Owners' views of canine nutrition, weight and wellbeing and their implications for the veterinary consultation.

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Objectives. To investigate owners' views around canine nutrition and wellbeing, how these beliefs may differ according to weight status of the dog, and the implications for owner support approaches.

Methods. A researcher-mediated questionnaire collected quantitative and qualitative data via structured interviews with dog owners (n = 147) attending a country park in the East Midlands, UK, with a specific focus on views around canine nutrition and wellbeing.

Results. 44% of owners cited 'past experience' when determining what to feed, and only 9% of owners cited the veterinarian as a source of this information. When comparing chosen verbal description vs. non-sequential BCS images of the dog, only 22% of owners with overweight animals matched perceived verbal and visual appraisals, compared with 89% of owners of ideal weight dogs ($p<0.001$). Owners cited a good diet and regular

exercise as important factors for canine wellbeing, but companionship with other dogs as the least important factor.

Clinical significance. Owners report being aware of the important association between canine nutrition and wellbeing, but their considered importance of factors influencing dog wellbeing may be influenced by their perceived weight status of the animal. This work also highlights the need for veterinarians to reframe owner discourse such that there is more routine discussion around weight and nutrition at every consultation. Furthermore, the use of non-sequential BCS images could be a useful tool for a more considered opinion of canine weight status by owners.

Keywords: Nutrition; Canine obesity: Veterinary communication; Body condition score; Owner perception

Introduction

Dog ownership in the UK has seen a steady rise with the population increasing from 7.5 to ~9 million between 2010 and 2018, equating to ~25% of UK households having a dog (PDSA 2018, PFMA 2019a). Their popularity as a pet has further increased recently with over 40% of new owners admitting purchasing a puppy during the Covid-19 pandemic as a companion during lockdown (Kennel Club, 2020). In parallel with increased ownership, it is proposed that as many as 60-75% of dogs could be overweight or obese (Courcier *et al.* 2010, German *et al.* 2018).

Many veterinarians consider obesity the biggest current health and welfare concern for UK pets (BVA 2016) and the World Small Animal Veterinary Association (WSAVA) has

recently classified pet obesity as a disease (Day 2017). The condition is defined as the accumulation of excess adipose tissue as a result of caloric intake exceeding energy expenditure over a significant period of time, leading to body weight exceeding the optimum by 10-25% (Bland *et al.* 2009, Burkholder 2000, German 2010). There are a number of reported risk factors that can predispose a dog to becoming overweight or obese, including owner traits (such as perceptions and motivations around feeding and exercise patterns), animal effects (genetics, neuter status, breed), as well as other dietary and disease aspects (German 2006, Raffan *et al.* 2015, Webb *et al.* 2020). Some owners may fail to view excessive weight as a concern within the context of animal health, and owner attitudes and behaviours concerning food and physical activity are also considered a potential risk factor with regard to the weight of the animal (Bland *et al.* 2010, Nijland *et al.* 2009). Dogs that are overweight by even a moderate amount have shorter life spans and are more prone to a plethora of adverse health implications compared with ideal weight dogs (Kealy *et al.* 2002, Laflamme 2012, Salt *et al.* 2019). These health conditions often compromise the wellbeing of the animal, with obese dogs having a lower quality of life (German 2011).

Owners frequently underestimate the Body Condition Score (BCS) of their dog, even when using a standard BCS chart (Eastland-Jones *et al.* 2014, White *et al.* 2011).Agreement between the owner and the veterinarian can vary depending upon the weight status of the individual dog, with lower levels of agreement as weight status of the animal increases from the ideal (White *et al.* 2011). Findings from recent national surveys of the UK pet population highlight the need to educate owners more on recognising deviations above a healthy weight (PDSA 2020), PFMA (2019b). The poor recognition could indicate that

owners are less able to contribute to maintaining a healthy weight status for their animal. This challenge suggests there is an important opportunity from a professional perspective for veterinarians to '*reclaim nutritional expertise*' with pet owners (Churchill and Ward 2016). Accordingly, veterinarians should provide clear advice to help owners recognise changes in weight status, and communicate the wider effects of pet obesity on health and wellbeing.

Owners can exert considerable influence regarding the most common reasons for a dog being overweight such as insufficient exercise and excessive or inappropriate treat feeding (Kienzle *et al.* 1998, PDSA 2016). Poor feed management strategies can be a primary cause of obesity associated with the tendency by some owners to show affection for their dog through food giving behaviours (Wensley 2008, White *et al.* 2016). It is suggested that owners of overweight dogs are more likely to observe the animal during meal times and feed a greater number of meals, treats and table scraps. The dog is also more likely to be present during preparation and consumption of human food (Kienzle *et al.* 1998). Many dog owners appear motivated to give treats for a number of reasons including as a reward for good behaviour and/or to accommodate a perceived need in variety in the diet. Although treats are given regularly as part of the normal feeding regime by owners, there is often minimal adjustment made to their dog's energy intake (Morelli *et al.* 2019, White *et al.* 2016).

