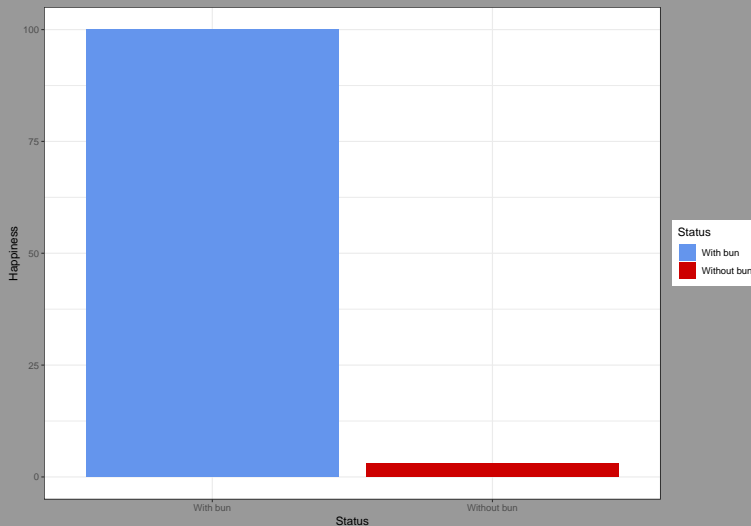


Lab meeting

Luke Hayden

14th November 2018

Did everybody get a bun?



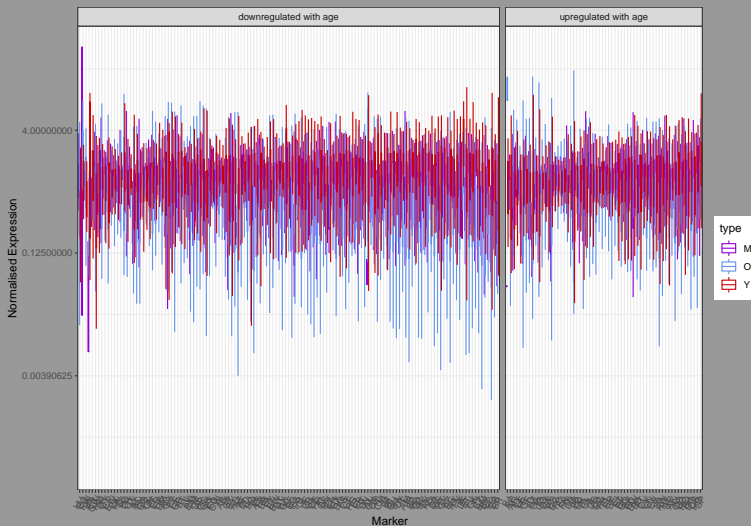
Project

Examine the effect of regeneration on the molecular age profile of *Parhyale* limbs

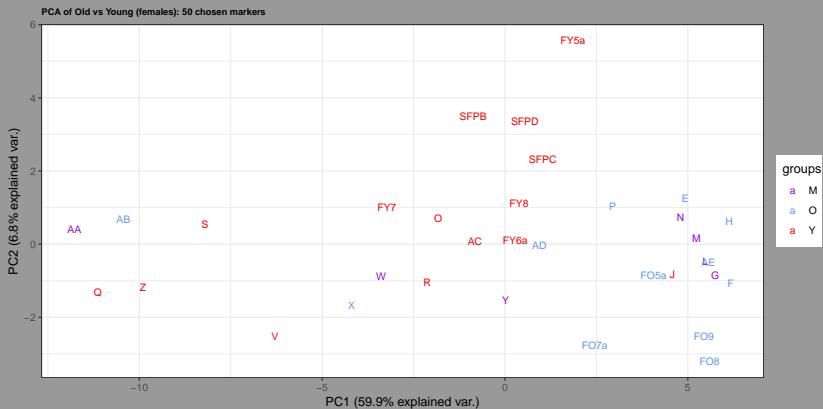
Designing codeset

- *Nanostring as method to quantify gene expression
- *200 genes in codeset
- 195 genes chosen on the basis of differential expression analysis
- 5 control genes: do not vary in expression between conditions

