

**Annual Report to  
Environmental Protection Authority  
for**

**Activities under ERMA 200223**

**AgResearch Ltd**

For the 12 months ending  
**30<sup>th</sup> June 2021**

**Submitted by Tim Hale  
Delegated Facility Operator / Manager  
AgResearch Ruakura  
Animal Containment Facility**

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## **Summary of Activities for the period 1st July 2020 to 30<sup>th</sup> June 2021**

This summary provides the information required by control 11 (Annual reporting) of the HSNO Act approval ERMA200223.

### **Outdoor Development Activities**

All outdoor development activities being carried out within the Animal Containment Facility at Ruakura comply with the requirements of the ERMA200223 approval.

Cattle, still alive at the end of the reporting period have now only been developed and maintained under the ERMA200223 approval.

Goat development and maintenance activities now only involve animals developed under the ERMA200223 approval.

Cattle, Goat and Sheep activities, other than the maintenance or growing of animals, have been flushing eggs from fertile animals, kidding of goats, lambing of recipient ewes and the transfer of embryos to and in some cases early stage recovery, from recipient animals. Semen has been collected from Rams for analysis or storage for future use.

Embryo Transfer activities this year have been in all three species.

These transferred embryos fall within the approved organism description for the ERMA200223 approval and are for either the production of human therapeutic proteins, or for the study of gene function.

All activities have been undertaken with the approval of the Ruakura Animal Ethics Committee.

Further details on development activities are provided within the following Science, Management and Ethics reports.

### **Unforeseen adverse effects resulting from the genetic modifications**

There have been no unforeseen adverse effects identified during this period.

### **Iwi liaison group relationship development and management activities**

The ERMA200223 Liaison Group has still not officially met since December 2011.

As advised in previous annual reports, at the request of a group of Ngati - Wairere elders the Liaison meetings were put on hold, while representation and membership of the Liaison group was discussed within the Hapu.

Following some correspondence and individual contact, this group of Ngati - Wairere elders was invited and did visit Ruakura in October 2012 and a process to progress representation was discussed. Unfortunately, due to circumstances mainly outside of AgResearch influence and despite further attempts, no progress has been made in resolving this representation directly to date.

There has again been some informal contact with original monitoring group members and regular contact with Tainui Group Holdings on their development activities for Ruakura.

AgResearch's Manager Māori - Strategy and Engagement who has local affiliations and his team are still working to build a relationship with Ngati - Wairere for Liaison Group and other Ruakura initiatives of interest to Ngati -Wairere and Tainui.

Members of the AgResearch Maori and Animal Science teams did meet in March 2021 with representatives from Te Haa o te Whenua O Kirikiriroa, principally to initiate the development of a long-term relationship for constructive consultation, but also to discuss a new area of GM animal science. Further interactions are being planned.

## **Additional Supporting Information**

The following reports are supporting information provided to expand on the previous summary and provide evidence of wider compliance with ERMA200223 Controls and MAF/ERMA New Zealand Standard 'Containment Standard for Field Testing of Farm Animals'.

This additional supporting information is also provided to enable equivalence to the previous annual reporting for the inactive GMF98009 approvals.

## **Science Report**

### **Cattle modified for milk composition**

- Cattle were maintained to investigate longevity and potential long-term health effects
- The genetic engineered cattle show the same age-related health issues known from conventional cattle with increasing age
- Milk from different transgenic lines is functionally analysed as part of international collaborations

### **Generating cattle genome edited for adaptation to warmer temperatures**

- Edited embryos were validated for the correct editing and full conversion into the intended genotype.
- The transfer of embryos edited for a natural sequence variant associated with a lighter coat colour was unsuccessful in establishing pregnancies. A control experiment identified that a faulty culture reagent was responsible which was replaced.
- The following transfer of embryos edited for a natural sequence variant for a short hair phenotype associated with heat tolerance established pregnancies at the expected rate.
- Additional embryos edited for a natural sequence variant associated with a lighter coat colour were produced with eggs and sperm from donors of high genetic merit. The embryos were cryopreserved and are awaiting transfer.

### **Goats producing therapeutic proteins**

- Goats were maintained to investigate longevity and potential long-term health effects
- Some of the goats were used as embryo transfer recipients for the production of new lines of transgenic offspring
- The new knowledge generated with the production and characterisation of the goats were published in two scientific articles (Wang et al., *Biotechnology Reports* 28 e00533, 2020; Laible et al., *FASEB Bioadvances* 2, 638-652, 2020).

### **Goats producing female-only offspring**

- Rejuvenated transgenic cell strains were used to remove two marker genes with a site-specific enzyme. Marker gene-free transgenic cell strains were used for somatic cloning, alongside a small number of artificially inseminated (AI) control animals. One cloned goat and two AI controls was carried through to birth. All three animals are close to puberty and appear healthy.

## **Generating germline-complemented sheep and fertile founders for breeding sterile hosts**

- Viable cloned, gene-edited lambs were maintained from four different *NANOS2* genotypes, namely: male homozygous knockout (Group 1), male heterozygous knockout (Group 2), female homozygous knockout and female wild-type cell lines (Group 4). These animals are presently being phenotyped.
- Female *NANOS2*<sup>-/-</sup> and male *NANOS2*<sup>+/-</sup> cloned lambs were used for breeding using ovum-pickup and in vitro fertilisation (IVF) or AI, respectively. Both genotypes displayed normal fertility.

## **Generating immune-compatible sheep for xenotransplantation**

- *GGTA* and *CMAH* genes were knocked out by genome editing in male and female ovine fetal fibroblasts and used for somatic cell transfer cloning.
- 5 female lambs were born and confirmed for loss of  $\alpha$ -Gal and Neu5Gc. Four of these lambs were used for AI to generate gene-edited offspring of both sexes.

## **Generating anephric sheep fetuses for xenotransplantation**

- *SALL1* was knocked out using two different strategies (small vs large deletion) to disrupt kidney development in sheep fetuses. Fetuses showed variable phenotypes, ranging from mild-severe renal hypoplasia to complete loss of kidneys.
- *SALL1* wild-type donor fibroblasts with an RFP reporter gene were generated and used for embryo complementation with *SALL1* knockout hosts. Recovered fetuses showed variable RFP chimaerism and partial to complete kidney rescue.
- Overall, this suggests that the kidney niche in *SALL1*<sup>-/-</sup> males is vacant but intact and can be rescued by embryo complementation

## **Overexpression of the histone demethylase KDM4B in transgenic cattle**

- One cloned female animal overexpresses the histone demethylase KDM4B fused to a GFP reporter transgene. This animal (#1801) will be used for repeated ovum pick-up, followed by IVF with wild-type sperm to generate transgenic offspring of both sexes.

## On Farm Management Summary for year ending 30/06/2021

**Animal Numbers 01/07/2020– 30/06/2021** (Births exclude still born or animals which die soon after birth reported in Animal Ethics Reports, Aged In and Out records changes in animal age<sup>1</sup>)

| Stock Class  | Open<br>(1/07/20) | Births | Transfer<br>In | Transfer<br>Out | Aged<br>In | Aged<br>Out | Killed | Deaths | Closing<br>(30/06/21) |
|--|-------------------|--------|----------------|-----------------|------------|-------------|--------|--------|-----------------------|
| <b>Casein (ERMA200223)</b>   |                   |        |                |                 |            |             |        |        |                       |
| <b>Total Casein</b>  | 0                 | 0      | 0              | 0               | 0          | 0           | 0      | 0      | 0                     |
| <b>MBP (ERMA200223)</b>  |                   |        |                |                 |            |             |        |        |                       |
| <b>Total MPB</b>   | 0                 | 0      | 0              | 0               | 0          | 0           | 0      | 0      | 0                     |
| <b>rhLF (ERMA200223)</b>   |                   |        |                |                 |            |             |        |        |                       |
| <b>Total rhLF</b>  | 0                 | 0      | 0              | 0               | 0          | 0           | 0      | 0      | 0                     |
| <b>BLg - (ERMA200223)</b>  |                   |        |                |                 |            |             |        |        |                       |
| MA Cows  | 16                |        |                |                 | 0          |             | 1      |        | 15                    |
| <b>Total BLg -</b>   | 16                | 0      | 0              | 0               | 0          | 0           | 1      | 0      | 15                    |
| <b>Erbitux (ERMA200223)</b>  |                   |        |                |                 |            |             |        |        |                       |
| <b>Total Erbitux</b>   | 0                 | 0      | 0              | 0               | 0          | 0           | 0      | 0      | 0                     |
| <b>Coat Colour (ERMA200223)</b>                                      |                   |        |                |                 |            |             |        |        |                       |
| <b>Total Coat Colour</b>   | 0                 | 0      | 0              | 0               | 0          | 0           | 0      | 0      | 0                     |
| <b>KDM4B (ERMA200223)</b>  |                   |        |                |                 |            |             |        |        |                       |
| MA Cows  | 0                 |        |                |                 | 1          |             |        |        | 1                     |
| R2yr Heifer  | 1                 |        |                |                 |            | 1           |        |        | 0                     |
| <b>Total KDM4B</b>   | 1                 | 0      | 0              | 0               | 1          | 1           | 0      | 0      | 1                     |
| <b>Conventional Cattle</b>   |                   |        |                |                 |            |             |        |        |                       |
| MA Cows  | 28                |        | 31             |                 | 19         |             | 28     |        | 50                    |
| R2yr Heifers   | 0                 |        | 19             |                 | 31         | 19          |        |        | 31                    |
| Other classes  | 57                | 22     | 31             | 57              | 22         | 53          | 0      | 0      | 22                    |
| <b>Total Conventional</b>  | 85                | 22     | 81             | 57              | 72         | 72          | 28     | 0      | 103                   |
| <b>Cattle Total</b>  | 102               | 22     | 81             | 57              | 73         | 73          | 29     | 0      | 119                   |
| <b>Cattle developed under ERMA approvals (Tg and non Tg progeny)</b> |                   |        |                |                 |            |             |        |        | 16                    |