Complex relationships exist between dog and owner in terms of how the human-animal bond can translate into individual displays of affection and wider views around canine nutrition and wellbeing. Owners are considered primarily responsible for ensuring optimum

weight management of their pet through appropriate feeding (Bland *et al.* 2009). However, there is also some responsibility for veterinary professionals to seek better understanding of owner knowledge and food giving behaviours to ensure the wellbeing of dogs at risk of obesity. This study aimed to investigate owners' views of what constitutes a good diet for their dog, their wider understanding of canine nutrition and wellbeing (including the role of the veterinarian in this), and how these beliefs may differ between owner-perceived appraisals of overweight and ideal weight status dogs.

Materials and Methods

All protocols and procedures for this study were conducted under institutional guidelines and received a favourable ethical opinion in December 2017.

Recruitment and interviewing of participants

Participants were dog owners who were approached at an East Midlands country park. Three researchers trained in field research good practice and face-to-face interview techniques carried out on-site interviews using structured questionnaires on weekdays between January and February 2018 and all data were collected between the hours of 10:00h and 16:00h. Availability sampling was employed in this study, as the owners were of the available population at the location, times and dates that structured interviews were carried out. (Etikan *et al.* 2016). All data were managed anonymously in line with data management policies at the University of Nottingham and no personal information that could be used to identify participants was collected during the study. To gain valid consent, potential participants were approached, provided with verbal information and an information sheet describing an overview of the study. Prior to the structured interviews,

all participants were confirmed to be over 18 years of age. The term ‘owner’ was used to describe the person who self-identified as the individual who was primarily responsible for care of the dog. This was important in situations where the dog was accompanied by multiple individuals. In any instance of multiple dogs, the owner chose one animal to discuss. Following completion of the questionnaire, the participant was offered a small gratuity; either a University of Nottingham pen or a dog exercise toy (i.e. a squeaking tennis ball).

Design of the questionnaire

In line with previous approaches (White *et al.* 2011, 2016) a semi-structured questionnaire was employed consisting of both open and closed questions in a face-to-face interview with each owner. The average completion time for each interview was 10 minutes. The full questionnaire was composed of 36 questions across five distinct sections (dog and owner demographics, and broader topics on dog wellbeing, nutrition and health), although the specific focus of the current paper was owners’ views on dog nutrition and wellbeing. The researcher read the questions from the questionnaire sheet and carefully recorded the participant’s responses by hand, in writing. Participants’ responses were captured in full by the researchers, however the responses were not audio recorded so cannot be regarded as verbatim. Prior to data collection from the country park, the researchers piloted the questionnaire on a small number of individuals, to verify the clarity of questions asked, and to reduce any possible variation in interviewer bias with regard to question delivery and data capture.

The questionnaire included a range of both ‘closed’ questions consisting of pre-coded response options (yes/no or a Likert scale to allow identification of trends within the dataset) and ‘open’ questions allowing owners the opportunity to expand upon their answers. Owners were asked a number of questions relating to feeding and wellbeing such as their definition of a ‘good diet’ for the dog, sources of nutritional advice, and the perceived importance of nutrition in terms of their dog’s wellbeing (some example questions are shown in Table 1). Owners were also asked to choose the factor they perceived as the most/least important in terms of dog wellbeing, from a list of options provided, based on an initial scope of literature by the research team. To determine perception of their dog’s BCS, and to investigate whether this judgement differed between verbal description and selection based on visual images, owners were initially asked to select a descriptive term relating to their dog’s weight status (*very underweight, underweight, ideal weight, overweight* or *very overweight*). They were subsequently asked to select a BCS image from a 5 point scale that they felt best represented the body shape of their own dog, from a selection presented. The BCS profiles shown to owners contained images for both large and small breed dogs, so that owners could choose the most appropriate profile with regard to the size of their own dog. Images used were adapted from existing PDSA condition score charts (see Figure 1). A novel aspect of the current study was that the BCS images of the dogs were presented in a randomised order and were not presented in the conventional (weight increasing) sequence, as would be expected with traditional BCS charts. Although this method was based on the owner’s perception through visual assessment alone, it was hoped that this approach would reduce unconscious bias and therefore mean that owners would make a more considered judgment of their dog’s BCS status, and they would not just select the mid-range BCS

profile that often depicts the ‘ideal’ weight status. In addition, to avoid any possible influence of colour association with weight status as seen in some other BCS charts (green = ideal weight, red/orange = over/underweight), all BCS images in the current study were presented to owners in a black and white format. The chosen approach regarding the randomised BCS images was considered a more accurate method of determining owner perception of weight status of their dog, rather than relying on verbal description alone.

Data and Statistical Analysis

Only questionnaires completed in full were analysed. A mixed method approach was used for this analysis with data reported as frequency counts and percentages and for quantitative analyses, two-way contingency tables with chi-squared tests of association were used with the probability level considered to indicate statistical significance taken as $p \leq 0.05$. Responses to open-ended questions were condensed into sub-categories for thematic analysis according to the content, for the relevant questions the coding of defined themes (Silverman 2015) was conducted. The themes for the relevant open-ended questions were then reviewed and confirmed by a second member of the project team. The themes relevant for this paper are presented in the results section. As with previous research (White et al., 2016), key themes were not determined in advance but were identified from the dataset where responses were analysed quantitatively by using frequency counts of the qualitative themes that were coded.

