Supporting biomedical research since 1981

An Information Guide to ARC Animals and Products

2015

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Address P.O Box 1180 Canning Vale Western Australia 6970
The Animal Resources Centre (ARC) is a self-funding Statutory Authority of the Government of Western Australia and for over 30 years has supported Australian and regional Asia-Pacific biomedical research, teaching and diagnostics by producing and supplying genetically-defined, specific pathogen free (SPF) research rats and mice. The outbred, inbred, mutant, hybrid and congenic lines of mice and rats supplied by the Animal Resources Centre meet the exacting world-class demands of contemporary biomedical research via animal health monitoring, genetic testing, quality assurance, and specialist production and maintenance expertise.

Through an Animal Ethics Committee (AEC), the animal care and use program at the Animal Resources Centre complies with the Australian Code for the care and use of animals for scientific purposes (8th Edition, 2013) and all operations are ISO9001:2008 compliant. These functions safeguard Australia’s biomedical research investment by minimising research-related variables associated with animal production including husbandry, veterinary care, transportation, and the specialised physical plant.

The Animal Resources Centre is an authorised breeder of selected mouse strains derived from pedigreed stocks from The Jackson Laboratory and may supply these strains to researchers in Australia, Indonesia, Malaysia, New Zealand and Singapore. The advantage being that genetic drift is minimised and strains are comparable on a national and international scale. The Jackson Laboratory’s repository has the largest variety of specialty mouse strains available from any single organisation.

Although predominantly an Australian national resource, the Animal Resources Centre has shipped animals to over 20 countries and continuously evolves to meet the biomedical demands of Australia and Asia-Pacific regions. The animal models maintained at the Animal Resources Centre are driven by customer demand and change accordingly.

The Animal Resources Centre develops, cultivates, and maintains a strong customer service and research partnership by meeting or exceeding unique institutional demands and supports domestic and international biomedical research programs by leveraging well-serviced, dedicated airports. Centralised resources permit ‘one-stop-shopping’ for essential customer services, including import/exports, animal health monitoring, evaluating genetic integrity, quarantine, rederivation, and cryopreservation.

This booklet outlines the Animal Resources Centre’s products and services and should be used as a guide only; details are subject to change. Additional information may be found on the website www.arc.wa.gov.au or by contacting info@arc.wa.gov.au.
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THE QUALITY PROMISE

Australia’s own Animal Resources Centre (ARC) enacts multiple measures to provide high quality, specific pathogen free animals. Our closed colonies require rederivation before entry to minimise the risk of introducing disease. The detailed quality control program includes health screening, genetic testing and phenotype monitoring. Our on-site veterinary staff and standardised breeding and maintenance procedures facilitate product consistency. The purpose-built, dedicated animal facility provides a controlled environment and HEPA-filtered fresh air. While these control measures cannot prevent biologic or animal-based variation, we strive to provide excellent customer service to keep you informed and stress-free.

The ARC is ISO9001:2008 accredited; all Standard Operating Procedures and Work Instructions undergo an annual audit. The ARC is an authorised breeder of select, pedigreed mouse strains from The Jackson Laboratory; supplying these strains to researchers in Australia, Indonesia, Malaysia, New Zealand and Singapore. Animal welfare is a constant consideration. Production colonies are monitored monthly to minimise overproduction and strain-specific statistics are reported to the AEC.

The ARC is a proud Registered Training Organisation and all animal technicians are offered on-site training in Certificate III Animal Technology. We are dedicated in our support of the biomedical research industry.

The ARC is a member of the non-profit Animal Transport Association (ATA). The ATA aims to involve members internationally to find solutions to a variety of animal transport problems. Members subscribe to the statement of policies and agree that the first consideration is the safe, humane and expeditious handling of any animals under our care.

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SERVICES IN A NUTSHELL

SUPPLY AND TRANSPORT OF POPULAR MOUSE AND RAT STRAINS

Contact orders@arc.wa.gov.au
- Off-the-shelf selection with per animal pricing.
- Additional specifications available (see page 44).

SOURCING AND IMPORTING UNIQUE RODENT STRAINS FOR CUSTOMERS

Contact imports@arc.wa.gov.au
- Option 1: Import and send animals to customer after DAFF clearance,
- Option 2: Import, rederive and send to customer, or
- Option 3: Import, rederive and maintain at the ARC.

ANIMAL EXPORTATION SERVICES

Contact exports@arc.wa.gov.au
- An industry leader in animal exportation to over 20 countries.

HOUSING AND MAINTAINING CUSTOMERS’ UNIQUE MOUSE OR RAT STRAINS

Contact csmanager@arc.wa.gov.au
- Specialised breeding and personalised colony management with weekly web uploads, pricing per box and delivery as required.

REDERIVATION TO IMPROVE THE HEALTH STATUS OF A COLONY

Contact imports@arc.wa.gov.au
- Rederivation of mouse and rat lines by embryo transfer with post-rederivation health screening.
- Transporting the animals back to your facility or maintain at the Animal Resources Centre.

STORE A BACK-UP OF YOUR MOUSE STRAIN

Contact imports@arc.wa.gov.au
- Cryopreservation of embryos and sperm, and IVF services.

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ORDERING PROCEDURE

The Animal Resources Centre accepts orders by telephone, fax or email.

Telephone  (08) 9332 5033 (International: +61 8 9332 5033)
Fax  (08) 9310 2839 (International: +61 8 9310 2839)
Email  orders@arc.wa.gov.au
Website  http://www.arc.wa.gov.au
Address  Animal Resources Centre
         PO Box 1180,
         Canning Vale, WA 6970,
         Australia

All orders need to be placed by 11am (AWST) the day before despatch (interstate) or delivery (local). The order confirmation is distributed externally at 1pm (AWST) on Fridays, Mondays, Tuesdays and Wednesdays (the day before despatch/delivery). Please notify us of any variances by 9am (AWST) on the day of despatch for interstate orders and 8am (AWST) for local orders so differences can be rectified promptly.

Specific sale conditions apply to Animal Resources Centre animal purchases. The current Terms and Conditions may be found on the website.

Please note: An AEC number must be provided upon ordering all live animals for scientific use or teaching within Australia. For genetically modified animals, the receiving facility must have appropriate NLRD approval and physical containment status.

PLEASE PROVIDE THE FOLLOWING WHEN PLACING YOUR ORDER:

- AEC approval number, customer code, purchase order number, strain, sex, quantity, age/weight, desired receipt date(s)
- Customer name, email, delivery address, telephone number
- Special instructions (e.g., weight range, individual identification)

Standing orders are encouraged as stock to fill these orders will be set aside to ensure continuous availability. Colonies are regularly reviewed to avoid overproduction. If you know of an increased future need, please inform us so that we can increase our production to meet your needs.
CANCELLATION OF ORDERS

It is the Animal Resources Centre’s policy that once an order is placed by a customer, it is a binding contract. We accept that orders may have to be cancelled but we will not accept a cancellation immediately prior to delivery or if animals have been specifically held or bred for the order. If an order is cancelled under these circumstances, the customer will be invoiced for the animal cost. Please note that delayed payment of invoices may incur fees.

CUSTOMER CONCERNS

All animals are checked before despatch but please ensure your order is correct on receipt. The nature of biology, especially of inbred and genetically altered animals, is such that the Animal Resources Centre cannot provide surety against complications or conditions arising after despatch and within the first 24hrs. In the event of abnormalities or losses due to transport, please notify the Animal Resources Centre within 24 hours of delivery. No responsibility will be accepted for late notification. Replacement of stock or credit will be negotiated.

All customer concerns will be investigated and are treated as opportunities to improve our business. Concerns about the phenotype or genotype of a strain should also be promptly reported to us.

HEALTH REPORTS

We conduct extensive, routine health screening and have health reports for all areas of the facility; please visit www.arc.wa.gov.au or contact us.
**BREEDING PROGRAMS**

**OUTBRED OR RANDOM STOCKS**

The terms ‘random’ and ‘outbred’ are often used interchangeably. At the ARC we use a randomisation table for outbred colonies less than 100 breeding females. For larger colonies future breeders are chosen from a maximum of one mouse per cage. Several outbreeding systems are recognised but the common aim of these systems is a population represented by as large a range of alleles of each gene as possible, resulting in an inbreeding coefficient of no greater than 2% per generation.

**INBRED STRAINS**

Inbred mouse strains are bred within a closed colony by brother-sister mating to maintain certain defining characteristics. Animals are considered inbred after at least 20 consecutive generations of brother-sister mating.

Substrain: Established inbred strains may genetically diverge with time into substrains if separated from the parental line for 20 or more generations.

