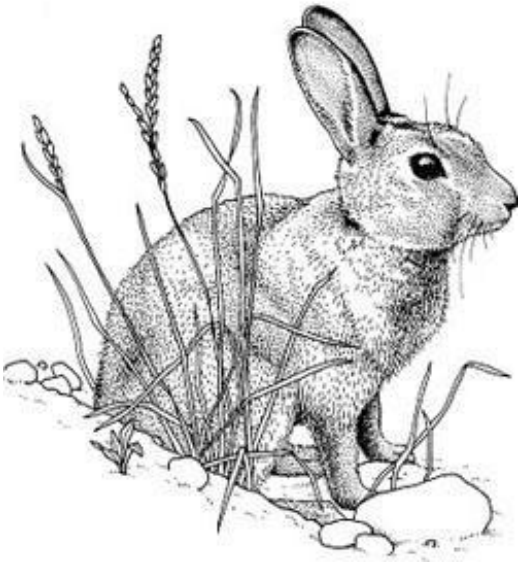
Final Report to the Australian Bureau of Agricultural and Resource Economics and Sciences –
Department of Agriculture, Fisheries and Forestry
Prepared for the

Australian Government
Department of Agriculture, Fisheries and Forestry
ABARES

Maximising the potential of improved biological control for rabbits



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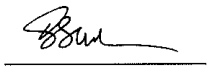
June 2014

The project 'Maximising the potential of improved biological control for rabbits' was carried out in accordance with the Objectives, Key Performance Indicators and Milestones as detailed in the following report.



20 June 2014

Signed Date

Ian S Wilkinson

Manager, Invasive Species Science

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Overview

Each year, rabbits cause an estimated $600 million worth of damage to agriculture in Australia. They also undermine farm sheds and other buildings, cause serious erosion and degradation problems, prevent regeneration of native vegetation, and damage domestic gardens and recreation areas.

In response to a recent rise in rabbit numbers throughout eastern Australia, a national Caring for our Country Program, RHD-Boost, was developed (now funded by the Invasive Animals Cooperative Research Centre). This project aims to identify, test and release a more virulent strain(s) of rabbit haemorrhagic disease virus (RHDV) into rabbit populations throughout Australia in ~2015/16. This RHD-Boost project provided the impetus for the current research in Western Australia (WA), funded by the Australian Bureau of Agricultural and Resource Economics and Sciences Australian Pest Animal Research Program.

Prior to RHDV, rabbit numbers were very high in WA, with several hundred rabbits per kilometre in the 80s and early 90s recorded at sites along the south coast. Although the effects of RHDV were variable in WA, post-RHDV numbers of rabbits are lower than the plagues recorded in the 1980s. Through the current project "Maximising the potential of improved biological control for rabbits", we aimed to collect current information on the abundance of rabbits at select sites in WA. Specifically, our objectives were to:

1) Re-establish systematic rabbit monitoring in WA.

2) Monitor rabbit abundance and serological status to RHDV and RCV-A1 over time.

3) Engage landholders and community organisations in on-going rabbit monitoring.

4) Maintain collaborations to deliver strategic rabbit management in WA.

In 2012/13, quarterly rabbit surveys and sampling were completed at four sites, with two of these sites surveyed and sampled again in 2013/14. Results indicate a trend of continued low rabbit activity at monitored sites, at levels similar to those seen after the initial spread of RHDV in WA. Relative to eastern Australia, the proportion of RHDV-positive individuals in shot samples from WA was also low. No samples collected in either year from any of the sites tested positive for the presence of the benign calicivirus (RCV-A1).

The RHD virus was identified, extracted and sequenced from a combination of stored historical samples and opportunistically collected samples from rabbit carcasses throughout WA. In addition, suspected field vectors of RHDV (flies) were collected for eight consecutive months from one site in WA.

Project location

Rabbit surveys were undertaken throughout the northern, southern and central agricultural regions of WA (Fig. 1) at seven sites (Table 1) representing both inland and coastal localities.

Table 1: Site description and location of rabbit survey transects in 2012/13 and 2014/15, plus description of site where vector sampling was undertaken in 2013/14, ticks indicate that survey was completed, blank = no survey undertaken.

Site	Location (Lat –S, Long – E)	Habitat type	Spotlight surveys conducted / Samples collected								Mean annual rainfall (mm)
			Autumn 2012/13	Winter 2012/13	Spring 2012/13	Summer 2012/13	Autumn 2013/14	Winter 2013/14	Spring 2013/14	Summer 2013/14	
Bremer Bay (BB)	34.392; 119.370	Cropping / pasture	✓	✓	✓	✓					Coastal (629.5)
Gingin Shire (GG)	30.950; 115.400	Pasture / cropping	✓	✓	✓	✓	✓	✓	✓	✓	Coastal (738.7)
Chapman Valley (CV)	28.283; 115.033	Cropping / pasture	✓	✓	✓	✓	✓	✓	✓	✓	Inland (447.8)
Lake Grace (LG)	33.133; 119.083	Cropping / pasture	✓	✓	count only ✓						Inland (265)
Stirling Ranges (SR)*	34.314; 118.033	Cropping / pasture – bordering national park	✓ (2011/12)	✓ (2011/12)	✓ (2011/12)	✓ (2011/12)					Inland (725.9)
Wellstead (WS)	34.323; 118.344	Cropping / pasture			shoot only ✓	shoot only ✓					Inland, coastal influence (5-600)
Whiteman Park (WP)	31.835; 115.944	Conservation / recreation reserve					✓ vector	✓ vector	✓ vector	✓ vector	Inland, coastal influence (770.3)

*Stirling Ranges surveys funded through RHD-Boost collaborative project

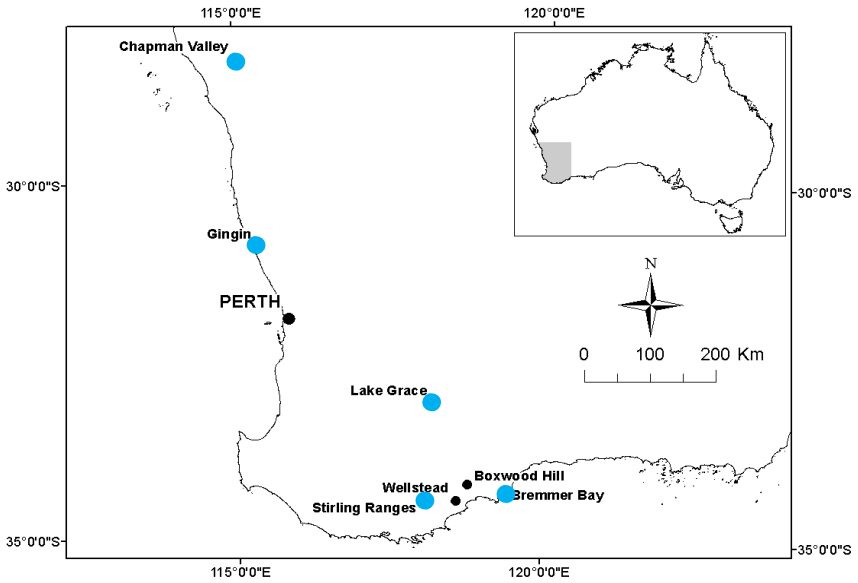


Figure 1: Location of main rabbit survey and sampling sites in the agricultural region of Western Australia. Additional samples were collected from Wellstead and vector sampling was conducted at Whiteman Park (situated within the Perth metropolitan area)

