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Coupling of physiological and ecological models to explore food fluctuation effects on sex change in hermaphrodite species

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ABSTRACT

One of the major evolutionary questions about sequential hermaphrodite is to determine where the direction and the timing of sex change are viewed as responses to demographic and environmental parameters[1].

To connect the sexual behavior of hermaphrodites to the environment parameters (e.g. food availability and population density) it is indispensable to couple models at physiological and ecological scales.

In this work, we aim to investigate the food fluctuation effect on the optimal individual sex change size and on population sex-ratio.

Our approach is based on the study of the sex-ratio and sex change size as emergent parameters from individuals behavior which is based on energy allocation rules. We developed an agent based model coupling Dynamic Energy Budget model [3] at individual scale and sexual allocation models at the population scale [2], [4] and [5].

We designed experiments to determine the most relevant parameters and study the effects of fluctuating food on the individual and population scales.

At constant food availability, both growth and maturation predicted by the model fit well with field observations.

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