DOI: 10.54597/mate.0050

NUTRITION OF HUNGARIAN POLICE DOGS

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ABSTRACT

Nutrition of working dogs has influence on both to their achievement and long, useful lifespan. Hungarian police dog handlers (n=674) were asked to fill a survey in August 2021 about all type of dog food they provide to their working animals on monthly base. Nutritional values for kg of body weight (energy density, crude protein, fat, fibre, ash, Ca:P, polyunsaturated fatty acids) were calculated from this database. The daily intake values were compared to the literature recommendations, and differences between the groups of police dogs (age, sex, qualification/working field) analysed. Metabolizable energy and crude fat intake of Hungarian police dogs is in concordance with the recommendations, while crude protein intake is significantly higher than the need of the animals. Energy intake/energy requirement ratio correlated negatively with hours on duty per day, and it was higher in general police dogs and in drug detection dogs than in patrol dogs. There was a weak positive correlation between age of the dogs and their daily crude fat intake.

ÖSSZEFOGLALÁS

A munkakutyák takaramányozása a teljesítményt és a hosszú hasznos élettartamot egyaránt befolyásolja. Hazai rendőrkutya vezetőkkel (n=674) töltettünk ki 2021 augusztusában egy kérdőívet arról, hogy egy hónapban milyen takaramányféleségből, mennyit adnak a szolgálati kutyának. Az így kapott adatbázisból kiszámítottuk a kutyák testsúlyra vonatkoztatott energia- és táplálóanyag-felvételét (nyersfehérje, nyerszsír, nyersrost, nyershamu, Ca:P, többszörösen telítetlen zsírsavak). A napi takarmányfelvételt összehasonlítottuk a szakirodalmi ajánlásokkal. Megnéztük, van-e a kutyák egyes csoportjai (életkor, ivar, munkakör) között eltérés. A hazai szolgálati kutyák napi metabolizálható energia és nyerszsír felvétele összhangban áll a szakirodalmi ajánlásokkal, ugyanakkor a napi nyersfehérje felvételük jelentősen meghaladja a szükségletet. Az energiafelvétel:energiaszükséglet hányados negatív korrelációban áll a napi munkaórák számával, valamint nagyobb az általános rendőrkutyák és a drogkereső kutyák esetében, mint a járőrkutyáknál. Gyenge pozitív korrelációt mutattunk ki a kutyák életkora és a napi nyerszsír felvétel között.

Introduction

Dogs are the first domesticated species, and nowadays kept all over the world, both as companion animals, and as working dogs. Their nutrition is having a high economical value, however, next to scientific results and recommendations, in practice it is often based on actual fashion and commonplace believes. Nutrition of working dogs is even more important, as it has impact on the achievement and long, useful lifespan of animals. Hungarian police dogs are well-known for being highly trained, however, their average useful lifespan spent on duty (4.8 years) is considered to be rather low.

The energy and nutrient requirement of working dogs differs from those of kept as pets, and also varies by the type of work they do. The two different, most deeply studied groups of working dogs according nutrition are sleddogs and racing greyhounds. Police

dogs are used in different fields, for different purposes, which are between these two patterns in the length and intensity of exercise, so their energy and nutrient need varies by working type according to it. Tracking and obedience are more similar to the pattern of sleddogs (Case et al., 2011), so accompanied with enhanced energy need, larger feed quantity (Wakshlag et al., 2014). Gordon et al. (2014) suggested, that search and rescue dogs - working on larger distances with low to medium intensity - require 8-10 times as much as their resting energy need for stop loosing weight, while Mullin et al. (2015) advised 5-8 times as much as the resting energy requirements (RER) for the same task. Search and rescue dogs require higher protein and fat content, with lower carbohydrate content (Chiofalo et al., 2019). Guard and patrol dogs are closer to the pattern of racing greyhounds in physical load, as their work requires shorter distances, but with greater intensity (Zoran, 2021). Guard and patrol dogs can be fed with dog food designed for active pets in case of energy density, but for building their musculature and condition they require higher protein and fat content. A study about greyhounds resulted that their performance was better when they were fed with higher carbohydrate and lower protein content food, than in the opposite case (Hill et al., 2001)

Higher ratio of saturated fatty acids negatively affects the olfactory capacity of dogs (Altom et al., 2003), and on the contrary, polyunsaturated fatty acids are beneficial to olfactory ability (Ober et al., 2016, Burri et al., 2018, Wakshlag et al., 2014). The aim of the present study was to survey the nutrient and energy supply of Hungarian police dogs.

