FOR COMMENT

SWFSPP Annual Meeting 2020
Agenda Item 4.1
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Adequacy of the SWF Targeted Myiasis Inspection work instructions

Introduction

The Targeted myiasis work instruction (November 2016) was reviewed. The assumptions behind the instructions were examined. The performance of field inspections was analysed to determine if the purpose of the instructions was being achieved.

Method

The data uploaded on NAHIS from 2015 to September 2020 was evaluated for number of inspections and wounds detected by site, jurisdiction and year.

References given in the instruction were reviewed.

The location of surveillance was not reviewed.

Findings

The work instructions aim to deliver sensitivity for detection of SWF. A key assumption in the calculations behind the instructions was the wounding rate.

Wounding rate

The incidence of wounds is also an important factor for detection by herd inspections, as OWS myiasis can only be initiated on open and moist wounds. The wounding incidence assumption in the instructions is 11%. This is derived from a rationale provided by Sam Beckett in his Risk of Entry Report. (Beckett 2014).

> *The wounding incidence during the Sumba trial was approximately 11% (Urech et al., 2013). The proportion of beef cattle with wounds caused by management and natural causes in Australia was obtained by Anaman et al. (1993) from 21 questionnaires completed by extension officers in Queensland, New South Wales and South Australia. The estimated average proportion of cattle with open wounds per*

week in regions with extensive grazing was 4.9%, 8.9% and 15.8% for steers, cows and calves respectively (Anaman et al., 1993). The wound incidence values for (northern) Australia are therefore approximately equivalent to wounding rates in Sumba

Comparison with field observations made during inspections (table 1) revealed a wounding rate 57 times lower than anticipated with an average of 0.193% (150/77806), QLD 1.14%, NT 0.018%, WA 0.32%).

The numbers of cattle the instructions require to be inspected is based on a wounding rate of 11%. Or in other words and expectation of 33 wounds being examined.

Sensitivity of surveillance

The assumed detection rate of a truly infested SWF wound is 59% (Urech et al, 2013).

The sensitivity of the inspection surveillance is difficult to assess due to considerable uncertainty as to the density of the SWF population in locations where SWF surveillance sensitivity can be assessed, and the opportunity for strike and likelihood of strike at that density. Sumba island studies provide a reference point for low density SWF surveillance and Malaysia for high density. The relative sensitivity of trapping and inspections can however be assessed. Interestingly at the level of inspection in the Sumba study wounds (observed for 14 days) were 5 times more sensitive than lucitraps.

Sensitivities used to inform the instructions are therefore relative to SFW populations Sumba Island. However, it is possible to calculate the absolute sensitivity of myiasis surveillance for various design prevalence's (percentage of wounds infested with SWF) based on the number of wounds observed. Table 3 shows the sensitivity of surveillance by jurisdiction for the total period and for the annual average at design prevalence ranging from 0.01 to 0.75. The table indicates that the average annual sensitivity is low. Capable of at best of detecting a 25% SWF wounding rate in WA with 95% confidence.

Table 1 Table wounds observed and inspections 2005 -2020

Jurisdiction	Wounds observed	Inspected	Wounding rate	Sensitivity at design prevalence 0.05, 0.1
NT	7	39101	0.02%	19%, 35%
Qld	27	2362	1.14%	55% 81%
WA	116	36343	0.32%	97%, 100%
Total	150	77806	0.19%	

Table 2 Table of myiasis inspection by jurisdiction and year

Statistic	Jurisdiction	2015	2016	2017	2018	2019	2020	Total
Total wounds observed	NT	0	6	0	1	0	0	7
	Qld	1	12	1	5	6	2	27
	WA	23	0	54	29	8	2	116
	Total	24	18	55	35	14	4	150
Total inspected	NT	1483	6955	8742	8016	4938	8967	39101
	Qld	209	639	555	571	263	125	2362
	WA	356	37	8001	6751	14342	6856	36343
	Total	2048	7631	17298	15338	19543	15948	77806
Average number of inspections per site	NT	49	62	73	60	55	142	74
	Qld	13	16	16	16	14	13	15
	WA	89	19	276	193	235	229	173
	Total	151	97	365	269	304	383	262
Site level wounded average	NT	0.0	0.1	0.0	0.0	0.0	0.00	0.0
	Qld	0.1	0.3	0.0	0.1	0.3	0.20	0.2
	WA	5.8	0.0	1.9	0.8	0.1	0.07	1.4

Table 3 Sensitivity of actual surveillance with given SWF wound design prevalence

Jurisdiction	**Wounds observed**	**Design prevalence of wounds with SWF**						
		0.01	**0.02**	**0.05**	**0.1**	**0.25**	**0.5**	**0.75**
Total wounds observed								
NT	7	0.04	0.08	0.19	0.35	0.67	0.91	0.98
Qld	27	0.15	0.27	0.55	0.81	0.99	1.00	1.00
WA	116	0.50	0.75	0.97	1.00	1.00	1.00	1.00
Total	150	0.59	0.83	0.99	1.00	1.00	1.00	1.00
Annual average wounds observed								
NT	1.2	0.01	0.01	0.03	0.07	0.17	0.33	0.49
Qld	4.5	0.03	0.05	0.13	0.24	0.51	0.79	0.93
WA	19.3	0.11	0.21	0.44	0.69	0.95	1.00	1.00
Total	25.0	0.14	0.26	0.53	0.78	0.98	1.00	1.00

Discussion

The disparity between observed wounds and expected wounds is marked. The number of animals inspected does not drive sensitivity, rather the number of wounds inspected. It would be preferable to maximise the number of wounds observed. This can be done by timing surveillance to coincide with the period immediately following castration and dehorning

Due to the lower number of wounds observed than expected the sensitivity of surveillance lower than inspected. It would be desirable to achieve a target annual sensitivity in each jurisdiction with the ability to detect a target SWF wound design prevalence with 95% confidence. This translates to a target number of wounds examined. Options are shown in Table 4

Table 4 Table showing the number of wounds that need to be observed to detect a given design prevalence with 95% confidence.

Design prevalence (percentage of wounds with SWF)	Annual wounds to be observed to give 95% confidence of detection
5%	100
10%	50
15%	32
20%	24
25%	20

The work instruction emphasis could shift from total numbers of cattle inspected to targeting the number of wounds inspected. The total number of wounds inspected per jurisdiction could provide a target sensitivity to detect an agreed design prevalence.

References

Sam Beckett 2014 Old World Screw-Worm Fly: Risk of Entry into Australia and Surveillance Requirements. Final Project Report November 2014

Urech R, Muharsini S, Tozer RS, Sumartono, Green PE, Brown GW, Spradbery JP, Mayer DG, Tack Kan Y and Kison A (2013). Cattle herd inspections and fly trapping for the detection of the Old World screw-worm fly, *Chrysomya bezziana*. Aust. Vet. J.: in print.