

ASSESSMENT OF CELL-MEDIATED IMMUNE RESPONSE TO LIVE *IN-VIVO* ATTENUATED AND KILLED VACCINES AGAINST *BABESIA BIGEMINA* IN CALVES

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INTRODUCTION

- Babesiosis is an economically important tick-borne, parasitic disease of cattle, caused by two species of Babesia; *B. bovis* and *B. bigemina*.
- There is a need for effective vaccines and safe prophylactic measures.
- The current study aimed to develop an effective vaccine against babesiosis targeting *B. bigemina*.

MATERIALS AND METHODS

A total (n=25) six months old, cross-bred male cattle calves were divided into five groups (A, B, C, D, E) after screening for the piroplasms through microscopy and PCR (Fig.1).

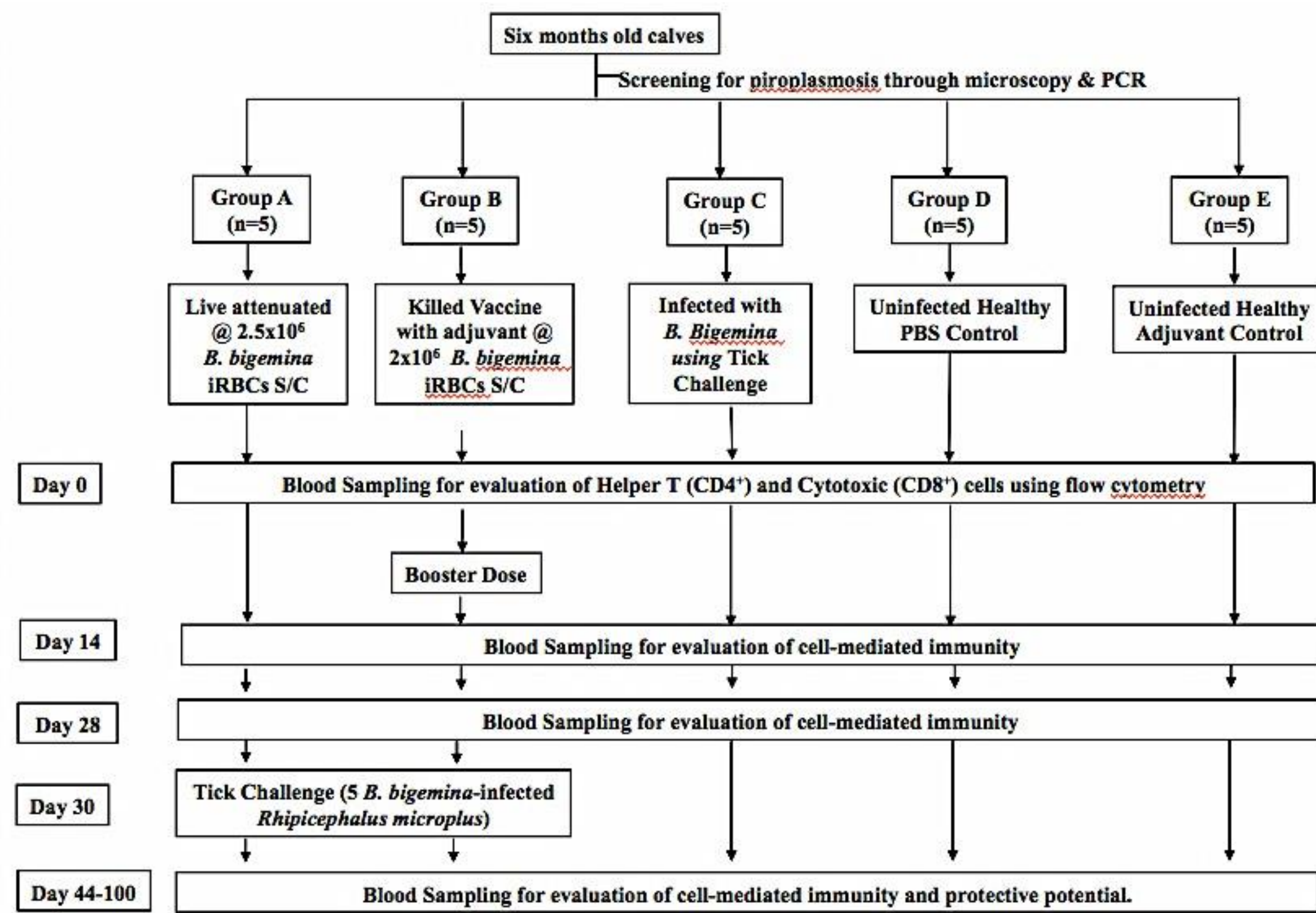


FIG. 1. Diagrammatic representation of vaccine study design showing sampling, vaccination, challenge and sampling time points.

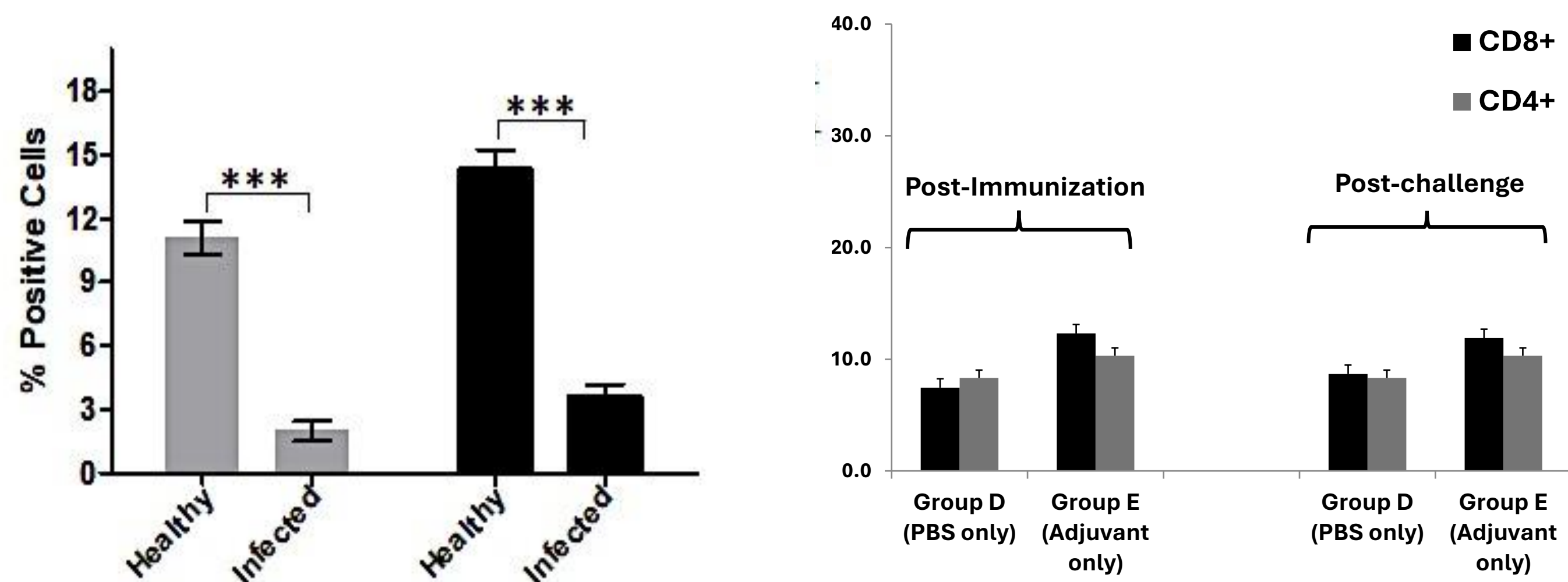


FIG. 5. Comparison of CD4+ and CD8+ T cells between Healthy and Infected groups ***, $p < 0.001$

FIG. 6. Comparison of CD4+ and CD8+ T cells Group D (PBS) and E (adjuvant only) during vaccine trial

