

FOR INFORMATION

SWFSPP Annual Meeting 2021

Agenda Item 4.4

last updated: 7 October 2021

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Insectocutor sensitivity study update**RECOMMENDATION**

1. That the SWFSPP Steering Committee **NOTE** this update on the insectocutor sensitivity trial.

BACKGROUND

1. At the 2019 SWFSPP Steering Committee annual meeting it was proposed that the sensitivity of insectocutors as a surveillance tool for screwworm fly warranted further investigation. An action from this meeting was for NAQS to develop PNG insectocutor project proposal further for consideration by committee and AHA (Action Item #7).
2. An update on the proposed trial design was provided at the 2020 SWFSPP Steering Committee annual meeting (agenda item 1.1). An action from this meeting was for committee members to review and provide comment on the PNG insectocutor trial design to NAQS.
3. Since the 2020 meeting, NAQS has worked with other committee members (Graham Mackereth and Bill Crowe) and other departmental colleagues to finalise the trial design and begin the operational phase of the trial.
 - a. The trial design is described in **Attachment A: Efficacy of insectocutors on livestock vessels for early detection of SWF incursion**.
 - b. **Progress to date:** The local trial in Broome (described in **Attachment A** and shown in **Attachment B**) has been completed, with trap contents sent to a NAQS-contracted entomologist (Bill Doherty) in Townsville for identification. On gross inspection of the Broome trial trap contents, the Lucitrap contained only flies but significantly lower numbers (as expected), whereas the insectocutor contained large quantities of mixed insects.
 - c. **Next steps:** the insectocutor and Lucitrap will be dismantled from Broome Common in October 2021, and packaged up with duplicate traps (i.e. total of two insectocutors and two Lucitraps) for freight to Markham Valley, PNG. They will be deployed at Ramu Beef feedlot from November 2021 to March 2022.

DISCUSSION**4. CHALLENGES**

- a. The insectocutors and Lucitraps were set in Broome three times at two-week intervals between July and September 2021.
- b. One trapping session was thwarted by cockatoos who chewed through the insectocutor cord on the first day of trap session. Busy yard staff didn't notice, hence nothing in the trap for that session, leaving only two for comparison

- c. The insectocutor appears to destroy insect bodies to a mass of wings, bodies and dust, so unsure how successful identification will be (entomology examination pending).

5. FINANCIAL IMPLICATIONS

Animal Health Australia has funded all equipment purchased thus far, NAQS has provided in-kind on-ground support for trap set-up and management. Bill Doherty will most likely complete identifications for the Broome trap contents at no cost (depending on time spent), and charge \$50/hr for PNG samples as they come through. AHA has agreed to cover freight costs for traps to PNG (including dangerous goods' freight for Bezzilures), and identification costs.

6. CONSULTATION/COMMUNICATION

Consultation to date:

- with AHA (Ian Langstaff) on costs
- SWFSPP committee on trial proposal
- Graham Mackereth, Bill Crowe and Skye Fruean on trial design and logistics.

A report on the trial outcomes will be written at the conclusion of the trial (anticipated to end March/April 2022) and provided to the SWFSPP Steering Committee.

7. NEXT STEPS/ACTIONS

- a. Broome trial trap contents in transit to Townsville for identification by Bill Doherty.
- b. Four traps (2x insectocutors, 2x modified Lucitraps) and all additional trap and sample supplies to be freighted to Ramu Beef feedlot in PNG during October.
- c. Trial to proceed in PNG from November 2021-March 2022.

Attachment A: Efficacy of insectocutors on livestock vessels for early detection of SWF incursion

Attachment B: Photos of insectocutor and Lucitrap in place at Broome Common feedlot.

ATTACHMENT A: Efficacy of insectocutors on livestock vessels for early detection of SWF incursion**Executive summary:**

Both Old World screwworm fly (*Chrysomya bezziana*) and New World screwworm fly (*Cochliomyia hominivorax*) are exotic to Australia, and deemed a significant animal health risk to livestock, companion animals and wildlife, and with zoonotic potential. Current strategies for incursion mitigation or early detection include use of insectocutors on returning livestock vessels, but there is very little knowledge regarding their efficacy. The aim of this project is to establish their efficacy for attracting old world screwworm fly, using Lucitrap as a positive control.

Introduction

The distribution of new world screwworm fly is currently limited to South America (recently eradicated from Central America), whilst old world screw worm fly is widespread across parts of Africa, the Middle East, and most of central and southern Asia, including Australia's closest neighbours Papua New Guinea (PNG), Indonesia and Timor Leste (Lau S, 2015). For this paper, SWF refers to both species as they both pose a similar risk to Australian biosecurity.