<sup>1</sup> Aligns with normal livestock reconciliation aging practice.

| Stock Class   | Open<br>(1/07/20) | Births   | Transfer<br>In | Transfer<br>Out | Aged<br>In | Aged<br>Out | Killed    | Deaths   | Closing<br>(30/06/21) |
|---|-------------------|----------|----------------|-----------------|------------|-------------|-----------|----------|-----------------------|
| <b>Goats</b>  |                   |          |                |                 |            |             |           |          |                       |
| <b>Erbitux &amp; Enbrel (ERMA200223)</b>                            |                   |          |                |                 |            |             |           |          |                       |
| Ma Doe  | 26                |          |                |                 | 1          |             | 8         |          | 19                    |
| R2yr Doe  | 1                 |          |                |                 |            | 1           |           |          | 0                     |
| R1yr Doe  | 0                 |          |                |                 |            |             |           |          | 0                     |
| Doe Kid   | 0                 |          |                |                 |            |             |           |          | 0                     |
| Buck Kid  | 0                 | 1        |                |                 |            |             |           |          | 1                     |
| R1yr Male +   | 0                 |          |                |                 |            |             |           |          | 0                     |
| Total Erbitux & Enbrel  | 27                | 1        | 0              | 0               | 1          | 1           | 8         | 0        | 20                    |
| <b>non Med inherit (ERMA200223)</b>                                 |                   |          |                |                 |            |             |           |          |                       |
| Total TCR   | 0                 | 0        | 0              | 0               | 0          | 0           | 0         | 0        | 0                     |
| <b>Conventional Goats</b>   |                   |          |                |                 |            |             |           |          |                       |
| MA Doe  | 23                |          |                |                 |            |             | 1         |          | 22                    |
| R2yr Doe  | 0                 |          |                |                 |            |             |           |          | 0                     |
| R1yr Doe  | 0                 |          |                |                 |            |             |           |          | 0                     |
| Male R1yr +   | 0                 |          |                |                 |            |             |           |          | 0                     |
| Kids  | 0                 | 2        |                |                 |            |             |           |          | 2                     |
| Total Conventional  | 23                | 2        | 0              | 0               | 0          | 0           | 1         | 0        | 24                    |
| <b>Goat Total</b>   | <b>50</b>         | <b>3</b> | <b>0</b>       | <b>0</b>        | <b>1</b>   | <b>1</b>    | <b>9</b>  | <b>0</b> | <b>44</b>             |
| <b>Goats developed under ERMA approvals (Tg and non Tg progeny)</b> |                   |          |                |                 |            |             |           |          | <b>20</b>             |
| Stock Class   | Open<br>(1/07/20) | Births   | Transfer<br>In | Transfer<br>Out | Aged<br>In | Aged<br>Out | Killed    | Deaths   | Closing<br>(30/06/21) |
| <b>Sheep</b>  |                   |          |                |                 |            |             |           |          |                       |
| <b>AI on Hooves</b>   |                   |          |                |                 |            |             |           |          |                       |
| 2th Ewes  | 0                 |          |                |                 | 12         |             |           |          | 12                    |
| R1yr Ewe  | 12                |          |                |                 |            | 12          |           |          | 0                     |
| Ewe Lamb  | 0                 | 4        |                |                 |            |             | 1         |          | 3                     |
| MA Ram  | 0                 |          |                |                 | 1          |             |           |          | 1                     |
| R2yr Ram  | 2                 |          |                |                 | 1          | 1           |           | 1        | 1                     |
| R1yr Ram  | 2                 |          |                |                 |            | 1           | 1         |          | 0                     |
| Ram Lamb  | 0                 | 2        |                |                 |            |             |           |          | 2                     |
| Total   | 16                | 6        | 0              | 0               | 14         | 14          | 2         | 1        | 19                    |
| <b>Conventional Sheep</b>   |                   |          |                |                 |            |             |           |          |                       |
| MA Ewes   | 84                |          |                |                 |            |             | 34        |          | 50                    |
| 2th Ewes  | 0                 |          |                |                 | 4          |             |           |          | 4                     |
| Ewe Hgts  | 4                 |          |                |                 |            | 4           |           |          | 0                     |
| Ewe Lamb  | 0                 |          |                |                 |            |             |           |          | 0                     |
| 2th Ram   | 0                 |          |                |                 | 7          |             |           |          | 7                     |
| R1yr Ram  | 7                 |          |                |                 |            | 7           |           |          | 0                     |
| Ram Lamb  | 0                 |          |                |                 |            |             |           |          | 0                     |
| Total Conventional  | 95                | 0        | 0              | 0               | 11         | 11          | 34        | 0        | 61                    |
| <b>Sheep Total</b>  | <b>111</b>        | <b>6</b> | <b>0</b>       | <b>0</b>        | <b>25</b>  | <b>25</b>   | <b>36</b> | <b>1</b> | <b>80</b>             |
| <b>Sheep developed under ERMA approvals (Tg and non Tg progeny)</b> |                   |          |                |                 |            |             |           |          | <b>19</b>             |

The preceding tables provide animal numbers by species over the reporting period in the development lines that are linked to the EPA approval. This includes transgenic and non-transgenic animals (progeny) and the conventional animals which are used to support the development lines.

For cattle there has been 2 movements of conventional animals out of the facility during the period. This was 25 steers of 59 conventional beef animals, under 2 years of age on the facility for grass control purposes and 1 2yr heifer which was identified as unsuitable for breeding prior to being used. There has been 1 movement of cattle into the facility, 50 R1yr and R2yr heifers as potential recipients.

29 female cattle (older) have been euthanased (killed); these animals have been disposed of in offal holes on-site, having been identified as surplus or now unsuitable animals (unable to leave facility), or following veterinary advice during this period.

For goats there has been no movement of animals onto or from the facility (apart from approved exit and returns for surgery purposes) during the period.

9 goats of varying ages have been euthanased (killed) and no goats died during the period; these animals have also been disposed of in offal holes on-site, as now surplus or unsuitable animals, or following veterinary advice.

For sheep there has been no movement of animals onto or from the facility (apart from approved exit and returns for surgery purposes) during the period.

36 sheep of varying ages have been euthanased (killed) and 1 sheep (Ram) died during the period; these animals have also been disposed of in offal holes on-site, as unsuitable animals, during slaughter recovery at lambing or following veterinary advice.

For management purposes, as previously identified, the facility is treated as a separate small farm within the main Ruakura Farm. It is fully self-contained apart for some machinery requirements and specialist staffing.

Animals on the facility continue to be managed in a way which aligns with normal farming practice in New Zealand, grazing outdoors on pasture.

This consists of daily shifts and restricted intakes depending on the age of the animal and its feed requirements. Examples are stage of pregnancy, lactating or rearing calf or kid, empty, young growing animals, etc.

60 cattle, 42 goat and 96 sheep recipients have been used for ET (embryo transfer). The grazing Heifers mated with artificial insemination last year calved with minimal assistance in spring 2020, these heifers are now being used as recipients and their progeny are still grazing on the Facility. All animals are regularly monitored for live weight and health status.

All animals graze mainly on pasture, with some crops, supplementary feeding of hay, balage or concentrates when required.

Goats can at times receive a higher proportion of their daily intake as supplementary feed, as concentrates, to reduce their impact on pasture availability for cattle and often have access to covered shelter in inclement weather.

Surplus pasture is conserved when possible for use in periods of low growth, as balage or hay and there was only minimal purchasing of extra supplement (meal) required this season, mainly due to lower animal numbers which enabled maintenance of an adequate annual feed supply.

Regular pasture renewal is carried out with at least 10% of the facility receiving some form of renovation annually. Mineral supplementation is carried out using a mineral dispensing system through the water troughs for assisting Facial Eczema control and other normal mineral deficiencies during identified periods of risk, as occurs on many farms.

Maintenance fertiliser mix applied this season included 55kgN/ha (nitrogen) and no selective additional Nitrogen (Urea) has been used on areas not used for milk/waste irrigation during the year.



## **Milk Production 19/20 season**

No GM cows calved and no GM goats kidded at all or specifically for seasonal milk production again this year.

This has meant there was again no milk stored this year for surplus disposal by irrigation to pasture.

## **Ruakura Animal Ethics Committee Reports**

### **RAEC # 15081 - Maintenance of Cattle on the Animal Containment Facility**

#### **Ruakura Animal Ethics Committee Report: Third Quarter 2020**

##### **Transgenic Cattle**

Summarised below are the animal numbers and animal health status of the various cattle groups for the reporting interval July to September 2020 according to the conditions for approval of Application 15081 Maintenance of cattle on the Animal Containment Facility.

##### **B) Beta-lactoglobulin (BLG) knockdown/knockout cattle**

###### **B.1 Animal numbers**

16, no change

###### **B.2 Health status**

No health issues during reporting period

##### **C) KDM4B cattle**

###### **C.1. Animal numbers**

1, no change

###### **C.2 Health status**

Enlarged udder still present, though now has "deflated" slightly- doesn't appear to be causing her any concern.

##### **D) Conventional recipient cattle**

###### **D.1. Animal numbers**

Initially 28, 1 euthanised for a positive Johnes results

###### **D.2. Health status**

No health issues during reporting period

All Cattle (GM + Conventional) received annual vaccinations (BVD, B12, Covexin, Lepto) and a drench during July.

