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**EFFECTS OF LOW CALORIES, HIGH FIBRE DIET ON
WEIGHT AND BODY CONDITION SCORE IN OVERWEIGHT/
OBESE PRONE CAT IN MALAYSIA**

By

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A RESEARCH PAPER SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENT FOR THE DEGREE OF DOCTOR OF
VETERINARY MEDICINE

FACULTY OF VETERINARY MEDICINE
UNIVERSITI MALAYSIA KELANTAN

2024

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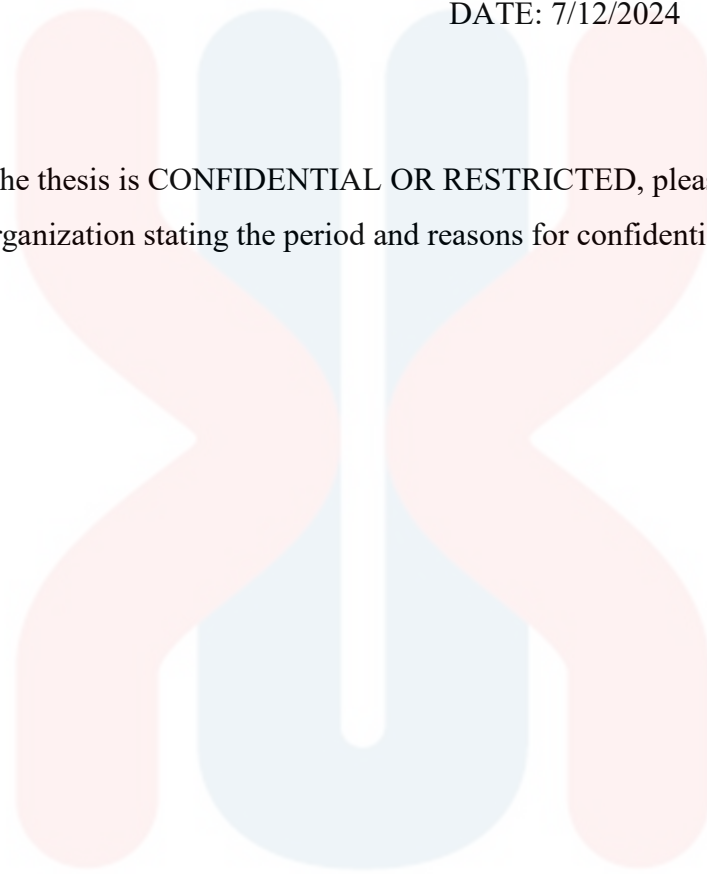
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ABSTRACT

An abstract of the research paper presented to the Faculty of Veterinary Medicine, Universiti Malaysia Kelantan, in partial requirement of the course DVT 55204 – Research Project.

Feline obesity is the most prevalent nutritional disorder among domestic cats, particularly middle-aged and neutered ones. Factors such as free feeding practices, sedentary lifestyles, and positive owner perceptions of chubby cats exacerbate the problem. Effective weight management strategies are therefore critical. This study investigates the effectiveness of a low-calorie, high-fibre diet (Diet A) in achieving gradual, safe weight loss (0.5%-2% per week) to minimize risks like hepatic lipidosis in overweight or obese-prone cats with a Body Condition Score (BCS) of 6/9 or higher. The study also evaluates the impact of this dietary intervention on overall health, owner compliance, and feeding practices. Additionally, strategies to increase satiety through dietary fiber and maintain lean body mass with high-protein formulas were integrated into the intervention. A cohort of overweight and obese-prone cats was enrolled and monitored for body weight, body condition score (BCS), and overall health metrics over a 4-week period. Behavioral observations, including satiety and activity levels, were also assessed to determine the diet's acceptability and impact on feline well-being with an emphasis on safety and minimizing adverse effects. While the results may not show a drastic loss of body weight, the trial underscored the importance of a slow and steady approach to feline weight loss to prioritize the long-term health and well-being of overweight cats. All cats included in the study were confirmed healthy based on pre-trial physical examinations. No systemic diseases were detected, and no participants were pregnant, lactating, or required special diets or medical interventions. One cat died before the trial due to unrelated complications, leaving a total of eligible cats in both trial and control groups. The mean body weight of cats in the trial group decreased from 4.65 kg to 4.51 kg, with a statistically significant mean difference of -0.14 kg ($p = 0.011$, 95% CI: -0.23380, -0.5420). In contrast, the control group showed a mean weight increase of 0.18 kg, which was not statistically significant ($p = 0.434$, 95% CI: -0.61, -0.96). The trial group exhibited a consistent reduction in mean body weight percentage across four weeks, while the control group showed fluctuations without a clear downward trend. The body condition score

(BCS) of the trial group significantly decreased from an initial mean of 8.4 to 7.4 ($p = 0.004$, 95% CI: -1.76, -0.65), whereas the control group showed no significant change ($p = 0.184$). This supports the efficacy of the low-calorie, high-fiber diet in improving body condition. Satiety scores in the trial group showed a mild decrease from 3.2 to 3.0, though this change was not statistically significant ($p = 0.80$). Palatability scores remained high throughout the study, with the trial group consistently scoring 4 out of 4, suggesting that the diet was well accepted by the cats. Overall, the findings indicate that the low-calorie, high-fiber diet effectively reduced body weight and improved BCS without negatively impacting satiety, palatability, or quality of life.

The activity of the animal and the behaviour are taken into account to ensure that the amount of the feed given does not depress the cat or causing them to have much deficit in their diet, and especially to know whether this diet helps them to lose weight without them feeling hungry or begging for food, as this factor is important in Malaysia as we all know how much cat owner put empathy for their cat, and once their cat beg for food, it is hard for the owner to resist. This study shows that despite of the non-drastic weight loss, but the cat shown a loss in the body condition score, without compromising the level of activity of the animal, hence helping cat to lose their weight at safe rate preventing adverse effect of drastic diet change.

Keywords: Feline obesity, overweight, owner compliance, low calorie high-fibre diet,

ABSTRAK

Kertas penyelidikan ini dibentangkan kepada Fakulti Perubatan Veterinar, Universiti Malaysia Kelantan, sebagai memenuhi keperluan bagi kursus DVT 55204 – Projek Penyelidikan.

Masalah berat badan berlebihan dalam kalangan kucing adalah masalah pemakanan tidak teratur yang paling kerap berlaku dalam kalangan kucing domestik, terutamanya mereka yang berada pada usia pertengahan dan kucing yang telah dimandulkan. Beberapa faktor seperti pemberian makanan secara bebas, gaya hidup tidak aktif dan juga persepsi positif pemilik terhadap kucing yang gemuk memburukkan lagi masalah ini. Oleh itu, strategi pengurusan berat badan yang berkesan adalah amat penting. Kajian ini menyiasat dan mengkaji keberkesanan diet rendah kalori dan tinggi serat (Diet A) dalam mencapai penurunan berat badan secara perlahan dan selamat (0.5%-2% setiap minggu) bagi mengurangkan risiko seperti penyakit hepatic lipidosis (hati berlemak) dalam kucing yang cenderung mendapat berat badan berlebihan atau obes dengan Skor Keadaan Badan (BCS) 6/9 atau lebih. Kajian ini juga menilai impak intervensi pemakanan ini terhadap kesihatan keseluruhan, kepatuhan pemilik, dan amalan pemakanan. Selain itu, strategi untuk meningkatkan rasa kenyang melalui serat diet dan mengekalkan komposisi badan yang sihat dengan formula protein tinggi turut dimasukkan dalam intervensi ini. Sekumpulan kucing yang cenderung berlebihan berat badan dan obes telah didaftarkan dan dipantau untuk berat badan, skor keadaan badan (BCS), dan metrik kesihatan keseluruhan selama tempoh 4 minggu. Pemerhatian tingkah laku, termasuk rasa kenyang dan tahap aktiviti, juga dinilai untuk menentukan penerimaan diet ini serta impaknya terhadap kesejahteraan kucing dengan penekanan terhadap keselamatan dan meminimumkan kesan sampingan yang tidak diingini. Walaupun hasil kajian tidak menunjukkan penurunan berat badan yang drastik, kajian ini menekankan pentingnya pendekatan penurunan berat badan kucing secara perlahan bagi memberi keutamaan kepada kesihatan dan kesejahteraan jangka panjang kucing yang mempunyai berat badan berlebihan. Semua kucing dalam kajian ini disahkan sihat melalui pemeriksaan fizikal sebelum ujian. Tiada penyakit dikesan, dan tiada kucing yang bunting, menyusukan anak, atau memerlukan diet khas atau rawatan perubatan. Seorang kucing mati sebelum ujian akibat masalah yang tidak berkaitan, jadi hanya sejumlah kucing yang layak dalam kumpulan percubaan dan kawalan. Purata berat badan kucing dalam kumpulan percubaan

menurun daripada 4.65 kg kepada 4.51 kg, dengan penurunan ketara sebanyak -0.14 kg ($p = 0.011$). Sebaliknya, kumpulan kawalan menunjukkan peningkatan purata berat sebanyak 0.18 kg, tetapi tidak signifikan ($p = 0.434$). Kumpulan percubaan mengalami penurunan berat badan yang berterusan sepanjang empat minggu, manakala kumpulan kawalan menunjukkan perubahan yang tidak menentu. Skor Kondisi Badan (BCS) dalam kumpulan percubaan turun dengan ketara daripada 8.4 kepada 7.4 ($p = 0.004$), sementara kumpulan kawalan tidak menunjukkan perubahan yang jelas ($p = 0.184$). Ini menunjukkan bahawa diet rendah kalori dan tinggi serat membantu memperbaiki kondisi badan kucing. Skor rasa kenyang dalam kumpulan percubaan turun sedikit daripada 3.2 kepada 3.0, tetapi perubahan ini tidak ketara ($p = 0.80$). Skor penerimaan makanan kekal tinggi sepanjang kajian, dengan kumpulan percubaan mencatatkan 4 daripada 4, menunjukkan bahawa kucing menerima diet ini dengan baik. Secara keseluruhan, hasil kajian menunjukkan bahawa diet rendah kalori dan tinggi serat berkesan untuk mengurangkan berat badan dan memperbaiki kondisi badan kucing tanpa memberi kesan negatif terhadap rasa kenyang, selera makan, atau kualiti hidup mereka. Aktiviti kucing dan tingkah lakunya diambil kira untuk memastikan jumlah makanan yang diberi tidak membuatkan kucing tertekan atau menyebabkan mereka kekurangan zat makanan, dan terutamanya untuk mengetahui sama ada diet ini membantu mereka menurunkan berat badan tanpa merasa lapar atau meminta makanan, faktor ini adalah penting di Malaysia, kerana kita semua sedia maklum pemilik kucing mempunyai empati yang tinggi terhadap haiwan peliharaan mereka, dan apabila kucing mereka meminta makanan, pemilik sukar untuk menahan diri untuk tidak memberikan makanan. Kajian ini menunjukkan bahawa walaupun penurunan berat badan tidak drastik, kucing menunjukkan skor keadaan badan (BCS) bertambah baik, tanpa menjejaskan tahap aktiviti haiwan, dengan itu membantu kucing menurunkan berat badan pada kadar yang selamat, mencegah kesan buruk perubahan diet yang drastik.