Methods

Rabbit surveys

Spotlighting and sample collection protocols are outlined in detail in Appendix 1b (Job Hazard Analysis: Rabbit spotlighting and sample collection) and 1c (Rabbit monitoring and sampling protocols). In the majority of instances, three nights of spotlighting were undertaken at each site to determine an index of rabbit abundance. Other feral animals and native herbivores were also counted and recorded along transects. A fourth night of spotlighting was then undertaken which included shot sampling of rabbits along transects (max. 20 individuals per transect).

Sample analysis

Once collected, samples were stored or sent for analysis. Blood samples were spun down within 36 hours of collection and sera sent to CSIRO laboratories in Canberra for RCV-A1 detection (RCV-A1 specific cELISA) and to Primary Industries and Regions South Australia (PIRSA) laboratories in Adelaide for RHDV detection (four isoELISA tests - cELISA, IgG, IgA and IgM). While all these four tests can determine if a rabbit was exposed to RHDV, the detection of IgM is indicative of a recent (i.e. less than six weeks) exposure to the virus.

Eyeballs preserved in neutral buffer formalin were sent to NSW Department of Primary Industries in Orange for age estimation (eye lens weight *v* body weight regression calculation). Liver samples (both frozen and separate sample stored in 90 % Ethanol) and duodenum samples (frozen) from all individuals have been retained at the DAFWA.

Any historical and opportunistic carcass samples were also sent to PIRSA and screened initially for RHDV presence / absence. Virus RNA was then extracted where possible from positive samples and sequenced.

Vector surveys

Whiteman Park was chosen as a suitable location for setting fly traps to monitor potential RHDV vector activity from August 2013 through to February 2014. Two locations within the park were selected, either on, or adjacent to, active rabbit warrens. Two styles of fly trap (Fig. 2) were baited with "Fly Trap Bait" (GEPRO, Welshpool Rd, Perth). The powered fly bait was mixed with warm water and left to stand for several days prior to use in the traps. Our intention was to pair up vector sampling with collection of sera from shot rabbits at the same site. Unfortunately, rabbit control at Whiteman Park is undertaken by a private contractor, who was unable to regularly and reliably collect fresh blood from shot rabbits for our analyses.

Traps containing live flies were collected from the field every two days over a fortnight period every month, for eight months. Whole traps were placed into -20^{o}C freezers for approximately one hour. Frozen flies were removed from traps and have been kept frozen at -20^{o}C for sorting. To date, vector samples have not been sorted and have not yet been screened for presence / absence of RHDV. Where possible, specimens will be sorted to species level, or to genera for bush flies (*Musca* spp.).

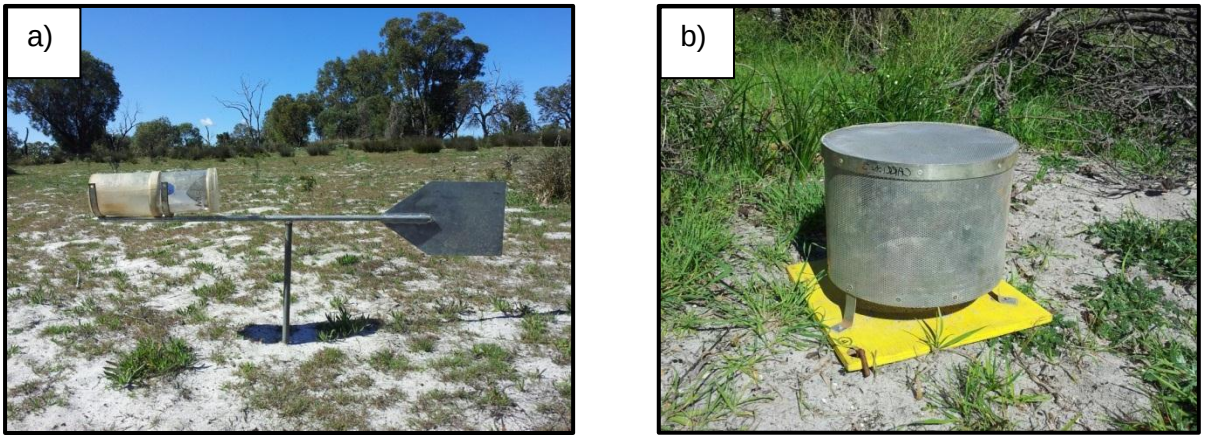


Fig. 2. Wind orientated fly traps (a) and ground fly traps (b) were baited for two weeks every month from August 2013 to February 2014 at Whiteman Park, Perth.

Results

Rabbit surveys

The location and timing of survey and sample collections for both rabbits and vectors are outlined in Table 1. Rabbit abundance was highest throughout the Stirling Ranges (between 6 – 8 rabbits km^{-1}), and lowest at Lake Grace (<1 rabbit km^{-1}). Typically, rabbit abundance was consistent within and between sites (at ~3 – 5 rabbits km^{-1}) over the course of project (Fig 3). Notable declines in abundance were detected at Chapman Valley and Gingin in the spring survey of 2013, corresponding to an outbreak of RHDV at these localities.

Historically, rabbit abundance has been much higher at the surveys sites. For example, pre-RHDV release, rabbit numbers were very high, with several hundred rabbits per km in the

80s and early 90s recorded at sites on the south coast. At Chapman Valley and Gingin in the northern agricultural region, rabbit abundance pre-RHDV release was at least twice as high as current surveys indicate (Fig. 4a, b).