Results

A total of 147 researcher mediated face-to-face interviews using a structured questionnaire (hereinafter interviews) were completed; dog and owner demographics and owners' views of canine nutrition and wellbeing across the full sample population are presented initially. Sub-populations were subsequently determined based on owner perceived BCS score of the dog: owners of ideal weight status dogs (IWDs; n = 45) with a dog BCS value of 3, owners of overweight status dogs (OWDs; n = 54) with dog BCS 4 or 5, and owners of underweight status dogs with BCS 1 or 2. Only IWDs and OWDs groups (n = 99) were included for further analysis to investigate perceptions of nutrition and wellbeing within these two specific cohorts.

Dog and Owner demographics

The majority of owners interviewed (74%) were aged over 45 years old with 64% identifying as female and 36% male. Just over half (55%) of owners reported being employed and 36% were retired. The dog population was fairly equally balanced across sex (53% female dogs to 47% male) and the majority (76%) of animals were neutered. Dog ages revealed 29% were 0-2 years, 30% 3-6 years, 21% 7-9 years and 20% 10 years or over. The prevalence of perceived overweight status was highest in dogs in the 3-6 and 7-9 year categories. Nearly two thirds of the sample population (61%) were pedigree breeds, 20% cross breeds and 19% were 'designer cross' breeds, i.e. a cross between two pedigree dogs to create a desired hybrid such as a Cockapoo or a Labradoodle. Only 21% of designer breeds were scored as overweight compared to 39% of pedigrees and 45% of cross breeds (p=0.073).

General views on canine nutrition and wellbeing

Of the 147 owners interviewed, all reported they were aware of the association between nutrition and wellbeing, stating that good nutrition was important with regard to the animal's health. The most common specific response to what owners considered a *good diet* for their dog, was a 'dry' diet with 38% of owners feeding a diet solely in this form. Wheat/grain free diets were reported by 7% of owners and only 5% of owners stated feeding a raw diet in response to this question. A range of responses were given in terms of how owners had learned what to feed their dog, sometimes with multiple factors. The most common single response was 'past experience' by 44% of owners, 'breeder' was 25%, 'trial and error' was 7% and the veterinarian was specifically mentioned by only 9% of owners.

Owner perceptions of nutrition and wellbeing

From the two owner subpopulations (IWDS; n = 45, OWDs; n = 54), 26 owners reported that they had not discussed any aspect of nutrition or the dog's weight with a veterinary professional. Of the 73 owners who had, 27 did not elaborate further on the content. Where specific topics were highlighted, the prominent theme of weight status was raised more commonly than nutrition across both groups, and only a minority of owners reported that they had specifically discussed both nutrition and weight with the veterinarian (Figure 2). Of the defined factors presented to participants, the provision of a good diet and regular walks/exercise were selected as the most important in terms of dog wellbeing by both owner subgroups (Figure 3a). The companionship of other dogs was ranked as the least important wellbeing factor for the dog in both owner subgroups, but particularly by OWDs. IWDs selected regular check-ups by a veterinary professional as the factor that was least

important in terms of dog wellbeing (Figure 3b). When asked an open question about why nutrition was important for wellbeing, of two prominent themes health and weight management, 81% of owners mentioned dog health and only 22% of owners mentioned weight with no notable difference between the owner subgroups ($p>0.05$). In further open-ended questions, both groups cited the internet as the main source of information related to feeding, with some owners who wanted more specific nutritional advice approaching a veterinarian. The vast majority (97%) of owners in this study reported feeding treats to their dog with the most commonly reported treat types being dog chews and dog biscuits, although both groups fed a combination of dog-specific and human food treats. Quantities of treats were not captured in the interviews but there was no difference in the types of treats fed between the two owner groups ($p = 0.379$).

Description of weight status category vs. selection of BCS profile

Owner interpretation of their dog's body condition score revealed a significant difference between the offered verbal descriptors of weight status and the subsequent perceived canine BCS profile they selected ($p<0.001$). The majority (n=40/45; 89%) of IWDs matched their descriptive term with the correct BCS profile, whereas far fewer (n=12/54; 22%) OWDs cohort matched verbal and visual assessments, with many owners selecting a higher BCS profile than the verbal description ($p<0.05$; see Figure 4). No difference was apparent in either sex or neuter status across the two groups ($p > 0.05$).