**CONGENIC STRAINS**

A congenic strain is genetically identical to an inbred strain except for a short chromosomal segment bearing the gene of interest. The formation of a congenic strain begins with the crossing of two breeding groups. One provides the genetic background and must always be an inbred strain. The other ‘donates’ the gene of interest and may or may not be an inbred strain. The mating system that produces congenic strains depends upon whether the gene of interest is dominant or recessive and the gene’s effect, when homozygous, on reproductive performance. Generally, ten backcross generations are required to yield a congenic animal, although contemporary molecular techniques can significantly shorten this period. Once established, a congenic strain is managed identically to an inbred strain.

**HYBRID STRAINS**

A hybrid is the first generation progeny (F1) of parents from two different inbred strains. Genetic uniformity and hybrid vigour are two desirable features of hybrids. They are typically not bred, except on demand, as the unique features cannot be maintained beyond the F1 generation. Hybrid nomenclature places the female strain first and the name is commonly shortened. For example the C57BL/6J (Female) x DBA/2 (Male) = B6D2F1, and C57BL (Female) x BALB/c (Male) = B6CF1.
**Mutant Strains**

These animals display a feature of a genetic mutation. It may be as simple and benign as a coat-colour mutation or a complex mutation where animals are sexually infertile or predisposed to a disease state or death. In most cases the mutation can be transferred to both outbred and inbred animals. Mutations can be either spontaneous (e.g. the nude mutation $\text{Foxn}1^{\text{nu}}/\text{Foxn}1^{\text{nu}}$, and hairless mutation $\text{hr}/\text{hr}$) or induced (transgenic and knockout strains).

**Recombinant Inbred Strains**

Recombinant inbred (RI) strains are derived from crossing two unrelated but highly inbred progenitor strains, which have been maintained independently under a regimen of strict inbreeding since the F2 generation, as separate parallel lines. A minimum of twenty generations of inbreeding is required thereafter, which results in numerous separate inbred strains derived from two inbred strains. These lines are useful tools to investigate whether a trait is polygenic or under the control of a single gene.
STRAIN SUMMARY

The strains listed below are available for sale from the Animal Resources Centre. Other customer-specific lines are also maintained, some of which may be available with permission from the owner.

Contact orders@arc.wa.gov.au for details.

Strains marked with an asterisk (*) are produced under a propagation agreement with The Jackson Laboratory. These mice are sold subject to The Jackson Laboratory’s Conditions of Use and also the Australian Patent Number (2004268530). The Jackson Laboratory’s Conditions of Use is available on their website. This information is included in the ‘Strain Information’ section for each substrain derived from pedigreed stocks from The Jackson Laboratory.

MICE

OUTBRED MICE

Arc:Arc(S) (Swiss)
Arc:Q(S) (Quackenbush Swiss)

INBRED MICE

129X1/SvJArc  *  CBA/CaHArc
A/JArc  DBA/1JArc  *
BALB/cArc  DBA/2JArc  *
C3H/HeJArc  *  FVB/NJArc  *
C57BL/6JArc  *  NOD/ShiLtJArc  *
C57BL/10ScSnArc  SJL/JArc  *

CONGENIC MICE

<table>
<thead>
<tr>
<th>Strain Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>B6.SJL-Ptprc&lt;sup&gt;a&lt;/sup&gt;Pep3&lt;sup&gt;b&lt;/sup&gt;/BoyJArc</td>
<td>Ptp</td>
</tr>
<tr>
<td>B10.BR-H2&lt;sup&gt;kd&lt;/sup&gt; H2-T18&lt;sup&gt;a&lt;/sup&gt;/SgSnJArc</td>
<td>B10BR  *</td>
</tr>
<tr>
<td>B6.A-Dysf&lt;sup&gt;pmad&lt;/sup&gt;/GeneJArc</td>
<td>BLA/J</td>
</tr>
</tbody>
</table>

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**Mutant Mice**

<table>
<thead>
<tr>
<th>Strain Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>BALB/c- Foxn1(^{nu})/Arc</td>
<td>athymic nude</td>
</tr>
<tr>
<td>C57BL/10ScSn- Dmd(^{mdx})/Arc</td>
<td>mdx (X-linked)</td>
</tr>
<tr>
<td>C.B-17/IcrHanHsdHsdPrkdc(^{scid})</td>
<td>SCID</td>
</tr>
<tr>
<td>NOD.CB17-Prkdc(^{scid})/Arc</td>
<td>NOD/SCID</td>
</tr>
</tbody>
</table>

**F1 Hybrid Mice**

B6D2F1

CBB6F1

Other hybrid strains available on request.

**Induced Mutant Mice**

<table>
<thead>
<tr>
<th>Strain Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>C57BL/6J-TgN(A^2K^6HLA)6HsdArc</td>
<td>A2Kb</td>
</tr>
<tr>
<td>B6.129P2-Apoe(^{tm1Unc})/JArc</td>
<td>Apoe *</td>
</tr>
<tr>
<td>B6.SVJ129-Rag1(^{tm1Bal})/Arc</td>
<td>Rag1</td>
</tr>
</tbody>
</table>

**Additional Information**

For other strains at ARC: [http://www.arc.wa.gov.au/?page_id=78](http://www.arc.wa.gov.au/?page_id=78)


Other useful websites:

- [www.informatics.jax.org/external/festing/search_form.cgi](http://www.informatics.jax.org/external/festing/search_form.cgi)

Coat colour genes: Tyr\(^{c}\) (albino), Tyrp1\(^{b}\) (brown), A (agouti), a (non-agouti), Myo5a\(^{d}\) (dilute).

Other genes of interest: Cdhr23\(^{ahl}\) (age related hearing loss), Pde6b\(^{rd1}\) (retinal degeneration 1).
**Rats**

### Outbred Rats

<table>
<thead>
<tr>
<th>Strain Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ArcCrl:CD(SD)IGS</td>
<td>SD (Sprague Dawley)</td>
</tr>
<tr>
<td>ArcCrl:WI</td>
<td>Wistar</td>
</tr>
</tbody>
</table>

### Inbred Rats

<table>
<thead>
<tr>
<th>Strain Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>BN/RijHsdArc</td>
<td>BN (Brown Norway)</td>
</tr>
<tr>
<td>DA/Arc</td>
<td>DA (Dark agouti)</td>
</tr>
<tr>
<td>F344/Arc</td>
<td>F344 (Fisher 344)</td>
</tr>
<tr>
<td>LEW/CrlArc</td>
<td>Lewis</td>
</tr>
<tr>
<td>PVG/CArc</td>
<td>PVG (Piebald Virology Glaxo)</td>
</tr>
<tr>
<td>SHR/NCrIArc</td>
<td>SHR (Spontaneous hypertensive rats)</td>
</tr>
<tr>
<td>WKY/NCrIArc</td>
<td>WKY (Wistar-Kyoto)</td>
</tr>
</tbody>
</table>

### Mutant Rats

<table>
<thead>
<tr>
<th>Strain Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBH–\textsuperscript{mu}/Arc</td>
<td>athymic nude</td>
</tr>
<tr>
<td>LPK</td>
<td>Lewis polycystic kidney</td>
</tr>
</tbody>
</table>

Please contact the Animal Resources Centre if you require a strain that is not listed or if you require information on international strain availability.
**STRAIN INFORMATION**

The corresponding strain information is provided in a standard format for easy reference. Information on animal characteristics, usage and historical origin has been obtained from: "NIH Rodents 1980 Catalogue"; The Jackson Laboratory website (www.jax.org); "Inbred Strains in Biomedical Research" (Michael Festing 1979) and "Origins and Characteristics of Inbred Strains of Mice" (Michael Festing, Mouse Genome 89(3), 421-548, 1991).

