

PRO1212: Omnivores Versus Carnivores: Can higher levels of pulse starch be tolerated in a wider range of species than corn?

The overall objective of this project was to compare whether the complex starches from pulses are tolerated better and at higher dietary levels than starches from corn in both carnivorous and omnivorous species. The species of interest are two commercially important aquaculture species, rainbow trout (carnivore) versus tilapia (omnivore) and this will be compared to two common companion animals, cats (carnivore) and dogs (omnivore). We first compared digestibility properties of wet versus dry processed pulse starches. We found that dry processed pulse starches retained slow digestibility better than wet processed pulse starches. However, either processing method produced starches that were highly digestible in all fish and pet species, but yet digested at a slower rate than corn. This led directly to our observation that pulses have lower glycemic indices in all species compared to the high glycemic index corn. All four species examined (dog, cat, tilapia, and trout) had starch processing and glucose transporting proteins in their intestines, indicating that whether a carnivore or an omnivore, starches can be utilized by all these species. However, overall, the carnivores (trout, cats) had lowered levels and thus a lesser ability to process and use dietary starch compared to omnivores (dogs, tilapia). Dog and cat feeding trials (8-weeks) showed that including 20% pulse starch in a complete diet provided health benefits through improved blood glucose and insulin compared to diets with corn starch. Also, tilapia fed diets with up to 30% lentil or pea starch grew better than diets with corn starch, but faba bean inclusion above 20% slowed growth. In conclusion, our work has shown that different pulses (peas, lentils, faba beans) can be utilized as dietary starch sources in pet and aquaculture feeds. Pulse starches (peas and lentils, but less so with faba beans) supported good growth which would lead to production benefits in aquaculture, while all three pulse starches provided health benefits in pets.