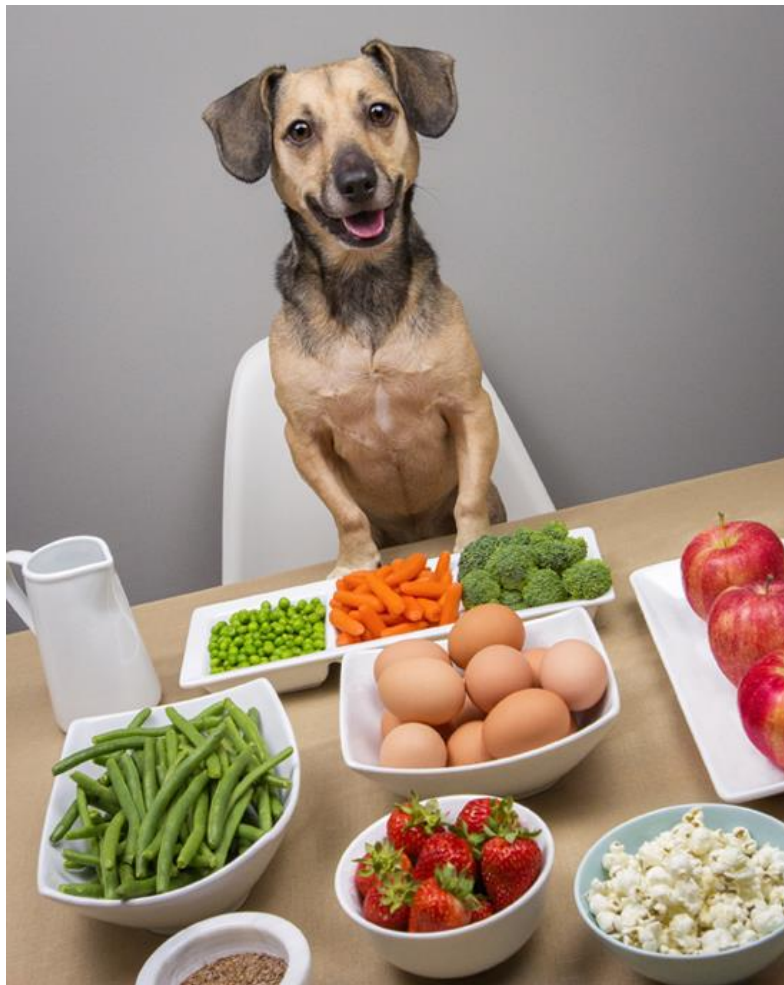




How owners' anthropomorphic tendencies associated with their feeding method towards their pets, and ultimately influence the pets' weight status



Mengdie Cao

August, 2014



How owners' anthropomorphic tendencies associated with their feeding method towards their pets, and ultimately influence the pets' weight status

Author: Mengdie Cao

August 2014, Wageningen University

Department of Business, Consumer and Competence Studies

Marketing and Consumer Behaviour Group (MCB)

Registration NO.: 900506154080

Minor Thesis: MCB-80424

Supervisor: Dr. Ellen van Kleef

Second reader: Dr. Erica van Herpen



Copyright

Niets uit dit verslag mag worden verveelvoudigd en/of openbaar gemaakt door middel van druk, fotokopie, microfilm of welke andere wijze ook, zonder voorafgaande schriftelijke toestemming van de hoogleraar van de leerstoelgroep Diervoeding van Wageningen Universiteit.

No part of this publication may be reproduced or published in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior written permission of the head of the Animal Nutrition Group of Wageningen University, The Netherlands.



Table of contents

Abstract	iv
1. Introduction	1
2. Theoretical framework	4
2.1 The prevalence of obesity in cats and dogs	4
2.2 Risk factors related to obesity in cats and dogs	5
2.2.1 Animals' physical factors	5
2.2.2 Environmental factors	8
2.3 Human-animal relationship	9
2.3.1 General	9
2.3.2 Anthropomorphism	10
2.4 Hypotheses and conceptual model	11
3. Methods	15
3.1 Sample	15
3.2 Design	15
3.3 Procedure	15
3.4 Measurements	15
3.4.1 Body condition score (BCS)	15
3.4.2 Anthropomorphic tendency	16
3.4.3 Feeding method of additional food	17
3.4.4 Body Mass Index (BMI)	18
3.4.5 Control variables	18
3.5 Data analysis	18
4. Results	20
4.1 Pre-processing of dataset	20
4.2 Primary analysis	20
4.2.1 Description of dataset	20
4.2.2 Body condition score (BCS) of pets	21
4.2.3 Anthropomorphic tendency	21
4.2.4 Feeding method of additional food	22
4.3 Results of hypotheses	23
4.4 Results of control variables	28
5. Discussion	29
6. Implication	33
7. Conclusion	34
Reference	35
Appendix 1 Questionnaire	37



Abstract

Obesity, which is commonly seen as one of the most common nutritional disorders in dogs and cats, has increasingly attracted the public's attention. Pet obesity is generally due to energy consumption exceeding energy expenditure over time. Various risk factors are found to be associated with pet obesity, such as age, gender and breed, which are related to the animals themselves. Besides, obesity is found to be associated with diet, activity level, feeding method and human-animal relationship as well, which are mainly determined by pet owners. The feeding method of additional food (commercial treats or leftovers) and human-animal relationship are considered to be two determinants. It is suggested that owners with overweight animals find it is hard to follow the weight-loss plan because they cannot resist giving treats as they are afraid that the pets might suffer. The owners humanizing their pets and do not treat them as companion animals, can be interpreted as a condition of anthropomorphism. In this study, whether and how the owners' anthropomorphic tendencies influenced the feeding method of additional food towards the pet, and sequentially affected the pet weight status was investigated. In addition, whether the anthropomorphic tendency could moderate the effect of owners' weight status on feeding method of additional food and pet weight status was explored as well. The result indicated that owners with higher anthropomorphic tendency were at higher risk to have overweight or obese pets. But the feeding method of additional food was not a path linking anthropomorphic tendency of respondents to pet weight status. Furthermore, it was found that the effect of weight status of owners on feeding method and pet weight status did not depend on their anthropomorphic tendency. Through what channel the owners' anthropomorphic thinking influence the pet weight status remains to be investigated

Keywords: Obesity; Pets, Feeding method; Additional food; Anthropomorphism



1. Introduction

Obesity, which is basically caused by energy consumption exceeding energy expenditure over time (Houpt and Smith, 1981), is generally seen as one of the most common nutritional disorders in dogs and cats (Lee et al., 2010). For cats, the prevalence of obesity varies from 11.5% (Courcier et al., 2012) to 35.0% (Lund et al., 2005). In terms of dogs, the prevalence of obesity varies from 34.0% (Lund et al., 2006) to 59.3% (Courcier et al., 2010). The difference in prevalence of obesity is due to the variation among countries, the sample size, the years and the definitions of overweight and obese applied by the authors.

Obesity of dogs and cats is reason for concern as it is correlated to various health risks. For cats, obesity can increase the potential predisposition for glucose intolerance (Appleton et al., 2001) and is associated with hepatic lipidosis (Marks et al., 1994), diabetes mellitus and lameness (Scarlett and Donoghue, 1998). When it comes to dogs, obesity can lead to diabetes mellitus, musculo-skeletal and cardio-casular disease (Robertson, 2003) and even shortened lifespan (Kealy et al., 2006).

Various factors are found to be associated with the obesity, such as breed, age and gender, which are related to the animals themselves (Kronfeld et al., 1991; Russell et al., 2000; Elizabeth et al., 2005; Holmes et al., 2007). Besides, obesity is found to be associated with diet, activity level, feeding method and human-animal relationship as well, which are mainly determined by pet owners (Sloth, 1992; Scarlett et al. 1994; Kienzle et al., 1998; Robertson, 2003; Toll et al., 2010). In particular, the feeding method include how much is fed, how frequent and how variable the diet is. The increasing risk of pet obesity can be due to the fact that pets adapt to their owners' lifestyles or habits. Owners determine the frequency, portion size and variety of meal provision and as such, they are the gate keepers responsible for the quantity and quality of the food provision of the pets. Similar conditions can be found in children's obesity, that parents may influence the children's eating behaviours and even weight status, through controlling the food provision and child-feeding strategies. For example, children lacked of self-controlling energy intake when their mothers showed higher levels of control in their feeding practices (Johnson and Birch, 1994).

People tend to increase the intake and frequency of consumption when the palatable food is presented, and it may lead to higher weight gain (Hays et al., 2002). It was also found that during the meal, obese human tend to selected different kinds of foods and take higher calorie foods than do non-obese subjects (Spitzer and Rodin, 1981). Hence, it could be possible that when the pets express enjoyment of a palatable food, their owners, especially who are overweight, might feed the pet more frequently, with wider variety or larger portion, and this probably results in weight gain in pets. Studies have shown that obese owners are more likely to have obese dogs (Kienzle et al., 1998; Holmes et al., 2007; Heuberger and Wakshlag, 2011). This overlap in lifestyle between owners and their pets can be a factor related to pets' weight status (Bland and Hill, 2011).



The relationship that owners have with their pets seems to be of particular relevance. Some pet owners perceive pets as their family members (especially as children) or friends and feed them with human food, such as the food scraps, or treats without taking the caloric density into account (Willoughby et al., 2005; Courcier et al., 2010). A similar phenomenon appears when owners implement a weight-loss plan for their pets. Compared with owners that had normal weight animals, owners with overweight animals found that it was difficult to follow the weight-loss plan because they cannot resist giving treats as they were afraid that their pets might suffer (Bland et al., 2010). This phenomenon, that owners humanize their pets and do not treat them as companion animals, can be interpreted as a condition of anthropomorphism (Horowitz and Bekoff, 2007; Bland and Hill, 2011).

For pet food manufacturers, service providers and retailers, anthropomorphic tendency of pet owners can trigger the purchase of their products or services (Edling, 2012). However, there might be negative consequences (i.e., obesity) of anthropomorphism, particularly when pets are placed in situations appropriate for humans and fed human food (Edling, 2012). Several studies have illustrated the mechanism of anthropomorphism and the assessment of the anthropomorphic tendencies towards non-human subjects (Albert and Bulcroft, 1988; Serpell, 2003; Chin et al., 2005; Horowitz and Bekoff, 2007; Edling, 2012; Cromer and Barlow, 2013). Limited literature, however, can be found that examines the correlation between anthropomorphism and owners' feeding method, and how this in turn impacts pets' obesity.

The aim of this study is to explore whether the degree to which pet owners treat their pets as human (i.e. anthropomorphic tendency) influences the owner's feeding method of additional food towards the pet, and how this in turn impacts the pet weight status. Moreover, the role of the anthropomorphic tendency in the relationship between owners' weight status and pet weight status would be investigated as a potential moderator as well. In the previous investigations, the obese owners were more likely to keep obese pet (Kienzle et al., 1998; Holmes et al., 2007; Heuberger and Wakshlag, 2011). The anthropomorphic tendency of owners might trigger the obese owners feed their pets referring to their own eating habits, which might lead to the weight gain of pets. A better understanding of the relationship between owner's anthropomorphism tendency and pet weight status can contribute to the development of recommendations which aim at preventing and dealing with the pet's overweight condition.

The research questions are:

RQ1: Whether and how the anthropomorphic tendency of the owners influences the feeding method of additional food towards the pet, and sequentially affects the pet weight status.

RQ2: Whether and how the anthropomorphic tendency moderates the effect of owners' weight status on the feeding method of additional food and pet weight status.

These research questions will be tested in a survey among owners of cats and dogs.

The following theoretical part contains a literature review of the main factors deemed responsible for pet obesity, and the phenomenon and assessment of anthropomorphism. The hypotheses and conceptual model of his study would be included as well. Then the method, results, discussion, conclusion and recommendation will be presented in the following sections.

2. Theoretical framework

2.1 The prevalence of obesity in cats and dogs

Obesity is one of the most common nutritional disorders in cats and dogs (Lee et al., 2010). Earlier studies indicated that the prevalence of obesity in cats varied between 11.5% (Courcier et al., 2012) and 35.0% (Lund et al., 2005), while in dogs, it varied from 34.0% (Lund et al., 2006) to 59.3% (Courcier et al., 2010) (**Table 2.1**). The difference in prevalence of obesity is due to the variation of countries, the sample size, the years and the definitions of overweight and obese generated by the authors. For example, in the studies conducted by Lund et al. (2005 and 2006), the animals who had body condition score (BCS) larger than 4.5 and less than 5.0 were defined as obese, whereas the animals that had BCS larger than 3.5 but less than or equal to 4.5 were defined as overweight. However, in the study of Courcier et al. (2010), a different morphometric technique, which was modified based on the S.H.A.P.E (Size, Health And Physical Evaluation), was used to measure the obesity. They defined dogs with SHAPE score of 5 were overweight and those with SHAPE score of 6-7 were obese (Courcier et al., 2010).