CERTIFICATION

This is to certify that we have read this research paper entitled '**Effects Of Low Calories, High Fibre Diet On Weight And Body Condition Score In Overweight/ Obese Prone Cat In Malaysia**' by **Nor Nazirah Binti Zuraki**, and in our opinion, it is satisfactory in terms of scope, quality, and presentation as partial fulfillment of the requirements for the course DVT 55204 – Research Project.

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ACKNOWLEDGEMENT

Special thanks to those who have given their support, guidance, advice, and aid for the completion of this project paper:

Dr Murshidah Binti Mohd Asri

Dr Amirul Faiz Bin Mohd Azmi

Dr Sandie Chong Shiew Shean

Family

Tan Pei Qi

Ang Hui Qian

Audrey

Mohd Amir

Siti Aishah Zainol Rashid

All my kids

All 8 cats from the trial

Lab assistants of FPV UMK

DVM 5 Class of 2020/2025

Thank You

DEDICATIONS

With the production of this thesis, mark that I have been able to complete my final year project. First of all, I thank Allah the almighty for have given me the strength and health to complete this thesis altogether with the final year project that was the requirement for my study.

I would like to express my greatest gratitude to Dr Murshidah Mohd Asri and also Dr Amirul Faiz for have been my supervisor and co-supervisor, they have been my mentor, my inspiration and have been giving their best to guide me and be patient with me throughout the trial period. Without them, this project itself will not be going anywhere. Not to forget Dr Sandie Chong Shiew Shean who was also my co-supervisor for her always fast response and gave us a better understanding especially on the animal ethic for this trial. Also, to the animal ethic committee who allow this trial to proceed, and Dr Dauda who always welcomes me to his office whenever I have questions even at the last minutes entertaining my questions and resolving all the questions in my mind.

My biggest gratitude to my family, my mom Nor'Aini Binti Abd Ghani and my dad Zuraki Bin Daud who have been giving endless support to me and encourage me to complete my thesis. Who have also been waiting to see their favourite child to graduate and to finally sleep well.

And to all my Neofilis classmates who have been supportive and gave words of encouragement, also those who volunteer to help me in Catel, Hazikh, Ding, Hui Qian and DVM 1 who took on their shift to help. And to my final year project partner, Tan Pei Qi, I thank you with all my heart for being patient with me, giving each other the kick in the butt that we need to finish this thesis, late night at catel and all that we have gone through throughout the trial.

I would also like to give my deepest thanks to Catel of FPV UMK, who allow me to keep some of the cats in the catel for observation and using the consultation room for blood taking procedures and all their equipment that we used. And to all who have been involved in this trial, seen or unseen, I can't thank you all enough but only Allah can repay your kindness better.

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LIST OF ABBREVIATIONS

CP	Crude protein
kg	Kilogram
g	Gram
SEM	Standard Error of Mean
p-value	Sig.
DER	Daily energy requirement
RER	Resting energy requirement
BCS	Body condition score
ME	Metabolizable energy
BID	Twice daily

Table 1: List of abbreviations

CHAPTER 1

1.0 INTRODUCTION

Feline obesity is the most prevalent nutritional disorder in domestic cats, especially those middle-aged and neutered cats. Obesity in cats is a significant concern due to its effect with various health complications, including insulin resistance, diabetes mellitus, lameness, joint diseases, and skin disorders. One of the top contributors to feline obesity is the practice of free feeding, where cats have continuous access to food, particularly dry food, which often leads to excessive caloric intake. This uncontrolled feeding pattern results in weight gain and, subsequently, the onset of obesity-related health issues.

As obesity leads to multiple metabolic and clinical problems, effective treatment and prevention strategies are essential for the well-being of cats. In veterinary medicine, the evaluation of a cat body condition is typically carried out using a scoring system, known as the Body Condition Score (BCS). The BCS is an objective tool that assists in assessing the level of obesity and provides insight into a cat's nutritional status. Managing obesity in cats is vital not only to prevent the associated health risks but also to enhance their overall quality of life and longevity.

The increasing prevalence of feline obesity necessitates the development of practical and effective interventions, such as dietary management programs, to combat this issue. Using a scoring system or a body condition score (BCS) chart can help both veterinarians and cat owners gauge a cat weight status accurately as sometimes it's hard for owners to recognize gradual weight gain in their pets. Body Condition Score is crucial in designing and monitoring weight management programs for pets. Establishing target weights and monitoring progress using BCS significantly enhances the effectiveness of weight loss initiatives in obese animals. Pets whose weight reduction was guided by BCS reached healthier weight levels and experienced improved overall health outcomes compared to those whose weight loss was not monitored using BCS (Bland *et al.*, 2009).

Losing weight at a pace of 0.5% to 2% per week is advisable. Thus, it could take anywhere from 24 to 60 weeks for the cat to reach a weight that is 3 kg lower than their

starting weight or desired weight (Hoelmkjaer & Bjornvad, 2014). Crash diets or sudden changes in food intake can lead to serious health complications, such as hepatic lipidosis (Johnson *et al.*, 2019). This sudden starvation or food deprivation will cause the mobilization of peripheral fat more than the liver capacity to either redistribute or to utilize it for beta-oxidation (energy production), this results in significant expansion of hepatocyte cytosol due to the accumulation of triglyceride (fat) stores (Center, 2023). Hence monitoring the cat's weight at home can help track progress and ensure that weight loss occurs safely.

Hence, this study will be carried out to check can low calorie, high fibre diet (diet A) potentially reduces body weight at gradual pace by 0.5% to 1.0% per week in animals, while improving quality of life, maintaining palatability, and minimizing the impact of free feeding by pet owners.

1.1 RESEARCH PROBLEM STATEMENT

Middle-aged cats (8–12 years old), neutered cats, and those that live indoors or mostly indoors have a higher risk of obesity. Effective weight management requires careful attention to diet and feeding habits. When determining daily calorie intake for weight loss, the goal is to ensure a safe rate of weight reduction. This helps preserve lean body mass, lowers the risk of hepatic lipidosis, and maintains a steady weight-loss progress to keep owners engaged and motivated. The positive attitude of pet owners on their cat obesity and overweight have somehow been a contributing factor in feline overweight and obesity problems. This lack of understanding and exposure to the consequences of their cat being overweight have led the owner to have a positive attitude towards their cat begging for food behavior. While many owners exhibit a negative attitude towards feline overweight and obesity, a significant group still perceives a 'chubby' cat as indicative of a high quality of life.

I. RESEARCH QUESTIONS

- Can low calorie, high fibre diet (diet A) potentially reduces body weight by 0.5% to 1.0% per week in animals with a BCS of 6/9 and above, while improving quality of life, maintaining palatability, and minimizing the impact of free feeding by pet owners?

II. RESEARCH HYPOTHESIS

- Low calorie, high fibre diet (Diet A) will affect the weight, body condition score and overall health of overweight or obese prone cats, as practical for the owners to comply with the feeding regime for a weight loss program.

III. RESEARCH OBJECTIVES

This study aims to evaluate the effects of a low-calorie, high-fiber diet (Diet A) on the weight, body condition score, and overall health of overweight or obesity-prone cats. Additionally, it investigates the practicality of owner compliance with the feeding regimen in a weight-loss program

CHAPTER 2

2.0 LITERATURE REVIEW

2.1 OVERVIEW OF IDEAL WEIGHT IN CAT

The weight of a cat is crucial for its overall health, with deviations from an ideal weight range posing significant health risks (Smith, 2018; Jones & Brown, 2020). Obesity in cats, characterized by overeating and sedentary lifestyles, has become a growing concern globally, including in Malaysia (Garcia *et al.*, 2019; Tan *et al.*, 2019). The Malaysian Veterinary Council (MVC) recognizes the escalating incidence of obesity-related ailments in companion animals, advocating for preventive measures (MVC, 2021). Given the cultural and dietary influences in Malaysia, tailored interventions are imperative to address feline obesity effectively (Chong *et al.*, 2018).

2.2 CONSEQUENCES OF FELINE OBESITY

Studies in neighboring countries, such as Singapore and Indonesia, highlight the pervasive nature of feline obesity in Southeast Asia, attributed to dietary practices and urban living conditions (Tan *et al.*, 2019; Lim *et al.*, 2020). Obesity in cats predisposes them to various health issues, including diabetes, joint problems, and reduced life expectancy (Jones & Brown, 2020). In Malaysia, the rapid urbanization and sedentary lifestyles exacerbate the risk of feline obesity (Chong *et al.*, 2018).

A cat is classified as overweight when it exceeds its ideal body weight by 10-20%, and as obese when it has more than 20% excess body fat. Feline obesity affects up to 63% of cats in developed countries. Excess weight leads to significant health risks, this includes immunosuppression, endocrine and metabolic disorders, cardiovascular disease, and osteoarthritis. Middle-aged (8-12 years old), neutered, and indoor cats are at a higher risk for developing obesity. Implementing appropriate diet and feeding strategies is essential for effective weight management (Ardente, 2023).

Body condition scoring in cats and dogs

Having a consistent scale to evaluate the body score helps to give precise results and to track progress in weight management in cats. Where 3/5 in 5-point scale and 5/9 in 9-point scale is an ideal weight for cats. While the highest number in the scale which is 5 in 5-point scale and 9 in 9-point scale is considered as obese (Steele, 2022).

