

Status of Rare Breeds of Domestic Farm Livestock in Australia 2004

Official Publication of
Rare Breeds Trust of Australia

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June 2004

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II. Glossary of Abbreviations

ABRI	Agricultural Business Research Institute
ACT	Australian Capital Territory
ADHIS	Australian Dairy Herd Improvement Service
AFS	Australian Friesian Sahiwal
AMZ	Australian Milking Zebu
APBA	Australian Pig Breeders Association
ASS	Association
Assoc	Association
AUS	Australian
Brah	Brahman
BSE	Bovine spongiform encephalopathy (also known as “mad cow” disease). It is a disease of cattle first identified in 1986
Char	Charolais
CSIRO	Commonwealth Scientific and Industrial Research Organization
Dept	department
DM	Droughtmaster
EBV	Estimated Breeding Values – an indicator of genetic potential based on objective measurements of performance.
F	actual inbreeding coefficient
FAO	Food and Agriculture Organisation
FOB	Free on Board. The value paid to producers
GVP	Gross Value of Production
Inc	Incorporated
Limo	Limousin
MC	Mail Centre
MG	Murray Grey
MOET	Multiple ovulation embryo transfer
NSW	New South Wales
NT	Northern Territory
NZ	New Zealand
PIC	Pig Improvement Company
PIGBLUP	a PC based genetic evaluation system for pigs. It has been designed to help breeders make the best selection decisions and to control their breeding programs better. (BLUP stands for Best Linear Unbiased Prediction- the most commonly used statistical method of assessing the breeding values of animals)
Q	Queensland
QDPI	Queensland Department of Primary Industries.
QLD	Queensland
RIRDC	Rural Industries Research and Development Corporation
RBTA	Rare Breeds Trust of Australia. The Australian non-government organisation working to save endangered breeds of domestic farm livestock.
RBST	Rare Breeds Survival Trust. The UK non-government organisation working to save endangered breeds of domestic farm livestock.
SA	South Australia
SG	Santa Getrudis
Short	Shorthorn
Simm	Simmental
SOWAnGR	State of the World’s Animal Genetic Resources
TAS	Tasmania
TBMMS	Traditional Breeds Meat Marketing Scheme. The registered name for the meat marketing scheme operating in the UK and supported by the Rare Breeds Survival trust.
UNE	University of New England
UK	United Kingdom
USA	United States of America
WA	Western Australia

III. Foreward

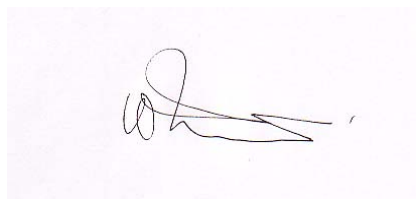
Food security is Rare Breeds Trust of Australia's overarching objective and encouraging genetic diversity is one of its primary goals.

Rare Breeds Trust of Australia (RBTA) was established to conserve genetic diversity in domestic breeds of farm livestock for the security of the Australian and overseas food and fibre markets. It is a company limited by guarantee in Australia and in 2000 received ministerial approval to be registered as a charitable trust. With a membership of approximately 250 people and growing, and links to breeds societies and registration authorities across all species groups, it has members in every state of Australia. RBTA's interests are in encouraging genetic diversity amongst all species of domestic farm livestock, including cattle, sheep, pigs, poultry, waterfowl, horses and goats.

As a member of Rare Breeds International, Rare Breeds Trust of Australia has particularly strong links with the Rare Breeds Conservation Society of New Zealand, American Livestock Breeds Conservancy (USA) and Rare Breeds Survival Trust (UK).

RBTA applauds the Australian government's involvement in the FAO report on State of the Worlds Animal Genetic resources (SOWAnGR). We offer this report as an overview to the Australian industry and hope that it may contribute to a greater understanding of some of the issues currently impacting on Australia's and indeed the worlds, animal genetic resources.

The issue of food security is at the heart of this report, and we support any efforts by the Australian government to be proactive in securing the future of our food through the effective management of our animal genetic resources.

A handwritten signature in black ink, appearing to read 'Warwick Turner', is centered on a light-colored rectangular background.

Warwick Turner
Chairman of the Board,
Rare Breeds Trust of Australia

IV. Acknowledgements

This report has been written entirely by volunteers.

Members of Rare Breeds Trust of Australia believe strongly in the importance of preserving genetic biodiversity in Australia's domestic farm livestock. It is the strength of this conviction which has prompted members to generously contribute their time and labour so that this report could be produced. It has been written as our submission to the Bureau of Rural Sciences as the Australian government prepares their report to FAO on the State of Australia's Animal Genetic Resources.

Megg Miller, Ian Mullins and Katy Brown as species coordinators have each contributed from their knowledge and research findings over many years to piece together the information to make up each of the species chapters. As species coordinators for sheep, poultry and waterfowl and horses, they have spent many months – and in some cases years- working to identify breeds which are most in danger of extinction in Australia. It is their knowledge that has been invaluable in producing this report. Thank you for all of your efforts.

From England, RBTA's friend and guide Lawrence Alderson has assisted us through the provision of his international perspective on breed numbers around the world. Thank you Lawrence for the patience and ongoing support you continue to afford us as we grow into organizational maturity.

Thanks also must go to a number of RBTA members who have contributed in some way or another to the writing of this report. To Anne Sim, for her data collection from the ASBBS flock book over the past ten years. To Barry Rochford for his research on cattle in his capacity of cattle coordinator over the last six months. To other members of the Board, for their research and support in compiling the report. Thank you for your contributions and support.

Thanks also to the members who have contributed to RBTA's pool of knowledge over the last twelve years. As with any organization, members come and go with time. Many have provided worthwhile contributions along the way and some have then chosen to no longer participate as active members. Their contributions have been appreciated whilst they have been able to offer them. Many of their contributions are included in some way or another in this report as they have helped to build up the body of knowledge that exists innately within RBTA today.

The Australian government's decision to participate in the FAO's State of the World's Animal Genetic Resources project is perhaps the most significant livestock biodiversity event which has taken place in Australia since the first rare breeds group was established in 1992. We thank the Australian government for recognizing animal genetic biodiversity as an issue affecting Australia's livestock industries. Reading the outcomes of the Australian and FAO reports in their entirety is something that every member of RBTA will look forward to.



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V. Introduction

It is no longer prudent to leave the world's animal genetic resources up to forces of nature or industry. Maintaining genetic diversity has too large a role to play in biosecurity and the future of our food.

Across all species of domestic farm livestock we are seeing an unprecedented reduction in genetic biodiversity both between and within breeds. This is despite –or perhaps as a consequence of– Australia being:

- the world's largest exporter of beef
- the world's largest producer of wool
- the world's largest exporter of mutton
- the world's second largest exporter of lamb
- the world's largest exporter of goat meat and
- the world's third largest exporter of dairy products.

There is a shift from using purebred animals to hybrid crossbreeds in some industries. The Australian pig industry is a good example of this trend. Registered purebred genetics accounted for less than 1% of the Australian national pig herd of 356,000 sows in 2002. Currently these pure breeds are being bred and maintained by a small group of 63 dedicated pig breeders across Australia. Of these, fewer than 20 breeders are maintaining the more threatened breeds and most of these are members of Rare Breeds Trust of Australia and the Australian Pig Breeders Association. Whilst these breeders need to be acknowledged for the important role they have played in preventing rare breeds from being lost, it must also be acknowledged that they do so at considerable expense and investment of their own time and money. On its own, this is an insufficient strategy to reliably secure these breeds. Each year the Australian Pig Breeders Association loses valuable members and breeders because they can no longer justify the considerable investments they make in the name of the securing the breeds for future generations.

Industries continuing to use purebred genetics such as in the dairy industry are narrowing their diversity through practices such as artificial insemination and the consequences of this are not being monitored in Australia. Australian dairy exports are a significant export earner for Australia at sales of AUS\$2,487 million in 2002/03 (5). Monitoring the state of inbreeding in the national dairy herd should be a high priority for the industry. Statistics from USA and Canada (6) already show increasingly high inbreeding coefficients in their dairy cattle herds. The levels are rapidly approaching inbreeding coefficients where depressed performance of reproduction, lactation and growth occur and as such have the potential to impact heavily on industry and farming families alike. What are the inbreeding statistics for dairy breeds in Australia? We need to know these trends to be able to manage them and currently in Australia we do not.

We have seen in the past 20 years traditional breeds such as Angus and Hereford cattle move from small frame scores to large frame scores. Breeders have infused their traditional breeds with continental breeds so that nearly all British breeds of cattle now display the continental double-muscled hindquarter so desired by today's meat markets. Whilst breeders rarely admit to such practices, it is widely accepted that it has occurred. The selection of sires based on EBV's and performance without any accountability for pedigree has contributed to this. What we today see in the show ring puts in question much of the integrity of what is supposed to be purebred genetics. Some people still maintain that it is not sufficiently important and that pedigrees are irrelevant in today's world of economic rationalism. RBTA fervently maintains that maintaining purity of breeds is essential to maintaining genetic diversity for the future. If we fail to maintain the breeds with all their phenotypic and genetic diversity, the consequence is that we leave for future generations a homogenous genetic base with limited scope for adaptation. In short, if we fail to maintain the diversity of our livestock, we will breed our industries into a corner that will be difficult to breed out of.

The vast majority of the diversity in poultry in Australia is held by small-scale poultry fanciers. Although the absence of any breed registration systems for poultry makes it difficult to trace the history and purity of their genetics, there are a few verifiable strains and breeds that are unique to Australia. Issues such as council regulations are impacting on the number of poultry and gender of poultry being kept and the closure of many of the smaller abattoirs is threatening the survival of a number of the more threatened breeds as the viability of keeping them diminishes. Small scale poultry breeders are finding it increasingly difficult to have their animals slaughtered in compliance with food safety regulations such that meat produced from the birds may be sold.

Horses are threatened by yet a different problem, no longer being required as a means of transportation and surpassed by the modern day tractors. Horses provide neither food (for human consumption) in Australia nor fibre. The huge diversity amongst horses in Australia is driven by the recreational passions of owners and breeders alone. Whether the recreation is racing, showing, dressage, show jumping, cross-country, camp drafting, or roping, horse breeds are maintained in the most part by enthusiasts. Whilst this has led to a huge array of horse breeds throughout the country, the loss of these breeds becomes more difficult as enthusiasts of the breed are dying, taking with them to their grave their skills, knowledge and passions. It is more difficult to find a commercial prop for horse breeds as their functions are limited to recreational pursuits.

Australia has a relatively short history. Accordingly all of the breeds of domestic farm livestock upon which our nation's agricultural industries are based have been introduced in the last 200 years. Some of these breeds, such as Australia's Coffin Bay pony, are breeds that have become locally adapted and now display very different characteristics from their original forbears. Others, for example the Australian Heritage Angora, have significantly different lineages than any others of their kind throughout the world. Some lines within a breed hold particular significance to Australia such as the Camden Merino. First introduced to Australia by Captain John Macarthur in 1796, the Camden Merino sheep still exist today as a closed flock to preserve and maintain the direct bloodline from Macarthur's "Camden" flock. Although Wessex Saddleback pigs no longer exist in their English country of origin, Australia is home to the remaining global population of around 70 registered breeding sows.

Our island continent is a valuable repository for many breeds whether they are endangered or not. Many of the breeds here display unique characteristics when compared to their cousins and ancestors. Some have no remaining cousins and exist here alone and in isolation. It is time to acknowledge that Australia is custodian of a valuable living arc.

To this end, RBTA continues to harness the enthusiasm and human resourcefulness of its members. It is however in need of broader community, government and industry support to truly secure the increasing number of endangered breeds. As was said at the start, ***it is no longer prudent to leave the world's animal genetic resources up to forces of nature or industry. Maintaining genetic diversity has too large a role to play in biosecurity and the future of our food.***

Rare Breeds Trust of Australia believes passionately in the need to value and maintain the animal genetic resources that currently exist in Australia. With strict quarantine restrictions to protect our animal industries from disease there is only limited opportunity to introduce new breeds or lines. Maintaining what genetic resources we already have in Australia should therefore be a high priority. To this end, RBTA strives to:

- i) Seek acknowledgement by the Australian government that securing animal genetic diversity is a national priority in securing the future of food.
- ii) Seek partners in Australia with whom an annual national census/breed survey can be initiated. The purpose of the survey/census would be to
 - monitor changing breed numbers
 - monitor the genetic diversity within particular breeds of concern
 - develop strategies and allocate resources appropriately to avert losses to genetic diversity in breeds of domestic farm livestock in Australia
- iii) Seek to initiate a cryogenic preservation strategy to run in parallel with live breeding programs to secure critically endangered breeds from extinction.
- iv) Seek scientific and genetic advice to help dedicated breeders to incorporate conservation breeding strategies into their existing breeding programs.
- v) Seek the development of a rare breeds meat/commodity marketing scheme (similar to the Traditional Breeds Meat Marketing Scheme (TBMMS) introduced in UK by the Rare Breeds Survival Trust)
- vi) Seek the establishment of an Australian Farm Heritage "Centre of Excellence" which commemorates the contributions made to Australia's agricultural industry by a diverse group of animals over its 200 year pioneering history.
- vii) Raise consumer awareness about the importance of biodiversity in our food chain
- viii) Raise awareness amongst landholders about the role they can play in maintaining genetic biodiversity

We welcome the support of those that wish to join with us on this epic journey.

VI. Basis for Defining Rare Breeds

The basis for defining the rarity status of breeds of domestic farm livestock has been evolving over the last few years. In the absence of sound data about total breed numbers in Australia, RBTA has used animal registrations as the indicative measure of breed numbers. This assumes that animal registrations are sufficiently indicative of the overall numbers of purebred animals being bred.

This data is relatively simple to collate in the case of pig breeds. There is only one recognised pig registry in Australia and it registers all pure pig breeds. In the case of sheep, cattle, goats and horses, the task of collating data is much more difficult. The huge number of breed registration bodies make collating and interpreting data difficult and time-consuming. For the most part each breed manages its own breed registry. In some cases, for example Ayrshire cattle and Waler horses there is more than one breed registry and up to three recognised registries for some other breeds. The registration of animals across more than one registry adds to the difficulty in collating and interpreting data accurately. Breed registries closing due to insufficient animals numbers for the registry to remain viable is yet another problem impacting on the collation of accurate data.

To add further to the complexity, currently no registration process exists in Australia for poultry and waterfowl. RBTA has in the last few weeks been successful in a bid for a small grant from Esso/Mobil to pilot the introduction of an Australian poultry register. The registration scheme will use permanent leg bands to identify strains of poultry breeds which can be verified as genetically true over a forty year span. These breeds are very few indeed hence the importance RBTA is placing on the scheme's development.

In the future, RBTA will be falling into line with other nations around the world to use more specifically the number of (young) breeding females registered as the indicative measure of a breed's numerical status. The table below outlines the currently recommended measures for determining a breed's rarity status at the country level. If other countries use this same measure, then comparisons across countries and total global populations will become easier to monitor.

TABLE 1. UPPER LIMIT OF NUMERICAL CRITERIA FOR THE CATEGORISATION OF FOUR SPECIES OF LIVESTOCK*

Species	Horses	Cattle	Sheep	Pigs
Category 1	15	25	30	35
Category 2	50	75	100	115
Category 3	150	250	300	350
Category 4	500	750	1000	1165

Source: Criteria for the recognition and prioritisation of breeds of special genetic importance. L Alderson. UK.

*(expressed as annual registrations of female young stock)

Once applied at the country level, these criteria will then be modified to determine a final priority ranking based on:

- Local adaptation
- Distinctiveness
- Global population
- Level of inbreeding

Although this process currently does not work well for poultry and waterfowl, we hope that over time a poultry and waterfowl registry can be introduced and incorporated into the categorisation process.

Chapter 1

Pig Breeds in Australia

Written by Fiona Chambers.
RBTA Director, Species Coordinator & Pig Coordinator.
June 2004

1.1 Executive Summary - Pigs

The Australian pig industry has undergone dramatic change in the last 50 years. Since 1960, the number of pork producers has fallen from almost 50,000 producers to fewer than 3,000 producers in 2002. Although there was a rise in the number of breeding sows in the national herd between 1960 and 1972, the numbers have remained fairly stable over the last 30 years, varying between 300,000 and 350,000 sows. Overall, these changes have resulted in (or from) the move to more intensive farming practices with the average herd size growing from just 4.3 sows per producer in 1960 to 135 sows per producer in 2002.

In the same time, the number of breeding sows being registered with the Australian Pig Breeders Association has fallen dramatically across all breeds signifying the shift from producing purebred animals to commercial crossbreds. In Australia the industry is currently dominated by three genetics firms. Hyfarm Pty Ltd, PIC Australia, and Cefn Genetics, each supply their own particular strains of commercial crossbred pigs to the Australian industry.

Improvements in evaluation systems (e.g. PIGBLUP ⁽⁴⁾) and artificial breeding techniques have allowed producers to carry fewer (if any) boars. It is now possible to utilize the highest performing terminal cross bred sires through the purchase of fresh semen from boars carefully selected on their estimated breeding value (EBV) results. Whilst this provides a number of advantages for producers, it also raises some negative consequences. The rapid narrowing of genetic variation within and between breeds poses a significant risk which is currently not being managed or assessed for its potential medium to longer term impacts.

In response to these large scale industry changes, the Rare Breeds Trust of Australia have identified the following key issues in relation to maximising Australia's pig genetic resources.

- a) Some breeds of pigs have already been lost in Australia, e.g. Poland China, Gloucester Old Spots, Middle Yorkshire White and most recently the Welsh.
- b) Some pure breeds of pigs are in danger of becoming extinct because their genetic characteristics are not commercially viable or applicable in today's industry or markets. Breeds most endangered include Wessex Saddleback, Large Black, Tamworth and Berkshire breeds.
- c) There is no government or industry support for monitoring or securing breeds at risk of extinction or loss from Australia. (A case in point has been the loss of the Welsh breed of pig from Australia in the last 8 years. The last known Welsh pigs were registered by the APBA in 1995. All efforts by RBTA have failed to find any remaining pigs of this breed in Australia).
- d) The practice of artificial insemination represents a significant risk over time. Despite offering a number of advantages- in particular the acceleration of genetic improvement, the risks are currently not being assessed or addressed.

1.2 National Pig Herd Statistics

The Australian pig industry has undergone dramatic change in the last 50 years. Since 1960, the number of pork producers has fallen from almost 50,000 producers to fewer than 3,000 producers in 2002. Although there was a rise in the number of breeding sows in the national herd between 1960 and 1972, the numbers have remained fairly stable over the last 30 years, varying between 300,000 and 350,000 sows. Overall, these changes have resulted in (or from) the move to more intensive farming practices with the average herd size growing from just 4.3 sows per producer in 1960 to 135 sows per producer in 2002.

TABLE 2: NUMBER OF PIG BREEDERS IN AUSTRALIA SINCE 1960

Source: Australian Bureau of Statistics and Australian Pork Limited.

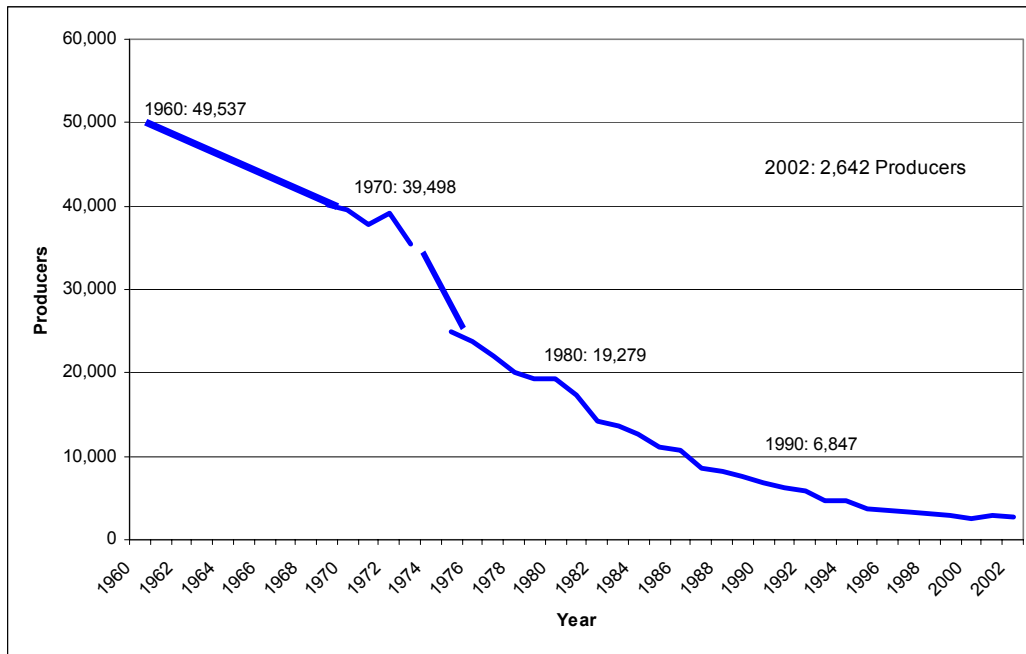
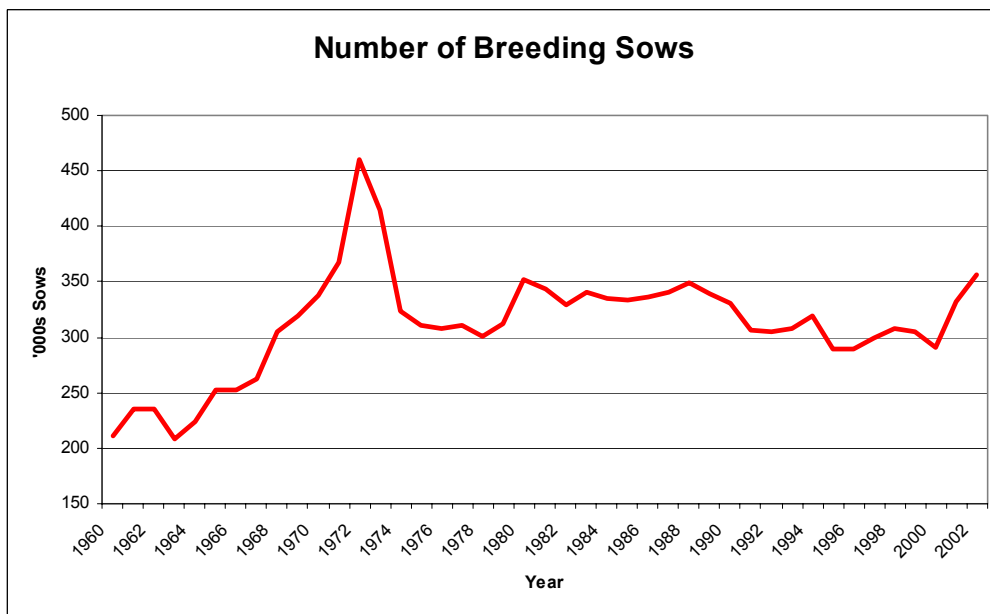


TABLE 3: TOTAL NUMBER OF BREEDING SOWS IN AUSTRALIA

Source: Australian Bureau of Statistics and Australian Pork Limited.

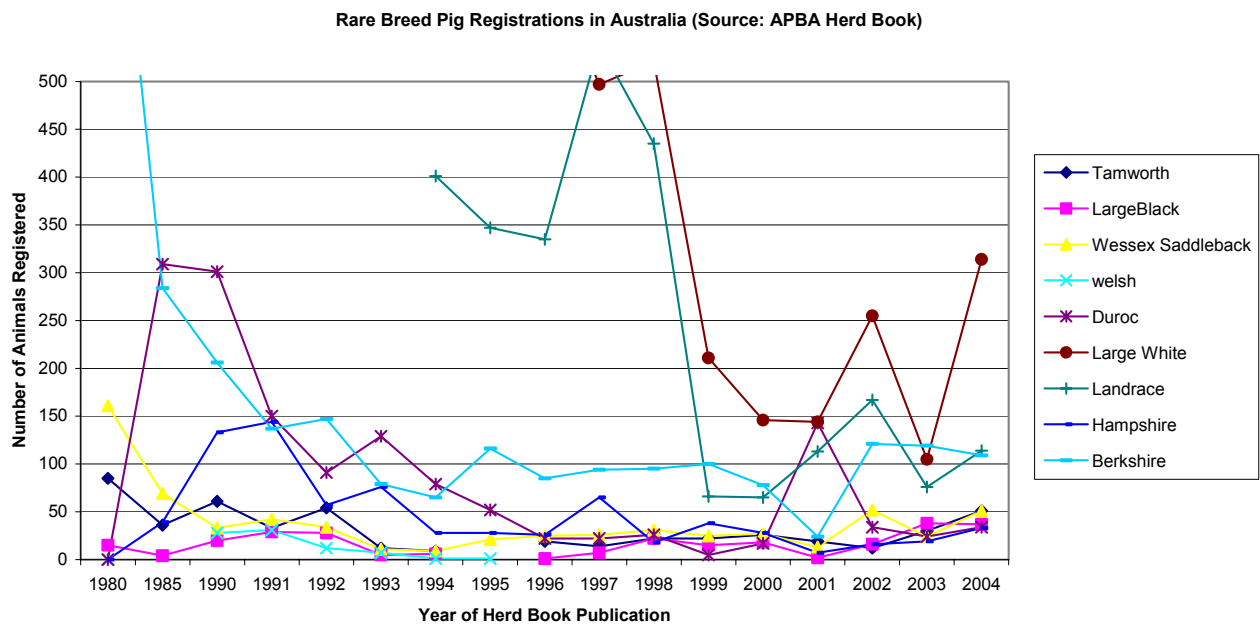


1.3 Pig Breeds in Australia

Along with the changes in farm scale has come a change in the genetics used in pig breeding. Today, three major pig genetics firms dominate the pig industry in Australia. Hyfarm Pty Ltd, PIC Australia, and Cefn Genetics each supply their own commercial crossbred pigs to the Australian industry. With a major focus on commercial gain in a predominantly intensively-housed environment, hybrid genetics offers maximum vigour. There are, however, casualties with this commercial model and many of the older breeds are now dangerously in decline. Loss of genetic diversity both within and between breeds is a huge issue currently not receiving the attention it deserves.

