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Nutritional Evaluation of Pet Dogs

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Welfare Evaluation of Pet Dogs Through Feeding Protocols Followed, Nutritional Composition of Available Feeds and Blood Metabolic Profile

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ABSTRACT

A survey was conducted in Central Kashmir covering 91 adult pet dogs with collection of 26 feed and 73 blood samples. Feeding practices followed by the dog owners were recorded and samples of commercial dry adult dog foods collected during survey were subjected to nutritional analysis to assess their effects on blood metabolic profile. Mostly (~63%) the pet dogs were reared on homemade diets with about 90% receiving non-vegetarian type, and only ~5% owners were exclusively feeding commercial dog foods of different brands. Majority (63%) of the pet dogs were fed thrice a day. Among the analyzed commercial dog food samples, the proportion falling below the recommended nutrient standards was 19% for protein, 15% for fat, 31% for fibre and calcium, 12% for total ash, and 15% for phosphorus. The homemade diets had wide variation in composition and were generally imbalanced. Blood metabolic profiling revealed prevalent calcium deficiency in dogs fed homemade diets, while plasma cholesterol (51%), triglycerides (44%), and urea nitrogen (30%) were found elevated beyond normal physiological ranges. It is concluded that homemade diets constitute the mainstay of feeding with little or no provision of supplements to pet dogs, but these diets are nutritionally imbalanced.

KEYWORDS: Commercial feeds, Feeding practices, Homemade diets, Nutritional status,

Pet dogs, Survey

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In modern society, the role of companion animals and the relationship between humans and their pets have markedly changed during the last century. Among companion animals, dogs are distinctive for their ubiquitous distribution, being closely associated with human settlements across diverse habitats. In India, the pet dog population has increased by 26% every year and at present, about 17% of the households own a pet dog (Singh et al., 2020). The total pet dog population is 24.74 millions out of which 9.43 millions are pet and 15.31 millions are stray dogs (Anonymous, 2019). While, in Jammu and Kashmir Union Territory the pet dog population is 1.06 lakh contributing a share of 1.22% towards the total pet dog population of the country, being reared predominantly for guarding owners' stocks and as military working dogs.

For better performance of the prescribed activities, health and welfare of the pet dogs require regular care and attention. Proper nutrition and

feeding management are the main objectives to ensure the well-being and performance of animals including pet dogs. Normally, homemade foods are the primary means of nourishing pet dogs; however, these diets appear to be nutritionally deficient or imbalanced (Pattanaik and Sharma, 2006), and feeding such diets may lead to some metabolic disorders in pet dogs (Gonzalez et al., 2003). As such, pet owners are now seeking alternative food options to the standard commercial dog foods available in different forms as dry foods, wet foods, semi-moist foods for various physiological conditions that meet their needs. Currently, no data is available on welfare of pet dogs with regards to feeding practices followed by the owners, nutritional composition of the available feeds offered and their nutritional status in Kashmir. Therefore, the present study was planned to ascertain the nutritional practices adopted and their impact on relevant blood metabolic profile of pet dogs reared in Central Kashmir.

The present study based on survey work was conducted in three central districts (Budgam, Ganderbal and Srinagar) of Kashmir valley. A total of 91 owners rearing adult dogs were interviewed with 48 from district Srinagar, 23 from district Ganderbal and 20 from district Budgam.

A single-visit formal survey technique was used through household interviews using a pre-tested survey schedule based on queries regarding the feeding practices like source (homemade or commercial), type (vegetarian or non-vegetarian) and composition of food, use of supplements, and frequency of feeding followed by pet dog owners. Besides, a total of 26 number of dry food samples for adult dogs representing seven different commercial brands (Pedigree, Drools, Royal Canin, Moochie, Himalaya, Canine Greek and PurePet) commonly offered were collected from the pet dog owners in the study areas. The collected samples were packed in sealed bags, carried to the laboratory for further processing and evaluation.

