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Re: Manuscript # (OEC-HY-2012-0281)

To The Editor,

Our detailed responses to specific issues raised by our reviewers are given below. Reviewer comments are shown in bold font and our responses are in plain text. Line numbers associated with reviewer comments refer to the original manuscript, while line numbers in our responses refer to the current version of the manuscript.

**1) I don’t understand how Appendix S5 in ESM illustrates that “the correlation between survival and SUB had 95% confidence intervals overlapping 0 under all combination of PDO and PDOlag and all age-classes” (P13 l277-279). I understand that this result is used to state that group thermoregulation was not as important as winter weather (P14 l310-312). So, it would be nice to clarify this point.**

This paragraph has been clarified. As the handling editor assumed, our intention was to convey the fact that, because a flat line could be drawn within the 95% confidence intervals in each subplot, the data did not support a directional relationship between the number of subordinates and juvenile survival. The revised text can be found on lines 277-281.

**Also, I don’t understand how Appendix S5 in ESM shows that “an increase from 0 to 3 subordinates was predicted to increase juvenile survival by an average of 0.79 when PDOlag was set to 1.57 (in fact 1.58 in the figure). Do the figures in Appendix S5 in the right order? Please check.**

This ambiguous sentence has been revised, and the new text can be found on lines 274-277. 0.79 was the maximum increase in predicted survival when the number of subordinate adults was increased from 0 to 3 in our models. As shown in the center panel on the bottom row of Appendix S5, this pattern was observed when PDOlag was set to its maximum value (1.58), and PDO was set to an intermediate value. Similar patterns were predicted at both low and high PDO values when PDOlag was set to its maximum value (see bottom row in Appendix S5). This statement was included to illustrate the fact that a positive correlation between the number of subordinates and survival was found (as predicted by the group thermoregulation hypothesis), but only under specific conditions and with large associated uncertainty.

**2) reading Appendix S2 I have noted that some deviances largely differ from each other but all lead to comparable AICc. For example on the second line, a deviance of 148.89 is reported. How then it is possible to get an AICc value of 563.95 given the definition of AIC? The lines with a Deviance around five hundred gave coherent AICc but not the models with small Deviance. Something is wrong in this table. Please check. (the same is true in Table 3).**

We have verified that all of the models we present had converged, that our goodness-of-fit test was conducted as described, and that the calculated AICc values we report are accurate. The apparent discrepancy between AICc values and model deviances as reported in our tables stems from the fact that we did not explain the true meaning of the deviance values.

Deviances reported by program MARK represent the difference between the standard deviance (-2\*log Likelihood) for each model and the -2\*log Likelihood of a fully saturated model (one in which the number of parameters = the number of data points). However, MARK calculates this value differently for models with and without individual covariates (the SUB covariate is an example of an individual covariate in our model set, whereas PDO is a time-varying covariate). As described on pages 5-2 to 5-3 of "MARK: a Gentle Introduction" (Cooch and White; www.phidot.org/software/docs/mark/book/pdf/chap5.pdf), the -2\*log Likelihood value of a saturated model with individual covariates is 0, so the deviance reported by MARK for individual covariate models is simply their -2\*log Likelihood value. As a result, models with individual covariates were reported as having much higher deviances than models without such covariates in our results.

We have corrected our results tables so that the deviance column shows the -2\*log Likelihood values that our reviewers expected, and we have explicitly defined the term in our table legends.

**P16 l348: Theuriau instead of Theiriau**

**Also, check the order of citations. Did you order according to an alphabetic order or to the chronological order? Alphabetic seems the right one (but it is not true along the manuscript). Then, Arnold should be cited after Allaine and Allaine and Theuriau but before Farand et al. When citing Arnold, 1990 should be cited before 1993. So, please check the coherence of citation order all along the manuscript.**

**Table 2: Fsub = Number of female subordinates**

These typos have been corrected and the order of in-text citations has been corrected to be consistent with our list of references.

We would like to thank the editors and our reviewers once again for their helpful comments throughout the review process.

Sincerely,

Vijay Patil