It has only been in the last 4 years that Rare Breeds Trust of Australia (RBTA) has collated information from the Australian Pig Breeders Association (APBA) into the graphs below. Collating the information relating to number of purebred pigs registered and number of studs registering purebred pigs has enabled RBTA to better monitor the changes directly impacting on the relative numbers of pigs and breeds. At this stage, the information does not graphically tell us anything about the number of lines being bred within each breed, nor the relative level of inbreeding occurring in pig herds. It also does not measure the numbers of unregistered pigs that may be purebred, and being used in the national herd. The graphs do however allow us to monitor the changing numbers of pigs being registered and the number of studs registering pigs. These two criteria are largely used to monitor and determine the rarity status of pig breeds in Australia given that there is a correlation between the number of pigs being registered and the total number of sows in the breeding population.

TABLE 4: TOTAL ANNUAL (MALE AND FEMALE) PIG REGISTRATIONS IN AUSTRALIA



For the purposes of monitoring, RBTA considers registered animals for two key reasons.

- 1) RBTA fully supports the process of registering animals. (Knowing an animal's pedigree is important when trying to avoid inbreeding in a well managed breeding program)
- 2) The information is readily available from the APBA and is indicative of the major trends in the national herd.

Dramatically falling numbers of Large White, Landrace and Duroc pigs being registered over the last 5 years has led to these breeds being included in our monitoring processes since 2000/01. These breeds are not, however, considered rare or endangered at this time in Australia. These breeds are not endangered in their country of origin, nor are they globally endangered. By way of example, Duroc and Hampshire pigs are native breeds of USA. Figures from the 1990s show 225,000 Duroc pigs and 190,000 Hampshire pigs existed in their country of origin and in addition, these breeds exist in many other countries. Despite their declining numbers in Australia they are not considered to be under threat. Similarly, Large White pigs and Landrace pigs both have large global populations and are not considered to be endangered.

Numbers of Wessex Saddleback, Large Black, Tamworth and Berkshire pigs, however, are all globally endangered and endangered in their country of origin and, therefore, remnant populations of these breeds in Australia require a high vulnerability status.

Following recommendations from the most recent international sources (7) RBTA intends to use the number of annual female registrations as the basis of its future monitoring system. This will enable better alignment and comparison of statistics between countries. It will also enable more accurate assessment of global populations.

The figures in the table below are estimates of pig numbers.

TABLE 5: ESTIMATE OF GLOBAL NUMBERS OF REGISTERED PUREBRED PIGS

Breed	Estimate of UK Population (1)	Estimate of Global population (1) (outside of UK)	Estimate of Australian population (2)
Berkshire	circa 300 sows	circa 12,000 sows (but almost all in USA and population is suspect – ref haplotype tests)	Circa 200 sows
British Saddleback	Circa 350 sows	Circa 100 sows	Circa nil sows
Large Black	Circa 300 sows	Circa 100 sows	Circa 70 sows
Tamworth	Circa 200 sows	Circa 1000 sows	Circa 70 sows
British Lop	Circa 200 sows	Circa nil sows	Circa nil sows
Gloucester Old Spots	Circa 500 sows	Circa 50 sows	Circa nil sows
Middle White	Circa 300 sows	Circa negligible	Circa nil sows
Wessex Saddleback	Circa 2 sows (imported to UK from Australia)	Circa 70 sows - all in Australia	Circa 70 sows

1.4 Numbers of Registered Studs in Australia.

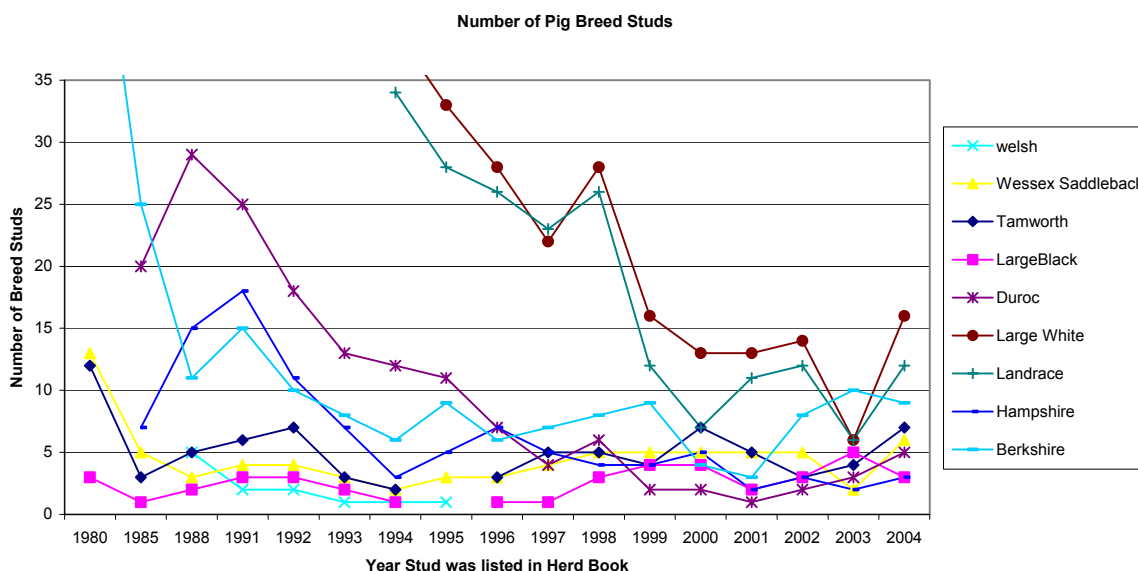
In some cases, although there may be 5 studs listed in the herd book, in reality there may only be 3 or 4. This is because we find that some breeders are purchasing unregistered animals born from unregistered but eligible parents. When the new owners pay to have their pigs registered and entered into the herd book, the parents are listed under the prefix of the stud where they have been bred even though the stud may no longer be operating,

This may be of little relevance where there are a hundred people breeding pigs. When there are only 5 breeders listed and 1 or 2 of those are no longer actually breeding pigs, it equates to 40% difference in the figures. This then is of great concern. This situation has occurred over the past 3 years within the following pig breeds:

- Large Black
- Berkshire
- Wessex Saddleback
- Tamworth

Where this has occurred, pigs may be moved to the next status rating, even though their apparent numbers/number of breeders appear stable.

TABLE 6: NUMBER OF REGISTERED PIG STUDS IN AUSTRALIA



1.5 Appendixed Pigs and Genetic Purity

There has also been an increase in the past 3 years in pigs being appendixed into the herd book as shown in the table below.

TABLE 7: NUMBER OF ANIMALS ENTERING THE APBA NATIONAL HERD BOOK THROUGH THE APPENDIX SYSTEM

BREED	2002 expressed as actual number and % of total entries	2003 expressed as actual number and % of total entries	2004 expressed as actual number and % of total entries
Large Black	3 (19%)	0	0
Hampshire	0	3	2 (6%)
Large White	5 (2%)	1 (1%)	39 (12%)
Landrace	1 (<1%)	4 (5%)	32 (28%)
Berkshire	8 (6%)	0	5 (5%)
Wessex Saddleback	1 (2%)	0	0
Tamworth	0	0	0
Duroc	0	1 (4%)	17 (50%)

TABLE 8: TOTAL NUMBER OF STUDS REGISTERING PIGS UNDER THE APPENDIX SYSTEM

BREED	2002 expressed as actual number and % of total entries	2003 expressed as actual number and % of total entries	2004 expressed as actual number and % of total entries
Large Black	1 (33%)	0	0
Hampshire	0	1 (50%)	2 (67%)
Large White	3 (14%)	1 (16%)	11 (69%)
Landrace	1 (8%)	1 (16%)	7 (58%)
Berkshire	1 (12%)	0	2 (22%)
Wessex Saddleback	1 (20%)	0	0
Tamworth	0	0	0
Duroc	0	1 (33%)	5 (100%)

Of particular interest is the fact that in 2004, all of the registered breeders of Duroc pigs introduced some appendixed animals and these appendixed animals amounted to 50% of all of the Duroc pigs registered in that year.

Similarly, a much higher proportion of Landrace, Large White and Hampshire pigs were also being appendixed. This raises a few questions.

1. Why are so many pigs being appendixed?
2. Are these pigs known to be purebreds or do they just display the appropriate phenotype of the breed?
3. Are these breeds in danger of losing their genetic integrity through introgression?

This information is currently being sought.

There is ongoing debate as to whether or not it is important that pig breeds are graded up through introgression with other breeds. In the case of the Berkshire breed in Australia, infusion from other breeds reputedly led in 2003 to the loss of an export contract for pure Berkshire meat to Japan. One of the conditions of the export order was purity. When DNA testing in Japan identified that some pig meat was from non purebred stock, the export contract was nullified.

Currently work is being done to explore whether or not there remains an opportunity for Australia to export pure Berkshire genetics to Japan, and indeed whether Australia can verify the pure status of its remaining Berkshire pigs.

The debate on the importance of genetic purity also continues. It is RBTA's strong belief that where the generic breed name is used to describe a breed, no grading-up should be permitted.

1.6 Level of Inbreeding of Pig Breeds in Australia

The exact numerical level of inbreeding or founder effect of pig breeds in Australia is unknown to RBTA. What is known is that within the breeds registered by APBA, there are greatly reduced numbers of pigs being registered and studs registering pigs. There is however substantial indicative evidence to suggest that level of inbreeding within the more threatened breeds of pigs is significant.

Currently the accepted method of recording separate lines in pig breeds is through the naming of male and female lines. It is accepted protocol for male pigs to take their father's name and female pigs to take their mother's name. This means that a male and female pig that are siblings will have exactly the same pedigree although they will have different names. This system on its own does not measure or delineate genetic difference. The table below shows the different lines known to still exist in Australia across the more threatened pig breeds. Whilst it is cause for concern that the number of lines is so low, it is of greater concern that within these remaining lines, there is such a high level of inbreeding that inbreeding depression is prevalent. It is suspected that loss of size and loss of reproductive performance (infertility, anoestrus, reduced litter sizes, poor motility in semen of boars etc) are just some of the effects being noted amongst the breeds and are attributable to inbreeding.

To aid in the monitoring of inbreeding in the remaining pig breeds in Australia, there is a call for greater scientific support for small-scale breeders of these rare pig breeds. In particular breeders are looking for;

- A geneticist to advise on the most appropriate breeding strategies to maintain genetic diversity within each breed
- A computer program to assist in monitoring and aiding decision-making with respect to minimising inbreeding.

TABLE 9: LINES OF THE RARER PIG BREEDS IN AUSTRALIA IN 2004

	WESSEX SADDLEBACK	LARGE BLACK	TAMWORTH	BERKSHIRE (incomplete)
MALE LINES	1. Pilot 2. Prince 3. Dominator 4. Satellite 5. Charlsun (Sir Charles)	1. Smithy 2. Black Jack (Jock)	1. Ajax 2. Regent 3. Jasper 4. Ranger 5. Roger 6. Atomic	1. Tom 2. Nobleman 3. Monty 4. Marshall 5. Cobber 6. Orlando
FEMALE LINES	1. Doreen 2. Sunset 3. Lucy 4. Lass 5. Beatrice 6. Adorabelle 7. Mary 8. May	1. Princess)all 2. Black Lady)one 3. Gypsy)line 4. Tess 5. Lady 6. Busy Maid 7. Black Ann 8. Lady Christina	1. Golden Martha 2. Martha 3. Jewell 4. Anne 5. Bertha 6. Rita 7. Lisa 8. Ruby 9. Elaine 10. Gleam	1. Star 2. Roseland 3. Joy 4. Lillie 5. Orange Blossom 6. Rose 7. Rainbow Magic

1.7 Feral Pig Populations in Australia

Feral pigs are for the most part considered to be an environmental and agricultural pest. A number of feral pig populations exist across Australia. RBTA has to date had insufficient resources to assess the relative genetic value, importance or significance of feral populations that have evolved since their introduction into Australia.

One known example of Australian feral pigs being used is the Westran herd of 15 sows. The herd is maintained for use by Westmead Hospital for research that aims to develop a method of transplanting islet cells from pigs to humans to cure diabetes. The herd has been developed from highly inbred feral Kangaroo Island pigs.

There may be some value in finding out more about the genetic merit of feral pigs in Australia that are currently considered to be no more than vermin.

1.8 Endangered Pig Breeds in Australia

Based on the most recent figures, the following pig status report for Australia is shown below. The rarity status of pigs in Australia has been determined following consultation with Lawrence Alderson, Chair Rare Breeds International, and takes into consideration global populations.

For the first time, Wessex Saddleback pigs have been moved into a critical ranking. This is following initial results from a European study that analysed DNA samples from a number of pig breeds to assess their genetic similarities and differences. The study of British Saddleback pigs (3) included 2 pigs of Wessex Saddleback origin that had been imported from Australia into the UK. The sample also included pigs from a stud in Ireland which breeds pigs exclusively for Essex Saddleback origin. The rest of the animals were British Saddlebacks of unknown origins. The study identified that the Wessex Saddleback pig samples from Australia were indeed genetically different from the European sample of British Saddlebacks. Based on this information, we are seeking to undertake further DNA samples from Australian Wessex Saddleback pigs to provide further evidence that Wessex Saddleback pigs in Australia differ from the British Saddleback pigs in the UK. In the light of this information, Wessex Saddleback pigs have been moved to critical status. As the breed no longer exists in its country of origin and global population numbers are fewer than 100, The Wessex Saddleback pigs remaining in Australia are now considered to be of international importance.

Large Black pigs are classed as critical in Australia as there are only 2 boar lines in existence.

TABLE 10: RARITY STATUS OF PIG BREEDS IN AUSTRALIA IN 2004

Status	Breed
EXTINCT OR LOST FROM AUSTRALIA	<ul style="list-style-type: none"> • Poland China • Gloucester Old Spots (circa 1930's) • Middle Yorkshire White (circa 1990's) • Welsh (circa 1995)
CRITICAL <i><30 annual registrations of females</i>	<ul style="list-style-type: none"> • Wessex Saddleback • Large Black
ENDANGERED <i><115 annual registrations of females</i>	<ul style="list-style-type: none"> • Tamworth
VULNERABLE <i><350 annual registrations of females</i>	<ul style="list-style-type: none"> • Berkshire

1.9 Conclusions

The data included in this report clearly identifies the precarious state of a number of pure breeds of pigs in Australia.

With hybrid pig genetics dominating the industry, the future of the pure breeds such as the Wessex Saddleback, Large Black, Tamworth and Berkshire pigs is uncertain. Currently these breeds are being bred and maintained by a small group of fewer than 20 dedicated pig enthusiasts –most of whom are members of Rare Breeds Trust of Australia and the Australian Pig Breeders Association. Whilst these breeders need to be acknowledged for the important role they have played in preventing rare pig breeds from being lost, it must also be acknowledged that they do so at considerable expense and investment of their own time and money. On its own, this is an insufficient strategy to reliably secure these breeds. Each year the Australian Pig Breeders Association loses valuable members and breeders because they can no longer justify the considerable investments they make in the name of securing the breeds for future generations.

The two most common requests RBTA is receiving from its breeders of rare breed pigs are for assistance to develop

- markets for the meat for rare breed pork products
- breeding strategies to minimise inbreeding.

Any further questions or feedback comments relating to this report should be directed to Fiona Chambers, Pig Coordinator RBTA, fermfarm@netconnect.com.au or ph (03) 5348 5566 Fax (03) 5348 5681

Chapter 2

Sheep Breeds in Australia

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June 2004

2.1 Executive Summary – Sheep

Sheep in Australia support two major industries. The wool industry, which has its roots in the very beginnings of Australia's colonisation in the 1770s is now Australia's second most important rural industry, while the sheep meat industry valued at around \$1.5billion in 2000. Milking sheep have in recent years been introduced to Australia and constitute an emerging industry.

95% of Australia's national sheep flock are either purebred Merino sheep (85.1%) used for wool production or first cross sheep (10.4%) used for producing prime lambs. The remaining 4.5% of sheep in Australia holds the greatest share of diversity representing more than 40 distinctly different breeds.

Figures over 10 years from the Australian Society of Breeders of British Sheep Ltd show a declining trend across more than a dozen of these breeds. Numbers of breeding ewes and numbers of stud breeders are both showing rapid decline in more than 90% of the recorded breeds.

Sheep breeds such as the Cotswold, North Devon and Teeswater were large framed fleece breeds that contributed to the development of the Australian sheep industry. Each of these breeds has been lost in Australia. Rare Breeds Trust of Australia believes that around half of Australia's remaining sheep breeds are threatened or in danger of being lost in Australia in the next ten years if immediate action is not taken. Many of the breeds are Australian derived breeds not found anywhere else in the world. As such their preservation should receive high priority.

Funds are urgently required to implement a national audit of sheep breeds in Australia. Once a complete picture of the state of these breeds is determined, a strategy needs to be devised to determine:

- a) which breeds are of greatest significance for preservation
- b) how these breeds can best be secured.

The familiar two dollar note has in recent years been replaced by a coin, however the small closed flock of descendants of the Camden Park Merinos remain as a living tribute to one of Australia's earliest pioneers. Captain John Macarthur.



The Camden Merino is a strong symbol and reminder of things of the past, but it has the potential to be much more. Let the Camden Merino be the flagship breed for Australia. There is strong potential for the Camden Merino to also be a symbol of Australia's progress and commitment to securing the future through its policy on the preservation of domestic farm livestock. We look forward to celebrating the day that this happens.

2.2 Case Study: The Camden Flock- Mt Bute Flock No. 3164

CASE STUDY:

THE CAMDEN FLOCK

Mt Bute Flock No. 3164

Captain John Macarthur, an officer in the 102nd Regiment, and his wife, Elizabeth, arrived in Australia in 1790, two years after the first settlement. In 1805 they took up a 5,000 acre land grant which was to become the centre of the developing Australian wool industry.

Macarthur had originally maintained a flock of Bengal sheep, but in 1797 he obtained three rams and five ewes from Captain Waterhouse, and one ram from Captain Kent, all from Capetown in South Africa. These fine wool producing sheep are believed to be descendants of the Spanish "Esturial" Merinos, given to the Dutch government by Spanish royalty.

In 1804 Macarthur returned from London with five rams and one ewe from the Merino flock of King George III, descendants of Spanish "Negrette" Merinos, the largest and strongest of migratory Merinos in Spain.

It was these two flocks which formed the nucleus of the Merino sheep bred at "Camden Park" by John and Elizabeth Macarthur.

In 1822, Macarthur's Merino flock had grown to such an extent that he exported 150,000 lbs. of wool, and in 1827, a bale of Macarthur wool sold for 196 pence per lb. This remained a world record price until 1949.

The flock remained at "Camden Park" under the supervision of the Macarthur family until the 1840's, when because of severe drought, the flock was transferred to other properties. In 1846, several rams and 150 ewes were acquired by the Hon. William Campbell, of "Auchmore", Strathloddon, in Victoria. In 1857, he sold the complete flock to Messrs. Griffith & Greene and a short while later the flock was obtained by Mr C. Knight, who took them to his property "Dunmore". They were then repurchased by Griffith & Greene, and transferred to "Glenmore", Bacchus Marsh in Victoria.

In 1873, the Hon William Campbell again became the owner, moving the flock to Booligal, New South Wales, where drought reduced numbers from 3,000 to 160. At Sir William Macarthur's request, Campbell sent a small number back to "Camden Park" in 1880. The remaining sheep were purchased by Mr T. Shaw, "Wooriwyrite" in July 1900 and soon after sold to Mr Samuel Wilson, "Ercildoune", Burrumbeet in Victoria. This property and sheep was purchased by Dr. Allan Currie in 1922.

Mr William Buckland, "Beckworth Court", became the owner of the flock in 1933 and the present stud was founded in 1967, when Mr H.J. Collins, "Mt Bute", purchased half the flock, comprising 2 rams and 39 ewes, from the estate of William Buckland. The remainder of the flock was sold to Mr Mac Troup of Clunes, in Victoria.

The present day 'Camden' sheep can be described as a very uniform flock of small, plain bodied sheep, with an open face, clean legs and showing little change in conformation and wool production. They have a micron range of 17 – 19. There is no neck development or wrinkle development in the breech area. Ewes weigh between 30 – 35 kgs and cut approximately 2 kgs of wool. Rams have heavy horn growth, generally more tightly curled than present day Merinos, cutting 2.5 – 3.5 kgs of wool and weighing between 45 – 50 kgs. Despite the long history of inbreeding, the reproductive performance of the flock is still outstanding in terms of ewe fertility and ram lambs reaching puberty at an early age.

The registered flock number 3164, run at Mt Bute, is a closed flock with no outside additions and will continue to be run in this manner to preserve and maintain the direct bloodline from Macarthur's 'Camden' flock.

[This article was provided by Michael & Sue Collins, Mt Bute, Linton, Victoria, the current owners of the Camden flock. We acknowledge their contribution in retaining this living history of our Merino heritage. Camden Park is listed as a Reference Flock in the Australian Stud Merino Flock Register.]

Victorian Stud Merino Sheepbreeders' Association Inc.

PO Box 326 Horsham 3402 Australia

2.3 Introduction

Although the familiar two dollar note has in recent years been replaced by a coin, the small closed flock of descendants of the Camden Park Merinos remain as a living tribute of the one of Australia's earliest pioneers. They also serve to be a reminder of the genetic evolution which has taken place since the first Merinos were introduced to Australia. A typical Camden Merino ewe today will cut only 2kg of wool and a ram between 2.5 to 3kg wool. This is in stark contrast to a Peppin Merino which can produce between 10kg in a ewe and 20kg in a stud ram.

Diversity has enabled this evolution and improvement to occur over the last two hundred years of Australia's history and before. Conversely, it is the uniformity of the closed flock that has kept the Camden Park Merinos as they are – relatively unchanged and unimproved reminders of our nation's small beginnings.

RBTA is currently undertaking a study with the CSIRO to investigate the genetic variation that exists within Australian sheep breeds. Whilst early in the study, about one third of the extant breeds have been sampled and analysed. It is through such investigation that the true relationship between many of Australia's breeds will be understood and appropriate management practices implemented to ensure ongoing survival.

2.4 Total Number of Sheep in Australia

The Australian wool industry is the second most important rural industry behind the beef industry.

In 2001, the ABS estimated the Australian sheep flock to be 114.8 million. In 2002/03, 117.5 million sheep were shorn with 85.1% of these being pure Merino, 10.4% being crossbred sheep and 4.5% being other breeds⁽⁸⁾. This means that 97.7% of the diversity in sheep breeds (42 out of 42 breeds) in Australia is represented in only 14.9% of the nation's flock.

Sheep bred in Australia are predominantly for wool production. In the last 10 years the average fibre diameter of the Australian clip has changed dramatically. In 1993/94, only 8.8% of the wool clip was finer than 19 micron, whereas ten years later, 30% of the wool clip is now classified as fine wool⁽⁸⁾. These statistics suggest a significant change in the breeds being used and warrant further investigation. In the absence of any formal monitoring process it is impossible to fully understand these changing trends and what they may signify for some of the more threatened sheep breeds with fleeces of larger fibre diameters. It would be the recommendation of RBTA that a process be established to monitor the changing numbers of breeding ewes of each breed being registered in the national flock. The purpose of this monitoring process would be to alert us to trends that serve to threaten some minor breeds. It is inevitable that the national flock will continue to oscillate between wool and meat production depending on the market outlook for each and that breeds will vary accordingly. An overarching strategy therefore needs to be established to ensure that no breeds become permanent casualties of the fluctuating marketplace.