Discussion

This study has identified findings in terms of canine nutrition, weight status and wellbeing, that supports or extends published work, and these findings have implications for

261 veterinary consultation practice. In agreement with other findings (Edney and Smith 1986,
262 McGreevy *et al.* 2005), a greater proportion of middle-aged and neutered dogs in the
263 current study population were perceived as overweight although there was no notable
264 difference between sex. Fewer designer breeds were described by owners as being
265 overweight, but only 19% of the current study population was composed of designer
266 breeds. Recent evidence, exacerbated by the Covid-19 pandemic, highlights that designer
267 breeds are more expensive to purchase (BBC, 2020) and previous studies have
268 suggested there could be an association between owner income and interest in dog
269 nutrition or animal weight status (Courcier *et al.* 2010, Kienzle *et al.* 1998, Suarez *et al.*
270 2012).
271
272 Dog owners most commonly viewed a dry diet as a good diet for the dog in the current
273 study, in agreement with wider feeding practices in current pet surveys (PDSA 2019) and
274 almost all dog owners reported feeding treats, mirroring findings in other studies (Morelli *et*
275 *al.* 2019, White *et al.* 2016) with many owners also feeding dental chews. It is
276 recommended that treat intake should not exceed 10% of daily energy requirement
277 (Brooks *et al.* 2014, Linder and Parker 2016) and even a dental chew can contribute
278 around 8% of daily energy requirements in small and medium dogs (Morelli *et al.* 2018).
279 Accordingly, owners could be inadvertently exceeding this allowance on a daily basis,
280 more so if dental chews are not being considered a traditional treat. It is possible that
281 some owners may be feeding treats as a proxy for *dog happiness* or to provide a degree of
282 variety in the dog's diet (PDSA 2018, White *et al.* 2016) rather than to reward.
283

Studies have indicated that some owners struggle to estimate an accurate BCS for their dog, which, along with difficulties in the comprehension of feeding guidelines, can lead to challenges in terms of the correct provision of calorie requirements (Yam *et al.* 2017). Where studies have reported inaccurately allocated BCS by owners, they often underestimate the weight status of their dog, particularly when the animal is overweight (Laflamme 2006, White *et al.* 2011, Yam *et al.* 2017). These findings are further supported by this study with a far lower level of agreement between description of weight status and BCS profile chosen for OWDs. Presenting owners with non-sequential BCS profiles may require owners to directly consider which BCS profile matches their dog's profile, as it removes any temptation to select the middle 'ideal condition' silhouette, as is often presented in conventional BCS scoring charts. To the authors' knowledge, this is the first time that such an approach has been taken using non-sequential black and white BCS images. A comparison of this novel approach against the standard method is warranted, but the above could prove a useful strategy in future research assessing owner-perceived animal condition score.

Despite reporting to know their dog's actual bodyweight as answered in the interview, several owners in the current study appeared challenged in selecting a BCS profile of their dog that match their perception of their dogs' weight, with only a few claiming to have any experience of using BCS charts, as also reported elsewhere (Eastland-Jones *et al.* 2014). Many veterinarians infrequently record weight status or use BCS charts in first-opinion practice (German and Morgan 2008, German *et al.* 2018, Rolph *et al.* 2014). With owners displaying limited ability to profile the weight of their dog, this work further emphasises the need for veterinarians to routinely implement the use of BCS assessment

in their clinical examinations. By promoting their use more frequently, veterinarians would ultimately be able to better support owners in developing their own awareness of, and ability to use, BCS charts. Current effective communication of pet obesity to owners appears suboptimal (Cairns-Haylor and Fordyce 2017) but as with other serious diseases, veterinarians have a professional obligation to address pet obesity by engaging and including communication around weight and nutrition in every client interaction (Churchill and Ward 2016).

This study highlights that many owners preferred to rely on the internet or past experience, rather than consulting a veterinary professional for advice on what to feed their dog. Few owners in this study reported discussing both the animal's weight and nutrition with their veterinarian, with most only discussing one or the other. The specific dynamics of consultation discussions were not captured in this research, so there is still need to explore the nature of potential barriers between veterinarian and owner when discussing weight management and nutritional advice. There may be a reluctance from owners to discuss dietary advice with veterinary professionals, and feelings of potential embarrassment or judgement about feeding habits, or their food choices for the dog (Churchill and Ward 2016). Evidence suggests primary health care specialists often face similar barriers in terms of meaningful discussion with obese patients, due to low self-confidence and lack of motivation to change existing dietary habits (Hansson *et al.* 2011). Owners may also engage in exercise and nutritional strategies first, before consulting a veterinarian for advice with an overweight animal (Bland *et al.* 2010). Even with the provision of nutritional advice from a veterinarian, there may still be issues in terms of application (Linder and Mueller 2014). This suggests there could be greater scope to

integrate the issues of weight status and nutrition in first-opinion conversations with owners, particularly as those with a strong vet-client bond are more likely to follow recommendations (Lue *et al.* 2008). As such, future research should focus on how veterinarians do and can frame the discourse around canine obesity with owners during routine consultations. Published guidelines are now available for veterinarians to aid with the implementation of weight management programs, including animal assessment and dietary advice, as well as strategies for client communication (Brooks *et al.* 2014), and this can be further supported by a greater level of nutritional education for veterinary graduates and development of associated skills and competencies (Becvarova *et al.* 2016).