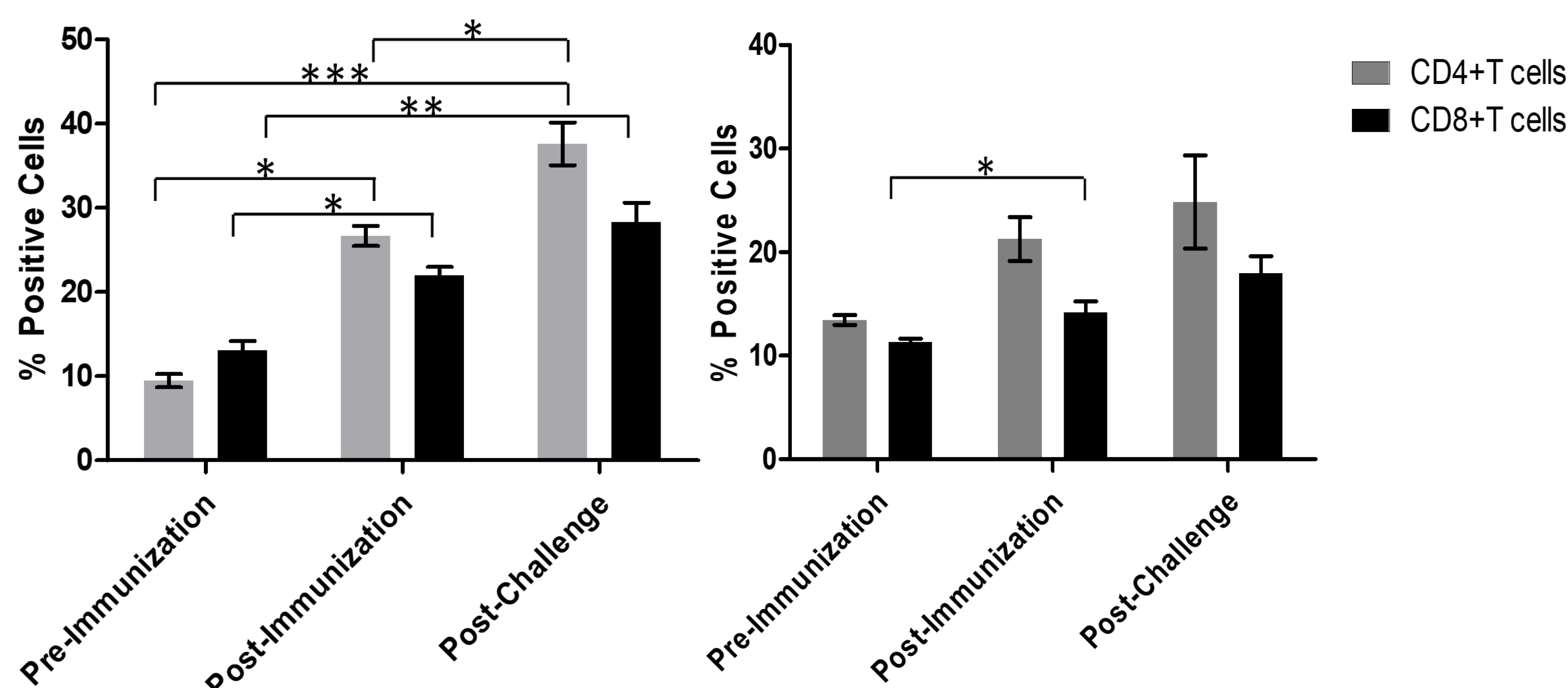


FIG. 7. Comparison of Live vaccinated calves (Left panel) & Killed vaccine (Right panel) for CD4+ and CD8+ T cells. *, $p < 0.05$. **, $p < 0.01$. ***, $p < 0.001$.