In these earlier studies, the cats' or dogs' owners were asked to provide basic information about their pets, such as age, gender, breed and body weight. Body weight is one of the criteria for the assessment of obesity. Cats and dogs can be seen as overweight if their body weights are about 10-19% above the ideal weight. When their body weights are 20% or even higher than the ideal weight, they can be characterized as obese (Toll et al., 2010). Besides, owners were asked to evaluate the body condition of their pets using a 5-point visual score (**Appendix 1**). This body condition score (BCS) is a subjective measurement of the animals' fat mass, which is another criterion for assessing obesity. Unlike the body weight, BCS also considers the animal's body size (Toll et al., 2010). In the previous studies, owners' estimations of BC were compared with the opinions of veterinarians who have been trained to measure the BC of pets. It was found that in cats and dogs, about 27% and 41% owners, respectively, underestimated their BC through the visual scale compared with the estimations by veterinarians. The underestimations were even higher (51% and 50%, respectively) when the owners used verbal description (very thin, thin, ideal, overweight and obese) without image (Colliard et al., 2006; Colliard et al., 2009).

Owners underestimating the pet's weight status can increase the possibility of over-feeding their pets (Toll et al., 2010). The study conducted by White et al. (2011) showed that about 39% of the owners who had overweight dogs (49 in total) underestimated their dogs' weight status. They demonstrated that sometimes, owners are unwilling to accept the truth that their pets are overweight or obese. These owners are likely to over-humanize their pets and overfeeding them as an expression of appreciation (White et al., 2011).

Table 2.1 Prevalence of obesity in dogs and cats population

Species	Country	Sample size	Prevalence, %	Reference
Cat	The United States	8159	35.0	Lund et al., 2005
	France	497	26.8	Colliard et al., 2009
	Great Britain	3227	11.5	Courcier et al., 2012
	New Zealand	≥301	27.0	Cave et al., 2012
	Australia	644	18.9	Robertson, 1999
Dog	The United States	21754	34.0	Lund et al., 2006
	Australia	2661	41.4	McGreevy et al., 2005
	France	616	38.8	Colliard et al., 2006
	Great Britain	696	59.3	Courcier et al., 2010

2.2 Risk factors related to obesity in cats and dogs

2.2.1 Animals' physical factors

Several factors result in obesity of pets and they can be grouped into animals' physical factors and environmental factors. Animals' physical factors contains of age, breed, gender and neuter status.

Age

The increase of the age leads to a decrease in energy requirement. If cats or dogs fail to decrease the energy intake, the over-consumption of energy can result in obesity (Toll et al., 2010). In cats, Sloth (1992) found that about 14% of cats under 3 years old were overweight, whereas around 60% of cats over 3 years old were overweight. In another study, it was shown that among the 8200 cats in the United States, the prevalence of overweight was highest (31-37%) in cats which in the age between 5-11 years (Lund et al., 2005). In dogs, Holmes et al (2007) found that among 111 dogs in UK, the incident rate of overweight was greatest (71%) in those aged 7.5-9.9 years. Moreover, it was found that among 22000 dogs in the United States, the prevalence of overweight was highest (32-37%) in dogs which in the age between 5-11 years (Lund et al., 2006). In conclusion, cats and dogs are in greatest risk to be obese when they are about 5-11 years of age.

Breed

Previous studies found that some breeds are more likely to be overweight or obese (Toll et al., 2010). To be specific, in terms of cats, a study found that among the 8200 cats in the United States, Domestic Shorthair (30.6%), Domestic Medium-hair (30.5%) and Manx breed (31.3%) cats had a high overweight prevalence of about 30% or more (Lund et al., 2005). When it comes to dogs, it was found that within about 22000 dogs in the United States, Cocker Spaniel, Dachshund, Dalmatian, Labrador, Retriever, Rottweiler, Golden Retriever, Shetland Sheepdog and Mixed-breed dogs were more likely to be overweight (Lund et al., 2006). The

breeds in miniature to medium size are at particular risk to be obese (Kronfeld et al., 1991). It was suggested that the breed can be a genetic factor which has effect on the body condition "set point". The set point can be seen as the physiologic modulation of energy balance that keeps ideal body condition. Breed is likely to be a factor influence the set point, leads to energy consumption exceeding expenditure, and ultimately cause the excess energy reserve (Toll et al., 2010). The type of breeds which mentioned above was shown in **Figure 1** and **2**.

Gender

It seems that intact females (females who are not desexed) require fewer calories than the intact males because of the gender-related difference in lean body mass (Toll et al., 2010). So if the intact females fail to control the caloric intake, they would be at risk of being overweight or obese. In dogs, Holmes et al (2007) found that among 111 dogs in UK, the prevalence of overweight was higher in females (41%) than in males (32%). Also in the study conducted by Colliard et al. (2006) on 616 dogs in France, it was indicated that the intact females had the higher risk to be overweight than the intact males. However, in cats, it was found that the intact males were 1.2 times as likely to be overweight than the intact females among 3300 cats in UK (Courcier et al., 2012). Moreover, in the earlier studies conducted by Lund et al. (2005) and Colliard et al. (2009), both of them found that the prevalence of obesity was higher with the intact male cats than the one with intact female cats. It was possibly because male cats had larger body frame than the females and their body conditions were more frequently being underestimated by their owners (Robertson, 1999). Thus, in dogs, the intact females are more likely to be overweight than the intact males but in cats, the higher risk of overweight seems to be associated with male gender.

Neuter status

The loss of estrogens and androgens from neutering can reduce the metabolic rate, and ultimately decrease the caloric requirement to maintain the ideal body weight (Toll et al., 2010). After the neutering, if cats and dogs maintain the food intake level when they were intact, they would consume more energy than expenditure and finally get overweight or obese. In cats, Courcier et al. (2012) found that among 3300 cats in UK, the neutered males were 6.7 times as likely to be overweight than intact males, while neutered females were 3.1 times as likely to be overweight than the intact females. Furthermore, both Lund et al (2005) and Colliard et al (2009) found that the neutered cats in either gender were at higher risk to be overweight than intact males and females. Similar case can be found in the studies of dogs. For example, Lund et al (2006) found that among 22000 dogs in the United States, the neutered males and female had higher incident rate of overweight (32.0% and 32.6%) than the intact males (20.0%) and females (23.1%). Also in the study conducted by Holmes et al (2007), it was shown that the prevalence of overweight in neutered dogs (59%) was higher than the one in intact dogs (43%). Thus, neutering from either gender in cats and dogs can be associated with higher risk of overweight or obesity



Figure 1 Picture of cat breeds (1: Shorthair; 2: Medium-hair; 3: Longhair; 4: Manx)



Figure 2 Picture of dog breeds (1: Dachshund; 2: Dalmatian; 3: Cocker Spaniel; 4: Golden Retriever; 5: Rottweiler; 6: Shetland Sheepdog)

2.2.2 Environmental factors

Besides the animals' physical factors, obesity of cats and dogs is found to be correlated to environmental factors such as dietary (especially the food palatability), activity level, feeding method (include how much is fed, how frequent and how variable the diet is), and human-animal relationship. In particular, activity level, feeding method and human-animal relationship are mainly determined by the pets' owners. As it is the main content in the current study, the human-animal relationship will be explained in the next chapter (**Chapter 2.3**)

Food palatability

As one of the key dietary factors, food palatability is a possible incentive trigger the overeating of the pets (Toll et al., 2010). It has been stated that animals can maintain a "set point" of body condition. It seems that this set point can be influenced by the environmental factors as well, such as the palatability. The set point increases with the growth of food palatability and as a result, the possibility of the animal develop a higher energy consumption than expenditure is suggested to be aggravated (Malandrino and Capristo, 2011). Palatability can be influenced by the nutrient composition, sensory characteristics (aroma, taste, size, shape, texture), and environmental conditions (e.g. temperature) of the food (Zaghini and Biagi, 2005). Pets often show a significant preference for the wet foods (which have a greater moisture content of about 75%) than the dry foods (which have moisture content about 10% and are nutritional balanced) (Kealy, 1975). To improve the palatability of the dry food, food industries use liquid or powder "palatants" to coat the dry food and entice pets to eat (Kealy, 1975). Supporting scientific studies about the effect of food palatability on obesity of cats are lacking but there was a study conducted on 16 dogs showed that when offered a highly palatable food ad libitum, 13 dogs kept a stable food intake and body weight, but the other 3 dogs increased in body weight rapidly, one of which became obese after a 40% rise in weight (Mugford, 1977). This result also confirmed that there were individual differences in the predisposition of obesity among these dogs (Mugford, 1977).

Activity level

Activity is one of the most important components of energy expenditure (Toll et al., 2010). Apparently, a low activity level, combined with a quite high dietary energy provision, has been correlated to the obesity in cats and dogs (Sloth, 1992; Scarlett et al. 1994). In a study involving 233 cats and conducted by Sloth (1992), it was found that 30% of the cats who had outdoor activities were overweight or obese, whereas 50% of the cats who were kept indoor were overweight or obese. Also in dogs, in Robertson's study which contains about 660 dogs in Australia, it was indicated that the incident rate of obesity reduced 0.9 times for each hour of exercise per week (Robertson, 2003).

Feeding method

Pet's obesity can be due to the fact that the feeding method has to be adapted to their owners' lifestyles or habits, which means the quantity, frequency and variety of the diet is manipulated by the owners. To be specific, in terms of cats, it was found that among 664 cats in Australia, only 13% of them were freely access the food during the whole day. They were 1.8 kg lighter than the cats that fed once (16%) and twice (62%) per day. However, it was found in another study, which conducted on 140 cats in UK, that for the cats who fed canned foods, their body condition score was significant higher than the one of cats fed with several meal per day (Russell et al., 2000). In dogs, there was no significant difference in the type of food (commercial food or homemade food) between the obese and non-obese dogs (Kienzle et al., 1998). But Robertson (2003) indicated that in his study, dogs who were fed only once a day were at higher risk to be obese than those fed several times per day.

Beside the daily meal, excessive provision of treats or kitchen scraps resulted in higher risk of pet obesity (Sloth, 1992; Kienzle et al., 1998; Toll et al., 2010). For example, in cats, Colliard et al (2009) noted that sometimes the owners in their study fed the cats with fresh meat or milk, but the owners were not aware of the quantity of this additional food. Then the provision of this additional food might become a risk factor of obesity. In another study which contained 644 cats in Australia, it was found that the cats who obtained supplements (such as vitamins, minerals and calcium-phosphorus preparations) were about 1.7 kg heavier than the cats did not received supplements (Robertson, 1999). When it comes to dogs, Courcier et al. (2010) conducted a study on about 700 dogs in UK. They found that dogs who were fed with snacks (no matter how frequently) were at higher risk to be overweight, and dogs who were fed with table scraps monthly were more likely to be obese (Courcier et al., 2010). Similar result was found in the study conducted on 120 dogs in Germany, which showed that in addition to daily meals, obese dogs were more often fed with table scraps (Kienzle et al., 1998). Thus, these earlier studies prove that in addition to the provision of daily meal, the provision of additional food (such as treats and table scraps) in both cats and dogs can resulted in weight gain.

2.3 Human-animal relationship

2.3.1 General

The human-animal relationship plays an important role in the development of pets' obesity. On the one hand, owners can be less aware of the nutritional balance of the pets, which may ultimately result in obesity of pets. For example, Kienzle et al (1998) found that among the 60 dogs' owners in their study, the owners who were obese themselves were limited interested in their own preventive health behaviour (such as exercise and weight control) as well as that of their dogs. On the other hand, some pet's owners develop a strong human-pet relationship, and pets are perceived as their family members.



In this case, the situation that owners humanize their pets and treat them as human beings, can be interpreted as anthropomorphism (Horowitz and Bekoff, 2007; Bland and Hill, 2011). Still, supporting scientific studies about how anthropomorphism influence pets' weight status are limited.

