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Hydrolyzed Feather Meal in dog nutrition: dry food proximate composition, amino acid content, and biogenic amines

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The use of animal by-products from the human food industry to produce commercial pet foods is considered a sustainable practice. This study aimed to characterise the chemical properties of two maintenance diets for adult dogs, achieved by substituting 7% of poultry meal with hydrolyzed feather meal (HFM). Two extruded diets were formulated to be isoenergetic, isonitrogenous, and isolipidic. The control diet (CTR) contained poultry meal as the sole source of animal-derived protein (160 g/kg of feed), whereas the experimental diet (TRT) included 90 g/kg of poultry meal and 70 g/kg of a commercial HFM product. Both diets contained the same ingredients, nutritional additives, and antioxidants. Triplicate food samples were analyzed for proximate composition, soluble dietary fiber (SDF) and insoluble dietary fiber (IDF) using AOAC (Association of Official Analytical Chemists) methods. Total dietary fiber (TDF) was calculated as the sum of SDF and IDF. Amino acid analysis was performed by gas chromatography, and biogenic amines by high-performance liquid chromatography. Statistical differences between diets were evaluated using a two-sample *t*-test in R ($p \leq 0.01$). The HFM contained approximately (g/100g, as-fed): 5.59 moisture, 82.64 crude protein (CP), 7.07 crude fat, 0.91 crude fiber (CF), 5.63 starch, 1.83 ash, 2.38 TDF, 0.35 SDF, 2.03 IDF. No significant differences were found between the CTR and TRT diets (g/100g, as-fed) for moisture (9.16 vs. 8.08), CP (19.07 vs. 19.20), fat (15.24 vs. 15.00), CF (2.10 vs. 2.00), starch (40.59 vs. 40.80), ash (5.45 vs. 5.01), TDF (7.51 vs. 6.97), SDF (1.37 vs. 1.00), IDF (6.14 vs. 5.98), respectively. Additionally, similar values were observed for the amino acid profiles between the two diets. Among the non-essential amino acids, however, serine was present at a significantly higher concentration in the TRT diet compared to the CTR diet (2.20 vs. 2.13 g/100g, as-fed; $p = 0.002$). The biogenic amine profile showed no significant differences between the two diets, except for cadaverine, which was significantly higher in the TRT diet compared to the CTR diet (0.124 vs. 0.082 mg/g, as-fed; $p = 0.009$). Nonetheless, recent studies on the in vitro toxicity of cadaverine to intestinal cells have shown that the cytotoxic levels in food are four times higher than those observed in the diet containing hydrolyzed feather meal.

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Hydrolyzed Feather Meal in dog nutrition: application of electronic senses on extruded diet

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The acceptability of food is a critically important factor. Color, odor, and taste can influence dogs' food preferences. Therefore, the aim of this study was to assess the acceptability, and consequently the palatability, of an extruded dog food containing hydrolyzed feather meal using sensory instrumentation. Two extruded isoenergetic (calculated metabolizable energy of 3680 kcal/kg, as-fed), isonitrogenous (19 %, as-fed) and isolipidic (15 %, as-fed) commercial diets were formulated to meet the nutritional requirements of adult dogs. The control diet (CTR) contained poultry meal as the sole source of animal-derived protein (160g/Kg of feed), while the experimental diet (TRT) included 90 g/kg of poultry meal and 70 g/kg of hydrolyzed feather meal (GOLDMEHL® FM, Gepro, Diepholz, Germany). The color, odor and taste of the diets were analyzed using E-Eye (Alpha M.O.S., Toulouse, France), E-Nose (FOX 4000, Alpha M.O.S., Toulouse, France) and E-Tongue, (αAstree, Alpha MOS, Toulouse, France), respectively. The data were subjected to Principal Component Analysis (PCA). In addition, the color, the odor and taste characteristics of the hydrolyzed feather meal (HF) were also considered in the evaluation. Regarding color, expressed through the RGB method, the PCA results indicate that both TRT and HF are characterised by lighter color codes. Specifically, a medium light shade of yellow (color code 2711) is present exclusively in HF (33.3%) and TRT (5.2%), but absent in CTR ($p = 0.0001$). This outcome is attributed to the high sensitivity of the E-Eye in detecting the presence of hydrolyzed feather meal in TRT feed, a difference that may not be perceptible to the naked eye. The volatile profile of the CTR and TRT feeds were very similar, as evidenced by the P and T sensors, with no significant effect from the presence of HF, as indicated by the LY sensors. Regarding the taste profile, the E-tongue results revealed no differences between the two groups. In conclusion, the partial replacement of poultry meal with hydrolyzed