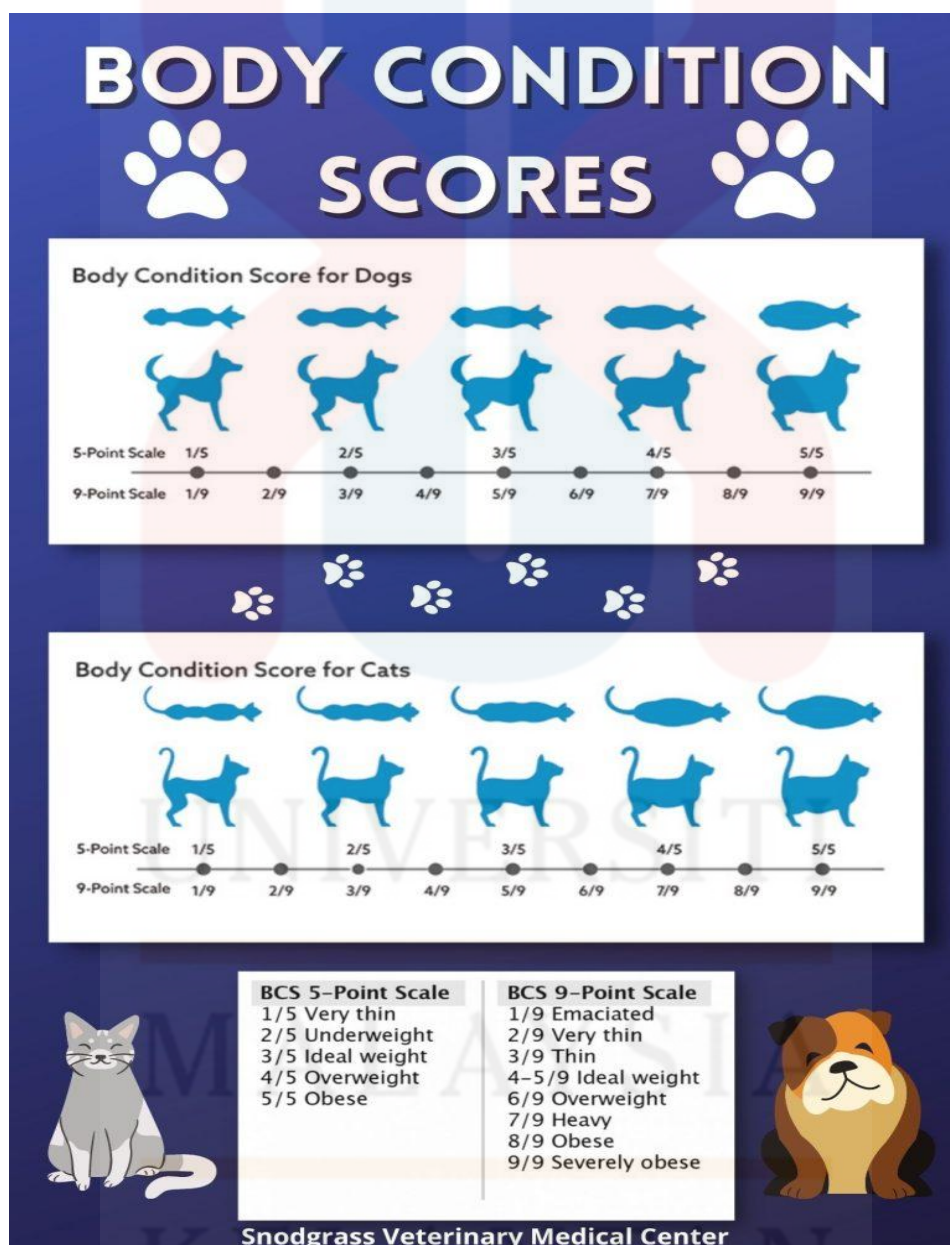


Figure 1: Scoring of body condition score(BCS)

2.3 IMPORTANCE OF WEIGHT MANAGEMENT STRATEGIES

Roberts (2017) advocates a multifaceted approach to weight management in cats, encompassing structured feeding schedules, calorie-regulated diets, exercise, and professional guidance. The owner does not really know how many calories their cat needs to match their activity status (Schokkenbroek, 2006). To set this straight, this mean that the Malaysian culture itself that offer a flavourful food suggesting high calorie together with the high sympathy offered where Malaysian cat owners often exhibit high levels of sympathy and empathy towards their feline or canine companions, perceiving them as vulnerable fragile beings deserving of nurturing and protection (Chong *et al.*, 2018).

This emotional bond fosters caregiving behavior, often leading owners to overfeed their cats in an attempt to ensure their well-being and happiness (Russell *et al.*, 2020). Many owners perceive their pets as “not fat, just a little chubby,” reflecting a subjective interpretation of weight status influenced by emotional attachment and cultural norms (Courcier *et al.*, 2011; Rowe *et al.*, 2015). This normalization or downplaying of overweight status may also stem from a lack of awareness about feline obesity and weight management principles (German *et al.*, 2010). Despite the availability of objective measures like Body Condition Scoring (BCS) systems, owners often rely on subjective assessments shaped by societal influences and personal biases (Linder & Mueller, 2014; Emma, 2017).

It is important to have a controlled and balanced diet for successful weight loss in cats (Tan *et al.*, 2022). Tailoring calorie intake to match energy expenditure is essential to achieve gradual weight loss without compromising nutritional needs hence help in reducing weight healthily without causing much deficit in daily calorie needed by the body per day, hence reducing begging which help the owner to be more disciplined on this matter.

2.4 STRATEGIES ON WEIGHT MANAGEMENT

Dietary modifications, including calorie restriction and nutrient-dense formulations, are fundamental in cat weight management (Laflamme, 2012). High-protein, low-carbohydrate diets have shown promise in promoting weight loss while preserving lean body mass (Backus *et al.*, 2010). Additionally, incorporating dietary fiber has emerged as a beneficial strategy for weight management in cats. Fiber-rich diets contribute to increased satiety, reduced energy intake, and improved gastrointestinal health (Floerchinger *et al.*, 2020). Encouraging physical activity through interactive toys, environmental enrichment, and structured play sessions can aid in calorie expenditure and weight loss (Rowan *et al.*, 2016). Access to vertical spaces, scratching posts, and hiding spots can stimulate natural behaviors and promote increased movement (Vidovic *et al.*, 2015).

Addressing feeding behaviors and emotional factors is integral to long-term weight management success. Scheduled feeding times, food puzzles, and gradual feeding transitions can help regulate food intake and prevent overeating (Zoran, 2010). Behavior-based interventions, such as positive reinforcement training and environmental modifications, can also influence dietary habits and promote weight loss (German *et al.*, 2011). The role of owners in implementing weight management strategies is crucial. Educating owners about the importance of portion control, regular feeding schedules, and recognizing signs of satiety can facilitate adherence to dietary guidelines (German *et al.*, 2009). Additionally, addressing emotional factors, such as guilt or emotional feeding, is essential for promoting long-term behavior change. **Veterinary Monitoring and Support:** Regular veterinary assessments are essential for monitoring weight loss progress, adjusting dietary plans, and addressing any underlying health issues (Linder *et al.*, 2019). Veterinary professionals play a crucial role in providing guidance to the owners through the weight loss process, providing education, support, and tailored management plans for them to comply (German *et al.*, 2009).

2.5 ROLE OF WEIGHT LOSS FEED FORMULAS

Emerging evidence suggests the efficacy of weight loss feed formulas in addressing feline obesity, including in Malaysia (Tan *et al.*, 2022). These specialized diets provide controlled calorie intake while ensuring adequate nutrition, facilitating safe and sustainable weight loss (Smith, 2018). Given the cultural dietary practices and urbanization in Malaysia, weight loss feed formulas offer a practical solution to combat obesity in cats (Chong *et al.*, 2018). Feeding cats with a moderate-protein, high-fiber diet under controlled conditions emerged as a viable and secure approach for inducing weight loss (Pallotto *et al.*, 2018).

Weight care feeds for cats are specifically designed to help them achieve and maintain an ideal body weight by closely aligning with their Resting Energy Requirement (RER) and Daily Energy Requirement (DER). The RER represents the energy a cat needs to maintain basic physiological functions at rest and can be calculated using the formula: 70 multiply by body weight (kg) exponential to 0.75 (National Research Council, 2006). The DER, which accounts for daily activities and weight goals, is calculated by multiplying the RER by an appropriate factor, typically around 0.8 for weight loss, ensuring a caloric deficit (German *et al.*, 2010).

Weight care feeds are formulated with specific nutritional constituents that control caloric intake while ensuring the cat receives essential nutrients. These feeds have a controlled caloric content to match the adjusted DER, effectively reducing caloric intake to promote weight loss or maintenance (German, 2016). Key components of these diets include high-quality proteins, which help preserve lean muscle mass during weight loss and have a higher thermic effect, increasing energy expenditure (Kienzle & Bergler, 2016). This is crucial as muscle mass maintenance supports metabolic health and prevents the loss of muscle that can accompany calorie restriction.

Additionally, weight care feeds often have an increased fiber content, which plays a significant role in promoting satiety and reducing overall food intake (Birmingham *et al.*, 2014). Fiber swells with water, creating a sense of fullness that helps curb overeating. Furthermore, these feeds are nutrient-dense, ensuring that despite the lower caloric intake,

cats still receive all necessary vitamins, minerals, and other nutrients to prevent deficiencies (Laflamme, 2012).

2.6 IMPORTANCE OF RESEARCH FINDINGS

Effective weight loss in obese cats is crucial for preventing a range of diseases caused by obesity. By shedding all their excess weight, the cats can significantly reduce their risk of developing diabetes mellitus, a condition exacerbated by obesity (Tan *et al.*, 2022).

Weight loss also reduces strain on the joints, reducing the onset or progression of joint diseases like osteoarthritis and degenerative joint disease (Jones & Brown, 2020). Furthermore, respiratory disorders, including labored breathing and decreased exercise tolerance, are common in obese cats but can be improved through successful weight loss (Garcia *et al.*, 2019). Similarly, cardiovascular issues such as hypertension and heart disease are prevalent in overweight cats but can be mitigated by reducing the burden on the heart through weight loss (Roberts, 2017).