#### **Ruakura Animal Ethics Committee Report: Fourth Quarter 2020**

##### **Genetically Engineered Cattle**

Summarised below are the animal numbers and animal health status of the various cattle groups for the reporting interval October to December 2020 according to the conditions for approval of Application 15081 'Maintenance of cattle on the Animal Containment Facility'.

##### **A) Beta-lactoglobulin (BLG) knockdown/knockout cattle**

###### **A.1 Animal numbers**

16, no change

A.2 Health status

No health issues during reporting period

B) KDM4B cattle

B.1. Animal numbers

1, no change

B.2 Health status

Enlarged udder still present- doesn't appear to be causing her any concern.

C) Conventional recipient cattle

C.1. Animal numbers

Initially 27, 81 heifers were brought onto the ACU as new recipients

C.2. Treatments and activities during reporting interval

28 heifers were synchronised, and 25 used for ET. This activity is associated with the project covered by AE 15088 (Generation of climate-smart cattle from edited embryos) and will also be reported under AE 15088.

C.3. Health status

No health issues during reporting period

## **Ruakura Animal Ethics Committee Report: First Quarter 2021**

### **Genetically Engineered Cattle**

Summarised below are the animal numbers and animal health status of the various cattle groups for the reporting interval January to March 2021 according to the conditions for approval of Application 15081 "Maintenance of cattle on the Animal Containment Facility".

A) Beta-lactoglobulin (BLG) knockdown/knockout cattle

A.1 Animal numbers

16, no change

A.2 Health status

No health issues during reporting period

B) KDM4B cattle

B.1. Animal numbers

1, no change

B.2 Health status

Enlarged udder still present- doesn't appear to be causing her any concern.

C) Conventional recipient cattle

### C.1. Animal numbers

Initially 108

### C.2. Treatments and activities during reporting interval

20 heifers were synchronised, and 16 used for ET. This activity is associated with the project covered by AE 15088 (Generation of climate-smart cattle from edited embryos) and will also be reported under AE 15088.

### C.3. Health status

No health issues during reporting period

All cattle received a Time capsule for Facial Eczema prevention late February

## **Ruakura Animal Ethics Committee Report: Second Quarter 2021**

### **Genetically Engineered Cattle**

Summarised below are the animal numbers and animal health status of the various cattle groups for the reporting interval April to June 2021 according to the conditions for approval of Application 15081 "Maintenance of cattle on the Animal Containment Facility".

*'No Report submitted to RAEC for this period' – below to provide link to other report sections*

1 2016 born BLg- developed a facial abscess and was humanely killed on veterinary advice.

27 Conventional recipients humanely killed as no longer needed due to age.

## **RAEC #15088 - Generation of climate-smart cattle from edited embryos**

### **Ruakura Animal Ethics Committee Report: Fourth Quarter 2020**

#### **Genetically Engineered climate-smart cattle**

Summarised below are the animal numbers and animal health status of the various cattle groups for the extended fourth quarter reporting interval September to December 2020 according to the conditions for approval of Application 15088 'Generation of climate-smart cattle from edited embryos'.

#### A) CS-cattle cattle

##### A.1. Animal numbers

The generation of CS cattle is in progress and no CS-cattle exist yet.

#### B) Conventional recipient cattle

##### B.1. Treatments and activities during reporting interval

28 heifers were synchronised prior to ET. 15 biopsied IVF embryos edited for a coat colour PMEL mutation and 10 non-edited IVF control embryos were transferred into 25 synchronised recipients. Ultrasound scans at d35 determined 5 pregnancies for the control embryos but zero for the edited embryos. A repeat scan at d41 confirmed 4 control and zero edited embryo pregnancies. The control pregnancies were aborted (in consultation from the AWO) with prostaglandin injection as no longer required, and to exclude potential

future impacts on the recipients welfare. Animals were confirmed non-pregnant via ultrasound post prostaglandin. No health issues seen.

#### B.2. Health status

No health issues during reporting period

### **Ruakura Animal Ethics Committee Report: First Quarter 2021**

#### **Genetically Engineered climate-smart cattle**

Summarised below are the animal numbers and animal health status of the various cattle groups for the first quarter reporting interval January to March 2021 according to the conditions for approval of Application 15088 'Generation of climate-smart cattle from edited embryos'.

##### A) CS-cattle cattle

###### A.1. Animal numbers

The generation of CS cattle is in progress and no CS-cattle exist yet.

##### B) Conventional recipient cattle

###### B.1. Treatments and activities during reporting interval

20 heifers were synchronised prior to ET. 16 biopsied IVF embryos mosaic for a coat colour PMEL mutation or PRLR mutation associated with a slick coat were transferred into 16 synchronised recipients. This was undertaken as a control experiment to confirm successful establishment of pregnancies with these embryos.

###### B.2. Health status

No health issues during reporting period specific to this project - general covered in 15081

### **Ruakura Animal Ethics Committee Report: Second Quarter 2021**

#### **Genetically Engineered climate-smart cattle**

Summarised below are the animal numbers and animal health status of the various cattle groups for the second quarter reporting interval April to June 2021 according to the conditions for approval of Application 15088 'Generation of climate-smart cattle from edited embryos'.

##### A) CS-cattle cattle

###### A.1. Animal numbers

The generation of CS cattle is in progress and no CS-cattle exist yet.

##### B) Conventional recipient cattle

### B.1. Treatments and activities during reporting interval

The control experiment with the transfer of 16 biopsied IVF embryos mosaic for a coat colour PMEL mutation or PRLR mutation associated with a slick coat resulted in 6 pregnancies at d36 of gestation that were terminated.

30 heifers were synchronised prior to ET. 15 biopsied IVF embryos validated for a slick coat mutation and 10 non-edited control IVF embryos were transferred into 25 synchronised recipients. The ultrasound scan confirmed 8 pregnancies with slick and 5 with control embryos at d49 of gestation.

### B.2. Health status

No health issues during reporting period

## **RAEC #15080 - Maintenance of ACF Goats**

### **Ruakura Animal Ethics Committee Report: Third Quarter 2020**

#### **Genetically Engineered Goats**

Summarised below is the status of the various goat groups and their offspring and any losses that have occurred during the reporting interval July to September 2020, in relation to the conditions for approval of Application 15080 "Maintenance of Goats on Animal Containment Facility?".

#### 1. BIOSIMILARS

##### A) Erbitux Goats

###### A.1 Animal numbers

Initially 25 (25 females)

2 goats had tested positive for Johnes disease and were euthanised

2 goats euthanised due to large udders

###### A.2 Treatments and activities during reporting interval

15 goats synchronised and 7 used as recipients for embryo transfers. The use of the other 8 for ET will occur in the next reporting period.

These activities are associated with the project covered by AE 15082 (Somatic cell transfer cloning to induce female-only offspring in goats) and will also be reported under AE 15082.

1 goat had a damaged tail tip that required amputating- treated by a veterinarian

All have had routine animal health treatments and hoof care during the period

##### B) Enbrel Goats

###### B.1 Animal numbers

Initially 2 (2 females)

1 goat euthanised for suspected polioencephalomalacia which was reoccurring

###### B.2 Treatments and activities during reporting interval

1 goat synchronised. Its use for ET will occur in the next reporting period.

This activity is associated with the project covered by AE 15082 (Somatic cell transfer cloning to induce female-only offspring in goats) and will also be reported under AE 15082.

All have had routine animal health treatments and hoof care during the period

## 2. RECIPIENTS

### C.1. Animal numbers

23 (23 females)

### C.2 Treatments and activities during reporting interval

16 goats synchronised and 6 used as recipients for embryo transfers. The use of 4 goats for ET and 6 goats for AI will occur in the next reporting period.

The use of 10 goats for ET is associated with the project covered by AE 15082 (Somatic cell transfer cloning to induce female-only offspring in goats) and will also be reported under AE 15082.

All have had routine animal health treatments and hoof care during the period

## **Ruakura Animal Ethics Committee Report: Fourth Quarter 2020**

### **Genetically Engineered Goats**

Summarised below is the status of the various goat groups and their offspring and any losses that have occurred during the reporting interval October to December 2020, in relation to the conditions for approval of Application 15080 'Maintenance of Goats on Animal Containment Facility'.

#### 1. BIOSIMILARS

##### A) Erbitux Goats

###### A.1 Animal numbers

Initially 21 females, one goat euthanised for mastitis

###### A.2 Treatments and activities during reporting interval

8 goats used for ET.

These activities are associated with the project covered by AE 15082 (Somatic cell transfer cloning to induce female-only offspring in goats). It will also be reported under AE 15082.

All have had routine animal health treatments and hoof care during the period

##### B) Enbrel Goats

###### B.1 Animal numbers

Initially 1 female

###### B.2 Treatments and activities during reporting interval

1 goat used for ET.

This activity is associated with the project covered by AE 15082 (Somatic cell transfer cloning to induce female-only offspring in goats) and will also be reported under AE 15082.

All have had routine animal health treatments and hoof care during the period

## 2. RECIPIENTS

### C.1. Animal numbers

Initially 23 females

### C.2 Treatments and activities during reporting interval

One goat was treated for a lump on her neck. The localised infection was seen and treated by a veterinarian and has since resolved.

4 goats used for ET and 6 goats for AI.

This activity is associated with the project covered by AE 15082 (Somatic cell transfer cloning to induce female-only offspring in goats) and will also be reported under AE 15082.

All have had routine animal health treatments and hoof care during the period

## **Ruakura Animal Ethics Committee Report: First Quarter 2021**

### **Genetically Engineered Goats**

Summarised below is the status of the various goat groups and their offspring and any losses that have occurred during the reporting interval January to March 2021, in relation to the conditions for approval of Application 15080 "Maintenance of Goats on Animal Containment Facility".