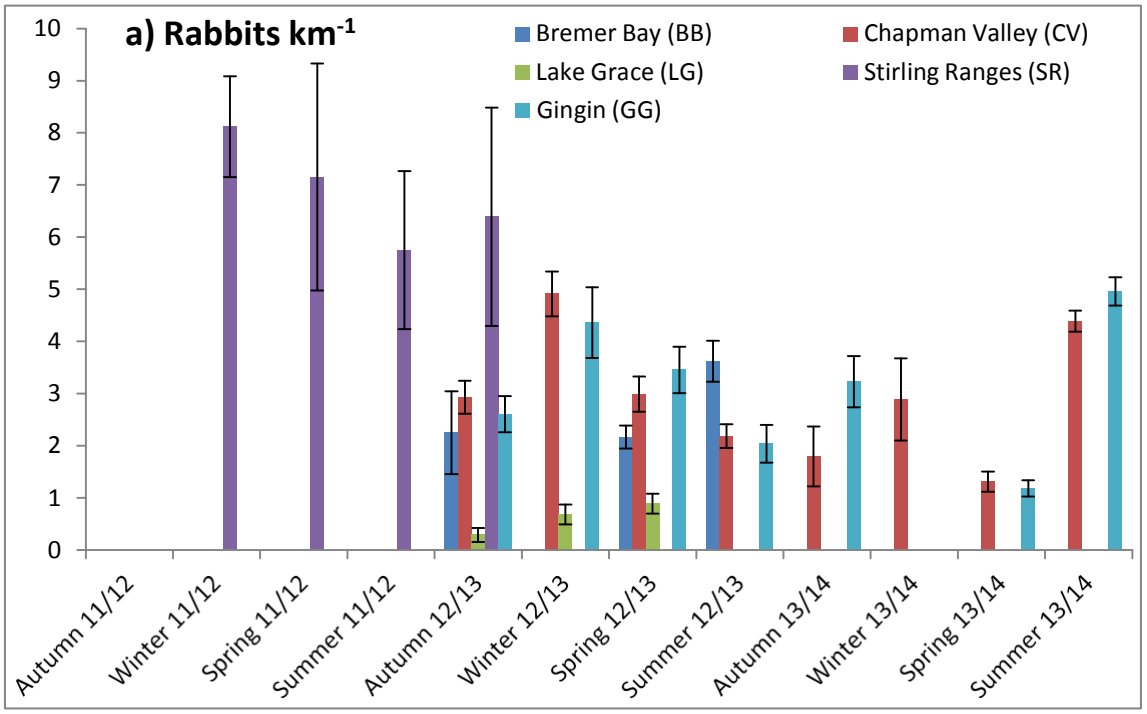
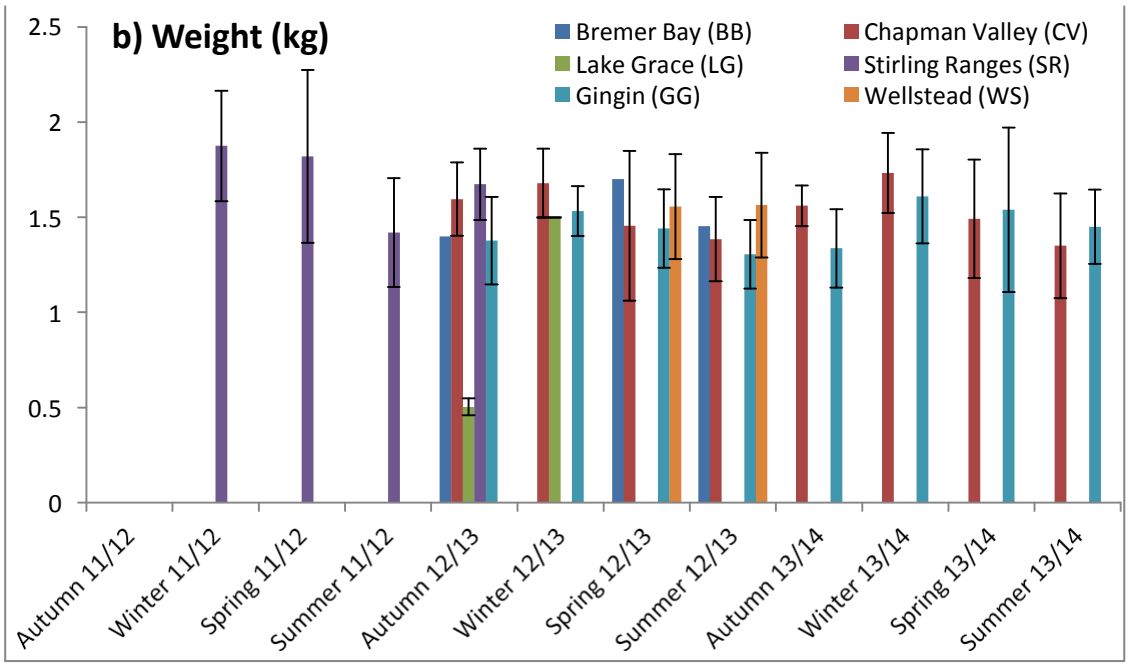
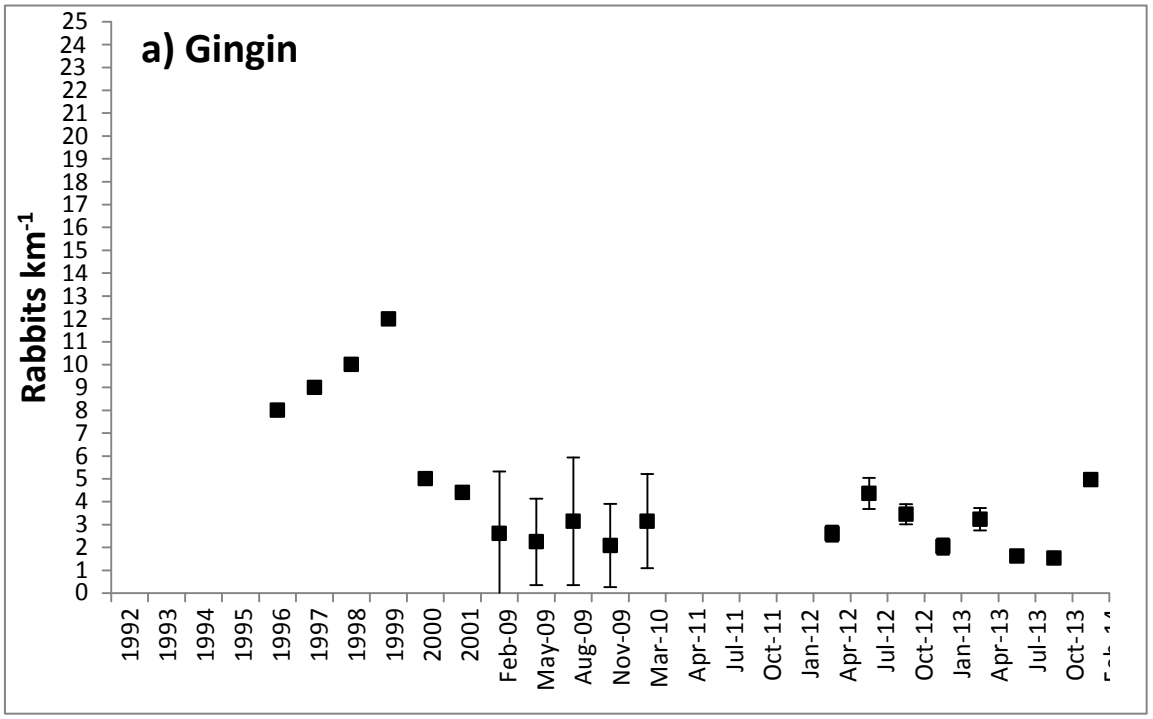