Out of the surveyed pet dogs, a total of 73 blood samples were collected as per the method of Waxman and Lind (2023). The area over the cephalic veins was clipped and scrubbed with a 2% chlorhexidine solution to collect the blood samples under all aseptic conditions into ethylene diamine tetra acetic acid (EDTA) vials for harvesting plasma placed in eppendorf microtubes and stored at “40 <”C for batch analysis.

The collected adult dog dry foods samples procured and offered by the owners in the study areas were ground, and then analyzed for proximate principles as per AOAC (2019) methods and few major minerals (calcium and phosphorus) as per Talapatra et al. (1948).

Blood glucose was estimated in whole blood immediately after collection using SD-Codefree blood glucose meter. After thawing, the plasma samples were analysed for contents of various biochemicals in semi-auto biochem analyzer (Photometer-5010V5+, Robert Riele INC, Berlin, Germany) using commercial kits (DiaSys Diagnostics Pvt. Ltd., Navi Mumbai, India).

The data collected during the survey were compiled and analyzed using frequency distribution analysis through the statistical software program SPSS (2011) for Windows. The frequency data analysis was employed to determine the proportion of different samples falling within or beyond the

established standard reference ranges. Descriptive statistics including means, standard deviations, and ranges were also computed providing both prevalence estimates and the degree of variation within the population under study.

In the survey conducted across Central Kashmir, female dogs (n=70) comprised 76.92% of the population, whereas males (n=21) accounted for 23.08%. A similar preference for bitches by majority (56%) of the respondents was also reported by Sawaimul et al. (2009). Four major pet dog breeds were identified in the region, with German Shepherds (45.05%) representing the largest group, followed by Labradors (32.97%), Golden Retrievers (17.58%), and Dalmatians (4.39%). Medium-sized exotic breeds were generally preferred by both civilian and military personnel, while none of the surveyed households kept the local Bakharwal dog.

A total of 62.64% of the respondents were found to feed their pet dogs solely on homemade diets, 5.49% exclusively on available commercial dry dog feeds, and rest 31.87% on homemade diets supplemented with commercial feeds (Table 1). Owners in surveyed area used mostly homemade diets for different reasons among which important ones included that homemade food are close to dogs natural diet, the owners preference to offer them the same food which they prepare for themselves, avoid monotonous feeding, with intention to avoid undesired ingredients in their diets, lack of awareness about feeding management of their pets, less availability of commercial dog feeds and even some reported financial constraints due to high price of proprietary pet feeds.

Homemade diets are the common items and constitute core feeding practice of dogs in India (Pattanaik and Kore, 2022). In Central Kashmir, the composition of homemade diets offered to pet dogs varied region wise depending upon the staple foods and preference of the owners. 90.11% of the surveyed dog population were being offered non-vegetarian diets by the owners due to their own dietary pattern as Jammu and Kashmir Union Territory is a main meat consuming region in India with about 80% human population being non-vegetarian.

Only 7.69% of the surveyed pet dogs were being offered dietary supplements in the form of micronutrients (mineral mixtures and vitamins), herbal immunomodulator, anti-oxidants/stress and

some treats as dog biscuits etc., while rest were fed the basal diets alone. Feed supplementation was practiced to bitches during pregnancy and lactation; however, in most of the cases the supplementation did not constitute part of the routine feeding schedule. Majority of the respondents reported that they feed their pet dogs thrice (62.64%) a day, while only

12.09% owners preferred to feed their pets two times a day. Frequency of feeding is an important aspect of metabolism and is known to influence both food intake as well as the metabolic efficiency. An increase in number of meals/day usually results in an increased energy loss as a result of meal-induced thermogenesis (Li and Zheng, 2023).