2.3.2 Anthropomorphism

As the times went on, keeping animals as pets was no longer a consequence of domesticating animals for food, labour or protection, but became a channel of forming companionship with other species (Hirschman, 1994). In Western culture, the companion animals (such as cats and dogs) got increasing concern and “won” a place in humans' life since the eighteenth century (Janet and Steven, 2003). The image of cats has been translated as “free of control” and “never obey your order or become a slave”, whereas dogs have made a strong impression of loyalty and security. Both of these can be seen as a humane emotion towards animals (Archer, 1997; Janet and Steven, 2003).

Generally, pets have been labelled by human elements (Archer, 1997). For example, some owners consider their pets as their children, or some female owners rely more on their pets for the need of affection than on their husbands or children (Serpell, 2003). Chartrand et al. (2008) mentioned that in the study conducted by American Kennel Club, it was found that about 34% of women approved that “If my dog was a man, he'd be my boyfriend”. In this kind of human-animal relationship, humans can benefit emotionally through using pets as alternative sources of social support.

According to the above-mentioned facts, this way of explaining or describing non-human animals by using human or human-like characteristics is called anthropomorphism (Horowitz and Bekoff, 2007; Cromer and Barlow, 2013). Owners express their anthropomorphic tendencies in other aspects as well. They give their pets names, feed pets at meal time in bowls, bring their pets to medical treatment and celebrate their birthdays (Archer, 1997). Particularly, owners share the home and lifestyle with their pets, and feed the pets with same food (or leftover) (Willoughby et al., 2005; Courcier et al., 2010; de Godoy et al., 2013). Owners with overweight pets cannot resist providing additional food or they did not want to make their pets suffer from losing weight (Bland et al., 2010). Some of them even enjoy watching the pets consuming food eagerly (Toll et al., 2010). Scherk (2012) mentioned that owners train the pets to beg for food and the pets “train” the owners to respond to the pets' boredom or needs for playing by providing them more food. These interactions between the owners and pets can contribute to the obesity of pets.

One possible reason explains what causes anthropomorphism is that the animal's behaviours comply with part or all of the successful human-human communication (Horowitz and Bekoff, 2007). For example, both dogs (wolves) and humans lower their heads and shoulders when greeting with their partners (Hirschman, 1994). On the other hand, anthropomorphism occurs when the “humanized” animals display those features of responsiveness that contribute to the early infant-adults relationship establishment, such as development of visual contact,

expressive facial and body reaction to the exits of adults and occasional body movements (Horowitz and Bekoff, 2007). It was stated that humans preferred to make the pets adorable and in need of care, which was similar with what the human infants does (Hirschman, 1994). It can be reflected by the facts that dogs has been selectively bred to have large round eyes, foreshortened snouts, short hair and small size, whereas cats has been selectively bred to have round eyes, small short muzzle and round face, which made them have similar traits of human infant (Hirschman, 1994).

Another possible reason can be that the owners are unable or unwilling to generate relationship with other human beings, and they choose the pets to be an alternative (Serpell, 2003). Those owners seem to believe that their pets love and care of them, and require their care and protection (Serpell, 2003). Besides, it was suggested that people who received less social support from other people tended to anthropomorphize their pets more (Chartrand et al., 2008). Especially the people who had to live alone without family members seemed to have high anthropomorphic tendency towards their pet (Archer, 1997).

For some pet food manufacturers, service providers and retailers, it is glad to see this human-animal relationship trigger consumer to purchase their products or services (Edling, 2012). However, for pets, although they can benefit from this process as well, the anthropomorphism might be responsible for some welfare problems, such as obesity (Serpell, 2003). The pets, which are treated as human, fed with human food and placed into a situation where fit for human but not fit for them, may suffer from the adverse impact of anthropomorphize (Edling, 2012).

2.4 Hypotheses and conceptual model

The weight status of pets is influenced by a variety of factors. Feeding and exercising are two main factors (Rohlf et al., 2010). As the most important way of energy intake for pets, feeding is the major element to be investigated in this study. Besides, instead of the daily meal, we focus on the additional food (treats or leftovers), which can be more attractive to the pets than the daily food (i.e. dry kibbles). Basically, the feeding method is mainly involve the quantity, frequency and variety of the food that provided to the pets. The more amount and higher frequency of the provision of additional food would result in weight gain in cats and dogs (Robertson, 1999; Courcier et al., 2010; Kienzle et al., 1998). Furthermore, in this study the variety of additional food is taken into consideration and expected to be positively related to the pet weight status.

H1: The amount of additional food fed to the pet is positively associated with the pet weight status.

H2: The frequency of feeding the pet with additional food is positively correlated with the pet weight status.

H3: The width of variety of additional food fed to the pet is positively associated with the pet weight status.



In terms of the influence of anthropomorphic tendency on feeding method, owners with high anthropomorphic tendency might not resist providing additional food and might enjoy watching the pets consuming food eagerly (Bland et al., 2010; Toll et al., 2010). Moreover, it was found that people themselves tended to increase the intake and frequency of consumption when the palatable food is presented (Hays et al., 2002). Especially for the obese people, they also tended to selected different kinds of foods (Spitzer and Rodin, 1981). If they treat their pets as human, they may feed their pets according to their own eating habits, which are mentioned above So it is expected that the anthropomorphic tendency of owners is positively associated with the quantity, frequency and variety of the additional food provided their pets, and sequentially has positive effect on the pet weight status.

H4: Owner who has high anthropomorphic tendency will feed his/her pet with larger amount of additional food than the owner who has low anthropomorphic tendency.

H5: Owner who has high anthropomorphic tendency will feed his/her pet with additional food more frequently than the owner who has low anthropomorphic tendency.

H6: Owner who has high anthropomorphic tendency will feed his/her pet with wider variety of additional food than the owner who has low anthropomorphic tendency.

H7: For owner who has high anthropomorphic tendency, their pet will have higher BCS.

In regards of the pet owner's weight status, it has been found that the obese owners were more likely to keep obese pet (Kienzle et al., 1998; Holmes et al., 2007; Heuberger and Wakshlag, 2011). Thus, it is expected that the BMI of owners is positively correlated with the pet weight status. Besides, the feeding method toward pets might be complied with owners' eating habits. So it is expected that the growth of the owners' BMI could trigger the increase of quantity, frequency and variety of the additional food provision.

H8: For the owner who has higher BMI, he/she will provide larger amount of additional food to the pet.

H9: For the owner who has higher BMI, he/she will provide the additional food more frequently to the pet.

H10: For the owner who has higher BMI, he/she will provide wider variety of additional food to the pet.

H11: For the owner who has higher BMI, his/her pet has higher BCS.

It has been stated that the obese people are more likely to consume large amount and multiple kinds of food (Spitzer and Rodin, 1981). If these obese people also tend to treat their pets as human, they might feed their pets according to their own eating habits, which could lead to the overweight or obesity of pets. The high anthropomorphic tendency might aggravate the

effect of owners' weight status on the feeding method towards pets and the pet weight status. Thus, it is expected that the BMI of owners has larger effects on the feeding method and pet weight status when the owners have high anthropomorphic tendencies.

H12: For the owner who has higher anthropomorphic tendency, the effect of owner's BMI on the quantity of additional food provision will be stronger than that for the owner who has lower anthropomorphic tendency.

H13: For the owner who has higher anthropomorphic tendency, the effect of owner's BMI on the frequency of additional food provision will be stronger than that for the owner who has lower anthropomorphic tendency.

H14: For the owner who has higher anthropomorphic tendency, the effect of owner's BMI on the variety of additional food provision will be stronger than that for the owner who has lower anthropomorphic tendency.

H15: For the owner who has higher anthropomorphic tendency, the effect of owner's BMI on the pet weight status will be stronger than that for the owner who has lower anthropomorphic tendency.

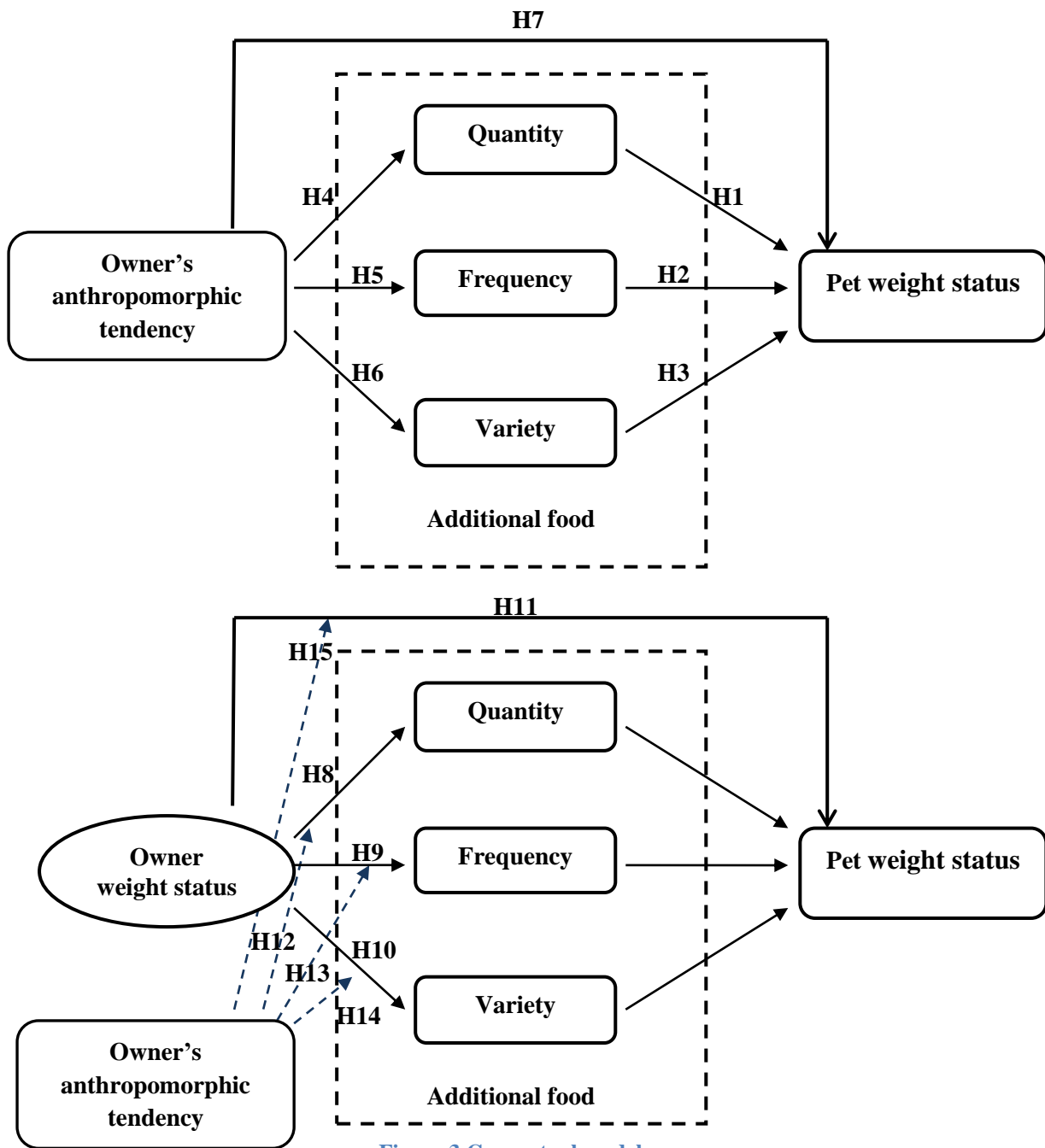


Figure 3 Conceptual model



3. Methods

3.1 Sample

The target participants of this study were Dutch owners of cats and dogs. They were recruited through sending email to the people who were on the mailing lists, and also recruited by the invitations which published in the Facebook of Bestia Turba Ferina (an association for all the non-production animals for Animal Sciences students in Wageningen University). Data were collected from 313 respondents in the Netherlands during July 2014.

3.2 Design

This study was conducted to be an online survey among cat and dog owners. It contained 25 questions, which should be answered by 5 point scales, yes or no answers, filling the blank and multiple choices. The owners (whatever cats' owners or dogs' owners) answered the same questions, except one question about the activity level for their cat or dog.

3.3 Procedure

A questionnaire was developed through the survey software Qualtrics. The link of this online questionnaire was sent to students in Wageningen University and potential respondents through email. Among these people, the person who kept cats or dogs as pets was invited to fill the questionnaire. They were asked to answer questions which contained two parts. The first part concerned the pets' owner themselves, whereas the second part focused on the information about their pets and how they treat their pets. The detail of each part was explained in the measurement section.