**DISCLAIMER**

The strain information presented in this manual is derived from published information. The Animal Resources Authority accepts no responsibility for the authenticity of the published information.
### OUTBRED MICE

<table>
<thead>
<tr>
<th>Arc:Arc(S)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Product code</td>
<td>ARC</td>
</tr>
<tr>
<td>Strain Description</td>
<td>Outbred, Swiss mouse heritage.</td>
</tr>
<tr>
<td>Coat Colour</td>
<td>Albino</td>
</tr>
<tr>
<td>MHC Haplotype</td>
<td>Outbred</td>
</tr>
<tr>
<td>Complement Factor</td>
<td>Some mice are C5 deficient</td>
</tr>
<tr>
<td>✓ Large litters (average 11-12 young per litter).</td>
<td></td>
</tr>
<tr>
<td>✓ Females are good foster mums.</td>
<td></td>
</tr>
<tr>
<td>✓ Robust mouse.</td>
<td></td>
</tr>
<tr>
<td>✓ Aggressive when handled older than 7 weeks.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Arc:Q(S)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Product code</td>
<td>QS</td>
</tr>
<tr>
<td>Strain Description</td>
<td>Outbred</td>
</tr>
<tr>
<td>Coat Colour</td>
<td>Albino</td>
</tr>
<tr>
<td>MHC Haplotype</td>
<td>Outbred</td>
</tr>
<tr>
<td>Complement Factor</td>
<td>Some mice are C5 deficient</td>
</tr>
<tr>
<td>✓ Useful strain for reproductive physiology studies.</td>
<td></td>
</tr>
<tr>
<td>✓ Females are good foster mums.</td>
<td></td>
</tr>
<tr>
<td>✓ Large litters (average 14 young per litter).</td>
<td></td>
</tr>
<tr>
<td>✓ Robust mouse, larger in size than Swiss.</td>
<td></td>
</tr>
</tbody>
</table>
INBRED MICE

129X1/SvJArc

Product code 129J
JAX stock number 000691
Strain Description Inbred
Coat Colour Chinchilla ($A^w/A^w\text{Oca2}^b\text{Tyr}^{c\text{-ch}}/\text{Oca2}^b\text{Tyr}^c$) and/or albino ($A^w/A^w\text{Oca2}^p\text{Tyr}^c/\text{Oca2}^p\text{Tyr}^c$)
MHC Haplotype H2K^b
Complement Factor C5 normal

✓ Used as a research tool in many fields, including cancer research, neurobiology and reproductive biology.
✓ A strain widely used for the production of targeted mutations using embryonic stem cell lines.
✓ Stumpy tails.
✓ Pregnant females litter early if transported pregnant.
✓ Progressive hearing loss with onset prior to 3 months of age (homozygous for $Cdh23^{ahl}$).
✓ Eye problems (blindness).
✓ See www.jax.org for more strain information.
✓ These mice are sold subject to The Jackson Laboratory’s Conditions of Use and also the Australian Patent Number (2004268530).
A/JArc

Product code          AJ
Strain Description    Inbred
Coat Colour           Albino (al/a Tyrp1b/Tyrp1b Tyrbc/Tyrbc)
MHC Haplotype         H2Kα
Complement Factor     C5 deficient

✓ Used in research on CD antigens, antigen receptors and histocompatibility markers.
✓ High social dominance of males in competition for females.
✓ High spontaneous incidence of lung adenomas and mammary tumours in breeding females.
✓ Congenital defects include cleft-lip/palate and polydactyly at a prevalence of up to 10%.
✓ Incidence of nephritis and amyloidosis nearly 100% at 15 months.
✓ Low aggression, low responder in general (activity, alcohol, anaesthetics, metabolism).
✓ Hearing loss, blindness.
BALB/cArc

Product code BC
Strain Description Inbred
Coat Colour Albino (A/A Tyrp1^b/Tyrp1^b Tyr^c/Tyr^c)
MHC Haplotype H2K^d

Complement Factor C5 normal

- Low incidence of mammary tumours.
- Amyloidosis (40%) in older males.
- Aggressiveness observed in male stock from 6 weeks of age and female breeders.
- Fighting amongst males increases when cohorts are divided into smaller groups.
- High social dominance exhibited by males in presence of females resulting in high aggression.
- Low mortality after neonatal thymectomy.
- Cystitis.
- Occurrence of divided septums.
- Barbering from 7 weeks.
<table>
<thead>
<tr>
<th><strong>Product code</strong></th>
<th>C3H</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>JAX stock number</strong></td>
<td>000659</td>
</tr>
<tr>
<td><strong>Strain Description</strong></td>
<td>Inbred</td>
</tr>
<tr>
<td><strong>Coat Colour</strong></td>
<td>Agouti (A/A)</td>
</tr>
<tr>
<td><strong>MHC Haplotype</strong></td>
<td>H2K(^{k})</td>
</tr>
<tr>
<td><strong>Complement Factor</strong></td>
<td>C5 normal</td>
</tr>
</tbody>
</table>

- Used as a general purpose strain in a wide variety of research areas including cancer, infectious disease, sensorineural, and cardiovascular biology research.
- Blindness by weaning age.
- High incidence of hepatomas.
- Typically C3H/HeJArc are unresponsive to lipopolysaccharide (LPS) due to a B-cell deficiency (Anderson and Ostermann, 1980).
- Highly susceptible to infection by Gram negative bacteria.
- Spontaneous corneal opacities.
- Retina lack photoreceptors.
- Hearing normal.
- Alopecia areata.
- Cardiac mineralisation/calcinosis.
- See [www.jax.org](http://www.jax.org) for more strain information.
- These mice are sold subject to The Jackson Laboratory’s [Conditions of Use](http://www.jax.org) and also the Australian Patent Number (2004268530).
C57BL/6JArc

Product code  B6
JAX stock number  000664
Strain Description  Inbred
Coat Colour  Black (a/a)
MHC Haplotype  H2K^b
Complement Factor  C5 normal

✓ Susceptible to the development of atheromatous lesions after 20 weeks on high fat diets.
✓ Develops non-insulin dependent diabetes mellitus and hypertension when fed a high/fat, high simple-carbohydrate diet.
✓ Glucose intolerance is due to spontaneous mutation in Nicotinamide Nucleotide Transhydrogenase (Nnt).
✓ Generally refractory to many tumours and to many infectious agents.
✓ Congenital abnormalities include microphthalmia, corneal opacities, anophthalmia and hydrocephalus (Smith, R.S., Roderick, T.H. and Sundberg, J.P., 1994).
✓ Susceptible to imperforate vaginas and mucometra.
✓ White spotting commonly observed in pigmentation.
✓ Aggressiveness observed in male stock from 6 weeks of age and female breeders.
✓ Fighting amongst males increases when cohorts are divided into smaller groups.
✓ Barbering and ulcerative dermatitis observed.
✓ See www.jax.org for more strain information.
✓ These mice are sold subject to The Jackson Laboratory’s Conditions of Use and also the Australian Patent Number (2004268530).
C57BL/10ScSnArc

Product code  B10
Strain Description  Inbred
Coat Colour  Black (a/a)
MHC Haplotype  H2K\textsuperscript{b}

✓ High incidence of spontaneous deviants (possible mutants).
✓ High degree of genetic distinctiveness.
✓ Primarily a genetic "tool" strain.
✓ The most commonly used strain for development of resistant congenic lines differing from the parental strain by single histocompatibility loci.
✓ Divided septums observed.
✓ Congenital abnormalities include microphthalmia, corneal opacities and hydrocephalus.
✓ Barbering common.
<table>
<thead>
<tr>
<th>Product code</th>
<th>CBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strain Description</td>
<td>Inbred</td>
</tr>
<tr>
<td>Coat Colour</td>
<td>Agouti (A/A)</td>
</tr>
<tr>
<td>MHC Haplotype</td>
<td>H2K&lt;sup&gt;k&lt;/sup&gt;</td>
</tr>
<tr>
<td>Complement Factor</td>
<td>C5 normal</td>
</tr>
</tbody>
</table>

- Low activity and docile.
- High overall tumour incidence, including hepatomas and mammary tumours.
- Resistant to the induction of atherosclerosis by high fat diet.
- Widely distributed as a general purpose strain.
- Considerable variation between substrains, thus care must be exercised in comparing CBA substrain data.
- High rate of spontaneous mutations.
**DBA/1JArc**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product code</td>
<td>DB1</td>
</tr>
<tr>
<td>JAX stock number</td>
<td>000670</td>
</tr>
<tr>
<td>Strain Description</td>
<td>Inbred</td>
</tr>
<tr>
<td>Coat Colour</td>
<td>Dilute brown ((a/a \text{Tyrp1}^b/\text{Tyrp1}^b \text{Myo5a}^d/\text{Myo5a}^d))</td>
</tr>
<tr>
<td>MHC Haplotype</td>
<td>H2K(^q)</td>
</tr>
<tr>
<td>Complement Factor</td>
<td>C5 normal</td>
</tr>
</tbody>
</table>