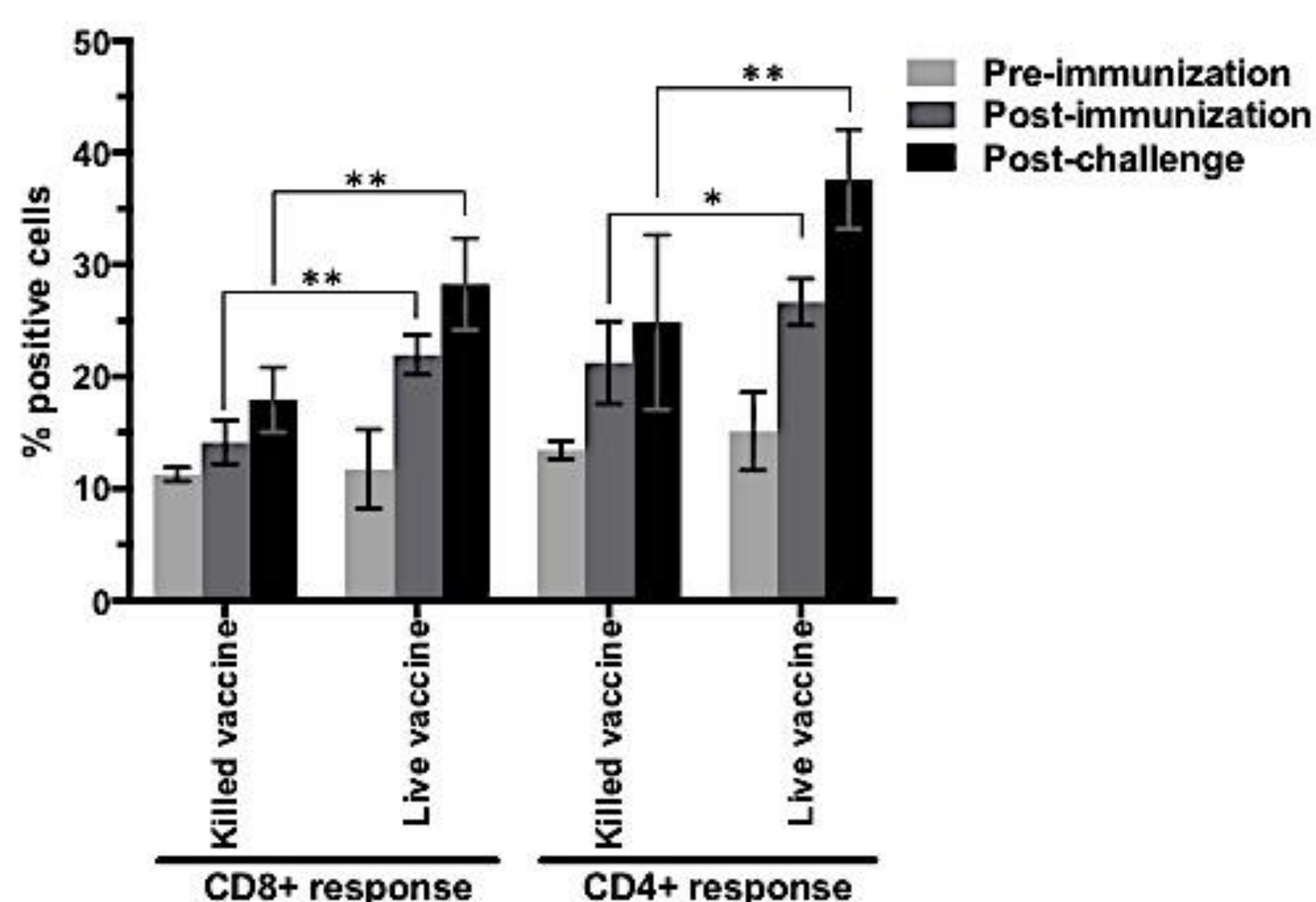


FIG. 8. Comparison of CMI between live and killed *B. bigemina* vaccinated calves, pre-immunization, post-immunization and post-challenge stage during trial. *, $p < 0.05$. **, $p < 0.01$