3.4 Measurements

Firstly, the owners were asked to indicate the number of cats or dogs they kept as pets. If the owners only kept one cat or dog, they were asked to answer the following questions based on this pet; If they kept more than one cats or dogs, they were asked to answer the questions based on the oldest cat or dog, because the oldest one was at higher risk of being obese (Lund et al., 2005&2006); If the owners kept both cats and dogs as pets, they were asked to answer the questions based on the oldest dog, because it seems that the prevalence of obesity for dogs (34.0-59.3%) is higher than cats (11.5-35.0%).

3.4.1 Body condition score (BCS)

The BCS was used to determine the weight status of pets. It is a 5-point score and each score correspondent to one weight status (i.e. 1 = very thin; 2 = thin; 3 = ideal; 4= overweight; 5 = obese). Based on the BCS chart (**Figure 4**), owners chose one condition that was most similar with their pets. Moreover, the owners were asked to report the veterinarian's opinion towards the body condition of their pets.

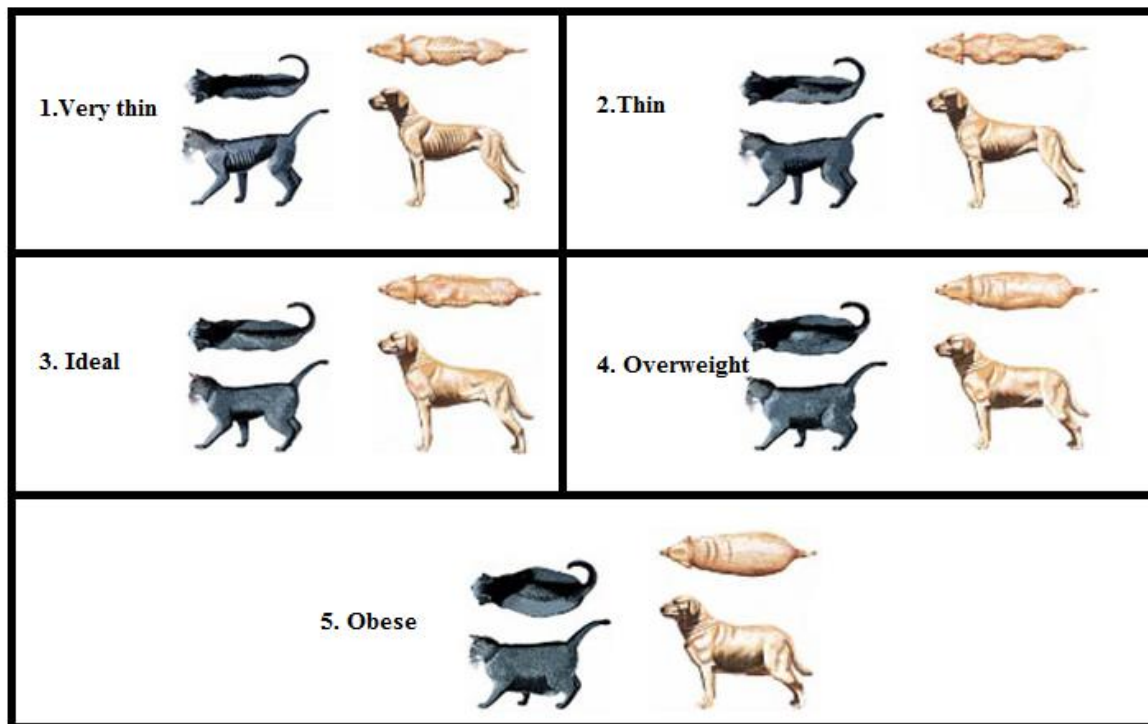


Figure 4 Hill's guide for body condition of cats and dogs (image from Hill's Pet Nutrition)

3.4.2 Anthropomorphic tendency

Anthropomorphism Scale

10-question Anthropomorphism Scale, which developed by Albert and Bulcroft (1988), was used to measure owners' general feeling towards their pets, rights of the pets and how much effort they would make for pets. The questions were answered through "yes or no", 5-point Likert scales or 5-point semantic scales. The score of 5 on the scale represented "Yes", "Very much", "Strongly agree" and "Always", whereas the score of 1 indicated "No", "Not at all", "Strongly disagree" and "Never". The total score was calculated by the sum of each question's score, with 10 as a minimum score and 44 as a maximum score (Albert and Bulcroft, 1998). The 10 questions (or statements) contained:

"When your pet is seriously ill, what is the maximum price you can accept for your pet's medical treatment?"

"To what extent do you feel that your pet is a part of your family?"

"No family is complete until there is a pet in the home."

"Pets should have the same rights as people."

"I like the pet because he/she is more loyal than other people."

"How often do you take pets along when visiting?"

"Are your feelings toward people ever affected by the way that they react to your pet?"

"How often do you celebrate your pet's birthday?"



“Do you have a photo of your pet in your wallet, in your home or office?”

“Does the pet is allowed to access to all parts of your house?”

Additional items

Besides the 10-question Anthropomorphism Scale, owners were asked about how they agreed/disagreed about 4 questions, which might be potentially related with their willingness to provide their pets more additional food. 5-point Likert scale (“Strongly disagree”, “disagree”, “Neither agree nor disagree”, “Agree”, and “Strongly agree”) was used to response these statements. These questions were conducted because we would like to study not only about to what extent the owners anthropomorphizing their pets, but also about the how anthropomorphism influence the feeding method. The score was calculated by the sum of each question’s score, with 4 as a minimum score and 20 as a maximum score. The 4-question feeding related anthropomorphism scale included:

“I would like spoil my cat or dog.”

“I would like to enjoy seeing him/her eating eagerly.”

“I cannot resist his/her begging behaviours.”

“I feel bad if my cat or dog seems hungry

Reliability of scales

The Cronbach’s alpha was used to check the reliability of the Anthropomorphic tendency scales (14 items), which included Anthropomorphism scales and 4-question feeding related anthropomorphism scale. Normally, Cronbach’s alpha > 0.7 showed a satisfactory internal consistency. The Cronbach’s alpha of the 10-question Anthropomorphism scale in the original study (Albert and Bulcroft, 1988) was 0.69. In current study, the Cronbach’s alpha of 10-question Anthropomorphism scales was 0.73. When taking the 4-question feeding related anthropomorphism scale into account, the Cronbach’s alpha of 14 items in the Anthropomorphic tendency scales was 0.74. It indicated that the forming of Anthropomorphic tendency scales, which combined the 4-question feeding related anthropomorphism scale with the 10-question Anthropomorphism scales, kept a high reliability of the scales.

3.4.3 Feeding method of additional food

In the questionnaire, the owners were asked if they have fed their cat or dog with commercial treats during the past 72 hours (Heuberger and Wakshlag, 2011). If they have, the daily average number of treats they fed their cat or dog in past 72 hours was recorded. Moreover, they were asked how many different types of snacks they had in their house.

Then they were asked if they have fed their cat or dog with leftovers (table scraps) during the past 72 hours. If they have, the number of items they fed their pets was recorded. The items were classified into 3 groups, based on the surveys conducted by Slater et al. (1992) and Robertson (1999). The 3 groups were:



Dairy items, including cheese, ice cream, milk and yogurt;

Meat items, including chicken, hot dogs, meat, meat juice, trimmings, fish;

Miscellaneous, including bones, bread, eggs, oil, offal, vegetable, rice, pasta, beverage;.

Besides, the total number of times they feed their pet with leftovers during the past 72 hours was recorded. The amount of leftovers was not recorded because there were limitations in the method. Firstly, the pets' owners might be not used to weighing the leftovers before feed them to their pets. Secondly, the recall method was depended on the participants' memories and might depress the validity and precision of the measurements. Lastly, even if the respondents could recall an appropriate amount, it was difficult to compare the amount among various species of food (i.e. solid vs. liquid; high caloric low amount vs. low caloric high amount).

3.4.4 Body Mass Index (BMI)

The BMI was used in order to determine the weight status of owners. It was measured according to the height and weight, which were reported by the owners themselves. The formula is:

$$\text{BMI} = \text{Weight (kg)} / \text{Height}^2 (\text{m}^2)$$

Owners with BMI higher than or equal to 30.00 were categorized as obese; those with BMI ranged from 25.00 to 34.99 were categorized as overweight; owners with BMI ranged from 18.50-24.99 were classified as normal and those with BMI less than 18.50 were classified as underweight (WHO, 2006).

3.4.5 Control variables

Besides the feeding method, the other factors that associated with pet obesity were measured as well. The owners were asked to provide information about their pets' age, gender (choosing from "male" or "female"), neuter status (choosing from "yes" or "no") and activity level. In regards of the activity level, the dog's owners were asked about the total duration of walking dog outside per week (Robertson, 2003), whereas the cat's owners were asked how often they played with their cat indoor each week and the daily time the cats were outside. Besides the pets, the pet owners' age and gender are recorded as well. These factors were recorded as control variables to make sure the feeding method and owners' weight status were the main affecting factors.

3.5 Data analysis

The data was analysed using SPSS Version 20.0. For all tests, p value < 0.05 was considered as significant. A correlation analysis was used to investigate if there was relationship among the variables we measured in the survey for both pets and respondents. Then, regression analysis was used to determine how the pet weight status changed when the amount, frequency and variety of additional food provided were varied.

In addition, regression analyses were conducted separately to investigate how feeding method (quantity, frequency and variety of provision) of additional food changed when the level of anthropomorphic tendency was varied.

How the anthropomorphic tendency influence the pet weight status was explored by regression analysis as well. Meanwhile, a moderation analysis was conducted to investigate if the anthropomorphic tendency could moderate the effect of respondents' weight status of on the feeding method of additional food or the weight status of pets.

4. Results

4.1 Pre-processing of dataset

313 people responded to the survey invitation, of which 261 respondents completed the questionnaire. The 52 people who did not finish all the questions were deleted from the dataset. Then, after checking the answer of each question, the data from two respondents were deleted because unrealistic answers were provided. One of them was deleted because the BMI was too low ($BMI = 13.9$, with 174 cm as height and 42 kg as weight) to be typical. The other one was deleted because the information of leftover provision was unrealistic (provided 125, 789 and 55 types of dairy, meat and other items to the pet, respectively). Finally, the data of 259 respondents was kept for the following analyses.

4.2 Primary analysis

4.2.1 Description of dataset

Among the 259 participants, 205 (79.2%) of them were female and 54 (20.8%) were male. They were aged from 17 to 80 years old. The BMI of them ranged from 15.8 to 37.5, and averaged at 23.6. It was shown that about 123 (47.5%) of them responded to the questionnaire based on their cat and 136 (52.5%) of them based on their dog.

Among the cats and dogs population in the study, 136 (52.5%) of them were male and 123 (47.5%) of them were female. The neutered/spayed cats or dogs accounted for 75.7% of the total population. They were aged from 0 to 20 years old, of which 21.9% were young (0 to 3 years), 41.2% were mid-aged (4 to 8 years) and 36.9% were aged 9 years or even older.

For the participants who answered the questions based on dogs, they walk their dogs 10.8 hours averagely during each week. In regards of the participants responded based on their cats, almost half of them (46.0%) played with their cats every day and the average time for the cats staying outside was about 7.4 hours per day.

Table 4.2.1 Number of sample (N), Mean, standard error (SE), standard deviation (SD) of the variables related to pets and respondents.

Variables	N	Mean	SD
Pets			
Age, years	259	7.4	4.6
Gender, 0: Male; 1: Female	259	0.7	0.5
Neutered/Spayed, 0: Yes; 1: No	259	0.6	0.4
Dog only: walking duration each week, hours	136	10.8	6.7
Cat only: duration staying outside each day, hours	108	7.4	5.2
Respondents			
Age, years	259	33.9	15.8
Gender, 0: Female; 1: Male	259	0.6	0.4
BMI, kg/m^2	259	23.6	3.9

4.2.2 Body condition score (BCS) of pets

Information of self-reported BCS and vet opinion of pets' body condition was provided by all 259 respondents (**Figure 5**). Around 67.2 % of respondents considered that their cat or dog was ideal (BCS 3); 17.8% of them thought their cat or dog was overweight and obese (BCS 4 or 5); and 4.7% of them found their pet was thin or very thin (BCS 2 or 1). However, after the Pearson Chi-Square analysis, it was indicated that there was distinction in the distribution of pet body condition according to the respondent opinions and vet opinions ($P = 0.005$). Particularly, around 11.2% of total respondents underestimated their pets to be "thin", which were "ideal" with regard to the vet opinion. Meanwhile, the Pearson Correlation analysis showed that the self-reported BCS was correlated to the BCS based on the vet opinions ($R = 0.639$; $P < 0.001$).

