AUTHOR'S DECLARATION

I declare that the work in this thesis/dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification

I hereby declare that this report is the result of my own work except for quotations and summaries which have been duly acknowledge.

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ABSTRACT

Most commercially produced clay cat litters nowadays have raised issues to pet owners since they are non-biodegradable and have no natural odor controlling features. In this study, biomass materials; sawdust and corn husk, were compared and processed into cat litter formulations due to their good absorption capacity and the biodegradability properties. Both biomass were dried at 80℃ for 24 hours to remove the moisture content and grinded using cutting mill to reduce their size. Each of the raw materials were then mixed with clumping agent (xanthan gum), deodorizer (sodium bicarbonate), and dust retardant (glycerol) to form mixtures of cat litter. The mixtures were then dried and pelletized to reduce the dust formation. Eight cat litter formulations including a commercial bentonite clay litter were tested in terms of their clumping activity, absorption capacity, and dust formation. Meanwhile, BET analysis was done to compare the surface area, total pore volume and average pore size of the sawdust cat litter, biochar, and hydrogel biochar. The results from clumping and absorption rate showed the highest percentage in bentonite cat litter at 99.27% and 95.49% respectively while corn husk cat litter has the highest dust formation rate at 1.88%. Sawdust biochar has the highest BET surface area of 239.2001 m^2/g and showed a mesoporous structure with pore size 3.0089 nm. The results have provided an indication on the suitability of sawdust as cat litter material. Future work shall focus on the effort to speed up the degradation process of the biomass as cat litter material as well as to study the effect of pellet density on its moisture uptake.

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CHAPTER 1
INTRODUCTION

1.1 RESEARCH BACKGROUND

Cats are among the domestic animals being adopted as pets around the world. One of the main concerns for pet owners is the disposal of the animal waste and covering any disturbing odors from the waste (Kiebke, 1994). Therefore, most cat owners would provide litter boxes for their pets and this is especially essential for the pets that stay indoors. The litter box is typically a plastic tray containing absorbent materials that is convenient for the elimination and covering of the cats waste (O'Rourke, 2000). Thus it is important for the materials to have good absorbing and clumping ability. Besides, the sole purpose of cat litter is to cover or absorb the urine and feces until it is disposed of.

There are various types of absorbent materials used in cat litter boxes such as the bentonite clay, silica crystals, and natural-based materials that come mostly from plants waste or biomass. In order to utilize the agricultural waste in Malaysia, biomass materials are used as cat litter material due to their good absorption properties besides their abundance of existence. Besides, the usage of biomass resources is much safer and environmental friendly compared to using the fossil fuels because the burning off of fossil fuels releases greenhouse gases (Wang et al., 2016). As much as the Earth needs greenhouse gases in the atmosphere to keep it warm, too much of these gases will cause the Earth temperature to spike up and thus, causing the major environmental problem, global warming (Ragauskas et al., 2006).

The agricultural sector is one of the biggest sectors practiced in Malaysia and it gives a major contribution to the country's economy development by having a 12% share in the national gross domestic product (GDP) (Surendran, 2016). The major crops produced from this industry include oil palm, rubber, cocoa, and rice that have been extensively grown by both public and private sectors (Mahmud, 2001). However, added Mahmud (2001), other types of plantation crops such as coconut, oil palm, and tropical fruits are also being grown with increasing demands by some private sectors. Due to the rapid growth of agricultural industry, the waste generated