- **Please note:** The ARC plans to discontinued this production strain mid-2015. Please contact [info@arc.wa.gov.au](mailto:info@arc.wa.gov.au) to discuss supply options.
- High incidence of chronic degenerative lesions in heart muscle of old animals.
- Low gross tumour incidence, especially in males.
- High incidence of lymphoma and lung tumours in some studies. Aggressive.
- See [www.jax.org](http://www.jax.org) for more strain information.
- These mice are sold subject to The Jackson Laboratory’s [Conditions of Use](http://www.jax.org) and also the Australian Patent Number (2004268530).
<table>
<thead>
<tr>
<th>DBA/2JArc</th>
</tr>
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<tbody>
<tr>
<td>Product code</td>
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<tr>
<td>JAX stock number</td>
</tr>
<tr>
<td>Strain Description</td>
</tr>
<tr>
<td>Coat Colour</td>
</tr>
<tr>
<td>MHC Haplotype</td>
</tr>
<tr>
<td>Complement Factor</td>
</tr>
</tbody>
</table>

- High incidence of sterility.
- High incidence of spontaneous calcification of the heart muscle in older mice.
- Low blood pressure, high red blood count.
- Active and aggressive.
- Intolerance to ethanol.
- Susceptible to audiogenic seizures (begins at 2 weeks, peaks at 3 weeks, gradually declines with age).
- Progressive hearing loss.
- Generally susceptible to infectious agents.
- Eye abnormalities (glaucoma, corneal mineralisation).
- See [www.jax.org](http://www.jax.org) for more strain information.
- These mice are sold subject to The Jackson Laboratory’s [Conditions of Use](http://www.jax.org) and also the Australian Patent Number (2004268530).
FVB/NJArc

Product code FVB
JAX stock number 001800
Strain Description Inbred
Coat Colour Albino (A/A Tyr^C/Tyr^C)
MHC Haplotype H2K^q
Complement Factor C5 deficient

✓ Useful for production of transgenic mice as fertilised eggs contain large and prominent pronuclei, which facilitates microinjections.
✓ Aggressive, especially female stock from 6 weeks of age.
✓ May get lung tumours but low incidence of lymphomas.
✓ Neuropathological conditions in some sublines, showing seizures and neuronal necrosis in cerebral cortical and hippocampal neurons (not observed in ARC colony for a few years now).
✓ See www.jax.org for more strain information.
✓ These mice are sold subject to The Jackson Laboratory’s Conditions of Use and also the Australian Patent Number (2004268530).
Product code: NOD
JAX stock number: 001976
Strain Description: Inbred
Coat Colour: Albino (A/A $\text{Tyr}^c/T\text{yr}^c$)
MHC Haplotype: H2K$^d$
Complement Factor: C5 deficient

- Strain was formerly called NOD/LtJ until 2007 when it was changed to NOD/ShiLtJ.
- This strain is used in immunology and inflammation research and is a polygenic model for type 1 diabetes.
- The Jackson Laboratory reports that diabetes occurs in 90-100% of females by 30 weeks of age and 40-60% of males by 30-40 weeks of age.
- Susceptibility to diabetes is polygenic and environment factors such as housing conditions, health status and diet exert a strong effect on penetrance.
- Females produce 4 to 5 litters before becoming diabetic.
- Female breeders are aggressive.
- The incidence of diabetes in males is influenced by environmental factors including pathogens in an inverse relationship i.e. higher incidence of diabetes in germfree animals than conventional animals. Please contact info@arc.wa.gov.au for more information.
- Mice free from diabetes by 1 year are prone to develop follicle centre cell lymphomas.
- See www.jax.org for more strain information.
- These mice are sold subject to The Jackson Laboratory’s Conditions of Use and also the Australian Patent Number (2004268530).
**SJL/JArc**

**Product code**  SJL  
**JAX stock number**  000686  
**Strain Description**  Inbred  
**Coat Colour**  Albino (Oca2<sup>p</sup> Tyr<sup>c</sup>/Oca2<sup>p</sup> Tyr<sup>c</sup> A/A)  
**MHC Haplotype**  H2K<sup>s</sup>  
**Complement Factor**  C5 normal

- Good model for limb girdle muscular dystrophy.
- SJL/JArc mice are immunocompetent but have elevated levels of circulating T cells.
- High incidence of type B reticulum cell sarcomas.
- High incidence of spontaneous amyloidosis.
- Sensitive to immune tolerance induction at birth but by two months becomes resistant to tolerance induction.
- Stock males are very aggressive.
- See [www.jax.org](http://www.jax.org) for more strain information.

- These mice are sold subject to The Jackson Laboratory’s [Conditions of Use](http://www.jax.org) and also the Australian Patent Number (2004268530).
## CONGENIC MICE

### B10.BR-\(H2^K\)\(H2-T18\)\(a\)/SgSnJArc

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
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<tbody>
<tr>
<td>Product code</td>
<td>BR</td>
</tr>
<tr>
<td>JAX stock number</td>
<td>000465</td>
</tr>
<tr>
<td>Strain Description</td>
<td>Congenic. More specifically, Created by transferring through backcrossing the (H2K) of the inbred strain C57BR onto the C57BL/10ScSn.</td>
</tr>
<tr>
<td>Coat Colour</td>
<td>Black ((a/a))</td>
</tr>
<tr>
<td>MHC Haplotype</td>
<td>(H2K)</td>
</tr>
</tbody>
</table>

- Used in research for CD antigens, antigen receptors and histocompatibility markers.
- Fecundity lower than C57BL/10ScSn but can have large litters.
- Corneal opacities may be observed from two weeks of age.
- White spotting may be observed in pigmentation.
- See [www.jax.org](http://www.jax.org) for more strain information.
- These mice are sold subject to The Jackson Laboratory’s [Conditions of Use](http://www.jax.org) and also the Australian Patent Number (2004268530).
**B6.A-Dysf^{prmd}/GeneJArc**

<table>
<thead>
<tr>
<th>Product code</th>
<th>BLA</th>
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</thead>
<tbody>
<tr>
<td>JAX stock number</td>
<td>012767</td>
</tr>
<tr>
<td>Strain Description</td>
<td>Congenic</td>
</tr>
<tr>
<td>Coat Colour</td>
<td>Black</td>
</tr>
</tbody>
</table>

- Mice contain the progressive muscular dystrophy (*prmd*) allele from the A/J inbred strain that was introgressed to the C57BL/6 genetic background.

- The Jain Foundation is sponsoring the maintenance of the colony at the Animal Resources Centre for research into dysferlin deficiency.

- Animals are free of charge for research approved by the Jain Foundation. ARC prices for animal shippers and transport apply to all orders.

- The Jain Foundation will be informed of any BLA/Js that the ARC supplies.

- See [www.jax.org](http://www.jax.org) for more strain information.
B6.SJL-Ptprc\(a\)Pep3\(b\)/BoyJArc

Product code  PTP  
Strain Description  Congenic  
Created by transferring through backcrossing the Ptprc\(a\) and Pep3\(b\) genes of the inbred strain SJL/J onto the C57BL/6 background.

Coat Colour  Black (\(a/a\))  
MHC Haplotype  H2K\(b\)  
Complement Factor  C5 normal  

- Confusion has occurred over the years due to changes in nomenclature of the T-Lymphocyte cell surface antigen CD45.

- \(Ptprc^a\) (protein-tyrosine phosphatase, receptor type c) was the gene symbol designated to the CD45 antigen because of its homology with human placental protein-tyrosine phosphatase 1B. \(Ptprc^a\) is one of a family of protein-tyrosine phosphatase genes involved with the regulation of cell growth.

- Congenital abnormalities include microphthalmia, corneal opacities, anophthalmia and hydrocephalus.

- Susceptible to imperforate vaginas, divided septums and mucometra.
**MUTANT MICE**

**BALB/c-Foxn1\textsuperscript{nu}/Arc**

Product code BCNU

Strain Description Mutant inbred

Coat Colour Albino ($A/A \text{ Tyrp1}^b/\text{Tyrp1}^b \text{Tyr}^c/\text{Tyr}^c$). Haired when heterozygous, nude when homozygous.

MHC Haplotype H2K\textsuperscript{d}

Complement Factor C5 normal

- Nude is an autosomal recessive mutation located on chromosome 11.
- Foxn1\textsuperscript{nu} – autosomal recessive Forkhead box N1.
- Typically, litters consist of equal nude and haired offspring. Preweaner nudes are not as robust as heterozygous littermates and are prone to heat loss, dehydration and slower weight gains, hence they should not be weaned before 4 weeks of age.
- Prone to dust in their eyes as no eyelashes.
- Homozygotes are athymic.
- Female nu/+ prone to cystitis.
- High Incidence of divided septums.
- The two major defects are failure of hair growth and dysgenesis of thymic epithelium due to developmental failure of the thymic anlage arising from the 3rd pharyngeal pouch. The defect lies in the thymic epithelium, there being no intrinsic defect in T cell precursors. Nude mice respond poorly to thymus-dependent antigens because of a defect in helper T-cell activity. Responses to thymus-independent antigens are normal. Normal or increased NK cell activity is present.
- Housed in an isolator – immunodeficient.

