

Interactive comment on “Effect of the silica content of diatom prey on the production, decomposition and sinking of fecal pellets of the copepod *Calanus sinicus*” by Hongbin Liu and Chih-Jung Wu

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We thank Referee #2 for her/his mainly positive comments to this manuscript.

I agree with the reviewer that other cellular properties of the prey may be equally important in order to test our hypothesis that the cellular Si content of diatoms affect zooplankton grazing, fecal pellet production, degradation and sinking. That is why we did not use two different species containing different amount of Si (to avoid difference in size and shape of the cells), or the same species growing at different growth phases (to avoid difference in cellular carbon and nitrogen contents). We did measure other

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cellular properties for prey used in this study, but not for all experiments, because we found it is rather consistent if we raise the prey in the same condition. Since detailed information of prey growth condition and prey cellular characteristics has been reported in Liu et al. (2016), a paper uses the same method to obtain the same prey, but focuses on the impact of diatom prey on copepod reproductive physiology, we did not include those data here. To clarify that, the following sentence is added to this manuscript: “Other cellular parameters, such as cell size and carbon and nitrogen contents, were also measured for selected samples (data not shown), and the results were consistent with those reported in a previous study (Liu et al., 2016), which showed no significant difference between the two types of prey.”

The second major point is related to the methodology for measuring the fecal pellet degradation rate. There is no doubt that the method used in this study, like all other available methods, is imperfect. The issue of under- or over-estimation during different stage of the degradation process that is raised by the reviewer is valid and we are aware of it. However, based on our experience, the pellets do not usually break into two half directly, but they are usually broken at one part and then lose its volume gradually. Since we do not count any debris smaller than half a pellet, we should have avoided double count, hence avoided severe overestimation.

The comments on the L-ratio is also well taken. I agree that the absolute value could be inaccurate, and it is affected by many biotic and abiotic factors, but the relative trend or pattern should be valid. Because the L-ratio can only serve as an indicator, we do not mean that “most of the fecal pellets released in low prey concentration with low Si content will be degraded with in the euphotic layer”, but they are “the most likely to be degraded in the eutrophic layer” (should be mixed layer to be more accurate). We have already used a cautious tone in our discussion, and we have added more discussions accordingly to point out the potential issues related to the interpretation of the L-ratio.

Due to the same reason, temperature cannot explain the entire difference (in agreement with the reviewer) in the degradation rate estimated by this study and those from

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previous studies. The experimental temperature in Hansen et al. (1996) and Oleson et al. (2005) were similar, but the latter reported higher degradation rates. We believe that the quantity and quality of the prey, particularly the cellular Si content in our case, plays a very important role in influencing the fecal pellet degradation rate. As to the issue of Q10, I believe it may not be as simple to just adopt the value of bacteria growth or production to that of fecal pellet degradation, because 1) bacteria can also use DOM, and 2) fecal pellets contain a lot of non-degradable (refractory) organic matter.

Minor points: 1) Product name and manufacturer of the CCD camera are added. 2) The reviewer is correct. However, although there are four treatments, we only compare the difference between two in most cases. Therefore, I have kept the use of t-test in the majority of the comparison, and used two-way ANOVA as suggested by the reviewer in some cases where the difference among four groups are compared, such as those reported in Fig. 3B and Table 2. 3) The reviewer is correct. This is just a speculation. We do not mean “complete digestion”, but that the prey will be relatively better digested when the prey concentration is low. We added a word “relatively” to make it more accurate.

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