#### 1. BIOSIMILARS

##### A) Erbitux Goats

###### A.1 Animal numbers

Initially 20 females

###### A.2 Treatments and activities during reporting interval

12 goats used for ET.

These activities are associated with the project covered by AE 15082 (Somatic cell transfer cloning to induce female-only offspring in goats). It will also be reported under AE 15082.

All have had routine animal health treatments and hoof care during the period

##### B) Enbrel Goats

###### B.1 Animal numbers

Initially 1 female

###### B.2 Treatments and activities during reporting interval

1 goat used for ET.

This activity is associated with the project covered by AE 15082 (Somatic cell transfer cloning to induce female-only offspring in goats) and will also be reported under AE 15082.

All have had routine animal health treatments and hoof care during the period

#### 2. RECIPIENTS

##### C.1. Animal numbers

Initially 23 females



C.2 Treatments and activities during reporting interval

20 goats used for ET

This activity is associated with the project covered by AE 15082 (Somatic cell transfer cloning to induce female-only offspring in goats) and will also be reported under AE 15082.

All have had routine animal health treatments and hoof care during the period

## **Ruakura Animal Ethics Committee Report: Second Quarter 2021**

### **Genetically Engineered Goats**

*'No Report submitted to RAEC for this period' – below to provide link to other report sections*

2 Erbitux goats were humanely killed late May (1 with Mastitis and the other a large hernia)

1 Conventional goat was humanely killed after Veterinarian diagnosed Neurological issues

## **RAEC #15082 – SCT cloning to induce female-only offspring in goats.**

## **Ruakura Animal Ethics Committee Report: Fourth Quarter 2020**

### **Genetically Engineered Goats**

Following two cloning runs with in vivo eggs, we have established some pregnancies. At first scan, establishment of viable pregnancies was poor, resulting in less than half of the expected cloned pregnancy rate per fetus ( $6/138 = 4\%$ ), only 2 fetuses with heartbeat and another 4 without heartbeat (presumably not viable). We'll be lucky to have 1-2 viable SCT kids at this stage, but there may be undetected multiples, which could increase this number. Disconcertingly, the AI control does not look much better with only 1/6 animals pregnant and 2 viable fetuses with heartbeat - that is much lower than what we got with the sheep AI controls in 2019 (6/9 pregnant with 11 animals born). This group serves as a scanning and general health control for the SCT pregnancies, but it follows a very different ART procedure (SCT/ET vs AI), so we can draw no immediate lessons from that. We don't have an explanation at the moment, I just mention the AI result because it could indicate an underlying problem in the recipient flock. Or it could be a statistical blip, numbers are too low to draw conclusions.

All empty recipients will be re-scanned to pick up potential false negatives from the first scan. We will first wait for the next scan date to validate the number of pregnancies and fetuses with greater accuracy. As a contingency, we consider repeating the experiments with abattoir eggs, followed by IVM/IVC and transfer at the 2-cell stage. Non-transferred embryos would be aggregated, then we would vitrify aggregation embryos for additional transfers into surrogate does.

Goats used in this project are also reported on under (AE APPLICATION 15080) Maintenance of Goats on Animal Containment Facility for general health and animal care purposes.

## **Ruakura Animal Ethics Committee Report: 1st Quarter 2021**

### **Genetically Engineered Goats**

Following two cloning runs with in vivo eggs, we established one cloned pregnancy and one control AI pregnancy by D60 of gestation. Both pregnancies held to term and one healthy cloned ("Brownie") and 2

healthy AI kids ("Whitey" and "Blackie") were born by C-section and natural delivery, respectively. Please see ####'s vet report attached to main application pdf #12590.

All three kids are being raised on their mums and appear to be doing well.

The clone was dehorned by #### without any concerns.

AWO visit and exam 25/03/2021:

It was reported to me that the cloned kid appeared more lethargic compared to the AI kids and played less the last few weeks. He has always been alert and feeding well from his mother. Weights were taken today and 'Brownie' was 9.5kg while 'Whitey' and 'Blackie' were 8.5kg and 7.5kg respectively. This makes his daily weight gain is approximately 250g/day, while the AI kids are 200g/day and 180g/day. This difference could be due to a singleton being fed more than twins, though this is all within the realms of normal. However, on exam he did have a pot belly and was full of milk, so its possible he may be expressing 'gutsy' drinking behaviour that we have seen in young cloned ruminants in previous years. On exam his front legs were slightly bowed and his 'knees' appeared bulky compared to the AI controls. Again this stockier build has been seen before with clones and its doesn't currently appear to be hindering his movement. On lung auscultation he did have some louder lung sounds comparative to the controls (though mild) and had a mild stertor when breathing. Dehorning wounds were healing well. Otherwise I had no concerns. The above will be monitored as he grows and a vet contacted if there are any concerns. I also checked his dams udder and there was no sign of injury or mastitis.

Even though one viable male clone is enough for proof-of-principle, we have planned a couple of repeat experiments to produce at least one more viable animal as contingency, just in case something happens to the first animal.

Recipient goats used in this project are also reported on under (AE APPLICATION 15080) Maintenance of Goats on Animal Containment Facility for general health and animal care purposes.

## **Ruakura Animal Ethics Committee Report: 2nd Quarter 2021**

### **Genetically Engineered Goats**

In March 2021, AgResearch created and implanted an additional 53 embryos from AGG cell line CR26, and an additional 35 embryos from cell line CR48, as well as 10 embryos derived from the parental cell line, used as positive controls. Embryos were transferred at the 1-2 cell stage, and looked good at transfer, using the same set of does as were used in the September/October cloning runs. At the ~35-day pregnancy check there were zero viable pregnancies in any group. The three primary possibilities for the failure here are (1) something in the TRD construct is killing the pregnancies, (2) something in the cell lines is killing the pregnancies, and (3) there is a technical problem in cloning, embryo transfer, or fertility of the does. Both (1) and (2) are largely ruled out by the as-expected pregnancy rate in the first run, and the healthy birth of 'Brownie' in the second run. In particular, the healthy birth of Brownie is incompatible with the idea of major mutation in cell strain CR26. Further, we had no health problems associated with this construct in mice, and it would not be expected to have a developmental effect. Although goats aren't mice, development is strongly conserved. This leaves either a technical problem with cloning, embryo transfer, or the does, or potentially a combination of somewhat poor fertility in the does (only 1/6 births even by AI is quite poor) combined with somewhat bad luck.

The existing clone is growing fine and will be kept for breeding and functional studies, some of which will fall into the next projected contract period.

From the AWO report, 4 June 2021:

'Hi all,

I examined Brownie last week while I was at Ruakura and he is looking good. Normal chest sounds on auscultation and didn't look as round in the belly as seen previously.

The kids were being weaned at the time so that will likely explain that. They were being fed meal which they were enjoying. ##### also took a gradual wean approach to reduce stress which involves keeping the does and kids side by side for a while so they can interact but the kids are unable to drink.

As they are getting older and bigger they are starting to headbutt each other (normal goat behaviour) and Brownie did have some wounds on his head which was treated with oxytetracycline spray. ##### to monitor and treat as required.'

AWO exam 22nd June 2021:

'Weights:

- Brownie 28.5kg
- Whitey 32.5kg
- Blackie 29.5kg

Brownie now weighs less than the other two goats and they are all gaining weight currently. Brownie has a smaller stature compared to Whitey and is a similar size to Blackie. Body condition wise (fat and muscle cover)- they are all the same. At this stage I am not concerned that he weighs less than the others as he is in similar condition. Fully weaned now and gets meal when they come into the yards.

No concerns on clinical exam. Wound on head has healed'

In addition, we are also collating a check lists of regular tasks for Brownie to make sure that this precious animal is well looked after and regularly monitored.

Daily tasks

- ACF staff observations in the paddock.
- Secure paddocks only are used to graze Brownie and fence checks are done before animals move into a paddock.
- A shelter is provided at all times.
- When weaned the kids are provided meal to help with rumen development
- To be fed an appropriate level of nutrition and supplemented as necessary.

Monthly tasks

- Regular FEC and drenching as required
- Regular foot trimming- every 2-3 months
- To maintain a healthy weight, kids are to be weighed and body condition scored.
- Veterinary exam.

Other tasks

Up to date with vaccinations

- Administer topical anti-fly product (such as Blaze) over summer to reduce stress and bother from fly nuisance.
- Any health concerns (even minor ones)- to contact Veterinarian and/or AWO.

Recipient goats used in this project are also reported on under (AE APPLICATION 15080) Maintenance of Goats on Animal Containment Facility

## **RAEC #15064 – Maintenance of cloned sheep for phenotype evaluation generated under 14693, 14696, 14697.**

### **Ruakura Animal Ethics Committee Report: 3rd Quarter 2020**

#### **Genetically Modified Sheep**

Summarised below is the status of the various sheep groups and any losses that have occurred during the reporting interval July to September 2020, in relation to the conditions for approval of Application 15064 'Maintenance of Cloned Sheep for Phenotype Generation'.

As of 30/09/2020, we have been characterising the 16 cloned sheep, generated across two different projects (germline and kidney complementation), with a variety of assays. This included:

##### 1) Semen collection from Hoss and Howie

To increase the chances of harvesting out-of-season semen from the putative chimaeric absolute transmitter (Hoss) and heterozygote NANOS2 ram (Howie), we discussed several strategies with #####, #####, #####, #####, and ### staff. The following tested sampling methods were tested: i) running the rams with younger ewes for natural mating and ii) via Artificial Vagina (AV) with synchronised ewes. Both rams were kept with two estrus-synchronised ewes (female AI lambs) in separate pens. The smaller build of these animals was a concession to Hoss's physical problems in mounting. To increase the chances of collection success, both rams were given melatonin (regulin) implants. Care was taken to ensure that Hoss does not suffer any adverse effects from mounting attempts and physical stress (modification 2770). Rams were out with the younger ewes from 1st September to 7th September before we attempted an AV collection again. On 8th September, we were informed that both Howie and Hoss were observed to have successfully mounted mated with the younger ewes. Therefore, we again attempt to collect samples via AV, using synchronised teaser ewes that were induced into standing oestrus (modification 2796). In total, rams were brought out on 7 dates and AV was attempted every time apart from the last.