2.5 Sheep Breeds Known to Exist in Australia

It can be concluded from the 2002/03 data above that there are 5.28 million purebred sheep (other than Merino) represented in Australia. Many of these breeds have been developed and "fixed" genetically by breeders in Australia and New Zealand and are descended from or still closely related to Merino sheep. Examples of these breeds include the following:

TABLE 11: BREEDS OF SHEEP DERIVED FROM MERINO SHEEP

Breed	%Merino	Developed in	Parent Breeds
Border- Merino	50%		Border Leicester ram over Merino ewe
Corriedale	50%	Australia & New Zealand.	Lincoln X Merino
Polwarth	75%	Western district of Victoria, Australia	Merino crossed with Lincoln X Merino 1 st Cross
Cormo	75%	Tasmania, Australia.	Corriedale ram over Saxon Merino ewes
Comeback	75%	Tasmania and Victoria	Merino X Corriedale and Polwarth
Zenith		Victorian sheep/wheat belt, Australia	Lincoln & Merino
Bond	50%	Australia	Imported Lincoln rams X Peppin Strain Merino.

The table below is a summary of all sheep breeds known to exist in Australia. The list may be incomplete and should be used as a guide only. It requires further research and development.

TABLE 12: SHEEP BREEDS KNOWN TO EXIST IN AUSTRALIA

<i>No</i>	<i>Breed</i>	<i>Developed by &/or country of origin</i>	<i>Imported to Australia</i>	<i>Parent Breeds</i>	<i>Breed Society in Australia</i>	<i>Distribution in Australia and Description</i>
	<i>Wool Sheep Breeds</i>					
1a	Merino – Peppin Strain (Medium wool)				Australian Association of Stud Merino Breeders Ltd Level 2, RAS Admin Building 1 Showgrounds Rd, Homebush Bay, NSW 2127 Ph (02) 9763 2744 Fax (02) 9763 1878 www.merinos.com.au	As much as 70% of all Merinos in Australia are said to be directly descended from the Peppin-developed sheep. This breed has a large frame and long legs, making it an efficient forager in dry inland areas. Produce around 10Kg wool each year which is high in wool grease, giving the wool a creamy colour
1b	Merino – Saxon Strain (Superfine & fine wool)				As above	Higher rainfall sheep. Smallest of all Merino strains cutting only 4-5kg wool each year. The wool is soft to handle, extremely bright, white in colour and very fine.
1c	Merino – South Australian Strain (Strong wool)				As above	The largest of all of the Merino strains in Australia. It has longer legs and a taller, heavier body than the Peppin and tends to have fewer skin wrinkles than the other strains. It also has the coarsest wool fibres of any of the strains and has a higher proportion of natural grease.
1d	Merino – Camden Strain		1797 and 1804		Victoria Stud Merino Sheepbreeders Association Inc PO Box 326 Horsham, Vic 3402 Ph (03)53811866 Fax(03) 5382 6022 www.merinovictoria.com	A closed flock descended directly from Captain John Macarthur’s “Camden Park” flock which was founded on Spanish bloodlines through Merino he imported to Australia in 1797 and 1804.
1e	Merino – Spanish Strain				As above	Relatively few in numbers compared with the other strains.

<i>No</i>	<i>Breed</i>	<i>Developed by &/or country of origin</i>	<i>Imported to Australia</i>	<i>Parent Breeds</i>	<i>Breed Society in Australia</i>	<i>Distribution in Australia and Description</i>
	<i>Wool SheepBreeds</i>					
1f	Poll Merino				Australian Association of Stud Merino Breeders Ltd Level 2, RAS Admin Building 1 Showgrounds Rd, Homebush Bay, NSW 2127 Ph (02) 9763 2744 Fax (02) 9763 1878 www.merinos.com.au	The development of the Poll Merino is relatively new. Recessive poll genes are believed to have existed in the breed for many years and infusions of hornless sheep during the development of the Merino breed in Australia also left some poll genes within normal Merino flocks. Poll rams have been selected and mated to Merino ewes and selection continued for the quality of pollness. The result is a pure Merino without horns. Because the selection and development of the Poll Merino has been largely on a 'within flock' basis, this Merino type is scattered throughout the Merino areas of Australia, and is represented within all categories of Merino mentioned previously, i.e. fine, medium and strong wools ⁽²³⁾ .
1g	Booroola Merino	CSIRO, Southern Tablelands of NSW, Australia			As above	The Booroola Merinos differ from the normal Merino in two important ways. First, their fertility is as high as any breed in the world. The number of lambs born per ewe lambing averages 2.4 with a range from one to six. In crosses with other Merinos this difference is naturally reduced but half-Booroola ewes on average wean about 20 percent more lambs than comparable Merinos under the same conditions. Second, they have the ability to breed at most times of the year, thus extending the breeding season. (10)

<i>No</i>	<i>Breed</i>	<i>Developed by &/or country of origin</i>	<i>Imported to Australia</i>	<i>Parent Breeds</i>	<i>Breed Society in Australia</i>	<i>Distribution in Australia and Description</i>
	<i>Merino-Based Breeds</i>					
1h	Dohne Merino		1998	German Mutton Merino sires X Peppin-style Merino ewes	As above	The Dohne Merino is a synthetic dual-purpose Merino
1i	Fonthill Merino			American-bred Rambouillet Merino rams X fine-wool Saxon strain of Merino	As above	The major objective in developing the Fonthill Merino was to increase the genetic potential of an easy care type sheep to produce wool, meat and lambs. Since the Fonthill was established in the 1950s it has been subjected to selection methods primarily designed to further increase body weight and fertility without changing the type of wool produced or the yield per head. Fonthill ewes produce 20-22 micron wool with the amount of wool cut per head similar to that obtained from other Merinos running under similar conditions. Lambing average within a flock is 100 percent.
1j	South African Mutton Merino (South African Meat Merino)	German, then exported to South Africa in 1932	Mid 1990's		A breed society has been established in Australia.	This breed of sheep was originally known as the German Mutton Merino. The breed was recognised in 1971 when the name was changed to South African Mutton Merino. In South Africa it was bred to produce a suitable slaughter lamb at an early age while producing good quality wool (of 23 micron or fewer) without the input of additional feeding. The breed is polled and the wool classified as strong to medium. In Australia it offers farmers an additional source of genetic material to produce sheep meat from a large framed sheep with a long loin. The breed could be used as a source for heavier lambs, as fat is not laid down in the carcase to a much later age than other sheep breeds.

<i>No</i>	<i>Breed</i>	<i>Developed by &/or country of origin</i>	<i>Imported to Australia</i>	<i>Parent Breeds</i>	<i>Breed Society in Australia</i>	<i>Distribution in Australia and Description</i>
	<i>Merino-Based Breeds</i>					
2	Bond Corriedale	Australian breed established in 1909		Lincoln rams X stud Peppin Merino ewes,	Australian Bond Sheep Breeders Association Ltd "Bunyarra", Urana, NSW 2645 Ph (02) 6920 8272	Originally known as the "Commercial Corriedale" or Bond Corriedale. It was bred to produce a soft handling, finer wool than the Corriedale. It is now recognised as a separate breed. The Bond has a large frame, is adaptable to a range of environments and has some resistance to fleece rot and blow-fly strike. This sheep grows a bulky fleece of 56s/58s count, with a fibre diameter of 25 to 27 microns, and a staple length of approximately 150mm. In the craft world, the fleece is used for fine to medium weight garments.
3	Comeback	Tasmania and Victoria		Merino X Corriedale and Polwarth		Similar to Merino but free of neck folds and lightly woolled around the points. Nostrils mottled, face white and free from wool. Polled or horned. The breed was first developed by crossing a British longwool cross back to the Merino. More recently Comebacks have been produced by crossing breeds such as the Corriedale and Polwarth with the Merino. Australia has approximately three million Comebacks which are mainly concentrated in cool wet areas. Although close to the Merino in type, Comebacks are selected to maximize production of meat as well as wool. Their wool is bulky with a staple length of more than 110mm and fineness ranging from 21-25 microns. (10)
4	Cormo	Tasmania in the 1960's		Corriedale ram X Saxon Merino ewe		The Cormo is a fairly large, plain bodied, fast-growing, open-faced sheep. Mainly found in the far South Eastern zone of Australia. The name Cormo is from the names of two of the parent breeds, <i>Corriedale</i> and <i>Merino</i> .

No	Breed	Developed by &/or country of origin	Imported to Australia	Parent Breeds	Breed Society in Australia	Distribution in Australia and Description
	Merino-Based Breeds					
5	Corriedale	Simultaneously in New Zealand and Australia in about 1874.		Lincoln X Merino	Australian Corriedale Association Inc. GPO Box 75B Melbourne 3001 Ph (03) 9817 6711 Fax (03) 9817 6125 www.corriedale.org.au	Dual-purpose sheep which is large framed, polled and produces a good carcass of either lamb, hogget, or mutton. Produces a bulky, high yielding fleece. Black feet and polled.
6	<u>Hyfer</u>	<u>Australia</u>		<u>50% Dorset X 25% Booroola Merino X 25% Trangie Fertility Merino</u>		<u>Hyfer is a composite sheep breed. They have high spring joining ability for flexible year-round lamb production</u>
7	Polwarth (Polled and Horned)	Victoria, Australia in 1880		Merino crossed with Lincoln X Merino 1 st cross	Polwarth Sheepbreeders Association of Australia (Fed) PO Box 108 Goodwood, SA, 5034 Ph (08) 8210 5211 Fax (08) 8231 4173 Polwarth Sheepbreeders Association of Australia (Vic) AB 120 Colac Vic 3249 Ph (03) 5233 4515 Fax (03) 5232 1421	The Polwarth is a dual-purpose sheep. It is large-framed, robust, free from wrinkles and produces a high-yielding, soft handling fleece. They will also yield a uniformly lean carcass suitable to a number of export markets. The breed has been successfully exported to many countries, particularly South America where they are known as "Ideals".
8	Border-Merino Crossbred				Australian Border Leicester Association Inc. "Cal Col", Deniliquin, NSW 2710 Ph (03) 5882 3338 Fax (03) 5882 3338	Second most popular breed in Australia, favored for its well proportioned carcass, high fertility, robust constitution and good milk production. It has shown itself to be well-suited as a prime lamb mother for Australian conditions.
9	Zenith	Wheat zone of Victoria, Australia.		Lincoln & Merino		Similar to Merino, but free of neck folds. Lightly woolled around the points. Polled, mottled nostrils, face white.

<i>No.</i>	<i>Breed</i>	<i>Developed by &/or country of origin</i>	<i>Imported to Australia</i>	<i>Parent Breeds</i>	<i>Breed Society in Australia</i>	<i>Distribution in Australia and Description</i>
	<i>Meat Sheep Breeds-short wool</i>					
10	Coolalee	Australia		Wiltshire Horn, Suffolk, Hampshire Down, Poll Dorset, Lincoln, English Leicester crossed over 8 years	Coolalee Sheep Breeders Association Inc. 'Milchomi', Bugaldie, NSW 2357 Ph: (02) 6843 8258 Fax: (02) 6843 8277	Commenced construction of the breed in 1968. First rams became commercially available in 1983. The breed is a terminal sire used for prime lamb production.
11	Dorset Down	England	1938	Southdown X Berkshire, Hampshire & Wiltshire	Dorset Down Breeders Association Inc PO Box 197 New Gisborne, Vic 3438 Ph (03) 5426 2140 Fax (03) 9903 9581	Terminal Sire in Prime Lamb Production. Fast maturing and robust breed.
12	Dorset Horn	England	1895		Australian Dorset Horn Breeders Association 82 Highett St Richmond, Vic 3121 Ph (03) 9428 4384 Fax (03) 9428 4384	Very square chunky appearance, long body and massive horns on both rams and ewes. Desired for their superior carcass composition and fast growth rates. Often mated to cross- bred ewes for the production of prime lambs.
13	East Friesian	East Friesland, Germany	1996			The German East Friesian milk sheep is the best known and most important of the Friesian breeds and is the breed known in the scientific literature as the "East Friesian". The East Friesian is reported as averaging 2.25 lambs with milk yield of 500-700 kg per lactation testing 6-7% milk fat, the highest average dairy milk yield recorded for any breed of sheep. Wool production is about 4.5 kg per ewe with a clean wool yield of 65% and a fineness of 50/56s / 48/50s (German Ministry of Agriculture). The mature weight of this breed is between 150 to 200 pounds (70-90 kg). The East Friesian is considered to be the worlds highest producing dairy sheep

<i>No</i>	<i>Breed</i>	<i>Developed by &/or country of origin</i>	<i>Imported to Australia</i>	<i>Parent Breeds</i>	<i>Breed Society in Australia</i>	<i>Distribution in Australia and Description</i>
	<i>Meat Sheep Breeds-short wool</i>					
14	Finnsheep		1993		The Australian Finnsheep Breeders Association (est 1993) Loddon Rise RMB 114 Inglewood, Vic 3517 Ph (03) 5437 3281 www.finnsheep.asn.au	The AFBA runs a Finn Leicester appendix for members who are stabilising a cross between the Finn and the Border Leicester and records details of Finn/East Friesian crosses. While its focus is primarily on maintaining records of registered sheep, the Association also promotes the breed and encourages, promotes, and carries out research into animal husbandry and genetics of relevance to purebred and crossbred Finnsheep in the Australian sheep flock (31).
15	Hampshire Down		1880		Australian Hampshire Down Breeders Association Cressy, Tasmania, 7302 Ph/Fax 903) 6397 6400	Primarily a meat producer with a fast growth rate. Face and ears dark brown approaching black. Polled
<u>16</u>	<u>Poll Dorset</u>	<u>Australia</u>		<u>Dorset Horn & Ryeland</u>	<u>Australian Poll Dorst Association Inc.</u> <u>GPO Box 75B Melbourne 3001</u> <u>Ph (03) 9817 6711</u> <u>Fax (03) 9817 6125</u> <u>www.polldorset.org.au</u>	<u>The most commonly used sire in the production of prime lambs in Australia supplying over 75% of the prime lambs produced annually. Main distinguishing features are it's hornless appearance, long-square body set on short legs, and 'spongy' short-stapled wool.</u>
17	Ryeland	Herefordshire England	1919		Ryeland Sheepbreeders Association of Australia PO Box 125 Hamilton Vic, 3300 Ph (03) 5572 2210	The Ryeland is a Downs type sheep. It was one of the breeds used to introduce the poll gene to the Dorset breed in the development of the Poll Dorset. The Ryeland is a hornless, prime lamb producer. It carries a fine Downs-type wool, and is well regarded as a fertile, heavy milking breed specializing in the production of prime lambs. 10) It has a white face, black nostrils and dark feet.
18	Shropshire	Shropshire England	1850's		Australian Society of Breeders of British Sheep Ltd Royal Showgrounds, Epsom Rd Ascot Vale, 3032 Ph (03) 9281 7444 Fax 903) 9376 2973	Established as a breed in 1792. A hardy, small framed polled sheep, it has black points on its face, legs and feet. It is has tasty meat and a dense fleece.

No.	Meat Sheep Breeds- short wool	Developed by &/or country of origin	Imported to Australia	Parent Breeds	Breed Society in Australia	Distribution in Australia and Description
19	South Dorset Down	New Zealand		Dorset Down X Southdown	c/o Australian Society of Breeders of British Sheep Ltd Royal Showgrounds, Epsom Rd Ascot Vale, 3032 Ph (03) 9281 7444 Fax 903) 9376 2973	Early maturing prime lamb with a high proportion of lean meat. Open faced with medium to dark points and light to medium skin pigmentation.
20	Southdown	Sessex, England	First Settlers		Southdown Australia inc. PO Box 91, Narre Warren, Vic 3804 Ph (03) 9796 8225	One of the smallest of sheep in Australia used in the production of prime lambs. When mated to Border-Merino ewes the resultant lambs grow rapidly into a marketable weight. Distinguishing features include its short square head, almost 'piggish' appearance, very square and long body. Wool is short and springy.
21	South Suffolk	New Zealand	1946		Australian South Suffolk Society "Kaybunda" PO Box 1084 young NSW, 2594 Ph (02) 6382 4534 Fax (02) 6382 3215	Developed in the South Suffolk is a fixed cross between the Suffolk and the Southdown. The breed is hornless with head, legs and feet brown to black. It is mainly used for the production of fast growing prime lambs.
22	Suffolk	England	1904		Suffolk Sheepleaders Association of Australia Pine Ridge, c/o PO Strathalbyn SA, 5255 Ph (08) 8537 0422	The Suffolk is hornless, has a black head, legs and feet. It is a highly fertile meat breed that has become popular as a terminal sire because it yields a heavyweight lamb that is quite lean.
23	Texel	Isle of Texel in the province of Northern Holland Animals were selected from Denmark and Finland to suit Australian conditions	1993		Australian Texel Stud Breeders Association Inc. GPO Box 75B Melbourne 3001 Ph (03) 9817 6711 Fax (03) 9817 6125 www.texal.org.au	The selected flock began quarantine in New Zealand in 1988. An objective selection program was implemented. In February 1993, 790 ewes and 50 rams were selected from a base flock of 2220 available for import to Australia. The first Texels were born in Australia in September 1993. The first volume of the flock registry was produced in April 1994. The breed is a heavily muscled lean sheep, and is used for the production of prime lambs.(28)
24	White Suffolk	Australia		Suffolk X Poll Dorsets	Australian White Suffolk Association Inc PO Box 108 Goodwood, SA 5034 Ph (08) 8210 5211 Fax (08) 8231 4173 www.whitesuffolk.org.au	The clean face and points (free of wool) of White Suffolk sired lambs minimises grass seed problems. Rams are renowned for their natural fertility and libido and can be mated at any time of the year. When mated to White Suffolk sires, ewes will have minimal lambing problems.(26)

<i>No</i>	<i>Breed</i>	<i>Developed by &/or country of origin</i>	<i>Imported to Australia</i>	<i>Parent Breeds</i>	<i>Breed Society in Australia</i>	<i>Distribution in Australia and Description</i>
	Meat Sheep Breeds – Long Wool					
25	Border Leicester	Leicestershire, England	1871		Australian Border Leicester Association Inc. “Cal Col”, Deniliquin, NSW 2710 Ph (03) 5882 3338 Fax (03) 5882 3338	Large, robust hornless sheep with no wool on face or legs. Wool tends to be long and very coarse. Its main role is crossing with merino ewes to produce a first cross prime lamb mother.
26	Cheviot	Cheviot Hills, England/Scotland borders	1938		Cheviot Sheepbreeders’ Association of Australia 71 Duke St. Richmond, Vic 3121 Ph (03) 9428 1770	The breed is a longwool type, hornless, of reasonable frame and used mainly for prime lamb production suited to hilly country with high rainfall.
27	Coopworth	New Zealand	1976	Romney X Border Leicester	Coopworth Sheep Society of Australia Inc. RMB 4630 Portland Vic. 3305 Ph (03) 5526 5248 www.coopworth.org.au	The breed was developed in the 1950’s and formally established in 1968. Wool 33-38 micron, excellent for home spinning. There were 8 registered flocks at in Australia at 1 st June 2003. ⁽²⁷⁾
28	English Leicester	England	1826		English Leicester Association of Australia inc. 40 Clark Rd Tynong North Vic 3813 Ph (03) 5942 8367 www.ballaratweb.net/elaa	English Leicesters were one of the first pure breeds to be imported into Australia in 1826. Large, polled sheep covered with long staple wool. Definite topknot with face white tending to blue and wedge-shaped. Suited to fertile high rainfall areas. The English Leicester Association of Australia Inc., was re-started in 1982, after a lapse of some time, to assist in the promotion of and ensure the survival of the breed. It was incorporated on 19th May, 1992. Ref: www.ballaratweb.net/alaa
29	Gromark	Northern NSW, Australia in 1965		Corriedale X Border Leicester	Gromark Society of Australia (est.1979) PO Box 426 Tamworth, NSW 2340 Ph (02) 6766 7044 Fax (02) 6761 3017 www.gromark.com	It is a dual-purpose sheep which evolved from objective selection for high growth rate and fertility with final selection being based on visual criteria - wool quality, frame and carcass attributes. The Gromark is a large-framed breed (ewes average 80kg) producing large lean lambs and good fleeces with wool fiber diameter being about 27-33 microns.

<i>No</i>	<i>Breed</i>	<i>Developed by &/or country of origin</i>	<i>Imported to Australia</i>	<i>Parent Breeds</i>	<i>Breed Society in Australia</i>	<i>Distribution in Australia and Description</i>
	<i>Meat Sheep Breeds – Long Wool (contd)</i>					
30	Gotland	Established on the Swedish Island of Gotland by Vikings sheep brought back from Russia		Karakul and Romanov sheep		The modern Gotland sheep were developed by selective breeding. They are fine boned, of medium size, with a hornless black head sometimes with white markings and free from wool. They have a dense, long, lustrous grey fleece, occasionally white, black or brown.
31	Lincoln	England	Early 1980's		Australian Lincoln Society Inc. Glenfine Homestead PO Cape Clear, Vic 3351 Ph (03) 5342 2290 Fax (03) 5342 2292	Large, polled sheep covered with coarse wool. Large forelock of evenly-waved wool hanging over face. Suited to high rainfall areas.
32	Perendale	New Zealand (late 40's) & Australia (late 50's)		Cheviot X Romney	Australian Perendale Association RMB 1476, Piries-Gough Bay Rd Mansfield, Vic 3722 Ph (03) 5777 3670	A medium sized sheep showing Cheviot characteristics, it produces a fleece of 50s to 56s count, or a micron range of 28 to 32, approximately 120mm in length. In coloured flocks, the breed has declined in popularity in recent years, partly because of its flighty nature. The fleece is fairly springy and lacks the lustre of the British Longwool breeds. It is used by hand spinners for medium weight garments.
33	Romney	Kent marshes in England	1872		Australian Romney Association inc. 82 Highett St Richmond, Vic 3121 Ph (03) 9428 4384 Fax (03) 9428 4384	It is a polled breed, has a large frame and is an excellent mother. When crossed with English shortwoolled breeds it produces high quality prime lambs.