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<table>
<thead>
<tr>
<th>Product code</th>
<th>MDX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strain Description</td>
<td>Mutant inbred</td>
</tr>
<tr>
<td>Coat Colour</td>
<td>Black (a/a)</td>
</tr>
<tr>
<td>MHC Haplotype</td>
<td>H2K&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

- *Dmd<sup>mdx</sup>* - sex linked recessive (Duchenne muscular dystrophy).
- Muscular dystrophy not observed.
- Cystitis and divided septums observed.
- Congenital abnormalities include microphthalmia, corneal opacities and hydrocephalus.
- Mice behave normally despite muscle pathology.
Product code: SCID
Strain Description: Mutant inbred
Coat Colour: Albino (A/A Tyyp1^b/Tyrp1^b Tyr^c/Tyr^c)
MHC Haplotype: H2K^d
Complement Factor: C5 normal

✓ Arose as a spontaneous autosomal recessive mutation in C.B-Igh-1^b (CB-17) congenic strain. Prkdc^{scid} (autosomal recessive, protein kinase, DNA activated, catalytic polypeptide).

✓ Homozygotes have little or no immunoglobulin in serum. Lymphoid organs consist of vascular connective tissue and macrophages and are devoid of lymphocytes.

✓ Bone marrow lacks plasma cells and lymphocytes and skin lacks dendritic Thy-1^+ epidermal cells. Although B and T-cells and pre-B and pre-T cells are absent early B and T-cells are present.

✓ A variable percentage (2-20%) of young adults develops low numbers of functional B and T-cells. This is not genetically determined.

✓ Macrophage activation and antigen presentation, NK cell activity and myeloid cell differentiation is normal.

✓ Useful model for studying the relationship between immunity and disease, studies on engraftment of xenogenic cells and tissues and studying human severe combined immunodeficiency.

✓ Also a useful model for understanding the basis of increased lymphoid malignancies in immunodeficiencies as thymic lymphomas occurs in about 15% of mice.

✓ Cystitis in female stock.

✓ Housed in an isolator.
NOD.CB17-Prkdc^{scid}/Arc

Product code NODSCID
Strain Description Mutant inbred
Coat Colour Albino (A/A Tyr^{c}/Tyr^{c})
MHC Haplotype H2K^{0/}
Complement Factor C5 deficient

✓ The Animal Resources Centre received breeding pairs from colonies held at the Walter and Eliza Hall Institute in December 1998.
✓ High mortality in breeders; aggressive.
✓ Prkdc^{scid} - autosomal recessive, protein kinase, DNA activated, catalytic polypeptide.
✓ No endogenous T- or B- lymphocyte function.
✓ Develops high incidence of thymoma with age and old mice can develop inclusion body nephropathy.
✓ Used for the delineation of the role of T cell subsets and auto-antibodies in diabetes.
✓ Housed in an isolator

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**Induced Mutant Mice (Transgenic and Targeted-Mutant Mice)**

<table>
<thead>
<tr>
<th>Product code</th>
<th>A2KB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strain Description</td>
<td>Transgenic</td>
</tr>
<tr>
<td>Coat Colour</td>
<td>Dark grey</td>
</tr>
<tr>
<td>MHC Haplotype</td>
<td>H2K&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Complement Factor</td>
<td>C5 normal</td>
</tr>
</tbody>
</table>

- Transgenic for HLA A2K<sub>b</sub> gene.
- Congenital abnormalities include microphthalmia, corneal opacities, anophthalmia and hydrocephalus.
- Litters lost at approximately 17 days.
- High fat diet prevents loss of litters.
- Refer to C57BL/6JArc for background strain information.
Mice homozygous for the \( \text{Apoe}^{\text{tm1Unc}} \) mutation show a marked increase in total plasma cholesterol levels that are unaffected by age or sex.

Divided septums prone in females.

Fatty streaks in the proximal aorta are found at 3 months of age. The lesions increase with age and progress to lesions with less lipid but more elongated cells, typical of a more advanced stage of pre-atherosclerotic lesion.

Moderately increased triglyceride levels have been reported in mice with this mutation on a mixed C57BL/6 x 129 genetic background.

Aged apoE-deficient mice (>17 months) have been shown to develop xanthomatosous lesions in the brain consisting mostly of crystalline cholesterol clefts, lipid globules, and foam cells. Smaller xanthomas were seen in the choroid plexus and ventral fornix.

Recent studies indicate that apoE-deficient mice have altered responses to stress, impaired spatial learning and memory, altered long term potentiation, and synaptic damage.

See [www.jax.org](http://www.jax.org) for more strain information.

These mice are sold subject to The Jackson Laboratory’s [Conditions of Use](http://www.jax.org) and also the Australian Patent Number (2004268530).
Product code RAG1
Strain Description Mutant inbred
Coat Colour Agouti (N6), Black (N10)
MHC Haplotype H2K^b
Complement Factor C5 normal

- Agouti N6 and black N10 mice available.
- Good breeding performance.
- Housed in an isolator.
- Mice homozygous for the \(Rag1^{tm1Bal}\) mutation produce no mature T cells or B cells.
- Their phenotype can be described as a "non-leaky" severe combined immune deficiency (\(Prkdc^{scid}/Prkdc^{scid}\). \(Prkdc^{scid}\) mice produce some B cells and IgM.
- They have no CD3^+ or T cell receptor (TCR) alpha-beta positive cells.
- The thymus of the mutant mice contains 15 to 130 times fewer cells than heterozygous or wildtype siblings.
- The thymocytes are CD8^-CD4^- and most are IL2 receptor positive.
- Neither the spleen nor bone marrow contain any IgM or IgD staining cells, indicating an absence of mature B cells.
- These and other data suggest that B cell and T cell development has been arrested at an early stage.
- Macroscopically, the mutants are indistinguishable from heterozygotes or normal wildtype siblings.
- Old mice can develop inclusion body nephropathy.
### OUTBRED RATS

**ArcCrl:CD(SD)IGS**

<table>
<thead>
<tr>
<th>Product code</th>
<th>SD</th>
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</thead>
<tbody>
<tr>
<td>Strain Description</td>
<td>Outbred</td>
</tr>
<tr>
<td>Coat Colour</td>
<td>Albino</td>
</tr>
<tr>
<td>MHC Haplotype</td>
<td>Outbred</td>
</tr>
</tbody>
</table>

- Females are good foster mothers.
- Docile, excellent parents.
- Mammary tumours common in older females.
- Popular rat to function as foster parents in caesarean procedures.
- Intelligent rat, thus popular model for psychology tests.
- Barbering when older than 8 weeks of age.
- Tendency to become very fat with age.

**ArcCrl:WI**

<table>
<thead>
<tr>
<th>Product code</th>
<th>WI</th>
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</thead>
<tbody>
<tr>
<td>Strain Description</td>
<td>Outbred</td>
</tr>
<tr>
<td>Coat Colour</td>
<td>Albino</td>
</tr>
<tr>
<td>MHC Haplotype</td>
<td>Outbred</td>
</tr>
</tbody>
</table>

- Females are good foster mothers.
- Very commonly used outbred rat.
- Tendency to become very fat with age.
- Spontaneous clonic convulsions reported.
- Young females very active.
- Barbering common.
### INBRED RATS

**BN/RijHsdArc**

<table>
<thead>
<tr>
<th>Product code</th>
<th>BN</th>
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<tbody>
<tr>
<td>Strain Description</td>
<td>Inbred</td>
</tr>
<tr>
<td>Coat Colour</td>
<td>Brown ((a, b, C, h')):</td>
</tr>
<tr>
<td>MHC Haplotype</td>
<td>RT1(n)</td>
</tr>
</tbody>
</table>

- Low post-partum mating frequency.
- Hydronephrosis and hydroureter common.
- Endocardial disease in older animals.
- High incidence of urinary bladder and ureteral carcinomas in old males.
- Moderate incidence of pituitary adenomas in older animals
- Immunologic model as the strain is unique in its expression of the high IgE - responder phenotype.
- Resistant to experimental allergic encephalomyelitis.
- Resistant to induction of autologous immune complex glomerulonephritis.