Obesity-related hepatic lipidosis, a severe liver condition, can be prevented or reversed with weight loss, while skin problems like dermatitis and skin fold infections are lessened with improved mobility and grooming (Smith, 2018). Ultimately, this low calorie, high fibre diet A not only enhances the overall health and quality of life of obese cats but perhaps helps in extending their lifespan by reducing the risk of obesity-related diseases and promoting general well-being.

Obesity in cats contributes to the development of various diseases through intricate physiological mechanisms. Diabetes mellitus (DM) in cats is primarily linked to obesity-induced insulin resistance and relative insulin deficiency (Slingerland *et al.*, 2016). Adipose tissue, particularly visceral fat, produces adipokines and pro-inflammatory cytokines, exacerbating insulin resistance (German, 2018). Hepatic lipidosis, or fatty liver disease, often occurs during rapid weight loss in obese cats, as adipose tissue breakdown overwhelms the liver's capacity for fat metabolism (German, 2018). Obesity-induced mechanical stress and chronic inflammation are major contributors to osteoarthritis,

accelerating cartilage degradation and joint inflammation (Bennett *et al.*, 2017). Lower urinary tract diseases in obese cats are associated with alterations in urinary pH and volume, promoting crystal formation and urinary tract inflammation (Lund *et al.*, 2011). Respiratory disorders such as feline asthma can be exacerbated by obesity, as excess fat deposition restricts lung expansion and chronic inflammation further compromises respiratory function (German, 2018). These physiological mechanisms underscore the importance of managing obesity in cats to prevent weight-related diseases and improve overall health and quality of life.

This study expect to show that low-calorie, high-fiber diet A is a safe and effective option for overweight and obese-prone cats in Malaysia, especially those with a body condition score above 6/9. This diet aims to support gradual weight loss (0.5–1% per week), improve body condition, and enhance overall health. The findings will also assess the practicality of the feeding plan and owner compliance in a home setting.

CHAPTER 3

3.0 METHODOLOGY

3.1 Study area

This study was conducted to cat owners in Malaysia.

3.2 Study design

This study was conducted by providing the low-calorie, high-fiber diet A to clients in Malaysia who met the targeted weight criteria. Clients received the diet A cat kibbles to feed their cats for one month, with an expected weight reduction of 0.5%–1.0% per week. No dietary changes were made for the control group. Body weight performance was evaluated and recorded throughout the study. This research was carried out as a prospective cohort study.

Nutrition analysis of low calorie high-fibre diet A cat kibbles is;

	Percentage (%)
Crude protein (min)	34%
Crude fat (min)	8.5%
Crude fiber (max)	11.5%
Moisture (max)	6.5%

Table 2: Nutrition analysis of low calorie high-fibre diet A

3.3 Study Population

The study population included 10 cats in Malaysia.

3.4 Selection criteria

3.4.1 Inclusion criteria

The inclusion criteria were overweight or obese-prone cats with a body condition score of 6/9 based on the Snodgrass Veterinary Medical Center Body Condition Scores, at least one year old, and in healthy condition without underlying disease upon physical examination, CBC, serum biochemistry, and urinalysis. The cats were required to be indoor and neutered, with minimal exercise but not restricted in a cage.

3.4.2 Exclusion criteria

The exclusion criteria for this study were overweight cats whose owners did not provide consent, cats that were not in healthy condition, pregnant or lactating animals or those expected to be during the trial. Cats with a history of adverse reactions to food, those requiring therapeutic or special care diets, animals scheduled for surgery during the trial period, and those participating in other clinical studies during the same period were also excluded.

3.5 Sampling Method and procedure

1. A recruitment poster was shared on social media to enroll 10 cats—5 for the treatment group and 5 for the control group.
2. Selected cats underwent a health screening, including a physical exam, CBC, serum biochemistry (liver and kidney function), and urinalysis.
3. Before Day 0, feed intake for the control group was recorded, while the treatment group had daily fecal scores and weekly body weight and BCS assessments. Baseline data, including body weight, BCS, and multi-angle photographs, were collected.
4. Each cat's indoor environment and exercise levels were assessed.
5. An isolated feeding area was set up to prevent food interference.

6. The treatment group underwent a two-phase feeding plan:

6.1 A 7-day transition period following the Royal Canin feed transition chart.

6.2 An 8-week feeding trial, including the transition period.

Day	Percentage old food (%)	Percentage new food (%)
1	75%	25%
2	75%	25%
3	50%	50%
4	50%	50%
5	25%	75%
6	25%	75%
7	0%	100%

Table 3: Feed transition plan

6.3 After that a low calorie high-fibre diet A was given according to the amount calculated. Owner can divide the amount into 2 meals per day, and fresh water must be provided all the time.

- a. Resting energy requirement (RER) = $70 \times BW_{kg}^{0.75}$
- b. During the stage of weight loss, daily energy requirement (DER) was calculated as the following table.

- c. Once the animal reaches ideal body weight, owners will have to adjust the feeding to maintenance stage, daily energy requirement (DER) was calculated as the following table.

Stage	Cat
Weight loss	DER = 0.8 x RER
Maintenance	(Neutered) DER =1.2 x RER (Intact) DER= 1.4 x RER

Table 4: Calculation of daily energy requirement in cats

- d. Actual metabolizable energy (ME) of low calorie high-fibre diet A are as follow:

Cat	301 kcal/100g
-----	---------------

Table 5: The actual metabolizable energy of low calorie high-fibre diet A.

- e. Amount of low calorie high-fibre diet A to be fed to the animal are calculated as
DER ÷ ME

Example
5 kg intact cat
RER = 70 x ^{0.75} = 234.06 kcal/day
DER during weight loss = 0.8 x RER = 187.25 kcal/day
Feed amount during weight loss = 187.25 kcal/day ÷ 301 kcal/100g = 62.2 g/day
Number of 50g cups of feed given per day = 62.2 g/50g
= 1.244 cups/ day
~ 1.25 cups / day

<p>Number of 50g cups of feed to be given per meal = 1.25 cups/ 2 meal</p> <p style="text-align: right;">= 0.625 cups per meal, twice daily</p> <p style="text-align: center;">(or)</p> <p style="text-align: right;">= 60% full cup per meal, twice daily</p> <p>DER during maintenance= 1.4 x RER = 327.68 kcal/day</p> <p>Feed amount during maintenance = 327.68 kcal/day ÷ 301 kcal/100g = 108.86 g/day</p> <p>Number of 50g cups of feed given per day = 108.86g/ 50g</p> <p style="text-align: right;">= 2.18 cups/ day</p> <p style="text-align: right;">~ 2.2 cups / day</p> <p>Number of 50g cups of feed to be given per meal = 2.2 cups/ 2 meal</p> <p style="text-align: right;">= 1.1 cups per meal, twice daily</p> <p style="text-align: center;">(or)</p> <p style="text-align: right;">= 1 full cup +10% of cups per meal,</p> <p style="text-align: right;">twice daily</p>
--

Table 6: Amount of feed to be given to the cat daily

7. Feeding plan for the control group:

7.1 No feed change, no feed transition, no intervention is required for the control group.

7.2 The DER is calculated based on Day 0, so throughout the study, there is a constant amount of feed being given ad libitum.

8. Owners have to weigh the amount of feed before and after their pets eat, they are given a table to record the amount of feed consumed every day in the unit of cups. The

owner will be given a cup measured with 50g to ease the owner in measuring the feed amount given.

9. At the beginning of the trial, owners are given a questionnaire to assess their pets quality of life. The questionnaire will have owners to score their pets level of happiness, energy, appetite, behavior and stool.

10. Follow up assessment will be conducted weekly until the end of the trial, body weight, body condition score, photo of the pet, amount of feed consumed, and quality of life are recorded.

11. Feeding practice will be adjusted according to the condition of the animals, make sure that no animals have weight drop exceeding 2% per week.

12. Any animals that are diagnosed with health problems during trial must be eliminated from trial and proceed with treatment.

13. On day 49, both groups of cats will do CBC and blood screening.

3.6 Owner Compliance for trial group:

1. Owners will have to make sure the low calorie high-fibre diet A is only fed to the targeted pet (in case of multi-pet households).
2. Owner will have to make sure the targeted pet only consumes low calorie high-fibre diet A throughout the trial.
3. Owner will have to feed the recommended amount of low calorie high-fibre diet A to the targeted pet, and do not exceed the recommended amount.

4. Owner does not feed any other food to the targeted pet, such as snacks, table scraps, and other pet food.
5. Owner has to report any health conditions or abnormalities of the targeted pet during trial to the vet.

3.7 Owner Compliance for control group:

1. Owner will have to make sure the targeted pet does not change its original diet throughout the study research.
2. Owner has to report any health conditions or abnormalities of the targeted pet during trial to the vet.

