The use of mixture models in ecology and evolution:
some examples describing cohort effects in ungulates

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Abstract: Mixed models have become a common analytical method in ecology and evolution to account for repeated measures on individuals. One assumption behind these models is that the distribution of the random effects follows a normal distribution. This assumption can be easily violated as soon as some level of clustering occurs among individuals. As an alternative to mixed models, mixture models have been developed to account for this clustering. Here, we used simulated data to test the accuracy of these models. We found that both BIC and bootstrap methods were better criteria than AIC for determining the number of clusters in the data. We then illustrate how mixture models can allow us to objectively group cohorts in various populations of ungulates. We showed that, in some cases, differences among groups of cohorts remained throughout life, whereas in other cases compensatory or cumulative effects occurred. Our study therefore illustrates the value of using mixture models in ecology and evolution.