Only a minority of owners from both subgroups mentioned weight as the reason that nutrition is important for the dog's wellbeing, suggesting that owners may not directly link nutrition with broader aspects around the animal's weight, or consider weight status important for wellbeing. Other studies have reported a lack of awareness amongst dog owners regarding the concerns about excessive weight within the context of animal health (White *et al.* 2016). Findings in this study further demonstrates the role of the veterinary profession in educating owners on the links between aspects of nutrition and the effects on health, particularly in relation to weight management. Reframing this discourse is essential if owners are to regard nutrition integral to canine health, rather than viewing 'feeding' as part of the normal provision of care. What is interesting in this study is that veterinary check-ups were not ranked as particularly important when owners were asked to consider aspects of dog wellbeing. If this is mirrored more widely, there may be a need to re-frame the key roles that veterinarians play as professionals emphasising their direct

355 support for general wellbeing, through the provision of health-related nutrition advice,
356 alongside the view of the profession as those who deal with disease and trauma.
357
358 A limitation of this study is that data collection was limited to weekdays during working
359 hours and only collected at one location in the East Midlands, UK. Therefore, the sample
360 may not fully represent the wider general population, although the study region has similar
361 (albeit slightly higher) levels of dog ownership compared with the UK average (29% vs.
362 25% respectively (Statista, 2020). The greater number of older female owners in the study
363 population has also been reflected in similar findings evaluating UK dog owner
364 demographics (Murray *et al.* 2010). It is also recognised that interpretation of some of the
365 results could be limited due to potential confounding factors such as animal age and
366 demographics that could have an influence on some of the study findings. Future
367 research would be warranted using multivariate analysis and encompassing a larger study
368 population across different locations. A further limitation is the lack of professional
369 validation of BCS values reported, and owners themselves can misinterpret BCS, even
370 when using a standard chart (Eastland-Jones *et al.* 2014). The lack of bodily palpation
371 (e.g. rib protrusion) of the animal as would often be the case in a more clinical setting
372 could also have had an influence on the owner's assessment of BCS, particularly for dogs
373 with dense/furry coats over the winter. However, the BCS approach used meant that
374 owners were deliberately challenged in terms of easily selecting an appropriate BCS
375 image for their dog. Owners were interviewed whilst walking their dog in winter, possibly
376 reflecting a more active lifestyle than the general population, which could also explain the
377 lower prevalence of overweight status dogs in the study, compared with the wider
378 population.

Conclusions

In this study, owners appear aware of the important association between canine nutrition and wellbeing, but the considered importance of factors influencing dog wellbeing could be associated with the perceived weight status of the animal. The use of non-sequential BCS images could prove a useful strategy in encouraging owners to have a more considered opinion of their own dog's weight status. In addition, dog owners report infrequent discussions with veterinarians around weight status and related aspects. More routine and specific discourse of weight and obesity during clinical consultations should support greater owner awareness and the development of weight management partnerships between owner and veterinarian. Discussion of nutrition in terms of canine health could be part of every veterinary consultation reinforcing the wider preventive medicine role of a caring profession.

Conflict of interest

No conflicts of interests have been declared.

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Ethical statement

Prior to commencing data collection, all procedures and protocols received a favourable ethical opinion by the School of Biosciences Research Ethics Committee; University of Nottingham, UK (Approval code: SBREC170112A).

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543 **Table 1.** Sample questions asking owner views of weight status, nutrition and feeding,

544 within the context of dog wellbeing

'Open' style questions - What would you say is a good diet for your dog? - Where would you get nutritional advice for your dog? - What do you consider is the best way to reward your dog for good behaviour?
'Closed' or tick-box questions: - Which of the following (BCS images) would you say best illustrates the profile of your dog? - Do you think your dog is very underweight, underweight, ideal weight overweight or very overweight? - Which of the following factors do you think is the most important for your dog's wellbeing? Which is the least?

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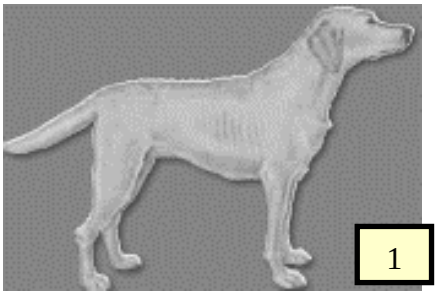
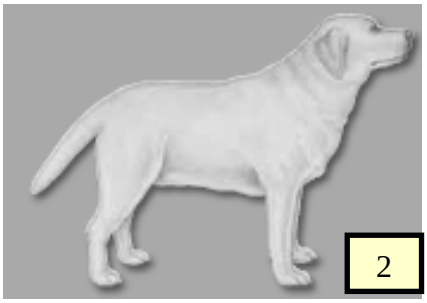
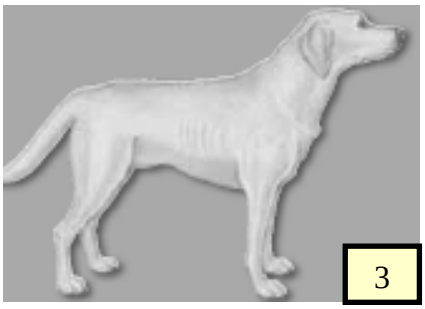
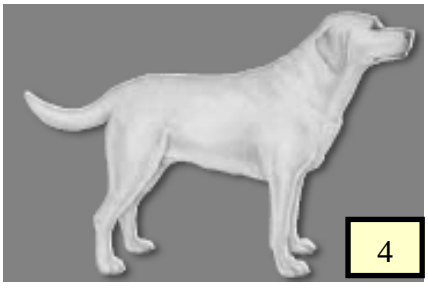
Figure 1. Non-sequential canine BCS profiles shown to study participants