3.8 Data collection tools

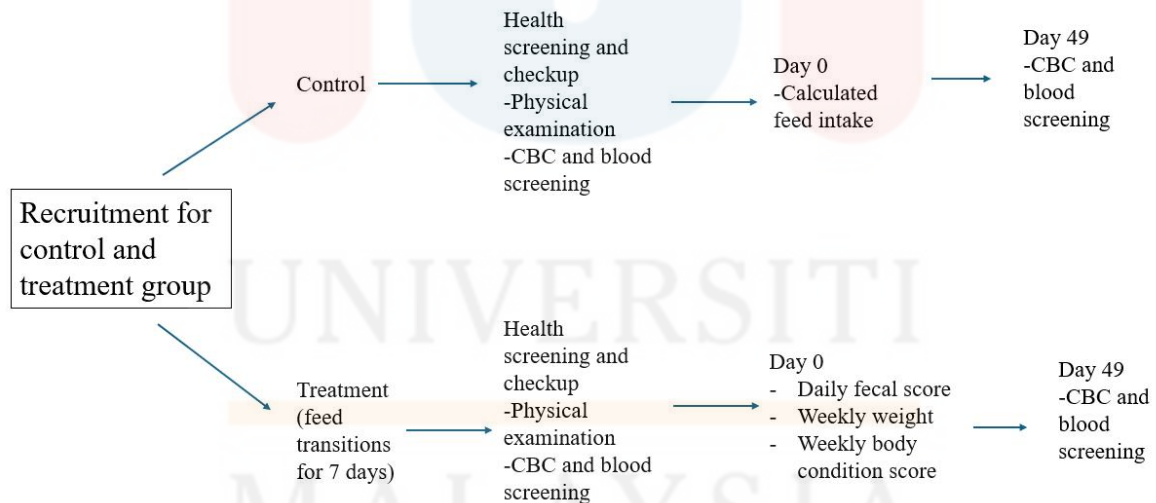


Figure 2: Flowchart on data collection throughout the study

Recruitment checklist

	Pass	Failed
--	-------------	---------------

Physical examination (normal)		
Deworming status		
Vaccination status		
History of food allergy		
Lactating/ pregnant/ expected to be		
CBC (normal)		
Serum biochemistry (normal)		
Urinalysis (normal)		
BCS >6/9		
Age at least 1 years old		
Indoor		
Isolated feeding area		
Willing to follow the feeding regime		

Table 7: Recruitment checklist

Health Screening and checkup chart for both control and treatment trial group

Category	Parameter	Time
Body weight	Kg	Day 0, 7, 14, 21, 28
Body condition score	x/9 (based on Snodgrass Veterinary Medical Center Body Condition Scores chart)	Day 0, 7, 14, 21, 28
Complete blood count	Basic hematology parameters	Day 0 & 49
Serum biochemistry	- BUN - Creatinine - ALT - ALKP - Triglyceride	Day 0 & 49
Urinalysis	Urine strip	Day 0 and 49
Faecal score	Based on chart	Everyday

Table 8: Health Screening and checkup checklist



FECAL SCORING SYSTEM FOR CATS



Figure 3: Fecal scoring in cats (Society, 2023)

MALAYSIA

KELANTAN

FYP FPV

Weekly Body Weight Assessment

	W1	W2	W3	W4	W5	W6	W7	W8
Body Weight (kg)								
Weight loss (kg)								
Cumulative Weight loss (kg)								
Weight loss rate (%)								

Table 9: Weekly Body Weight Assessment

Assessment Rubric

	Criteria				Points
	1	2	3	4	
Body Weight	Body weight increased than before trial	Body weight remained the same	Body weight decrease less than 1kg	Body weight decrease more than 1 kg	

Body Condition Score	Body condition score increased than before trial BCS 6/9	Body condition score remain BCS 6/9	Body condition score improve to BCS 5/9	Body condition score improve to BCS 4/9	
Photo (Back, Front, Sides, Up)	The body become rounder and more fat pads	The body become less rounder and less fat pads	The body become fit and muscular	The body become thin and lean	
Energy/activity level	Cat seems to be depressed and dull from before the feed changes	Cat's activity remain the same with no changes	Cat ' s activity show slight changes from before where animal show positive attitudes	Cat ' s activity changes from before where animal show positive attitudes	
Quality of life	The animal is not active, depressed and avoid socializing with humans and other companion animals	The animal is not active, has a normal level of happiness, and reduced level of socializing with humans and other companion animals.	The animal is active, happy and good at socializing with humans and other companion animals.	The animal is hyperactive, very excited and very playful with humans and other companion animals.	
Palatability	The animal	The animal	The animal did	The animal	

	does not finish the trial feed given that day more than half cup (>50%) and asking for other food.	does not finish the trial feed given that day less than quarter cup (<25%) and asking for other food.	not finish the trial feed given that day (<25%) the trial feed given that day and did not ask for other food.	finished the trial feed given that day and did not ask for other food.	
Satiety	The animal keeps asking for food, very fast in eating the food offered.	The animal keeps asking for food, fast in eating the food offered.	The animal seldom asks for food, at moderate speed to the food offered in the food bowl.	The animals do not ask for food and even have leftovers, seldom eating once food is offered.	

Table 10: Assesment rubric

Data analysis

The data collected during the 1-month feed trial were analyzed using SPSS. A paired t-test was performed to compare pre- and post-trial body weight, assessing the effectiveness of the low-calorie, high-fiber diet in achieving a safe weight loss rate of 0.5% to 1% per week. The statistical significance of the weight change was determined using the p-value. Graphs were plotted to visually represent weight trends before and after the trial. Categorical data, including body condition score and quality of life, were analyzed using Google Forms and SPSS. Microsoft Excel was used for initial data organization, while SPSS was utilized for statistical computations and data visualization.

3.9 Ethical considerations

Ethical approvals for using animals in the current study was applied from the Animal Ethics Committee of the Universiti Malaysia Kelantan with an approval code from the FPV Animal Ethics Committee: UMK/FPV/ACUE/FYP/002/2024



CHAPTER 4

4.0 RESULTS

4.1 PHYSICAL EXAMINATION

Before the trial, physical examination was done and the result shows that all cats both in the trial and control groups appeared normal, healthy and showing no signs of systemic diseases. The cats were neither pregnant nor lactating, none of the cats had a history of adverse reactions to food. None of the participants are required to be on other therapeutic diets or any scheduled for surgery nor involved in any other clinical studies during that time. Only one of the supposed participants died before trial due to unrelated complications. Hence, all the cats present passed the physical examination.

4.2 BODY WEIGHT

4.2.1 Mean Body Weight

Mean Body Weight	Week 1	Week 2	Week 3	Week 4
Trial Group (kg)	4.65	4.58	4.58	4.54
Control Group (kg)	4.33	4.47	4.51	4.51

Table 11: Weekly mean body weight of both control and trial group

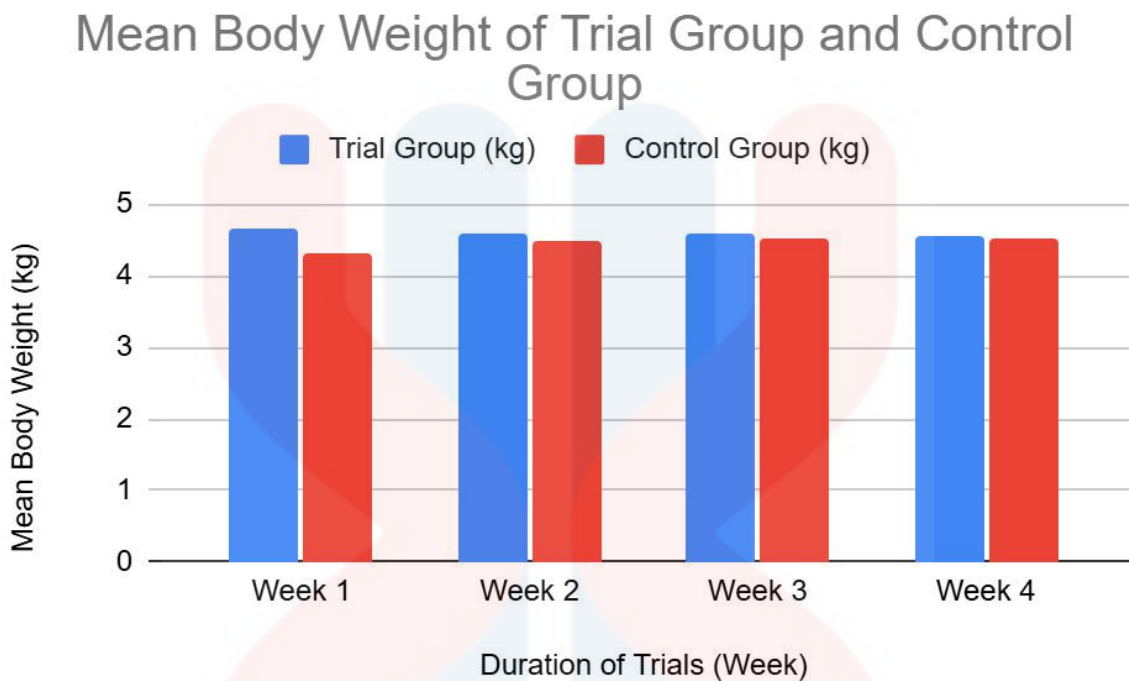


Figure 4: Bar Graph of mean body weight (kg) of trial and control group

4.2.2 Weekly Mean Body Weight Loss (kg)

Mean Weekly Weight Loss (kg)	Week 1	Week 2	Week 3	Week 4
Trial Group (kg)	0.07	0.01	0.03	0.06
Control Group (kg)	-0.14	-0.04	0.01	-0.02

Table 12: Weekly mean body weight loss for both control and trial group

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Weekly Mean Body Weight Loss of Trial Group and Control Group

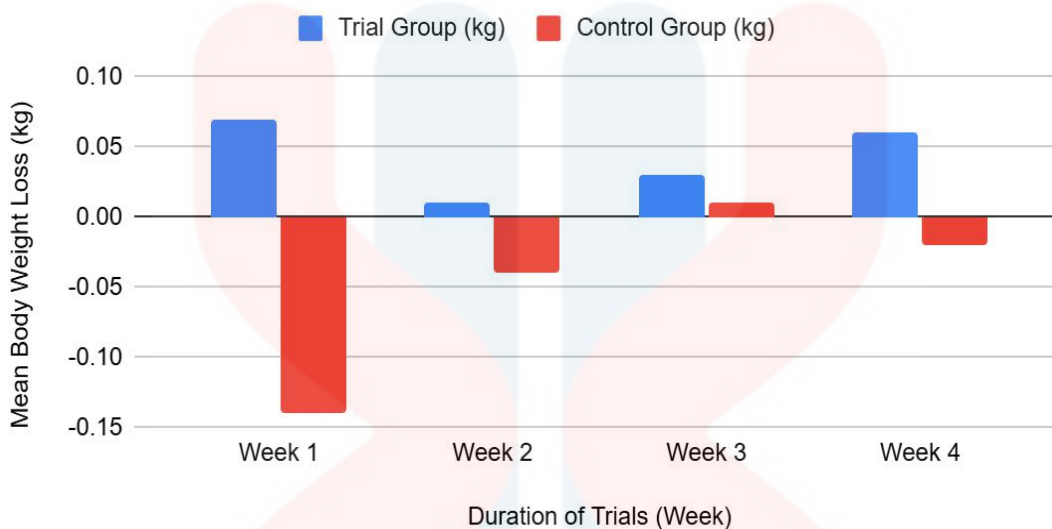


Figure 5: Bar graph of weekly mean body weight(kg) loss

4.2.3 Weekly Mean Body Weight Loss Percentage (%)

Mean Weekly Weight Loss Percentage (%)	Week 1	Week 2	Week 3	Week 4
Trial Group (%)	1.44	0.06	0.73	1.53
Control Group (%)	-3.32	-1.03	0.08	-0.5

