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Short Communication

Optimizing Pet Food Formulations with Alternative Ingredients and Byproducts

Rishav Kumar* and Meena Goswami

Department of Livestock Products Technology, College of Veterinary Sciences and AH, DUVASU, Mathura, U.P., India

***Corresponding Author:** Rishav Kumar, Department of Livestock Products Technology, College of Veterinary Sciences and AH, DUVASU, Mathura, U.P., India.

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Abstract

This mini review explores the diverse utilization of byproducts and alternative ingredients in pet food formulations, aiming to optimize nutritional content, palatability, and health benefits. Emphasis is placed on the role of binders, carbohydrates, and protein sources, such as wheat gluten, soy protein concentrate, dehydrated pork rind, and potato starch, in enhancing texture, flavor, and digestibility. Notably, the incorporation of potato starch and ragi offers promising results in improving kibble characteristics, nutrient digestibility, and fecal characteristics in both adult dogs and puppies. Additionally, the nutritional significance of cereals and millets, including ragi, sorghum, and lentil flour, is highlighted, showcasing their potential in addressing specific dietary needs and promoting health benefits such as blood glucose reduction and cholesterol lowering. Furthermore, the gluten-free nature of ragi makes it suitable for dogs with wheat allergies or gluten intolerance. While various studies suggest potential health benefits of ragi, further comprehensive research, including randomized clinical trials, is warranted to validate these findings and establish its full therapeutic potential for canine nutrition.

Keywords: Pet Food Innovation; Nutritional Enhancement; Ragi Benefits; Palatability; Gluten-Free Options

Introduction

The pet food industry continually seeks innovative approaches to optimize product quality, nutrition, and health benefits for companion animals. This paper explores the utilization of various ingredients and byproducts, ranging from traditional cereal grains to alternative sources like potato starch and ragi (finger millet), in formulating pet food. Emphasis is placed on enhancing palatability, texture, and nutritional value while considering specific dietary requirements and potential health benefits for pets. By examining the roles of binders, carbohydrates, protein sources, and antioxidants in pet food formulations, this study aims to contribute to the ongoing evolution of pet nutrition and welfare.

Utilization of alternative ingredients in pet food formulations

Slaughtering of food animals not only provides meat but also provides valuable byproducts to mankind. By slaughtering and processing meat animals, only one third part is meat while the rest of the portion includes byproducts and waste, which need to be adequately processed and efficiently utilized in various waste [1].

Pet food binders serve the crucial role of promoting cohesion among ingredients, ensuring the desired texture in the final product. Wheat gluten and soy protein concentrate are commonly employed in canned pet food as binders due to their capacity to form a mild gel post-heat treatment and retain water effectively under various temperature conditions. Adding fiber enhances the flavor and text of pet food [2] of in the realm of alternatives, dehydrated pork rind, a concentrated form of animal protein, is considered not only as a substitute for vegetable binders but also as a partial replacement for spray-dried animal plasma in wet pet food formulations.

Health benefits and nutritional significance of binders in canine nutrition

Potato, a valuable carbohydrate source, contributes approximately 268 kJ/100 g of edible part, along with 1.8 g of protein, 14.7 g of soluble starch, and 1.2 g of dietary fiber on an 'as fed' basis (TACO, 2011). Incoprapatre ragi enhances palatability as well as shelf life of pet food [3,4]. The composition of potato starch (PS) comprises 80% amylopectin and 20% amylose, differing from corn, which typically contains 23 to 28% amylose and 72 to 77% amy-

lopectin. Binders are also important to large animals too [5]. The starch digestibility, attributed to high gelatinization capacity primarily found in amylopectin, positions potato starch as a highly digestible carbohydrate source. Remarkably, potato starch boasts high dry matter (DM, 83.6%) and starch digestibility (99.80%) values for adult dog.

Examining kibble characteristics, nutrient digestibility coefficients, metabolizable energy, palatability, and fecal characteristics, Diets containing 100, 200, or 300 g/kg of potato starch significantly ($P < 0.05$) enhanced the expansion index, lowered density values, improved nutrient digestibility, and increased fecal dry matter in adult dogs and puppies [11].

Cereal grains have played a pivotal role in commercial pet food since their introduction in extrusion processes in 1954 [6]. These grains act as primary carbohydrate sources, contributing not only nutritional value but also aiding in the extrusion process. Ragi, known for its extended digestion time, is considered an ideal meal for diabetics and obese individuals. Its significance has grown due to its dietary fiber, starch pattern, and high calcium and iron content. Compared to wheat and rice, ragi stands out nutritionally, offering higher calcium (380 mg), dietary fiber (18 g), and phenolic compounds (0.03-3.0g) per 100 g. The polyphenol and dietary fiber content in ragi are attributed to various health benefits, including anti-diabetic, anti-tumorogenic, and anti-atherosclerogenic effects.

Extruded pet food incorporating sorghum, wheat, corn, oat, buffalo liver, and carabeef fat, suggesting the use of potassium sorbet and α-Tocopherol as antioxidants for improved shelf life [7]. Introduced pea and lentil flour into dog feed, resulting in significantly ($P<0.05$) lower glycemic index and digestibility compared to the control [10].

Lower blood taurine concentrations in dogs fed soluble fiber from beet pulp compared to those on insoluble fibers from cellulose [8]. The quality characteristics of dogs fed diets with rice, wheat, and corn as main ingredients versus diets with milled sorghum fractions [9]. Dogs fed whole sorghum and sorghum flour-containing diets exhibited similar antioxidant capacity to the control diet, while a sorghum mill-feed diet rich in bran displayed significantly ($P < 0.05$) higher firmness and hardness values, along with increased circulating antioxidant potential.

Ragi has lots of benefits based on its historical roots, consumption trends, nutritional content, processing methods, and health benefits. Amongst cereals and millets, finger millet leads with the highest calcium (344 mg%) and potassium (408 mg%).

Studies, both in vitro and in animals, suggest potential health benefits of finger millet, including blood glucose reduction, cholesterol lowering, antiulcerative properties, and facilitation of wound healing. However, the absence of suitable intervention or randomized clinical trials poses a challenge in fully understanding these health effects. Glycemic index (GI) studies on finger millet preparations present varying values, often relying on outdated methodologies. To establish well-founded health benefits, there is a call for comprehensive GI testing for unhealthy dogs.

Conclusion

In conclusion, the utilization of alternative ingredients and byproducts in pet food formulations offers significant potential for enhancing nutritional quality, palatability, and health benefits for companion animals. By incorporating ingredients such as potato starch, ragi, and sorghum, pet food manufacturers can achieve improved kibble characteristics and nutrient digestibility while addressing specific dietary requirements. Furthermore, the gluten-free nature of certain ingredients provides options for pets with food sensitivities. However, further research, including randomized clinical trials, is needed to validate the observed health benefits and optimize formulations to meet the diverse nutritional needs of pets. This study underscores the importance of ongoing innovation in pet food formulation to support the health and well-being of companion animals.

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