28 July 2020

30 July 2020

6 August 2020

13 August 2020

16 September 2020

23 September 2020

28 September 2020

On 23rd September, motile semen was collected from Howie, which is now being stored by ###. No sperm was collected from Hoss. The repeated rounds natural mating or AV collection did not improve his health (laboured breathing, rectal prolapse, front leg problems) and so he was euthanised by captive bolt prior to post-mortem harvest of epididymal sperm.

2) Blood sampling (jugular, approx. 10ml each) was carried on several occasions to validate the genotype (Howie & Hoss, 3 PDFF3 ewes) and immunological phenotype (OFF4 CMAH/GGTA-knockout ewes for profiling 5NeuGC/a-Gal antigens, respectively)

3) Gonad development was monitored by regular measurements of scrotal circumference.

## **Ruakura Animal Ethics Committee Report: 4th Quarter 2020**

### **Genetically Modified Sheep**

Summarised below is the status of the various sheep groups and any losses that have occurred during the reporting interval October to December 2020, in relation to the conditions for approval of Application 15064 'Maintenance of Cloned Sheep for Phenotype Generation'.

#### 1. NANOS2 genotypes

##### A.1 Animal numbers

Initially 10 animals, 3 males and 7 females. 1 male died (Hammer) due to acute pulmonary congestion (see adverse event 198).

##### A.2 Treatments and activities during reporting interval

All have had routine animal health treatments during the period. Weight and scrotal circumference was determined monthly. Several sheep were placed on restricted feed regime to reduce their body condition score (currently a 4 or 4.5/5 aiming for 3-3.5/5, especially of the Poll Dorset breed. A clinical exam by the AWO in November found that while most were clinically well, on lung auscultation there are harsh lung sounds which could indicate chronic pneumonia. These are mostly mild with 7/9 animals affected. 1936 (Rachel) still favours her left hind limb after her stifle injury but she appears to keep up with the group without issue.

#### 2. CMAH/GGTA genotypes

##### B.1 Animal numbers

5 females.

##### B.2 Treatments and activities during reporting interval

All have had routine animal health treatments during the period. A clinical exam by the AWO in November found that while most were clinically well, on lung auscultation there are harsh lung sounds which could indicate chronic pneumonia. These are mostly mild with 4/5 animals affected. 1917 (Bertha) did have increased respiratory effort with a slightly dull mentation compared to the other ewes (no change).

## **Ruakura Animal Ethics Committee Report: 1st Quarter 2021**

### **Genetically Modified Sheep**

Summarised below is the status of the various sheep groups and any losses that have occurred during the reporting interval January to March 2021, in relation to the conditions for approval of Application 15064 'Maintenance of Cloned Sheep for Phenotype Generation'.

Semen collection from the two different NANOS2 genotypes has finished with two successful collections from Bunter and Howie. As per the Animal Welfare Officer's note added to AE Application number 15051 (01/04/2021 #####), we improved collection success by synchronizing the OFF4 group of cloned two toots (4 animals) to aid AV semen collection and then will go to a ram for natural mating. Unfortunately, one ewe (1920- Serena) may have been inadvertently fertilised during collection and will have to be hormone-treated to make sure she does not get pregnant with the NANOS2 genotypes. She will then go out to the ram as originally planned.

OPU from the PDFF group of NANOS2 genotypes (3 knockout and 4 wild-type animals) has not yet started due to Howie's semen not yet being available for IVF. Timelines have slipped due to the extra goat

cloning work and Easter but we have given ### the heads up about sheep OPU in April. As soon as we have obtained semen from Howie, it will be tested for IVF on abattoir eggs as a prerequisite prior to OPU-IVF. The first OPU is scheduled for 29 April.

Health issues over this period:

- 1917 (Bertha), lame front left foot. Vet checked and treated with pain relief and antibiotics. She recovered well. Bertha has and continues to be behind the group condition wise (2.5 while others are 3-4/5) and no other changes since the last exam vet exam Nov 2020. Bertha has not gone out to the ram.
- No specific health issues reported for the other sheep.

## **RAEC #15051 – Maintenance of cloned sheep for breeding and phenotype evaluation**

### **Ruakura Animal Ethics Committee Report: 1<sup>st</sup> Quarter 2021**

#### **Genetically Modified Sheep**

RAEC Report: 1st Quarter (February - April) 2021 for Cloned Sheep

Summarised is the status of the various sheep groups during the 1st reporting interval, in relation to the conditions for approval of Application 15051 "Maintenance of Cloned Sheep for Phenotype Generation".

#### 1. NANOS2 genotypes

##### A.1 Animal numbers

9 animals, 2 males (Howie, Bunter) and 7 females.

##### A.2 Treatments and activities during reporting interval

Semen collection from the two different NANOS2 genotypes has finished with two successful collections from Bunter and Howie.

OPU from the PDFF group of NANOS2 genotypes (3 knockout and 4 wild-type animals) was performed on 29th April, after Howie's semen had been successfully tested for IVF. The majority of ewes had a laparotomy rather than laparoscopy, due to difficulties in surgery with abdominal fat. It resulted in a shorter procedure which was seen as an improved benefit to the sheep even if it meant the surgical wound was larger. Given that the animals had a laparotomy rather than a laparoscopic procedure, they will have a 6-week recovery time rather than 4 weeks (from surgery to surgery). Oocyte recovery was good but there was some uncertainty as to whether this was due to natural or artificial stimulation. We will revisit the protocol to ensure it is suitable.

Out of the 7, 2 sheep had poorer oxygenation and required extra care during and post op. This was likely due to chronic pneumonia and lung consolidation from having pneumonia as lambs. The following day, the sheep were all doing well. One ewe 1930 had a swelling at the laparotomy site, the swelling reduced over the next couple of days so it was likely a hematoma.

Health issues over this period:

- AWO exam 27th April: Howie in good condition, has large testicles that now hang to his hocks but they palpate normally. Bunter continues to have poor lung sounds on auscultation and is 'snotty'. He is also starting to become a bit aggressive in the paddock (by bunting people- normal older pet ram behaviour).
- The Poll Dorset's were all healthy on exam and on average 90kg with a BCS 4 except for 1 (#36 Rachel). Rachel is the sheep who had a left leg injury as a lamb. She is weak on her left hind with reduced muscling but not lame when walking. She had been recently scouring and had undergone treatment and she appeared to be improving. She was 79kg with a BCS 3.

## 2. CMAH/GGTA genotypes

### B.1 Animal numbers

5 females.

### B.2 Treatments and activities during reporting interval

As per the Animal Welfare Officer's note added to AE Application number 15051 (01/04/2021 #####), we improved collection success by synchronizing the OFF4 group of cloned two tooth (4 animals) to aid AV semen collection and then went out for natural mating. Unfortunately, one ewe (1920-Serena) may have been inadvertently fertilised during collection and was hormone-treated to make sure she does not get pregnant with the NANOS2 genotypes. She then went out to the ram as originally planned. Ewe 1917 (Bertha) had a lame front left foot. Vet checked and treated with pain relief and antibiotics. She recovered well.

AWO exam 27th April: Bertha has and continues to be behind the group condition wise but she has gained in condition and sits at 3 (rather than 2.5), the others still sit at a BCS 4/5. Bertha was being grazed with the ewes and lambs away from the others (who were with the ram). The sheep are currently cutting their teeth with some being 'official' two tooth. All of the sheep has some mild lung sounds on auscultation but otherwise appeared in good health.

## **Ruakura Animal Ethics Committee Report: 2nd Quarter 2021**

### **Genetically Modified Sheep**

#### RAEC Report: 2nd Quarter (May - July) 2021 for Cloned Sheep

Summarised is the status of the various sheep groups during the 1st reporting interval, in relation to the conditions for approval of Application 15051 "Maintenance of Cloned Sheep for Phenotype Generation". *(This report does cover activity after this EPA reporting period)*

### 1. NANOS2 genotypes

#### A.1 Animal numbers

9 animals, 2 males (Howie, Bunter) and 7 females.

#### A.2 Treatments and activities during reporting interval

Bunter and Howie are representing the only cloned members of their respective genotypes and are maintained for continuous observation.

OPU from the PDFF group of NANOS2 genotypes (2 knockout and 4 wild-type animals) was performed on 8/7/2021, after Howie's semen had been successfully tested for OPU-IVF before. All ewes had a laparotomy rather than laparoscopy. It resulted in a shorter procedure which was seen as an improved benefit to the sheep even if it meant the surgical wound was larger. There was trouble with intubating 1941 as she had a very long epiglottis and had to recover to be anaesthetised again. When she woke up again, she had to be on oxygen and given planipart as she went into respiratory distress. She continued to have laboured breathing for approximately a week post surgery but has since recovered. Oocyte recovery was again good, with 60 oocytes recovered from 6 sheep (average 10 oocytes/ewe). This compares to 69 oocytes from 7 sheep (average 10 oocytes/ewe) on 29/4/2021 and shows that the animals stimulated well out of season using our current stimulation protocol.

Health issues over this period:

- Bunter has ongoing respiratory issues as mentioned previously- no change
- #75, an AI-derived offspring of Howie, replicating Howie's genotype (NANOS2+/-) was healthy with no concerns and maintained as per ACF farm practices.
- Rachel (NANOS2-/-) died on 1st July as reported (adverse event 246)
- No specific health issues reported for the other sheep.