RESULTS

- Group A exhibited the significantly highest cell-mediated immune responses among all the groups, with higher protection post-immunization and post-challenge.
- The significantly higher lymphocytic count of CD8+ and CD4+ T cells was associated with the protective potential of live attenuated *B. bigemina* vaccinated calves (Group A) than killed *B. bigemina* vaccinated calves (Group B) up to day 100 post-challenge.
- A significantly higher protection level was observed post-challenge
- Field trials are planned to validate the vaccine efficacy in farm conditions with natural seasonal tick challenge

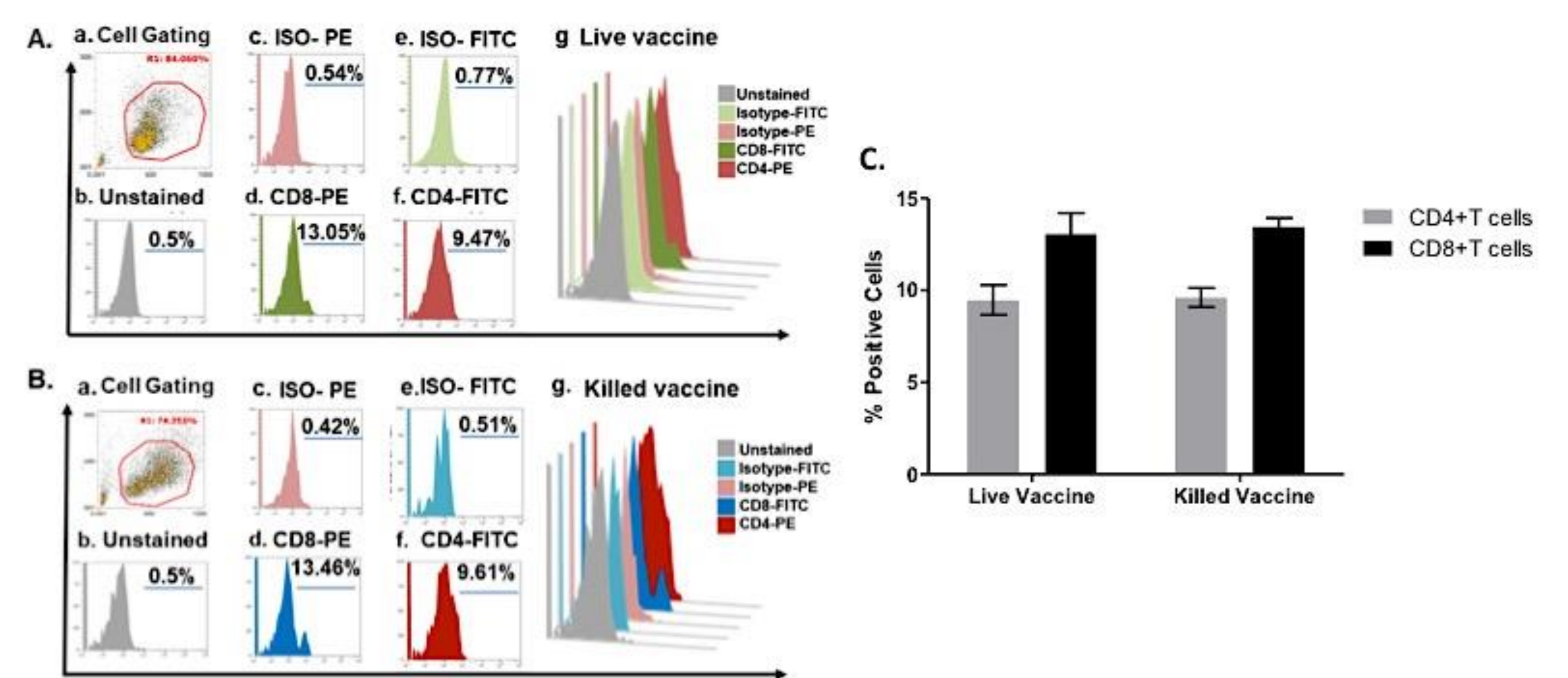


FIG. 2. Pre-immunized quantification of bovine CD8+ and CD4+ T cells in live and killed *B. bigemina* vaccinated calves using flow cytometry

