

Review on the
Bachelor Thesis of Fardokht Mohammadi
FINE-SCALE RECOMBINATION MAPS
OF THE
CATTLE GENOME INFERRED BY LINKAGE DISEQUILIBRIUM
by Dr. Andreas Futschik

The main topic of this thesis is the construction of recombination maps for two cattle breeds, Fleckvieh & Braunvieh. The maps are constructed for chromosome 25 based on linkage disequilibrium information obtained from approx. 400 000 SNP. Ms. Mohammadi used the software LDJump developed by Hermann et al (2019). As a part of her work, she developed an interface to LDJump that permits to run the software on *vcf* files. This will be quite useful for people that use LDJump, as *vcf* is a popular format for data files.

The obtained recombination maps have subsequently been used in a further analysis. In particular the correlation of the recombination rate with gene density, GC content and SNP density has been investigated. A comparison of the recombination maps between the two cattle breeds is also presented.

I found this to be an exceptionally good bachelor thesis.

First of all the thesis is very clearly written and well structured. It was a pleasure to read the concise text and clear explanations.

As mentioned above, this thesis involves both method development and data analysis. As far as I can see, the programmed interface works and requires only a small fraction of the total run time of LDJump. The application to both a high and a low SNP density genomic region provides some insight concerning the number of SNPs needed to obtain accurate recombination maps. From a statistical point of view the subsequent analyses that build on the recombination estimates are fairly straightforward, but the many figures provided provide a good illustration of the findings. Concerning the hypothesis tests for nonzero correlations it would have been good to discuss whether it makes sense to assume independent estimates across windows.

Finally, I guess that the obtained recombination maps should prove useful for the scientific community.

Overall, I think that the quality of this bachelor thesis goes far beyond most work at this level.

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