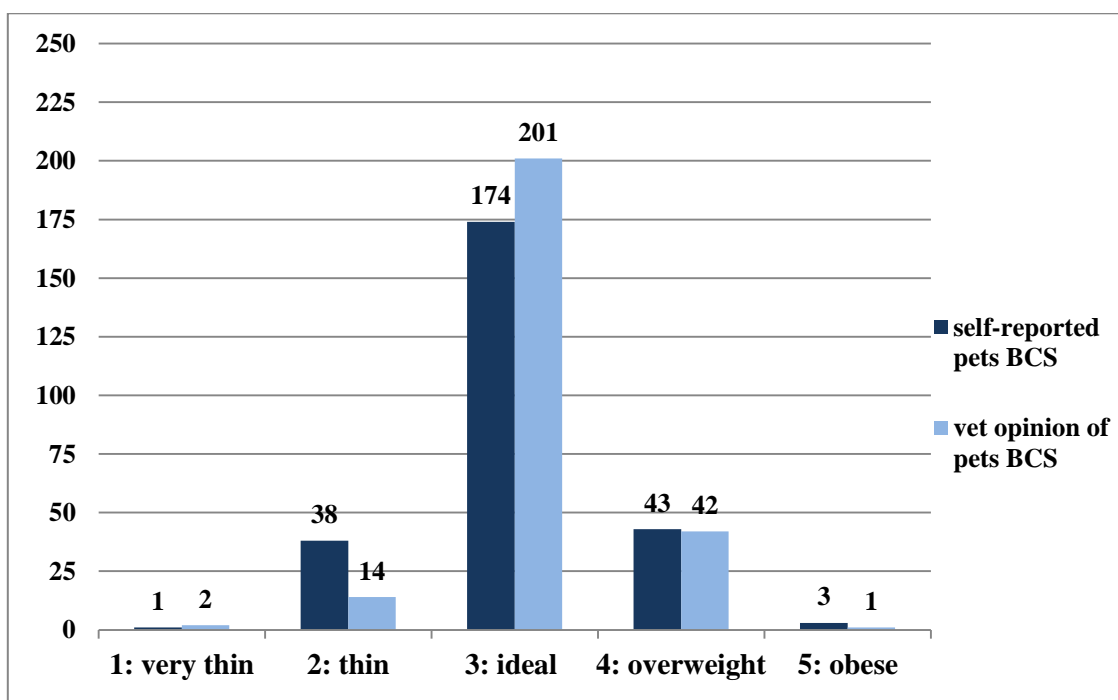


Figure 5 Body condition score distribution of respondents' cats and dogs (N = 259)

4.2.3 Anthropomorphic tendency

The result of 10-question Anthropomorphism Scale showed that among 259 respondents who filled in this scale, the average anthropomorphism score was 26.0, with scores ranged from 10 to 40. In regards of the 4 statements which related with their willingness to provide their pets more additional food, the average score among 259 respondents was 11.2, with 4 as a minimum score and 20 as a maximum score. For the following analysis, the final anthropomorphic tendency score was calculated by the sum of the anthropomorphism score and 4 extra questions' score. The average anthropomorphic tendency score among 259 respondents was 37.1, with scores ranged from 15 to 60 (**Table 4.2.3**).

Table 4.2.3 Number of sample (N), standard deviation (SD) of the variables, including 10-question Anthropomorphism Scale score, 4-question feeding related anthropomorphism scale score and the Anthropomorphic tendency score.

Variables	N	Mean	SD
10-question Anthropomorphism Scale score (Cronbach's alpha: 0.73)	259	26.0	5.7
4-question feeding related anthropomorphism scale score (Cronbach's alpha: 0.70)	259	11.2	3.3
Anthropomorphic tendency score (Cronbach's alpha: 0.74)	259	37.1	7.3

4.2.4 Feeding method of additional food

During the past 72 hours, there were 45.6% or 32.0% of total respondents fed their pets with commercial treats or leftovers, respectively. It was found that the average number of commercial treats provided each day was 3.2, with results ranging from 0 to 15. They had about 2.5 different types of snacks available in their place, with a maximum reaching 10 different types. When it comes to the leftovers, the mean value of total number of feeding times during the past 72 hours was 2.8, with a maximum reaching 10 times. When it comes to the types of leftovers, there was about 3.2 different kinds of leftovers fed to the pet in total during the past 72 hours, with results ranged from 1 to 35.

For the following analyses, the average number of commercial treats each day was set as the quantity of additional food provision; the total number of feeding times of the leftovers during the past 72 hours was set as the frequency of additional food provision; the variety of additional food represented the sum of the types of snacks available at home and the types of leftovers had fed to the pets in the past 72 hours. In regards of whole 259 respondents, there were 1.5 snacks fed to the pets averagely each day. The average frequency of providing leftovers in the past 72 hours was 0.9. There were 2.2 different types of additional food averagely available for the pets (**Table 4.2.4**).

Table 4.2.4 Number of sample (N), standard deviation (SD) of the variables, including the quantity, frequency and variety of additional food provision.

Variables	N	Mean	SD
The quantity of additional food provision (average number of commercial treats per day)	259	1.5	2.4
The frequency of additional food provision (total times of providing leftovers during the past 72 hours)	259	0.9	1.7
The variety of additional food provision (sum of the types of snacks available at home and the types of leftovers provided to the pets in the past 72 hours)	259	2.2	3.3

4.3 Results of hypotheses

In current study, a bivariate correlation analysis was conducted to find if there was relationship among the variables we measured for both pets and respondents (**Table 4.3.1**). The result indicated that the anthropomorphic tendency score were positively correlated with both the respondent-reported and the vet opinion of the pet body condition. Besides, the anthropomorphic tendency was found to be positively relation with both the quantity and the variety of the additional food. In regards of the feeding method of additional food, only the frequency of additional food provision was found to have positive relation with the pet body condition (from vet opinions). Neither the quantity nor variety of the additional food was related to the pet body condition (reported by respondents).

Then, multiple regression analyses were conducted to investigate if feeding method of additional food had influence on the pet weight status reported by respondents or by vet opinions (**Table 4.3.2**). It was expected that the amount, frequency and variety of additional food fed to the pet had positive effect on the pet weight status. However, the result showed that the feeding method of additional food had no influence on the BCS of pets which reported by respondents. When it comes to the pet body condition according to the vet opinions, only the frequency of additional food was found to have positive influence on the vet opinion of pet body condition ($P = 0.046$). When analysing the cats and dogs separately, it was found that only the frequency of additional food provided towards dogs had positive effect on the pet body condition according to vet opinions ($P = 0.043$). Thus, the Hypothesis 2 was confirmed but Hypothesis 1 and 3 were rejected.

Table 4.3.2 Regression coefficients of BCS (owner reported) and Vet opinion

Variables	Self-reported BCS		Vet opinion of BCS	
	β	t-value	β	t-value
Pet related:				
Age	-0.037	-0.587	-0.031	-0.494
Gender	-0.079	-1.265	-0.039	-0.638
Neutered/Spayed	-0.092	-1.475	-0.158	-2.549
Feeding method of additional food:				
Quantity	0.015	0.212	-0.028	-0.396
Frequency	0.136	1.808	0.148	2.009
Variety	-0.069	-0.830	-0.038	-0.470
The BMI of respondents	-0.008	-0.121	-0.001	0.011
Anthropomorphic tendency score	0.200	3.062	0.241	3.755
Adjusted R^2	0.036		0.070	

The significant β are bold in the table. The “Gender” and “Neutered/spayed” are dummy variables. For the “Gender” of pets, a value of 0 represent male and 1 stands for female. For the “Neutered/spayed”, a value of 0 represent have been neutered/spayed and 1 stands for have not been neutered/spayed.

Table 4.3.1. Pearson correlations between 12 variables related to both pets and respondents

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Pet age	-											
2. Pet gender	0.115	-										
3. neutered/spayed	-0.179**	-0.071	-									
4. Pet BCS	-0.009	-0.072	-0.086	-								
5. Vets opinions	0.022	-0.028	-0.155*	0.639**	-							
6. The quantity of additional food	-0.097	-0.043	0.093	0.052	0.027	-						
7. The frequency of additional food	0.069	0.020	0.065	0.109	0.136*	0.089	-					
8. The variety of additional food	0.038	0.012	0.041	0.054	0.080	0.430**	0.552**	-				
9. Anthropomorphic tendency score	0.039	-0.098	-0.093	0.195**	0.222**	0.301**	0.108	0.241**	-			
10. Respondent BMI	-0.022	-0.106	0.098	-0.010	0.017	0.079	-0.040	-0.007	0.032	-		
11. Respondent age	0.129*	-0.058	0.066	0.017	0.064	0.055	-0.013	0.001	0.120	0.375**	-	
12. Respondent gender	0.066	-0.012	-0.003	-0.117	-0.069	-0.031	0.053	0.045	-0.216**	0.163**	0.135*	-

**=p<0.001, *=p<0.05

The influence of anthropomorphic tendency on the feeding method of additional food was analysed by regression analyses as well. It was expected that respondents who had high anthropomorphic tendency will feed his/her pet with larger amount, more times or wider variety of additional food. The result showed that the anthropomorphic tendency had positive effect on the quantity ($P < 0.001$) and variety ($P < 0.001$) of additional food provided to the pets. So the Hypothesis 4 and 6 were verified to be true. However, no significant relation was found between the anthropomorphic tendency of respondents and the frequency of additional food (**Table 4.3.3**), which means the Hypothesis 5 was rejected. But when we analysing the cats and dogs separately (**Table 4.3.4**), it was found that the anthropomorphic tendency score was positively related with the quantity, frequency and variety of additional food provision in both the cats and dogs. On the contrary, the original 10-question Anthropomorphism Scale score was found to be negatively correlated with the quantity, frequency and variety of additional food provision in both the cats and dogs (except in the dogs, it had no effect on the quantity of additional food provision).

In addition, the multiple regression analyses were used to investigate if there was relation between anthropomorphic tendency of respondents and weight status of pets (**Table 4.3.2**). The result indicated that the anthropomorphic tendency score had positive effect on both the owner reported body condition of pets ($P = 0.002$) and the vet opinion about the pet body condition ($P < 0.001$). Besides, the original 10-question Anthropomorphism Scale score has been found to be positively related with both the owner reported body condition of pets ($P < 0.001$) and the vet opinion about the pet body condition ($P = 0.001$). Thus the Hypothesis 7 was confirmed. But when analysing the cats and dogs separately, no significant correlation was found between the anthropomorphic tendency score and body condition of pets in neither cats or dogs.

Table 4.3.3 Regression coefficients of quantity, frequency and variety of additional food according to the anthropomorphic tendency score and 10-question anthropomorphism scale score.

Variables	Quantity of additional food		Frequency of additional food		Variety of additional food	
	β	t-value	β	t-value	β	t-value
10-question Anthropomorphism Scale score	0.226	3.727	0.019	0.186	0.151	2.447
Adjusted R²		0.051		<0.001		0.023
Anthropomorphic tendency score	0.301	5.068	0.108	1.742	0.241	3.980
Adjusted R²		0.087		0.008		0.054

The significant β are bold in the table.

Table 4.3.4 Regression coefficients of quantity, frequency and variety of additional food according to the anthropomorphic tendency score and 10-question anthropomorphism scale score, based on dogs or cats

Variables		Quantity of additional food		Frequency of additional food		Variety of additional food	
		β	t-value	β	t-value	β	t-value
Dogs:							
10-question Anthropomorphism Scale score		-0.275	-1.464	-0.537	-2.811	-0.387	-2.081
Anthropomorphic tendency score		0.540	2.868	0.608	3.177	0.651	3.497
Adjusted R ²		0.100		0.071		0.121	
Cats:							
10-question Anthropomorphism Scale score		-0.494	-2.525	-0.581	-2.917	-0.526	-2.649
Anthropomorphic tendency score		0.667	3.405	0.533	2.676	0.607	3.055
Adjusted R ²		0.097		0.066		0.072	

The significant β are bold in the table.

It was expected that the feeding method of additional food mediated the relation between anthropomorphic tendency of respondents and weight status of pets. But as indicated above, although the frequency of additional food provision had influence on the weight status of pet according to the vet opinions, there was no effect of anthropomorphic tendency on the frequency of additional food (**Figure 6**). Therefore, the feeding method of additional food did not meet the criteria of a mediator between anthropomorphic tendency of respondents and weight status of pets.