<i>No</i>	<i>Breed</i>	<i>Developed by &/or country of origin</i>	<i>Imported to Australia</i>	<i>Parent Breeds</i>	<i>Breed Society in Australia</i>	<i>Distribution in Australia and Description</i>
	<i>Fat Tail Sheep</i>					
34	Awassi	Arabian Peninsular	Mid 1980's			Fat-tailed sheep. Carpet type wool, fleece is brown to white. Estimated numbers were 400,000 Merino/Awassi cross sheep in Western Australia in 2001 ⁽³²⁾ .
35	Karakul	Iran & Afganistan	1985			This sheep is multi purpose: pelt, fleece and meat. It has a long, lustrous fleece, usually black, but can be red, brown and white. It is estimated there are 260,000 Karakul/Merino ewes in WA. Australian Total: 260,000
36	Damara	South Africa	1996		Damara Breeders group 2 Shiela St Mosman Park, WA 6012	A fat tail sheep with high fertility. First imported into Western Australia. It sheds its fleece that can be of different colours (tan, brown, black and white spotted). The fleece consists of hair with a fine layer of wool. It was estimated that in 2001 there were 7,000 pure Damara in WA, 2,000 in SA, 500 in NSW and 800 in Qld. It is estimated there are 100,000 Damara/Merino cross ewes in WA, 70,000 in SA, 30,000 in NSW and 24,000 in Qld Australian Total: 234,300 Ref: ⁽²⁴⁾

No	Breed	Developed by &/or country of origin	Imported to Australia	Parent Breeds	Breed Society in Australia	Distribution in Australia and Description
	<i>Carpet Wool Breeds</i>					
37	Carpetmaster			Border Leicester cross Romney ram X Perendale ewe.		The Carpetmaster has the easy-care attributes of the Perendale, with a higher fleece weight. The fibre diameter is 40 micron and has a staple length of 150mm. In common with other carpet-wool breeds, it has high yielding, heavily medullated wool.
38	Elliotdale	CSIRO Elliott Research Station in Tasmania, Australia in 1963-1968		Tasmanian Romney	Elliotdale Sheepbreeders Society PO Box 199 Dandenong, Vic 3175 Ph (03) 9793 5605 Fax (03) 9790 0755	The Elliotdale is similar to the Romney, with cleaner points and a carpet-wool fleece of 38-40 micron diameter. Rams may be horned or polled but ewes are always polled. The breed also has many prime lamb features, producing quick growing lambs of excellent quality. (10)
39	Drysdale	New Zealand	1975		The Australian Drysdale Sheep Breeders' Association (est 1979) RMB 2465 Kilmany Vic 3851 Ph (03) 5149 2250 Fax (03) 5149 2257	Numbers of Drysdales have increased steadily. In 2003 there were 10 000 Romney and Drysdale ewes being mated to Drysdale rams in Australia, 118 registered stud breeders plus over 200 commercial breeders of Drysdale sheep. The breed has spread to New South Wales, Victoria, Tasmania, South Australia and Western Australia.(30)
40	Tukidale		1975	New Zealand Romney	Tukidale Sheep Society of Australia Blackwood Park, North Purnim Vic. 3278 Ph/Fax (03) 5567 1148	It is stocky in appearance and produces an extremely long stapled fleece of very coarse wool. The breed is very robust and hardy, with the fleece being ideal for carpet-wool production. The wool is highly medullated, harsh to handle and chalky white. It grows at approximately 2.5cm per month. These characteristics give carpets resilience, hard-wearing qualities and the ability to accept dyes readily. As with other carpet-wool breeds, Tukidales require shearing every six months. (29)

<i>No</i>	<i>Breed</i>	<i>Developed by &/or country of origin</i>	<i>Imported to Australia</i>	<i>Parent Breeds</i>	<i>Breed Society in Australia</i>	<i>Distribution in Australia and Description</i>
	<i>Wool-Sheeding Sheep breeds</i>					
41	Dorper	Developed in South Africa in the 1930's	1996	Blackhead Persian ewes with a Dorset Horn ram	Dorper Sheep Breeder's Society of Australia Inc. PO Box 108 Goodwood, SA, 5034 Ph (08) 8210 5211 Fax (08) 8231 4173 www.dorper.com.au	The breed has the potential to be developed for domestic and export meat markets. It is a mutton breed with a high lambing percentage. It is now numerically the second largest sheep breed in South Africa. Its fleece is wool and hair which is shed if not shorn regularly. It mostly has a black head. Its pelt is most sought after. It is estimated there are 1,500 pure Dorper in WA 10,000 Dorper/Merino crosses in WA, & 5,000 in NSW Australian Total: 16,500 Ref: (24)
42	Wiltipol	Australia		Border Leicester, Poll Dorset and Poll Merino sheep	Australian Wiltipoll Association Inc (1996) PO Box 620 Strathalbyn, SA 5255 www.wiltipoll.com	The Wiltipoll is a sheep developed for the traditional heavy prime lamb market. Like the Wiltshire Horn it sheds its wool and requires no shearing. The advantages of the wool shedding are that costs are cut dramatically, and that there is no need for shearing, crutching, jetting, dipping or mulesing. They are fly and lice resistant and therefore need no chemical treatment. Requirements for registration of Wiltipoll sheep state that the sheep must have no less than 96.87% Wiltshire Horn blood, it must be polled and must totally shed its fleece annually. To achieve the required percentage of Wiltshire Horn blood, a ewe of a polled breed must be first crossed with a pure bred Wiltshire Horn ram and then back -crossed successively for four generations (33).
43	Wiltshire Horn	Wiltshire, England	1952		Australia Wiltshire Horn Sheepbreeders' Association Pickwick, Gunaroo Rd Gunaroo, NSW 2620 Ph (02) 4845 1552 Fax (02) 4845 1519 www.wiltshirehorn.asn.au	A breed society was first formed in UK in 1923. A key feature of the Wiltshire Horn is that it sheds its wool and does not require shearing. Wiltshires now have the third highest number of studs of all the British breeds (behind Border Leicesters and Suffolks) so they are no longer a rare breed. Of 195 Wiltshire studs that have been started, 76 still exist (25)

2.6 Number of Registered Breeding Ewes in Australia

In 2000, the total number of breeding ewes in Australia was estimated by Australian Bureau of statistics to be 50 million (11). Approximately 42.5 million of these were Merino, 5 million were crossbreds, and the remaining 2.5 million purebred sheep made up from approximately 40 other breeds as listed above. The statistics do not discern a difference between registered and non-registered animals and the numbers are therefore not indicative of genetic integrity or merit.

The graph below does not include all sheep breeds in Australia. It includes twelve breeds currently being registered by the Australian Society of Breeders of British Sheep Ltd. (ASBBS). Most of the other breeds are registered with their own breed society and there are currently insufficient financial resources for RBTA to monitor the breed status across each of these breed associations.

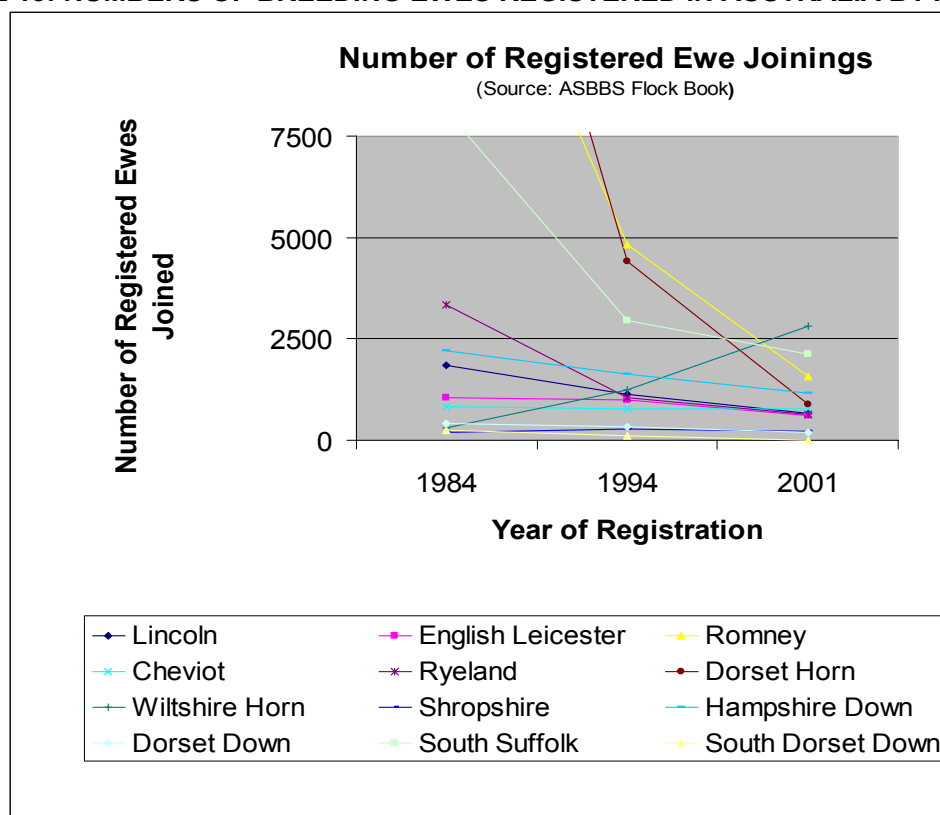
What is interesting in the graph below is the downward trend of all breeds with the exception of the Wiltshire Horn (and to a lesser extent South Suffolk which has shown a small increase). As recently as 10 years ago, the Wiltshire Horn breed was considered critically endangered in Australia. It has in recent years enjoyed a revival with increasing demand for the breed as shown by the registered ewe numbers and the number of registered flocks.

Sadly all other ten breeds are continuing their decline with falling numbers of ewes being bred. Many of these (and other breeds not shown in this graph) are of increasing concern to RBTA. It is our strong belief that all breeds need to be monitored to ensure that:

- 1) Registered ewe and ram numbers do not fall so low that the continuation of the breed is threatened.
- 2) Inbreeding coefficients are kept to an acceptable level where inbreeding depression is avoided/minimized.
- 3) The number of registered breeders does not fall so low as to threaten the ongoing survival of the breed.

Currently this information is not being monitored on a national level across all breeds.

TABLE 13: NUMBERS OF BREEDING EWES REGISTERED IN AUSTRALIA BY ASBBS



2.7 Number of Flocks in Australia Registered by ASBBS

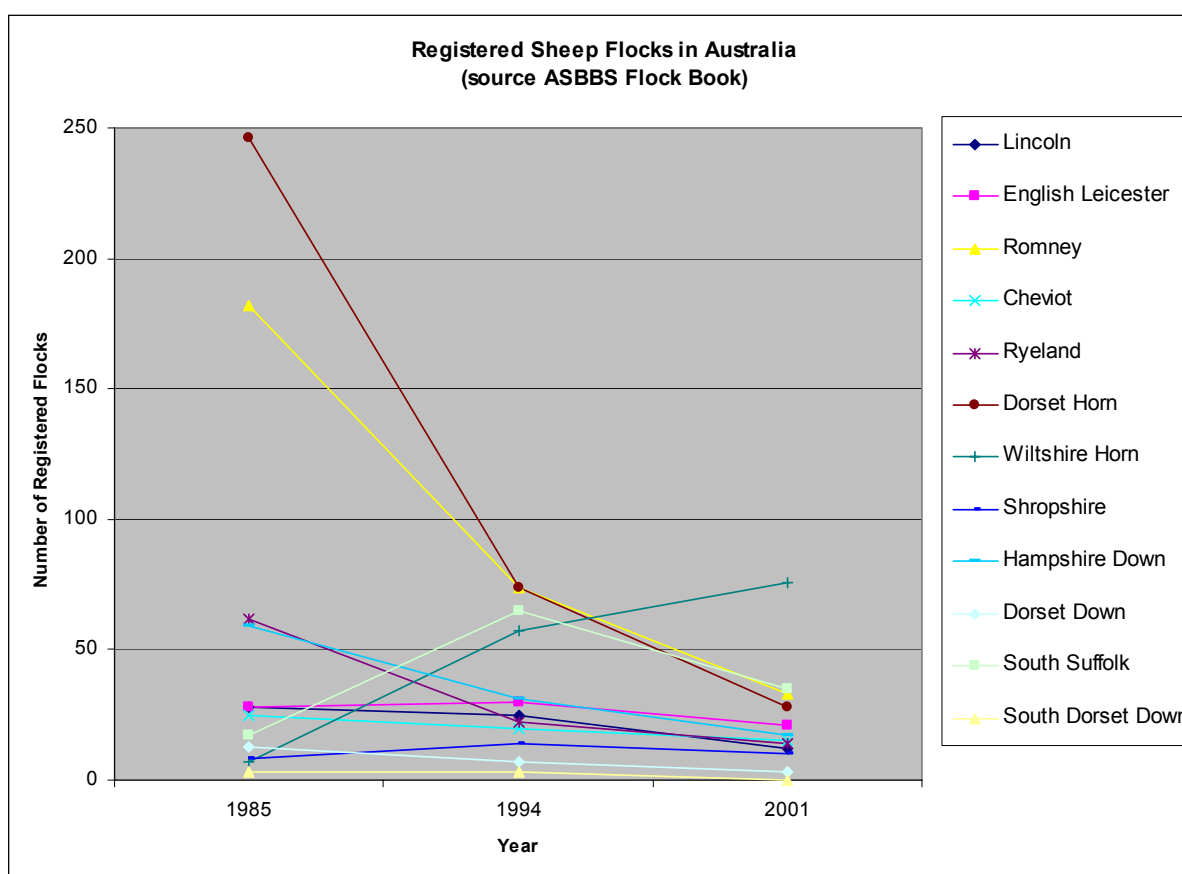
The number of registered flocks is continuing to decline. This is likely to be due to a number of contributing factors including:

- the relevance of pedigrees losing ground to objective measurement and EBV data (e.g. Lambplan)
- the move away from purebred genetics to crossbred genetics
- older breeders (who have been staunch advocates for particular breeds) getting older and dispersing the flocks.

With a polled equivalent readily available, the Horned Dorset is losing its following as older generation farmers hand over the management of the farms to the next generation. With horns being a negative management attribute, many younger breeders prefer to opt for the polled equivalents when available.

Breed loyalties are dying with the breeders, threatening the ongoing survival of a number of breeds - polled and horned alike.

TABLE 14: NUMBERS OF FLOCKS IN AUSTRALIA REGISTERED BY ASBBS



2.8 Endangered Sheep Breeds in Australia

In assessing the significance of sheep breeds to the RBTA, the group that have been recommended for critical status either exist in exceedingly low breeding numbers or have been known in the sheep community in the last decade but have proved elusive to locate despite reasonable investigation. It is more than likely small pockets of purebreds exist on farms carrying commercially viable breeds and my recommendation is that we make it a priority to track down former breeders to ascertain what has become of the Horned Polwarth, Cormo, Zenith, Elliotdale, Booroola Merino and Carpetmaster. Of these, the Horned Polwarth, Zenith, Elliotdale and Booroola Merino are Australian originated and are probably not represented outside Australia.

The Camden Merino should be considered Australia's most historically important sheep breed. It is doubtful the specimens remaining today date back to the first flock John Macarthur developed at the beginning of the 19th century. Most sheep in the colony at that time carried the genes of Cape or Indian breeds because there were so few in Australia. It is more likely current Camden Merinos trace back to improved flocks belonging to the Macarthur family from the 1830s or later. Regardless, Camdens and Macarthurs are connected and so should share the historical recognition this family is given for their contribution to Australian farming and the wool industry.

The Carpetmaster and Cormo have origins in NZ. The Carpetmaster appears to have died out there; it has not been included among the breed profiles in *Sheep Breeds of NZ* (Meadows, Reed, 1997). The entry for the Cormo suggests numbers of 65,000 exist there, a thriving population. The Cormo was developed first in Tasmania and the genetic crossing used to produce it duplicated in NZ though with slightly different Merino bloodlines. Discussion needs to take place to decide whether the Cormo should be on our critical list or whether our energies should be focused on breeds where there are no known populations outside Australia.

The dilemma regarding the Cormo is repeated when the South Dorset Down is considered. It was developed in NZ from Dorset Down and Southdown and an existing population of 5000 is quoted by Meadows in *Sheep Breeds of NZ*. As well, the parent breeds still exist and so it could be possible to recreate it. There are no studs registered in the 2003 Flock Book (Aust). The Dorset Down and Shropshire are inclusions in the critical category because of their limited breeding numbers. With the present preoccupation of the wool industry with pigmented contamination of the national wool clip, a greater prejudice against breeds with coloured points will develop and this does not auger well for the promotion or preservation of Shropshire and Dorset Down.

The Endangered category to date has five recommendations; two British strong wool breeds, a prime lamb terminal sire and two carpet wool breeds. Both the Lincoln and the English Leicester have suffered a drop of almost half in the numbers of breeding ewes kept since 1994. As larger scale breeders age and encounter ill health and have to downsize, these two breeds will face less certain futures. Small markets that accounted for reasonable sales of fleeces have dried up; the Chinese market for long-stapled fleece for dolls' hair has disappeared as has the former local market for roller lagging. The Ryeland's continued presence in the public arena is due to the dedicated commitment of one numerically large stud breeder, a situation which cannot last forever. The breed has some long-term potential as an alternative terminal sire to the very popular Poll Dorset and White Suffolk, but much more promotion is needed to educate small breeders about the Ryeland's qualities.

The future is not good for carpet wool breeds because they have medullated fibre and this is another contaminant that is downgrading the national wool clip. As well, there is no demand for carpet wool and breeders pay more for shearing (twice yearly) and cartage of wool bales than they receive for wool. Breeders say there is no future with carpet wool and no interest in the sheep, a most concerning situation.

With the recommendation for the vulnerable category, the Cheviot appears to be in the most precarious position. It's a lively, flighty sheep so a handful for less experienced keepers, it's a strong wool breed with terminal sire characteristics but it's not well known. Serious promotion is required to keep numbers stable.

The Hampshire has done well in feed conversion/growth rate trials and also in taste trials and so is a good choice for small farmers wanting a money making sheep that is appealing to look at.

The Dorset Horn has been sliding back numerically – the horns are a curse for breeders to handle and the best qualities of this breed can now be found in the successful Poll Dorset. Breeders of the Poll access the Dorset Horn to retain nonseasonal breeding and meat carcass traits and for as long as this practice continues the Dorset Horn will be safe.

Breeds that need careful watching include the Romney and also the Perendale, Coopworth and Gromark. Among many new creations and introductions there are breeders with low numbers of breeding ewes, low enough to be considered for our conservation categories, but they do not meet the criteria that would bring them to our attention.

TABLE 15: RARITY STATUS OF SHEEP BREEDS IN AUSTRALIA IN 2004

Status	Breed
EXTINCT OR LOST TO AUSTRALIA	<ul style="list-style-type: none"> • Cotswold • North Devon • Teeswater
CRITICAL < 300 breeding ewes	<ul style="list-style-type: none"> • Horned Polwarth (Aust only) • Camden Merino (Aust only) • Carpetmaster (NZ, Aust) • Booroola Merino (Aust only) • Zenith (Aust only) • Shropshire • Dorset Down • Elliotdale (Aust only) • South Dorset Down • Cormo
ENDANGERED <500 breeding females	<ul style="list-style-type: none"> • Lincoln • English Leicester • Ryland • Drysdale (estimate only) • Tukidale (estimate only)
VULNERABLE < 900 breeding ewes	<ul style="list-style-type: none"> • Cheviot • Hampshire • Dorset Down
AT RISK <1500 breeding ewes	<ul style="list-style-type: none"> • Romney
RECOMMENDED FOR INVESTIGATION	<ul style="list-style-type: none"> • Perendale • Coopworth • Gromark
NEW CREATIONS OR INTRODUCTIONS	<ul style="list-style-type: none"> • East Friesians (87 breeding ewes) • Texeldown (279 breeding ewes in 2003) • Wiltipol (431 breeding ewes in 2003) • Aust Finn (204 breeding ewes in 2003) • Centre Plus (unknown)

2.9 Conclusion

Little is known about the relative proportions of each of approximately 40 breeds that make up 4.5% of Australia's national sheep flock. Although many breeds have their own breed registries, the data has not been collated into one source because of insufficient resources to do so. This data is imperative if we are to effectively track changing breed numbers and monitor the viability of remnant breed populations. RBTA believes that around half of these breeds are threatened or in danger of being lost in Australia in the next ten years if immediate action is not taken. Many of the breeds are Australian derived breeds not found anywhere else in the world. As such their preservation should receive high priority.

Funds are urgently required to complete the survey of sheep breed genetics and to implement a national audit of sheep breeds in Australia. Once a complete picture of the state of these breeds is determined, a strategy needs to be devised to determine:

- which breeds are of greatest significance for preservation
- how these breeds can best be secured.

Chapter 3

Breeds of Poultry and Waterfowl in Australia

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June 2004

3.1 Executive Summary – Poultry and Waterfowl

Poultry breeds in Australia serve two major functions: the provision of meat and eggs. The provision of down from some breeds of much less economic importance.

Hybrid crossbred genetics currently dominate in both commercial egg laying and broiler production systems in Australia, with 4 hybrid breeds of birds accounting for approximately 98% of all egg layers.

In 2000, it was estimated that the 25 million dozen eggs produced by backyard egg producers accounted for only 0.1% of all eggs produced in Australia. It should not be overlooked however that the producers of these 25 million dozen eggs are also guardians of the vast majority of the diversity in poultry breed genetics in Australia. It is significant that this valuable genetic material is currently being held by a large number of breeders and not concentrated with governments or multinational corporations. Of concern is the current lack of sufficient monitoring programs to adequately record trends that may threaten the ongoing survival of some breeds. With so many breeds spread across a large number of breeders, there is advantage in the spread of the risk. The collation of actual data to properly assess the changing status of the breeds may consequently be very difficult to gather.

RBTA is currently working to introduce Australia's first poultry registration system. This should encourage the keeping and breeding of pure poultry breeds and should eventually rectify the problem that currently exists of inadequate identification of genetically purebred poultry.

3.2 Australian Industry Overview- Egg Production

In the year ended 30th June 2000 approximately 2.19 billion eggs were produced in Australia (ABS Agricultural Commodities 7113.0 1999-2000) from a national flock of just over 12 million hens (ABS Agricultural Commodities 7113.0 1999-2000). A preliminary estimate of the gross value of egg production for the year 2001 is approximately \$333 million (ABS Value of Agricultural Commodities 7501.0 2000-2001). The majority of eggs are produced by 1117 commercial establishments but approximately 25 million dozen eggs (just 0.1% of the nations production) comes from backyard non-commercial operations.

Cages are the most dominant production system in Australia. Approximately 85% of shell eggs sold in Australian supermarkets are from intensive cage systems⁽¹³⁾. An alternative system evolving in the Australian egg industry is the barn system that accounts for approximately 4% of Australian supermarket shell egg sales. Free range production systems account for about 11% of Australian supermarket shell egg sales ⁽¹³⁾.

Australia ranks number 37 in the world in terms of egg production with approximately 13 million layers producing 155,000 tons of eggs. In the year ended June 1998, Australia exported approximately 1250 ton (645 ton as shell egg and 614 ton as egg product) of eggs that accounts for just under 1% of our total production ⁽¹³⁾.

3.3 Egg Producing Breeds of Poultry in Australia

There are 4 major breeds of birds used in the Australian egg industry and all have been imported into Australia over the last 10 years. The 4 breeds of bird are the Hisex, ISA, Hy-line and Lohmann Brown. The 4 breeds of bird account for approximately 98% of all egg layers in Australia and, as a result of consumer preference, all are brown egg layers. The benefits of the imported layers over the previous breeds used include the precocious onset of production, early large egg size and a smaller bird with superior feed conversion⁽¹³⁾.

3.4 Australian Industry Overview –Meat Production

The Australian chicken meat industry has undergone enormous changes since its emergence as a specialist industry in the late 1950's. It has grown from an industry that produced approximately 3 million broilers in 1950-'51 to producing approximately 400 million broilers (approximately 570,000 tonnes dressed weight) annually⁽¹⁵⁾.

Poultry meat (of which chicken is ~95%) has now become the second most consumed meat in Australia (30.8 kg per person annually in 1998-99) with a gross value of \$1174.3 million ⁽¹⁴⁾.

There are 5 major chicken meat processors in Victoria (Bartter-Steggles, La Ionica, Hazeldenes, Inghams, and Baiada). Each of these organisations either own or directly control each stage of production from the breeding and hatching of chicks through to the processing and marketing of the final product ⁽¹⁴⁾.

3.5 Meat Producing Breeds of Poultry in Australia

In the early days of the commercial industry, most of the chickens used represented pure breeds or varieties. Today, in stark contrast, we see most of the genetics used in commercial egg and meat industries in Australia being various synthetic or hybrid lines of meat chickens. These are usually known by the name of the breeding company and a code which identifies its strain, such as 'Cobb 533', 'Ross 121', 'Lohmann 97'.⁽¹²⁾ There are currently two major genotypes used in the Victorian chicken meat industry. The two genotypes, the Ross bird and the Cobb bird, are derived from stock imported from the UK and the US respectively ⁽¹⁴⁾.

The important characteristics selected for in broilers are growth rate, feed conversion and carcass processing characteristics. The modern commercial broiler strains are capable of achieving liveweights of 2.8 kg at 49 days of age with feed conversion of less than 1.9 kg of feed per kg of liveweight ⁽¹⁴⁾.

Most of the meat breeds of chickens used in today's commercial breeding programs, have been developed using the following pure breeds:

New Hampshire, White Plymouth Rock, Cornish or Indian Game, Barred Plymouth Rock,
Light Sussex, Australorp, Rhode Island Red

3.6 Registration of Poultry in Australia

As mentioned, there is no registration process for pure poultry breeds in Australia and this makes it very difficult to identify the genetic integrity of the different breeds. Several breeds have strains, which can be verified as genetically true over a forty-year span, but these breeds are very few indeed. The Rare Breed Trust of Australia pilot scheme Australian Poultry Register should eventually rectify the problem of inadequate identification of genetically purebred poultry.

3.7 Breeds of Poultry and Waterfowl in Australia

Pure breeds of poultry are classified according to categories, (e.g. heavy breed, light breed) and sub categories (e.g. soft feather, hard feather). Breeds are then further categorized according to variations of colour- of which many exist.

A number of breeds have been modified in size over time to be represented as bantams – smaller versions of the original breed. Some breeds, such as the Japanese, Seabright and Rosecomb exist naturally as bantams and have no larger counterparts. Rare Breeds Trust of Australia currently only considers naturally occurring bantams in its priority listings as it does not consider created bantam breeds to be true examples of domestic farm livestock. This is a subject over which there may be some controversy.

It has long been a problem in Australia gaining access to accurate figures on numbers of purebred animals in existence. Breeders are often reluctant to provide true responses to surveys for fear of negative consequences to the information being provided. Two major reasons are:

1. Some small scale poultry keepers keep more birds than are specifically allowed under council regulations. Where this occurs, breeders will generally provide an underestimate of actual bird numbers kept for fear of reprisal.
2. Breeders are concerned that if they disclose details of the rarer breeds they keep, that these birds may be stolen.

These two factors are known to make it difficult to get accurate data on breed numbers.

Table 16 below lists each of the breeds currently known to exist in Australia, with all their colour variations. The list may be incomplete and requires more research. The list also does not in itself make any guarantee as to the purity of the birds purported to be in existence.