Fig. 3 a) Mean number of rabbits from three consecutive spotlight counts at sites throughout the West Australian agricultural region from 2011 – 2014. b) Mean weight (kg) of shot rabbits sampled on one night along the same transects. All error bars are one standard deviation.





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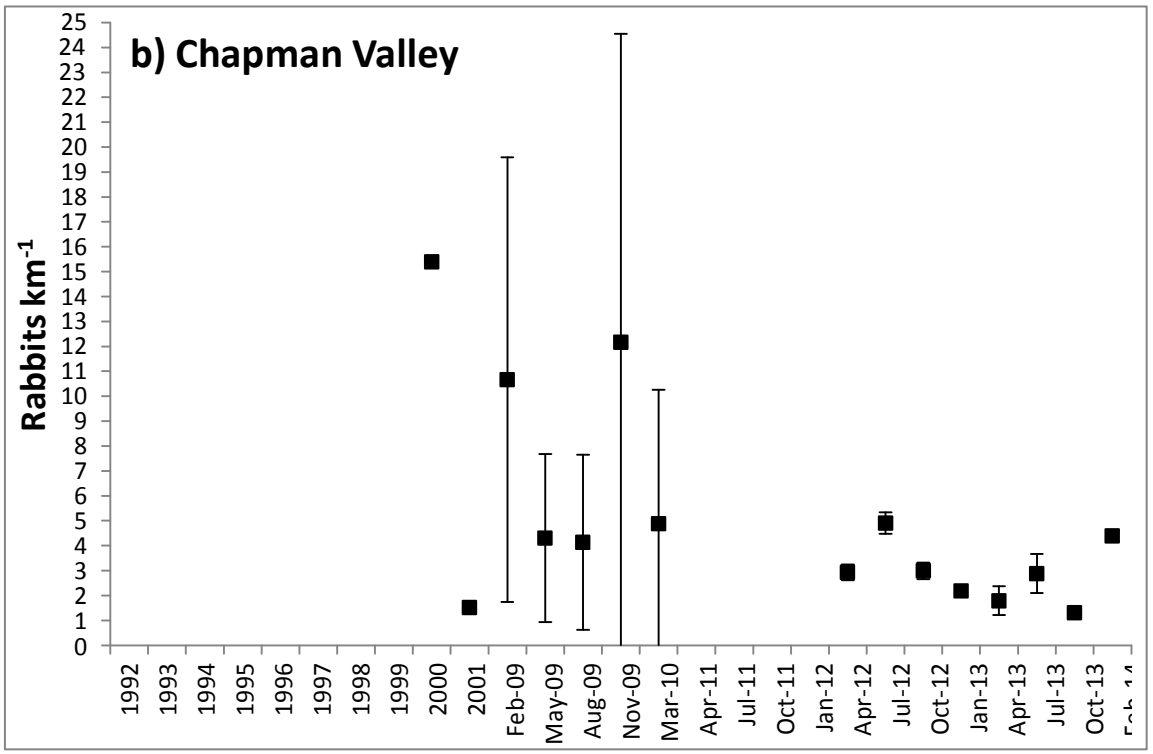
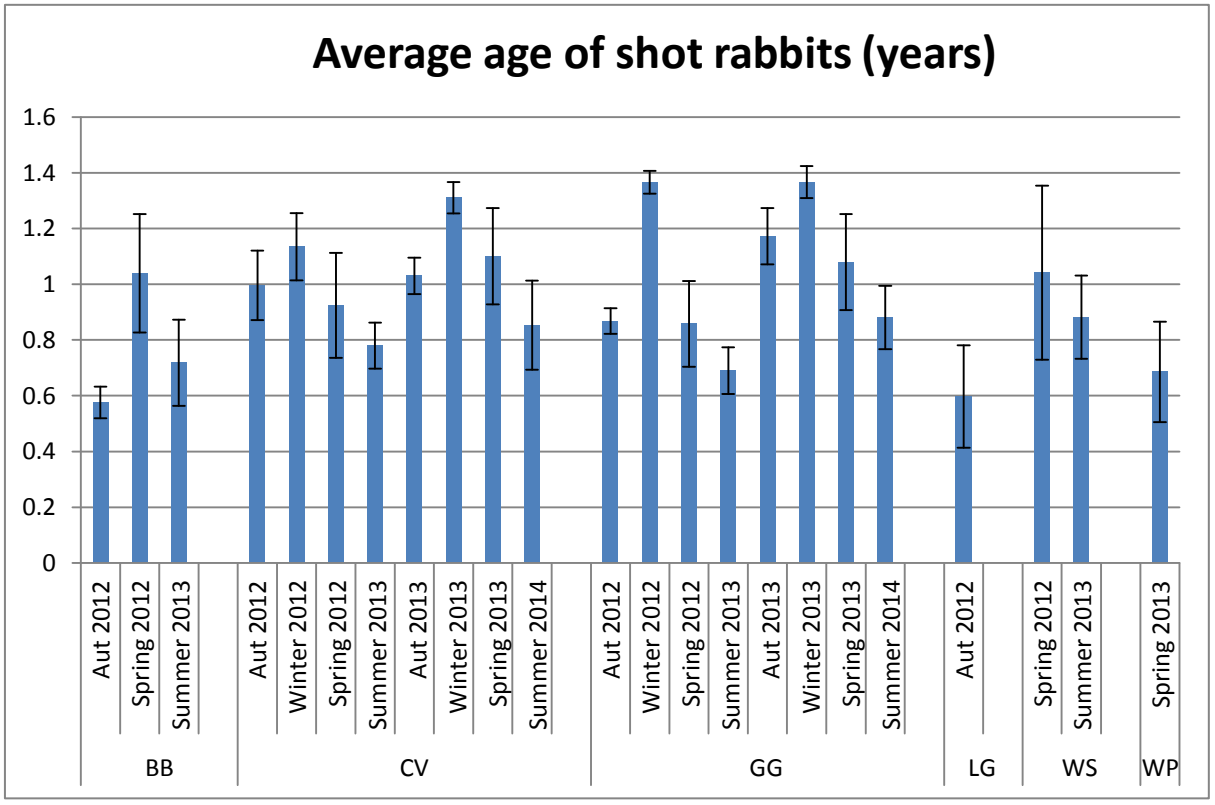


