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# Veterinary vaccines: Oriented approaches for intracellular and extracellular pathogens

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**Statement of the Problem**: We work on two relevant cattle pathogens such as *Mycobacterium bovis,* agent of bovine TB and *Escherichia coli* O157:H7, the main member of the Enterohemorrhagic *E. coli* (EHEC) group, is the agent of uremic hemolytic syndrome. *M. bovis* and EHEC are both zoonotic pathogens. But while M. bovis is pathogenic to both cattle and humans, producing tuberculosis; EHEC do not provoke an illness in cattle (being cattle a reservoir) but causing a severe disease in human infants. In turn, *M. bovis* is an intracellular pathogen and EHEC is not an invasive pathogen.

**Methodology & Theoretical Orientation**: We reasoned that to combat an intracellular pathogen, we need a live attenuated vaccine deleted in genes related to the virulence for that we designed a *M. bovis* wild type deleted in *mce* genes, additionally and for safety, another gene (*phoP*) was deleted. The vaccine probed to be effective in mice, guinea pig and cattle experimentally challenged. In the case of EHEC, we used recombinant proteins (rAgs) from the type 3 secretion systems and sometimes additional proteins. rAgs were emulsified in an adjuvant that promotes mucosal IgG response. Animals were challenged with an EHEC inoculum and a protection reducing the bacterial shedding and the number of excreting animals was observed.

**Conclusion & Significance**: The rational design of vaccines is based in selecting the adequate approach to induce the adequate protective immune response for a given pathogen. In our case, results were promissory and prompt us to improve the current vaccine formulations to obtain efficient vaccines.

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