

PO-AAU-205
46960

THE INTERNATIONAL CENTRE OF
INSECT PHYSIOLOGY AND ECOLOGY
P.O. BOX 30772 NAIROBI, KENYA

USAID GRANT DAN. 4083-G-SS-3063-00
HOST RESISTANCE INTEGRATED TICK CONTROL
DECEMBER 1985 - FEBRUARY 1986

4TH MARCH 1986

- 1 -

1.0. Introduction

There have been no major changes in research direction or outputs during the quarter under review. The Christmas festivities and home leave (Dr. de Castro) have slowed down work output over the period.

2.0. Personnel

There have been no changes in programme staff. Advertisements have been placed in both the local and international scientific press for two postdoctoral fellows - one immuno-chemist and one population modeller.

3.0. Progress against agreed outputs

3.1. Rusinga Island

The survey of ticks on forty four premises on the Island has been completed. The results for cattle, calves and goats are given in Appendix 1. The main species are Rhipicephalus appendiculatus, R. evertsi, Amblyomma variegatum and Boophilus decoloratus. R. appendiculatus the vector of East Coast fever is by far the most numerous tick.

Sheep have been sampled and the tick species and instars are being identified and counted. This concludes the initial tick survey.

A disease survey was conducted in January 1986 on ten selected farms on the Island. All bovines on the farms and some of the goats and sheep were examined for evidence of tick borne disease. Serum for assessment of Theileria parva and Theileria mutans antibody level was taken. Blood evaluated for packed cell volume and smears made for microscopic examination to detect parasites. The serum will also be assessed for leptospiral and Brucella antibodies. Buffy coat layers were examined for Trypanosomes - none were found.

In all 207 cattle, 109 sheep and 37 goats were ear tagged and treated as above. Approximate ages were determined. These animals will be regularly visited to record production data, and it is hoped these 10 farms will form the basis of Phase II. The work was carried out in collaboration with KARI, Muguga.

Five farms (from the above ten) have been selected for the monthly tick population survey. They will be subjected to whole body collections every month for one year. The first sampling was carried out in January. As soon as possible the counts will be changed to standard female counts to allow data to be used in the ACIAR population model.

3.2. Inlona Ranch

The current trial (see September-November 1985 Report) is being terminated. The remaining susceptible cattle were removed from the experimental paddock in December 1985 to avoid further losses.

Tick-resistant cattle were kept in the paddock up to end of February when after a final tick challenge assessment, weighing and blood collection died on January 1986 of streptothicosis despite treatment. The trial is now analysed and will be written up as a scientific publication.

Results on daily liveweight gains and number of ticks in the groups are shown in Fig. 1. Preliminary analysis suggests that Boran tick resistant cattle were not able to keep tick numbers at a low level in the paddock and this in turn revealed the existence of a tick burden threshold beyond which liveweight gains are depressed.

3.3. Comparison of *Rhipicephalus appendiculatus* field and laboratory strains

Both field, laboratory strains of *R. appendiculatus* have now been fed on adult cattle and the early results confirm that there are differences between the strains. The field strains are not as susceptible as the laboratory strain to resistance induced by feeding. The engorged weight of females from the lab. strains is less than that from the field strains. Egg viability is being assessed at this time.

3.4. Intradermal Test

No further progress has been made in assessing the tissue culture antigen in truly naive animals due to failure to obtain an export license/import license from Kenya to the U.K.

Attempts to establish *Amblyomma* and *Boophilus* cell cultures from embryonating egg cultures have failed because of heavy bacterial contamination in eggs from ticks derived from the field.

4.0. Inducement of artificial immunity with selected tick derived antigens

4.1. Rabbits

4.1.1. Rabbits immunised with three midgut preparations (see 4.5.1 of report Sep.-Nov. 1985) have now completed their challenge. There is a small effect on larvae and nymphal feeding weights but these rabbits immunised with solubilised midgut antigen show the greatest effect with a 40% reduction in adult fed weight and a similar reduction in egg hatchability.