Age estimation

A standard formula is applied to the dry lens weight of eye-ball lens' collected from shot rabbits to estimate age with a high degree of accuracy. Figure 5 shows the average age in years of rabbits sampled from transects throughout WA (± 1 s.error). There was a significant effect of season on the age of rabbits shot (2-factor ANOVA; season $F_{7,215}$, P<0.001), with older rabbits sampled in winter as expected as young born the previous spring mature. There was no effect of site (site $F_{5,215}$, P = 0.169) and the interaction between season and site was also not significant. The age distribution of individuals sampled from each transect during each season does not likely reflect the true age structure of the rabbit population at each site. Shot rabbits tend to be large (and therefore older) and very few kittens were sampled at any locality.



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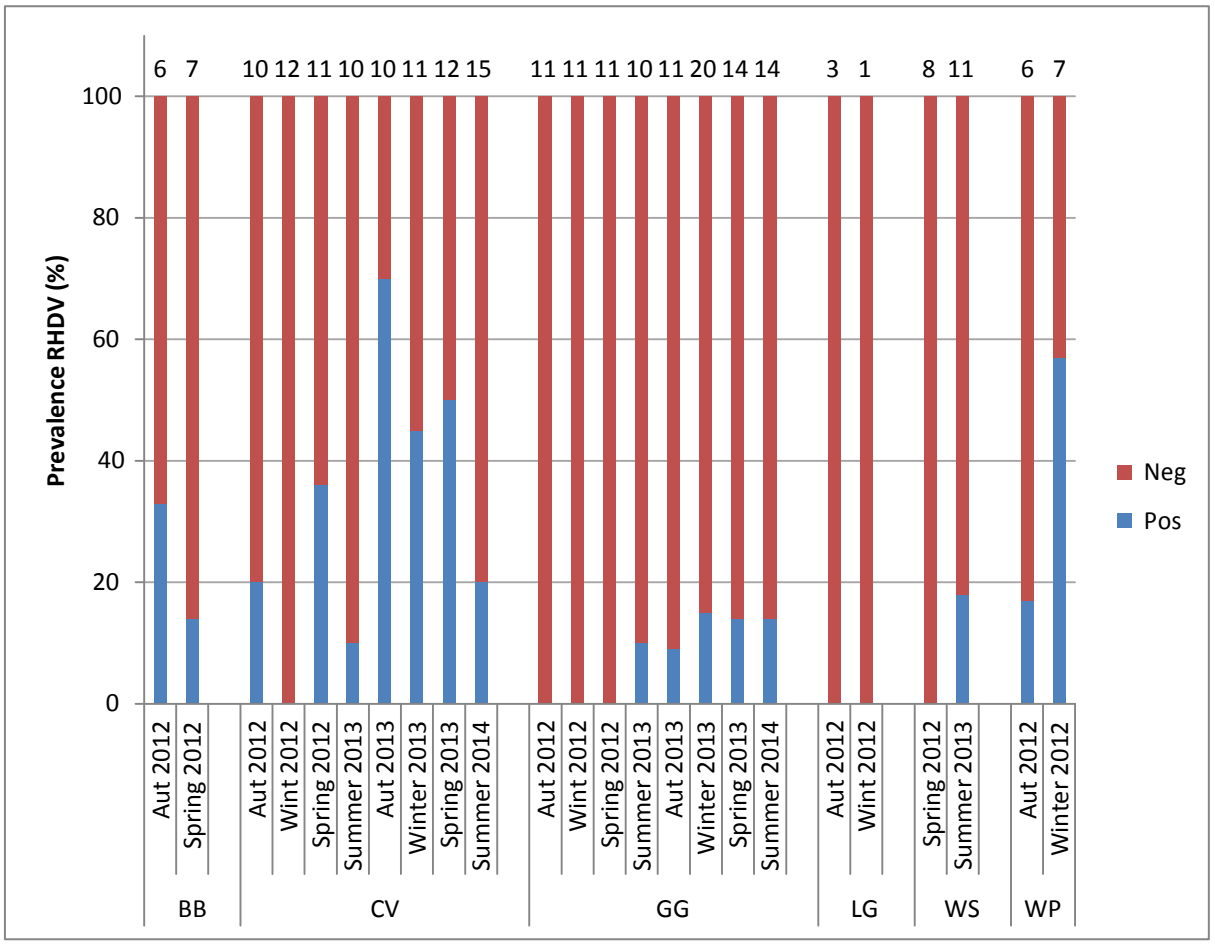
Sample serology

Under the current project, 242 serology samples were analysed to determine individual RHDV immunological status. Figure 6 illustrates the prevalence of individuals that tested positive to possessing IgG antibodies to RHDV (i.e. proportion of individuals from the shot samples that have been exposed to RHDV). The highest prevalence (70 %) of individuals with antibodies to RHDV was detected at Chapman Valley in the northern agricultural region in autumn, 2013. The reduction in overall rabbit activity caused by the autumn 2013 outbreak is evident from photographs taken on the same property (Fig. 7 a,b), where rabbit browse lines into crops are much reduced after the RHDV outbreak. Overall, prevalence

across sites was low (average 18.8 % ± 4.3 % standard error), ranging from 0 – 70 %. No individuals tested positive from the Lake Grace locality in the central agricultural region, however sample sizes were very small (1 – 3 individuals). All samples were also tested for the presence of antibodies to the benign calicivirus (RCV-A1), and *all* samples returned negative for this test.



