# Feeding snacks to coral larvae boosts energy levels for growth and survival

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Credit: Colleen Rodd, Southern Cross University

Coral larvae reared with food have more energy to transform into settled polyps and successfully establish themselves as young corals, a Southern Cross University Ph.D. researcher has found.

The study, published in the journal *Frontiers in Marine Science* and led by Ph.D. candidate Colleen Rodd of Southern Cross University, found feeding the larvae provides an energy boost in the critical early stages of development and improves survival.

The findings will bolster coral restoration efforts around the globe to recover degraded reef systems—including the coral larval restoration projects known commonly as Coral IVF led by Colleen's supervisor Distinguished Professor Peter Harrison.

"It is not enough simply to put coral larvae on the reef; those larvae need to survive in greater numbers," said Colleen.

"It is possible that larvae—both wild and cultured—run out of energy and die in the process of transforming from free-swimming larvae into stationary coral polyps in a process known as settlement.

"By providing food to the laboratory-reared larvae, our study has shown the larvae receive an important benefit that improves their chances of survival."

Overcoming high post-settlement mortality bottlenecks is a key priority goal in coral restoration. Current larval restoration techniques supply millions of cultured larvae to degraded reefs.

Distinguished Professor Peter Harrison and his teams have successfully used his innovative Coral IVF technique in the Philippines and on sections of Australia's Great Barrier Reef.

This new research is part of a large research project funded by a substantial philanthropic grant from the Paul G Allen Family Foundation to Professor Harrison, which aims to increase the scale and success of coral larval restoration on damaged sections of the Great Barrier Reef.

"We have found that once on the reef, cultured larvae face the same barriers to settlement, survival and recruitment as wild-spawned larvae," said Professor Harrison.

"Rearing cultured larvae with access to food supplements is likely to provide larvae with increased energy and capacity for settlement and post-settlement survival, thereby significantly increasing the efficiency of larval restoration efforts."

Professor Harrison's previous research showed that many newly settled coral polyps tend to die within the first few days and weeks after settlement, which he concluded was most likely due to the young corals running out of energy.

"High early mortality may be due to the energy investment required for larvae to complete metamorphosis into polyps and start growing their complex skeletons, as these processes require a lot of energy," Professor Harrison said.

"Therefore, coral larvae with lower energy reserves may deplete their energy reserves more quickly and die shortly after settlement or while starting to grow their skeleton."

These ideas stimulated Colleen's study which found that for larvae provided with energy-rich food from feeding, more of the metamorphosed polyps were able to survive until they acquired microscopic algal symbionts (known as zooxanthellae or Symbiodiniaceae) and gained photosynthetically-derived nutrition.

Once the coral spat develop tentacles, they can begin to feed in the same manner as adults by capturing and eating microscopic plankton as well as adding energy and nutrients from their symbiotic microalgae.

The laboratory-based experiment used larvae of two mass spawning reef-building coral species—Acropora tenuis and Acropora millepora—that were cultured at the Australian Institute of Marine Science National Sea Simulator experimental facility near Townsville.

Larvae were randomly assigned to either fed or unfed treatment groups for each species. Fed larvae received homogenized Artemia (brine shrimp) once a day, for three days.

"The results are exciting and show that, for both species, feeding significantly increased larval settlement," said Colleen.

**More information:** Colleen Rodd et al, Enhancing Coral Settlement Through a Novel Larval Feeding Protocol, *Frontiers in Marine Science* (2022). DOI: 10.3389/fmars.2022.918232

Provided by Southern Cross University

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