### DA/Arc

<table>
<thead>
<tr>
<th>Product code</th>
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<tbody>
<tr>
<td>Strain Description</td>
<td>Inbred</td>
</tr>
<tr>
<td>Coat Colour</td>
<td>Agouti ((A,B,C, H))</td>
</tr>
<tr>
<td>MHC Haplotype</td>
<td>RT1(^{av1})</td>
</tr>
</tbody>
</table>

- Uses include studies on transplantable salivary gland adenocarcinomas, transplantation immunology, autoimmune disease (eg thyroiditis).
- Occasional hydrocephalus.
**F344/Arc**

Product code: F344  
Strain Description: Inbred  
Coat Colour: Albino \((a, B, c, h)\):  
MHC Haplotype: RT1\(^{lv1}\)

- Interstitial cell tumours of the testis.  
- Resistant to spontaneous autoimmune thyroiditis.  
- Low incidence of nephritis.  
- The most popular strain of rat for use in carcinogen evaluation, due to relatively low incidence of naturally occurring neoplasms but a relatively high responder to induced neoplasms via chemicals and/or irradiation.  
- Young females are jumpy and don’t like being handled.

**LEW/CrlArc**

Product code: LEW  
Strain Description: Inbred  
Coat Colour: Albino \((a, B, c, h)\)  
MHC Haplotype: RT1\(^l\)

- Docile.  
- Susceptible to induction of experimental allergic encephalomyelitis, adjuvant induced arthritis, induced autoimmune myocarditis and autologous immune complex glomerulonephritis.  
- Host for a number of induced neoplasms (lymphoma 8, renal sarcoma, fibrosarcomas).
### PVG/CArc

<table>
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<tr>
<th>Product code</th>
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<tbody>
<tr>
<td>Strain Description</td>
<td>Inbred</td>
</tr>
<tr>
<td>Coat Colour</td>
<td>Black hooded ((a, B, C, h))</td>
</tr>
<tr>
<td>MHC Haplotype</td>
<td>RT1(^c)</td>
</tr>
</tbody>
</table>

- ✓ Docile.
- ✓ Popular inbred for general use as low activity relative to other strains.
- ✓ Resistant to experimental allergic encephalomyelitis and the induction of autoimmune thyroiditis.
- ✓ Useful model for development of autoimmune thyroiditis and diabetes due to insulitis following thymectomy and sublethal x-irradiation.

### SHR/NCrIArc

<table>
<thead>
<tr>
<th>Product code</th>
<th>SHR</th>
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<tbody>
<tr>
<td>Strain Description</td>
<td>Inbred</td>
</tr>
<tr>
<td>Coat Colour</td>
<td>Albino ((c))</td>
</tr>
<tr>
<td>MHC Haplotype</td>
<td>RT1(^k)</td>
</tr>
</tbody>
</table>

- ✓ Blood pressure measured as part of Phenotype Management Plan.
- ✓ Blood pressure of 150-160mmHg by 10 weeks of age in males and females.
- ✓ High incidence of periarteritis nodosa autoimmune in origin, myocardial infarctions, nephrosclerosis, lymphopaenia and variable incidence of cerebral lesions relative to the degree of hypertension.
- ✓ Aggressive.
WKY/NCrlArc

<table>
<thead>
<tr>
<th>Product code</th>
<th>WKY</th>
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<tbody>
<tr>
<td>Strain Description</td>
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</tr>
<tr>
<td>Coat Colour</td>
<td>Albino (a, B, c, h)</td>
</tr>
<tr>
<td>MHC Haplotype</td>
<td>RT1^I</td>
</tr>
</tbody>
</table>

- Adult WKY have an inability to excrete acid appropriately after acute or chronic acid loading compared to Sprague Dawley rats.
- A subset of WKY originating at NIH demonstrates an inheritable transmission of biventricular cardiac hypertrophy (BVH).
- WKY with BVH provide a natural model of volume load hypertrophy.
- Recognised normotensive control to use in parallel with studies involving the hypertensive SHR rat.
**MUTANT RATS**

<table>
<thead>
<tr>
<th>Product code</th>
<th>CBHNU</th>
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<tbody>
<tr>
<td>Strain Description</td>
<td>Mutant inbred</td>
</tr>
<tr>
<td>Coat Colour</td>
<td>Black hooded ($a$, $B$, $C$, $h$)</td>
</tr>
<tr>
<td>MHC Haplotype</td>
<td>RT1$^c$</td>
</tr>
</tbody>
</table>

- ✓ Homozygotes have little or no hair and are athymic.
- ✓ Heterozygotes have hair and functioning thymus.
- ✓ Prone to dust in their eyes as no eyelashes.
- ✓ Similar dysgenesis to nude mutation in mice.
- ✓ Cell mediated immunity greatly reduced or absent with a marked reduction of T-lymphocyte function.
- ✓ Extremely susceptible to infection with *Clostridium piliforme*.
- ✓ Housed in an isolator.
<table>
<thead>
<tr>
<th><strong>Product code</strong></th>
<th>PKD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strain Description</strong></td>
<td>Mutant Inbred</td>
</tr>
<tr>
<td><strong>Coat Colour</strong></td>
<td>Albino ((a, B, c, h))</td>
</tr>
<tr>
<td><strong>MHC Haplotype</strong></td>
<td>RT1(^1)</td>
</tr>
</tbody>
</table>

- Docile.
- Lewis (LEW/SsNArc) rat is the background strain.
- Lewis polycystic kidney (LPK) model of autosomal-recessive polycystic kidney disease (ARPKD).
- Bilateral PKD starts as early as 3 weeks and progresses with age in homozygous animals (Kidney Blood Pressure Research 2007; 30: 129-144).
- Develop hypertension in homozygous animals and susceptible to induction of experimental allergic encephalomyelitis.
**VARIATIONS ON STANDARD ORDERS**

The Animal Resources Centre can supply age or weight orders, time-mated females, pregnant females and litters, as detailed below.

**AGE VERSUS WEIGHT**

Customers should be aware that there are many reasons for variations in body weight, including:

- Age is based on one week (7 days) of births. For inbred mice this can often result in a 5-6g weight range. For outbred mice this can easily be 12-15g. Rat weight ranges are obviously much bigger.
- We always sell the biggest stock first.
- We always try and size match stock, but in periods of high sales this may mean that we only have small stock to work with.
- We also have the problem that sorting through stock regularly can slow down or stop them growing. This can result in small animals of a particular age range being lighter than animals in a younger age range.
- Travel stress is always a factor and often affects body weight on arrival. Animals generally regain the weight within 48 hours, but this can vary depending on the strain and age of the animals as well as the conditions on the day the animals travel.

If size is important we suggest customers order by weight. We can then make a judgement about adding additional weight at the time of despatch to compensate for travel stress.

**BREEDING ANIMALS**

Mouse substrains derived from pedigreed stocks from The Jackson Laboratory are provided to end users solely to support internal research use. These mouse substrains and progeny of these substrains should not be transferred or sold to other third parties for any purpose. This same policy applies to all strains supplied by the Animal Resources Centre.
**Time-Mates**

Mice are hormone synchronised and mating is determined by observation of a vaginal plug. Rats are naturally mated. Please note the following particulars:

- Day 0 of pregnancy is the day the vaginal plug is observed. It is recommended that customers confirm their requirements with the relevant literature to ensure consistency.
- We are able to guarantee that 100% of mice and rats supplied after day 14 post-mating will be pregnant, however loss of pregnancy can occur during transport.
- Mated females less than E14 are not guaranteed pregnant.
- The time-mated animals Conditions of Sale are found on the website.

**Pregnant Females and Litters**

Shipping pregnant females and litters carries an inherent risk of loss, for which the Animal Resources Centre will not compensate. The following is recommended:

- Pregnant females will be despatched up to E18.
- Animals will not be shipped the same day they are weaned.
- Orders for litters must be placed before they are born to avoid pups being despatched from harem cages with the wrong mother.
- Local deliveries of pups can be sent at 1-3 days of age.
- We recommend despatching pregnant females for interstate delivery of pups, but we will send litters at ≥3 days of age on despatch.
- For despatch with two flights, litters at ≥4 days will be sent.
- The Animal Resources Centre can provide superovulated females for donor eggs only.

**Aged Animals**

The Animal Resources Centre does not normally hold stock beyond 12 weeks of age. Some strains of animals can be aged up to two years with the addition of a weekly charge and conditions. Arrangements for holding older animals depend on the strain and age required.
**SPECIAL MATED ANIMALS**

The ARC can create F1 hybrids at your request, however accommodating these requests can depend on the strain(s) required and their location at the ARC. Please contact us with your request.

**STANDING ORDERS**

The ARC can ensure you receive your requested animals on an on-going basis, either weekly, fortnightly or monthly, by placing a standing order. Please contact us with your requirements for a standing order.

**SURGICAL ALTERATIONS**

Common surgical alterations include:

- Ovariectomies
- Vasectomies
- Castrations
- Splenectomies

Please see Veterinary Support section on page 55.