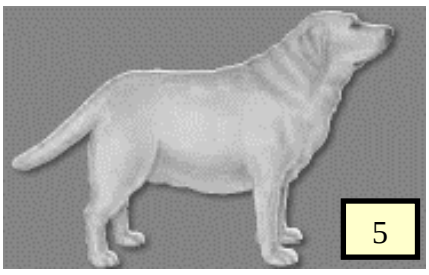
Large breed



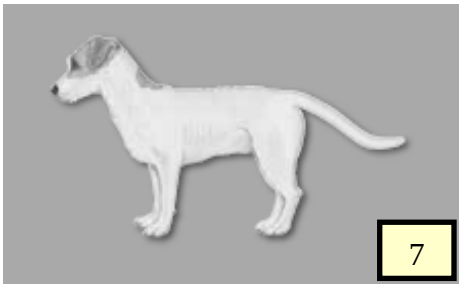


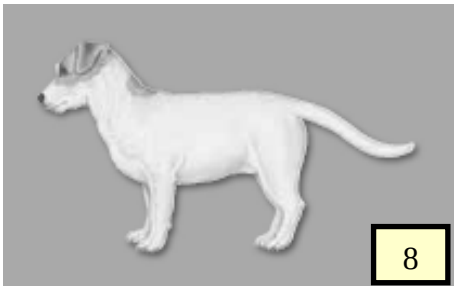


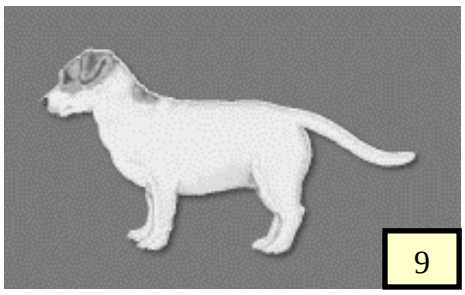


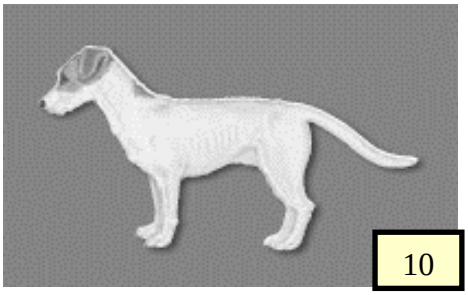


Small breed









Images adapted from https://www.pdsa.org.uk/media/6386/dog-body-condition-score-chart.png

Figure 2. Topics discussed between veterinary professionals and owners of ideal (IWD; n = 45) and overweight (OWD; n = 54) dogs.