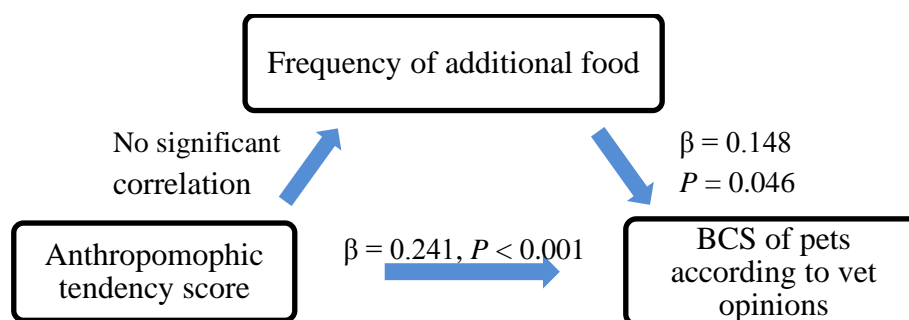


Figure 6 Relation among the anthropomorphic tendency score, frequency of additional food and BCS of pets according to vet opinions

Besides, regression analyses were conducted to investigate whether the weight status of respondents had effect on the feeding method of additional food and pet weight status. The

result indicated that the BMI of respondents had no effect on the feeding method of additional food or the BCS of the pets (**Table 4.3.5** and **Table 4.3.6**), which means the Hypotheses 8 to 11 were all rejected. Then, the potential moderation effect of the anthropomorphic tendency of respondents was investigated by a moderation analysis of variance. Beside the BMI of respondents and anthropomorphic tendency score, another variable was formed through multiplying the anthropomorphic tendency score by the BMI of respondents after centralization. It was expected that the anthropomorphic tendency of respondents could moderate the effect of their weight status on the pet weight status. However, the regression result showed that there was no significant moderate influence, neither towards the BCS reported by respondents nor the BCS according to vet opinions (**Table 4.3.5**). Thus, the Hypothesis 15 was rejected. When it comes to the feeding method of additional food, it was expected that for the owner who had higher anthropomorphic tendency, the effect of the BMI of respondents on the feeding method of additional food would be stronger than that for the owner who had lower anthropomorphic tendency. But through the moderation analysis, no significant moderate effect was found in regards of the feeding method of additional food (**Table 4.3.6**), which means the Hypothesis 12 to 14 were all rejected.

Table 4.3.5 Moderation analysis of BCS (owner reported) and Vet opinion

Variables	Self-reported BCS		Vet opinion of BCS	
	β	t-value	β	t-value
The BMI of respondents	-0.018	-0.298	-0.027	-0.435
Anthropomorphic tendency score	0.195	3.169	0.222	3.629
Moderation (BMI* Anthropomorphic tendency score)	0.024	0.385	0.028	0.450
Adjusted R²	0.028		0.039	

The significant β are bold in the table

Table 4.3.6 Moderation analysis of quantity, frequency and variety of additional food

Variables	Quantity of additional food		Frequency of additional food		Variety of additional food	
	β	t-value	β	t-value	β	t-value
The BMI of respondents	0.069	1.152	-0.040	-0.646	-0.010	-0.165
Anthropomorphic tendency score	0.299	5.013	0.111	1.780	0.243	4.007
Moderation (BMI* Anthropomorphic tendency score)	0.007	0.120	-0.034	-0.546	-0.052	-0.844
Adjusted R²	0.085		0.003		0.050	

The significant β are bold in the table

4.4 Results of control variables

Other factors that may associate with pet weight status were analysed as well. The results of regression analysis (**Table 4.3.2**) showed that the pets' age had no influence on the BCS of pets. In addition, there was no significant difference between the male and female pets on their weight status. However, it was found that the neutered/spayed pets had higher BCS based on the vet opinion ($P = 0.002$), but no difference was found in the self-reported BCS of pets. In regards of the activity levels, it was found that the duration of walking dog outside each week did not have influence on the dog weight status ($\beta = -0.105$, $P = 0.223$). When it comes to the cats, neither the frequency of playing with cats each week ($\beta = 0.061$, $P = 0.503$) nor the daily time of cats stay outside ($\beta = -0.084$, $P = 0.385$) had influence on the BCS of cats.

5. Discussion

The aim of this study was to investigate how the anthropomorphic tendency of the pet owners influenced the feeding method of additional food and pet weight status, and whether the anthropomorphic tendency moderated the effect of owners' weight status on the feeding method and the pet weight status.

It was expected that the anthropomorphic tendency of owners had positive effect on the pet weight status (Hypothesis 7). The result confirmed that the respondents with higher anthropomorphic tendency score were at higher risk to have overweight or obese pets. But the feeding method of additional food was not a path which linking anthropomorphic tendency of respondents to pet weight status. The relation between pet weight status and anthropomorphic tendency remained unexplained. It is speculated that the regular meal, which was not measure in this study, can be one of the factors influence the pet weight status. The feeding method of regular meal could be a potential factor that link up the anthropomorphic tendency and pet weight status. It would be convinced to explain this correlation if the further survey include the investigation about the effect of anthropomorphic tendency on the feeding method of regular meal.

The result of regression analysis between anthropomorphic tendency and feeding method of additional food showed that respondents who had higher anthropomorphic tendency would provide larger amount and wider variety of additional food to their pets (Hypotheses 4 and 6). This willingness of respondents to overfeed their pets may be caused by that respondents could not resist their pets' begging behaviours or did not want to see their pets suffering from hunger (Bland et al., 2010). Respondents who preferred anthropomorphizing their pets were more likely to provide wider variety of leftovers. In human, similar result can be found in the Spitzer and Rodin's (1998) study, that the obese people tended to selected different kinds of foods. It seems that the pets' diet was getting similar with their owners' diet when the owners are more likely to anthropomorphising their pets. This result in accordance with the suggestion that pet owners who humanized their pets were more likely to provided pets with food resembled their own food (de Godoy et al., 2013). In addition, the result of regression analysis also showed that the anthropomorphic tendency of respondents did not influence the frequency of additional food provision (Hypothesis 5). It seems that the respondents expressed their anthropomorphic tendency towards their pets by providing them with larger amount and wider variety of additional food, rather than increasing the frequency of additional food provision.

Interestingly, the result also indicated that the frequency of additional food provision was positively related with anthropomorphic tendency when considering the cats and dogs separately. In this case, we emphasized the effect of owners' anthropomorphic tendency, so both the cats and dogs were regarded as the animals which could be anthropomorphised as human. The data of cats and dogs were combined and with the expanding of sample size, the frequency of additional food tended to be less affected by the anthropomorphic tendency. That might be caused by the significant difference of frequency of additional food provision

between cats (0.7 time/day) and dogs (1.1 times/day), and the variance of anthropomorphic tendency score between dog owners (mean value = 38.9) and cat owners (mean value = 35.2). In other words, dog owners were more likely to anthropomorphize their pets ($P < 0.001$), and tended to feed their pets more frequently ($P = 0.049$) than the cats owners. So when combine the data from cats and dogs, the effect of anthropomorphic tendency on the frequency of additional food might be weakened.

Another interesting finding was that the original 10-question Anthropomorphism Scale score was negatively related with the quantity (only in cats), frequency and variety of additional food provision in both the cats and dogs. This result was in contrast to our expectation that the owners who preferred anthropomorphizing their pets tended to provide larger amount, more times and wider variety of additional food. One possible reason could be that the owners with higher Anthropomorphism Scale score are more likely to take the nutritional balance of pets into account, just as they are concern about their nutritional balance themselves. So they might limit the provision of additional food and be at lower risk to overfeed their pets. This finding can be a potential reason explains why the frequency of additional food was less affected by the anthropomorphic tendency. Compared with the anthropomorphic tendency score (which has 14 questions in total), the original 10-question Anthropomorphism Scale score had an opposite effect on the feeding method. This opposite effect weakened the influence of the whole anthropomorphic tendency score on the feeding method of additional food provision.

Previous research showed that the provision of additional food could lead to a high risk of pet obesity (Sloth, 1992; Kienzle et al., 1998; Toll et al., 2010). However, in this study, the result indicated that only the frequency of additional food has a positive effect on the pet body condition according to vet opinions (Hypothesis 2). This result is in line with what Courcier et al. (2010) found in a study on 700 dogs in UK. They indicated that dogs who were fed with snacks daily, weekly or monthly were at higher risk to be overweight than the dogs who never had been fed with snacks. It also indicated that if considering the cats and dogs separately, the frequency of additional food only had influence on the dogs' body condition. This might be due to the less times of additional food provision each day towards cats (mean value less than once), which made the frequency of additional food was not a major factor resulted in weight gain in cats. In addition, in our study, no effect of the quantity or variety of additional food provision was found on the pet weight status as reported by respondents (Hypotheses 1 and 2). This result was in contrast to the findings stated in the study of Kienzle et al. (1998), which conducted on 120 dogs in Germany. Kienzle et al. (1998) found that dogs tended to be obese when they were fed more numbers of snacks per day. When it comes to the variety of additional food, it was difficult to compare the result with previous researches because the relevant literature was limiting.

There are some reasons that may explain the lack of correlation between feeding method of additional food and pet weight status (according to both the respondents and vet opinions). On the one hand, only 46 respondents (17.8% of total respondents) reported their pets were overweight or obese, whereas the other 213 respondents considered their pets to be un-

overweight. The small sample size of overweight or obese pets' owners can be one of the factors that have negative impact on the reliability of the regression analysis. On the other hand, the effect of additional food on the pet weight status might be weaker than the one of the regular meal. Especially for the frequency of daily meal provision, it was demonstrated that in the study of Robertson (2003), dogs which were fed only once per day were at higher risk to be overweight than those fed various times each day. It was also found that in 140 cats in UK, the cats who fed canned foods ad libitum had significant higher BCS than the one of cats fed with several meals per day (Russell et al., 2000). Based on the result of the current study, the feeding method of additional food (except the frequency) is not the major reason for the overweight or obese of the pets. The regular meals, which were not considered in this study, could be one of the factors related to the pet weight status.

According to the pet body condition reported by respondents' estimation and vet opinions, the respondents' estimations was correlated, but not totally in line with the vet opinions. To be specific, among the 38 respondents, who thought their cat or dog was in "thin" body condition, there were 29 of them (78.4%) underestimating their pet body condition. Although using a visual scale (with image) is more effective than a verbal description in the estimation of body condition by the respondents, the underestimation of pet body condition can still happen (Colliard et al., 2006). In the studies of Colliard et al. (2006 and 2009), about one-third of cat owners and half of dog owners underestimated the body condition of their pet by the visual scale compared with the estimations by veterinarians. One possible reason for the underestimation could be that the respondents did not accept the fact that their pet was overweight or obese (White et al., 2011). Another reason is, unlike the veterinarians, the respondents haven't been trained to measure the body condition of pets, so they might not provide a relevant accurate result (Colliard et al., 2006; Colliard et al., 2009). In addition, the information of "vet opinion" about the pet body condition was collected from the respondents, not directly from the veterinarians. We cannot eliminate the possibility that some respondents answered this question by subjective assumption because their pets' body conditions haven't been estimated by any veterinarian. In this case, the risk of underestimation or overestimation of the body condition of pets might be higher than what we found in this study. In other words, more underestimation would happen between the "ideal" and "overweight" body condition as well.

In regards of the weight status of respondents, no correlation was found between the BMI of respondents and weight status of pets. It is in contrast with the result from the study about 400 dogs in UK, which indicated that the owners who were classified as overweight or obese ($BMI > 25$) owned the largest population (74%) of obese dog (52% of total dog population) (Holmes et al., 2007). Kienzle et al. (1998) also found in their study, which conducted on 120 dogs in Germany, that the population of overweight owners was larger in the owners of obese dogs (23.7%) than the owners of normal weight dogs (8.3%). Furthermore, it was expected BMI of respondents had positive effect on the feeding method of additional food provision. But the regression analysis showed that the quantity, frequency and variety of additional food provision did not change depending on the owners' weight status. Besides, the moderation

analysis showed that the anthropomorphic tendency did not moderate the effect of the BMI of respondents on the feeding method of additional food or even the body condition of pets. According to this result, it seems that the owners' weight status has no main impact on implementing the feeding method of additional food towards their pets or weight status of pets.