Table 1. Feeding practices followed by pet dog owners in Central Kashmir

Attributes	Variables	District Srinagar (n=48)	District Ganderbal (n=23)	District Budgam (n=20)	Pooled Avg ± SE (n=91)
Source of feed offered	Home-made	60.42 (29)	60.87 (14)	70.00 (14)	62.64 ± 3.12
	Commercial	6.25 (3)	4.35 (1)	5.00 (1)	5.49 ± 0.56
	Mixed	33.33 (16)	34.78 (8)	25.00 (5)	31.87 ± 3.05
Type of feed offered	Vegetarian	4.17 (2)	13.04 (3)	20.00 (4)	9.89 ± 4.58
	Non-vegetarian	95.83 (46)	86.96 (20)	80.00 (16)	90.11 ± 4.58
Feed supplements offered	Yes	8.33 (4)	4.35 (1)	10.00 (2)	7.69 ± 1.68
	No	91.67 (44)	95.65 (22)	90.00 (18)	92.31 ± 1.68
Daily feeding frequency	Once	0.00 (0)	0.00 (0)	0.00 (0)	0.00 ± 0.00
	Twice	12.50 (6)	13.04 (3)	10.00 (2)	12.09 ± 0.94
	Thrice	64.58 (31)	60.87 (14)	60.00 (12)	62.64 ± 1.41
	Quadruple	22.92 (11)	26.09 (6)	30.00 (6)	25.27 ± 2.05
	<i>ad lib</i>	0.00 (0)	0.00 (0)	0.00 (0)	0.00 ± 0.00

Nutritive value of available adult pet dog foods

The pooled mean values for nutritional parameters of the 26 adult pet dog food samples collected in the surveyed areas were within the normal ranges (AAFCO, 2018) and are presented in Table 2. Dry matter (DM) content of 50.00% of the samples was in the range of 88-90%, while 38.46 and 11.54% of the samples were having more than 90% and less than 88% DM, respectively. 69.23% of feed samples were in the range of 18-22% for crude protein (CP) content; however, 11.54% feed samples were having more than 22% CP and 19.23% feed sample were having less than 18% CP. 80.77% of the feed samples were having fat (EE) content within the range of 5-8%. 57.69% of feed samples were having fibre (CF) content within the range of 3.5-6%, while 11.54% of the samples were having CF more than 6%. 15.38% sample were having more than 0.5% calcium and 30.77% having less than 0.5% calcium. 19.23% of feed samples were seen to have more than 0.3% phosphorus and 15.38% less than 0.3% phosphorus. Average concentration of different nutrients in majority of the commercial dry adult pet dog foods available in central Kashmir were within the ranges

of recommended values representing that these were more balanced, uniform, nutritious and within the frames as declared by most of the manufacturers. In contrast, homemade diets offered to pet dog in India were nutritionally inadequate and/or imbalanced with respect to protein, energy and minerals especially Ca and P (Pattanaik and Sharma, 2006).

Blood metabolic profile of adult pet dogs

All the attributes of blood metabolic profile (Table 2) for majority of the adult pet dogs in the surveyed areas were within the normal physiological ranges (Kaneko et al., 1997) except for plasma cholesterol wherein 50.68% of the pet dogs surveyed had above normal values. 43.84% of the plasma samples analyzed were having calcium (Ca) values below the normal physiological range, while none of the samples had above normal values representing wider prevalence of Ca deficiency among the surveyed dogs. This was also reflected by higher percentage (31.51%) of animals with plasma phosphorous (P) levels above the reference range coupled with 24.66% of the dogs having plasma ALP levels below the suggested physiological range referring to metabolic bone disease conditions in the surveyed

pet dogs. Serum ALP levels may act as a useful, non-invasive indicator of skeletal health in dogs, and as a diagnostic and prognostic marker in the management of dogs with musculoskeletal or metabolic disorders (Allen et al., 2000). Hyperphosphatemia is perceived as a latent display of imbalanced dietary Ca: P ratio. Factors like consumption of meat or grains based foods with high P contents for longer periods due to non-vegetarian feeding practices would be attributed to hyperphosphatemia and hyper-cholesterolemia of surveyed dogs in the present study.