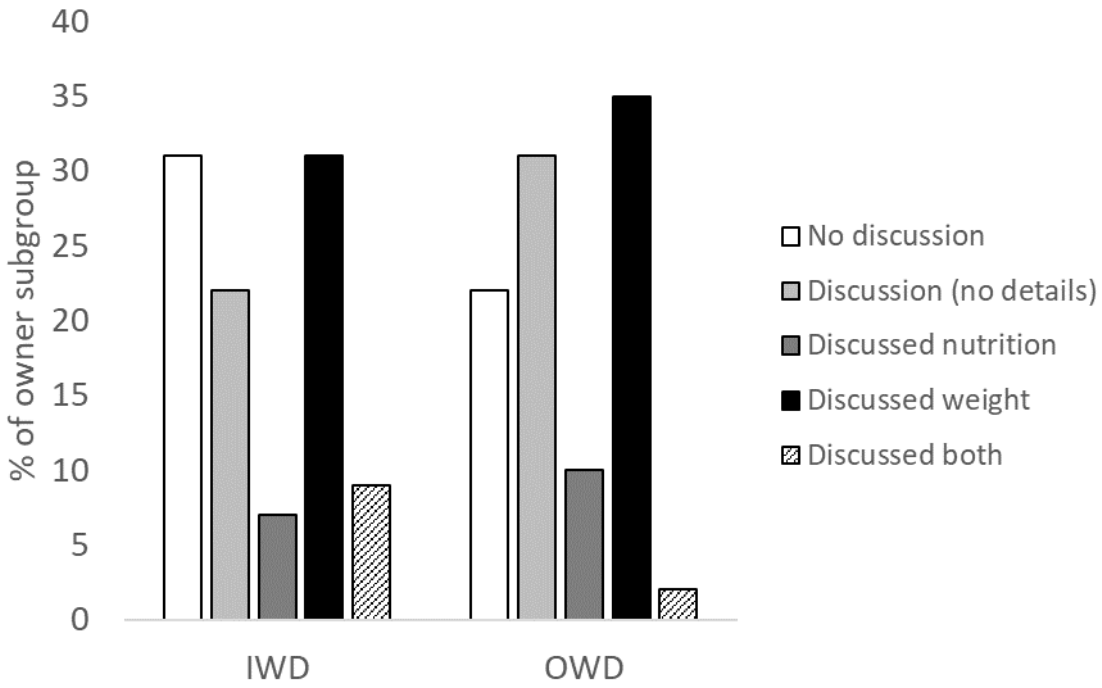
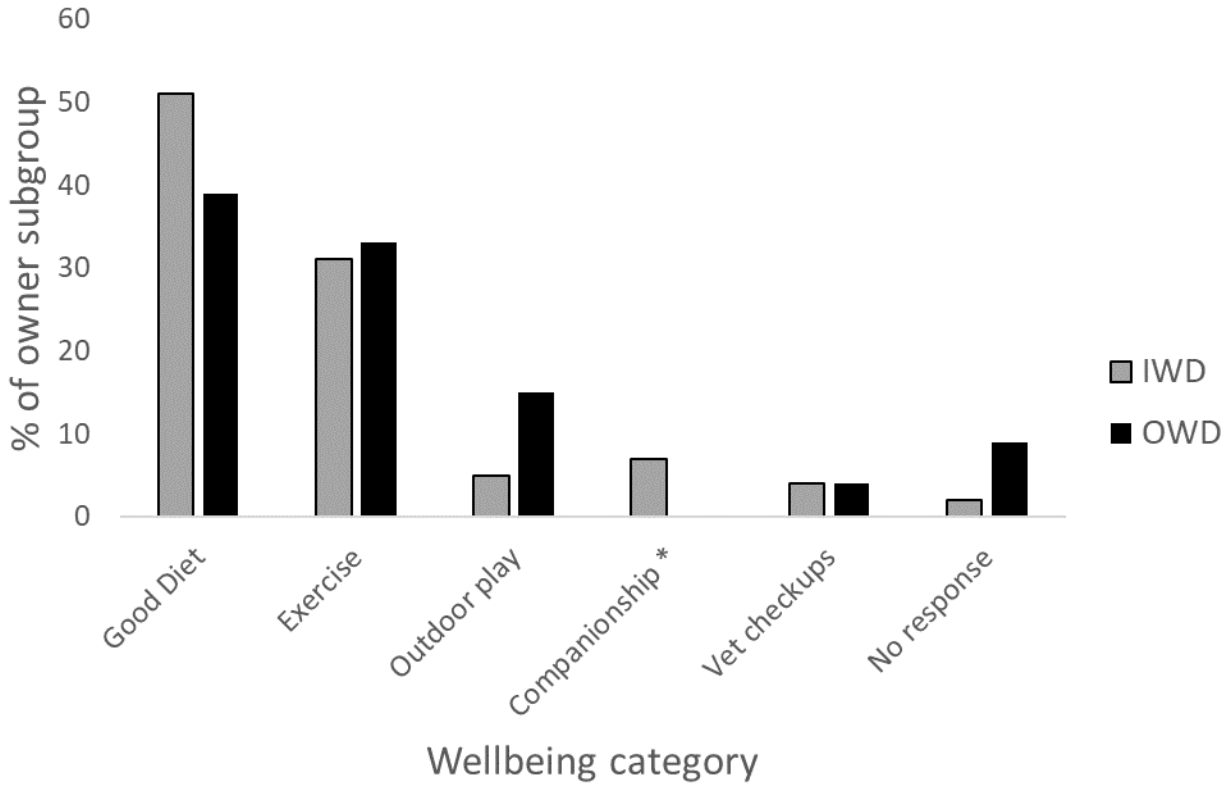
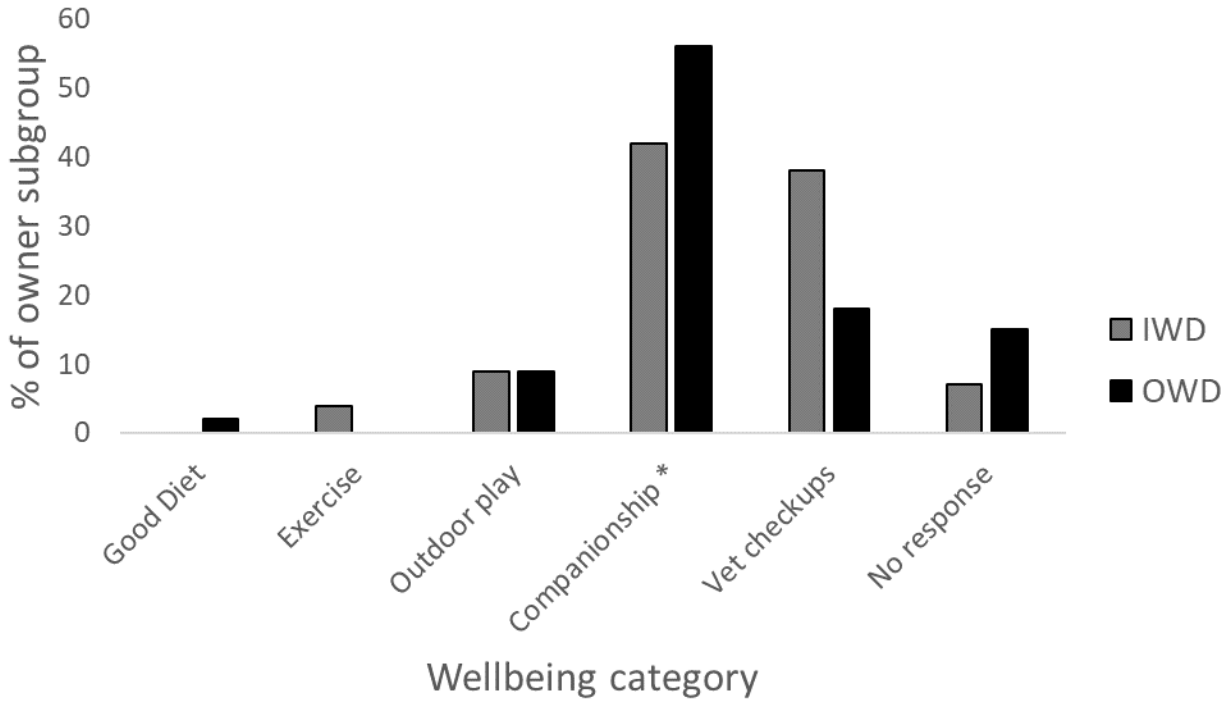


