Table S1. Pathogens combination and frequency of co-infections detected in cattle in Malawi.

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| ***Double infections***  | Study site | Overall *n* = 191 |
| Kasungu*n* = 26 | Nkhotakota *n* = 37 | Katete *n* = 36 | Likasi *n* = 34 | LUANAR*n* =33 | Mikolongwe*n* = 28 |
| *Anaplasma marginale* + *Theileria mutans* | 0 | 1 (3%) | 1 (3%) | 1 (3%) | 0 | 0 | 3 (1.6%) |
| *Anaplasma marginale* + *Theileria parva* | 0 | 1 (3%) | 1 (3%) | 0 | 0 | 0 | 2 (1.0%) |
| *Anaplasma marginale* + *Theileria velifera* | 0 | 0 | 1 (3%) | 0 | 1 (3%) | 0 | 2 (1.0%) |
| *Anaplasma platys* + *Theileria parva* | 0 | 2 (5%) | 2 (6%) | 2 (6%) | 1 (3%) | 0 | 7 (1.6%) |
| *Anaplasma platys* + *Theileria velifera* | 0 | 0 | 0 | 1 (3%) | 0 | 0 | 1 (0.5%) |
| *Anaplasma* sp.+ *Theileria mutans*  | 1 (4%) | 0 | 0 | 0 | 0 | 0 | 1 (0.5%) |
| *Ehrlichia* sp.+ *Theileria mutans* | 0 | 1 (3%) | 0 | 1 (3%) | 0 | 1 (4%) | 3 (1.6%) |
| *Ehrlichia* sp.+ *Theileria parva* | 1 (4%) | 1 (3%) | 0 | 0 | 0 | 0 | 2 (1.0%) |
| *Ehrlichia* sp. + *Theileria velifera* | 0 | 1 (3%) | 0 | 0 | 0 | 0 | 1 (0.5%) |
| *Theileria mutans* + *Theileria parva*  | 1 (4%) | 3 (8%) | 4 (11%) | 1 (3%) | 0 | 0 | 9 (4.7%) |
| *Theileria mutans* + *Theileria velifera* | 4 (15%) | 4 (11%) | 1 (3%) | 2 (6%) | 11 (33%) | 1 (4%) | 23 (12.0%) |
| Sub-total  | 7 (27%) | 14 (38%) | 10 (28%) | 8 (24%) | 13 (39%) | 2 (7%) | 54 (28.3%) |
| ***Triple infections*** |
| *Anaplasma bovis* + *Theileria mutans* + *Theileria velifera* | 0 | 0 | 0 | 0 | 1 (3%) | 1 (4%) | 2 (1.0%) |
| *Anaplasma marginale* + *Theileria mutans* + *Theileria parva* | 1 (4%) | 0 | 2 (6%) | 0 | 1 (3%) | 0 | 4 (2.1%) |
| *Anaplasma marginale* + *Theileria mutans* + *Theileriatautotragi* | 0 | 1 (3%) | 0 | 0 | 0 | 1 (4%) | 2 (1.0%) |
| *Anaplasma marginale* + *Theileria mutans* + *Theileria velifera* | 1 (4%) | 1 (3%) | 0 | 0 | 0 | 1 (4%) | 3 (1.6%) |
| *Anaplasma platys* + *Anaplasma* sp.+ *Theileria mutans*  | 0 | 1 (3%) | 0 | 6 (18%) | 3 (9%) | 3 (11%) | 13 (6.8%) |
| *Anaplasma platys* + *Anaplasma* sp.+ *Theileria velifera* | 1 (4%) | 0 | 0 | 0 | 0 | 0 | 1 (0.5%) |
| *Anaplasma platys* + *Theileriamutans* + *Theileria parva* | 1 (4%) | 0 | 0 | 0 | 0 | 0 | 1 (0.5%) |
| *Anaplasma platys* + *Theileria mutans* + *Theileria tautotragi* | 1 (4%) | 0 | 1 (3%) | 0 | 0 | 0 | 2 (1.0%) |
| *Anaplasma platys* + *Theileria mutans* + *Theileria velifera* | 0 | 2 (5%) | 0 | 0 | 0 | 0 | 2 (1.0%) |
| *Anaplasma* sp.+ *Theileria mutans* + *Theileria tautotragi* | 0 | 6 (16%) | 0 | 3 (9%) | 0 | 0 | 9 (4.7%) |
| *Anaplasma* sp. + *Theileria mutans* + *Theileria velifera* | 1 (4%) | 0 | 0 | 2 (6%) | 0 | 0 | 3 (1.6%) |
| *Ehrlichia* sp.+ *Theileria mutans* + *Theileria parva* | 2 (8%) | 0 | 0 | 1 (3%) | 0 | 0 | 3 (1.6%) |
