



Seewiesen Colloquia

Speaker invited by: Dept. Kempenaers

Thursday, January 8, 2015, 13:00 h, in House 4, Lecture Room

Quantifying inbreeding depression and the double whammy of measurement error

Prof. Dr. Lukas Keller

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Quantitative estimates of the magnitude of inbreeding depression in traits of interest is of central importance in evolutionary genetics, animal and plant breeding, and conservation biology. At the face of it, obtaining such estimates is labour intensive but seems straightforward. Standardized methods using weighted linear regression have existed for nearly 60 years, and approaches using mixed models have become popular in the last two decades. However, like most statistical analyses in ecology, evolution, and behaviour, these methods currently ignore the measurement errors and uncertainties in covariates. Measurement error and uncertainties in covariates can lead to severely biased parameter estimates and reduced statistical power, known as the double whammy of measurement error. In this talk I will show that estimates of inbreeding depression are also affected by such biases because all measures of inbreeding, whether derived from pedigrees or molecular markers, contain uncertainties and measurement errors. I will introduce Bayesian methods that allow us to obtain correct parameter estimates in the presence of uncertainties, provided that good estimates of the uncertainties exist. The latter is not always trivial. I will end with a discussion of the challenges that lay ahead when correcting for measurement error and uncertainties in statistical analyses in ecology, evolution, and behaviour.

Who is Lukas Keller?

- 1996 PhD University of Wisconsin- Madison, USA
- 1997 Postdoctoral Research Fellow, Princeton University, USA
- 2000 Lecturer, Glasgow University, Scotland
- 2003 Assistant Professor, since 2009 Professor of Animal Evolutionary Biology, University of Zurich, Switzerland
- 2008 Director, Zoological Museum of the University of Zurich, Switzerland

Selected publications:

- Keller, L.F. and Waller, D.M. 2002. Inbreeding effects in wild populations. **Trends in Ecology and Evolution** 17: 230-241.
- Reid, J.M. and Keller, L.F. 2010. Correlated inbreeding among relatives: occurrence, magnitude, and implications. **Evolution** 64: 973-985.
- Keller, L.F., Biebach, I., Ewing, S.R., and Hoeck, P.E.A. 2012. The genetics of reintroductions: inbreeding and genetic drift. In: **Reintroduction Biology: Integrating Science and Management** (Ed. by J.G. Ewen et al.). Wiley-Blackwell, pp. 367-401.
- Reid, J.M., Keller, L.F., Marr, A.B., Nietlisbach, P., Sardell, R.J., and Arcese, P. 2014. Pedigree error due to extra-pair reproduction substantially biases estimates of inbreeding depression. **Evolution** 68: 802-815.
- Muff, S. and Keller, L.F. In press. Reverse attenuation in interaction terms due to covariate measurement error. **Biometrical Journal**.