## 2. CMAH/GGTA genotypes

### B.1 Animal numbers

5 females.

### B.2 Treatments and activities during reporting interval

- 4 females (not Bertha) were naturally bred to a ram for 2 cycles along with 3 controls as per modification #2969.
- Bertha is similar to previous checks but has gained weight over winter and is now in good condition.
- All animals are maintained and are doing well.



## Ministry for Primary Industries Manatū Ahu Matua



### Verification Report<sup>1</sup>

|                             |   |
|-----------------------------|---|
| <b>Report ID:</b>           | PBV/2501/2020/02  |
| <b>Outcome:</b>             | <b>Unacceptable</b>   |
| <b>Issued to:</b>           | AgResearch - Ruakura Campus   |
| <b>Operator ID(s):</b>      | 2501  |
| <b>Issued by:</b>           | Crystal Lange<br>Phone: 079578319<br>Email: crystal.lange@mpi.govt.nz |
| <b>Verification Period:</b> | 2020-02-29 to 2020-08-28  |
| <b>Verification Date:</b>   | 2020-08-31  |
| <b>Published:</b>           | 2020-08-31 13:35  |
| <b>Next Due Date:</b>       | 2020-11-28  |
| <b>Level/Step:</b>          | <b>5.1</b> (started on 6.1 , and ceiling is 6 )                       |
| <b>Report Type:</b>         | Scheduled   |
| <b>Peer Reviewed By:</b>    | Richard Tukia   |

<sup>1</sup> A Verification Report is a formal report issued when sufficient evidence has been assessed to arrive at an outcome for a verification period. This report may contain Technical Reviews and external audit findings completed during the period. Inadequate and/or untimely responses to deficiencies identified in this report, poor/unacceptable performance, or failure to pass subsequent audits may result in the escalating imposition of sanctions and/or interventions provided by law.

This report, including any attachments, is intended solely for the **Operator** of 'AgResearch - Ruakura Campus'. The information it contains is confidential and may be legally privileged. Unauthorised use of this report, or the information it contains, may be unlawful. If you have received this report by mistake please call **Crystal Lange** immediately on **079578319** or notify by email using **crystal.lange@mpi.govt.nz** and erase the report and attachments. Thank you.

The Ministry for Primary Industries retains the 'original' of this report and accepts no responsibility for changes made to 'copies', including attachments, however they may be distributed.



## 1. Premises Profile

AgResearch - Ruakura Campus is, under section 39 of the Biosecurity Act 1993, approved as a Transitional and Containment Facility in accordance with the requirements of the MPI/EPA standard(s) identified. Under section 40 of the Biosecurity Act, AgResearch is approved as an operator of that facility and is primarily responsible for the facility, compliance with facility approvals and all activities involving risk goods.

The standards that the facility is approved to specify the structural and operating requirements for containment and/or transitional facilities holding regulated organisms and risk goods that are, or may contain:

- Agricultural Compounds
- Animals
- Animal Products
- Biologicals
- Miscellaneous
- Non-risk Goods
- Plant Products

### Physical Address :

10 Ruakura Campus Bisley Road, Ruakura, Hamilton

### Glossary of terms :

|          |                                 |
|----------|---------------------------------|
| ACU      | Animal Containment Unit         |
| CAR      | Corrective Action Required      |
| COVID-19 | Coronavirus Disease of 2019     |
| GM       | Genetically Modified            |
| MPI      | Ministry for Primary Industries |
| PBV      | Performance Based Verification  |
| PP       | Plant Protection                |
| PPE      | Personal Protective Equipment   |
| VS       | Verification Services           |

## 2. Executive Summary

The inspection undertaken August 18 2020 had an UNACCEPTABLE outcome with two significant events happening. First, an unknown (and therefore unapproved) transfer of frozen cell lines and secondly, frozen semen stored outside of the containment facility footprint without appropriate access control. The transfer non compliance has been closed as the core issue was historic. Appropriate control has been put in place and a self review of registers implemented. It is expected the semen storage will be closed prior to the next MPI inspection which will be at the increased frequency of three monthly.

Despite these two critical events the delegated operator demonstrated good control of her area of oversight and a proactive response to issues and questions raised by staff. With ongoing support from her Palmerston North counterparts and



the Ruakura Farm Manager, the delegated Operator is continuing to grow into the role at a fast rate. MPI is satisfied that overall, AgResearch Ruakura is operating in compliance with the requirements of the standards it is approved to and the HSNO approvals. Providing the non-compliances are addressed within the timeframes stipulated and on other major or critical events occur, the facility and operator approvals will be continued.

### 3. Operator Summary

Crystal Lange (MPI) was confirmed as the MPI Inspector, her authority of appointment under the Biosecurity Act 1993 and Hazardous Substances and New Organisms Act 1996 (warrant) was displayed. The entry meeting was held between Tim Hale (Farm Manager and delegated operator, AgResearch) and Crystal, with the exit meeting being between Crystal and Genevieve (Gen) Sheriff (primary delegated operator, AgResearch). Gen participated in the inspection of the ACU with Crystal and Tim. The inspection of all other standards was with Crystal accompanied by Gen. Joanne Jensen (authorised signatory) was present during inspection of the glasshouses.

Health and Safety is covered by an electronic visitor's log and COVID-19 QR code. No additional hazards were notified.

The inspection process included a review of onsite records, where applicable; staff training, biological products register, new organisms registers, internal audit and physical inspection areas specific to each standard.





#### 4. Verification Completed (this period)

##### **Biosecurity**

See notes specific to each standard below.

The following elements were verified in this PBV period:

|   |            |
|---|------------|
| Biosecurity:Containment Facilities for Plants: 2007                   | Acceptable |
| Biosecurity:Containment Facilities for Vertebrate Laboratory Animals  | Acceptable |
| Biosecurity:Containment Standard for Field Testing of Farm Animals    | Acceptable |
| Biosecurity:Facilities for Microorganisms and Cell Cultures: 2007a    | Acceptable |
| Biosecurity:Transitional Facilities for Biological Products           | Acceptable |
| Biosecurity:Transitional and Containment Facilities for Invertebrates | Acceptable |

**Subject:** Containment Facilities for Plants: 2007

##### Note List:

[Crystal Lange]

The PC2 Glass House is not in use. Refurbishment of the anteroom is complete and the service door is well mounted and secure. Insect mesh is to be remounted prior to use. Plastic flanges damaged by sunlight need to be replaced or the plumbing gaps sealed. Heat control options are still being investigated. Autoclave treatment of soil was discussed.

The PC1 controlled environment rooms and Glasshouse were well maintained. Plants in the Glasshouse were individually labelled and each table had the HSNO application code attached as signage to the end of the table. A hard copy of the plant register is held in the associated laboratory.

**Subject:** Transitional and Containment Facilities for Invertebrates

##### Note List:

[Crystal Lange]

The PC2 Glasshouse which holds nematodes has been refurbished. As such no nematodes are currently held.

Insect screens were inspected as part of the refurbishment and will be compliant once seated flush with panelling.

**Subject:** Containment Standard for Field Testing of Farm Animals

##### Note List:

[Crystal Lange]

The June 2020 internal audit for the ACU was completed and sent to MPI. It confirmed compliance with the HSNO Approval (ERMA200223) Controls 1-7 and 10-13. Control 9 noted the ongoing issues with tagging goats in a way that is practicable and robust.

The MPI inspection verified compliance with the recording required in the register including genotype, parentage, veterinary treatments and assessments. Specifics on donor genetic material and collected semen are maintained by research staff. The register had not been updated at the time of this report.



Perimeter checks and pest control activities were recorded in the day book. No animals were moved off site without approval. All carcasses were disposed of in the offal hole.

**Subject:** Containment Facilities for Vertebrate Laboratory Animals

Note List:

[Crystal Lange]

The facility register was provided in both the old and new reporting systems and differences in presentation explained. Staff training was up to date with site and staff specific training completed. The internal audit was completed in a timely manner. Maintenance issues noted in the internal audit were described, these repairs do not impact on animal containment.

iButton records for autoclave cycles were discussed. It is suggested a Quarantine waste cycle be programmed (if required) to extend the heat treatment by 5 minutes to account for any variability in data loggers.

Two strains of GMO Mice were traced from the register to the cages.

Rabbits will no longer be serviced by AgResearch staff. The Gene Transfer Indoor Containment Facility and the PC2 Goat Shed are not in current use.

### **Quality Assurance**

MPI was notified in a timely manner of incidents that occurred this verification period and an open discussion has been ongoing.

Internal audits were completed in a timely manual for all sections. Training was undertaken remotely for all staff with a video and a follow up questionnaire.

The following elements were verified in this PBV period:

|  |            |
|--|------------|
| Quality Assurance:Biosecurity Contingency Plans        | Acceptable |
| Quality Assurance:Notifications to MPI/EPA             | Acceptable |
| Quality Assurance:Operator Control                     | Acceptable |
| Quality Assurance:Operator Internal Verification       | Acceptable |
| Quality Assurance:Training and Competency of Personnel | Acceptable |

### **Documentation and Certification**

All current imports and transfers were well documented

The following elements were verified in this PBV period:

|  |            |
|--|------------|
| Documentation and Certification:Biosecurity Authority Clearance Certificates (BACCs) | Acceptable |
|--|------------|





The following elements were verified in this PBV period:

|   |            |
|---|------------|
| Documentation and Certification: Documentation and Record Keeping | Acceptable |
|---|------------|

### **Identification, Traceability & Management**

Joanne Jensen was added to the list of approved signatories.

Traceability was well managed at ACU and Glasshouse and for recent activity. One non-compliance during the period had resulted in the delegated Operator requesting that all registers on site be reviewed.

