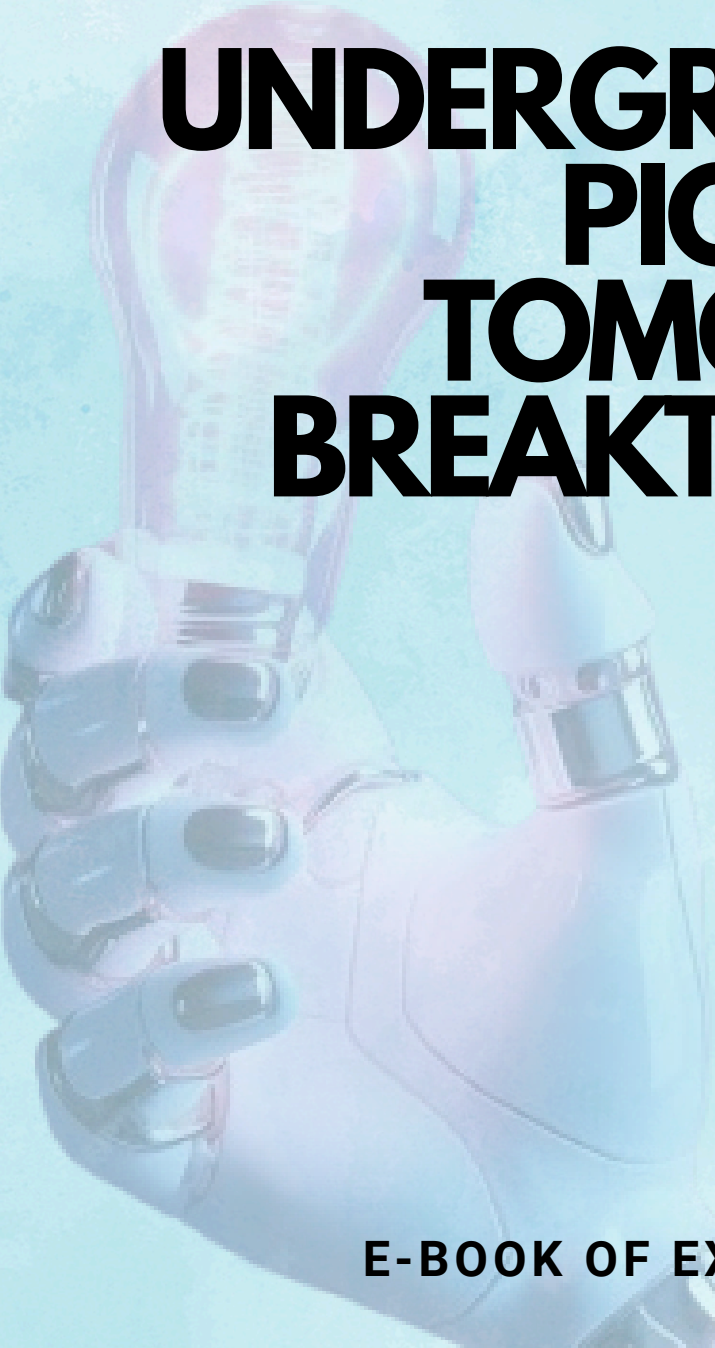




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UNDERGRADUATES PIONEERING TOMORROW'S BREAKTHROUGH

E-BOOK OF EXTENDED ABSTRACTS

Furresh: AN ECO-FRIENDLY CASSAVA AND COFFEE-BASED CAT LITTER INNOVATION FOR SUSTAINABLE PET CARE

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ABSTRACT

Pet ownership in Malaysia has been rising steadily, creating an increasing demand for safe, effective, and environmentally friendly pet care products. Conventional cat litter, especially clay or silica-based, poses significant problems as it is non-biodegradable, requires destructive mining, consumes high energy during production, and may release harmful dust that can cause respiratory issues in both pets and humans. This project was initiated to address these concerns by introducing an innovative eco-friendly cat litter named Furresh, developed from cassava pulp and recycled coffee grounds. The main objectives are to reduce dependency on non-biodegradable materials, promote sustainability through agricultural waste upcycling, and provide pet owners with a healthier, chemical-free alternative. Cassava pulp functions as the primary absorbent due to its natural fibrous texture that enhances clumping ability, while coffee grounds act as a natural deodoriser with strong odour-masking properties. Small amounts of corn flour and baking soda are also incorporated to improve texture and odour control. The novelty of Furresh lies in its unique combination of agricultural by-products rarely applied in cat litter formulation, producing a product that is not only biodegradable and compostable but also supports zero-waste initiatives. By utilizing locally available resources, Furresh promotes a circular economy, reduces environmental pollution, and raises awareness of sustainable pet care practices. With its affordability, effectiveness, and eco-friendly attributes, this project has strong potential for commercialisation in the growing pet care industry while contributing to the achievement of multiple Sustainable Development Goals (SDGs).