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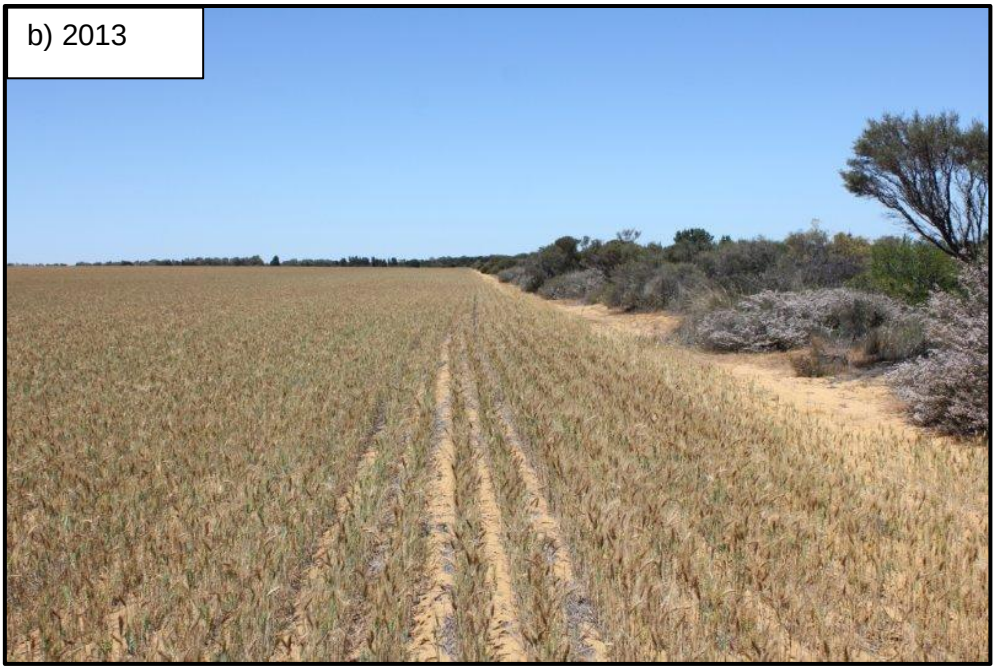

Vector sampling

It is anticipated that sorting and classifying sample collections will take two weeks and will be finalised in July 2014. Subsequently, we established collaboration with Dr Nina Schwensow (School of Earth and Environmental Sciences, University of Adelaide) who is also extracting and sequencing RHDV RNA from vector samples collected in South Australia. We have chosen to pursue this collaboration as a means of utilising established laboratory protocols and to ensure efficient processing of samples. Dr Schwensow is exploring Next Generation genetic techniques to efficiently process RNA samples, and will process and sequence WA vector samples and supply the DAFWA with results once completed. Any RNA strains sequenced can then be compared to sequenced strains of RHDV identified from rabbit carcasses.

A total of 21 rabbits have also been sampled from the Whiteman Park location between April 2012 and May 2013. To date, 13 have screened for RHDV which was detected in 38% of samples. Any sequenced virus RNA obtained from vectors will be compared to that sequenced from these rabbit samples, as well as from other positive rabbit samples collected during the course of the current project.

All future results from vector and opportunistic rabbit carcass screening and sequencing will be forwarded to ABARES.

Opportunistic sample collection and sequencing

In 2013 and 2014, we undertook a media campaign to raise the profile of the current work and to request that landholders report any suspected RHDV rabbit carcasses to the DAFWA. The aim of collecting opportunistic carcasses was to increase the probability that we could detect RHDV presence in rabbit populations, if it was present. Of the 33 historical and opportunistic samples that were supplied to PIRSA laboratories for RHDV analysis (majority sent in 2011; Table 2), ten have tested positive for presence of RHDV RNA using PCR, 15 remain to be tested (by end July 2014) and three require re-testing (no band seen on the initial PCR screen). All positive samples will be submitted for sequencing, which is anticipated to commence by July 2014. The large (three year) delay in the processing of these samples was unanticipated and in part reflects conflicting work priorities for the PIRSA laboratory and the lack of alternative, cost-effective, out-sourcing options.

RHDV was detected in 10 of the 15 screened 'opportunistic' rabbit samples (prevalence of 67%). This prevalence is higher than the average obtained across all sites where samples were collected from shot rabbits (range 0-70%). The prevalence of RHDV detected in opportunistic samples is therefore likely to be a more accurate reflection of the true prevalence of RHDV in wild rabbit populations.

Table 2: List of historical and opportunistic rabbit samples submitted between 2011 – 2014 screened for the presence of RHDV.

Sample ID	Tissue	Date	Lat	Long	Location (km relative to Perth metro)	PCR Result

L1	Liver	Jan-12	S 31 21' 06.60"	E 116 25' 54.48".	95 NE	**not tested**
L2	Liver	Jan-12	S 31 21' 06.60"	E 116 25' 54.48".	95 NE	**not tested**
L3	Liver	Jan-12	S 31 21' 06.60"	E 116 25' 54.48".	95 NE	**not tested**
L4	Liver	Jan-12	S 31 21' 06.60"	E 116 25' 54.48".	95 NE	**+ve**
PINJ01	Liver	Jan-12	-32.65785	115.874205	75 S	**+ve**
PINJ02	Liver	Jan-12	-32.65785	115.874205	75 S	**not tested**
Abbey01	Liver	5/02/12	-33.66461	115.256056	200 SW	**+ve**
FF01	Femur	9/03/12	-31.98985	116.00993	Perth metro	**not tested**
WH#1	Liver	25/09/12	-30.841032	116.723313	145 NE	**+ve**
WH#2	Liver	25/09/12	-30.84133	116.72467	145 NE	**not tested**
CRIS_1009720	Leg	19/09/12	-28.078	114.652	380 NNW	**not tested**
PARUNA Sanctuary	Liver	10/06/12			50 NE	**+ve**
Cameron_Wild_1	Liver	20/10/11	-31.353	119.182	330 E	**+ve**
17 Mile Gate 1	Leg	5/09/12	-31.696876	117.280906	135 E	**not tested**
17 Mile Gate 1	Leg	5/09/12	-31.696876	117.280906	135 E	**not tested**
R&K cummings	leg	19/02/12	270718.01	6822043.82	420 N	**not tested**
Trevor_McIntosh_1	Liver	15/09/10	-34.9188	117.3555	360 SE	**+ve**
Trevor_McIntosh_2	Liver	15/09/10	-34.9188	117.3555	360 SE	**+ve**
Trevor_McIntosh_3	Liver	15/09/10	-34.9188	117.3555	360 SE	**no band**
Mark_Tomaseting_1	Liver	15/09/10	-35.0043	117.8050	380 SE	**not tested**
Mark_Tomaseting_2	Liver	15/09/10	-35.0043	117.8050	380 SE	**+ve**
Rob_Copeland	Liver	15/09/10	S33 53' 12.195"	E118 16' 00.60"	310 SE	**no band**
David Elphick	Liver	15/09/10	-35.0342	117.6489	380 SE	**no band**
South Coast NRM	Liver	7/11/10	S34 59' 04.82"	E117 52' 52.20	390 SE	**+ve**
Dan & Jang Orchard	Liver	15/09/10	-32.08105	115.79067	Perth metro	**not tested**
Lorna Glen Research Station_1	Whole carcass	Oct-2013	-26.2269	121.5490	840 NE	**not tested**
JR1-JR6	Liver	04/03/14	-27.5778	114.5022	530 NNW	**not tested**

