lahore, Pakistan. The moisture, ash, crude fiber, and crude protein levels of the food were assessed using standardized methods.

A 10 g sample was dried in a hot air oven at 105 °C until a constant weight was achieved, with the weight loss recorded as moisture content. For ash content determination, one gram of the sample was placed in a pre-weighed porcelain crucible and subjected to ignition in an ashing furnace set at 600 °C until white ash was produced, maintaining a constant weight.

The nitrogen content was measured using the micro-Kjeldahl method and was then multiplied by 6.25 to calculate the crude protein content. The carbohydrate content was determined by difference, following the guidelines established by AOAC (1990).

2. Aflatoxin determination

Thin Layer Chromatographic (TLC) technique was used for detecting Aflatoxins in the cat food (Nisa et al., 2012; Romers, 1976). The presence of Aflatoxins in the product was then further detected through the method explicated. The standard was compared with the extract of sample for Aflatoxin determination. Aflatoxins present in sample were identified using the thin layer chromatographic (AOAC, 2023).

The analysis of aflatoxins food formulated for cats was conducted (Begum et al, 1985). A sample of 50 grams was combined with 250 milliliters of chloroform and shaken for 30 minutes. Subsequently, 50 milliliters of the resulting solution was evaporated using a water bath. The volume was adjusted, and the sample was spotted onto a TLC plate following the outlined procedure. Various concentrations of standards were compared with the sample extract to determine the aflatoxin levels. The total aflatoxins (AFB1+AFB2+AFG1+AFG2) were quantified using the specified formula (Zahra et al., 2020).

$$\text{Aflatoxin B1 } (\mu g/kg) = \frac{S \times Y \times V}{W \times Z}$$

Results and Discussion

Cat food was analyzed for its nutritional aspects and aflatoxins contamination. The obtained nutritional analysis results suggest that the prepared food for adult cat can be considered as a potential food having high calories i.e., 386.40 Kcal/100g in order to fulfill dietary requirements.

Table 1: Results of Nutritional Analysis

Sr. No.	Parameter	Values
1.	Moisture (%)	5.80 ± 0.22
2.	Ash (%)	3.20 ± 0.15
3.	Protein (%)	18.20 ± 0.92
4.	Fat (%)	7.20 ± 0.85
5.	Fibre (%)	3.40 ± 0.12
6.	Carbohydrates (%)	62.20 ± 1.12
7.	Energy (Kcal/ 100g)	386.40 ± 1.22

Aflatoxins are detrimental and carcinogenic fungal substances known which may affect food quality to greater extent. Most common Aflatoxins are mainly named as Aflatoxin B1, B2, G1 and G2 (Zahra et al., 2021). In 2007, a total of 100 food samples were gathered from pet sections in the city of Alfenas, Brazil, comprising 45 dog foods, 25 cat foods, and 30 bird foods. These samples were analyzed for aflatoxin levels using thin-layer chromatography (TLC). The analysis revealed that 12 of the samples, which included peanut butter, tested positive for aflatoxin (Maia and Pereira, 2002).

In this study; product was analysed for Aflatoxin contamination and found safe as no Aflatoxin was detected. The same results were found in study conducted by Becer and Filazi, (2010), where 50 cat food samples (25 local and 25 imported) were found with no contamination of aflatoxins. It depicts that product is safe for health (Table 2)..

Table 2: Aflatoxin Analysis of Cat Food

Sr. No.	Aflatoxin (ppb)	Amount
1.	B1	Not Detected
2.	B2	Not Detected
3.	G1	Not Detected
4.	G2	Not Detected

The product is found fresh and that uniquely provides satisfying results in solidifying a mixture with a good calorie amount for cats. The nutritional profiles of dry cat food product in Lahore market was examined, focusing on the differences between Grade A and Grade B categories to meet the specific dietary needs of cats as obligate carnivores (Hamdan et al., 2024).

This research, which involved a proximate analysis of product, uncovered the levels of protein, fat, fiber, moisture, ash, and carbohydrates. Grade A cat foods were found to contain higher amounts of protein and fat than their Grade B counterparts, with a significant variation in moisture levels. However, only a select few products achieved the ideal nutritional standards for cat food as recommended by existing literature. The results indicate that this developed cat food formulation is not optimal due to its protein content for adult cat. Although; the purchased cat food was found safe on the basis of aflatoxins analysis.

Conclusion

The growing dependence on cats for companionship and comfort is believed to be a significant factor contributing to the substantial expansion of the pet food industry, which has seen a corresponding rise in demand for cat food among pet owners and breeders.

This study aims to check the quality and nutritional aspects of locally available cat food that offer optimal nutritional benefits. The food analyzed was found safe for the consumption of cat. The nutritional aspects were found not according to the AAFCO and NRC guidelines for cat food on dry basis. The findings highlight the significance of tier classification in commercial cat foods based on pricing and stress the necessity for the industry to remain vigilant in upholding the nutritional quality of cat food. The study offers benchmark data that can assist in the creation of healthier cat food formulations, promoting transparency and safety within the pet food sector.

Conflict of Interest

The authors declare no conflict of interest.

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