Determining the Ammonia Release Variations from Feeding API Goldfish Pellets vs. Competitor

INTRODUCTION
Most fish owners do not relate the release of ammonia by fish into the water with the harm associated with it. It is important to remember that chronic exposure to even relatively low levels of ammonia cause stress, physiological imbalance and increased susceptibility to disease. Selecting a fish food which delivers proper nutrition and keeps ammonia release to a minimum is essential to optimize fish health.

AIM
To evaluate feeding API® Goldfish Pellets against a leading competitor pellet for clean, clear water, based on the release of ammonia.

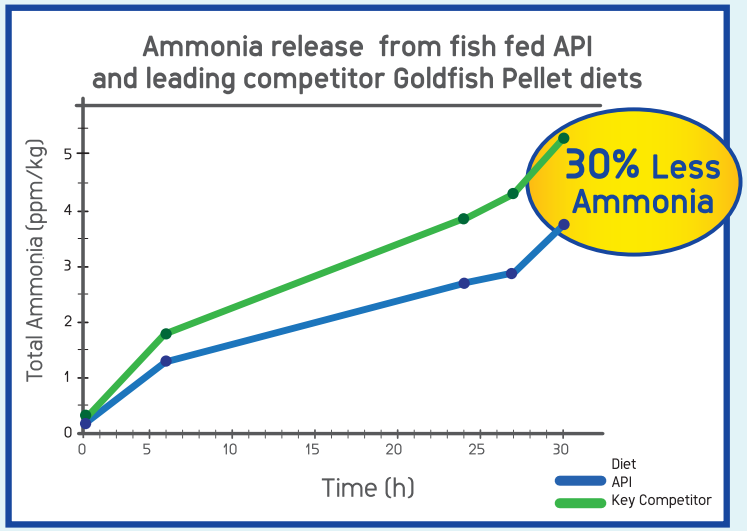
METHODS
This study compares water quality parameters of tanks containing goldfish *(Carassius auratus)* fed either API Goldfish Pellets (API), or a leading food competitor (X). Eight (8), 30 gallon glass tanks (100-Liter) were used for this study. During the study, each tank was a bare glass aquarium absent of filtration. Each diet was fed to four tanks (n=4) with water samples analyzed in duplicate for each tank. There were 9 fish in each tank with a similar biomass (±8% of the average). Each aquarium was only provided aeration through the test period. To protect the fish, the ammonia was monitored to assure the concentration of free ammonia (un-ionized ammonia) did not reach a sub-lethal toxic level.

All tanks were isolated from the recirculation system at time 0. Water quality parameters were assessed through a 30-hour goldfish feeding regimen to determine which food resulted in less ammonia release. A water sample was taken at 0-hrs, 6-hrs, 24-hrs, 27-hrs and 30-hrs. Each water sample was measured for ammonia using a Hach DR/2400 spectrophotometer. Data was calculated statistically using Total Ammonia Fit Least Squares Model.

RESULTS
This study shows that fish fed API Goldfish Pellets produced 30% less ammonia when compared to a leading competitor. API Fish Foods, through a proprietary manufacturing process, binds essential amino acids allowing better utilization of nutrients with less waste, resulting in cleaner, clearer water.

DISCUSSION
This study evaluates the impact of feeding goldfish *(Carassius auratus)* either API Goldfish Pellets or leading competitive goldfish food product measuring the impact on the water quality. To judge water quality the ammonia parameter was evaluated. Ammonia is the main nitrogenous waste compound excreted by fish and crustaceans as a result of protein metabolism. It exists in two forms, ionized ammonia (NH_4^+) and un-ionized ammonia (NH_3), with the latter form being very toxic to fish. The majority of the ammonia entering the water from fish is diffused through the gills. The lethal effects of exposure to ammonia are severe gill damage leading to suffocation and/or kidney damage resulting in metabolic and physiological imbalance, convulsions and then death. Even at low levels, ammonia is well documented to reduce growth rate and damage gill filaments and cellular tissue.

Understanding the way fish feed and digest their food is important for formulating a highly nutritious diet. Using advances in science to deliver the nutrition with less ammonia is what makes one fish food superior to another. This study proves API Goldfish Pellets leaves the aquarium water cleaner and supports the claim that aquariums fed API Goldfish Pellets resulted in less ammonia providing a healthier environment for goldfish.



Diets differed significantly from each other throughout the study. At the 30 hour timeframe **API fed tanks had 30% less ammonia** as measured by Mean total ammonia nitrogen concentration compared to competitor X.

Advancing Fish Nutrition

The truly innovative API Fish Food diets have been developed jointly by the research and development teams at the Waltham Centre for Pet Nutrition and Mars Fishcare. The Waltham Centre is the world's leading authority on pet care and nutrition, and is recognized around the world for its research in fish nutrition. Mars Fishcare is well known as an aquatics industry leader, pioneering innovative solutions to help consumers maintain and enjoy healthy aquariums and ponds for over 50 years. No one knows more about keeping a healthy aquatic environment than the research and development team at Mars.

Waltham Centre for Pet Nutrition Leicestershire, England

Mars Fishcare Aquatic Research Center Chalfont, PA

Mars Fishcare maintains two dedicated aquarium research facilities that house freshwater and saltwater tropical fish and goldfish. They are staffed by fish nutritionists, biologists, aquarists and aquatic technicians. Team members regularly present findings at national and international scientific conferences and in peer-reviewed scientific journals and books.

We have taken our industry leading expertise in water quality and applied our deep knowledge of fish nutrition to create these new, breakthrough API Fish Food diets.

Trust API as the complete solution for clean, clear water and a healthy aquarium.