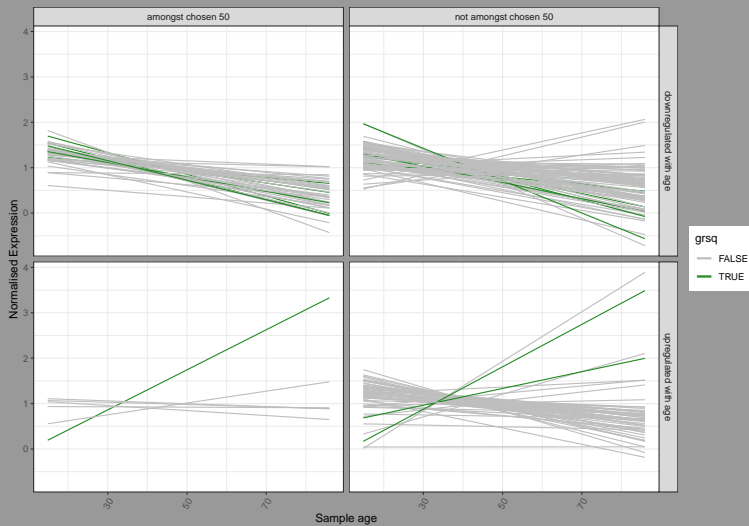
Old vs Young



Young vs old separation: PCA old vs young



Expression/length relationship



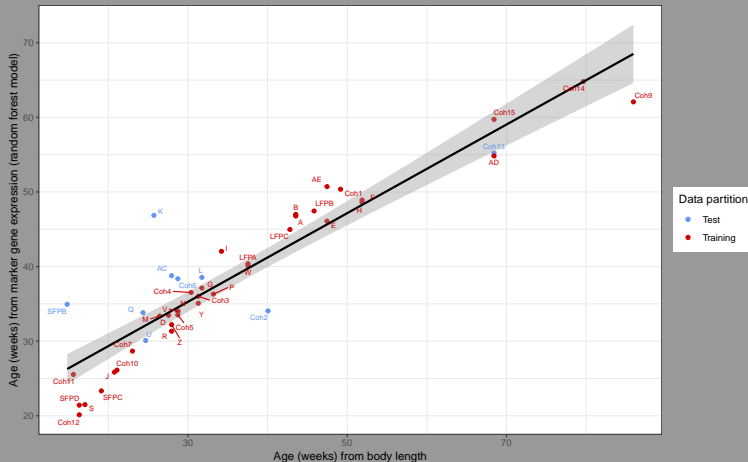
Old Random Forest model

Using Marker gene expression to predict age

52 markers in model

RMSE in training data: 6.973

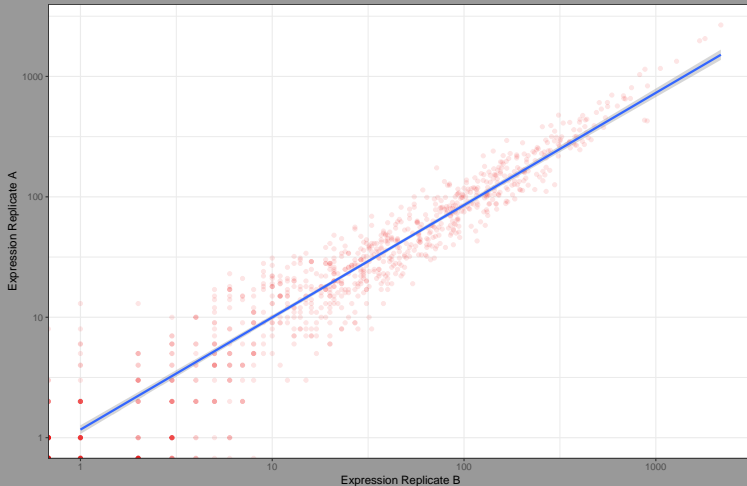
RMSE in test data: 12.631



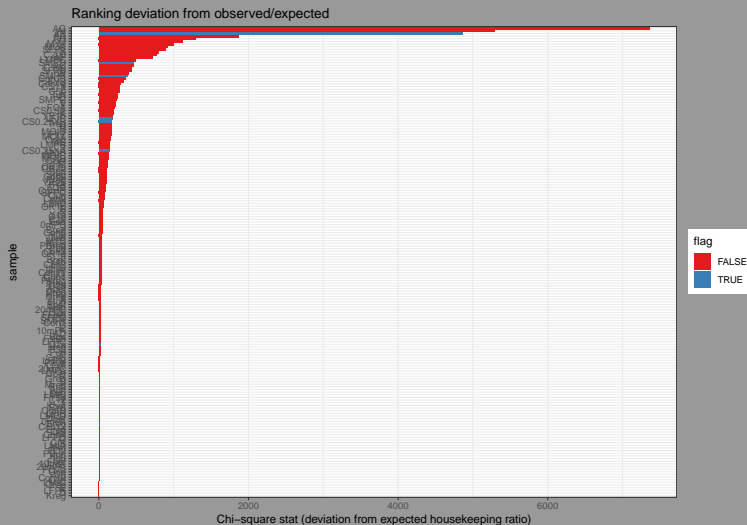
Quality assurance 1: Read number

How much expression needed for replicability?

