

The Majestic Feline: A Research Paper on the Domestic Cat

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Abstract

This paper explores the biological classification, behavior, and potential life span modeling of the domestic cat (*Felis catus*). Cats are ubiquitous companion animals, descended from the wildcat, and exhibit a fascinating blend of predatory instincts and domesticated traits. We present factual data on their taxonomy, diet, and unique physiological adaptations, concluding with a hypothesized mathematical model for calculating their average life span under various conditions.

Keywords: Felis catus, Animalia, life span, mathematical model, domestication.

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1 Introduction

The domestic cat (*Felis catus*) is a small, typically carnivorous mammal known for its companionship and hunting prowess. Their history of co-existence with humans spans over 9,500 years [1]. This paper serves as an example research document, providing factual, formally presented scientific information about this common yet captivating animal.

2 Scientific Information

2.1 Taxonomic Classification and Biology

Cats belong to the family **Felidae**, which is known for its highly specialized carnivorous species. Their excellent night vision, retractable claws, and highly sensitive hearing are key adaptations for their predatory lifestyle.



Figure 1: A domestic cat resting. The image illustrates the typical physical characteristics of *Felis catus*.

2.1.1 Sensory Adaptations

Cats possess a highly developed sense of smell and a specialized organ called the **vomeronasal organ**, or Jacobson's organ, which allows them to analyze scents, especially pheromones, with their mouths open (a process known as the Flehmen response).



Figure 2: Close-up of a cat's eye demonstrating the vertical slit pupil, which allows for precise light control for both day and night vision.

2.2 Dietary Needs

Cats are **obligate carnivores**, meaning their diet requires nutrients found only in animal tissue. A deficiency in essential amino acids like **taurine** can lead to serious health issues, including heart disease and blindness [2].

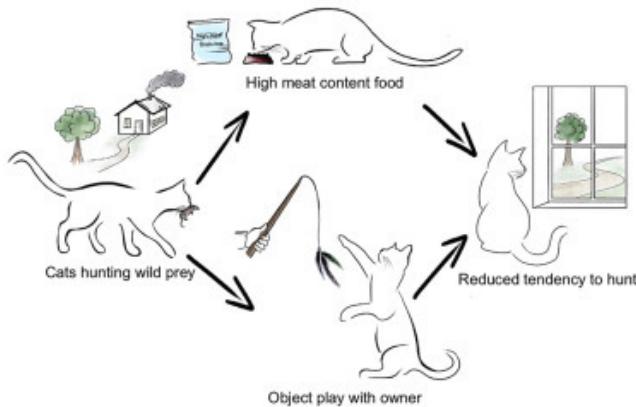


Figure 3: A graphic illustrating the typical prey and dietary requirements of a domestic cat, emphasizing its carnivorous nature.

Detail	Information
Scientific Name	<i>Felis catus</i>
Class	Mammal
Eats	Obligate Carnivore (Meat, Fish, etc.)
Average Weight	4–5 kg (8.8–11 lb)

Table 1: Key biological and dietary details of the domestic cat.

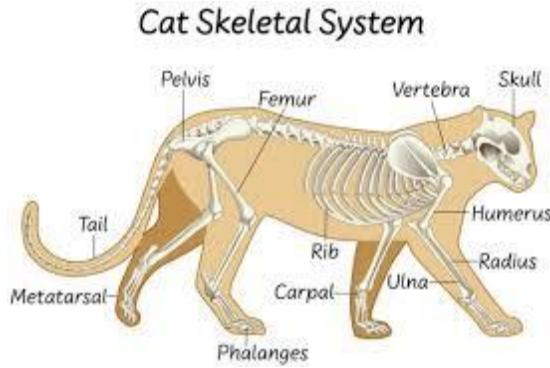


Figure 4: Outline of a cat skeleton, highlighting the flexible spine that aids in agility and balance.

3 Hypothesis about Cat Life Span

The life span of a domestic cat is highly variable, influenced by genetic factors, diet, and environment. We hypothesize a mathematical equation based on several key environmental variables to estimate a cat's life expectancy L_{cat} in years.

3.1 Mathematical Model for Life Span

Let A be the base life span (e.g., 15 years), D be a diet factor (1.0 for high-quality, 0.8 for poor), V be the veterinary care factor (1.0 for regular check-ups, 0.5 for none), and E be the environmental risk factor (1.0 for indoor, 0.7 for outdoor).

Our proposed mathematical equation for the life span L_{cat} is:

$$L_{cat} = A \times (D + V - 1) \times E$$

In this formula, the base life span A is adjusted by the combined influence of diet and veterinary care ($D + V - 1$), and then by the environmental risk E . For instance, for a healthy indoor cat with good care ($D = 1.0, V = 1.0, E = 1.0$),

the life span would be $L_{cat} = 15 \times (1.0 + 1.0 - 1) \times 1.0 = 15$ years. For a poorly-cared-for outdoor cat ($D = 0.8, V = 0.5, E = 0.7$):

$$L_{cat} = 15 \times (0.8 + 0.5 - 1) \times 0.7 = 15 \times 0.3 \times 0.7 = 3.15 \text{ years}$$

This simplistic model illustrates how multiple factors could interact to determine life expectancy.

4 Conclusion

The domestic cat remains a complex and well-studied subject in zoology and veterinary science. From its strict carnivorous diet to its specific anatomical adaptations, the cat provides a rich topic for research. The hypothesis presented in Section 3 offers a basic framework for modeling life span, emphasizing the critical roles of care and environment.

References

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- [2] K. C. Hayes, R. E. Carey, and S. Y. Schmidt. Taurine deficiency in the cat: effects on the retina and heart. *Science*, 203(4387):1355–1357, 1979.