Bakers Hill_1	Whole carcass	1/11/13	-31.7479	116.4595	60 ENE	**not tested**

Discussion

The current project addressed the need for contemporary rabbit surveys throughout Western Australia at localities with differing annual rainfall and land-use. Whilst relatively extensive knowledge exists in this state with regards to historical rabbit abundance, particularly around the time of the original release of RHDV, no systematic surveys had been conducted in recent years. The current data has therefore helped determine whether rabbit populations in WA are increasing, as has been suggested for certain areas in the eastern states of Australia. Our field data also provides important ground-truthing information to compare to alternative forms of rabbit index estimations, including citizen science initiatives (e.g. "FeralScan"). From a national perspective, this current information, particularly when combined with the results of serological analyses, are important for informing the participation of WA in the on-going IA-CRC RHD-Boost project.

The current project has therefore value-added to the RHD-Boost project, by collecting and collating data on rabbit abundance and serological status to both RHDV and RCV-A1. Our current findings indicate that the current field strain(s) of RHDV are most active amongst wild rabbit populations during late spring, early autumn. However, the prevalence of RHDV activity we detected amongst shot rabbit samples was relatively low at all sites sampled compared to the level of activity seen amongst eastern state rabbit populations. This may reflect our sampling strategy, such that more accurate prevalence rates could be obtained via screening of opportunistic samples, and / or it may indicate that conditions (e.g. rabbit abundance, vector behaviour, climate and land-use) for RHDV transmission are not as conducive in WA compared to other locations throughout Australia. Without knowing the properties of the new strain(s) of RHDV to be released under the RHD-Boost project (i.e., will the virulence of the new strain outcompete existing field strains, or will the new strain infect individuals carrying RCV-A1 antibodies), it is difficult to comment on the most strategic release sites in WA. However, the current project has provided important background abundance and serological information that will help inform management in WA on where new strains of RHDV may be particularly effective, and knowledge on the best timing of release, once the characteristics of the new strain are known.

That no samples collected during the current study tested positive for the benign calicivirus is an intriguing result. Antibodies against this variant of the virus are commonly found in eastern Australia with prevalence between 13 and 100 %. The benign virus was first detected and reported from the south coast of WA by Bruce and Twigg (2004)[1]. It remains unclear whether we did not detect antibodies against RCV-A1 because of the limited geographical extent of our sampling (although we did deliberately re-sample rabbits from Wellstead and Bremer Bay, locations near to where RCV-A1 was first detected), or whether the epidemiology of the benign virus has changed in WA and the virus is no longer present at the same level as before. It is possible that suppression of rabbit populations in WA post RHDV-release could be responsible for a breakdown in the direct transmission of RCV-A1 between rabbits (vectors do not seem to be as important in the transmission of RCV-A1 compared to the RHD virus). In addition, the propensity of rabbits to form warrens in WA is less compared to that seen in eastern Australia due to WA's extensive sandy, loose, soils.

Reduced warren use in WA may also further limit the chances of RCV-A1 transmission and may explain the absence of this virus from all the samples collected during the current study. Finally, there is the (yet to be tested) possibility that a field strain(s) of RHDV in WA has been / is circulating that is capable of over-riding the immunity previously conferred by RCV-A1.

The implication of the lack of RCV-A1 presence in WA is that any new, more virulent strains of RHDV released in the future may be particularly effective at further reducing rabbit populations in WA, especially in the northern, central and southern agricultural areas sampled during the current project. In ongoing work, the DAFWA is seeking to collect additional rabbit samples from the south-west corner of WA, where modelling by CSIRO researchers in Canberra indicates the highest probability for detecting RCV-A1.

On-going research potential

We have collected tissue from all rabbits sampled to date for both DNA and virus RNA extraction. As per Table 2, we have also sent for sequencing several opportunistic rabbit samples collected in WA. We would like to pursue a host-disease molecular epidemiological study to further investigate the mode of virus transmission. By investigating rabbit population dynamics, virus epidemiology and rabbit population genetics, we will be able to compare field strains of RHDV circulating in WA with those in the eastern states and help inform at a national level on the mode and efficacy of RHDV biological control of rabbits.

The DAFWA intends to continue its participation with the IA-CRC RHD-Boost project by undertaking new rabbit and serological surveys in the far south-west corner of the state (near Cape Leeuwin / Cape Naturalist area) in 2015. This work represents a collaborative approach between DAFWA and the national RHD-Boost project managers.

[1]Bruce, J.S. and Twigg, L.E. (2004). Rabbit haemorrhagic disease virus: serological evidence of a non-virulent RHDV-like virus in south-western Australia. *Wildlife Research* **31**: 605-612.

Media / Extension

- **ABC radio -** 10th October 2012: ABC 720 with John McGlue – Rabbit monitoring and control in Western Australia. In response to anecdotal community reports of increasing numbers of rabbits in metropolitan areas, Susan Campbell was asked by ABC radio to provide an update on current rabbit work being undertaken by the Department of Agriculture and Food, WA. This interview provided an opportunity for informing the community on current research activities at local and national scales, including the current project and its role in the larger RHD-Boost program. The interview was effective, as evidenced by a follow up request from a local community meeting group for a presentation on rabbits (below).

- **Ballajura library talk (SC) –** 22nd February 2013. Susan Campbell gave a 45 min presentation, including discussion, to a local community group at the Ballajura library. Through this presentation we provided an overview of rabbit control and then focussed on current research activities. This presentation was effective in raising

awareness of on-going rabbit work and we took the opportunity to remind the community to report any dead rabbits that may have died from RHDV to the DAFWA.

- **NAR presentation (IW)** – 19th March 2013. Leader of Invasive Species Science (ISS), Dr Ian Wilkinson provided a presentation to management and staff of the Northern Agricultural Region (NAR) on ISS projects, including an update on rabbit activities. Staff appreciated receiving feedback on how their on-ground work had contributed to a larger project, we were able to provide summary statistics from all the surveys and were able to scope the potential for on-going work in this region.