TABLE 16: BREEDS OF POULTRY AND WATERFOWL IN AUSTRALIA

Class	Breed- full size	Type/Colours	Breed-Bantam size	Type/Colours
Poultry				
Heavy Breed Hard Feathered	Australian Game	Black-red, blue-duckwing, Blue-red, Gold-duckwing, Partridge, Pile, Silver Duckwing, white	Australian Game	Black-red, Gold-duckwing, Silver Duckwing,
	Australian Pit Game	muffed	Australian Pit Game	muffed
	Indian Game	Dark, white	Indian Game	Blue-laced, Dark, white
			Jubilee Game	
	Jungle Fowl			
	Malay	Black-red, Buff, Duckwing, Pile, White	Malay	Black-red, Birchen, Pile,
	Modern Game		Modern Game	Black red, Birchen, Black, Brown red, Crele, Duckwing gold, Duckwing Silver, lemon blue, pile.
	Old English Game	Black red dark leg, Black red light leg, Blue red, Blue, Brown red, Crele, Duckwing blue, Duckwing gold, Duckwing silver, Ginger, Grey, Pile, Spangled,	Old English Game	Black red partridge dark leg, Black red partridge light leg, Black red Wheaten, Blue red, Blue spangled, Blue tailed wheaten, Birchen, Black, Blue, Brown red, Crele, Cuckoo, Duckwing blue, Duckwing gold, Duckwing silver, Pile, Spangled, White.
Heavy Breed Soft Feathered			Antwerp	Bearded
	Australorp		Australorp	
	Barnevelder	Dark	Barnevelder	
	Brahma	Dark, Buff Columbian, Light, Gold, White	Brahma	Dark, Buff Columbian, Light, Gold, White
	Cochin	Cochin buff	Cochin	
	Dorking	Silver, Silver grey,	Dorking	Silver
	Faverolles		Faverolles	
	Frizzle	Black, Blue, Buff ,Crele, Cuckoo, Duckwing, Lavender, Red,	Frizzle	Black, Blue, Buff ,Crele, Cuckoo, Duckwing, Red, white
	Croad Langshan	Black		
	Australian Langshan	Blue, Black, White	Australian Langshan	
	New Hampshire		New Hampshire	
	Orpington	Black, Blue, Buff, Cuckoo, White	Orpington	Black, Blue, Buff, Cuckoo, White
	Plymouth Rock	Barred, Dark, Dark barred, Light barred	Plymouth Rock	Barred, Dark, Dark barred, Light barred

Class	Breed- full size	Type/Colours	Breed-Bantam size	Type/Colours
			Pekin	Birchin, Black, Blue, Buff Columbian, Columbian, Cuckoo, Mealy grey, Mottled, Partridge, Splashed, Wheaten, White.
	Rhode Island	Red, Rosecomb, White	Rhode Island	Red, White
	Sussex	Lavender, Light, Silver, Speckled,	Sussex	Light, Silver, Speckled
	Transylvanian Naked Neck		Transylvanian Naked Neck	
	Wyandotte	Barred, Black, Buff, Columbian, Gold-laced, Golden Crele, Partridge, Red, Silver-laced, Silver-pencilled, White,	Wyandotte	Blue laced, Black, Blue, Buff, Buff-Columbian, Columbian, Cuckoo, Gold-laced, Golden crele, Partridge, Red, Silver-laced, Silver-pencilled, White,
Light Breed Soft Feathered	Ancona	Black	Ancona	Black
	Andalusian		Andalusian	
	Aracana	Black, Lavender, Partridge	Aracana	Black, Lavender, Partridge
	Barnevelder	Dark	Barnevelder	Dark
			Belgian Barbu d'Anvers	Mottled, quail, Quail blue, Blue, Cuckoo, Silver millefleur, White
			Belgian Barbu d'Uccles	Black, Blue, Lavender, Millefleur, Mottled, Porcelaine, Blue Quail, Cuckoo, Quail, Silver Millefleur, White
	Campine	Gold, Silver	Campine	Gold, Silver
	Hamburg	Black, Buff, Gold-spangled, Silver spangled	Hamburg	Black, Gold-pencilled, Gold-spangled, Silver penciled, Silver-spangled
	Houdan	Mottled, White	Houdan	
			Japanese	Black, Birchen or grey, Black tailed, Black Tailed white, Blue, Wheaten, White
	Leghorn	Blue red, Black, Blue, Brown, Buff, Cuckoo, Duckwing Gold, Duckwing Silver, Pile Red, White	Leghorn	Blue red, Black, Blue, Brown, Buff, Cuckoo, Duckwing Gold, Duckwing Silver, Pile Red, White
	Minorca		Minorca	Black, Blue
	Polish	Cuckoo, Frizzled black, Frizzled blue, Frizzled cuckoo, Frizzled gold laced, Frizzled Silver laced, crested mottled, Frizzled white crested blue, Gold laced, Silver laced, White crested mottled, White crested self, White frizzled	Polish	Frizzled Silver laced, Frizzled white crested black, Silver laced, White crested black
Class	Breed- full size	Type/Colours	Breed-Bantam size	Type/Colours
			Rosecomb	
			Seabright	Gold, Silver.

	Silkie	Bearded, Black, Blue, Buff, Partridge, Silver White,	Silkie	Bearded, Black, Blue, Buff, Partridge, Silver White,
	Spanish	Black, Blue, Cuckoo, Gold, Red, White	Spanish	Black, Blue, Cuckoo, Gold, Red, White
	Welsummer			
Ducks- Large	Aylesbury			
	Blue Swedish		Black East Indian	
	Campbell		Call	
	Cayuga		Chocolate bibbed	
	Crested			
	Elizabeth			
	Indian Runner			
	Mallard			
	Muscovy			
	Orpington			
	Pekin		Orpington	
	Rouen			
	Saxony			
	Silver Appleyard		Saxony	
	Welsh Harlequin		Silver Appleyard	
	African			
Geese				
	Chinese			
	Crested			
	Egyptian			
	Embden			
	Pilgrim			
	Pomeranian			
	Roman			
	Sebastopol			
	Toulouse			
Turkeys				

3.8 Basis for Defining Rare Breeds of Poultry

RBTA requires that poultry breeds can be shown to have existed continuously for 40 years. In the absence of registry records for poultry, RBTA recognizes breeds described in the current Australian Poultry Standards, and seeks to determine genetic purity by way of statutory declarations by breeders. Other breeds must have contributed less than 20 percent of the genetic makeup of the breed in the last six generations, and the parent breeds used in the formation of the breed must no longer be available in Australia for them to be considered as a rare breed.

Once the above four criteria are assessed and the breed determined to qualify, the rarity status of breeds of poultry and waterfowl is determined by applying the numerical basis in the table below:

TABLE 17: NUMERICAL BASIS FOR DEFINING RARE BREEDS OF POULTRY AND WATERFOWL IN AUSTRALIA

Critical	Fewer than 100 purebred breeding pairs
Endangered	Fewer than 200 purebred breeding pairs
Vulnerable	Fewer than 300 purebred breeding pairs
At Risk	Fewer than 500 purebred breeding pairs

Other factors used when assessing the rarity status of breeds of poultry and waterfowl include trends in breed numbers (e.g. are numbers decreasing rapidly?) and the proximity of distinct breeding groups (e.g. is the breed found in fewer than four distinct units, which are more than 100km apart?) and global populations (are there significant numbers of the breed overseas?). Answers to these questions may give the breed a higher priority within the list, or may even permit a breed that does not qualify otherwise to be included.

3.9 Endangered Breeds of Poultry and Waterfowl in Australia

The interest of the Trust is in purebred poultry for their utility qualities in meat and egg production and for the contribution they have made and can in the future make to the genetics of commercial poultry strains. Many show poultry breeders have a tendency to outcross to other breeds to reintroduce desirable characteristics (since they concern themselves more with the look of birds as opposed to ensuring their genetic purity). The Trust would have breeders breed for greater diversity amongst the available purebreds and then select from the offspring for show purposes without threatening the genetic integrity of flocks. This is not to deny that poultry clubs and associations, which focus on the showing of poultry, have played a large part in saving many breeds from extinction.

Several breeds have color varieties mentioned, as there can be some genetic make up difference even though the breed is identified under the same breed name. For example, the Sussex fowl has a Speckled variety which is genetically different from the more common Light Sussex.

Whilst, in the main, only true bantams (breeds where there is no large type, like the Sebright) are listed, there are still some listed colors of the Old English Game (OEG) and others where they have some value in the show scene of the past and the present day.

There is a growing trend to introduce table geese to restaurant menus and this might improve numbers for some of the larger geese like the Embden and Toulouse. The popularity of several turkey varieties in North American, like the Bourbon Red, through listing on the Slow Food initiative Ark of Taste, is fanning Australian interest in such non-commercial varieties of turkeys. The RBTA has recently begun a turkey interest group, which is fostering the breeding of old turkey breeds for the table.

Of the four pure bred poultry which have been uniquely created in Australia (Australorp, Australian Game, Australian Pit Game and Elizabeth duck), all except the Australorp are in small numbers and need special attention to ensure they survive as much for their Australian heritage significance as for their utility qualities. The table below lists minor breeds of poultry and waterfowl that are currently in Australia. **Breeds/strains shown in bold and underlined are Australian creations.**

TABLE 18: ENDANGERED BREEDS OF POULTRY AND WATERFOWL IN AUSTRALIA

	<i>Turkey Varieties</i>	<i>Breeds of Geese</i>	<i>Duck Breeds</i>	<i>Poultry Strains (> 40years).</i>	<i>Poultry Breeds/Strains not known to be >40 years *</i>
Status	Breed	Breed	Breed	Breed	Breed
Critical Fewer than 100 breeding pairs	Black Narragansett Royal Palm Bourbon Red White (Other than commercial)	African Chinese (white) Crested Roman Pilgrim Pomeranian Sebastapol	Aylesbury Black East Indian Campbell (dark) Crested Indian Runner (varieties other than white or fawn & white) Orpington (buff) Saxony Welsh Harlequin	Campine, John Hobbs Strain <u>Australorp, Judson Strain</u>	<u>Standard Soft Feather</u> Australorp (white) Autosexing Breeds Hamburgh (penciled) Langshan(Croad) Orpington (white) Plymouth Rock (other than barred) Plymouth Rock (light barred) Spanish Red Sussex <u>Standard Hard Feather</u> Malay Game Red Jungle Fowl
Endangered	Slate	Exhibition Toulouse	Blue Swedish Campbell (white) Cayuga <u>Elizabeth</u> Muscovy (other than white or black & white) Silver Appleyard	Leghorn, White CSIRO Strain	<u>Standard Soft Feather</u> Ancona Andalusian <u>Australorp (blue)</u> Campine Silver Grey Dorking Faverolles (Salmon) Hamburgh (gold spangled) <u>Langshan, Australian (blue, white)</u> Leghorn (pile, buff, duckwing) Orpington (black) Polish Rhode Island (rosecomb, white) Silkie (other than black, white) Sussex (speckled) Transylvanian Naked Neck Wyandotte (buff, Columbian, crele, gold-laced) <u>Standard Hard Feather</u> <u>Australian Game</u> <u>Australian Pit Game</u> Old English Game (black-red L/L, partridge L/L, partridge D/L, pile L/L, pile D/L) Phoenix <u>Bantam Soft Feather</u> Pekin (birchen, brown-red, cuckoo) Sebright Rosecomb (other than black)

TABLE 18: ENDANGERED BREEDS OF POULTRY AND WATERFOWL IN AUSTRALIA continued

	<i>Turkey Varieties</i>	<i>Breeds of Geese</i>	<i>Duck Breeds</i>	<i>Poultry Strains (> 40years).</i>	Poultry Breeds/Strains not known to be >40 years *
Status	Breed	Breed	Breed	Breed	Breed
Vulnerable	Bronze	Chinese (brown) Embden Toulouse	Indian Runner (fawn & white) Rouen Campbell (khaki) Muscovy (white, black & white) Pekin	Bronze turkey, King Island strain	<u>Standard Soft Feather</u> Araucana (Lavender strain) Barnevelder (doubled laced) Frizzle Hamburgh (black, silver spangled) Leghorn (brown, black, blue) New Hampshire Orpington (blue & buff) Welsummer Wyandotte (partridge, pencilled) <u>Standard Hard Feather</u> <i>Indian Game (Jubilee)</i> <u>Bantam Soft Feather</u>

Watch: Barbu d' Anvers (other than quail, lavender, black) Barbu d' Uccle (other than millefleur & porcelaine) Barbu d' Watermeal, Pekin (varieties other than black, white, blue and buff and those listed under *Rare* and *Vulnerable*)

* Only True Bantams, those which have no large counterpart, are included in these lists)

3.10 Conclusion

Hybrid cross-bred genetics currently dominate in both commercial egg laying and broiler production systems in Australia. Accurate statistics regarding the numbers of breeds of purebred poultry and waterfowl in Australia are not available, however best estimates would suggest that whilst about 8 commercial hybrid breeds are responsible for 95% of Australia's egg and broiler production, around 100 distinctly different breeds produce less than 5%.

There is currently no breed registry to consult for accurate numbers of birds in any poultry breed. Poultry clubs stand to be the best source of information in the future, however before breeders will respond meaningfully to surveys, they need to feel that providing accurate information will benefit them and not damage their current circumstances in any way.

Building an ongoing data file is imperative for Australia to effectively track changing breed numbers and monitor the viability of remnant breed populations. A national audit of breeds of poultry and waterfowl in Australia is urgently needed. Once a complete picture of the state of these breeds is determined, a strategy needs to be devised to determine:

- which breeds are of greatest significance for preservation
- how these breeds can best be secured.

One of the great benefits for the ongoing survival of most breeds of poultry and waterfowl is in their relatively small size. Unlike pig, sheep, cattle and horse breeds which require their keepers to be physically fit and have access to large landholdings, poultry breeds can be kept in most environments including suburban backyards. Birds can be easily managed by the young or the elderly. They provide regular rewards through their eggs or meat and the wide range of breeds and types provides the opportunity for a healthy and manageable pastime or hobby to develop. We should not underestimate the strength of this as we work to secure the diversity of breeds of poultry and waterfowl in Australia.

Chapter 4

Cattle Breeds in Australia

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June 2004

4.1 Executive Summary – Cattle

Cattle are important to Australia with the beef industry ranking as the leading rural industry with a GVP of \$4.8 billion including live cattle exports. The dairy industry ranks as the third most important rural industry to the nation with sales worth \$2.8 billion at the farm gate in 2002/03. Both industries are major contributors to the Australian economy.

There are at least seventy different breeds of cattle in Australia across both industries with recognized registration bodies for all but seven breeds. Purebred cattle are a majority in both beef and dairy enterprises, although a number of the recognized breeds (around 32%) are stabilized composites of two or more other breeds.

With 70% of all Australian dairy farms practicing herd recording, informative data is more readily available for dairy breeds than for other species. Australian Dairy Herd Improvement Service records have recently been analysed and confirm the increasing level of inbreeding occurring in the Holstein-Friesian breed. The rate at which this level of inbreeding is occurring is largely attributable to the practice of artificial insemination and the widespread use of a small selection of high performing sires.

Although Australian rates of inbreeding are well below Canadian and American equivalents, a strategy needs to be defined to manage the rate of increase so that inbreeding continues to be contained within acceptable limits. Canadian and American dairy breeds are already close to reaching levels where inbreeding depression is known to occur. There has been a move towards using US Holstein genetics in Australian herds over the past ten years. As a consequence, the top 5 sires in Australian Holsteins are now US bred and together constitute 30% of the Australian Holstein gene pool. These statistics are of concern when you consider the speed at which inbreeding can occur.

It is likely that similar trends are being experienced across other cattle breeds however it is difficult to predict the extent of the inbreeding without adequate data. Establishing monitoring processes across all cattle breeds in Australia should be a priority.

4.2 Industry Overview – Beef Cattle

In 2000 Australia had 24.4 million head of beef cattle of which 12.3 million were beef cows and heifers. These cattle were run over 76,662 properties suggesting an average herd size of 318 animals (15).

The beef industry is the most important rural industry to Australia with a GVP of \$4.8 billion including live cattle exports of around \$479 million (ABARE 2000). This makes Australia the largest exporter of beef in the world. Approximately 66% of Australia's total beef production is being exported and the total value of exports in 2000 was approximately \$3.5 billion.

The states with the largest populations of beef cattle are Queensland (11.5 million), NSW (5.5 million), Victoria (2.4 million), WA (2.1 million), SA (0.995 million), and Tasmania (0.411 million).

The Australian climate varies dramatically between north and south and the breeds of cattle vary accordingly. In the northern states and territories, *bos indicus* cattle thrive in the tropical and sub tropical climates. In the more southern temperate states, *bos taurus* breeds dominate. Over the evolution of the industry in Australia, crosses between *bos indicus* and *bos taurus* breeds have led to the introduction of a number of composite breeds that have become stabilised and widespread.

4.3 Industry Overview – Dairy Cattle

The Australian dairy industry is the third most important rural industry valued at \$2.8 billion at farm gate in 2002/03. Although Australia produces only 2% of the world's milk, it ranks third in terms of dairy trade accounting for 17% of all dairy product exports. More than half of the milk produced on Australian dairy farms is exported to more than 100 countries around the world (15).

The Australian dairy industry is predominantly pasture-based with approximately 80% of feed requirements coming from grazing. Feedlot dairying remains unusual in Australia, although the use of supplementary feed, with hay, silage and grains is becoming increasingly widespread (15).

The industry has undergone dramatic change over the past twenty years with average herd sizes increasing from 85 cows in 1980 to an estimated 195 cows in 2002/03. Australian dairy farmers have been operating in a completely deregulated industry environment since 2000. In a recent international cost-of-production study, Australian dairy farmers were in the lowest cost category of all farms participating in the survey (15).

Approximately 70% of Australian dairy farms practice herd recording and genetic evaluation is conducted by the Australian Dairy Herd Improvement Service (ADHIS). Improvements in herd genetics as well as advances in pasture management and supplementary feeding regimes have seen average annual yields per cow increase from 2,850 litres to over 4,800 litres over the past two decades.

4.4 Total Numbers of Cattle in Australia

In the 2000 there were 14.5 million cows and heifers in Australia comprising 12.3 million beef cows and 2.2 million dairy cows. By 2003 following drought, the national dairy herd had dropped to 2.1 million cows.

4.5 Inbreeding Within Cattle Breeds

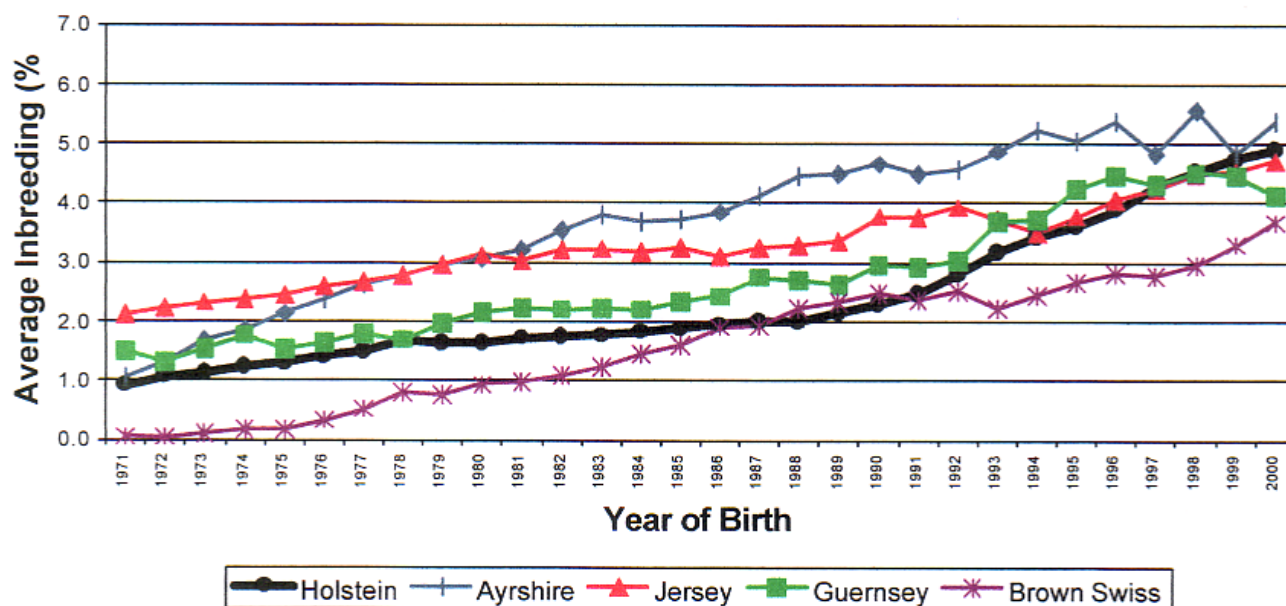
Extensive data available from the Canadian Dairy Network reveals that levels of inbreeding have been on the rise in Canada across all dairy breeds over the past 35 years (18).

The Canadian data plots inbreeding levels across 5 dairy breeds. Average percentage inbreeding coefficients for 2002 (not shown in the data below) ranged from the lowest, 2.07 in Milking Shorthorn, to the highest, 7.75 in the Canadienne. Holstein cattle in Canada recorded percentage inbreeding levels of 4.91 in the same year.

TABLE 19: THRITY YEAR TREND IN INBREEDING FOR THE FIVE MAIN DAIRY BREEDS IN CANADA.

(source Canadian Dairy Network)

Inbreeding Trends in Canada



Generally, high inbreeding coefficients cause depressed performance of reproduction, lactation and growth. The Canadian Dairy Network goes on to state, “Unless specifically intended, matings that result in inbreeding levels greater than 6.25% are not recommended in order to maintain reasonable levels of inbreeding in a herd or population” (18).

This data raises questions about the level of inbreeding in dairy (and other) breeds in Australia. Australian data is not as complete as Canadian and US data and has not been available until this year. Man (2004) found that the levels of inbreeding in Australian Holstein-Friesians increased slowly in the 1970’s and 1980’s, but increased more dramatically in the 1990’s (20). The kinship has increased more rapidly due to the intense use of particular sires or sire families (which were firstly composed of a large influx from Canada, and then from the USA). As these sires were relatively unrelated to the Australian dam population in the 1970’s and 1980’s, it meant that the percentage inbreeding did not really increase as much as the relationship (or kinship) between cows(20).

The Australian data is difficult to analyse due to the complexity of the pedigrees available. USA and Canadian populations show higher inbreeding estimates and this is, in part, because of the depths to which their pedigrees trace. It is likely that Australian inbreeding levels may be slightly higher than is being expressed in the current data.

The trends are consistent across Australian, Canadian and American data with all showing increasing levels of inbreeding over time.

TABLE 20: TREND IN THE AVERAGES OF OVERALL INBREEDING AND KINSHIP IN AUSTRALIAN HOLSTEIN-FRIESIAN COWS

(source: Mann, W.Y.N (2004) Pedigree Analysis of Holstein Friesians in Australia)

The orange line shows the average overall inbreeding in each year of birth of NASIS-sired cows with known parents

The red line shows the the same for non-NASIS-sired cows.

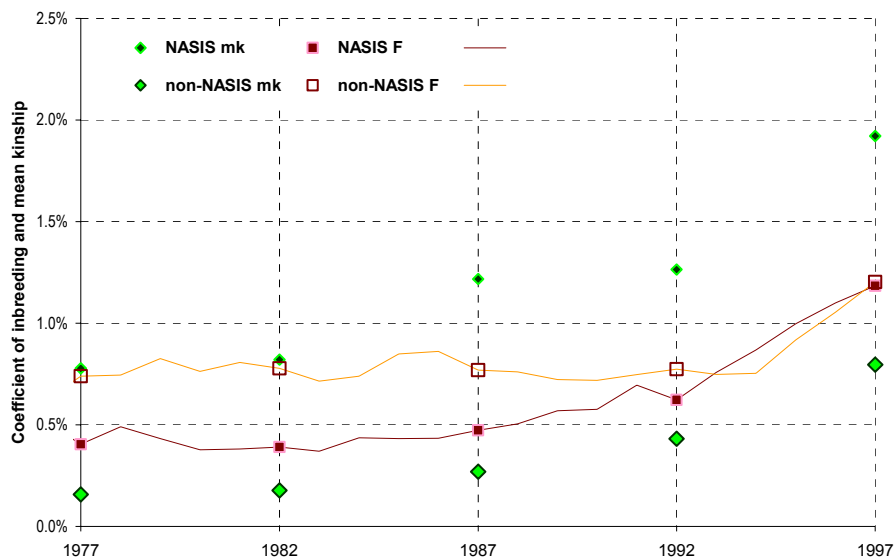
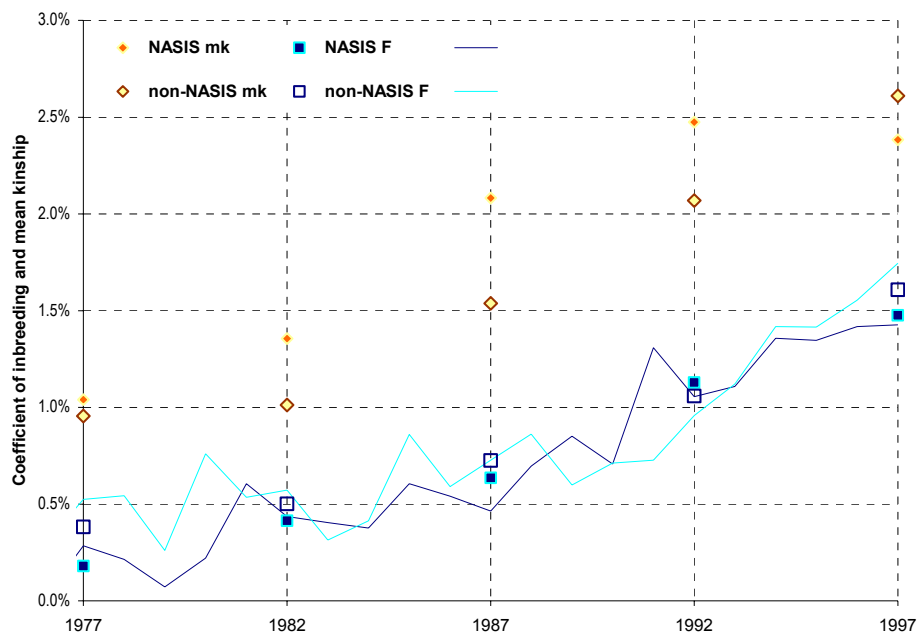


TABLE 21: TREND IN THE AVERAGES OF OVERALL INBREEDING AND KINSHIP IN AUSTRALIAN HOLSTEIN-FRIESIAN BULLS

(source Mann, W.Y.N (2004) Pedigree Analysis of Holstein Friesians in Australia)

The dark blue line shows the average overall inbreeding in each year of birth for NASIS bulls with known parents

The light blue line shows the same for non-NASIS bulls



In 1996, Young and Seykora (19) reported that two Holstein sires (Pawnee Farm Arlinda Chief and Round Oak Rag Apple Elevation) accounted for 25% of all genes segregating in US registered Holstein cattle in 1990.