Table 13: Weekly mean body weight loss percentage

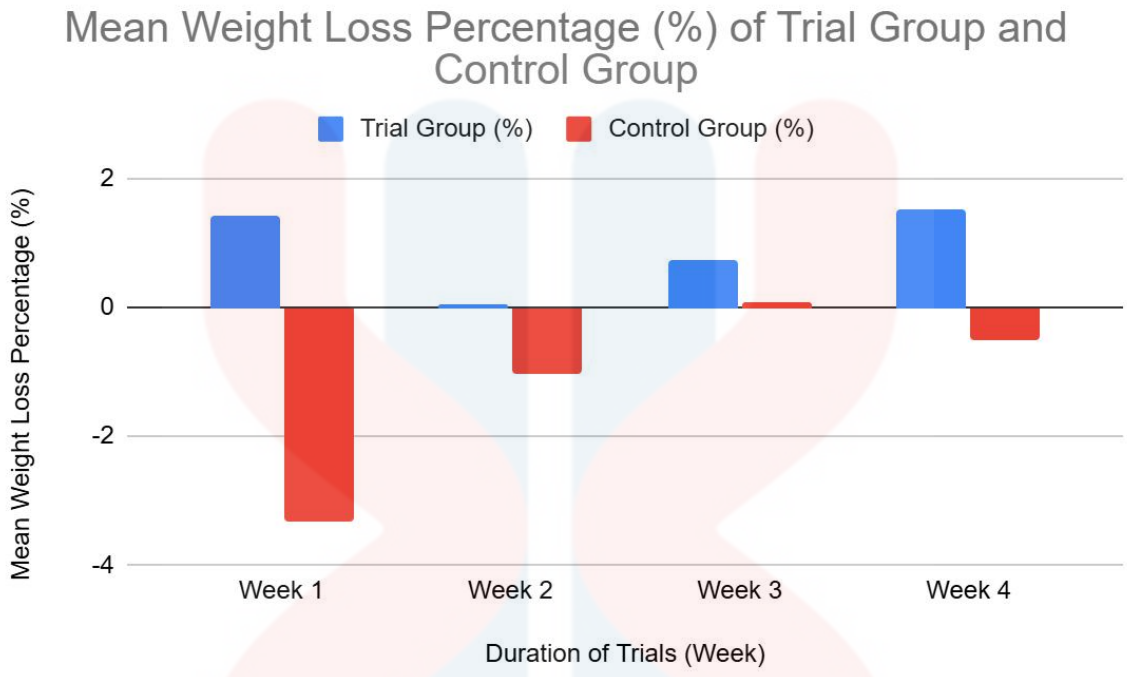


Figure 6: Bar graph of weekly mean weight loss percentage (%)

The mean weight before and after the low-calorie high fibre diet weight loss program was significant different ($p < 0.05$, 95%CI of mean difference: -0.23380, -0.5420). The mean weight was lower after the low-calorie high fibre diet weight loss program. The mean was reduced by - 0.144kg after the weight loss program. We are 95% sure that the reduction of weight lies between -0.23380, -0.5420.

Variables	Measurement, Mean (SD)		Mean Difference (95% CI)	P value
	Pre	Post		
Body weight	4.65 (0.48)	4.51 (0.45)	-0.14 (-0.23 , -0.54)	0.011 ($p < 0.05$)

Table 14 : P value of body weight before and after feed trial for trial group

The mean weight before and after the low-calorie high fibre diet weight loss program showed no significant differences ($p > 0.05$, 95% CI of mean difference : -0.61, -0.96).

The mean weight was higher than after the low-calorie high fibre diet weight loss program. The mean was reduced by 0.17677 kg after the weight loss program. We are 95% sure that the increment of weight lies between -0.61, -0.96.

Variables	Measurement, Mean (SD)		Mean Difference (95% CI)	P value
	Pre	Post		
Body weight	4.33(0.40)	4.51 (0.38)	0.18(-0.61, -0.96)	0.434 (p > 0.05)

Table 15 : P value of body weight before and after feed trial for control group.

4.3 BODY CONDITION SCORE

Column 1	Day 0	Week 1	Week 2	Week 3	Week 4
Trial Group	8.4	8.4	8.2	8	7.4
Control Group	6.67	6.67	7	7	7

Table 16: Weekly mean body condition score

Trial Group Mean BCS Vs Control Group Mean BCS

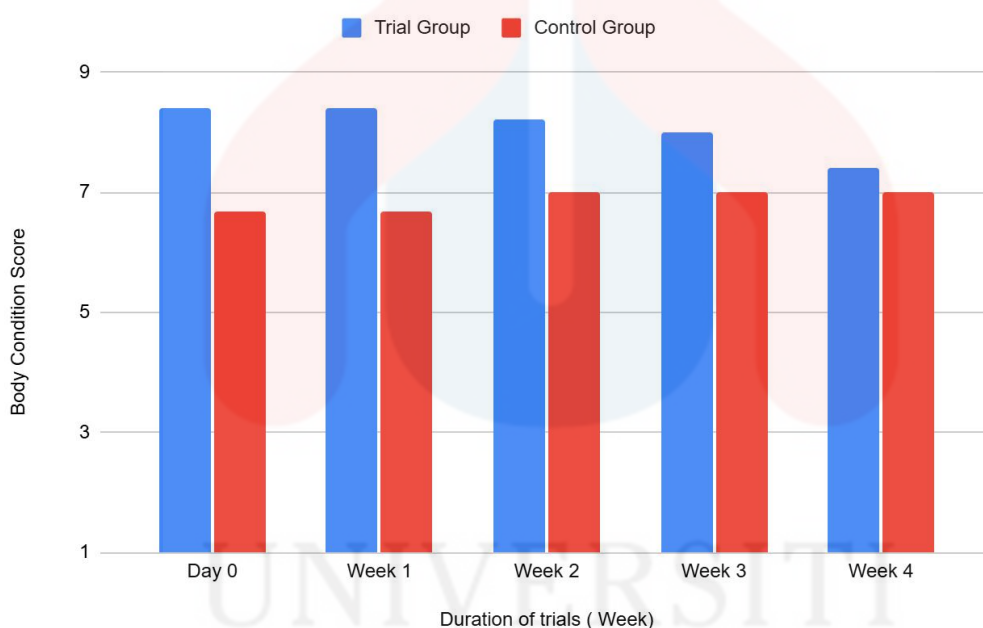


Figure 7: Bar graph of weekly mean of body condition score (BCS)

The mean BCS before and after the low-calorie high fibre diet weight loss program was significant different ($p < 0.05$, 95%CI of mean difference :-1.76, -0.65). The mean BCS was lower than after the low-calorie high fibre diet weight loss program. The mean was reduced by 1.20 after the weight loss program. We are 95% sure that the increment of BCS lies between -1.76, -0.65.

Overall performance result

	Control	Treatment	SEM	P value
Average initial body weight (kg)	4.33	4.65	0.18 (Control) / 0.21 (Trial)	0.03
Average final body weight (kg)	4.51	4.51	0.22 (Control) / 0.20 (Trial)	1.00
Average body weight loss (kg)	-0.05	0.04	0.04 (Control) / 0.01(Trial)	<1.00
Average BCS initial	6.67	8.4	0.33 (Control) 0.20 (Trial)	< 0.01
Average BCS final	7.33	7.20	0.527 (Control) 0.200 (Trial)	>0.05

Table 17: Overall Performance Result of The Body Weight Loss and BCS Changes

4.4 SATIETY

Score	1 (Hungry)	2 (Unsatiated)	3 (Moderately_satiated)	4 (satiated)
Criteria	The animal keeps asking for food, very fast in eating the food offered.	The animal keeps asking for food, fast in eating the food offered.	The animal seldom asks for food, at moderate speed to the food offered in the food bowl.	The animals do not ask for food and even have leftovers, seldom eating once food is offered.

Table 18: Scoring of Satiety of The Feed

Mean Satiety Score	Week 1	Week 2	Week 3	Week 4
Trial Group	3.2	2.74	2.11	2.02
Control Group	3.67	2.67	1.52	2.76

Table 19: Weekly mean satiety score

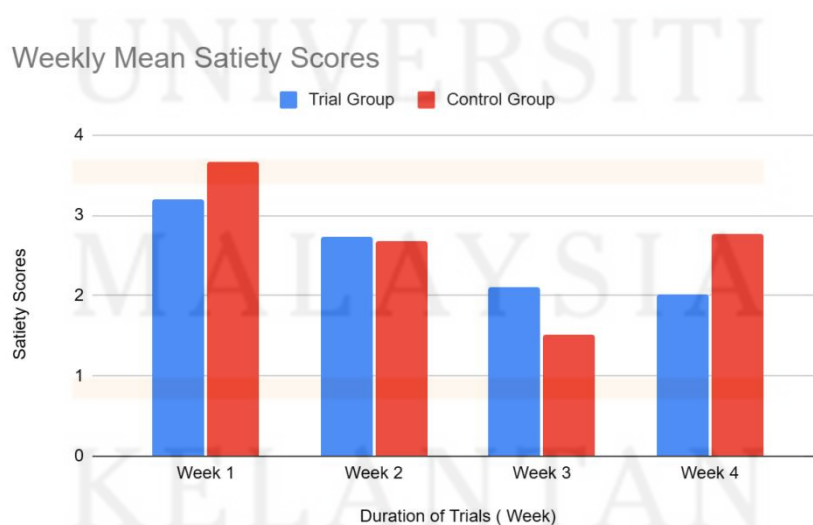


Figure 8: Bar graph of weekly mean satiety score

The mean satiety score before and after the low-calorie high fibre diet weight loss program was not significant different ($p < 0.05$, 95%CI of mean difference :-2.24, 1.84). The mean satiety score was lower than after the low-calorie high fibre diet weight loss program. The mean was reduced by 0.20 after the weight loss program. We are 95% sure that the increment of satiety score lies between -2.24, 1.84.