Materials and methods

A survey was conducted by the Hungarian Police Education and Training Centre in August 2021; a questionnaire was spread among police dog handlers about the practice of feeding their working dogs. 674 answers were recorded in an Excel table. Unfortunately some of them couldn't be involved in all of the analyses, as some data were missing, or data provided was undoubtedly false, so n=289 was the lowest number of individuals in some tests. The following factors of the dogs were recorded: age, sex, breed, qualification/working field and hours spent on duty per day. The exact name of dry food, moisture food, unprocessed meat and their quantity fed on monthly base, as well as the same data about treats used for reward (during training and work) were recorded.

The live weight of dogs was calculated as the average of the interval in breed standards for the given sex. Daily quantities fed from each source were calculated by dividing the provided data with 30.5. The nutritional values of commercial dog foods – crude protein, crude fat, crude fibre, crude ash, Ca, P, and in some cases omega 3 and 5 fatty acids – were collected from the webpages of the manufacturers or distributors. Energy content of commercial dog foods was calculated according to the following formula: (crude protein x 3.5) + (crude fat x 8.5) + (carbohydrates x 3.5)) x 10 = metabolizable energy content (ME, kcal/kg). In case of unprocessed meats the crude protein content (g/100g) was calculated by: crude protein content in % of meat x meat % / 100, while crude fat content (g/100g): fat content according to meat % x meat % /100. The energy density (kcal/kg) was determined according to the formula ((protein (g /100g) x 4) + (fat (g/100g) x 9)) x 10. Resting energy need of dogs was calculated by the Maynard formula (Case et al., 2011): 70×live

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weight$^{0.75}$, and multiplied by 0.004187 to get it in MJ. Software package InStat was used for statistical analyses.

Data were checked for normal distribution and the observed vs recommended nutritional and energy supply was evaluated by Wilcoxon test. Energy supply of dogs used for different purposes were compared by ANOVA and Student T-test.

Results and discussion

Most dogs in the sample got treats (n=481), and the majority of them (n=402) were mainly fed with commercial dry food. Less than half of them (n=241) got unprocessed meat at all, and moisture, canned food was even less popular (n=105). On full sample level 87% of the daily energy intake originated from dry food, 7% from treats, 5% from meat and 1% from canned, moisture food. The daily metabolizable energy (ME) intake of dogs was 10.42±2.74 MJ/day, when calculated for the full sample (n=410), and 10.62±2.17 MJ/day, when probably false data was excluded (n=388). The calculated resting energy need for the same group of dogs is 3.77±0.44 MJ/day and 3.79±0.44 MJ/day, respectively. According to Zoran (2011), working dogs require 2-5 times larger daily energy intake as the resting value, so these values, 2.77-2.87 × larger than RER in population level are in concordance with this. Ratio of energy intake and resting energy need varied among the dogs, between 1.1-1.49 and 4.0-4.49, and these categories – defined for equal intervals - showed a normal distribution on sample level (KS test, p=0.04).

The daily nutrient intake of Hungarian police dogs is shown in Table 1.

Table 1. Daily nutrient intake and nutrient intake per kg of live weight (mean ± standard deviation, g/day) in Hungarian police dogs

	Nutrients			
	Crude protein (n=674, 302)	**Crude fat** (n=598, 278)	**Crude fibre** (n=545, 277)	**Crude ash** (n=476, 277)
Daily intake, total sample[a], g/day	132.30 ± 85.29	91.80 ± 49.28	16.11 ± 18.57	39.07 ± 2.13
Daily intake, revised dataset[a], g/day	171.39 ± 28.07	102.88 ± 30.35	16.20 ± 5.15	43.37 ± 1.31
Intake/kg body weight, total sample[a], g/kg body weight/day	4.03 ± 2.79	2.78 ± 1.61		
Intake/ kg body weight, revised dataset[a], g/kg body weight/day	5.78 ± 1.35	3.46 ± 1.13		

[a] as number of dogs varied by analyses, their number is indicated under the ingredients' name, in the same order

Crude protein requirement of dogs in general is 42.1 g/1000 kcal according to the FEDIAF recommendation, while Wakshlag et al. (2014) defined it as 2 g/kg body weight/day for pet dogs, and 1.5-2 times more, so 3-4 g/kg body weight/day for working dogs. Even when counting with 4 g/kg body weight/day, the real crude protein intake of police dogs is higher, than the recommended quantity (Wilcoxon test, p=0.0001).