Throughout the 1970's in Australia, the majority of prominent ancestors were born in Australia, with a significant proportion of the rest coming from two Canadian ancestors. Since that time, there has been sequential introgression of prominent ancestors from the USA, so that by 1997, the top five Holstein ancestors in Australia were US bulls that together make up for 30% of the Australian Holstein gene pool. (20). Ancestors with large genetic contributions accounted for 80-90% of the inbreeding in the population. To date, the replacement of Australian Holstein genes with overseas genes has not had an unduly disadvantageous effect on genetic variation in Australian Holstein Friesians. The continued concentration on a small number of sire families could be cause for concern (20).

Man's analysis of pedigree data for Holstein Friesian cattle in Australia has shown the impact of artificial insemination in the population.

The data showed the relative contributions from sires and dams. Highly prolific sires (those with more than 99 progeny) produced almost 2.9 million progeny which equates to more than two-thirds of the entire dairy population recorded in the ADHIS database. In contrast to the bulls, the maximum number of progeny from a cow, (which was born in 1993), was only 50, and such a number is only achievable with multiple ovulation and embryo transfer (MOET).

The key question is how long this increasing inbreeding trend can be sustained before inbreeding depression becomes evident?

Some geneticists believe that commercial Holstein farmers will, like the pig industry, be crossbreeding within 10-20 years.

4.6 Dairy Breeds of Cattle Existing in Australia

Relative numbers of dairy breeds have been assessed using the ADHIS industry statistics. These statistics are from the 70% of dairy herds which participate in herd recording schemes and are indicative of the likely breed breakdowns across the broader industry.

If we apply to the total dairy population the percentages for all dairy breeds recorded, the approximate breed numbers would be as shown in the table below:

TABLE 22: ESTIMATED DAIRY BREED NUMBERS IN AUSTRALIA

Breed	Average Number of Cows #	Average %	Extrapolated Estimate of Cow Numbers 2003
Holstein	629183	70%	1,456,878
Jersey	88324	10%	204,550
Unknown	118243	13%	274,251
Holstein/Jersey cross	37588	4%	87,085
Illawarra	10702	1%	24,671
Ayrshire	6851	1%	15,792
Australian Red Breed	5671	1%	13,167
Guernsey	3873	0%	8,929
Brown Swiss	2869	0%	6,677
Dairy Shorthorn	601	0%	1,384
Simmental	336	0%	777
Australian Friesian Sahiwal	141	0%	325
Commercial dairy	101	0%	227
Australian Milking Zebu	74	0%	170
Red Poll	35	0%	79
Meuse-Rhine-Issel	17	0%	38
Total	904607		2,095,000

These cow numbers are an average of three years data between 1999 – 2003.

Of the 14 breeds known to exist on dairy farms in Australia, Holstein-Friesian cattle are the predominant breed accounting for approximately 70% of all dairy cattle. Jerseys make up 10% of the national dairy herd, 13% are of unknown breeding, and 4% are Holstein/Jersey cross cattle (22). This means that 14% of the diversity of dairy breeds in Australia (2 out of 14 listed breeds/breed conjugates) represents as much as 80% of the total national dairy herd. Conversely, as much as 86% of the diversity of dairy breeds in Australia (twelve breeds) represents a mere one fifth of the national herd and many of these breeds are in very low numbers. Two breeds, the Australian Friesian Sahiwal (AFS) and the Australian Milking Zebu are in falling numbers and are of concern to RBTA as locally developed breeds.

The AFS was developed by the Queensland government in the 1960s at a reputed cost of \$30 million. In 1994 the QDPI sold all AFS livestock, semen and embryo's and handed it over to industry for continued commercial development. Today, 10 years later, over 95% of the genetics is controlled by one business. The breed continues to be exported to a range of tropical countries including Mexico, Brunei, Philippines, Nicaragua, Thailand, India, Bangladesh, Sri Lanka, Malaysia, El Salvador, and Panama. Mexico has the largest breeding population with an estimated 1,000 purebred animals and 7,000 derivatives in the process of grading-up to pure bred. Only 250 purebred animals remain in Australia. They are owned exclusively (with a few isolated exceptions) by one commercial genetics business that describes the breed as "meeting a small industry niche".

Similarly, the Australian Milking Zebu, which was developed in Australia in the 1950s by CSIRO, is now in rapid decline. The ADHIS statistics show only 63 AMZ animals were herd tested in Australia in 2002/03. The Australian Milking Zebu Breed Society has become inactive and animals are becoming difficult to locate. With a predominantly temperate-climate dairy industry in Australia and the increasing pressure on Australian dairy farmers to become more efficient producers, there is declining role for the AMZ in Australia. Its future role in other tropical countries will depend largely on how we manage the remaining seed-stock in Australia. 120 embryos and semen are currently held by the same seed-stock genetics business that holds the AFS. It would be a tragedy to lose the century of combined breeding selection of the AMZ and AFS breeds through a laissez-faire approach. In reality, it may already be too late for the AMZ.

One can only question how it came to be that genetic resources developed over so many years with governmental foresight, vision, and support came to be the commercial property of a single entity. The exclusive ownership of any individual breed is a subject of great concern to RBTA and warrants serious investigation and review. The aim of such a review would not be to destabilize the commercial opportunities in limited niche markets (these niche markets play

an important role in aiding the breeds' ongoing existence). The aim of such a review would be to secure affected breeds and their genetic assets from the risks associated with limited availability.

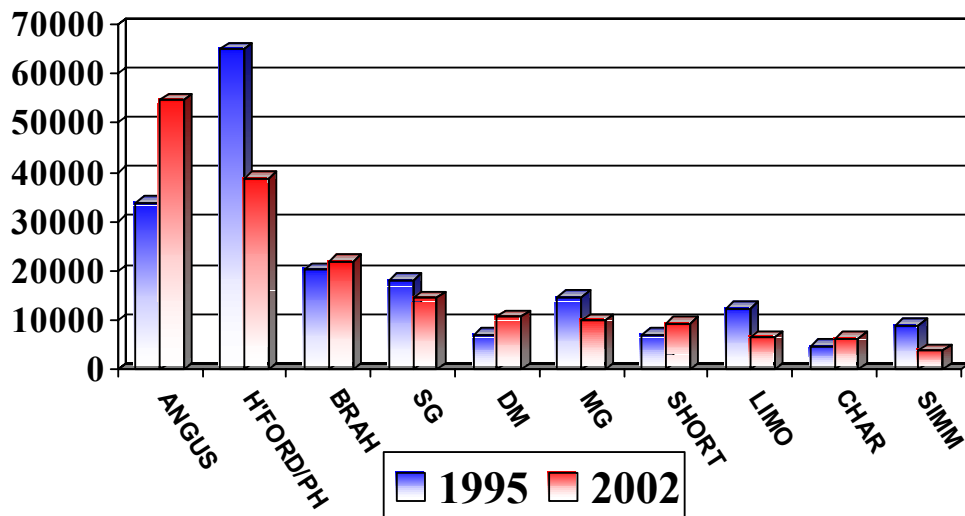
4.7 Beef Breeds of Cattle Existing in Australia

Around 25% of all pure beef breeds in Australia are Hereford. In addition, there is Hereford influence in over 50% of all crossbred beef cattle (17). Angus cattle have continued in their popularity over the past decade with calf registrations increasing 129% between 1990 (24,401 calf registrations) and 2003 (55,837 calf registrations) (21).

The table below shows the changes in registration numbers across 10 beef breeds. Annual registrations for half of the breeds: Angus, Brahman, Droughtmaster, Shorthorn and Limousin, have increased in number over the 7 years between 1995 and 2002. The other 5 breeds have all experienced declining registrations.

TABLE 23: BEEF BREED REGISTRATIONS IN AUSTRALIA 1995 AND 2002

(SOURCE: Australian Registered Cattle Breeders Association)



Together, the British breeds: Angus, Hereford and Poll Hereford, Shorthorn and Murray Grey cattle account for 57.1% of all beef cattle registrations in Australia. Tropical breeds: Brahman, Droughtmaster and Santa Getrudis cattle account for 19.3% of all beef cattle registrations. European breeds: Charolais, Limousin and Simmental account for 12.3% of all beef cattle breed registrations. The remaining 11.3% of beef cattle registrations are made up from 25 different breeds. An estimated 22 other beef breeds exist in Australia but either no longer run a stud registry or are not members of ARCBA. Ascertaining details of some of these breeds needs to be a priority to determine their numerical and genetic status.

The tables below show the changing registration patterns across the three classes of beef cattle in Australia: British, Tropical and European breeds.

TABLE 24: BEEF CATTLE REGISTRATIONS – BRITISH BREEDS

(SOURCE: Australian Registered Cattle Breeders Association)

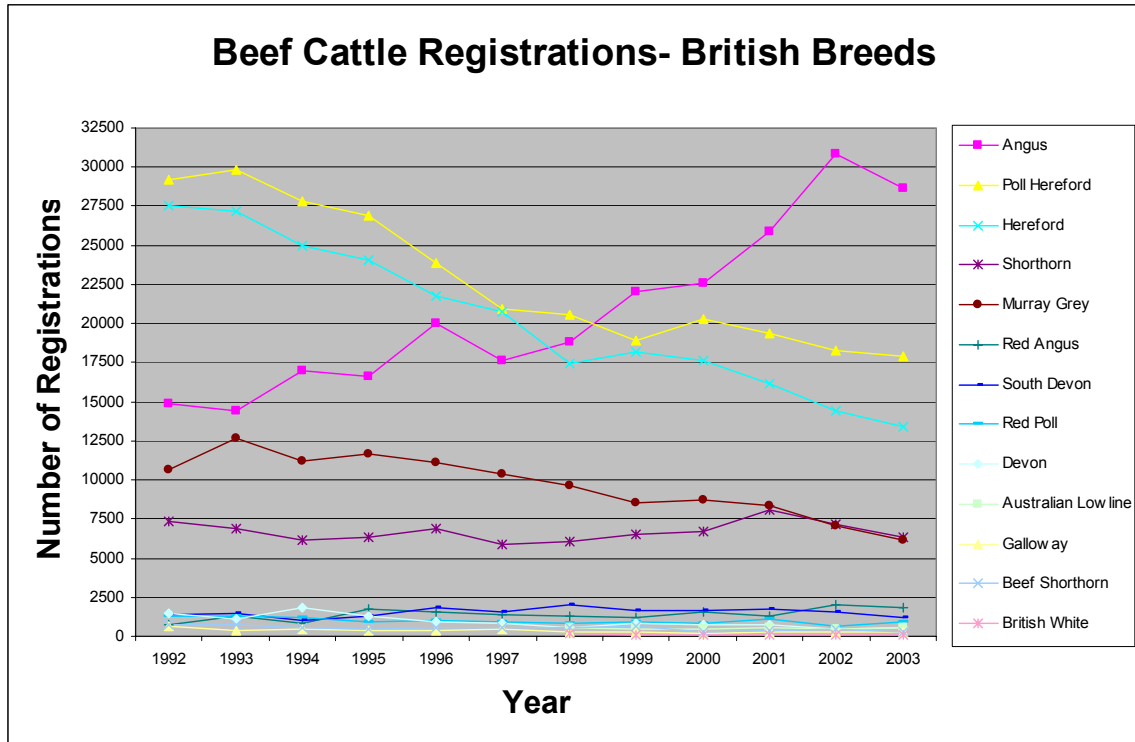


TABLE 25: BEEF CATTLE REGISTRATIONS – TROPICAL BREEDS

(SOURCE: Australian Registered Cattle Breeders Association)

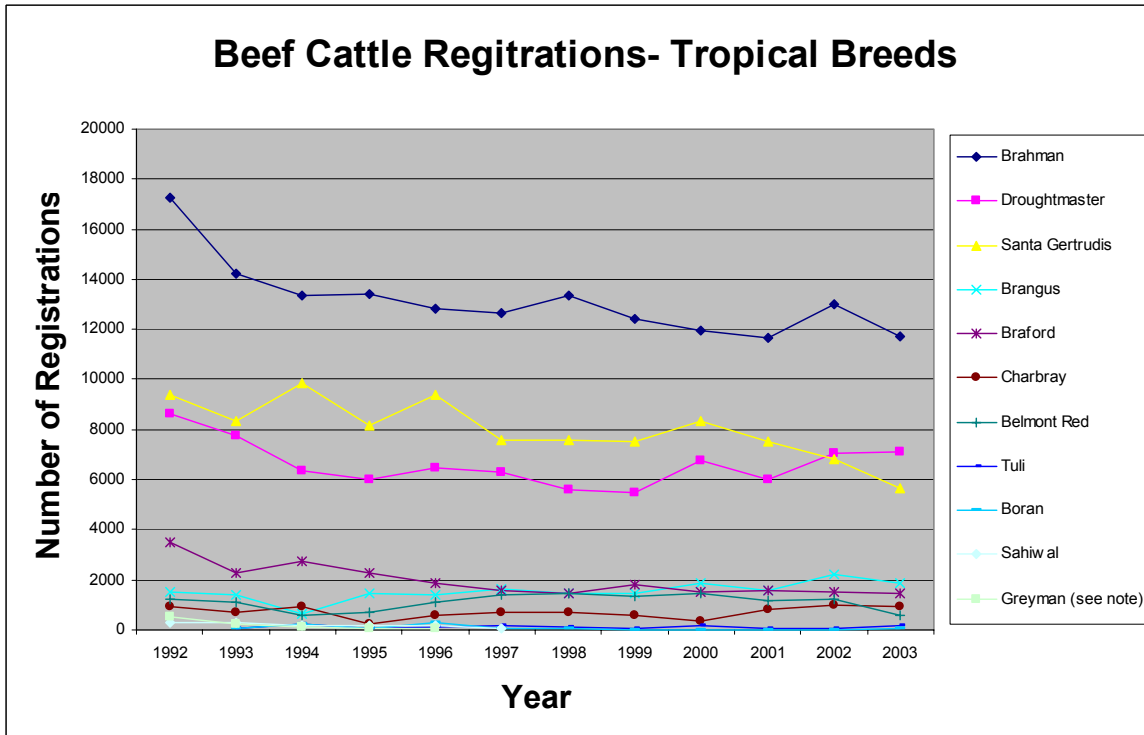
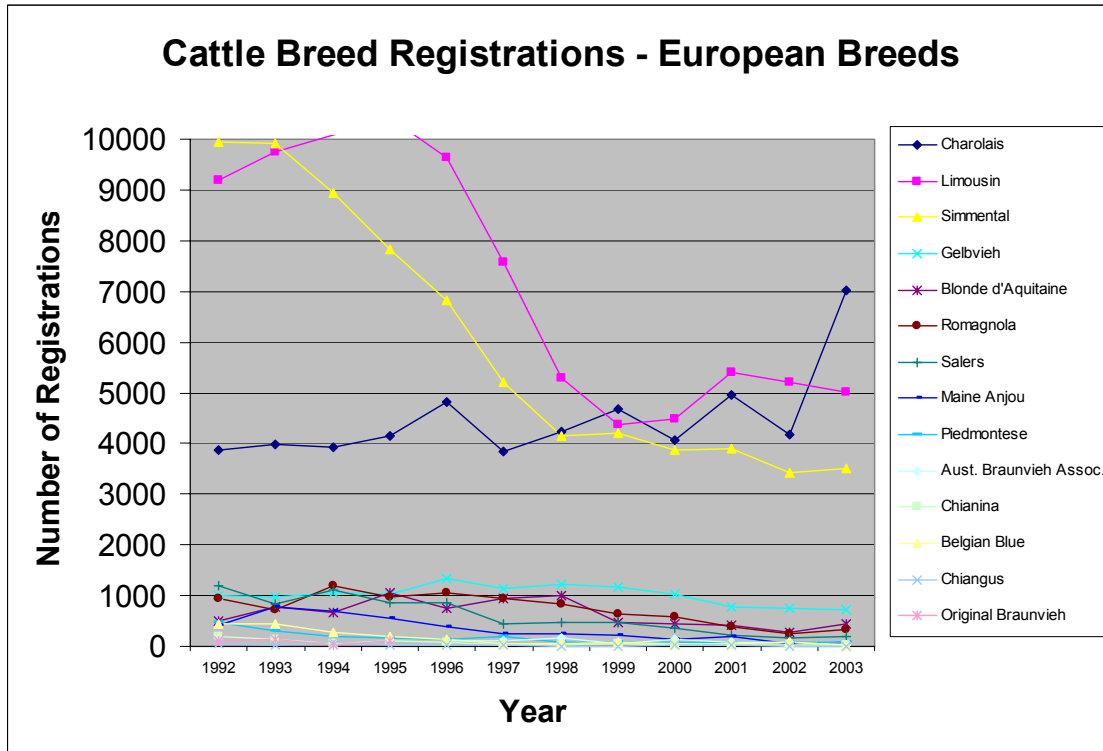


TABLE 26: BEEF CATTLE REGISTRATIONS – EUROPEAN BREEDS
(SOURCE: Australian Registered Cattle Breeders Association)



4.8 Endangered Breeds of Cattle in Australia

The following list of cattle breeds in Australia fit the criteria for being listed as rare. As such they require special consideration to ensure their ongoing survival. The listing is incomplete at this stage.

Status	Breed
CRITICAL < 25 annual female registrations	<ul style="list-style-type: none"> • White Park • British White • <u>Australian Milking Zebu</u> • <u>Belmont Adapteur</u>
ENDANGERED <75 annual female registrations	<ul style="list-style-type: none"> • Traditional Hereford • Traditional Angus • Traditional Dairy Shorthorn
VULNERABLE < 250 annual female registrations	<ul style="list-style-type: none"> • English Longhorn • <u>Australian Friesian Sahiwal (AFS)</u>
AT RISK <750 annual female registrations	<ul style="list-style-type: none"> • Devon (548 reg in 2003) • Galloway (313 reg in 2003) • Beef Shorthorn (255 reg in 2003) • <u>Belmont Red (580 reg in 2003)</u> • Red Poll (877 total reg in 2003)

Although Hereford and Angus cattle are mainstream beef breeds in Australia, most of today's existing animals are suspected to have experienced introgression from other breeds. Finding traditional animals which have not had other breeds infused into their genetic makeup is a priority for Rare Breeds Trust of Australia. Traditional Angus cattle are currently listed as critically endangered by the Rare Breeds Survival Trust in their country of origin. Traditional

Hereford cattle are classed as Vulnerable. Shorthorn breeds, both dairy and beef, also need to be assessed as they too are believed to have significant genetic introgression from other red and white breeds.

Both the Australian Milking Zebu (AMZ) and the Australian Friesian Sahiwal (AFS) are Australian derived breeds. The AMZ is currently being bred in very small numbers in Australia and the AMZ breed society has become inactive. Remaining genetics for the breed - 1200 frozen embryos (36) are being held by one company. The AFS has proven itself to be a successful breed with sales of progeny to Mexico, Thailand, Bangladesh, Malaysia, Sri Lanka, Vietnam, El Salvador, Panama, Nicaragua and Brunei. An extensive upgrading program is currently in place in Mexico with around 1000 purebred AFS and about 7000 AFS derivatives. In Australia there are only 250 purebred animals and about 2000 derivatives, and these are used in the breeding up program for sale to other countries. The Queensland government is reputed to have spent over \$30 million dollars developing the breed in Australia, but handed over the program to industry for continued commercial development in 1994. It is estimated that over 95% of the remaining AFG genetics in Australia is now owned by one company.

4.9 Conclusion

Cattle genetics in Australia are still largely based on pure breeds. Over the past 100 years, some 12 new composite breeds have been developed, stabilised and locally adapted to Australia's range of unique tropical, sub-tropical and temperate environments. Some of these breeds have already fared well and are present in large numbers. The Murray Grey is a fine example of a breed which has become popular not only in Australia, but in many countries around the world. Other breeds, such as the Square Meaters are not yet ten years old and are still to be fully proven.

Key issues which are threatening the future of pure cattle breeds in Australia are:

- The loss of genetic integrity of the traditional pure breeds through introgression from other breeds (e.g. Angus, Shorthorn and Hereford)
- The narrowing of the genetic base of breeds through increased levels of inbreeding and kinship (e.g. Holstein, Ayrshire and 'commercial' Angus)
- Leaving the future of Australia's genetic resources entirely up to the forces of the commercial genetics marketplace.

Controlled-breeding techniques such as artificial insemination and embryo transfer are useful tools at our disposal. Like any tool, they need to be used wisely. Artificial insemination has been in part responsible for average annual milk yields per cow increasing from 2,850 litres to over 4,800 litres over the past two decades in the dairy industry. It is also responsible for contributing to an increase in the level of inbreeding in our herds. We need to manage our strategic breeding decisions very carefully and leaving these decisions up to the commercial marketplace is not a sound strategy for the future of our animal industries. Determining a sound strategy for the future of Australia's animal genetic resources needs to become an immediate priority.