Adult screwworm flies lay eggs on wounds or moist orifices of warm-blooded animals, and the hatched maggots then feed on healthy flesh, needing only a mild excoriation to break through the skin and burrow deep, potentially resulting in large debilitating wounds.

An incursion of SWF into Australia would most likely establish in northern Australia, having significant effects on northern livestock - affecting production, animal welfare, and access to important international export markets. Quite apart from economic and welfare effects in the livestock industry, the impact on domestic animals, wildlife and would also be potentially devastating. People living in remote and socially disadvantaged areas with limited access to health care would also be affected, with cases of endemic species myiasis already seen regularly.

An extensive early detection surveillance network is in place across Australia and particularly in the north where SWF is more likely to establish. The surveillance strategy is coordinated by the Screwworm Fly Surveillance and Preparedness Program (SWFSPP), a technical committee comprised of industry and government stakeholders coordinated by Animal Health Australia, with the aim to detect a SWF incursion early enough to ensure a high chance of successful eradication. The surveillance strategy consists of targeted live fly trapping, wound and myiasis monitoring across a range of species, and maggot submissions from human and animal wounds. This strategy also serves to contribute to SWF pest freedom assurance.

Risk assessments of SWF incursion potential to Australia identify several regulated and unregulated pathways including:

- Infested passengers returning from host countries
- Imported animals carrying flies
- Live flies hitchhiking on aircraft or vessels (particularly those returning from SWF endemic countries after exporting livestock)
- Windborne spread from near-neighbour countries

Passengers and animals travelling from PNG through the Torres Strait are a particular risk to carry SWF south.

To mitigate the risk of SWF incursion from the hitchhiking pathway, insectocutors have been used on livestock vessels since 1986. Old world SWF has been detected on at least eight reported occasions

(Rajapaska, 1989), however none since 1988, and only one incident of trapped live flies whilst in an Australian Port (Lady Geraldine, Darwin 1988). Other forms of SWF mitigation on board vessels include use of pestigas, phytosanitary measures, and biosecurity inspections as described in the work instruction “Undertake a livestock vessel inspection” (Department of Agriculture, Water and the Environment, 2018)

Insectocutors are non-specific electrical discharge traps generally used to control flying insects. Specific SWF traps include Lucitraps with Bezzilure, and older style sticky traps with Swormlure – these lures contain synthetic chemical attractants designed to mimic warm-blooded animal wounds. Lucitraps are widely used for Australian endemic blowfly control, but when used with SWF-specific Bezzilures have been shown to be more effective at attracting SWF than other lure-based traps (Urech, 2012). To the best of SWFSPP’s knowledge Lucitraps have not been compared to insectocutors for efficacy as part of the incursion mitigation strategy on board vessels.

Despite their long-term use, there have also been no studies demonstrating the sensitivity of insectocutors as a mitigation strategy for SWF using livestock as bait animals. One laboratory-based study (Clarke, 1991) noted an average of 13% female and 21% male SWF released in a room were attracted to insectocutors. To better understand the efficacy of using insectocutors in early detection and risk mitigation strategies, the trial proposed here will be conducted in a field setting with live host animals, to provide a more realistic setting for host and pest behaviour. The trial ultimately seeks to confirm that insectocutors provide adequate confidence for early detection of SWF on a livestock vessel. Testing the sensitivity of a trap in an area with a known endemic population is not the same as on a ship where SWF is not expected but given this well managed feedlot has a thorough SWF management strategy, there is likely a relatively low-density SWF population that might be similar to an endemic port area where livestock discharge from vessels.

Objectives

1. To determine if insectocutors are effective at attracting and killing SWF in a low-density endemic SWF environment.
 - a. Null hypothesis: there is no evidence that insectocutors are effective at attracting and killing SWF.
2. To determine the efficacy of insectocutors at attracting/trapping SWF compared to Lucitraps.
 - a. Null hypothesis: there is no difference in efficacy between insectocutor and Lucitrap at trapping SWF.

Methods

Study design

This is a comparative study to test the effectiveness of insectocutors in a SWF endemic setting with live host animal baits. Lucitraps will be used as positive controls.