| *Ehrlichia* sp.+ *Theileria mutans* + *Theileria velifera* | 1 (4%) | 0 | 0 | 0 | 0 | 0 | 1 (0.5%) |
| *Babesia bigemina* + *Theileria mutans* + *Theileria velifera*  | 1 (4%) | 2 (5%) | 0 | 2 (6%) | 2 (6%) | 6 (22%) | 13 (6.8%) |
| *Theileriamutans* + *Theileria parva* + *Theileria tautotragi* | 1 (4%) | 0 | 0 | 0 | 0 | 0 | 1 (0.5%) |
| *Theileria mutans* + *Theileria parva* + *Theileria velifera* | 1 (4%) | 0 | 4 (11%) | 3 (9%) | 6 (18%) | 1 (4%) | 15 (7.9%) |
| Sub-total | 12 (46%) | 13 (35%) | 7 (19%) | 17 (50%) | 13 (39%) | 13 (46%) | 75 (39.3%) |
| ***Quadruple infection*** |
| *Anaplasma bovis* + *Anaplasma marginale* + *Theileria mutans* + *Theileria tautotragi* | 0 | 0 | 0 | 0 | 0 | 1(4%) | 1 (0.5%) |
| *Anaplasma marginale* + *Babesia bigemina* + *Theileriamutans* + *Theileria velifera* | 0 | 0 | 0 | 1 (3%) | 0 | 0 | 1 (0.5%) |
| *Anaplasma marginale* + *Theileria mutans* + *Theileria parva* + *Theileria tautotragi* | 0 | 0 | 1 (3%) | 0 | 1 (3%) | 2 (7%) | 4 (2.1%) |
| *Anaplasma marginale* + *Theileria mutans* + *Theileria parva* + *Theileria velifera* | 0 | 0 | 2 (6%) | 3 (9%) | 0 | 0 | 5 (2.6%) |
| *Anaplasma* *platys* + *Theileria mutans* + *Theileria parva* + *Theileria tautotragi*  | 0 | 0 | 1 (3%) | 0 | 0 | 0 | 1 (0.5%) |
| *Anaplasma platys* + *Theileria mutans* + *Theileria parva* + *Theileria velifera* | 0 | 1 (3%) | 1 (3%) | 0 | 0 | 0 | 2 (1.0%) |
| *Anaplasma* sp.+ *Ehrlichia* sp.+ *Theileria mutans* + *Theileria velifera* | 0 | 0 | 0 | 0 | 0 | 1 (4%) | 1 (0.5%) |
| *Anaplasma* sp.+ *Theileria mutans* + *Theileria parva* + *Theileria velifera* | 1 (4%) | 0 | 0 | 0 | 0 | 1 (4%) | 2 (1.0%) |
| *Ehrlichia* sp. + *Theileria mutans* + *Theileria parva* + *Theileria velifera* | 0 | 0 | 0 | 0 | 0 | 1 (4%) | 1 (0.5%) |
| Sub-total | 1 (4%) | 1 (3%) | 5 (14%) | 4 (12%) | 1 (3%) | 6 (21%) | 18 (9.4%) |
| ***Quintuple infection*** |
| *Anaplasma Platys* + *B. bigemina* + *Theileria mutans* + *Theileria parva* + *Theileria velifera* | 0 | 1 (3%) | 0 | 0 | 0 | 0 | 1 (0.5%) |
| *Anaplasma platys* + *Anaplasma* sp.+ *Theileria mutans* + *Theileria parva* + *Theileria velifera* | 0 | 0 | 0 | 0 | 1 (3%) | 0 | 1 (0.5%) |
| *Anaplasma marginale* + *Anaplasma platys* + *Anaplasma* sp.+ *Theileria mutans* + *Theileria velifera* | 0 | 0 | 0 | 0 | 1 (3%) | 0 | 1 (0.5%) |
| *Anaplasma bovis* + *Anaplasma platys* + *Anaplasma* sp.+ *Theileria mutans* + *Theileria velifera* | 0 | 0 | 0 | 0 | 0 | 1 (4%) | 1 (0.5%) |
| Sub-total | 0 | 1 (3%) | 0 | 0 | 2 (6%) | 1 (4%) | 4 (2.1%) |
| ***Sextuple infection*** |
| *Anaplasma bovis* + *Anaplasma platys* + *Anaplasma* sp.+ *Theileria mutans* + *Theileria parva* + *Theileria velifera* | 0 | 0 | 0 | 0 | 1 (3%) | 0 | 1 (0.5%) |

n = number of samples, number of samples positive and percentage is provided in parenthesis.