**BLOOD AND TISSUE COLLECTION**

Serum and plasma are available upon request. If you require tissue dissections from cadavers we may be able to accommodate your request; please contact us for further information (info@arc.wa.gov.au).

**EXTRA SERVICES—UPON REQUEST**

- Weighing animals (+10%),
- Ear tagging (+ technician time),
- SHR blood pressure test (price on application),
- Palpation (+25%),
- Glucose testing ($4.00 per mouse),
- Check divided septums (+10%),
- Unrelated outbred selection (+10%),
- Specified animals for breeding (where agreed)
SERVICES

TRANSPORTATION SERVICES

For over 30 years the Animal Resources Centre has been dedicated to providing safe and efficient transportation of laboratory animals and related products throughout Australia and overseas. Building and maintaining strong and reliable relationships with our airline partners, freight forwarders, road couriers and customs agents ensures we can confidently transport animals. As a client this means less stress for you and less stress for the animal.

Australian and International clients can be assured that our optional door to door delivery is undertaken by professionals in the field of laboratory animal transportation. Our experienced partners assist us with hundreds of shipments a week throughout Australia and worldwide. Let the Animal Resources Centre team of transportation experts assist you in providing the most efficient and cost effective solution that will meet your needs.

THE ARC ADVANTAGE

Our facility is located close to domestic and international airports, and trusted road couriers, with specially trained drivers delivering animals. Animals are shipped in filtered, IATA-approved shippers with high quality food, gel packs and bedding.

Temperature controlled cabinets are available at Perth Airport for our exclusive use. This allows the animals to rest in monitored, temperate conditions prior to departure. The internal and external box temperatures are closely monitored to comply with animal welfare practices. The Animal Resources Centre will postpone any animal shipment if the ground temperature risks animal welfare.

Established relationships with major airline carriers guarantee competitive rates, a reliable and flexible service, and excellent safety records. Our customer service team can provide you with transportation options to suit your individual needs.
ANIMAL EXPORTATION SERVICES

The Animal Resources Centre is an industry leader in the exportation of animals to over 20 destinations worldwide. Over the years we have established a professional network of industry providers including airline carriers, customs agents and freight forwarders that provide you, the client, with hassle-free transportation and documentation. Please contact exports@arc.wa.gov.au for more information.

THE ANIMAL RESOURCES CENTRE ADVANTAGE

Our exportation experts have specialised knowledge of international requirements and regulations for shipping laboratory animals and are able to assist you in providing the most efficient and cost effective solution to your needs. We can assist and liaise with Australian and overseas researchers needing to export animals from Australia for collaborative research. We provide filtered shippers designed specifically for international exportation and if required, door-to-door delivery including customs clearance. We are familiar with handling the supportive documentation required by different countries and can provide health certificates when required. Shipments are transported and lodged at the International Airport by trained staff.
ANIMAL IMPORTATION AND REDERIVATION SERVICES

The Animal Resources Centre offers a comprehensive animal importation service, housing Australian or International sourced rodents (Mice or Rats) in one of their two DAFF Quarantine Approved Premises. Individual customer needs are determined and every importation is customised to meet these specific requirements, including, Post-quarantine clearance, rederivation, and/or cryopreservation.

A case-specific cost estimate is prepared and itemised invoicing allows customers to track expenses. Invoicing for each import is carried out sequentially as each part of the importing process is completed.

HOW THE ANIMAL RESOURCES CENTRE IMPORTS YOUR RODENT STRAIN FOR YOU

Complete an Import Request Form by requesting one via email from imports@arc.wa.gov.au. Send completed forms to imports@arc.wa.gov.au.

The Animal Resources Centre’s Imports Coordinator manages all aspects of the import process, including sourcing requested rodent models, document preparation, liaising with suppliers and researchers and organising customs and/or DAFF clearance at the Australian entry point (international imports only). Costs can vary due to the type of animals and level of services required, please contact the Animal Resources Centre for a price estimate.

To find out more about the options available from the Animal Resources Centre, please view the table on page 49.
IMPORT AND REDERIVATION OPTIONS

The following options all require post-arrival Quarantine clearance after import.

**Option A: Import and send to client**

Available for animals from facilities providing high-level SPF animals with adequate source colony health testing.

- ✔ House animals in a DAFF-approved Quarantine facility (QT2) in an individual flexible film isolator
- ✔ Confirm DAFF/health clearance
- ✔ Organise any additional health testing where requested
- ✔ Animals cleared and sent on to client

**Option B: Import, rederive animals and send on to client**

- ✔ House animals in our DAFF-approved international Quarantine facility (QT1)
- ✔ Rederive using embryo transfer techniques
- ✔ House rederived animals in a flexible film isolator
- ✔ Health test sentinels for clearance
- ✔ Send animals on to client

**Option C: Import, rederive animals and maintain at ARC**

- ✔ House animals in our DAFF-approved international Quarantine facility (QT1)
- ✔ Rederive using embryo transfer techniques
- ✔ House rederived animals in a flexible film isolator
- ✔ Health test sentinels for clearance
- ✔ House at ARC in our Custom Strains barrier area for on-going maintenance to provide client with animals as required (see page 50)

**Option D: Import, cryopreserve embryos or sperm (mice only)**

- ✔ House animals in our DAFF-approved international Quarantine facility (QT1)
- ✔ Cryopreserve embryos or sperm (see page 52)
HOUSING AND MAINTAINING CUSTOMERS’ UNIQUE MOUSE OR RAT STRAINS AT THE ARC

The Custom Strains department provides breeding and maintenance of customer-owned rodent strains, including inbred, hybrid, congenic and genetically modified strains. All strains are housed in our Custom Strains barrier area under SPF conditions.

WHAT CUSTOM STRAINS STAFF PROVIDE:

- Initial and ongoing advice on breeding program design
- Weekly maintenance and monitoring of breeding programs in consultation with the customer, according to customer requirements
- Experience in monitoring animal welfare of ‘non-mainstream’ strains
- Regular health screening and quality control monitoring
- Date births regularly
- Wean pups at 19-21 days old
- Reserve progeny for future breeding
- Reserve progeny for despatch (as requested by customer)
- Provide weekly breeding and stock updates via an online Web-upload system
- Ongoing advice on colony size management to minimise customer costs
- Privacy and confidentiality of strain information

A maintenance charge is calculated according to the number of boxes maintained weekly for each rodent strain, plus any additional services provided (see page 51 for additional services available).

The Animal Resources Centre does not provide genotyping services; tissue samples are collected and sent to the customer for genotyping.
**WHY CHOOSE THE ARC TO MAINTAIN YOUR RODENT STRAINS?**

- Highly trained animal technicians (RTO Cert III or related degree)
- Competitive costs
- Regular communication and updates from our technical staff managing your rodent strains
- Friendly customer service staff

The following additional services are available for custom strain customers.

- Tissue collection (ear or tail)
- Saphenous vein blood collection
- Cardiac blood collection
- Urine glucose analysis

**Sample collection**

- Local and interstate sample delivery
- Time-mated females

**Sample delivery**

- Weighing animals
- Tattooing

**Miscellaneous services**

A limited range of specialised experimental procedures may be performed if customers have prior ARC Animal Ethics Committee approval.

The costs of additional services vary according to specific customer requirements. For more information or to discuss your unique requirements and receive a quote, please contact the Custom Strains Manager (csmanager@arc.wa.gov.au) or Imports Coordinator (imports@arc.wa.gov.au).
STORE A BACK-UP OF YOUR MOUSE STRAIN

CRYOPRESERVATION – SPERM AND EMBRYO FREEZING

The Animal Resources Centre provides a specialised cryopreservation and reanimation service for mouse embryos and sperm. This process helps safeguard your line and reduce mouse maintenance costs for lines that are not actively required.

Cryopreservation success is strain dependent; please discuss your requirements with us before proceeding and requesting a quote (imports@arc.wa.gov.au). Our experienced staff can recommend whether embryo or sperm cryopreservation would be the more suitable method and can explain the process.

The Animal Resources Centre recommends validation of cryopreserved strains to live pup, and can arrange for this on site.

The Animal Resources Centre can also organise cryopreservation under the Australian Phenomics Network (APN) subsidy scheme, as required. Please contact us for details.
QUALITY CONTROL (HEALTH MONITORING) AND VETERINARY SUPPORT

HEALTH MONITORING

Monitoring health and genetic integrity is essential for producing high quality SPF rodents. We have an extensive and targeted quality control approach consisting of:

✓ Molecular testing
✓ Serological testing
✓ Bacteriological testing for specific bacteria
✓ Parasitic and fungal testing
✓ Post mortem examination (histological testing)

Each facility area is considered a separate population and is reported as such in our health reports. Monthly health screening is performed for select, commonly encountered agents with more comprehensive testing, which includes bacteriology and parasitology, performed quarterly and semiannually depending upon the agent and the facility area tested (e.g. barrier or isolator). Colony animal testing is conducted on sentinel and colony animals.