- A trial will be conducted locally in Broome from July to September to ensure traps are functional and to establish that insectocutors do attract calliphorid flies
- Traps will be set in PNG during monsoon season, when SWF are more active – November to March
- Insectocutors and Lucitraps will be placed at opposite ends of the test paddocks so as not to interfere with each other.
- Traps will be cleared and reset weekly, and their location rotated, to account for site/trap/host effects.
- To ensure consistent data collection, collectors will be provided with forms to capture host data and weather conditions.

- Flies will be frozen on collection, use drying agents within samples to gather moisture and reduce rotting
- Samples will be couriered to Australia each week for ID +/- PCR

Setting

The experimental setting has been chosen as it is a large beef production facility in a known SWF endemic area.

- o Ramu Beef feedlot, Markham Valley, Papua New Guinea.
- o Breeding/rearing/fattening/slaughter beef production facility. 3000 head in each of two feedlots at any one time. Produced 7700 calves in 2020, i.e. lots of susceptible host animals particularly after calf-marking.
- o Branding/dehorning/castrating is done in January
- o 50-100 cases SWF myiasis each year despite extensive controls (Dectomax @marking, Demise anytime through yards, backrub in remote paddocks)
- o Paddock 25 (see attached map) – lots of signal grass and vegetation for SWF habitat
- o Paddock is long enough that traps can be separated to reduce competition of attractants.
- o Avoid eucalypts (*Lucilia* spp. avoid them, not sure about SWF?)



Paddock 25 – suitable vegetation for SWF habitat and large enough to set traps at each end

Materials

Insectocutor trap – e.g. Starkeys PestWest LP440 insect killer as used on livestock

- Generator & fuel – Ramu can provide

MODEL	Cost (2019)	Pros	Cons
LP440	\$964.14 (ex GST & Freight)	Identical to those on livestock vessels so ideal control	Expensive to purchase, Bulky and expensive to transport to PNG Large area covered (3ha) - may interfere with Lucitrap?
L40	\$404.05	Cheaper to purchase, Easier and cheaper to transport to PNG	Not identical to those on vessels, smaller area covered. BUT is still robust commercial grade quality
Bunnings (similar style to L40)	Approx. \$70	Very cheap, easier/cheaper to transport to PNG	Much less range and quality – not recommended.

LP440 Insect Killer



An outdoor light with the strength to reassure time outside will not be interrupted by flying insects. This robust weatherproof design is ideal to provide coverage in horticultural settings, parks and gardens.

- Zinc-anneal frame 'built to last' construction – we only use the best quality components
- Fully compliant with all required Australian and European certified safety standards
- Easy installation

Dimensions

H: 71cm W: 52cm D: 52cm

Weight

- 17kg

Coverage

- Wall mounted / Freestanding: 3 hectare

Finish

- White

Tube Data

- 4 x 40 Watt Starkeys Compact tubes

Lucitrap

- Bezzilure-2 kit (synthetic wound-derived attractant)
- Gloves
- Spare lures
- Insecticide tabs/kill strips

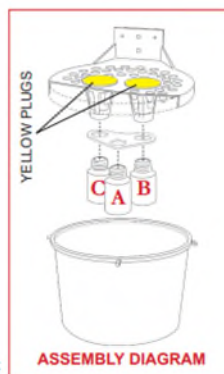


LuciTrap® TRAP KIT

CONTENTS: 5 x Bowls
5 x LuciTrap Lids
1 x Bag containing

- 10 x Yellow Plugs
- 10 x Collars*
- 1 x Tweezers*
- 1 x Bridge/Boomerang*

- NOTES:
- The parts marked * are needed for the LuciTrap Refill Kit.
 - The LuciTrap A, LuciTrap B and LuciTrap C are sold separately as Lucitrap Refill Kit.
 - Visit www.bugsforbugs.com.au for more information.
 - On the LuciTrap Refill Kit label, under 'DIRECTIONS FOR USE', there is reference made attaching LuciTrap to a tree. Avoid eucalypts. Experience has shown that attractiveness to Luci flies may be reduced.



One example of barrier designed to minimize dislodgement by livestock.