All genes, samples with replicates



Quality assurance 2: Housekeeping gene ratio



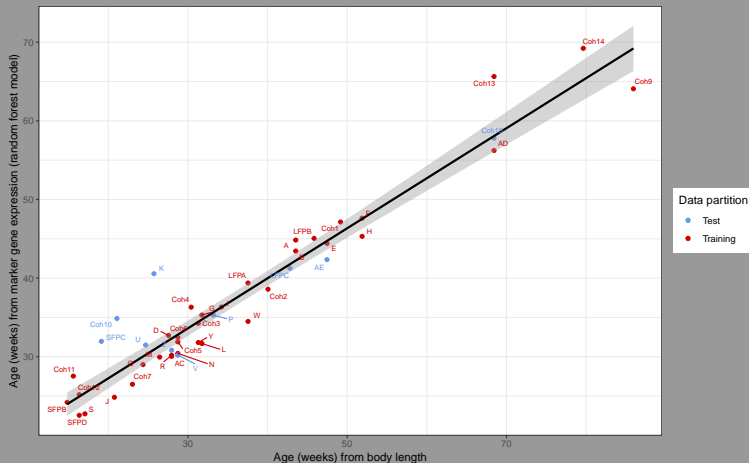
40-fold cross-validation

Using Marker gene expression to predict age

55 markers in model

RMSE in training data: 6.321

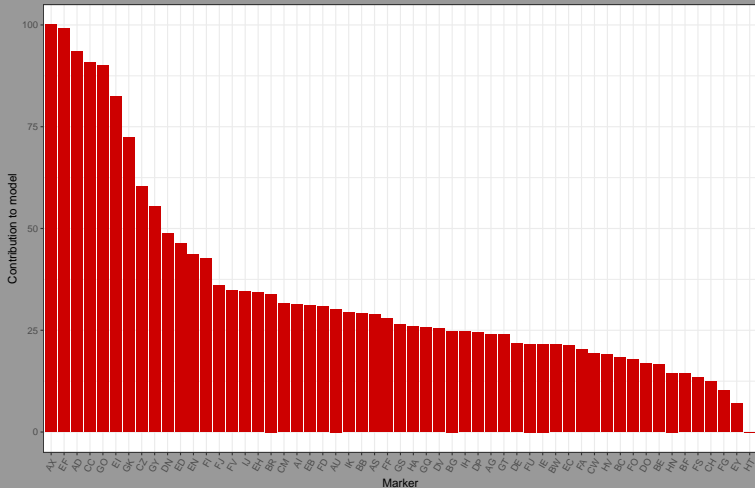
RMSE in test data: 8.812



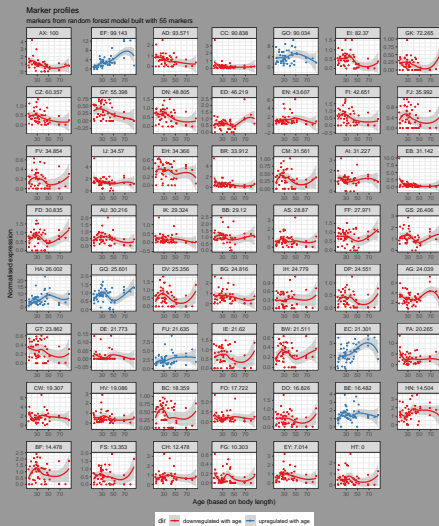
Contributions to model

Marker contributions

random forest model built with 55 markers



Marker profiles



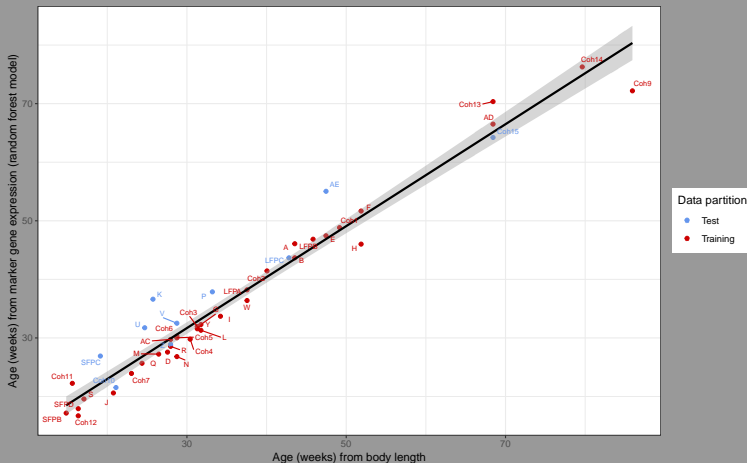
Gradient Boosting Machine