Post immunisation sera from these rabbits is now being used to identify and characterise the antigens in the immunising preparations.

4.1.2. Soluble antigens from midgut dissected from 5 day fed ticks has been fractionated according to molecular weight into 12 major components. The first four of these fractions has been used to immunise rabbits. These rabbits have been challenged and the egg hatchability results are awaited.

4.2. Goats

The infestation of the goats and collection of biopsies for histological examination is complete. Most of the sections have been prepared and microscopic examination commenced.

Larvae, nymphs and adults for pasture seeding have been collected and the challenge of the animals will take place when the farms are made goat proof.

4.3. Sheep

Due to a shortage of ticks all the antigens required for the immunisation experiment have not been collected. Dissection and collection of tick organs has continued during the period.

4.4. Cattle

An adequate number of ticks have been dissected and the organ extracts prepared and made into vaccines. Vaccination of cattle commenced in January, and bleeding at 7 day intervals is underway.

5.0. Future plans for next three months

5.1. Rusinga Island: Continue monthly tick survey. Collect infected 24 hr attached R. appendiculatus for production of E.C.F. stabilate. Appoint veterinarian and commence training.

5.2. Intona Ranch: Assess feasibility of carrying out evaluations of cattle breed tick susceptibility in heavily infested paddocks. (new output if commenced).

5.3. Intradermal Test: Complete serological assessment of antibody levels (not carried out in last quarter).

Test Intona Ranch immune cattle for responses.

5.4. Comparison of R. appendiculatus field and laboratory strains: Complete egg viability assessments.

5.5. Induction of artificial immunity

5.5.1. Rabbits: Continue identification and immunisation of antigens using immune sera.

5.5.2. Immunise rabbits with four further smaller molecular weight fractions. Complete egg hatchability results on first four fractions.

5.5.3. Goats. Seed pastures and commence goat challenge. Continue microscopic examination of dermal slides

5.5.4. Sheep: Continue dissection of antigens. Commence vaccination regimen.

5.5.5. Cattle: Complete vaccination schedule. Challenge animals.

1985 TICK SURVEY - RUSI'GA ISLAND

MEAN AND RANGE OF TICKS IDENTIFIED ON BOVIDE AND CAPRAE

TICK SPECIES		ADULT CATTLE	CALVES	GOATS
		\bar{x} (RANGE)	\bar{x} (RANGE)	\bar{x} (RANGE)
RHIPICEPHALUS APPENDICULATUS	ADULTS	132.2(85-199)	65.3(24-134)	21.8(7-38)
	NYMPHS	56.7(24-117)	42.6(10-71)	40.4(9-112)
	LARVAE	14.5(0-38)	16.(0-26)	3.4(1-16)
RHIPICEPHALUS EVERTSI	ADULTS	10.6(3-26)	5.7(2-7)	10.1(5-24)
	NYMPHS	0.3(0-3)	Nil	33.1(0-64)
	LARVAE	2.4(0-10)	0.2(0-1)	75.1(1-175)
AMBLYOMMA VARIEGATUM	ADULTS	46.7(3-88)	18.7(1-37)	0.5(0-3)
	NYMPHS	73.0(32-126)	34.9(15-70)	14.0(0-22)
	LARVAE	35.6 (2-192)	42.5 (3-181)	26.4(0-71)
BOOPHIUS DECOLORATUS	ADULTS	4.4(0-9)	3.9(0-13)	0.2(0-2)
	NYMPHS	4.6(0-13)	3.2(0-17)	0.1(0-1)
	LARVAE	2.4 (0-15)	1.5(0-7)	Nil

Notes: 1) In addition 2 Hyalomma rufipes males and 1 Amblyomma adult male were noted in adult cattle.

