



The relevance of body condition and muscle condition scores to assess the welfare of sheltered dogs

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Abstract. Many researches into the welfare of shelter dogs underscore the importance of some indicators like body condition score and muscle condition score. The aim of this study was to emphasize the importance of these two parameters in assessing the welfare of sheltered dogs. In order to carry out this study, 10 dogs from a private dog shelter in Cluj County, Romania, were selected. Both of the scores were assessed by visual inspection and palpation. In addition to greatly reducing the negative effects associated with sheltering, a socialization program was performed during eight weeks. The data obtained were statistically processed using the SPSS program v.17. There were no statistically significant differences ($p>0.05$) between the two assessors for the assessment of both indicators. The implementation of these programs can result in a substantial increase in the adoption rate of these animals.

Key Words: body, dog, muscle, shelter, welfare.

Introduction. In our days, it is accepted that welfare is a specific characteristic of an animal and by no means something given to it. Welfare can range from very good or adequate to poor or very poor (Rooney et al 2009). Dogs have been used in a wide variety of activities and it is wrong to think that regardless of their daily activity, their welfare can never be compromised (Stafford 2006).

Many shelters do not provide the minimum welfare conditions and do not provide the needs of the housed dogs. Therefore, many animals may have difficulties to cope with the environment. Dogs may experience negative feelings and concomitantly have a poor welfare (Rooney et al 2009). For this reason, we must ensure that shelter facilities meet the minimum welfare standards. It is also widely accepted that it is the human responsibility to understand and ensure that the individual welfare needs are met throughout the animal's life cycle (Whay 2007; Bayvel & Cross 2010; Collins 2011; Philpotts et al 2019).

The periodic evaluation of the shelters leads to the early identification of all the deficiencies regarding the well-being of the housed dogs. After this stage, the application of a plan to remedy the reported deficiencies should follow as soon as possible. The welfare of dogs is neglected even in the presence of many methods of environmental enrichment. Thus, we need to put more emphasis on implementing the most effective methods and techniques to meet the minimum living conditions of dogs. At the same time, studies related to the socialization methods of sheltered dogs aimed at increasing the chances of their adoption come to support the care and responsibility we should assume towards these animals. In many European shelters, dogs can spend many years, but at the same time, a poor environment and management of housing spaces can lead to a low quality of life. The absence of harmonized European legal regulatory frameworks

specifying minimum requirements for dog shelters makes it difficult to define general welfare standards for sheltered animals (Barnard et al 2014; Barnard et al 2016).

According to the Animal Protection Index (<https://api.worldanimalprotection.org/country/romania>), Romania currently has one of the weakest legislations for animal welfare and protection in the entire European Union. This index includes various categories of animals such as: farm animals, animals in captivity, companion animals, animals used for draught and recreational purposes, animals used in scientific research, wild animals. Our country was classified as a category D country in all conditions regarding the welfare of animals, cruelty against them and existing legislation in this field (<https://api.worldanimalprotection.org/country/romania>). The aim of this study was to emphasize the importance of body condition and muscle condition scores in assessing the welfare of sheltered dogs

Material and Method. The study was performed in a private dog shelter in Cluj county, Romania. In order to carry out this study, 10 dogs were selected and, according to the shelter's register, did not appear with health problems at the start of the study. Old animals and those showing aggressiveness toward the assessors were excluded. The body condition score and the muscle condition score of the selected animals were assessed by visual examination and palpation at the beginning of the study (assessment I) and after finishing the socialization period (assessment II). Both assessments were made by two assessors (A1 - already familiar for the dogs and A2 - unknown). Both assessors were trained to use the assessment protocol in a previous study performed in 10 dogs kept in similar conditions with those included in the present study. The training of the assessors was performed until an intra- and inter-assessor agreement of 89% was achieved. Both the initial assessment (before the beginning of the socialization program) and the final one were performed in similar conditions. The examination was carried out at a minimum distance of 1.5 m from the dog boxes by direct inspection of the animals and their living environment. Direct individual examination began with approaching the animal through slow approach and socialization. For ethical reasons, the contention of the dogs was avoided. After the dog-evaluator contact was made, both scores were assessed by visual examination and palpation.

Body condition score (BCS). The body condition score (BCS) is determined by direct visual inspection and palpation of the animal. First, the dog was observed from above and the shape of the body was noted, as well as the amount of fat on both sides. The dog was then observed from the side and gently touched on the back and sides of the ribcage. In the last stage, the hip bones were examined.

According to the World Small Animal Veterinary Association (WSAVA), the preferred scale is from 1 to 9, which allows for easier identification of subtle weight changes: 1/9 emaciated, 2/9 very thin, 3/9 thin, 4-5/9 ideal weight, 6/9 overweight, 7/9 heavy, 8/9 obese, 9/9 severely obese. The WSAVA considers BCSs from 1 to 3 to be "under ideal", an ideal BCS is 4 or 5 and the BCSs from 6 to 9 are "over ideal" (https://www.aaha.org/globalassets/02-guidelines/2021-nutrition-and-weight-management/resourcepdfs/nutritiongl_bcs.pdf).