TABLE 27: BREEDS OF CATTLE IN AUSTRALIA

No.	Breed	Developed by &/or country of origin	Imported to Australia	Parent breeds	Distribution in Australia	Breed Society in Australia
<u>1</u>	<u>Adapteur (Belmont Adapteur)</u>	<u>CSIRO Belmont station</u>	<u>1950's</u>	<u>Hereford X Shorthorn</u>	<u>Central Queensland</u>	<u>Adapteur Association of Australia "Boxvale", Builyan, Qld. 4680</u> <u>ph (07) 4974 1163 fax (07) 4974 1343</u>
2	Africander (Afrikaner)	South Africa	1950's		Queensland	
3	Angus (Aberdeen Angus)	Scotland	1820's		All over, but mainly in southern temperate zones	The Angus Society of Australia Locked Bag 11, Armidale, NSW. 2350 Ph (02) 6772 3011 Fax (02) 6772 3095 www.angusaustralia.com.au
<u>4</u>	<u>Australian Friesian Sahiwal</u>	<u>ODPI, Australia</u>	<u>1960's</u>	<u>Holstein Friesian X Sahiwal</u>	<u>Tropical areas of NT, northern WA and northern Qld.</u>	<u>AFS Cattle breeders Association of Australia Inc. 157 Burbong St, Chapel Hill, Q. 4069</u> <u>(07) 3378 4258</u> <u>www.afstropicaldairybreed.org</u>
<u>5</u>	<u>Australian Milking Zebu (AMZ)</u>	<u>CSIRO, Australia</u>	<u>1950's</u>	<u>Sahiwal & Sindhi X HF&Jersey&Guernsey & Illawarra & Ayrshire</u>	<u>Old & NSW</u>	<u>The AMZ Breed Society (since 1970)</u> <u>c/o AFS Cattle Breeders Association of Aust.Inc. 157 Burbong St, Chapel Hill, Q. 4069</u> <u>(07) 3378 4258</u> <u>www.afstropicaldairybreed.org</u>
<u>6</u>	<u>Australian Red Dairy Breed (Aussie Red)</u>	<u>Sweden/Norway/Denmark/Germany</u>	<u>1985</u>		<u>Vic, NSW, SA, WA, Old, Tas</u>	<u>Australian Red Dairy Breed Inc 44 Ferguson Cres, Deakin, ACT.2600</u> <u>ph (02) 6273 4088</u> <u>www.austredbreed.une.edu.au</u>
7	Ayrshire	Scotland	1848		NSW, Vic, Qld, SA, Tas, WA.	Ayrshire Australia Ltd (1891) PO Box 189 Kiama, NSW 2533 Ph (02) 4232 3333 F (02) 4232 3350 Australian Ayrshire Breeders Ass. Inc (late 1970's) Roya Showgrounds, Epsom Rd. Ascot Vale, Vic 3032 Ph (03) 9281 7556 F (03) 9376 2973 www.ksrcl.com.au
8	Bazadaise	France (south of Bourdeaux)	1991		Tas, Vic, NSW, Qld NT, SA	Bazadaise Breeders of Aust. Assoc. Inc. (1994) PO Box 54 Grantville, Vic 3984. Ph (03) 5678 8366 F (03) 5678 8247 www.bazadaise.com.au

No.	Breed	Developed by &/or country of origin	Imported to Australia	Parent breeds	Distribution in Australia	Breed Society in Australia
9	Beefmaker	NSW, Australia in 1972		75 % Hereford X 25% Simmental		
10	Beef Shorthorn	Northern England	1825		Vic, SA, Tas, NSW, southern Qld, WA ACT, NT	Beef Shorthorn Society of Australia (1920) Private Bag 2020 Box Hill, Vic 3128 Ph(03) 8800 3233 F(03) 9890 1379 www.beefshorthorn.org.au
11	Belgian Blue	Ardenne Hills region of Belgium	1988		Vic (mainly)	The Australian Belgian Blue Cattle Society (1988) PO Box 575 Berwick, Vic 3806. Ph/fax (03) 5629 2560 www.allbreeds.info/australian_belgian_blue
<u>12</u>	<u>Belmont Red</u>	<u>CSIRO Belmont, Australia</u>	<u>1954</u>	<u>50% Africander X 25% Shorthorn X 25% Hereford</u>	<u>Old, NSW, WA, Vic</u>	<u>Belmont Red Assoc of Australia (1979)</u> <u>PO Box 990 Armidale NSW 2350</u> <u>Ph (02) 6772 7720 F (02) 6772 9599</u> www.belmontred.com.au
13	Belted Galloway	South west Scotland	1950's from NZ		SA, NSW, Vic, Tas, Qld, WA	Australian Belted Galloway Assoc. Inc. (1975) Kiama Stud Registration Centre Ltd PO Box 189 Kiama, NSW 2533 Ph (02) 4232 3333 F (02) 4232 3350 www.beltedgalloway.com.au
14	Blonde d'Aquitaine (Blondes)	South west France	1972		All over Australia	The Blonde d'Aquitaine Society of Australia and New Zealand ABRI, UNE. Armidale, NSW. 2351 Ph (02) 6773 2393 F (02) 6772 1943 http://blondes.une.edu.au
15	Bonsmara	South Africa	1998	3/8 Shorthorn-Hereford 5/8 Africander	Qld, NSW	Bonsmara Cattle Breeders Society of Australia Inc. (2000) PO Box 990 Armidale, NSW 2350 Ph (02) 6772 7720 F (02) 6772 9599
16	Boran	Southern Ethiopia, Africa	1990		Qld, NSW	Boran Association of Australia Inc. PO Box 18 Jambin, Qld, 4702 Ph (07) 4996 5245 F (07) 4996 5362
<u>17</u>	<u>Braford</u>	<u>Old, Australia</u>	<u>1940's</u>	<u>Brahman X Hereford</u>	<u>Old, NSW mainly</u>	<u>Australian Braford Society Inc (1962)</u> <u>PO Box 749 Rockhampton, Qld.4700</u> <u>Ph (07) 4927 5196 F (07) 4927 5708</u> www.braford.org.au

No.	Breed	Developed by &/or country of origin	Imported to Australia	Parent breeds	Distribution in Australia	Breed Society in Australia
18	Brahman	USA	1933		Qld, northern NSW, WA, NT (Vic)	Australian Brahman Breeders Association PO Box 796 Rockhampton, Qld 4700 Ph (07) 4927 7799 www.brahman.com.au
19	Brangus	USA	1950's	Brahman X Angus	Mainly in Qld, NT & northern NSW	The Australian Brangus Cattle Assoc. Inc. (1961) ABRI, UNE, Armidale, NSW. 2351 Ph (02) 6773 3373 F (02) 6772 5376 http://brangus.une.edu.au
20	Braunvieh	Germany, Austria & Switzerland	1972-1990		Qld, Vic, NSW, Tas, SA & WA	Australian Braunvieh Assoc. Inc (1974 -1994) PO Box 45 Apsley, Vic 3319 Ph/Fax (03) 5586 1218 www.braunviehcentre.com The Original Braunvieh Beef Breeders of Aust. PO Box 409 Cockatoo, Vic 3781 Ph (03) 5968 1533 F (03) 8537 5059
21	British White	England	1958		NSW, Qld, WA, SA, Vic	The British White Cattle Society of Aust. Ltd (1983) MS 422 Clifton, Qld, 4361 Ph/fax (07) 4695 8561
22	Brown Swiss	Switzerland	1974		Qld, Vic, NSW, Tas, WA	Brown Swiss Cattle Breeders of Australia (1974) 20 Britain St, Leura, NSW. 2780 ph (02) 4784 1266 www.brownswiss.com.au
23	Charbray	Texas, USA	After 1969	Charolais bull X Brahman cows	Qld, NSW, Vic, WA	The Charbray Society of Australia (1977) PO Box 5245 Central Qld MC, Qld, 4702 Ph (007) 4936 3535 F (07) 4936 3765 www.charbray.org
24	Charolais	Central France	1969		NSW, Qld, Vic, SA, NT, WA, Tas	The Charolais Society of Australia Ltd PO Box 772 Armidale, NSW. 2350 Ph (02) 6771 1666 F (02) 6771 1561 www.charolais.com.au
25	Chiangus	California USA	1975	Chianina X Angus	Vic, NSW, Qld, WA, SA,	The Chiangus Herd Book (1986) Chianina Society of Australia ABRI, UNE, Armidale, NSW. 2351 Ph (02) 6773 2242 F (02) 6772 5376
26	Chianina	Asia/Africa to Italy	1974		Qld, NSW, Vic, WA	Chianina Society of Australia (1973) ABRI, UNE, Armidale, NSW. 2351 Ph (02) 6773 2242 F (02) 6772 5376

No.	Breed	Developed by &/or country of origin	Imported to Australia	Parent breeds	Distribution in Australia	Breed Society in Australia
27	Dairy Shorthorn	16th century Britain	Pre 1930		Tas, NSW, SA, WA, Vic	Dairy Shorthorn Assoc of Australia (1930) Royal Showgrounds, Epsom Rd Ascot Vale Vic 3032 Ph (03) 9281 7440 F (03) 9376 2973 www.geocities.com/dairyshorthorn/
28	Devon	South west England	Early 1800's		All states	Devon Cattle Breeders Society of Aust. (1935) PO Box 72 Gloucester, NSW. 2422 Ph/fax (02) 4994 7189 www.devoncattle.com
29	Dexer	Ireland	Pre 1940's		All states and ACT	Dexter Cattle Australia Inc (1987) ABRI UNE, Armidale, NSW 2351 Ph (02) 6773 3471 F (02) 6772 5376 http://dexter.une.edu.au
30	<u>Droughtmaster</u>	<u>North Queensland, Australia</u>	<u>1930's</u>	<u>Zebu bulls X Shorthorn, Hereford & Shorthorn-Devon cross cows + Brahman cattle after 1930's</u>	<u>Nt, Old, northern NSW & WA</u>	<u>Droughtmaster Breeders Society</u> <u>PO Box 978 Kenmore, Qld. 4069</u> <u>Ph (07) 3378 3040 F (07) 3878 1569</u> <u>www.droughtmaster.com.au</u>
31	English Longhorn					
32	Galloway	South west Scotland	Pre 1858		NSW, Qld, SA, Tas, Vic, WA, ACT	Australian Galloway Association (1951) PO Box 531 Wodonga, Vic. 3689 Ph (02) 6027 3361 F (02) 6027 3454 www.galloway.asn.au
33	Gelbvieh	Bavaria	1976-1979		Qld, Vic, Tas, NSW, SA, WA, ACT	Australian Gelbvieh Assoc. inc. ABRI, UNE, Armidale, NSW. 2351 Ph (02) 6773 3373 F (02) 6772 1943 www.gelbvieh.asn.au
34	Greyman			Murray Grey X Brahman		<u>The Murray Grey Beef Cattle Society (1962)</u> <u>PO Box 250 Armidale, NSW, 2350</u> <u>Ph (02) 6771 5151 F (02) 6771 5144</u> <u>www.murraygrey.com.au</u>
35	Guernsey	Brittany/Guernsey	1898		SA, Vic, Qld, NSW, Tas, WA	Guernsey Cattle Society of Aust. Inc. (1911) Kiama Stus Registration Centre Ltd PO Box 189, Kiama, NSW. 2533 Ph (02) 4232 3333 F (02) 4232 3350 www.ksrcl.com.au

No.	Breed	Developed by &/or country of origin	Imported to Australia	Parent breeds	Distribution in Australia	Breed Society in Australia
36	Hereford	Herefordshire, England	1826		Qld, NSW, SA, Vic, Tas, WA	Australian Hereford Society Ltd (1890) PO Box 1014 Spring Hill, Qld. 4004 Ph (07) 3236 2166 F (07) 3236 2177 www.hereford.com.au
37	Highland Cattle	Highlands and west coastal islands of Scotland	Mid 1800's reintroduced in 1950's		Vic, Tas, SA, NSW, Qld, WA	Australian Highland Cattle Society Inc (1988) Royal Showgrounds, Epsom Rd Ascot Vale Vic 3032 Ph 903) 9281 7444 F (03) 9376 2973 www.highlandcattle.org.au
36	Holstein	Western Europe	1850's		All dairy areas across Australia	Australian Holstein Friesian Association Inc (1914) Private Bag 14, 504 Racecourse Rd. Flemington, Vic 3031 Ph (03) 9376 1811 F (03) 9372 1394 http://holsteinaust.une.edu.au
38	<u>Illawarra</u>	<u>Australia, 80km south of Sydney</u>	<u>Pre 1930's</u>	<u>Jersey, Guernsey, Dexter, Holstein-Friesian, Shorthorn, Ayrshire</u>	<u>Qld, NSW, SA, Vic</u>	<u>Illawarra Cattle Society of Australia Ltd. (1930)</u> <u>PO Box 189 Kiama, NSW. 2533</u> <u>Ph 902) 4232 3333 F (02) 4232 3350</u> <u>www.ksrcl.com.au/illawarra</u>
39	Kimberly Shorthorn	Australian				
40	Jersey	English Channel Island of Jersey	1850's		All states and territories	Australian Jersey Breeders Society (1899) PO Box 292 Ascot Vale, Vic 3032 Ph (03) 9370 9105 www.jersey.com.au
41	Limousin	Central France	1973		Qld, NSW, Vic, Tas, SA, WA	Australian Limousin Breeders Society Ltd PO Box 262 Armidale, NSW. 2350 Ph (02) 6771 1648 F (02) 6772 9364 www.limousin.com.au
42	Lincoln Red	Lincolnshire, England	Early 1900's and again in 1951		South west WA, Hunter region and Liverpool ranges of NSW, also Qld, Vic, Tas & Norfolk Island.	The Lincoln Red Society (Aust) Ltd (1971) PO Box 601 Armidale, NSW 2350 Ph (02) 6771 5219 F (02) 6772 2244
43	<u>Lowline</u>	<u>NSW Dept Agriculture, Trangie Research Centre Australia</u>	<u>1974</u>	<u>Angus</u>	<u>Tas, Vic, Qld, SA, WA, NSW, ACT</u>	<u>Australian Lowline Cattle Ass. Inc. (1992)</u> <u>ABRI, UNE, Armidale, NSW, 2351</u> <u>Ph (02) 6773 2393 F (02) 6772 1943</u> <u>http://lowline.une.edu.au</u>

No.	Breed	Developed by &/or country of origin	Imported to Australia	Parent breeds	Distribution in Australia	Breed Society in Australia
44	Luining	Isle of Luining, off west coast of Scotland	?	Beef Shorthorn X Highland	Highlands of SE Australia	
45	Maine Anjou	North west France	1973		Central NSW, Vic	Maine Anjou Society Ltd (1993) PO Box 505 Mt Martha, Vic 3934 Ph (03) 5976 3140 F (03) 5974 3120 www.allbreeds.info/maine_anjou
46	<u>Mandalong Specials</u>	<u>Erskine Park NSW, Australia</u>	<u>1970's</u>	<u>Brahman, Poll Shorthorn, Charolais, British White, Chianina</u>	<u>NSW, Old, NT, Vic, SA</u>	<u>Mandalong Specials Cattle Ass. of Aust. Mandalong Park, Mamre Rd. Erskine Park NSW. 2759</u> <u>Ph 902) 9670 4005 F (02) 9760 5375</u>
47	Meuse-Rhine-Issel (Dutch Red and White)	Holland				
48	Minature Hereford	South West Texas, USA	1997	Hereford	All Australian states & NZ	Aust. Minature Hereford Cattle Assoc. Inc (1997) PO Box 442 Echunga, SA. 5153 Ph/fax (08) 8388 9632 www.minatureherefords.com.au
49	<u>Murray Grey</u>	<u>Upper Murray Valley, NSW-Vic border Australia</u>	<u>1905</u>	<u>Angus X Shorthorn</u>	<u>NSW, Vic, Old, Tas, SA, WA, ACT</u>	<u>The Murray Grey Beef Cattle Society (1962)</u> <u>PO Box 250 Armidale, NSW, 2350</u> <u>Ph (02) 6771 5151 F (02) 6771 5144</u> <u>www.murraygrey.com.au</u>
50	Piedmontese	Italy	1988-89	Aurochs X Zebu	NSW, ACT, Vic, Qld, SA	Australian Piedmontese Cattle Association ABRI, UNE, Armidale, NSW. 2351 Ph (02) 6773 3342 F (02) 6772 1943 www.piedmontesecattle.com.au
51	Pinzgauer	Austria	1990		Qld, NSW, Vic, Tas	Australian Pinzgauer Breeders Assoc. Ltd. (1990) PO Box 189 Kiama, NSW. 2533 Ph (02) 4232 3333 F (02) 4232 3350 www.ksrcl.com.au
52	Poll Hereford	USA	1920	Hereford	Qld, NSW, SA, WA, Tas, ACT, southern NT	The Australian Poll Hereford Society Ltd (1933) Locked Bag 7 Armidale, NSW. 2350 Ph (02) 6772 1399 F (02) 6772 1615 www.pollhereford.com.au
53	Red Angus	Introduced to Scotland by Vikings			All Aust states and territories	Red Angus Society of Australia. Inc. (1970) ABRI, UNE, Armidale, NSW. 2351 Ph (02) 6773 3144 F (02) 6772 1943 www.redangus.org.au

No.	Breed	Developed by &/or country of origin	Imported to Australia	Parent breeds	Distribution in Australia	Breed Society in Australia
54	Red Poll	Suffolk England	1850		WA, SA, Qld, NSW, Vic	Australian Red Poll Society Inc (1918) ABRI, UNE, Armidale, NSW 2351 Ph (02) 6773 3144 F (02) 6772 1943 http://redpoll.une.edu.au The Red Poll Cattle Breeders Assoc of Aust. (1978) 840 Ardmona Rd. Mooroopna, Vic. 3629 ph (03) 5829 0122
55	Romagnola	Italian peninsula	1976		Qld, NSW, WA, SA, Vic Tas	Romagnola Breeders Society Ltd (1992) PO Box 860 Toowoomba, Qld. 4350 Ph (07) 4638 0666 F (07) 4638 0667 www.romagnola.com.au
56	Sahiwal	Punjab, Pakistan	1950's		Qld, NT, northern NSW, northern WA	The Australian Sahiwal Society (1969) 'The Grange', Willowvale, Qld. 4209 Ph (07) 5546 6268
57	Salers	France	1985		Qld, NSW, WA, Tas, Vic, SA	Australian Salers Assoc. Inc. (1985) ABRI, UNE, Armidale, NSW. 2351 Ph (02) 6773 2393 F (02) 6772 1943 http://salers.une.edu.au
58	Santa Getrudis	Texas USA	1952	Brahman X Shorthorn	All states and territories of Aust.	Santa Getrudis Breeders (Aust) Assoc. (1954) Santa Getrudis House, 103 Copperfield St PO Box 57, Geebung, Qld. 4034 Ph (07) 3216 2708 F (07) 3216 2509 www.santagetrudis.com.au
59	Senepol	St Croix, Caribbean	2000	N'Dama X Red Poll	Qld, NT, NSW, WA	Australian Senepol Cattle Breeders Assoc. Inc. (2000) 'Wirrabilla', Limestone Ridges, Peak Crossing, Qld. 4306 Ph (07) 5467 2136 F (07) 5467 2034 www.senepol.com.au
60	Shorthorn	British breed	1825		All states and territories of Aust.	The Shorthorn Society of Australia Ltd. (1935) PO Box 61 Armidale, NSW. 2350 Ph (02) 6772 9622 F (02) 6772 2244 www.shorthorn.com.au
61	Simbrah		1960's	Simmental X Brahman		The Australian Simmental Breeders Assoc. Ltd. PO Box 323 Concord West NSW. 2138 Ph (02) 9764 6111 F (02) 9764 6100 www.simmental.com.au

No.	Breed	Developed by &/or country of origin	Imported to Australia	Parent breeds	Distribution in Australia	Breed Society in Australia
62	Simmental	Simme Valley, Switzerland	1971		Throughout Australia	The Australian Simmental Breeders Assoc. Ltd. PO Box 323 Concord West NSW. 2138 Ph (02) 9764 6111 F (02) 9764 6100 www.simmental.com.au
63	Sindhi	Sind province of Pakistan	1954 as gift to Aust Govt from Pakistan		Limited distribution all in tropical areas	
64	South Devon	South Devon, England	Early 1900's		Qld, NSW, Tas, Vic, SA, WA	South Devon Cattle Society of Aust. Inc. ABRI, UNE, Armidale, NSW 2351 Ph (02) 6773 3144 F (02) 6772 1943 http://southdevon.une.edu.au
65	<i>Square Meaters</i>	<i>NSW, Australia</i>	<i>1996</i>	<i>Murray Grey</i>	<i>Qld, NSW, Tas, WA, Vic, ACT</i>	<i>Square Meaters Cattle Association (1996)</i> <i>PO Box 371 St Mary's NSW. 1790</i> <i>Ph (02) 9834 4322 F (02) 9834 4311</i> www.squaremeaters.com.au
66	Sussex					
67	Tuli	Zimbabwe	1990		Qld NSW, WA, SA	Tuli Association of Aust. Po Box 18 Jambin, Qld. 4702 Ph (02) 6782 1007 or (07) 4996 5245
68	Texas Longhorns		1986			
69	Wagyu	Japan	1988		All states of Aust and ACT (not NT)	The Australian Wagyu Breeders Assoc. Ltd (1989) ABRI, UNE, Armidale, NSW. 2351 Ph (02) 6773 3138 F (02) 6772 1943 http://wagyu.une.edu.au Blackmore Genetics 2335 Mickleham Rd Mickleham. Vic 3064.
70	Welsh Black	Hill country of Wales	1980's		Vic, NSW, SA, Tas, King Island, Qld,	Australian Welsh Black Cattle Society inc. (1994) Royal Melbourne Showgrounds, Epsom Rd, Ascot Vale Vic 3032 Ph (03) 9281 7444 F (03) 9376 2973
71	White Park	UK	1987		ACT., Serpentine, WA.	Ph (02) 6230 3372 aranmohr@austarmetro.com.au
72	Zebu	India, Asia, Africa	1920's		Northern Australia in limited numbers	Australian Zebu Association Lot 6 Widgee Creek Hill View via Beaudesert Qld. 4285 Ph (07) 5544 8173

Chapter 5

Horse Breeds in Australia

Written by Katy Brown.
RBTA Director & Horse Coordinator.
June 2004

5.1 Executive Summary – Horses

Horses are significant to Australia. The contribution to GDP of the horse industry in 1999 is estimated at over \$6.3 billion, and if the value of volunteer labour is also included, this pushes the contribution of the industry to almost \$8 billion (44). This amounts to contributions between 30% and 66% greater than Australia's largest rural industry, the beef industry, (2002/03 GDP contributions of \$4.8 billion). A report funded by RIRDC in 2001 failed to identify how many horses were present in Australia and suggests "guestimates ranging from 900,000 to 1.8 million". Not a lot is known about the diverse industry, including how many horse businesses there are.

5.2 Horse Industry Overview

Horses hold an important place in Australian history and in everyday life. Over the last century, the changes to mechanisation and transport, and the rising costs of land and livery have found the focus of the equine industry change from one of necessity and demand to one of pleasure and sport. With this change comes the demand for a different type of animal to meet the needs of a predominantly ridden industry. Consequently, we are losing many of the heavy breeds that have contributed greatly to Australia's evolution over the last 200 years.

RBTA is greatly concerned by the plight of these heavy harness breeds. Many of these breeds are critically endangered, both in their countries of origin and in Australia. Some Australian locally derived breeds, similarly, are threatened. In many cases they are so endangered that external aid will be needed to maintain viable breeding populations. Ultimately, international breeding programs may be the only option for securing the international existence of some of these breeds. This will require an internationally coordinated approach and the cooperation of independent nations.

Heavy pony breeds are also threatened as the trend for the riding pony type has dominated in the show ring over the last 30 years. Small populations of British and European pony breeds exist in the hands of totally committed breeders and owners. Help and guidance by geneticists would enhance the breeding potential of these small groups to maintain viable populations. Even the tyranny of distance could be bridged within Australia if funding could be sourced for artificial breeding programs.

There is no doubt that the public perception of the Australian horse industry is one of success and viability with high profile Australian horse sports in the media daily. The racing industry, encompassing both gallopers and harness racing, is a major employer and contributor to our sporting culture and most industry funding comes directly from grants or industries related to this sport. Sport horses, such as 3 day eventers, dressage horses and show jumpers also enjoy the international spotlight on regular occasions. Many people have wonderful memories of Australia receiving Olympic gold medals in the most grueling horse sport - the successive 3 day event. Australia has also produced world champion endurance horses and international show horses.

On further examination at the actual "grass roots" level, the industry is made up of many non-professional riders and owners. It is relatively affordable to own and ride horses in Australia (compared with many other countries). Riding is well entrenched in the Australian culture, whether it be the outback or the city. This large group is serviced by a further industry of specialists including educational facilities and industry groups (seven of them), professional riders and trainers, breeders, farriers, vets, equine practitioners, feed manufacturers, saddlery and equipment makers. A buoyant industry that somewhat belies the plight of the rare breeds of horses that are struggling to survive.

Although some breeders are commercial, many horses and ponies (non-Thoroughbred) are bred on a relatively small scale by people who do so with no outside financial help or tax benefits. In some countries there is a tax benefit for those who keep horses. Therefore many of the breeders of non-racing or sport horses in Australia find themselves in the minority, breeding for the love of it rather than financial gain. These minority breed groups are usually underpinned by a breed society and a registration body, often (but not always) run by a group of volunteers. Most breed societies are run by members voted to committee and often the success of that breed long term is totally determined by the dedication, skill and commitment of these people. This in itself is a limiting factor to the long term preservation of breeds. Harness breeds in particular are suffering as many of the "old timer" stalwarts of the breed have passed away, taking with them knowledge, passion and usually a long held and well respected stud prefix.

The success of Australia's many breeds of horses is, to some extent, in the hands of the breeders. The absence of a viable market for the progeny limits the number of horses that will be bred. Marketing of breeds and their respective traits is extremely important to create a prosperous future. Unlike, sheep, cattle and pig breeds, the market for horse

meat is not a palatable option in Australia. There is a need for preservation strategies that are founded on the functional uses of horses. There is also a need for preservation strategies for breeds that no longer serve a practical function. The survival of the heavy draught breeds remains precarious.

5.3 What is a Breed?

To define the evolution of genotype, phenotype and heritage the animal is known as a certain breed. This breed to be determined as “pure” must have had no outside blood for the past forty years with a further 60 years of known heritage (pedigree) prior to that. There are many breeds of horses and ponies and most are derived from a region and a line of breeding that has evolved a type admirably suited to the purpose of its progenitors. Most animal breeders strive to improve the breed and generally the best animals are selected for breeding. This further enhances and “stamps” the desired type. Often show ring trends will effect the selection of breeding stock. Usually, but not always, this is in the long term good of the breed.

5.4 Breed Status

Many of these equine breeds are far from rare in their country of origin but may only be represented within Australia by small numbers. Others are rare both here and in their country of origin. Animals on the rarity list in their country of origin are immediately placed on the rarity lists in Australia. Other breeds rely (in the absence of an official survey) on historical and numerical evidence. The process of categorizing horse breeds is an ongoing one with several factors limiting the collection of data.

5.5 Registration Process

The most limiting factor to surveying the total number of horse breeds and individuals in Australia is the complication brought about by the registration process.