Using Marker gene expression to predict age

55 markers in model

RMSE in training data: 3.06

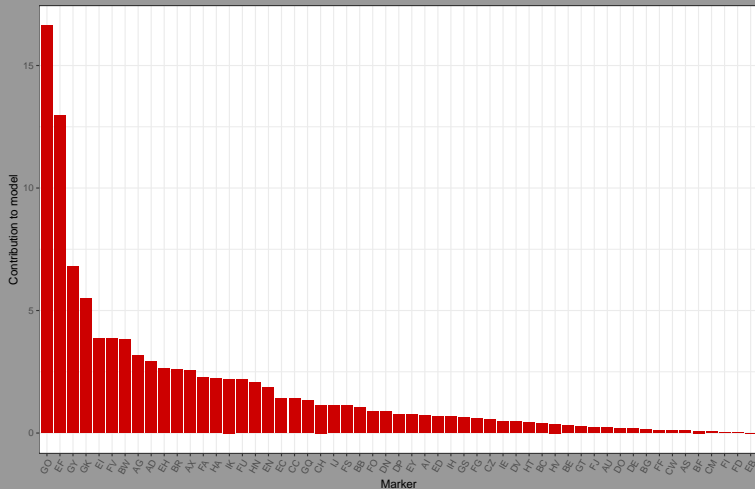
RMSE in test data: 5.84



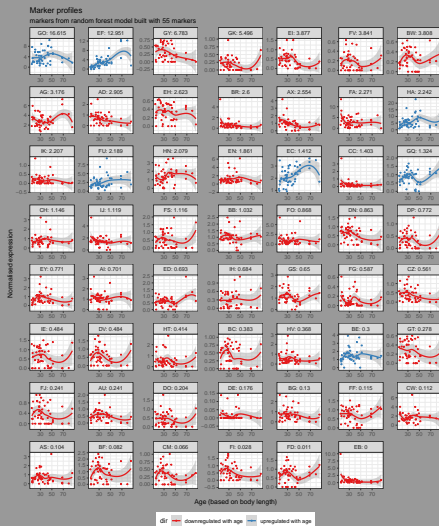
Marker contributions

Marker contributions

GBM model built with 55 markers



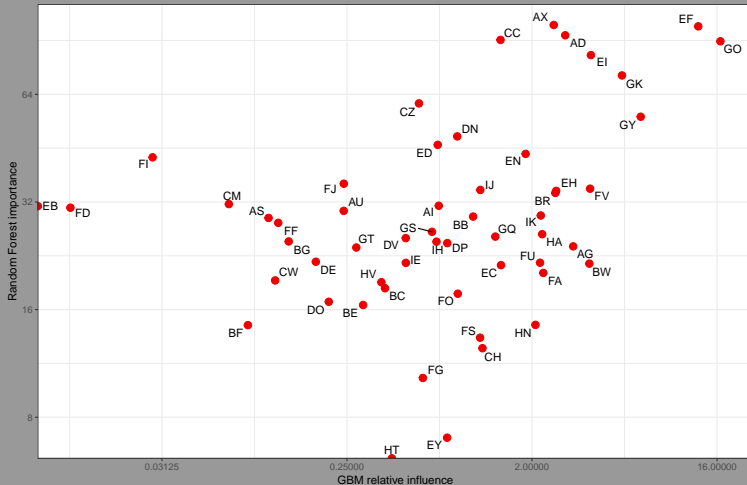
Marker contributions and profiles



GBM vs Random Forest

Marker importance: GBM vs Random Forest

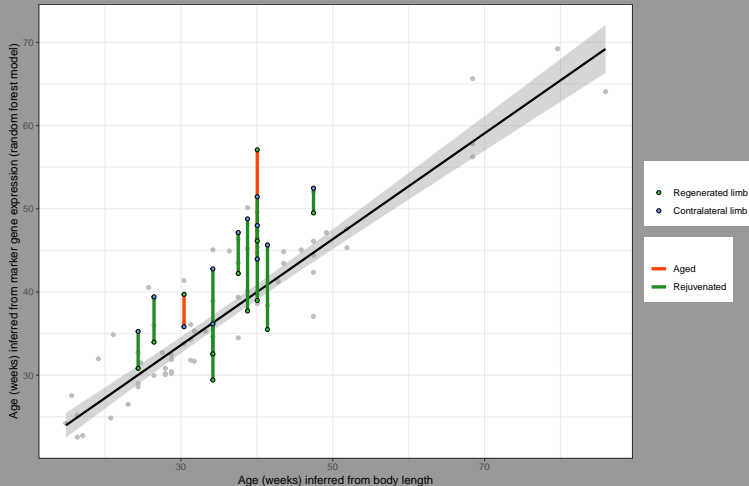
Same 55 markers



Does regeneration rejuvenate?

Change in molecular age due to regeneration