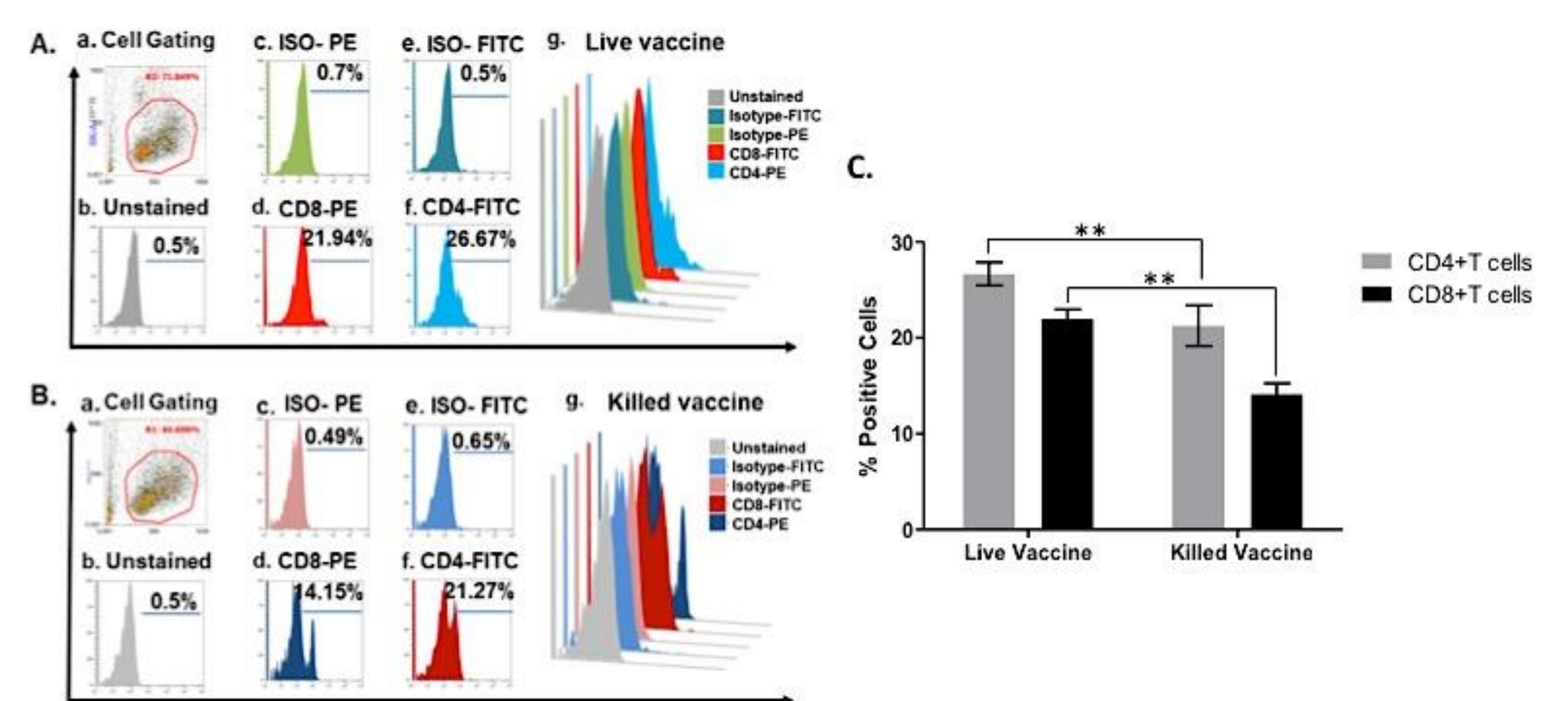


FIG. 3. Post-immunized quantification of bovine CD8+ and CD4+ T cells in live and killed *B. bigemina* vaccinated calves using flow cytometry **, $p < 0.01$