The EPA code for transfer RT1038 was identified as incorrect and the research spoken to during the audit.

The following elements were verified in this PBV period:

|  |              |
|--|--------------|
| Identification, Traceability & Management: Authorised Signatories            | Acceptable   |
| ☘ Identification, Traceability & Management: Inventory Control and Accuracy  | Unacceptable |
| Identification, Traceability & Management: Segregation                       | Acceptable   |
| ☘ Identification, Traceability & Management: Transfer of Goods and Organisms | Acceptable   |

**Subject:** Transfer of Goods and Organisms

Note List:

[Crystal Lange]

- ☘ When an old approval was updated to include addition species there seemed to be a general assumption that the original species (mouse) was included. Two similar approvals used do not have mouse. The correct Approval code (GMD100059) was supplied and the transfer form updated.

#### **MAJOR NON-COMPLIANCE**

Limited knowledge of the approved organisms in a HSNO Approval

#### **CORRECTIVE ACTION REQUIRED:**

1. Ensure staff review active approvals to ensure hosts, vectors, approval scope and containment protocols are compliant

To Be Completed By: 30 October 2020

Future incidents will be escalated to a CRITICAL non-compliance as research work can only be undertaken if an applicable approval is available.



---

**Subject:** Storage Areas

Note List:

[Crystal Lange]

- ✳ Heritable material (ERMA200223) collected from the ACU stored in a freezer outside the containment facility. While the room is within the secure Animal Physiology building, the freezer was not locked or posted with appropriate signage. As these samples are not yet in the register (access issues as noted elsewhere) this may not have been identified for some time, if at all during an internal audit.

Storage options for including the room in the facility or adding extra security for non facility storage was discussed.

CRITICAL NON-COMPLIANCE

GM organisms (frozen gametes) stored outside the containment facility.

CORRECTIVE ACTION REQUIRED:

1. Implement appropriate storage immediately.

UNDERWAY: Access control will be added to Room 18 and other storage units will also be moved here.

---

**Subject:** Inventory Control and Accuracy

Note List:

[Crystal Lange]

**This issue is now closed.**

- ✳ MPI was advised 3/08/2020 of an inadvertent transfer of GM cells. The cells had not been requested and were not known to have been stored with this researcher's product. The researcher has since decided to keep the BME TERT 321 cells so a retrospective transfer was completed.

The root cause analysis identified historic records did not list the location of the cells (received 2012) and it's to be assumed the 5 vials were relocated at some stage post 2014 when the researcher was relocated to Grasslands.

CRITICAL NON-COMPLIANCE

1. Register not maintained as required
2. Control of GM cells not maintained
3. Unapproved transfer

CORRECTIVE ACTION REQUIRED:





AgResearch initiated:

1. Samples have been added to the Grasslands register
2. Retrospective transfer obtained.
3. Rukaura site register review

To Be Completed By: Findings of register review will be discussed at the next Facilities for Microorganisms and Cell Cultures standard inspection in three months.

### **Hygiene & Sanitation**

Cobwebs were noted on the walls in several PC2 laboratories and a chair base in the Plant Protection building (see non-compliance 'Design and Construction'). Cleaning is not being maintained in the (disused) Molecular Laboratory. As this laboratory has the hand wash and eyewash facilities for the suite it is essential these are kept free of dust. Walls and skirting in the washup (autoclave) room were grimey.

The following elements were verified in this PBV period:

|  |            |
|--|------------|
| Hygiene & Sanitation:Cleaning and Disinfection                                 | Acceptable |
| Hygiene & Sanitation:Personnel Hygiene and Personal Protective Equipment (PPE) | Acceptable |
| Hygiene & Sanitation:Pest, Vermin and Weed Control                             | Acceptable |
| Hygiene & Sanitation:Waste Management  | Acceptable |

### **Design and Construction**

Structural compliance was acceptable for all areas inspected. Maintenance issues are reported separately. Access has been managed across a range of restrictions due to varying COVID-19 levels. Under the current Level 2, all AgResearch access must first be recorded at Reception.

The following elements were verified in this PBV period:

|   |            |
|---|------------|
| Design and Construction:Access and Security                                   | Acceptable |
| Design and Construction:Animal Enclosures and Facilities (inc. invertebrates) | Acceptable |
| ☼ Design and Construction:Laboratories  | Acceptable |
| Design and Construction:Open Field Testing Facilities                         | Acceptable |
| Design and Construction:Physical Containment Level 1 (PC1)                    | Acceptable |
| Design and Construction:Physical Containment Level 2 (PC2)                    | Acceptable |
| Design and Construction:Plant Houses and Glasshouses                          | Acceptable |
| Design and Construction:Signage   | Acceptable |






**Subject:** Laboratories

Note List:

[Crystal Lange]

 **MINOR NON-COMPLIANCE**

General facility hygiene and maintenance not maintained the the level expected.

**CORRECTIVE ACTIONS REQUIRED:**

1. Address hygiene in PP
2. Ensure surfaces are impermeable
3. Ensure functional access by tightening door handles

To Be Completed By:  
10 September 2020

**Subject:** Physical Containment Level 2 (PC2)

Note List:

[Crystal Lange]

Screws holes were seen unsealed in the PP Mol.Lab.  
All door handles in the Tissue Culture Suite (Animal Physiology) need to be tightened. A small paint flake was noted on the ceiling of 17d.

**Hazardous Substances and New Organisms (HSNO) Act**

Aspects of compliance were verified for:

GMD003420, GMC001197, GMC03001, ERMA200223, NOC100181, NOC100184, APP203832, APP203417, GMD100059.

The following elements were verified in this PBV period:

|  |            |
|--|------------|
| Hazardous Substances and New Organisms (HSNO) Act:HSNO Act Approvals for Development of New Organisms  | Acceptable |
| Hazardous Substances and New Organisms (HSNO) Act:HSNO Act Approvals for New Organisms for Containment | Acceptable |

**Mandatory Tasks**

**5. Definitions**

**Acceptable**

Where the Animal Products Officer (or Biosecurity Inspector) is satisfied that the operator is substantially complying with requirements; and where there have been any departures from



regulatory requirements, that the operator's corrective actions have been, or are being, applied appropriately and effectively.



**Unacceptable**

Departures from regulatory requirements, identified by the Animal Products Officer (or Biosecurity Inspector), are to be transferred to the operator's issue management system for resolution. (Key Topic / Non-compliance)

Where the Animal Products Officer (or Biosecurity Inspector) has determined that the operator is not in substantial compliance with regulatory requirements; evidenced by inadequate operator controls. (Key Issue / Non-compliance)

# Ministry for Primary Industries

## Manatū Ahu Matua



### Verification Report<sup>1</sup>

|                             |   |
|-----------------------------|---|
| <b>Report ID:</b>           | PBV/2501/2021/01  |
| <b>Outcome:</b>             | <b>Acceptable</b>   |
| <b>Issued to:</b>           | AgResearch - Ruakura Campus   |
| <b>Operator ID(s):</b>      | 2501  |
| <b>Issued by:</b>           | Crystal Lange<br>Phone: 079578319<br>Email: crystal.lange@mpi.govt.nz |
| <b>Verification Period:</b> | 2020-11-05 to 2021-02-27  |
| <b>Verification Date:</b>   | 2021-03-08  |
| <b>Published:</b>           | 2021-03-08 16:35  |
| <b>Next Due Date:</b>       | 2021-08-27  |
| <b>Level/Step:</b>          | <b>6.1</b> (started on 5.2 , and ceiling is 6 )                       |
| <b>Report Type:</b>         | Scheduled   |
| <b>Peer Reviewed By:</b>    | Rana Fathizargaran  |

<sup>1</sup> A Verification Report is a formal report issued when sufficient evidence has been assessed to arrive at an outcome for a verification period. This report may contain Technical Reviews and external audit findings completed during the period. Inadequate and/or untimely responses to deficiencies identified in this report, poor/unacceptable performance, or failure to pass subsequent audits may result in the escalating imposition of sanctions and/or interventions provided by law.

This report, including any attachments, is intended solely for the **Operator** of 'AgResearch - Ruakura Campus'. The information it contains is confidential and may be legally privileged. Unauthorised use of this report, or the information it contains, may be unlawful. If you have received this report by mistake please call **Crystal Lange** immediately on **079578319** or notify by email using [crystal.lange@mpi.govt.nz](mailto:crystal.lange@mpi.govt.nz) and erase the report and attachments. Thank you.

The Ministry for Primary Industries retains the 'original' of this report and accepts no responsibility for changes made to 'copies', including attachments, however they may be distributed.



## 1. Premises Profile

AgResearch - Ruakura Campus is, under section 39 of the Biosecurity Act 1993, approved as a Transitional and Containment Facility in accordance with the requirements of the MPI/EPA standard(s) identified. Under section 40 of the Biosecurity Act, AgResearch is approved as an operator of that facility and is primarily responsible for the facility, compliance with facility approvals and all activities involving risk goods.

