Development of non-acaricide innovations for control of Ticks and tick borne diseases (TTBDs) in Uganda

Background

In Uganda, tick control depends entirely on use of acaricides applied in dips or as sprays. Acaricide use is characterized by malpractices and development of tick resistance. Currently, no new molecules of acaricides are being developed. Therefore, there is need to develop alternative TTBDs control innovations

1. Development of rGST anti-tick vaccine

rGST is a promising tick antigen to control TTBDs. Preliminary results from research efforts to evaluate rGST for tick control are suggestive that rGST reduces tick counts by 85.0% (*R. appendiculatus*), 88.0% (*B. decoloratus*) in zebu/sahiwal crosses. Evaluation of rGST for tick control in Nganda, Ankole and Boran breeds is underway.





rGST on-station trials on zebu/sahiwal cattle

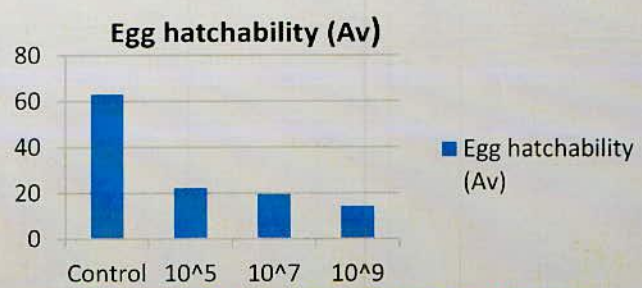
2. Development of recombinant subolesin (rSUBO) anti-tick vaccine

rSUBU are tick antigents with a potential to distort tick metabolic processes eading to death of ticks. Research efforts are underway to extract, express and stabilize Rsubo from ticks of economic importance in Uganda.

3. Development of fungal bio-acaricides for tick control

Entomopathogenic fungi (EPF) of Metarhizium and Beauveria species kill ticks when they come in contact with them. Research efforts are underway to isolate and evaluate the acaricidal properties of different EPF isolates upon which fungal bio-acaricide formulations will be developed.

Effect of Metarhizium spp isolate on A, variegatum eggs hatchability





Emerging threat of tick resistance to acaricides in Uganda



Acaricides

Are chemicals used to kill ticks. All acaricides undergo quality tests and approvat by NDA, MAAIF & NARO before they are licensed and released to the market

Tick Resistance





Rhipicephalus *Amblyomma* *Boophilus*

Occurs when ticks do not die after being exposed to acaricides.

Evidence of Tick resistance in Uganda

- In western and central Uganda, 90.0% of ticks have been reported to resist Synthetic pyrethroids; 43.3% to co-formulation acaricides; 13.3% to Organophosphates & 12.9% to Amidines (Vudriko *et al.*, 2016)

Economic implications of tick resistance

- In Uganda, tick borne diseases (TBDs) contributes 30% of calf crop loss, 90% of total disease control costs and over 60% of total farm inputs.
- Tick resistance increases economic loses due to TBDs

Factors that risk of development of tick resistance:





Knapsac sprayer Hand sprayer Spraying cattle in kraal

- Improper spraying equipment
- Lack of cattle crushes
- Irregular application Intervals
- Poor acaricide mixing ratios
- Mixing of 2-3 classes of acaricides together
- Prolonged use of one class of caricide
- Use of inadequate amounts of acaricide wash per animal

Recommendations

1. Develop alternative non-acaricide control strategy
2. Sensitization on proper use of acaricides