When it comes to the control variables, it was indicated that there was no relation between the activity level, age or gender of pets and the pets' weight status. But it was found that the dogs and cats that had been neutered or spayed were at higher risk of being overweight or obese. This result is in line with the several previous studies which indicated that the cats or dogs are more likely to be obese after neutering (Lund et al., 2005; Colliard et al., 2009; Coucier et al., 2012). In regards of these variables in current study, neuter/spayed status can be one of the factors resulted in pet obesity. The other variables, such as activity level, age and gender were not main factors that lead to pets being overweight or obese. One reason can explain no significant effect was found could be that only a small part of respondents (17.8% of total respondents) reported their pets were overweight or obese. It can be due to the possibility that some of the respondents might underestimate their pets' weight status.

In summary, we found that the owners with higher anthropomorphic tendency toward their pets were more likely to have overweight or obese pets. The owners with higher anthropomorphic tendency would feed their pet with larger amount or more types of additional food, but these were not the major factors resulted in the obese or overweight of pets. The pet weight status was positively related with the frequency of additional food provision. However, it seemed that the frequency of additional food did not change with the anthropomorphic tendency of owners. The regular meal provision was speculated as a path linking the anthropomorphic tendency and pet weight status, and it should be measured if further studies can be conducted. Moreover, considering the underestimation of body condition of pets by the owners, the data of pet body conditions could be more precise if collecting this information directly from veterinarians.

6. Implication

The anthropomorphic tendency has been proposed as an important part of humanity, through that animals were domesticated to be companion by our ancestors (Bradshaw and Casey, 2007). However, the anthropomorphic tendency can interfere with the owners' decision, and finally has negative impact on their pets. Just as what was found in the current study, owners with higher anthropomorphic tendency were more likely to have obese pets. We cannot ignore the human-like characteristics of the companion animals, but it doesn't mean that we have to treat them completely as human. Although the feeding method of additional food was not a mediator between anthropomorphic tendency of owners and weight status of pets in our study, the nutritional balance of pets is still an important matter that needs to be concerned. Especially when purchasing the commercial pet food or feeding the pets, it should be taken into account that which type of food is suitable for the pets and how much to feed the pets according to their age and weight status.

Besides, it was found that the more times the owner provided additional food, the more likely the pet being overweight or obese. In addition, neutered/spayed cats or dogs were at higher risk to be overweight and obese as well. Thus, the frequency of additional food provided to the pets should be controlled for keeping an ideal body weight. Moreover, after the pets being neutered or spayed, the daily food provision should be reduced because of the decrease of caloric requirement.

7. Conclusion

The main research questions of this research are “Whether and how the anthropomorphic tendency of the owners influences the feeding method of additional food provision and sequentially affects the pet weight status.” and “Whether and how the anthropomorphic tendency moderates the effect of owners’ weight status on the feeding method of additional food and pet weight status.

For the first research question, it can be concluded from the survey’s results that the owners with higher anthropomorphic tendency tend to provide more amount and types of additional food to their pets. Although the anthropomorphic tendency of owners is positively correlated with the pet weight status, the weight gain of pets is not mainly caused by the increase of quantity and variety of additional food. Only the frequency of additional food provision is found to have impact on the pet weight status, but the frequency of additional food has no correlation with the anthropomorphic tendency of owners. Therefore, it is possible to conclude that the owners with higher anthropomorphic tendency are at higher risk to own overweight or obese pets, but it is not due to the feeding strategy of additional food. It is speculated that the regular meal could be one of the factors mediation has effect on the correlation between anthropomorphic tendency and pet weight status. It is suggested that further studies should include the investigation of the feeding method of regular meal of pets.

In regards of second research question, it can be concluded that the anthropomorphic tendency does not moderate the effect of owners’ weight status on feeding method of additional food or even the body condition of pets. It was speculated that the underestimation of pet weight status by the owners could be one of the possible reasons for the insignificant correlation. In this case, collecting the data of pet body conditions directly from veterinarians should be considered in the further researches.

In summary, as a component of human nature, the anthropomorphic thinking has both the positive and adverse impacts on the companion animals. It can improve the animals’ welfare, but it may cause suffering to companion animals at the same time. It should arouse attention from the pet owners that to what extent the pets could be treated as our friends or family members.



Reference

- Albert A, Bulcroft K. 1988. Pets, Families, and the Life Course. *J Marriage Fam* 50(2):543-552.
- Appleton DJ, Rand JS, Sunvold GD. 2001. Insulin sensitivity decreases with obesity, and lean cats with low insulin sensitivity are at greatest risk of glucose intolerance with weight gain. *Journal of feline medicine and surgery* 3(4):211-228.
- Archer J. 1997. Why do people love their pets? *Evol Hum Behav* 18(4):237-259.
- Bartneck C, Kulic D, Croft E, Zoghbi S. 2009. Measurement Instruments for the Anthropomorphism, Animacy, Likeability, Perceived Intelligence, and Perceived Safety of Robots. *Int J Soc Robot* 1(1):71-81.
- Bland IM, Guthrie-Jones A, Taylor RD, Hill J. 2010. Dog obesity: veterinary practices' and owners' opinions on cause and management. *Preventive veterinary medicine* 94(3-4):310-315.
- Bland I, Hill J. 2011. Tackling dog obesity by tackling owner attitudes. *Animal Science Reviews* 2011: 11-18
- Bradshaw JWS, Casey RA. 2007. Anthropomorphism and anthropocentrism as influences in the quality of life of companion animals. *Anim Welfare* 16:149-154.
- Cave NJ, Allan FJ, Schokkenbroek SL, Metekohy CAM, Pfeiffer DU. 2012. A cross-sectional study to compare changes in the prevalence and risk factors for feline obesity between 1993 and 2007 in New Zealand. *Preventive veterinary medicine* 107(1-2):121-133.
- Chartrand TL, Fitzsimons GM, Fitzsimons GJ. 2008. Automatic effects of anthropomorphized objects on behavior. *Soc Cognition* 26(2):198-209.
- Colliard L, Ancel J, Benet JJ, Paragon BM, Blanchard G. 2006. Risk factors for obesity in dogs in France. *J Nutr* 136(7):1951s-1954s.
- Colliard L, Paragon BM, Lemuet B, Benet JJ, Blanchard G. 2009. Prevalence and risk factors of obesity in an urban population of healthy cats. *Journal of feline medicine and surgery* 11(2):135-140.
- Courcier EA, Thomson RM, Mellor DJ, Yam PS. 2010. An epidemiological study of environmental factors associated with canine obesity. *J Small Anim Pract* 51(7):362-367.
- Courcier EA, Mellor DJ, Pendlebury E, Evans C, Yam PS. 2012. An investigation into the epidemiology of feline obesity in Great Britain: results of a cross-sectional study of 47 companion animal practises. *Vet Rec* 171(22):560-+.
- Cromer LD, Barlow MR. 2013. Factors and Convergent Validity of the Pet Attachment and Life Impact Scale (PALS). *Human-Animal Interaction Bulletin* 2013, Vol. 1, No. 2, 34-56
- de Godoy MR, Kerr KR, Fahey GC, Jr. 2013. Alternative dietary fiber sources in companion animal nutrition. *Nutrients* 5(8):3099-3117.
- Edling TM. 2012. Effect of anthropomorphism on companion and captive animal husbandry. *J. Anim. Sci.* Vol. 90, Suppl. 3/J. Dairy Sci. Vol. 95, Suppl. 2:457
- Hays NP, Bathalon GP, McCrory MA, Roubenoff R, Lipman R, Roberts SB. 2002. Eating behavior correlates of adult weight gain and obesity in healthy women aged 55-65 y. *Am J Clin Nutr* 75(3):476-483.
- Heuberger R, Wakshlag J. 2011. The relationship of feeding patterns and obesity in dogs. *J Anim Physiol an N* 95(1):98-105.
- Hirschman EC. 1994. Consumers and Their Animal Companions. *J Consum Res* 20(4):616-632.
- Holmes KL, Morris PJ, Abdulla Z, Hackett R, and Rawlings JM. 2007. Risk factors associated with excess body weight in dogs in the UK. *Journal of Animal Physiology and Animal Nutrition* 2007 Blackwell Publishing Ltd: 166-167.
- Horowitz AC, Bekoff M. 2007. Naturalizing anthropomorphism: Behavioral prompts to our humanizing of animals. *Anthrozoos* 20(1):23-35.
- Houpt KA, Smith SL. 1981. Taste Preferences and Their Relation to Obesity in Dogs and Cats. *Can Vet J* 22(4):77-81.
- Janet MA, Steven FA. 2003. Cat culture: The social world of a cat shelter. Chapter one: 1-16
- Johnson SL, Birch LL. 1994. Parents' and children's adiposity and eating style. *Pediatrics* 94(5):653-661.
- Kealy, RD. 1975. Synergistic flavor enhancing coatings for cat food compositions comprising citric and phosphoric acids. United States Patent. Us 3930031 A.
- Kienzle E, Bergler R, Mandernach A. 1998. A comparison of the feeding behavior and the human-animal relationship in owners of normal and obese dogs. *J Nutr* 128(12 Suppl):2779S-2782S.
- Kronfeld DS, Donoghue S, Glickman LT. 1991. Body Condition and Energy Intakes of Dogs in a Referral Teaching Hospital. *J Nutr* 121(11):S157-S158.
- Lee H, Kim M, Choi M, Lee N, Chang J, Yoon J. 2010. Assessment of feline abdominal adipose tissue using computed tomography. *Journal of feline medicine and surgery* 12(12):936-941.
- Lund EM, Armstrong PJ, Kirk CA, Klausner JS. 2005. Prevalence and risk factors for obesity in adult cats from private US veterinary practices. *Intern J Appl Res Vet Med.* Vol.3, No.2:88-96.
- Lund EM, Armstrong PJ, Kirk CA, Klausner JS. 2006. Prevalence and risk factors for obesity in adult dogs from private US veterinary practices. *Intern J Appl Res Vet Med.* Vol.4, No.2:177-186.
- Malandrino N, Capristo E. 2011. Palatability as an addictive trigger in obesity: a changing paradigm in the past decades. *Frontiers in psychiatry* 2:81.
- Marks SL, Rogers QR, Strombeck DR. 1994. Nutritional Support in Hepatic-Disease .2. Dietary-Management of Common Liver Disorders in Dogs and Cats. *Comp Cont Educ Pract* 16(10):1287-&.
- McGreevy PD, Thomson PC, Pride C, Fawcett A, Grassi I, Jones B. 2005. Prevalence of obesity in dogs examined by Australian veterinary practices and the risk factors involved. *Vet Rec* 156(22):695-+.
- Mugford, R.A. 1977. External influences on the feeding of carnivores. *The Chemical Senses and Nutrition*: 25-48.



- Robertson ID. 1999. The influence of diet and other factors on owner-perceived obesity in privately owned cats from metropolitan Perth, Western Australia. *Preventive veterinary medicine* 40(2):75-85.
- Robertson ID. 2003. The association of exercise, diet and other factors with owner-perceived obesity in privately owned dogs from metropolitan Perth, WA. *Preventive veterinary medicine* 58(1-2):75-83.
- Rohlf VI, Toukhsati S, Coleman GJ, Bennett PC. 2010. Dog Obesity: Can Dog Caregivers' (Owners') Feeding and Exercise Intentions and Behaviors Be Predicted From Attitudes? *J Appl Anim Welf Sci* 13(3):213-236.
- Russell K, Sabin R, Holt S, Bradley R, Harper EJ. 2000. Influence of feeding regimen on body condition in the cat. *J Small Anim Pract* 41(1):12-17.
- Scarlett JM, Donoghue S, Saidla J, Wills J. 1994. Overweight Cats - Prevalence and Risk-Factors. *Int J Obesity* 18:S22-S28.
- Scarlett JM, Donoghue S. 1998. Associations between body condition and disease in cats. *J Am Vet Med Assoc* 212(11):1725-1731.
- Scherk DVM. 2012. Obesity: winning the battle of the bulge takes more than a bag of. *Small Animal Track. ISVMA Annual Conference Proceedings.*
- Serpell JA. 2003. Anthropomorphism and anthropomorphic selection - Beyond the "cute response". *Soc Anim* 11(1):83-100.
- Singh, R., Laflamme, P., Sidebottom-Nielsen, M., 2002. Owner perceptions of canine body condition score. *Journal Veterinary Internal Medicine* 16, 362.
- Slater MR, Scarlett JM, Donoghue S, Erb HN. 1992. The Repeatability and Validity of a Telephone Questionnaire on Diet and Exercise in Dogs. *Preventive veterinary medicine* 13(2):77-91.
- Sloth C. 1992. Practical Management of Obesity in Dogs and Cats. *J Small Anim Practice* 33(4):178-182.
- Spitzer L, Rodin J. 1981. Human Eating Behavior - a Critical-Review of Studies in Normal Weight and Overweight Individuals. *Appetite* 2(4):293-329.
- Toll PW, Yamka RM, Schoenherr WD, Hand MS. 2010. Obesity. *Small Animal Clinical Nutrition*, 5th Edition, Chapter 27: 501-542
- White GA, Hobson-West P, Cobb K, Craigon J, Hammond R, Millar KM. 2011. Canine obesity: is there a difference between veterinarian and owner perception? *J Small Anim Pract* 52(12):622-626.
- WHO. 2006. BMI classification. From http://apps.who.int/bmi/index.jsp?introPage=intro_3.html
- Willoughby KN, Michel KE, Abood SK. 2005. Feeding Practices of Dog and Cat Owners Reflect Attitudes Toward Pet Foods. Abstracts of the American Academy of Veterinary Nutrition (AAVN) Clinical Nutrition and Research Symposium, held in Baltimore, Maryland, June 1st, 2005: 428
- Zaghini G, Biagi G. 2005. Nutritional peculiarities and diet palatability in the cat. *Vet Res Commun* 29:39-44.