Muscle Condition Scoring (MCS). MCS was carried out through palpation over the temporal bones, scapulae, lumbar vertebrae and pelvic bones (Cline et al 2021), as well as visual examination. A muscle condition score was carried out by gently grasping the skin and muscle between the thumb and index finger in a pinch gesture (without the pinch).

According to the World Small Animal Veterinary Association, the muscle condition score is categorized as follows (https://www.aaha.org/globalassets/02-guidelines/2021-nutrition-and-weight-management/resourcepdfs/nutritiongl_bcs.pdf): normal muscle mass/1; mild muscle loss/2; moderate muscle loss/3; severe muscle loss/4. A normal score is where no skin/muscle come together when grasped, mild muscle loss is where a slight raising of the skin and muscle occurs, moderate muscle loss is indicated by a closer

rise in both skin and muscle and severe muscle loss can be noted by an obvious grasp of skin (Canine and Feline Body Condition Score and Muscle Condition Score).

The intensive socialization program was carried out during eight weeks and the assessor A1 performed it. In the first five weeks, the program was performed three days per week, and in the following three weeks in four days per week. This program was done in the morning, between 9 a.m. and 11 a.m. and it involved direct human interaction with the animals, ten minutes per animal (four minutes of petting and six minutes of grooming using a brush).

The data obtained were statistically processed using the SPSS program, version 17. To compare the results, the Mann-Whitney test was used, and to compare the results of the two evaluations, the Friedman test was used. The differences were considered significant if $p < 0.05$.

Results and Discussion. There were no statistically significant differences ($p > 0.05$) between the two assessors for the first evaluation of the BCS. The first assessor (A1) obtained a BCS of 7 for three dogs (Zola, Malica and Thor), unlike A2, who scored only one dog (Zola) with the same score. A1 scored four dogs (Bogdana, Macko, Gyuri and Oreo) with a score of 6, compared to A2 who rated five dogs (Bogdana, Malica, Macko, Gyuri and Thor) with this score. A difference to consider was established when the ideal score of 5 was noted. The score was achieved by two dogs (Samar and Savarina) for the first assessor, while the second assessor gave this score to a number of three dogs (Samar, Oreo and Savarina). Only one dog (Matteo) scored 3 by both A1 and A2.

At the second assessment, seven out of ten dogs obtained identical BCSs from both assessors (Table 1). Only 30% of the dogs (Samar, Oreo and Savarina) achieved the ideal score of 5 from both assessors. One dog (Mateo) had a score of 3, well below the normal limit, thus being malnourished and cachectic. Half of the evaluated dogs (Thor, Gyuri, Bogdana, Macko and Malica) obtained a score of 6 in the case of the first assessor (A1), while the second assessor (A2) scored only 40% of the dogs (Zola, Bogdana, Gyuri and Thor) with this score. A percentage of 10% of all dogs scored 7, but from different assessors: A1 for Zola, and A2 for Malica. This condition represents a state of severe obesity, which can endanger the health of dogs, being an aspect as important as malnutrition or cachexia. Regular physical activity promotes and at the same time can prevent and treat certain diseases in dogs or humans. Veterinarian-prescribed exercise programs have shown some success in exponentially increasing activity among overweight dogs, but the actual impact of these special programs has yet to be tested on dogs and their owners. However, these programs are effective for both dogs and their owners (Duncan et al 2020; Malkani et al 2022).

Table 1

Results obtained for body and muscle condition scores

<i>Dog's name</i>	<i>BCS</i>				<i>MCS</i>			
	<i>Assessment 1</i>		<i>Assessment 2</i>		<i>Assessment 1</i>		<i>Assessment 2</i>	
	<i>A1</i>	<i>A2</i>	<i>A1</i>	<i>A2</i>	<i>A1</i>	<i>A2</i>	<i>A1</i>	<i>A2</i>
Zola	7	7	7	6	1	1	1	1
Bogdana	6	6	6	6	1	1	1	1
Malica	7	6	6	7	1	1	2	1
Mateo	3	3	3	3	2	2	2	2
Macko	6	6	6	5	1	2	1	2
Gyuri	6	6	6	6	1	1	1	1
Samar	5	5	5	5	2	2	2	2
Oreo	6	5	5	5	2	1	1	1
Thor	7	6	6	6	1	1	1	2
Savarina	5	5	5	5	1	1	1	1

Note: BCS - body condition score; MCS - muscle condition score.