Crude fat requirement of dogs in general is at least 1.3 g/kg body weight/day, based by the NRC recommendation. Wakshlag et al. (2014) refers to crude fat need as 5-13% of the daily feed in case of pet dogs, which can be even 20% in working dogs. Mean crude fat intake of the Hungarian police dog food samples are higher than 1.3 g/kg body weight/day

(Wilcoxon test, p=0.00001), and there's no difference (p=0.973) between the recommended 3.38 g/kg body weight/day value and the counted real intake.

Crude fibre intake as the ratio of daily feed intake is 2.39±1.99% for the whole database, and 2.39±0.66% for the corrected dataset, according to intake values shown in Table 1. While dogs in general require 2-4% of fibre, in case of working dogs this can be even 3-7%, as Case et al. (2011) stated for sleddogs. More than a quarter of dogs (27%) in our sample had under 2% crude fibre content, while 2.17% of them got more crude fibre than 4% of their daily feed quantity.

The crude ash intake values in Table 1 mean 2.39±1.99% of the daily feed for the whole database, and 2.39±0.66%, when calculated for the dogs with full, approved data.

The calcium and phosphorus ratio for the whole database (n=417) is 1.54±0.55 and 1.57±0.89 for the revised dataset. The recommendation is 1-1.5 – in case of adult dogs, and 1.6-1.8 for puppies and youngsters. Our data mainly was built up from adults, but the counted ratio is close to the later one, so in general animals get a bit more calcium than they actually need.

Qualification/working field is having an effect on the ratio of energy intake and energy need (ANOVA, p=0,047). Comparing working fields pair by pair, mean energy intake / requirement of patrol dogs' is lower, than of general police dogs' (p=0,0158) or drug detection dogs' (p=0,0331, t probes). That is in concordance with the literature - Case et al. (2011), Gordon et al. (2014), Mullin et al. (2015), Zoran (2011) - that guard and patrol dogs (closer to the racing greyhound pattern in working load) doesn't require as enhanced energy density as search and rescue dogs (similar to sleddog pattern).

There's a highly significant (p=0,0003), loose negative correlation (r=-0.02133) between daily working hours and energy intake / need ratio.

Daily crude protein intake is not connected neither to the age of animals, neither to hours spent on duty per day. There's no difference in daily protein intake according to the qualification/working field of dogs, and intake by kg of body weight shows a normal distribution in all groups, except explosive detection dogs.

There's a weak positive correlation (r=0.1642, p=0.0061) between crude fat intake (per kg body weight) and the age of the dogs, so older dogs are get a bit higher quantity of crude fat.

There's no correlation between qualification/working field and daily polyunsaturated fatty acid intake - which suggested to be connected to improve scent dogs work (Ober et al., 2016, Burri et al., 2018, Wakshlag et al., 2014) - in case of n-6 fatty acids p=0.422, in case of n-3 p=0.421.

Conclusions

Hungarian police dogs are fed mostly with dry food of different quantity; dog handlers are not really taking care of choosing one appropriate to the age, lifestyle and neuter status of the animal. That can be one of the reasons why the useful lifespan – so the time they spend in service after training - of those dogs is only 4.8 years, as visible from the register of the training centre.

As treats are used frequently during training and work – meaning 7% on average of the daily energy intake in the sample - their nutritional values, different from complete dog foods' has to be considered when planning the nutrition of the dogs.

The energy intake of police dogs is in concordance with literature recommendations for working dogs – such as the differences in ME intake between working fields - but parallel they get two- or even threefold quantity of crude protein as advised. The reason behind could be, that the dog food manufacturers try to satisfy the common need which claims high protein content as a main factor of good quality dog feed, and in parallel, handlers feed dog food designed for family pets, not those in concordance with the higher energy need of working dogs.

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