Appendix 1 Questionnaire

Q1: Fijn dat u mee wilt doen aan dit onderzoek! Deze vragenlijst maakt deel uit van mijn afstudeerproject naar hoe eigenaars van huisdieren met hun dier omgaan. Het invullen van de vragenlijst zal ongeveer 10 minuten duren. Er zijn geen goede of foute antwoorden, wilt u invullen wat als eerste bij u opkomt? Als deelnemer aan dit onderzoek blijft u geheel anoniem. Onder de deelnemers wordt een irischeque ter waarde van € 25,- verloot. Er zijn geen risico's of voordelen verbonden aan het invullen van de vragenlijst. U kunt op ieder moment beslissen om te stoppen met invullen. Voor eventuele vragen kunt u contact opnemen met Mengdie Cao (Mengdie.Cao@wur.nl). Door op 'ja' te klikken geeft u aan dat u bovenstaande hebt gelezen en ermee instemt:

☐ ja, ik doe mee aan dit onderzoek.

Q2: Hoeveel katten en honden heeft u zelf als huisdier?

☐ Katten: _____

☐ Honden: _____

Q3: U gaf aan dat u een kat of meerdere katten heeft in uw huishouden. Deze vragenlijst gaat over uw kat. Als u meerdere katten heeft, vul dan alstublieft deze vragenlijst in met uw oudste kat in gedachten.

U gaf aan dat u een hond of meerdere honden heeft in uw huishouden. Deze vragenlijst gaat over uw hond. Als u meerdere honden heeft, vul dan alstublieft deze vragenlijst in met uw oudste hond in gedachten.

U gaf aan dat u zowel een kat of meerdere katten en een hond of meerdere honden heeft in uw huishouden. Deze vragenlijst gaat over uw hond. Als u meerdere honden heeft, vul dan alstublieft deze vragenlijst in met uw oudste hond in gedachten.

Q4: Wanneer uw huisdier ernstig ziek is, wat is de maximale prijs die u accepteert voor medische behandelingen?

- ☐ Minder dan 100 euro
- ☐ 100 - 500 euro
- ☐ 500 - 1000 euro
- ☐ 1000 - 1500 euro
- ☐ Er is geen geldbedrag dat me tegen kan houden om medische zorg te geven aan mijn huisdier als dat nodig is.

Q5 In welke mate voelt u dat uw huisdier onderdeel is van uw gezin?

- ☐ Helemaal niet
- ☐ niet zo sterk
- ☐ een beetje
- ☐ best veel
- ☐ heel veel

Q6 In welke mate bent u het eens of oneens met de volgende stellingen?

	Geheel mee oneens	mee oneens	niet mee eens en niet mee oneens	mee eens	geheel mee eens
Geen enkel gezin is compleet zonder huisdier in huis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Huisdieren zouden dezelfde rechten moeten hebben als mensen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik houd van mijn huisdier omdat hij/zij meer trouw is dan een mens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q7 Maak een inschatting hoe vaak de volgende dingen gebeuren.

	nooit	zelden	soms	vaak	altijd
Mijn huisdier meenemen op visite	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mijn gevoel over mensen wordt beïnvloed door de manier waarop ze reageren op mijn huisdier	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Het vieren van de verjaardag van mijn huisdier	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q8 Zijn de volgende stellingen waar?

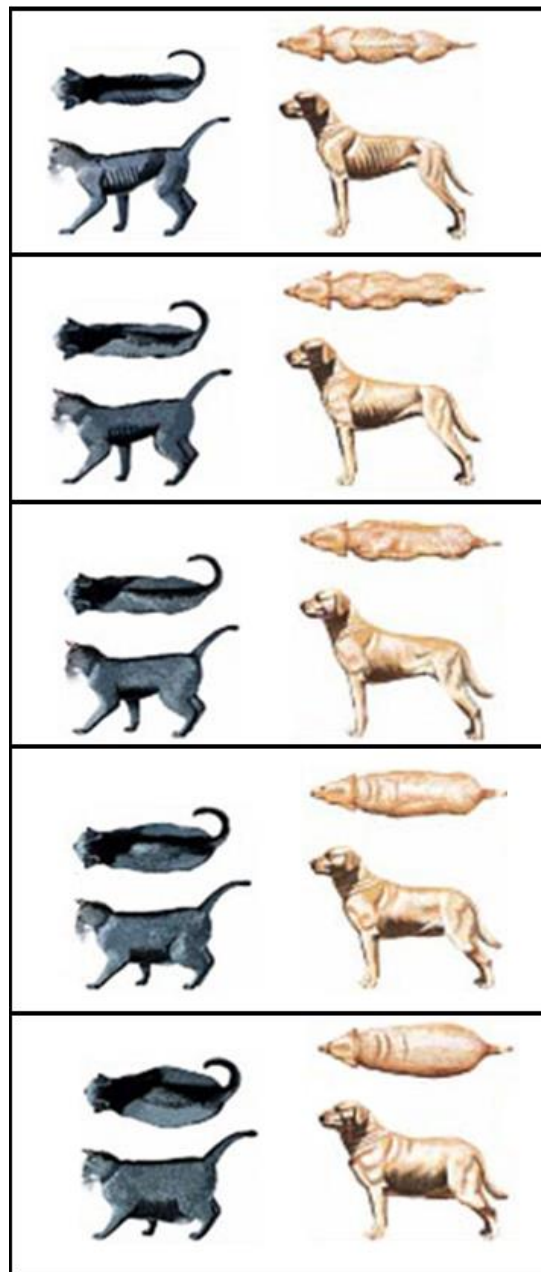
	nee	ja
Ik heb een foto van mijn huisdier in mijn portemonnee, huis of kantoor	<input type="radio"/>	<input type="radio"/>
Mijn huisdier heeft toegang tot alle vertrekken in mijn huis	<input type="radio"/>	<input type="radio"/>

Q9 In welke mate bent u het eens of oneens met de volgende stellingen?

	geheel mee oneens	mee oneens	niet mee eens en niet mee oneens	mee eens	geheel mee eens
Ik houd ervan om mijn huisdier te verwennen met eten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik geniet ervan om mijn huisdier te zien eten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik kan het moeilijk weerstaan als mijn huisdier bedelt om eten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik vind het een vervelend gevoel als het lijkt alsof mijn huisdier hongerig is	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q10 Welke plaatje hieronder komt het meest overeen met hoe uw huisdier er uit ziet? Klik met uw muis op 1 van de afbeeldingen.

	Off	On
very thin		
thin		
ideal		
overweight		
obese		





Q11 Wat is de mening van uw dierenarts over het gewicht van uw huisdier?

- ☐ Ernstige mate van ondergewicht
- ☐ enige mate van ondergewicht
- ☐ Ideaal gewicht
- ☐ enige mate van overgewicht
- ☐ Ernstige mate van overgewicht

Q12 Heeft u uw huisdier de afgelopen drie dagen snacks gevoerd die u kunt kopen in de supermarkt of dierenwinkel?

- ☐ nee
- ☐ ja

Answer If Heeft u uw huisdier de afgelopen drie dagen snacks gevoerd die u kunt kopen in de supermarkt of dierenwinkel? Ja Is Selected

Q13 Wat is het gemiddeld aantal snacks per dag dat u geeft aan uw huisdier? Denk hierbij aan de laatste drie dagen.

_____ aantal snacks

Answer If Heeft u uw huisdier de afgelopen drie dagen snacks gevoerd die u kunt kopen in de supermarkt of dierenwinkel? Ja Is Selected

Q14 Er zijn verschillende typen snacks te koop voor huisdieren, zoals bijvoorbeeld koekjes, sticks en snoepjes. Hoeveel verschillende typen snacks heeft u momenteel in huis?

_____ aantal verschillende type snacks in huis momenteel

Q15 Heeft u uw huisdier restjes eten gegeven in de afgelopen drie dagen bijvoorbeeld kliekjes of kleine hapjes tijdens uw eigen maaltijd)

- ☐ nee (1)
- ☐ ja (2)

Answer If Heeft u uw huisdier restjes eten gegeven in de afgelopen drie dagen bijvoorbeeld kliekjes of kleine hapjes tijdens uw eigen maaltijd)? Ja Is Selected

Q16 Hoeveel verschillende type restjes (dus geen maaltijden) heeft u uw huisdier in de afgelopen drie dagen gegeven?

_____ Zuivel, zoals kaas, yoghurt, melk, ijs
_____ vlees en vis, zoals kip, rundvlees, broodbeleg
_____ Anders, zoals botten, brood, eieren, groente, rijst, pasta



Answer If Heeft u uw huisdier restjes eten gegeven in de afgelopen drie dagen bijvoorbeeld kliekjes of kleine hapjes tijdens uw eigen maaltijd)? Ja Is Selected

Q17 Hoeveel keer in totaal heeft u uw hond of kat gevoerd met restjes/kliekjes gedurende de afgelopen drie dagen?

_____ Totaal aantal keer restjes gegeven in laatste 3 dagen

Q18 Wat is de leeftijd van uw hond of kat in jaren? Als u het niet precies weet, geef dan een schatting.

_____ Leeftijd

Q19 Het geslacht van uw huisdier:

- ☐ mannelijk
- ☐ vrouwelijk

Q20 Is uw huisdier gecastreerd/gesteriliseerd?

- ☐ ja
- ☐ nee

Answer If Hoeveel katten en honden heeft u zelf als huisdier? honden Is Selected

Q21 Hoe lang wandelt u met uw hond elke week?

_____ Totaal aantal uren per week dat u wandelt met hond

Answer If U gaf aan dat u een kat of meerdere katten heeft in uw huishouden. Deze vragenlijst gaat over uw kat. Als u meerdere katten heeft, vul dan alstublieft deze vragenlijst in met uw oudste kat. Is Displayed

Q22 Hoe vaak speelt u met uw kat elke week?

- ☐ zelden
- ☐ 1 keer per week
- ☐ 3 - 4 keer per week
- ☐ (bijna) dagelijks
- ☐ meerdere keren per dag



Answer If U gaf aan dat u een kat of meerdere katten heeft in uw huishouden. Deze vragenlijst gaat over uw kat. Als u meerdere katten heeft, vul dan alstublieft deze vragenlijst in met uw oudste kat. Is Displayed

Q23 Hoe lang is uw kat gemiddeld buitenshuis per dag?

_____ Totaal aantal uren buitenshuis per dag

Q24 Bovenstaande vragen gingen over uw huisdier. De volgende vragen gaan over u.

Q25 Wat is uw lengte in centimeters?

_____ Lengte

Q26 Wat is uw leeftijd in jaren?

_____ Leeftijd

Q27 Wat is uw gewicht in kilo's?

_____ Gewicht

Q28 Wat is uw geslacht?

- ☐ Vrouw (1)
- ☐ Man (2)

Q29 Als u nog opmerkingen heeft voor de onderzoeker, schrijf ze hier

Q30 Aan Wageningen Universiteit worden vaker studies verricht waarvoor wij op zoek zijn naar deelnemers. Mogen wij u hiervoor af en toe (maximaal 1 keer per maand) benaderen per e-mail? Zo ja, schrijf hieronder uw e-mailadres (niet nodig als u dit al eerder heeft aangegeven):

Q31 Hartelijk dank voor uw medewerking. Dit waarderen wij zeer!