Variables	Measurement, Mean (SD)		Mean Difference (95% CI)	P value
	Pre	Post		
Satiety Score	3.20 (1.10)	3.00 (0.71)	-0.20 (-2.24, 1.84)	P = 0.80 ($p > 0.05$)

Table 20: P value of Satiety Score of The Feed

4.5 QUALITY OF LIFE

One of the key aspects of evaluating the success of a dietary intervention, especially one aimed at weight loss, is assessing whether the diet impacts the overall well-being and quality of life of the pet. In this study, despite the low-calorie, high-fiber diet (Diet A) being primarily focused on weight loss, it was found that the diet did not adversely affect the cats' quality of life. On the contrary, the cats in both the trial and control groups exhibited continued playfulness and overall engagement throughout the study period. Playfulness is an important indicator of an animal's physical and mental health, as it reflects their energy levels, cognitive function, and emotional state (Wells, 2009). Throughout the study, the cats in both groups continued to exhibit playful behavior, suggesting that they were physically comfortable and psychologically engaged. Despite the reduction in caloric intake, none of the cats showed signs of lethargy, frustration, or a

reduced interaction with their environment, which are common indicators of distress in pets undergoing restrictive diets (Lem et al., 2017).

The maintained playfulness of the cats suggests that the low-calorie, high-fiber diet was not only safe but also conducive to preserving their mental and emotional well-being. Previous studies have reported that the overall well-being and behavior of pets undergoing weight loss programs are often influenced by both the quality of the diet and the manner in which the diet is introduced (Case *et al.*, 2020; Hall *et al.*, 2015). In this study, the cats' continued playfulness emphasizes that the intervention did not result in behavioral changes associated with discomfort or dissatisfaction.

4.6 PALATABILITY

Palatability Score	Week 1	Week 2	Week 3	Week 4
Trial Group	3	4	4	4
Control Group	3	3	3	3

Table 21: Weekly Mean of Palatability Score

Mean Palatability Score of Trial Group and Control Group

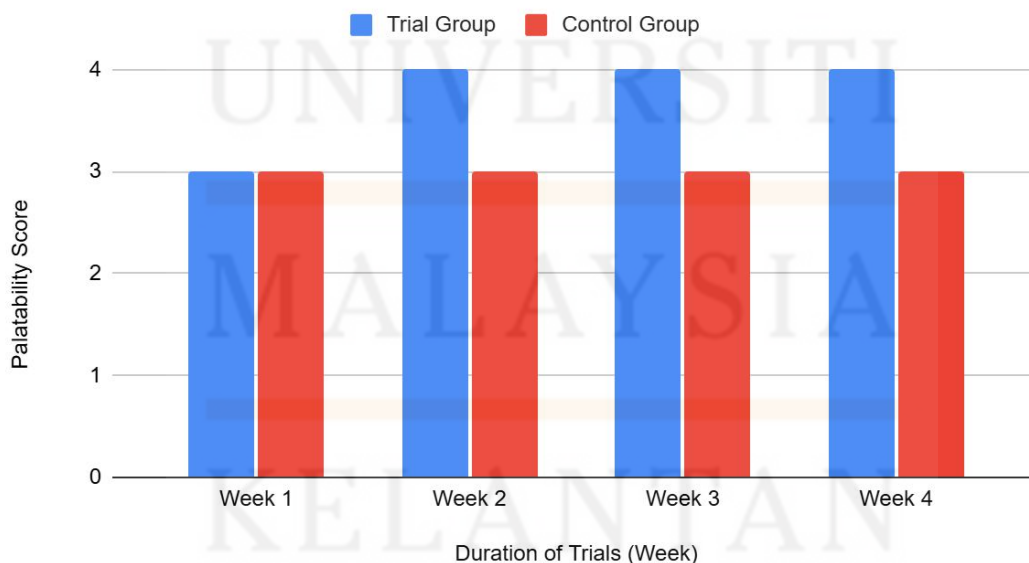


Figure 9: Bar graph of mean palatability score weekly

CHAPTER 5

5.0 DISCUSSION

The objective of this study was to evaluate the effects of a low-calorie, high-fiber diet (Diet A) on overweight or obese-prone cats, focusing on their body weight, body condition score (BCS), overall health, and owner compliance with the feeding regime. The findings of this study suggest that Diet A has potential benefits in weight reduction, improvement of body condition score, and maintenance of overall health, with a manageable level of owner compliance. However, it also highlights the complexity of the feeding regime and the variety in outcomes across the trial and control groups.

5.1 Overall health

The results of the blood tests, including complete blood count (CBC) and serum biochemistry, indicate that the low-calorie, high-fiber diet did not negatively impact the overall health of the cats. Key biochemical parameters, such as blood urea nitrogen (BUN) and creatinine for kidney function, as well as alanine aminotransferase (ALT) and alkaline phosphatase (ALKP) for liver function, remained within normal reference ranges in both the trial and control groups (German, 2016). This suggests that the dietary intervention did not place additional metabolic stress on renal or hepatic systems, supporting its safety in feline weight management (Center, 2023).

Urinalysis results also confirmed normal kidney function across both groups, with no signs of proteinuria, hematuria, or urinary tract abnormalities (Christmann *et al.*, 2016). These findings align with previous studies indicating that high-fiber weight-loss diets do not compromise renal function when properly formulated. The absence of adverse effects on liver enzymes further supports the claim that gradual weight reduction prevents hepatic lipodosis, a common concern in overweight cats undergoing rapid weight loss (Pallotto *et al.*, 2018).

Comparatively, some studies have documented mild increases in liver enzymes during initial weight loss phases, likely due to fat mobilization (Pallotto *et al.*, 2018). However,

the stability of biochemical markers in this study suggests that the controlled feeding regimen and gradual weight reduction (0.5%–1% per week) were effective in minimizing potential metabolic disturbances (German, 2016).

While this study demonstrated the safety of Diet A, future research should consider monitoring inflammatory markers and oxidative stress levels to assess long-term metabolic effects (Center, 2023). Additionally, comparing different dietary compositions (e.g., high-protein vs. high-fiber formulations) could provide further insight into optimizing feline weight-loss strategies (Christmann *et al.*, 2016).

5.2 Body weight and body condition score

One of the important findings of this study is the significant reduction in body weight and BCS in the trial group after four weeks of feeding Diet A. The mean body weight of cats in the trial group decreased from 4.65 kg to 4.51 kg, a mean difference of -0.14 kg, with a significant p-value of 0.011 ($p < 0.05$). This result aligns with the hypothesis that the low-calorie, high-fiber diet would contribute to a gradual reduction in body weight. The weekly mean weight loss percentage ranged from 0.06% to 1.53%, demonstrating a consistent but mild decrease over the four-week period.

In comparison, the control group exhibited a slight increase in body weight, with a mean difference of 0.18 kg ($p = 0.434$), which was not statistically significant. This supports the idea that Diet A was the contributing factor to the observed weight loss in the trial group, as the control group did not experience any notable weight change during the same period. Therefore, the study's findings support the hypothesis that a low-calorie, high-fiber diet can have a positive effect on reducing body weight in overweight or obese-prone cats, providing a viable weight management strategy for obese-prone animals.

The significant reduction in body condition score (BCS) in the trial group, from 8.4 to 7.4 ($p = 0.004$), indicates that the low-calorie, high-fiber diet effectively improved body composition. This reduction of 1.20 points supports the hypothesis that controlled feeding with a high-fiber formulation contributes to gradual weight loss. The high fiber content

likely played a role by increasing gastric distension, slowing digestion, and prolonging satiety, which may have reduced voluntary food consumption (Weber *et al.*, 2017). This aligns with the observed weekly mean weight loss percentage in the trial group, which ranged from 0.06% to 1.53%, demonstrating a controlled rate of weight reduction within the targeted safe range of 0.5%–1.0% per week.

In contrast, the control group showed no significant change in BCS ($p = 0.184$), reinforcing that Diet A was the primary factor in the observed improvements. The mean BCS in the control group increased slightly from 6.67 to 7.33, suggesting that their diet did not create the caloric deficit necessary for weight reduction. This could be due to the energy density of the control diet or the lack of portion control, as cats fed ad libitum or on maintenance diets tend to maintain or gain weight (Rowe *et al.*, 2015). The statistical insignificance in the control group further highlights the necessity of structured dietary intervention for effective weight management.

The ability of Diet A to promote weight loss while maintaining overall health is supported by its controlled impact on metabolism. Unlike rapid weight-loss strategies, which may lead to muscle depletion, high-fiber diets facilitate fat metabolism while preserving lean body mass (German *et al.*, 2015). The trial group's weight reduction of 0.144 kg, with a 95% confidence interval ranging from -0.23380 to -0.5420 kg, suggests a predictable and safe decline in body weight. This controlled reduction minimizes the risk of metabolic disturbances, particularly hepatic lipidosis, a common concern in overweight cats undergoing rapid weight loss (Center, 2023).

The results of this study aligned with existing literature on the benefits of high-fiber diets for feline weight management. While some studies report mild increases in liver enzymes during weight loss phases due to fat mobilization (Pallotto *et al.*, 2018), no significant changes in biochemical markers were observed in this study, indicating that the weight-loss process remained within a safe metabolic range. Future research should explore whether combining high-fiber and high-protein diets could optimize weight loss while enhancing lean body mass retention.

5.3 Satiety and palatability

In terms of satiety, the trial group show a slight reduction in satiety score over the four-week period, with the mean score decrease from 3.2 to 3.0. Although this reduction indicates a mild decrease in hunger, the change was not statistically significant ($p = 0.80$). This suggests that while the low-calorie, high-fiber diet may have contributed to an increase in satiety, it did not lead to a substantial improvement in hunger management, as evidenced by the relatively constant satiety score.

The palatability of the diet was also evaluated, with the trial group consistently scoring 4 on the scale from 1 to 4, indicating that the diet remained palatable throughout the study. In contrast, the control group maintained a palatability score of 3, suggesting that the trial diet did not negatively impact the animals' acceptance of the food. The palatability score in the trial group is important because it suggests that the cats' preference for the diet was maintained, which is indeed crucial in ensuring owner compliance as owner tend to show empathy when their cat does not eat.