Figure 3a. Factors ranked by owners as being the most important in relation to dog wellbeing: Owners of ideal weight dogs (IWD; n = 45) vs. Owners of overweight dogs (OWD; n = 54.



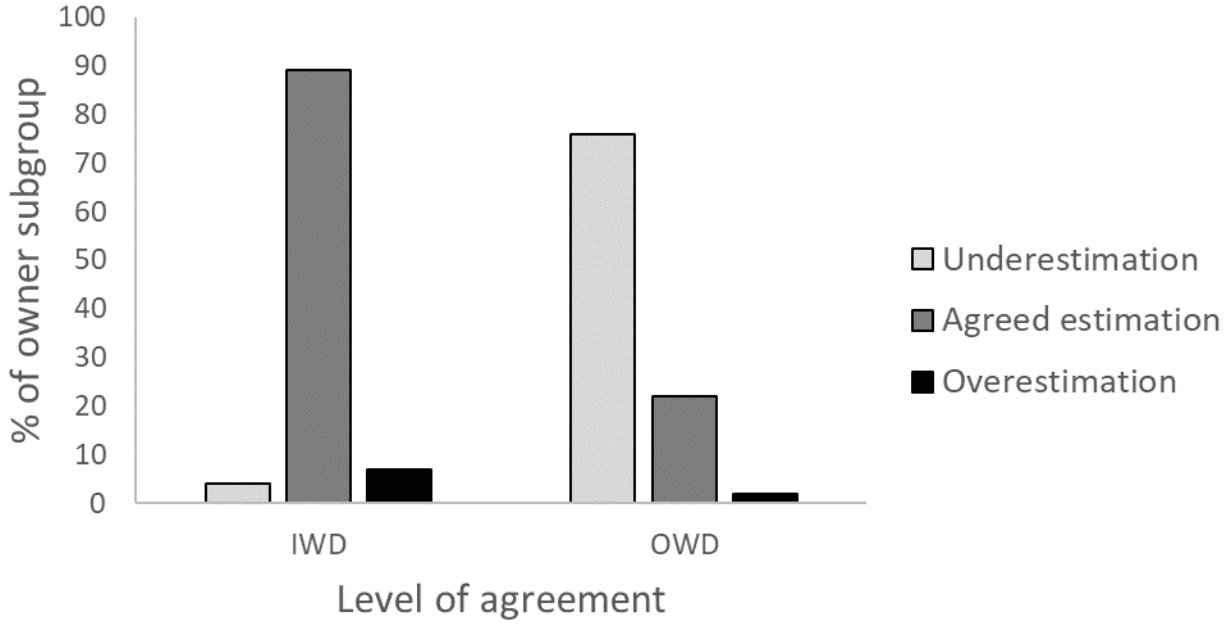
* *With other dogs*

Figure 3b. Factors ranked by owners as being the least important in relation to dog wellbeing: Owners of ideal weight dogs (IWD; n = 45) vs. Owners of overweight dogs (OWD; n = 54)



* *With other dogs*

609 **Figure 4.** Owner judgement of dog weight status: Owner-reported verbal description
610 compared with perceived BCS profile chosen: Owners of ideal weight dogs (IWD; n = 45)
611 vs. Owners of overweight dogs (OWD; n = 54), P<0.001.



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