Model type: RANGER, 55 markers used

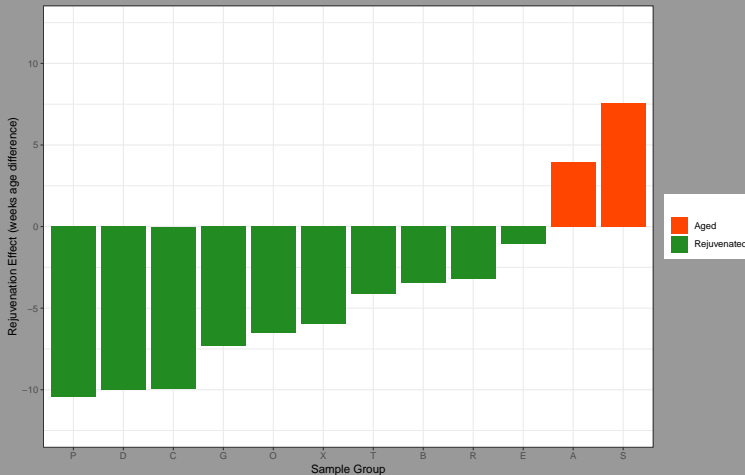


Does regeneration rejuvenate?

Rejuvenation Effect

Model type: RANGER, 55 markers used

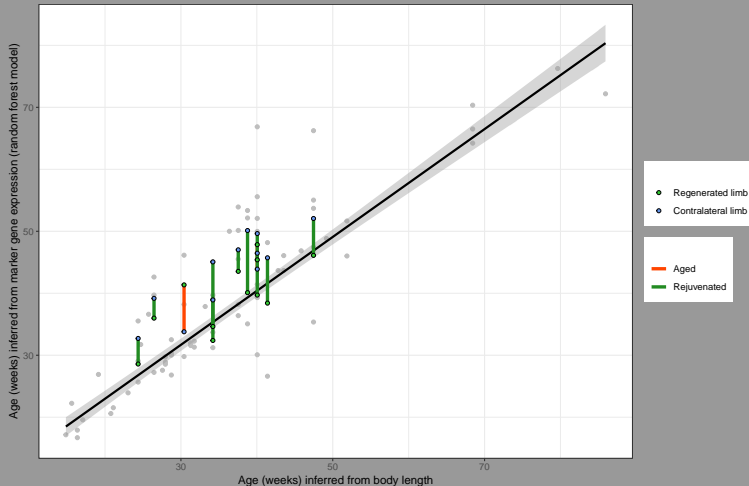
p-value of t-test between regenerated and unamputated: 0.103



Does regeneration rejuvenate?

Change in molecular age due to regeneration

Model type: GBM, 55 markers used



Does regeneration rejuvenate?

Rejuvenation Effect

Model type: GBM, 55 markers used

p-value of t-test between regenerated and unamputated: 0.32