Keywords: *Eco-friendly, Biodegradable Cat Litter, Waste Upcycling, Sustainability, Pet Care*

INTRODUCTION

Pet ownership is on the rise globally, and with it, the demand for pet care products, particularly cat litter, has expanded significantly. Traditional cat litter, often made from clay or silica, has been criticised for its environmental impact, including non-biodegradability, landfill accumulation, and carbon-intensive production processes (Wang et al., 2021). Additionally, conventional litters may contribute to dust generation and chemical exposure, raising health concerns for both cats and owners.

In response, eco-friendly alternatives have gained increasing attention as consumers become more environmentally conscious (Yue et al., 2020). Agricultural by-products such as cassava pulp and coffee grounds present a promising opportunity for sustainable product innovation. Cassava pulp, rich in starch, is known for its natural absorbency and clumping properties (Onyango et al., 2019), while coffee grounds have been demonstrated to provide natural odor control due to their porous structure and ability to absorb volatile compounds (Haile, 2014). By repurposing these agricultural wastes, Furresh addresses both environmental and waste management challenges.

While green innovations in the pet industry are emerging, few have combined biodegradability, compostability, and performance in a single product. This study introduces Furresh, an innovative cat litter

formulated from cassava pulp and ground coffee, designed to meet the dual goals of functionality and sustainability. indent the first line of paragraph following a heading or sub heading. Use single spacing for main document. Note that there is only one space between sentences.

OBJECTIVES

The objectives of this innovation are:

- i. To develop a cat litter product derived from cassava pulp and coffee grounds that is fully biodegradable and compostable.
- ii. To provide an environmentally sustainable alternative to conventional clay and silica-based litters.
- iii. To enhance odour control and clumping properties using natural agricultural by-products.
- iv. To contribute to sustainable consumption and waste reduction by valorising agro-waste streams.

METHODOLOGY AND DEVELOPMENT

The development of Furresh involved a systematic process:

1. Raw Material Collection and Preparation – Cassava pulp, a by-product of the starch industry, was dried and finely crushed to enhance absorbency and clumping potential. Coffee grounds were collected post-brewing, dried, and sterilized to eliminate microbial contaminants.
2. Formulation Process – The cassava pulp was mixed with corn flour and baking soda to enhance structural integrity and deodorising capacity. Coffee grounds were incorporated for odour absorption and antibacterial properties. The mixture was pelletised to produce the final litter form.
3. Performance Evaluation – Initial trials assessed Furresh for absorbency, clumping ability, odour control, and biodegradability. Testing methods were adapted from established standards for pet litter evaluation (ASTM, 2015). Comparative analysis was conducted with commercial clay-based litter to benchmark performance.
4. Sustainability Assessment – Environmental impact was qualitatively evaluated by considering biodegradability, composability, and potential for reducing agro-waste.

INNOVATION AND SIGNIFICANCE

Furresh provides several significant innovations:

- Biodegradable and Compostable – Unlike clay-based litter, which is non-renewable and landfill-dependent, Furresh decomposes naturally and can be repurposed as compost, thus contributing to circular economy practices.
- Natural Odor Control – Coffee grounds provide effective absorption of ammonia and other odour-causing compounds, reducing the need for chemical additives.
- Clumping Functionality – The starch-rich cassava pulp allows for effective clumping, making cleaning convenient for pet owners.
- Waste Valorisation – By utilizing agro-waste (cassava pulp and coffee grounds), Furresh reduces food industry by-product disposal, thereby lowering environmental burden.
- Pet and Human Safety – Free from synthetic fragrances or harmful additives, Furresh ensures safe use for cats and their owners.

RESULTS AND DISCUSSION

Preliminary testing indicated that Furresh exhibited strong absorbency and clumping performance, comparable to conventional clay litter. The odor control provided by coffee grounds was particularly effective in reducing ammonia-related smells, confirming literature on the adsorptive properties of spent coffee grounds (Haile, 2014). Biodegradability trials showed significant decomposition within a short period, validating its compostable potential.

The discussion of these findings highlights Furresh's dual impact: improving pet hygiene while reducing ecological footprint. This aligns with the increasing consumer preference for eco-friendly products, especially among environmentally aware pet owners (Yue et al., 2020). Moreover, by addressing waste management issues through the upcycling of cassava and coffee residues, Furresh contributes to sustainable production practices in line with SDG 12 (Responsible Consumption and Production).

However, while laboratory trials were promising, broader consumer testing is necessary to assess long-term usability, dust levels, and clumping durability. Market adoption will also depend on cost competitiveness, availability, and consumer education regarding the environmental advantages of biodegradable litter.

CONCLUSION

Furresh demonstrates the potential of integrating agricultural by-products into innovative pet care solutions. The product provides an eco-friendly, compostable, and effective alternative to clay and silica litters, addressing both environmental and consumer needs. By valorising cassava pulp and coffee grounds, Furresh not only reduces agro-waste but also offers functional benefits, including odor control and clumping performance.

Future research should expand on large-scale biodegradability testing, explore microbial safety in composting applications, and conduct consumer market trials to evaluate acceptance. In doing so, Furresh may become a leading example of sustainable innovation in the pet industry, bridging environmental stewardship with responsible pet ownership.

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