The standards that the facility is approved to specify the structural and operating requirements for containment and/or transitional facilities holding regulated organisms and risk goods that are, or may contain:

- Agricultural Compounds
- Animals
- Animal Products
- Biologicals
- Miscellaneous
- Non-risk Goods
- Plant Products

### Physical Address :

10 Ruakura Campus Bisley Road, Ruakura, Hamilton

### Glossary of terms :

|          |   |
|----------|---|
| TF       | Transitional Facility                       |
| ACF      | Animal Containment Farm                     |
| ACU      | Animal Containment Unit                     |
| BACC     | Biosecurity Authority Clearance Certificate |
| CAR      | Corrective Action Required                  |
| CAR      | Corrective Action Request                   |
| COVID-19 | Coronavirus Disease of 2019                 |
| CTO      | Chief Technical Officer                     |
| DFO      | Delegated Facility Operator                 |
| EPA      | Environmental Protection Authority          |
| GM       | Genetically Modified                        |
| HSNO     | Hazardous Substances and New Organisms      |
| MPI      | Ministry for Primary Industries             |
| NC       | Non-Compliance                              |
| PBV      | Performance Based Verification              |
| PC1      | Physical Containment Level 1                |
| PC2      | Physical Containment Level 2                |
| PP       | Plant Protection                            |
| PPE      | Personal Protective Equipment               |
| R&M      | Repairs and Maintenance                     |
| SAC      | Small Animal Containment                    |
| VS       | Verification Services                       |

## 2. Executive Summary

This was a scheduled and announced inspection of the AgResearch Limited transitional and containment facility at Ruakura. The objective of this visit was





to verify compliance with the facility manual, the Import Health Standard(s), the standards identified in the "Biosecurity" section of this report and the facility and operator approvals as held under the Biosecurity Act 1993.

The inspection undertaken 2 March 2020 had an acceptable outcome with good compliance with the MPI standards being observed. Minor issues in the laboratories resulted in one NC being issued.

Operator Control continues to be reviewed and strengthened. MPI is satisfied that AgResearch Limited is operating in compliance with the requirements of the standards it is approved to. As such the facility and operator approvals will be continued. This inspection falls as scheduled for the ACF and SAC. It is the second of an increased frequency for the laboratories.

### 3. Operator Summary

The entry and exit meetings along with the reality check of the facility was carried out by Crystal Lange (MPI) with Genevieve Sheriff (delegated Operator) and Tim Hale (delegated Operator ACF) of AgResearch. The Inspectors' authority was confirmed under the Biosecurity Act 1993 and Hazardous Substances and New Organisms Act 1996 was confirmed.

Health and Safety is covered by a visitor register. This inspection was undertaken at COVID-19 Level 2 (2021). No additional hazards were notified.

The inspection process included a review of onsite records, where applicable but not limited to, staff training, biological products and animal registers, internal audit and physical inspection of laboratories and the field test.

Three events had occurred that MPI was required to be notified about. An office air-conditioning unit fire 6/01/2021, requiring the external door to be open (under supervision) for smoke dispersal. A basement door (shared space) was found propped open (5/02/2021), and a glass pane was found broken in the glasshouse 1/03/2021.



#### 4. Verification Completed (this period)

##### **Biosecurity**

The following elements were verified in this PBV period:

|  |            |
|--|------------|
| Biosecurity:Containment Facilities for Vertebrate Laboratory Animals | Acceptable |
| Biosecurity:Containment Standard for Field Testing of Farm Animals   | Acceptable |
| Biosecurity:Facilities for Microorganisms and Cell Cultures: 2007a   | Acceptable |
| Biosecurity:Transitional Facilities for Biological Products          | Acceptable |

**Subject:** Containment Standard for Field Testing of Farm Animals

Note List:

[Crystal Lange]

Controls 1-7, 9, 10 of HSNO Approval ERMA200223 were assessed and no non-compliances were noted. A mob of cows were in the yards and good animal handling was observed. Ears tags were selected for a full records check. Two parent and three baby goats were also sighted next to the yards. A mob of sheep and other cattle were seen in separate paddocks during the Northeast perimeter check.

The secondary access gates were well secured and are electronically monitored. Perimeter check and pest control is recorded in the day book.

Pigs, while held under the Vertebrate Laboratory Animals Standard are managed by ACF staff.

**Subject:** Containment Facilities for Vertebrate Laboratory Animals

Note List:

[Crystal Lange]

Three SAC staff have received refresher training since the last inspection. Areas of the surgery requiring R&M were sighted and discussed.

##### **Quality Assurance**

New laboratory managers are in the process of being appointed to cover staff relocations and retirements. The manual will be updated to cover this and other minor changes.

Induction training had been completed for ten science staff since November 2020. Contractor training was completed 25/02/2021 and site wide refresher training has been booked.





The ACF internal audit for December 2020 had been emailed to the Inspector. Internal audits for laboratories were sighted at the last audit.

The following elements were verified in this PBV period:

|  |            |
|--|------------|
| Quality Assurance:Biosecurity Contingency Plans        | Acceptable |
| Quality Assurance:Operating Procedures                 | Acceptable |
| Quality Assurance:Operator Control                     | Acceptable |
| Quality Assurance:Operator Internal Verification       | Acceptable |
| Quality Assurance:Training and Competency of Personnel | Acceptable |

### **Documentation and Certification**

All imports and transfers for this inspection period were on file. Monitoring of multiple transfers was demonstrated.

The following elements were verified in this PBV period:

|  |            |
|--|------------|
| Documentation and Certification:Biosecurity Authority Clearance Certificates (BACCs) | Acceptable |
| Documentation and Certification:Documentation and Record Keeping                     | Acceptable |
| Documentation and Certification:Site Plans, Specification and Modifications          | Acceptable |

### **Identification, Traceability & Management**

Gen had been granted access to the Reproduction register but was unable to access this on the day. One tenant register was able to be viewed and records associated with HSNO Approval GMC100216 were confirmed as meeting the requirements of the standard.

Two cows from the standing mob (in yards) were selected for a records check. All animal records were available including those from prior to movement to or purchase by the ACF.

The following elements were verified in this PBV period:

|   |            |
|---|------------|
| Identification, Traceability & Management:Inventory Control and Accuracy      | Acceptable |
| Identification, Traceability & Management:Product and Organism Identification | Acceptable |
| Identification, Traceability & Management:Segregation                         | Acceptable |
| Identification, Traceability & Management:Transfer of Goods and Organisms     | Acceptable |



The following elements were verified in this PBV period:

|   |            |
|---|------------|
| Identification, Traceability & Management:Transport of Risk Goods and Organisms | Acceptable |
|---|------------|

### **Hygiene & Sanitation**

Laboratories were clean and tidy with appropriate PPE available.

Vermin continues to be actively controlled on the ACF.

iButton print outs for the Plant Protection (PP) and SAC autoclaves were reviewed. PP met the time temperature requirements for 55 minutes where as SAC had a 5 minute difference between buttons. Neither run recorded for iButton D3 met the requirements. Companion iButton 'BC' indicated acceptable treatment of 18 and 15 minutes for disposal cycles.

The following elements were verified in this PBV period:

|  |            |
|--|------------|
| Hygiene & Sanitation:Cleaning and Disinfection                                 | Acceptable |
| Hygiene & Sanitation:Personnel Hygiene and Personal Protective Equipment (PPE) | Acceptable |
| Hygiene & Sanitation:Pest, Vermin and Weed Control                             | Acceptable |
| Hygiene & Sanitation:Waste Management  | Acceptable |

**Subject:** Waste Management

Note List:


[Crystal Lange]

iButton D3 should be discarded.

### **Design and Construction**

A selection of PC1 and PC2 laboratories were chosen for inspection.

The following elements were verified in this PBV period:

|  |            |
|--|------------|
| Design and Construction:Access and Security  | Acceptable |
| Design and Construction:Animal Enclosures and Facilities (inc. invertebrates)  | Acceptable |
|  Design and Construction:Laboratories | Acceptable |
| Design and Construction:Open Field Testing Facilities  | Acceptable |
| Design and Construction:Physical Containment Level 1 (PC1)   | Acceptable |
| Design and Construction:Physical Containment Level 2 (PC2)   | Acceptable |





**Subject: Laboratories**

**Note List:**

[Crystal Lange]



**Animal Physiology**

97 - wall surface (paint) was not sealed by the fridge, sealant should be applied around the doorframe to ensure seepage does not occur under the new flooring or existing walls.

Bench top fittings showed water damage. AS these items are built in, they should be added to the laboratory end of life policy.

96 - A fabric topped foot stool was seen. The fabric and underlying adhesive should be removed or the item added to the laboratory end of life policy.

16 - a section of draw front requires sealing.

**Plant Protection**

The door to the molecular laboratory would not close without assistance. The fume hood fan was noisy.

The above minor NC should be addressed and confirmed to MPI by 1 April 2021.

**Subject: Physical Containment Level 2 (PC2)**

**Note List:**

[Crystal Lange]

Notification was received 1/03/2020 of a glass panel found broken on the PC2 Glasshouse. No plants were in the room at the time. Additional containment methods were discussed at the time. Repair was scheduled for 2/03/2020.

**Hazardous Substances and New Organisms (HSNO) Act**

GMC100216 was confirmed as in use during inventory checking. APP200223 was assessed and the majority of controls are noted in the Biosecurity section for the Field Test Standard. A development application is underway for Ruakura Technologies.

The following elements were verified in this PBV period:

|  |            |
|--|------------|
| Hazardous Substances and New Organisms (HSNO) Act:HSNO Act Approvals for Development of New Organisms  | Acceptable |
| Hazardous Substances and New Organisms (HSNO) Act:HSNO Act Approvals for New Organisms for Containment | Acceptable |

**Mandatory Tasks**



## 5. Definitions

### Acceptable

Where the Animal Products Officer (or Biosecurity Inspector) is satisfied that the operator is substantially complying with requirements; and where there have been any departures from regulatory requirements, that the operator's corrective actions have been, or are being, applied appropriately and effectively.



Departures from regulatory requirements, identified by the Animal Products Officer (or Biosecurity Inspector), are to be transferred to the operator's issue management system for resolution. (Key Topic / Non-compliance)

### Unacceptable

Where the Animal Products Officer (or Biosecurity Inspector) has determined that the operator is not in substantial compliance with regulatory requirements; evidenced by inadequate operator controls. (Key Issue / Non-compliance)