- **Media Statement – 26 June 2013**

Government of Western Australia
Department of Agriculture and Food

Media Statement

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26 June 2013

Landholders asked to support rabbit research

The Department of Agriculture and Food is appealing for assistance from rural and metropolitan landholders in its latest research into controlling growing rabbit populations.

The department's Invasive Species Science group is exploring several options for improved rabbit control, including research into sourcing and releasing a new strain of rabbit haemorrhagic disease virus (RHDV).

The virus was first introduced in 1996 in response to a decline in the effectiveness of myxomatosis disease.

Department researcher Susan Campbell said that research in Western Australia was being undertaken as part of the national RHD-'Boost' program, run through the Invasive Animals Cooperative Research Centre, Australia's largest integrated invasive animal research program.

"The program aims to sample rabbits throughout Australia and assess whether individuals have been exposed previously and carry antibodies to RHDV and a related benign form of the virus," Dr Campbell said.

"West Australian landholders can help by reporting any suspected outbreak of RHDV on their property to their local department office or directly to our team.

"Outbreaks would be evidenced by carcasses that show no obvious outward signs of death.

“The information will be used to assist with the strategic release of new viral strains.”

Dr Campbell said that, along with fieldwork, researchers were conducting laboratory studies to source, sequence and test various strains of RHDV to identify a suitable, virulent strain for release in Australia.

The group is also investigating the role of insect vectors in the transmission of this virus by sampling flies from the wild and sequencing samples to determine whether a virus is present.

Dr Campbell said there was currently little information available on the pathways of transmission of RHDV in the wild.

“The research work being undertaken now will be of great benefit when it comes time to release any new strain(s) of RHDV in the near future,” Dr Campbell said.

The work is being funded by the Australian Bureau of Agricultural and Resource Economics and Sciences, through its Australian Pest Animal Research Program to increase rabbit monitoring in Western Australia.

Since their introduction in 1859, European rabbits (*Oryctolagus cuniculus*) have had a devastating impact on agricultural production and biodiversity in Australia, with competition and land degradation by rabbits listed as key threatening processes under the *Commonwealth’s Environmental Protection and Biodiversity Act (1999)*.

Carcass reports can be made directly to Dr Susan Campbell on (08) 9366 2301.

Media contacts:

Dr Susan Campbell, DAFWA researcher 9366 2301

Jodie Thomson/Lisa Bertram, media liaison 9368 3937/3325

- **Article for DPaW Bushland News (Spring 2013):**

With funding from the Australian Bureau of Agricultural and Resource Economics and Science's Australian Pest Animal Research Program, the West Australian Department of Agriculture and Food's Invasive Species Science group is conducting research to support ongoing, effective, biological control of rabbits in Western Australia (WA).

Rabbit Haemorrhagic Disease Virus (RHDV – formally known as rabbit calicivirus) was first introduced in 1996 in response to a decline in the effectiveness of myxomatosis disease. Unfortunately rabbit numbers are on the rise again throughout the country, triggering a need for researchers to source and release more virulent strain(s) of RHDV.

Research in WA is being undertaken in conjunction with the national RHD-'Boost' program, run through the Invasive Animals Cooperative Research Centre. This program aims to sample rabbits throughout Australia and assess whether individuals have been exposed previously and carry antibodies to RHDV and a related benign form of the virus.

Rabbit survey and sampling is currently undertaken at strategic locations throughout the Northern, Central and Southern Agricultural regions in WA. In addition, WA landholders can assist by reporting any suspected outbreak of RHDV on their property to their local department office.

Outbreaks of RHDV would be evidenced by carcasses that show no obvious outward signs of death. The information collected from fresh carcasses will be used to assist with the strategic release of new viral strain(s) in the future.

Work is also underway at Whiteman Park where samples of flies are collected every month to determine the role that these insects may play as vectors of RHDV. There is currently little information available on the pathways of transmission of RHDV in the wild.

Since their introduction in 1859, European rabbits (*Oryctolagus cuniculus*) have had a devastating impact on agricultural production and biodiversity in Australia, with competition and land degradation by rabbits listed as key threatening processes under the Commonwealth's Environmental Protection and Biodiversity Act (1999).

Reports of rabbit carcasses that may have died from RHDV can be made directly to Dr Susan Campbell, Research Officer, DAFWA on 9366 2301 or to your local DAFWA office.

Photo caption: ***The Department of Agriculture and Food WA is encouraging rural and metropolitan landholders to report any fresh rabbit carcasses discovered on their properties to support research on improved rabbit biological control.***

Photo credit: Brian Lukins, Industry & Investment, NSW.

- **Northern AgMemo (SC)** - 18th July 2013
  http://www.agric.wa.gov.au/PC_95781.html?s=716437179
  'WA landholders asked to support rabbit research"

- **Media Release – January 2014**

Government of **Western Australia**
Department of **Agriculture and Food**

Media Statement

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23 January 2014

Landholders encouraged to contribute to rabbit research

Landholders throughout Western Australia are being asked to keep an eye out for dead or diseased rabbits and report them to the Department of Agriculture and Food.

Department research officer Susan Campbell said rabbit surveillance by the community and department was part of ongoing biological control research to address rabbit numbers.

"The initial release of the rabbit haemorrhagic disease virus (RHDV, 'calicivirus') in 1995 succeeded in suppressing rabbit numbers to varying extents throughout the landscape, however in recent times rabbit numbers have again begun to increase," Dr Campbell said.

"Researchers are seeking reports of suspected RHDV or myxoma virus outbreaks to enable us to collect samples from rabbit carcasses and test for the prevalence of rabbit control viruses in WA.

"By testing for viruses and comparing the strains of viruses in WA to those present in the eastern states, we will be better able to plan for effective future rabbit control."

Dr Campbell said an outbreak of RHDV would be evidenced by a noticeable drop in rabbit activity and possibly dead rabbits that showed no sign of injury or disease.

During a myxoma virus outbreak, rabbit activity would also decline and affected rabbits would have lesions and abscesses, particularly around the eyes and ears.

Since their introduction in Australia, European rabbits have had a devastating impact on agricultural production and biodiversity, caused largely through competition and land degradation.

Rabbits are estimated to cost Australian agriculture $200 million annually.

The ongoing rabbit research conducted by the Department of Agriculture and Food is part of the Australian Pest Animal Research Program (APARP), supported by the Australian government.

Landholders who suspect an outbreak of either RHDV or myxoma virus are asked to immediately contact their local department office or Dr Susan Campbell on +61 (0)8 9366
2301.

Media contact:

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Dr Susan Campbell, research officer	+61 (0)8 9366 2301

- **Summary of subsequent local print and radio media in 2014**

summary 2014 media uptake.txt