The prevalence of abnormal blood metabolic profiles reveal higher values for all estimated parameters (except blood glucose and serum ALT, AST and ALP) in those pet dogs reared by their

owners on homemade compared to commercial diets (Figure 1). The percentage of population with above reference values for plasma cholesterol, triglyceride and urea nitrogen levels were higher in dogs fed homemade than those fed commercially available dog foods. While, percentage of population with below reference values for plasma proteins and minerals were lower in pet dogs on commercial feeds. Higher plasma fats, urea N and blood glucose levels in pet dogs fed on homemade diets could be attributed to greater proportion of grains and meat sources in the said diets. In agreement to the present findings, Gonzalez et al. (2003) reported that dogs fed a homemade feed exhibited higher values of glucose and cholesterol than dogs feeding on a commercial ration.

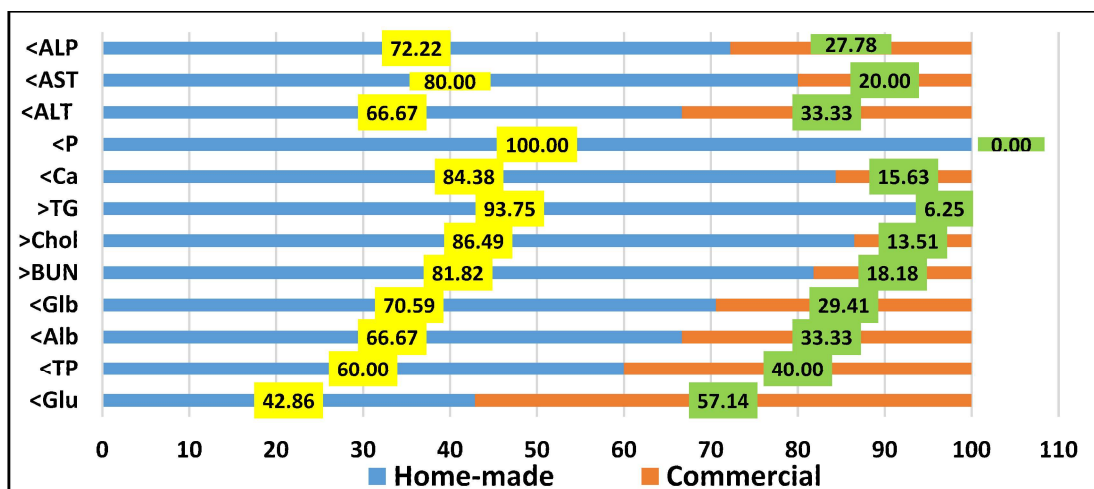
Table 2. Nutritional profile of adult pet dog in Central Kashmir

Attribute	Reference value * & **	Pooled Mean of samples
Composition (%) of available commercial foods		
DM	88-90.0	90.87
CP	18.0	19.90
EE	5.0	6.26
TA	2.5-3.0	2.65
CF	3.50	4.71
Ca	0.5-0.6	0.51
P	0.3-0.5	0.44
Blood metabolic profile		
Glu (mg/dL)	65-118	98.45
TP (g/dL)	5.4-7.1	6.97
Alb (g/dL)	2.6-3.3	3.12
Glb (g/dL)	2.7-4.4	2.98
PUN (mg/dL)	10.0-28	18.46
Chol(mg/dL)	135-270	245.75
TG (mg/dL)	23-102	100.48
Ca (mg/dL)	9-11.3	9.25
P (mg/dL)	2.6-6.2	5.84
ALT (U/L)	17-95	25.45
AST (U/L)	18-56	22.71
ALP (U/L)	20-156	42.87

* AFFCO (2018) reference values for adult dog food

** Kaneko et al. (1997) reference values for blood biochemicals in adult dogs.

Figure 1. Prevalence of abnormal blood metabolic profiles in adult pet dogs fed diets of different sources in Central Kashmir



CONCLUSION

Feeding of non-vegetarian type homemade diets were being preferred over proprietary feeds with little or no provision of supplements to the pet dogs in Central Kashmir. These diets were qualitatively inadequate to meet the nutrient requirements which was reflected in their metabolic profiles. Comparatively most of the evaluated commercial adult dry dog foods met the minimum AAFCO requirements for different nutrient contents and their feeding resulted in blood biochemical indices within the normal physiological ranges.

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