One possibility for trap positioning. Preferably place on southern or eastern side of structures

General equipment

- Sample containers
- Sample handling instructions
- Silica/other drying agent sachets?? Approx. 10-20c each
- Data collection forms – include date/collector/location/number host animals/rain & wind conditions etc.
- Self-addressed post packs

Risk Mitigation Strategy:

No	Activity	Hazard Identification	Risk Assessment				Likelihood after controls	Risk acceptable?
			Risk	Likelihood	Consequence	Risk control		
1	Trap setting	No power at trap site	Insectocutor won't work -no samples	Possible	Project failure	Generator placed at trap site, regular refueling	Unlikely	Acceptable
		Errors in trap set up, lures not set properly etc.	Insectocutor / Lucitrap won't work – inaccurate data	Possible	Inaccurate data	Test experiment design at Broome Common cattle yards first, then write instructions for Ramu Beef setup	Unlikely	Acceptable
		Traps set too close together	Interference between traps – likely that Lucitrap will detract flies away from insectocutor	Possible	Inaccurate data, project failure	Test experiment design at Broome Common cattle yards first and ensure insectocutor is trapping flies	Unlikely	Acceptable
		Traps set where SWF not active or out of season	No flies caught despite traps possibly being effective	Possible	Inaccurate data or project failure	Set traps in known SWF season – October/November until March/April	Unlikely	Acceptable
2	Trap collecting	Traps not collected frequently enough	Flies rot or eaten by ants	Likely	Sample unable to be identified	Collect frequency depends on how many flies caught and if rainy weather – NPA traps collected every 2-3 days to avoid rotten flies.	Unlikely	Acceptable
		Flies delayed or lost in transit	Flies rot or lost –	Likely	Sample useless	Use drying agents within samples to gather moisture and reduce rotting especially condensation after freezing	Possible	Acceptable
3	Data analysis	Confounding parameters						

Issues to resolve

ISSUE	DESCRIPTION	SOLUTION	VARIATION
Seasonality	SWF more prevalent in Wet season – may need to clear and switch traps every 2-3 days so is long time/effort for Ramu staff and DAWE staff managing trap and IDing samples	John has suggested that Ramu is keen to be involved and has a R&D section that will probably help with resourcing. DAWE capacity – TBC (& depends on sample yield)	May need to reassess frequency of trap catches if Ramu can't keep up, or if yield too high for DAWE capacity. Think start weekly and adjust as needed.
Presence of host animals	Need high numbers of susceptible animals	Plenty of susceptible hosts, and still 50-100 cases/year in feedlot despite range of prevention & treatment strategies. Ensure traps are set where wounded animals (marked calves) are providing SWF habitat nearby	May need to move sites if initial selected sites not yielding samples
Trap placement	Ensure traps are separated such that they don't compete for attracting flies	The LP400 covers up to 10ha so perhaps is too big for this purpose (despite wanting to use same model as on livestock vessels) Lucitrap is recommended at a rate of one per 100 animals, not on area.	May need to move sites if initial selected sites not yielding samples May need to use a smaller insectocutor
Trap placement	How many traps to use?	Start with one each (insectocutor & Lucitrap) and if no SWF trapped at all within first month or so then try duplicate traps in other sites?	Go all out and have three of each to start with, need to identify other sites though – may be challenging...
Lure choice	Bezzilure 2 alone, or Bezzilure 2 & POC	Resolved – Bezzilure 2 (only) to be used as per current trapping protocols.	
Frequency & duration of trapping	How often to clear & switch traps?	Start with NPA protocol for Lucitraps and at each trap clearance then switch trap sites	Adjust as necessary for trap yield
Couriering samples from Ramu to Australia	Who pays? Transport time?	Find out if Ramu has a regular courier account for priority packages, or use whatever offshore program has done for survey samples	
Resourcing for sample sorting & IDs	Send to where?	NAQS-contracted entomologist, Bill Doherty has agreed to assist with trap sorting and IDs.	

References

Clarke, G. (1991). Testing of an electrocutor trap for screwworm fly *Chrysomya bezziana*. *Australian Veterinary Journal*, 276-277.

Lau S, L. I. (2015). Imported New World Screw-worm fly myiasis. *The Medical Journal of Australia*, 435.

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Rajapaska, N and Spradbery, JP. (1989). Occurrence of the Old World screw-worm fly *Chrysomya bezziana* on livestock vessels and commercial aircraft. *Australian Veterinary Journal* 66 (3) 94-96.

Urech, R., P.E. Green, G.W. Brown, J.P. Spradbery, R.S. Tozer, D.G. Mayer, Y. Tack Kan (2012). Field assessment of synthetic attractants and traps for the Old World screw-worm fly, *Chrysomya bezziana*. *Veterinary Parasitology* 187 (3–4): 486-490.

ATTACHMENT B: Photos of insectocutor and Lucitrap in place at Broome Common feedlot



Figure 1 Location of insectocutor and Lucitrap at Broome Common feedlot during local trial phase.



Figure 1 Lucitrap at Broome Common feedlot during local trial phase.



Figure 3 Insectocutor at Broome Common feedlot during local trial phase.