5.4 Owner Compliance and Adherence Challenges

While the results of this study show positive effects on the cats' weight and condition, one important factor that needs more attention is how well pet owners follow the feeding plan. Even though the diet proved to be beneficial, some owners found it challenging to stick to the feeding program, which could affect the long-term success of any weight-loss plan for their pets.

5.4.1 Understanding Owner Compliance

Owner compliance refers to the extent to which pet owners can follow the prescribed diet, including proper food portions, feeding schedules, and any other instructions provided by the veterinarian or nutritionist (German *et al.*, 2018). In this study, while the low-calorie, high-fiber diet A was effective in promoting weight loss and improving body condition score (BCS) in the trial group, practical challenges arose that made it difficult for some pet owners to fully comply with the regimen. This is primarily due to the need for a consistent feeding schedule and portion control (Linder & Parker, 2016).

One of the key components of a weight-loss program for pets is strict portion control to ensure that the animal receives the right amount of nutrients without overfeeding. However, many owners find it difficult to adhere to precise feeding amounts, especially when their pets appear hungry or unsatisfied after meals. This can lead to overfeeding, either out of compassion for the animal's perceived hunger or due to a lack of understanding of the importance of calorie restriction in weight management (Camara *et al.*, 2019). Studies have shown that owners who are unaware of their pet's ideal weight often underestimate their pet's body condition, further contributing to overfeeding (Courcier *et al.*, 2011).

Additionally, while the trial diet was designed to be palatable to cats, some may be more selective with new foods, which can pose a challenge for owners. In such cases, pet owners may revert to previous feeding habits to ensure their pets eat sufficiently, potentially hindering the effectiveness of the diet (Ramos *et al.*, 2020). Despite the palatability score in this study remaining high throughout the trial, individual differences in cat preference may still affect owner adherence to the program.

Moreover, some pet owners have busy schedules, making it difficult to maintain consistency in feeding routines. Owners may struggle to provide food at specific times or may be unable to closely monitor their cat's feeding behavior as required, leading to deviations from the prescribed feeding schedule (Chan *et al.*, 2022). Lack of routine and

inconsistent feeding can reduce the effectiveness of a weight-loss plan, as irregular feeding may lead to overconsumption or difficulty in tracking progress.

Furthermore, some owners may not fully understand the long-term benefits of a controlled diet for weight loss and may perceive a slight reduction in body weight or BCS as sufficient progress, leading them to discontinue the regimen too soon (Vitger *et al.*, 2016). Others may feel discouraged by slow weight loss, leading to reduced adherence to the plan. This misunderstanding can jeopardize the overall success of the program, as ongoing adherence is critical for maintaining weight loss and achieving long-term health benefits (Weber *et al.*, 2017).

5.4.2 Implications of Non-compliance

Non-compliance can seriously impact the effectiveness of dietary interventions, especially in long-term weight management programs for pets. When pet owners does not follow the recommended feeding routines, cats may fail to reach their target weight loss or body condition score (BCS) improvements. Inconsistent feeding habits can also affect a cat's metabolism, leading to unhealthy weight gain or slow progress in losing weight. Additionally, not following the prescribed feeding plan can cause health issues down the road. These problems, like nutritional imbalances or metabolic disruptions, might not be immediately noticeable but can become serious over time. Sticking to the diet is essential not just for achieving the desired weight loss, but also for supporting the overall health and well-being of the cat in the long run.

5.4.3 Strategies to Improve Compliance

To overcome these challenges and improve owner compliance, several strategies can be implemented, including education and guidance. Providing detailed, easy-to-understand instructions on how to follow the feeding regimen can significantly improve adherence (German *et al.*, 2018). Educational materials or consultation sessions help pet owners understand the importance of portion control, interpreting pet behavior (such as perceived hunger), and managing feeding schedules effectively (Chan *et al.*, 2022). Emphasizing the long-term benefits of weight management may further motivate owners to stay committed to the plan (Vitger *et al.*, 2016).

Another key strategy is habit modification and adjusting feeding methods. Helping owners manage their pets' behavior around food is crucial, as some cats may exhibit persistent begging or overconsumption tendencies (Camara *et al.*, 2019). Owners can be encouraged to feed smaller portions throughout the day or engage their pets in interactive feeding activities, such as puzzle feeders, to increase satisfaction while maintaining calorie restrictions (Ramos *et al.*, 2020).

Personalized diet plans also improve adherence, as each pet responds differently to dietary interventions (Linder & Parker, 2016). Tailoring recommendations based on individual preferences, health status, and behavioral responses can enhance compliance. If the diet aligns with the cat's eating habits and nutritional needs, owners may find it easier to follow the plan, increasing overall success rates (Weber *et al.*, 2017).

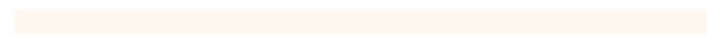
Regular monitoring and support are also essential. Routine check-ins, whether in person or virtually, provide owners with guidance and reassurance throughout the feeding program (German *et al.*, 2015). Veterinary staff can track progress, address concerns, and offer encouragement to keep owners engaged. Additionally, reminding owners of the health risks associated with obesity reinforces the importance of following the diet plan consistently (Rowe *et al.*, 2015).

Lastly, incentives and rewards can enhance compliance. Offering recognition for progress, such as weight loss achievements or consistent adherence to the diet, can motivate pet

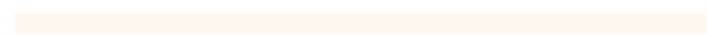
owners (Courcier *et al.*, 2011). Incentives may include discounts on veterinary services, special promotions on pet food, or acknowledgment of the owner's dedication to their pet's health (Laflamme, 2012).



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6.0 CONCLUSION AND RECOMMENDATION

This study suggests that a low-calorie, high-fiber diet is an effective and practical intervention for reducing body weight and improving body condition in overweight or obese-prone cats. The significant weight loss and improvement in body condition score (BCS) observed in the trial group highlight the potential of this diet for long-term weight management. Additionally, stable health parameters, such as blood biochemistry and urinalysis, indicate that the diet is safe for feline weight loss programs.

However, there are limitations to consider. The small sample size, particularly in the control group (n=3), may affect the generalizability of the findings. Future studies with larger sample sizes are necessary to validate these results and assess their applicability to a broader population of overweight cats. Additionally, the study duration was limited to four weeks, which may not be sufficient to evaluate the long-term effects of the diet. Extending the duration of future research could provide deeper insights into the diet's sustained effectiveness and impact on overall health.

Another key challenge identified in this study is owner compliance, which plays a critical role in the long-term success of feline weight management programs. Despite the effectiveness of the diet, maintaining adherence to feeding guidelines remains difficult for some pet owners. To enhance program success, it is essential to provide proper education, practical tools, and ongoing support to help owners manage their pets' weight effectively. Addressing compliance through tailored, supportive interventions will not only improve dietary intervention outcomes but also ensure that pets achieve and maintain a healthy weight and optimal well-being in the long run.

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8.0 Appendices



Figure 10: The back picture of one of our trial group, Mochi, a 3 years old female.

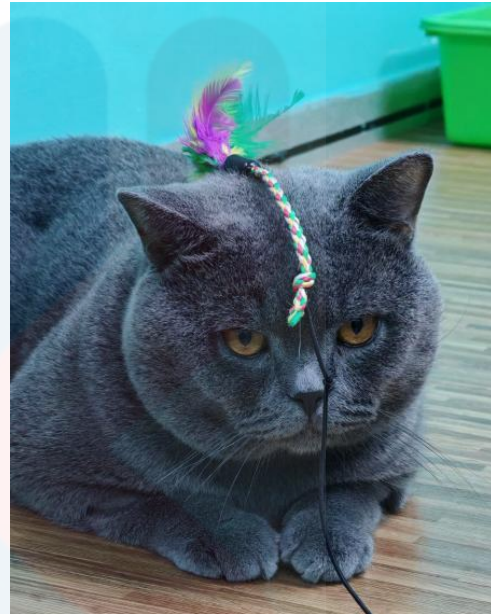


Figure 11: Leo, one of our trial group member, this is picture of him before the trial.



Figure 12: Leo, after the trial showing improvement of body condition score after the trial.



Figure 13: Leo, after the trial showing improvement of body condition score after the trial



Figure 14: Weighing of the animal every week to keep track on the weight reduction.



Figure 15: Animal show satiety after eating the kibbles.



Figure 16: Isabelle, one of our control group member



Figure 17: Mochi from the front view after the trial

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Figure 18: Mochi, dorsal view after the trial showing improvement of body condition score. With empty bowl showing Mochi finished the meal.

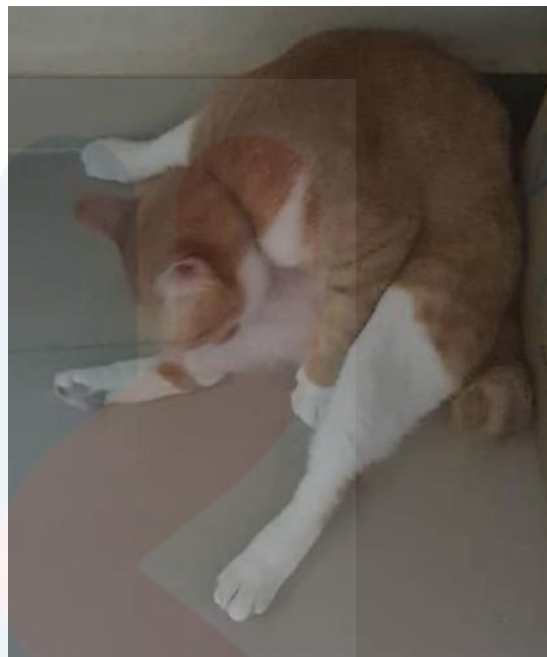


Figure 19: One of the achievement in the trial group, where Kimbo finally able to lick it's perineal area. Before this owner said that Kimbo not able to lick due to fat on the ventral region.



Figure 20: Feed was weighed before given to the animal according to it's daily energy requirement.



Figure 21: The leftover kibbles will be weighed and kept record.

Table 22: Pictures taken during the weight loss feed trial