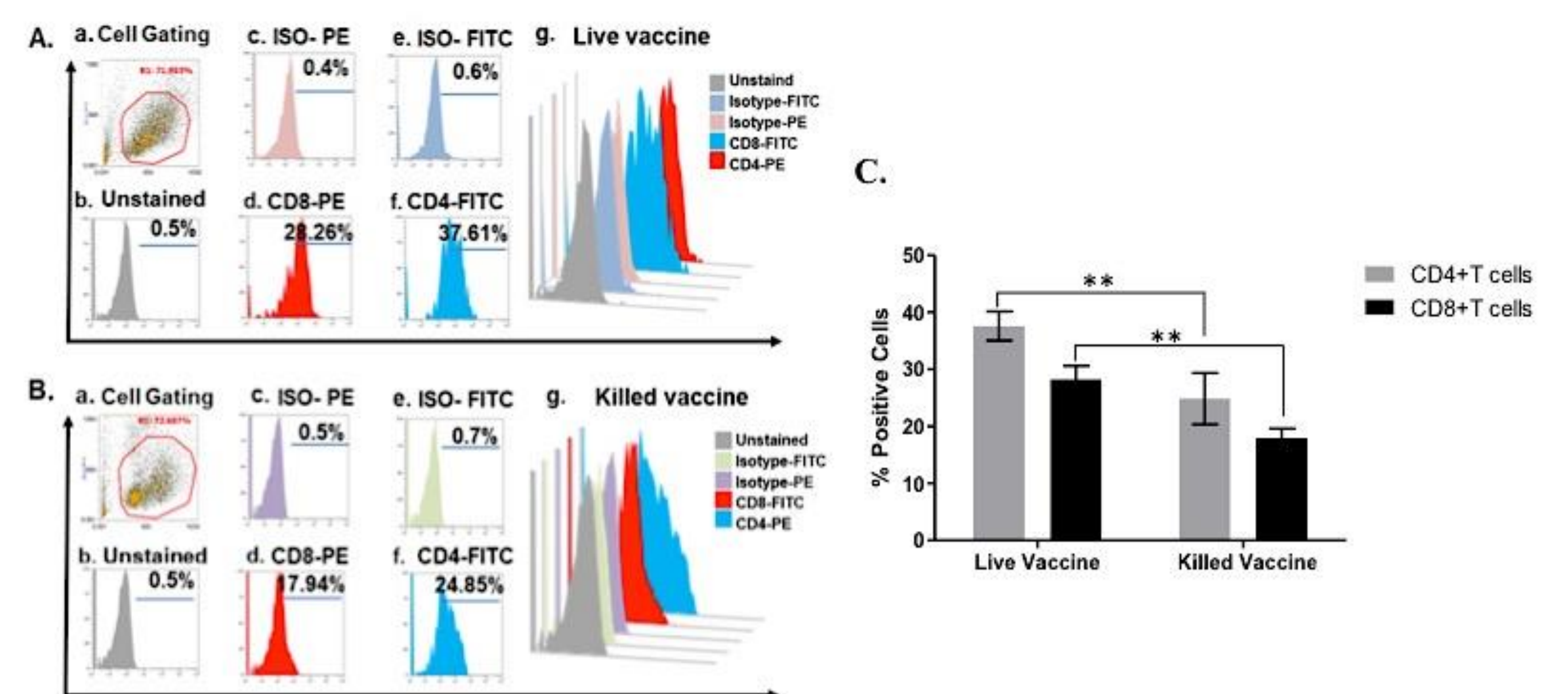


FIG. 4. Post-challenge quantification of bovine CD8+ and CD4+ T cells in live and killed *B. bigemina* vaccinated calves using flow cytometry. **, $p < 0.01$

