THE WATER AND LAND FOOTPRINT OF PETS

Nowadays, dogs and cats are considered as a family member, and they demand food from their owners. Since pets consume food, they might contribute to the water and land footprint of humanity by the share of freshwater and land demand of pet food production and consumption.

This study shows that the global water and land footprint of pets are 193×10^6 m³ and 280×10^6 m² in 2016. They contribute 2×10^{-21} % and 3×10^{-4} % to the total global annual average of water and land footprint of humanity with $9,087 \times 10^{27}$ m³ and $9,903 \times 10^{10}$ m². In a global average, the large dog breeds are the most significant contributor with 39% and 35% respectively of the global water and land footprint of pets. The average of a large dog breed has much higher water and land footprint (703 m³/year and 1,147 m²/year) than a medium dog breed (416 m³/year and 683 m²/year), a small dog breed (231 m³/year and 376 m²/year) and a cat (85 m³/year and 86 m²/year). These results confirm that the body weight which regarding the annual food intake is important in determining the global water and land footprint of pets.

Although in this study dog foods have lower animal content (58%) than the cat food products (67%), the water and land footprint of dog food products in average (5 m³/kg and 8 m²/kg) are larger than cat food products (2 m³/kg and 3 m²/kg). These are due to dog products contain higher meat meal, or dried meat ingredients (23%) compare to the cat food products (17%). Also, the dog foods use lower by-products with 8% of the whole animal content within the whole ingredients, while cat foods use higher animal by-products contents with 11% in the products.

The water footprint of pets can be understood from two factors namely the total water footprint of the ingredients used in the pet food products and the water footprint of the drinking water, whereas the land footprint of pets only considers the total land footprint of the ingredients used in the pet food products. The pet's consumption rate and composition in the pet food products influence the value of water and land footprint of a pet. First, the more food is consumed by a pet, the more water and land are required to produce the pet food. Second, the more animal content in the pet food products, the higher water and land footprint of the products. Further, a pet food containing more meat meal and animal primary products tends to have higher water and land footprints rather than a product with fresh meat and animal by-products content.

Overall, the consumption rate and ingredient selection are the major components in determining the water and land footprint of pets. Nevertheless, unlike a human who can control their diets and pick the ingredients which have low footprints, pets cannot adjust their consumption rate and choose what to eat in the pet food as the ingredients are already blended by the manufacturers. Thus, the decision in reducing water and land footprint of pets is from the pet owners to give the proper amount of pet food and choose the best ingredients both for pets and environments.

Table 1. Summary of annual intake (kg/year), water footprint (m³/year) and land footprint (m²/year) per pet category

Pet Category	Body Weight (kg)	Total Food Intake (kg/year)	Water Footprint (m³/year)	Land Footprint (m²/year)
Cats	4-6	24	85	86
Small dog breeds	1-9	49	231	376
Medium dog breeds	9-23	88	416	683
Large dog breeds	>23	153	703	1147
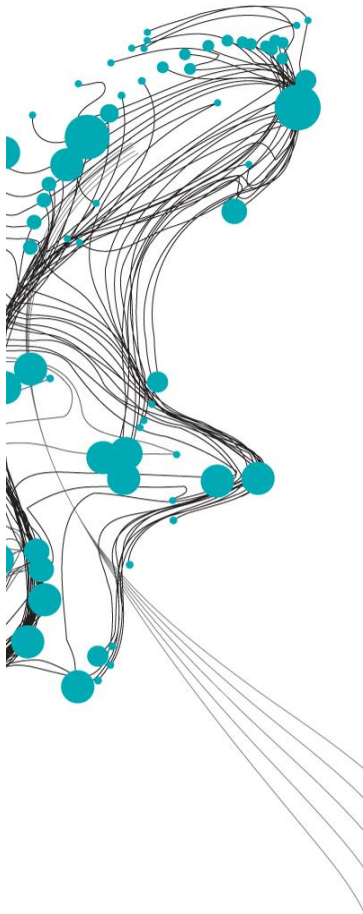
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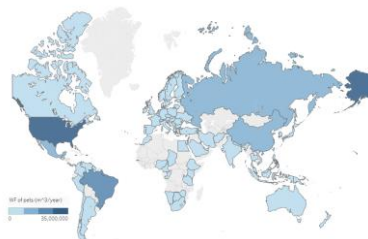Prof.dr.ir. Arjen Y. Hoekstra
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Figure 1: Global water footprint of pets in 2016 (m³/year).   Figure 2: Global land footprint of pets in 2016 (m²/year).

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