After the first evaluation of the MCS, both assessors obtained similar results for six dogs - the MCS was 1/normal muscle mass (Table 1). For the muscle condition score marked with 2, the assessors obtained the same result only for two dogs (Mateo, Samar). In the case of two dogs (Macko and Oreo), no statistically significant differences ($p>0.05$) were recorded between the two assessors: A1 scored one dog (Macko) with a score of 1 (normal), in contrast to A2 who scored with a score of 2 (mild). Oreo scored 2 (mild) from A1, compared to A2, which assigned it a score of 1 (normal).

After the final evaluation of the MCS performed by A1 and A2, seven dogs obtained identical results (Table 1). The first assessor noted Zola, Bogdana, Macko, Gyuri, Oreo, Thor and Savarina's MCS as normal (1), while A2 gave the score 2 to four dogs (Mateo, Macko, Samar and Thor), the rest of dogs being rated as normal (1). Currently there are several studies that have evaluated environmental factors in dog shelters such as: temperature, relative humidity, light, acoustics and their effects on animal welfare and behavior. However, until now, there is no solid evidence that environmental factors could influence to a certain extent the muscle condition of dogs in shelters (Burban 2018). Muscle tissue disorders can be progressive or recurring and usually have a sudden onset. Among the most frequently encountered clinical signs are: weight loss, depression, acute lack of energy, weakness and pain (Harari 2022). The MCS shows that 70% of the dogs were ranked as normal (1), compared to 30% that scored mild (2) in the second assessment carried out by A1. During the same evaluation, A2 scored 60% of the dogs as normal and the remaining 40% as mild.

The BCS after the first assessment was between 3.0-7.0. The meaning of this fact is extremely important because a score of 5 represents the ideal score for a dog regardless of age, breed, sex or size. At the end of the study, an exponential increase of this score is observed from 20% to 30% for the first assessor and from 30% to 40% for the second one. Among all the subjects, only one recorded a score of 3, representing a precarious condition that requires human intervention by supplementing the amount of food and providing ideal housing conditions. A recent study demonstrated the importance of a nutrient-balanced food in the daily diet of dogs. The study involved a therapeutic diet for weight loss in dogs. They consumed 25% more energy than inactive dogs, while experiencing a 2% weekly weight loss (Wakshlag et al 2012). A step count of 1000 was associated with a 2% increase in calories used. Other studies also suggest that for each kilometer traveled, the caloric burn is approximately 2 kcal kg⁻¹ (National Research Council 2006). Thus, according to the data obtained in our study and regarding the changes in the BCS in 3 out of 10 dogs, it can be concluded that nutrition is the main factor influencing the changes in BCS. This is mainly due to the mix of food that dogs receive daily, which is high in carbohydrates (rice, pellets) and low in fat (bird feed). Moist food is missing from the dogs' occasional diet. Weight loss can also be accentuated due to accommodation conditions, environment, as well as diarrhea episodes.

The goal for each dog is to achieve a BCS between 4 and 5. Even though this score may sometimes seem low from the owners' point of view, it is important to mention to them that it represents the optimal weight of their pet. The veterinarian has the responsibility to educate the owners in these special cases. These scores have been extrapolated from other animal species, with dogs and cats being less studied. With the increase of the BCS above 6, regardless of the dog's development stage from a morphological or physiological point of view, it is prone to the risks associated with various systemic diseases, such as: heart, respiratory, kidney and other diseases.

After the first assessment, 70% of the dogs had a MCS of 1 (normal), and at the end of the study, the majority maintained their score, with a slight decrease that was not statistically significant ($p<0.05$). Thus, score 1 (normal) decreased from 70% to 60% in A2, while score 2 (mild) increased from 30% to 40% at the end of the study in the case of the same assessor. This is possibly due to changes in temperature, decrease in fat and muscle mass ratio, nutrition, periodic deworming, as well as their ability to cope with the stress induced by low temperatures. In addition, a sustained effort through exercise during the interaction could have led to this result. The decrease in MCS is not a serious problem as long as the situation is managed in time by a diet rich in proteins and by ensuring favorable conditions for harmonious muscle development. After the first

assessment, 30% of the dogs were ranked as mild (2), and at the end of the study, an increase was observed in the case of A1. No dog obtained scores 3 or 4 in both evaluations. The decrease in MCS is often associated with senility or cachexia, frequent phenomena in dogs and not only, but which can be evaluated by clinical examination in order to be able to quantify the muscle losses suffered by the animal (Freeman et al 2017).

Conclusions. The lack of an integrated system for continuous monitoring of the welfare of sheltered dogs, as well as the deficient national legislation in this field, represent a well-founded reason to take concrete measures based on scientific studies and environmental enrichment techniques already applied in other states. The individual assessment of the body and muscle condition scores is a useful and easy to apply method, which can identify poor welfare management practices of sheltered dogs in Romania.

Conflict of Interest. The authors declare that there is no conflict of interest.

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