2) Sheep data incomplete

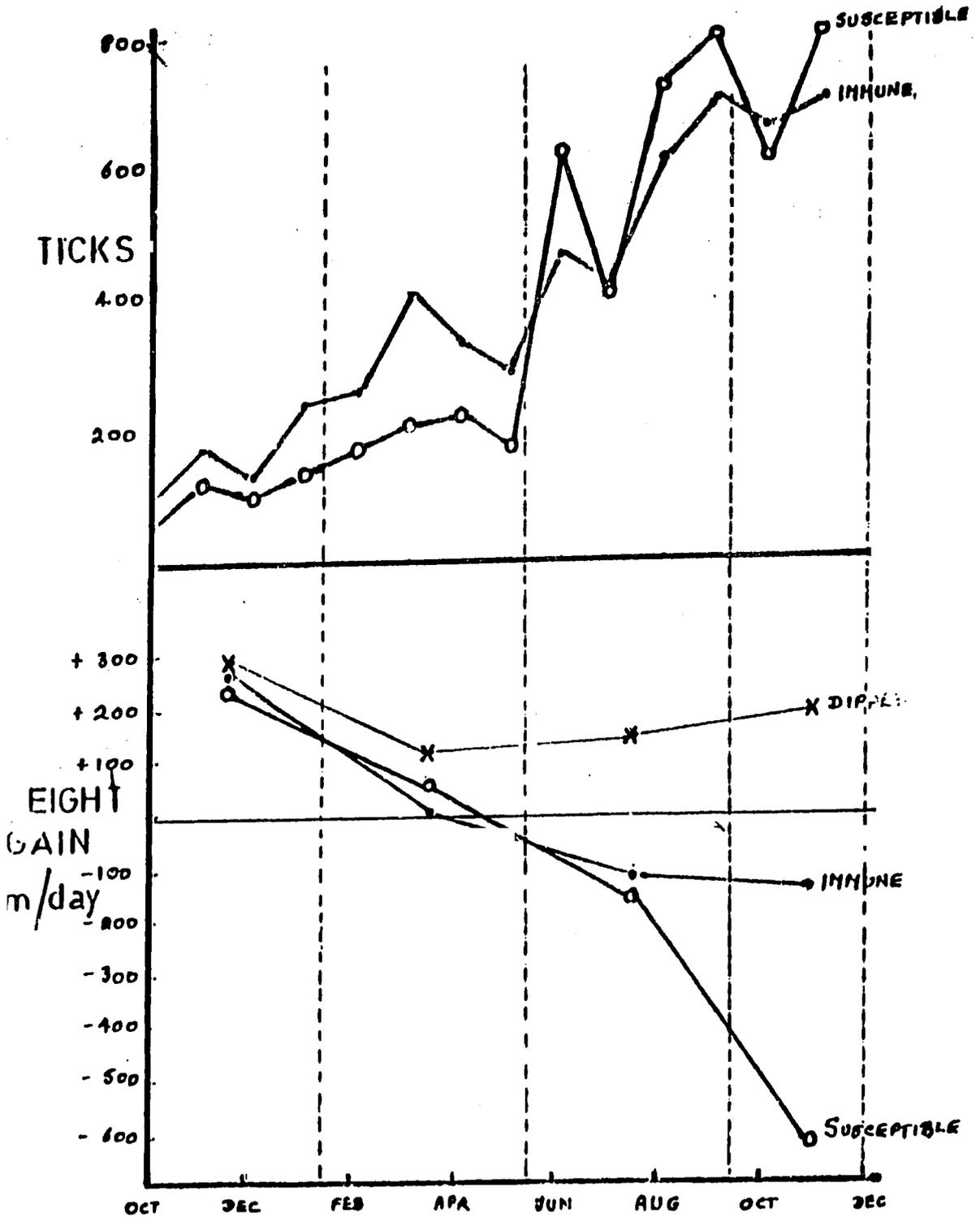
3) Total animal numbers on 44 forms: 63 adult cattle
41 calves
43 goats

DEP

31/1/86

INTONA RANCH

Appendix 11



1984

1985