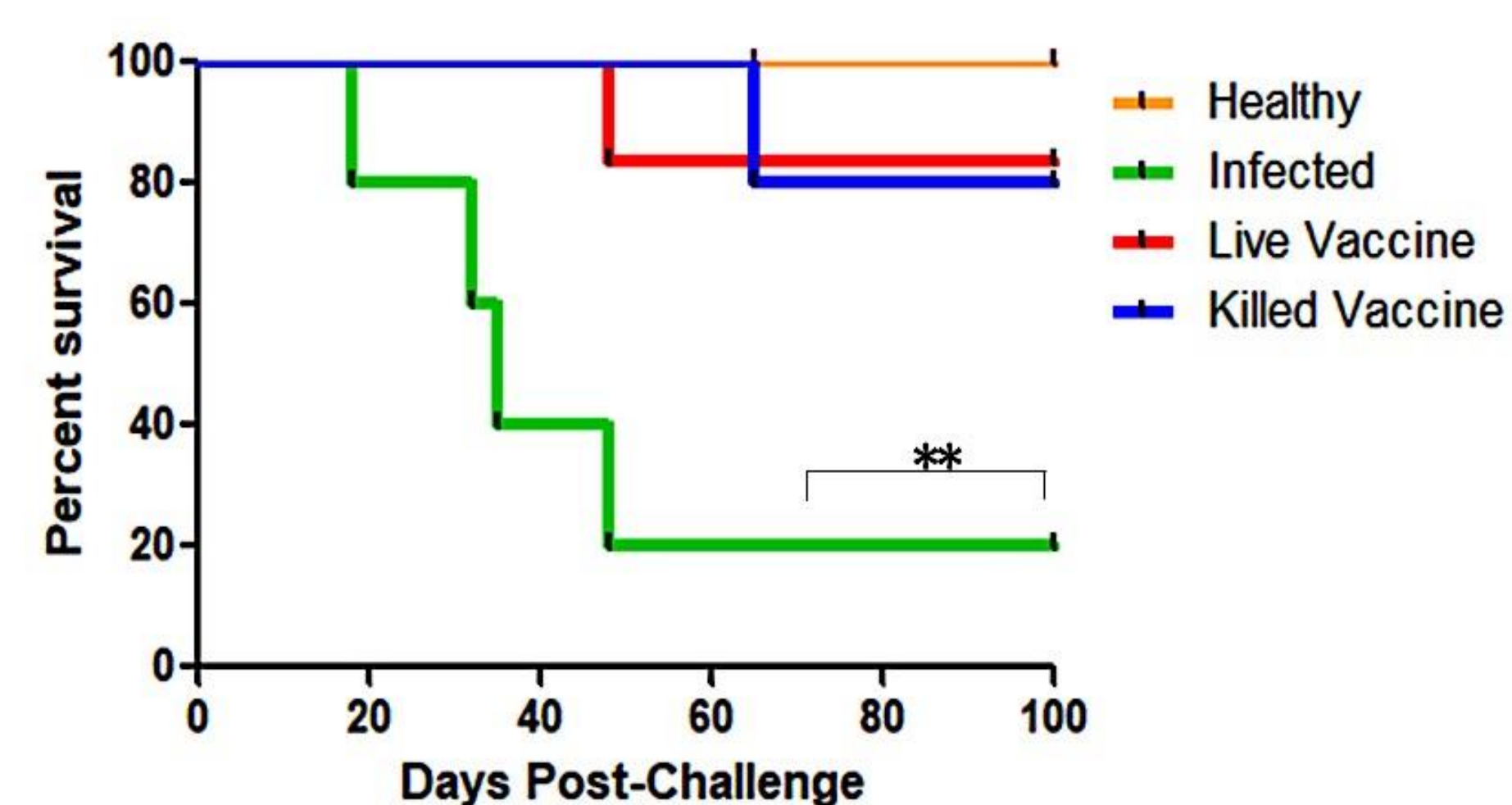


FIG. 9. Survival potential of different groups post-challenge. **, $p < 0.01$.

CONCLUSION

The live attenuated *B. bigemina* vaccine prepared from local isolates can be used efficiently for prophylaxis against bovine babesiosis to overcome economic losses in cattle industry.