

App for visualizing the bovine physical–genetic map

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Cattle breeding can be optimized with the CLARITY app. Credit: Manuela Reichelt/FBN

Physical maps are created in genome research to illustrate how the genetic information is arranged on individual chromosomes. In addition,

genetic maps show the probability with which genetic variants can be transmitted together from one parent to an offspring.

High-resolution genetic maps have many applications in science: They help in statistical analyses to find genetic variants that are related to certain performance or health traits. They can also be used to calculate how closely animals are related to each other and how large the reproductive population is. This is precisely why genetic maps are relevant not only for research, but also for [animal breeding](#) and the management of livestock populations. Genetic maps are indispensable for developing modern breeding strategies and maintaining an animal resource to ensure [genetic diversity](#).

Based on extensive data from German Holstein cattle and German/Austrian Fleckvieh cattle, the Research Institute for Farm Animal Biology (FBN) has developed a platform that allows users to interactively explore the combined physical–genetic map of these cattle breeds.

Interactive CLARITY app is a valuable tool for education and research

By continuously integrating data from different cattle breeds, the app also enables their comparison and visualizes genetic diversity. CLARITY is thus a valuable tool for education and research on cattle genomes and is open for expansion to include other animal species. Through an intuitively designed user interface, users can select and customize individual features with simple clicks. The results can be downloaded in common formats and used free of charge (license CC-BY 4.0).

"The app is not a static catalog of information. It offers the user unique possibilities to think their way into the genetic maps according to their

own ideas. For example, genome areas can be selected or interesting regions with a higher chance of recombining genetic variants can be enlarged," explains Dr. Dörte Wittenburg, who developed the app in collaboration with an international team of scientists at FBN.

"The [cattle](#) breeding associations were immediately convinced by this project and provided [genetic data](#) from hundreds of thousands of animals, so the results have a high degree of accuracy," Dr. Wittenburg elaborates. The numerous features of the app are described in a paper that has been published in the journal *Frontiers in Genetics*.

More information: Nina Melzer et al, CLARITY: a Shiny app for interactive visualisation of the bovine physical-genetic map, *Frontiers in Genetics* (2023). [DOI: 10.3389/fgene.2023.1082782](https://doi.org/10.3389/fgene.2023.1082782)

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