Animal health monitoring samples are analyzed by independent laboratories including IDEXX RADIL (Missouri, USA); Cerberus Sciences (Adelaide); South Australian Health and Medical Research Institute (SAHMRI); Agriculture WA, VetPath Laboratories and Murdoch University Parasitology department.

Area health reports are available on the ARC website. Health reports list agents that are monitored due to their potential impact on animals and/or research. Some agents are considered opportunistic while others may only impact immunodeficient animals, or are classified as non-pathogenic or acceptable in research animals; where relevant these comments are indicated on the health report. Room level health report information is also available.
ENVIRONMENTAL MONITORING.

Supplies entering animal areas are appropriately sterilised and monitored by chemical and biological indicators. In addition, food, bedding and water inside the animal areas are cultured monthly for bacteria and fungi. An automated system continuously verifies animal drinking water pH (2.5), in addition to a daily manual pH check.

AREA, COLONY AND BREEDING MANAGEMENT.

Facility areas are managed as discrete units to minimise cross-contamination. This includes restricting movement of personnel, animals and supplies. Procedures, colony locations and animal movement are all scrutinised to minimize genetic contamination.

GENETIC MONITORING OF INBRED STRAINS.

Semi-annual genetic monitoring confirms the genetic background and genetic purity of inbred lines and the genetic diversity of outbred lines. Animals from either the foundation/nucleus or production colonies undergo genetic testing, as do recently rederived animals. The Evolutionary Biology Unit, South Australian Museum conducts allozyme electrophoresis of the allelic profiles for 16 distinguishable biochemical rat markers. The Australian Genome Research Facility Ltd (AGRF) evaluates twenty SNP markers in the mice.

PHENOTYPE AND GENE OF INTEREST TESTING.

The phenotype of relevant strains is monitored to ensure strain characteristics are consistent with customer expectations. Phenotype monitoring includes blood pressure analysis of the SHR rat, the SCID gene and other relevant strain-specific hematology and biochemical characteristics.

CUSTOMER FEEDBACK AND COMMUNICATION.

Customer feedback regarding strain characteristics and animal health is an important part of our quality management system; this includes transport and experiment-related issues. Feedback is handled formally and provides an opportunity to improve our services by better understanding a customer’s unique needs and expectations. Information regarding variations in strain characteristics, genetic integrity or a known pathogenic agent outbreak will be emailed to customers known to purchase the impacted strain.
VETERINARY SUPPORT

Our veterinarians manage the quality control program, provide veterinary care, and are available to advise customers on veterinary related matters and animal-related variables during experimentation. Rodent surgical alterations are available for a surcharge on the animal’s base price (ovariectomies, vasectomies, castrations, and splenectomies). We have a strong animal welfare emphasis in our approach to veterinary matters. Customer discussions regarding any animal-related care or experimentation matter is both welcomed and valued.
PLANT AND FACILITY INFORMATION

The ARC’s physical plant provides facility support system redundancy, including electricity and water supply. The building monitoring system monitors and reports on key systems, including the facility’s internal environment. The plant and security are monitored and serviced 24 hours a day.

Multiple methods are used to sterilise supplies, including autoclaves, dunk tanks, and fumigation. Husbandry personnel don dedicated clothing before moving around the site, to reduce the risk of introducing contaminants from street clothes.

Animal production occurs in two separate buildings, a Production Facility and an Isolator and Quarantine Facility. The Production Facility consists of six distinct areas to prevent cross-contamination. Personnel entering the Production Facility ‘shower in’ to maintain the animal's health status. Personnel remove footwear and immediately enter change rooms where they disrobe, shower and shampoo. Personnel then redress behind the barrier in sterilised clothing inclusive of hood, gloves and surgical mask.

Staff movement is managed to ensure personnel only move from clean to progressively dirtier areas after a specified period. Each animal room receives 100% HEPA-filtered air. Acidified animal drinking water (pH range 2.25-2.75) prevents bacterial contamination.

The light cycle is set at 15 hours on and 9 hours off. Lighting intensity is reduced when personnel are not working in the room.

The Isolator Facility contains 40 large flexible film production animal isolators and 20 smaller isolators. Isolators receive HEPA-filtered air, sterilised food, bedding and cages.

The Animal Resources Centre has two DAFF Quarantine-approved premises; one transit area with isolators only, and another longer term Quarantine area for rederivations.
This information has been obtained from standard textbooks and not from animals at the Animal Resources Centre. Weights (*) refer to outbred animals. Inbred animals generally have lower body weights than outbreds. Adult males may be considerably heavier than females.
**WEIGHT DATA FOR WISTAR AND SPRAGUE DAWLEY RATS**

Please contact the Animal Resources Centre if exact weights are required as these figures are approximate and should be used as a guide.

**Wistar**

<table>
<thead>
<tr>
<th>Weeks of age</th>
<th>MALE (g)</th>
<th>RANGE (g)</th>
<th>FEMALE (g)</th>
<th>RANGE (g)</th>
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</thead>
<tbody>
<tr>
<td>3</td>
<td>77±7</td>
<td>66-96</td>
<td>62±6</td>
<td>50-75</td>
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<td>5</td>
<td>178±12</td>
<td>160-215</td>
<td>93±11</td>
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<tr>
<td>6</td>
<td>225±15</td>
<td>204-271</td>
<td>117±11</td>
<td>92-147</td>
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<tr>
<td>7</td>
<td>273±21</td>
<td>249-337</td>
<td>136±11</td>
<td>113-170</td>
</tr>
<tr>
<td>8</td>
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<td>9</td>
<td>327±13</td>
<td>308-347</td>
<td>172±13</td>
<td>141-213</td>
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<tr>
<td>10</td>
<td>352±16</td>
<td>328-371</td>
<td>184±14</td>
<td>152-225</td>
</tr>
<tr>
<td>11</td>
<td>376±18</td>
<td>347-398</td>
<td>191±14</td>
<td>164-237</td>
</tr>
<tr>
<td>12</td>
<td>389±17</td>
<td>363-409</td>
<td>201±15</td>
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</table>

**Sprague Dawley**

<table>
<thead>
<tr>
<th>Weeks of age</th>
<th>MALE (g)</th>
<th>RANGE (g)</th>
<th>FEMALE (g)</th>
<th>RANGE (g)</th>
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<td>77±8</td>
<td>60-92</td>
<td>68±6</td>
<td>56-78</td>
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<tr>
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<td>123±11</td>
<td>94-147</td>
<td>107±10</td>
<td>91-124</td>
</tr>
<tr>
<td>6</td>
<td>176±14</td>
<td>137-207</td>
<td>143±11</td>
<td>126-165</td>
</tr>
<tr>
<td>7</td>
<td>229±17</td>
<td>181-266</td>
<td>168±11</td>
<td>149-196</td>
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<tr>
<td>8</td>
<td>280±18</td>
<td>229-328</td>
<td>191±13</td>
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<td>326±23</td>
<td>269-376</td>
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<tr>
<td>10</td>
<td>365±27</td>
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<td>402±32</td>
<td>338-474</td>
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<td>425±34</td>
<td>367-492</td>
<td>252±18</td>
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</table>
**WEIGHT DATA FOR BALB/cArc AND C57BL/6JArc MICE**

Please contact the Animal Resources Centre if exact weights are required as these figures are approximate and should be used as a guide.

**BALB/cArc**

<table>
<thead>
<tr>
<th>Weeks of age</th>
<th>MALE (g)</th>
<th>RANGE (g)</th>
<th>FEMALE (g)</th>
<th>RANGE (g)</th>
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<tr>
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<tr>
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<td>24±1</td>
<td>21-26</td>
<td>20±1</td>
<td>17-23</td>
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</table>

**C57BL/6JArc**

<table>
<thead>
<tr>
<th>Weeks of age</th>
<th>MALE (g)</th>
<th>RANGE (g)</th>
<th>FEMALE (g)</th>
<th>RANGE (g)</th>
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<td>6-10</td>
<td>7±1</td>
<td>6-10</td>
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<td>18-22</td>
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</tbody>
</table>
**TERMS AND CONDITIONS FOR THE SALE OF ANIMALS**

The [Terms and Conditions](#) for animal sales are available on the website.
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