

Discovery of antigen-specific bovine antibodies using High throughput genomic technologies

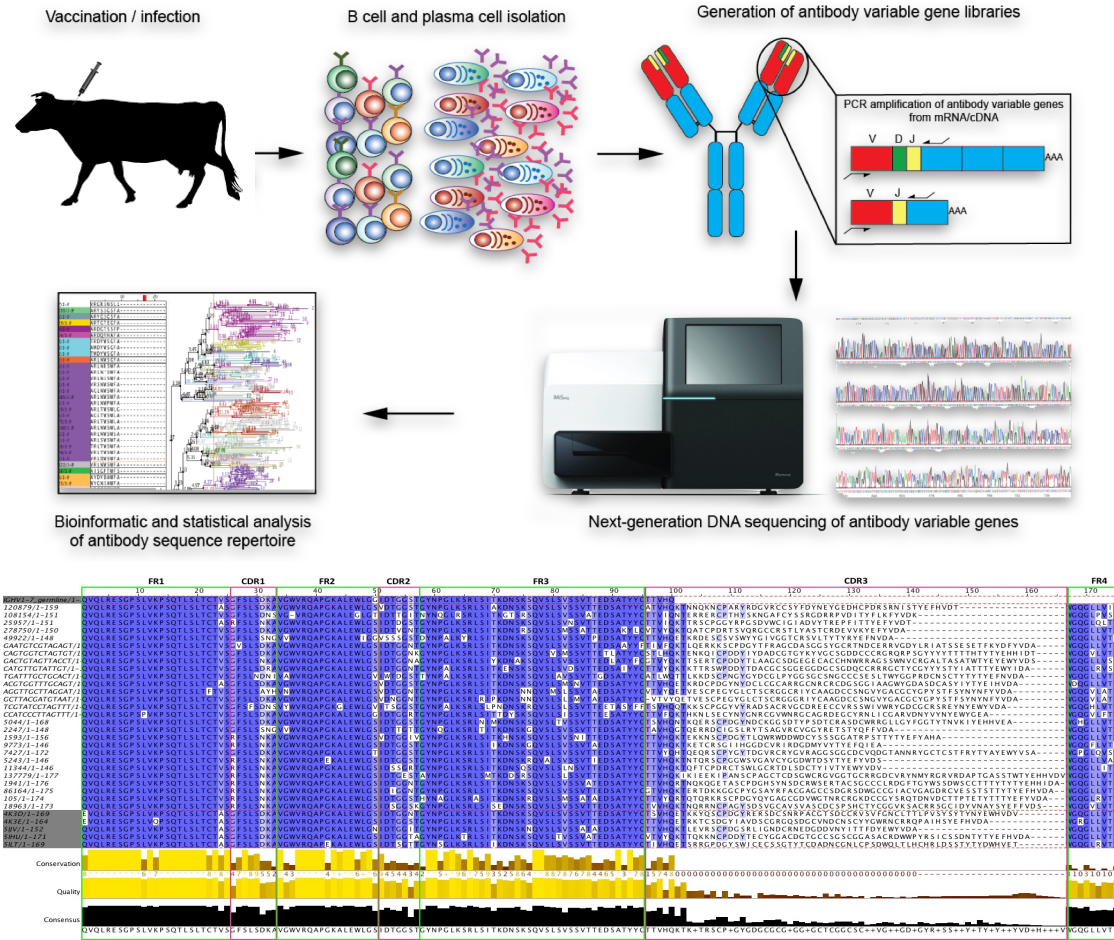
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Objective & Context

- To understand antibody responses to infection and vaccination to help design better vaccines
- Use antigen-specific antibodies to identify critical components of antigens for use in vaccine development
- Add to the immunogenetic knowledge on African bovine breeds
- Develop the technology using East Coast Fever (ECF) experimental vaccine studies

The approach

- To apply high throughput sequencing technology to characterize the quality of antibody response to immunization
- Developed a novel strategy to capture the unusually long antibodies found only in bovines that could exhibit superior neutralizing capacity
- Established bioinformatic analyses pipelines on ILRI's high performance computer for profiling antibody responses



Outputs

- Antibody repertoires of several experimental animal have been sequenced, including from indigenous African breeds such as Ankole, Ndama and Boran
- Antibody repertoire characteristics of African breeds differ from those of exotic breeds
- Putative antigen-specific antibodies identified against an ECF vaccine candidate
- Novel alleles for immunoglobulin genes identified in African bovine breeds

Future work

- Recombinant antigen-specific antibodies will be synthesized and tested for neutralizing
- This technology can be applied to study immune responses to other disease models of cattle, other ruminants and humans
- Antibody-based therapeutics can be developed from the sequences of protective antibodies
- Automation of the analysis pipeline and production of recombinant antibodies can allow scaling for increased demand

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High throughput immune repertoire analysis by next-generation sequencing and bioinformatics identifies unique bovine antibody sequences with ultra-long CDR3 lengths and proves qualitative molecular information on antigen-specific responses.

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