

# Dog food processing methods answering questions

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According to the Association for Pet Obesity Prevention in 2014, approximately 53% and 58% of dogs and cats, respectively, in the United States were overweight and obese. These numbers have steadily increased since 2010. However, most pet owners (? 90%) do not realize and cannot identify that their pets are overweight/obese.

What can we do about this growing problem? Pet food companies and nutritionists are searching for ingredients, like prebiotics and probiotics, to combat these conditions. But, could the problem have another solution?

Dr. Aulus Carciofi, Professor at Sao Paulo State University in Brazil, and his colleagues, are trying to answer these questions by taking a deeper look into pet [food processing](#) and going back to the basics. Previous literature shows that [particle size](#) influences nutrient digestibility in livestock and human diets. And although this is proven common knowledge for livestock nutritionists, there is not enough research to back the same claim in kibble dog diets.

Published in the newest issue of the *Journal of Animal Science*, Carciofi's lab investigated the "Effect of the particle size of maize, rice, and [sorghum](#) in extruded diets for dogs on starch gelatinization, digestibility, and the fecal concentration of fermentation products." They fed 54 beagle dogs either maize, rice or sorghum that were either fine, medium or coarsely ground. Maize and rice are two of the most widely used cereals in dog food and sorghum is considered less digestible for

dogs.

They verified during extrusion, starch gelatinization is directly correlated to particle size. But for the rice-based diets, "the raw material particle size and starch gelatinization did not change nutrient digestibility," said Carciofi.

Carciofi's lab found that dogs fed the maize- and sorghum-based diets had reduced total tract apparent nutrient digestibility for foods with greater raw material particle size and lower starch gelatinization. Furthermore, dogs fed the sorghum-based diet had a linear reduction in nutrient digestibility, according to cereal particle size.

In the feces, there were higher concentrations of total short-chain fatty acids for dogs fed sorghum-based diets, compared to dogs fed the other two diets. As particle size increased, dogs fed maize and sorghum food had increased propionate and butyrate. Carciofi explained that an increased amount of butyrate and decreased fecal pH could be a potential prebiotic effect and improve intestinal health of dogs.

Overall, for proper feces formation and digestibility, "sorghum and maize based diets required a greater reduction in particle size for an increased degree of gelatinization," stated Carciofi. "Rice based diets were more easily digested even when the rice was more coarsely ground and subsequently, less gelatinized."

Carciofi concluded that "if properly processed, maize and sorghum are as easily digested as rice-based food." He also believes that dog food processing companies "could look closer at the particle reduction process."

Based on their results and others, rice is easily digested and doesn't depend on the processing. However, maize and sorghum are "dependent

on a proper raw material particle size and need to be appropriately extruded to produce highly digestible foods," said Carciofi. In the end, even sorghum, thought to be less digestible, can be similar to rice if cooked and ground properly.

Carciofi suggests that rice needs to be ground to a mean particle size of

For sorghum- and maize-based diets, it is important to have 0% of particles > 600  $\mu\text{m}$ , and no more than 10% or 15% of particles > 400  $\mu\text{m}$ , Carciofi explained. If a greater proportion of large particles in cereals are present during extrusion, there will not be enough time to fully hydrate and cook. Therefore, the starch gelatinization and [diet](#) digestibility will be lower.

Carciofi's lab is continuing work in the food processing area. Recently, they found an interesting link between food processing and the metabolic responses of the animals. They are also researching mechanical energy transference and starch cooking in dog and cat diets.

These food processing techniques may be a low cost and effective way of producing diets that are potentially more beneficial and can control digestibility. In turn, hopefully these methods, in combination with others, can reduce the amount of obese and overweight pets in the United States.

**More information:** Bazolli, R. S., R. S. Vasconcellos, L. D. de-Oliveira, F. C. Sa, G. T. Pereira, and A. C. Carciofi. 2015. Effect of the particle size of maize, rice, and sorghum in extruded diets for dogs on starch gelatinization, digestibility, and the fecal concentration of fermentation products. *J. Anim. Sci.* 93:2956-2966. [DOI: 10.2527/jas.2014-8409](https://doi.org/10.2527/jas.2014-8409)

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