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Goldfish in a tank: the effect of substrate on foraging behaviour in aquarium fish

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Abstract

*The welfare of captive animals is influenced by their ability to express natural behaviours. Foraging is one behaviour that may be particularly important in this respect; many species will continue to work for food even when it is freely available. The role of substrate, and in particular particle size, on the foraging behaviour of goldfish (*Carassius auratus*) was examined through three repeated measures experiments. In the first, tanks were set up with five uniform substrates: plastic grid, coarse sand, fine gravel, pebbles, and cobbles. In the second, fish were provided with a choice between coarse sand and fine gravel, fine gravel and pebbles, and pebbles and cobbles. In the third, they were provided with two choices between coarse sand and cobbles, one where the sand contained more food and one where the cobbles did. Our results show that particle size significantly affected the amount of time goldfish spent foraging, and that goldfish exhibited foraging behaviour even in the absence of a substrate they can manipulate. Goldfish foraged longest when provided with coarse sand. Fish foraged significantly longer over smaller particle size substrates when given a choice, although they did not distinguish between the two finest substrates, coarse sand and gravel. Increases in total time spent foraging were achieved through more, rather than longer, bouts. Food density did not significantly alter preference for smaller particle substrates. In general, coarse sand (1.5 mm) was found to be the most appropriate substrate in terms of facilitating natural foraging behaviours. These findings are discussed with respect to the welfare and husbandry of goldfish and aquarium fish in general.*

Keywords: *animal welfare, aquarium fish, foraging, goldfish, husbandry, substrate*