Purebred horses are usually registered with their appropriate stud or herd book and are identified using a number of different methods: branding, tattooing, whorl and color marking recording, micro-chipping, and DNA testing are the most common. The registration process is proof of breeding and pedigree (more so if DNA testing is applied).

Because there are so many breeds existing in Australia the level of administration varies greatly from international studbooks to locally run and administered breed societies.

The administration of some studbooks is run by companies prioritized in the registration of animals: for example the Australian Pony Stud Book and the registration of its 9 associated breeds are processed by the Santa Gertrudis Society in Queensland. The administration and promotion of the group is in the hands of its state and federal committees. These are further backed by regional promotional groups and breed societies. Volunteers come from an active national membership. The Royal Agricultural Society in each state performs registration services for some breeds and still more are registered by individual breed societies. It is not uncommon for societies to tender out the registration administration process.

The following scenarios may exist when it comes to registration:

1. Horses/ponies may be registered by one herd book in Australia (this may have state sections which may or not be linked)
2. Horses/ponies may be registered by a parent country herd book overseas
3. Horses/ponies may be registered with both of the above
4. Horses/ponies may be dual registered with more than one breed society either within Australia or overseas catering for the same breed
5. Horses/ponies may be purebred but unregistered
6. Horses/ponies may be registered but the current owner may not be a financial member

7. Different processes for registration and identification exist between breeds making comparisons between breeds difficult.

Most Breed groups are generally backed by an enthusiastic committee of members who work to promote and preserve their chosen breed. These groups go by many names but essentially do the same thing: Owners and Breeders, Promotional groups, Enthusiasts Group etc. They are generally self funded and run.

5.6 Breeding- Up Programs, Foundation Breeding or Grading-Up

Some breeds exist in very small numbers in Australia and to facilitate the expansion of these breeds, breeders cross them with suitable types to begin a “breeding up” program or foundation system. This allows for the registration and grading up of animals based on blood percentage, generally approximately 5 crosses back to a purebred stallion (generally the foundation stock are mares) allows the final result to be graded as “pure” but generally a different registration prefix is added to denote the animal does not descend from purebred stock from the country of origin. **These graded up animals are not generally recognized as significant by the Rare Breeds Trust of Australia whose primary focus is the preservation of pure genetics.** For riding and other purposes, many people happily own “part bred” animals of many breeds. If the cross has been well selected, a high percentage of breed traits from the desired breed are often present in the derivative. Certainly, first cross hybrid vigour is often a valuable trait.

5.7 Artificial Breeding

Options for artificial breeding of horses include

1. Fresh chilled semen (interstate, local)
2. Frozen semen (interstate Overseas)
3. Embryo transfer

Limitations on artificial breeding techniques are cost, semen viability, quarantine regulations and registration rules (ie Artificial Insemination (AI) is not accepted by many studbooks).

Horse semen is also reputedly harder to freeze and defrost with good viability than some other animals and there are a limited number of veterinary practices prioritized in the technique. The cost is also high compared with many other species. One Victorian Fjord horse breeder spent over \$23,000 on semen and veterinary costs to achieve one foal. As a non commercial breeder this is a high cost for an individual.

AI remains one of the most important assets to breeders of rare or minority breeds as it allows for the introduction of new purebred genetic material into small genetic pools. Unlike cattle or pigs, the volume of animals inseminated by one sire is unlikely to have the effect of narrowing the genetic base of national horse breed populations.

A recent event highlighted the need for better international communications. Pony breeds in Britain were quarantined for semen collection and long term semen storage. Unfortunately, the ponies quarantine period did not meet the time frame for export of the semen material to Australia. Pony breeders in Australia wanted to purchase some of the semen and put much needed new genetics into the Australian gene pool, but the additional weeks quarantine could not be arranged.

The introduction of fresh bloodlines ensures not only the maintenance of breed type but helps rioriti the effects of inbreeding. For international gene banks to be truly useful, an international quarantine protocol needs to be developed to ensure that material collected and stored anywhere in the world can be made available internationally.

5.8 Importation

The importation of breeding animals to Australia is an extremely costly exercise and is generally well represented in racing circles with “shuttle” stallions spending seasons on either side of the globe. For other breeds, the number of new imports is relatively low with those arriving usually been associated with the highly commercial breeds such as

Warmblood sporthorses. Other minority breeds will see a handful of new animals limited to individual breeders. Very few breeds see a huge influx of new genetics by the arrival of live animals.

5.9 Case study

The Highland pony has been bred in Australia from 6 original imports arriving in the late 1960s to early 1970s. The first influx of new blood was 1 stallion in 2000, which consequently resides in WA, several thousand kilometers from the main breeding populations in Victoria and NSW. There are currently about 60 purebred Highlands in Australia. The recent collection of Highland semen by the RBST in the UK is not suitable for use in Australia due to non-compliance with international quarantine protocols.

5.10 Uses of different breeds

Commercial viability ensures the success of a breed. There is always a market for a good all rounder, and horses usually find their use under one of the following headings:

1. Riding (Children and Adult Pleasure Riding, Riding for the Disabled (RDA), Competition, Adult Riding Club (ARC), Pony Club (PC)).
2. Racing (Flat and Steeplechasing)
3. Horse sports (Dressage, Showjumping ,Endurance, One Day Eventing, 3 Day Eventing)
4. Showing (Led , Ridden and Driven)
5. Harness (Working, Pleasure, Showing, Combined Driving, Tourist)
6. Heavy horse harness (Working, Display, Tourism, Showing)
7. Harness racing (Pacers and trotters)
8. Circus and Entertainment
9. Breeding
10. Blood Culture (Vaccines and antidotes) and Medical uses
11. Conservation and Heritage breeding programs (that need to be seen as a truly valid and valuable use).

5.11 Conclusion

A national survey of all equine breeding stock in Australia is the most critical priority. A survey of those breeds already listed as rare in their countries of origin needs to be a high priority, as does the defining of Australian locally adapted, feral breeds. A national breed and bloodline audit is essential if the securing of genetic biodiversity is to be prioritized and accomplished.

Australia has a low incidence of equine diseases and is an ideal reservoir from which to draw genetic material. It should be noted that animals that are imported such a long way and at such cost are often of extremely high standard and, in turn, provide well-selected base breeding stock. We have fine examples of many breeds in Australia. This gene pool is extremely important in the case of an international disease outbreak or scarcity of genetic resources. As Australia has a low incidence of equine diseases, genetic material is generally readily available for export following adequate quarantine protocol.

It is of utmost importance that genetic material, (including semen and embryos) be secured in an international genetic “arc”. Horse breeds of utmost importance include the heavy horses: Suffolk Punch, Shire horse, Cleveland Bay, Clydesdale, Hackney, Belgian Draught and the pony breeds: Dartmoor and Highland.

Horses breed one foal per year and may breed for approximately 10-15 years. Introduce human factors and the animal may be used for purposes other than breeding (e.g. riding, harness). In such cases, embryo transfer would be a viable option to conserve the lines. These services in many cases cannot be funded privately and grants must be sought for the breeding and holding of stud animals where they otherwise may not be bred.

Currently the RBTA does not own animals but the only future for some breeds may be with this sort of intervention and breeding programs.

TABLE 28: BREEDS OF HORSES IN AUSTRALIA

This list is indicative of the breeds found in Australia but is by no means complete. Rare Breeds are marked by an asterisk. This list is still under review.

No.	<i>Breed</i>	<i>Developed by &/or country of origin</i>	<i>Imported to Australia</i>	<i>Parent breeds</i>	<i>Breed Society in Australia</i>	<i>Description and Distribution in Australia</i>
1	Andalusian *	Spanish province of Andalusia.			Andalusian Horse Association of Australia P.O. Box 266 Torquay, Victoria, 3228 Ph (03) 5263 3402 Fax (03) 5263 3403	
2	Australian Stockhorse				The Australian Stock Horse Society, Ltd. (1971) P. O. Box 288, 92 Kelly Street Scone NSW 2337 Australia Tel: (065) 45 1122 Fax: (065) 45 2165 Web Site: www.ahs.com.au	
3	Australian Pony			Thoroughbred, English Hackney pony and Hackney horse, Arab, Welsh Mountain and Cob type, Timor, Hungarian pony and Exmoor bloodlines were the main contributors	Australian Pony Stud Book Society Inc (1931) 103 Copperfield Street P.O. Box 57 Geebung QLD 4034 Ph: (07) 3216 2011 Fax: (07) 3216 2509 www.apsb.asn.au	Not exceeding 14 hands high. The Australian pony evolved from the blending of the various breeds of horses and ponies imported into Australia from the early 1800's onward. The stud book has been closed to most outside breeding since 1960. The only cross still allowed by the Stud Book is the cross with a Welsh Section A or B. This outcross is gradually being phased out and it is intended that the Australian pony section will be closed completely in 2005
4	Australian Draught Horse					
5	Australian Brumby (wild)					

6	American Saddlebred					
7	Arabian <ul style="list-style-type: none"> • English (Crabbet) • Polish • Egyptian 				Arabian Horse Society of Australia Limited (1975) 226 George Street Locked Bag No 6, Windsor, NSW. 2756 Australia Ph (02) 4577 5366 Fax (02) 4587 7509 www.ahsa.asn.au	
8	Appaloosa					
9	Belgian Draught*					
10	Belgian Warmblood					
11	Caspian*					
12	Cleveland Bay*					
13	Clydesdale*					
14	Connemara*	<i>Ireland</i>	<i>1963</i>	Descended from the primitive native stock interbred with the Spanish horses that swum ashore from the wrecks of the Spanish Armada. Arab, Thoroughbred and Irish Draught blood have also contributed.	Australian Pony Stud Book Society Inc (1931) 103 Copperfield Street P.O. Box 57 Geebung QLD 4034 Ph: (07) 3216 2011 Fax: (07) 3216 2509 www.apsb.asn.au	Distinguishing features of the Connemara Pony are hardiness of constitution, staying power, intelligence and soundness.
15	Coffin Bay Pony* (wild, South Australia)			<i>Timor Pony</i>		
16	Danish Warmblood					
	Dales	Eastern side of the Pennines, England, in			Australian Pony Stud Book Society Inc (1931)	This breed is one of the heaviest of Great Britain's native pony breeds, and there is a

		Northumberland, County Durham and Yorkshire			103 Copperfield Street P.O. Box 57 Geebung QLD 4034 Ph: (07) 3216 2011 Fax: (07) 3216 2509 www.apsb.asn.au	strong likeness to the Welsh Cob. It has been employed for carting and farmwork, as well as being used in local trotting races. The maximum allowed height of the breed is 14.2hh, but can be smaller. The colour is predominantly black, with dark brown and grey being permitted.
17	Dartmoor*					
18	Exmoor (1)*					
19	English Riding Pony					
20	English Spotted Pony*					
21	Fjord*				Australian Pony Stud Book Society Inc (1931) 103 Copperfield Street P.O. Box 57 Geebung QLD 4034 Ph: (07) 3216 2011 Fax: (07) 3216 2509 www.apsb.asn.au	
22	Falabella					
23	Freisian*	northern province of Friesland in The Netherlands			Australian Friesian Horse Society (1983) 23 Mariemont Ave, Beaumaris, Victoria 3193. Ph: (03) 9589 1605	Always jet-black with a long flowing mane and tail, often to the ground. He carries his noble head on a crested neck. His action is flamboyant and eye-catching. He can be driven, ridden, jumped, likes working on the land or performing in the circus. He is one of the most versatile breeds of the world.
24	French Warmblood					
25	German Warmblood					
26	Greenbank Army Barracks Brumby				Brumby Protection Group PO Box Q476, Sydney 1230 www.thebrumby.org	

					email: brumbypg@yahoo.com.au	
27	Guy Fawkes River National Park Brumby	Australia			The Australian Brumby Heritage Society “Kararly” 7 Wattle Drive Arding via Armidale NSW 2350	
28	Highland*(60)				Australian Pony Stud Book Society Inc (1931) 103 Copperfield Street P.O. Box 57 Geebung QLD 4034 Ph: (07) 3216 2011 Fax: (07) 3216 2509 www.apsb.asn.au	
29	Hackney Horse*					
30	Hackney Pony*				Australian Pony Stud Book Society Inc (1931) 103 Copperfield Street P.O. Box 57 Geebung QLD 4034 Ph: (07) 3216 2011 Fax: (07) 3216 2509 www.apsb.asn.au	
31	Hannovarian					
32	Hafflinger*					
33	Icelandic (2)*					
34	Irish Sporthorse					
35	Irish Draught*					
36	Kosiosko Brumby					
37						
38	Lippizaner*					

39	Lusitano	Portugal	August 2002	The Sorraia, believed to have developed from crosses between native Iberian Proto Draft Horses (<i>Equus Caballus Caballus</i> of Western Europe) and ancient strains of Oriental/North African horses.		The origins of the Lusitano horse date back to at least 25,000 B.C. in the form of its primitive ancestor, the Sorraia breed.
40	Miniature Pony					
41	Miniature Horse					
42	Morgan Horse*					
43	Namadgi National Park Brumby					
44	New Forest*				Australian Pony Stud Book Society Inc (1931) 103 Copperfield Street P.O. Box 57 Geebung QLD 4034 Ph: (07) 3216 2011 Fax: (07) 3216 2509 www.apsb.asn.au	
45	Oldenburger					
46	Percheron*	France			Percheron Horse Breeders Association Percheron Association Australia Inc. Secretary / Registrar Ann Pinfold on (02)6385 8344	Percherons generally range between 16 to (very occasionally) 18.2 hands in height. Average height of the Australian Percheron is about 16.1 to 17 hands. Weight is generally in the range of 750 - 1000 kgs. The number of purebreds in Australia is around 350 purebreds, with many crossbreds used for eventing, dressage

47	Palouse*					
48	Palamino					
49	Quarterhorse					
50	Shire*				<p><i>Shire Horse Breeders of Australia</i> www.shirehorses.info/newsletters.shtml</p> <p><i>East of England Showgrounds</i> <i>Peterborough, PE2 6XE</i> <i>England</i> <i>Ph 001144 1733 234451</i> <i>Fax 001144 1733 370038</i></p>	<p>Shires, in general, were used in the 16th century with paintings dating back to the 15th century that show them in the perfection of form. Without question, the Shire horse was used as a war-horse.</p>
51	Suffolk Punch (6)*					
52	Swedish Warmblood					
53	Shetland				<p>Australian Pony Stud Book Society Inc (1931) 103 Copperfield Street P.O. Box 57 Geebung QLD 4034 Ph: (07) 3216 2011 Fax: (07) 3216 2509 www.apsb.asn.au</p>	
54	Standardbred					
55	Thoroughbred					

56	Tennessee Walking Horse*					
57	Timor pony					
58	Welsh Mountain Pony (Section A,B,C,D)				Australian Pony Stud Book Society Inc (1931) 103 Copperfield Street P.O. Box 57 Geebung QLD 4034 Ph: (07) 3216 2011 Fax: (07) 3216 2509 www.apsb.asn.au	
59	Warmblood					
60	Waler*					In the Boer War, Walers were exported in great numbers. Between 1899 and 1902 nearly 16,000 horses served in such regiments as the Lancers, Commonwealth Horse, Mounted Rifles and Bushmen's Troop. About 160,000 Australian horses served in World War I

TABLE 29: DONKEY BREEDS EXISTING IN AUSTRALIA

	Australian Donkey*					
	English Donkey					
	Irish Donkey					

Chapter 6

Goat Breeds in Australia

Written by Fiona Chambers.
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June 2004

6.1 Executive Summary – Goats

Australia is the world's largest exporter of goat meat and the majority of these exports are derived from the countries feral goat populations. These animals have become locally adapted over the last 200 years of existence in Australia. Specialty meat breeds such as the Boer and Kalahari Red have been introduced into Australia in the last eleven years in an attempt to "improve" the feral breeds' carcass composition. It is hoped by many breeders that the introduction of these new breeds will solve all of the problems encountered by the goat meat industry: irregular carcass size, shape, age and general quality.

In reality, much of the irregularity in the goats comes from the wild harvesting techniques which are less discerning than when goats are farmed. The introgression of the new genes is likely to improve the carcass quality of farmed goats, whether purebred or hybrid origins. It is, however, also likely to destabilise the delicate genetic constitution of feral animals and put at risk the genetic evolution of the last 200 years.

Genetic swamping stands to destabilise large populations of feral goats in a very short time frame in Australia and something needs to be done to protect the locally adapted feral breeds from uncontrolled introgression from the recently introduced breeds.

6.2 Goat Industry Overview

Goats in Australia are predominantly used for meat which is worth around \$45.7 million FOB. Fibre and milk production are smaller industries and leather a bi-product of the meat industry.

Goat meat is the most widely consumed meat in the world and Australia (ranking 46th in terms of production) is a relatively small goat producer on a world scale. It is, however, the world's largest exporter of goat meat. In 2001, Australia's farmed goat inventory was approximately 200,000 head. In 2001/02 the Australia goat slaughter was 859,000 head with 138,781 of these being exported. Feral goat populations account for the large proportions of slaughtered goats and are a significant national resource.

America is the largest importer of goat meat from Australia. Taiwan, Caribbean, Saudi Arabia and Canada are other significant markets.

6.3 Goat Breeds in Australia

About 13 breeds of goat exist in Australia. Three are feral breeds, three are fleece breeds, two are meat breeds, and six are dairy breeds.

It is believed that the Bernier Island feral goat has been completely lost in the last 20 years. Extensive culling occurred on the island in 1984 following a 20 year eradication program. Although some were goats removed from the island at the time of culling, a report commissioned by RIRDC in 1997 suggests that there were no more Bernier Island goats in existence at any of the sights where they were removed to. (35)

Table 21 below summarises the breeds in existence in Australia.

6.4 Endangered Goat Breeds

The Australian Heritage Angora is Australia's most significant endangered goat breed. With only 3 registered breeders and less than 150 purebred animals remaining, the future of this breed is uncertain. Having a history that is different to any other Angora around the world, RBTA strongly encourages support for the preservation of the registered Heritage Angora that has documentary evidence of its ancestry from Australia's first registered Angora stud – the Banksia herd.

Other goats at risk are the locally adapted feral goats. The Australian Feral goat, currently is at risk from genetic swamping from the more recently introduced meat breeds – in particular the Boer. Controls need to be put in place to ensure that the Australian Feral goat is not lost to introgression over the coming decade.

6.5 Case Study: Australian Heritage Angoras

THE AUSTRALIAN HERITAGE ANGORA

*“Australian Angora Goats have a French “Cashmere-Angora”, Cashmere and Turkish Angora pre- and post-grading-up background. This is a different background to Angoras in either South Africa or the USA”.
J.V.Evans. J.D.Stewart Memorial Refresher Course in Goats. 22-24 February 1984.*

Angora goats were first imported into Australia in 1832 and 1833 by Alexander Riley (of Raby NSW) from M. Polonceau's herd in France. Purebred Angoras from the herd of the Duchess of Berri were imported in 1833.

M Polonceau of France starting crossbreeding Angora goats and Cashmeres in 1822 and the type was fixed in 1827. Purebred Angoras were imported from Turkey (the home of the Angora goat) in 1853, 1856, 1863, 1865, 1869, 1871 and 1873. There was every possibility that some were upgraded Angoras originating from the "Turkish native" or Anatolian Black (a fleece and meat goat) as Turkey had begun an upgrading program to rapidly increase numbers. By 1870 the original Angora in Turkey was virtually extinct.

In 1856 seven pure bred Angora goats were imported from Turkey by Mr. Sichel and these went to Royal Park in Melbourne (Acclimatisation Society of Victoria) In 1863 twelve bucks arrived at Royal Park from France (? M Polonceau type). In 1865 ninety-eight angoras were imported from Turkey. These also went to the Royal Park herd. By 1870 Royal Park had greatly increased and was dispersed. Mr. Wilson who was associated with Royal Park took 50 of the best to his Wimmera property. The remainder was sold to various purchasers.

South African blood was introduced into Trawalla, Victoria in 1873 (number and type not known). John Giles of Bairnsdale owned a herd in the latter part of the 19th century (size of operation not known). It is, however, known that "Banksia" stud (herd started 1904) was based on Giles and Peak Station (S.A.) blood, and that Peak Station was based on Kempe's herd started in 1888 from blood from Muriel's herd.

Price Muriel imported 184 Angoras from Turkey between 1869 and 1873. Muriel sold his herd about 1890. When Muriel sold out, Mr E.C.Kempe bought 144 Angoras to add to his herd. In 1901 Kempe (in partnership with Sir Sydney Kidman) bought Peak Station (north of Lake Eyre). In 1902 there were 1000 Angoras on Peak Station. Later over 2000 Angoras of very good quality were reported to be thriving on Peak Station. The herd was dispersed in 1906 (Kempe's death). "Banksia" bought Peak Station blood before the 1906 dispersal.

During the 1920s and 1930s there was virtually no interest in Angoras in Australia. By 1950 all interest in Angoras had gone. In that year the only herd with a history going back to "the good old days" was "Banksia". For all practical purposes the herds built up in the 19th and very early 20th centuries had been killed off or allowed to go feral.

The Banksia stud of Mr. Barton was registered with the Goat Breed Society of Australia in 1947. By 1963 fourteen studs were registered with this society. Volumes 5 to 16 of the Goat Breed Society of Australia records the first 500 goats that were pure bred. Later volumes include animals that cannot be traced directly and solely to the Banksia purebred herd. With the upsurge of interest in the Angora goat, an upgrading program began in the 1960's using feral and dairy goats.

All Australian Heritage Angora goats trace their pedigrees back to the purebred Banksia herd. There are only 3 registered studs breeding the Australian Heritage Angora goat.

The breed is thrifty, hardy and has clean legs and an open face. They don't need to be wigged to be able to see where they are going. They have quiet temperaments, are easy animals to look after and are ideally suited to Australian conditions.

Their fleece is beautiful for hand spinning. It is very easy to prepare, as no harsh chemicals are needed to clean it. Its softness, silkiness and lustre are its redeeming qualities. Yields remain about the same as they were in the 1800s – around 1.5kg per female – significantly less than the 3kg shorn from a modern day, improved Angora. To see these goats in the early morning sunlight is a pleasure, their wonderful flowing fleece glitter in the sunlight.

Records of their breeding have been kept since 1950 and annual published records since 1973. The Australian Mohair industry boomed in the late 1970's based on these Banksia derived animals. Buyers from UK encouraged production and animals were sought and exported to UK and NZ.

Higher yielding lines were introduced from overseas in the 1980's. Since then South African and Texan Angoras have taken over to the detriment of the Australian Heritage Angora. Today, less than 150 Australian Heritage Angoras remain as a symbol of Australia's quality, heritage beginnings.

Written by Valerie Donald.
Breeder of Australian Heritage Angora Goats & Donkeys
Textile Artist

Information in this case study regarding the history of the Australian Angora goat comes from a paper written by J B Evans published in "Refresher Course for Veterinarians, Proceedings No. 73, The JD Stewart Memorial Refresher Course in Goats 1980".

6.6 Conclusion

The Australian Heritage Angora has a unique history. Its history is different to that of the Texal Angora of USA and the South African Angora, both of which have come to dominate the Australian Mohair industry over the past two decades with their higher yielding fleeces. With only three dedicated, small-scale breeders remaining, the Australian Heritage Angora is at risk of being lost.

The Australian Heritage Angora is worthy of our attentions and support and needs an action plan put immediately in place to ensure its ongoing survival. Whether it is preserved to honour the quality and distinctiveness of its unique fleece or as a living treasure- a reminder of Australia's unique pioneering history – the Australian Heritage Angora is uniquely Australian and accordingly needs to be preserved.

In contrast, our feral goat populations have no registration history and limited documentary evidence to validate their history. Their widespread prevalence across the country is a living testimony to the success of their evolution. Over the past 200 years they have become locally adapted to the harshest of Australian conditions and come to be a veritable resource for the nation. As the world's largest exporter of goat meat products, the introduction of Boer and Kalahari Red goats into Australia has been hailed as an opportunity to improve the quality of our goat meat carcasses. Whilst this may be true, it may also serve to undermine the stability of our locally adapted animals in ways we are yet to fully understand. It would seem prudent to "make haste slowly" where the introgression of Boer and Kalahari Red genetics into our feral populations is concerned. Once genetic swamping has occurred, it may prove very difficult to turn back the clock and reclaim the stability of 200 years of genetic evolution and local adaptation. Finding places to isolate at least some of our feral goats and protect them from the inevitable introgression from newly introduced breeds would seem to be an appropriate and reasonable strategy for Australia to adopt. For this to be effective, however, it needs to happen right now.

TABLE 30: BREEDS OF GOATS IN AUSTRALIA

<i>No.</i>	<i>Breed</i>	<i>Developed by &/or country of origin</i>	<i>Imported to Australia</i>	<i>Parent breeds</i>	<i>Breed Society in Australia</i>	<i>Description and Distribution in Australia</i>
	<i>Fibre Breeds</i>					
1	Angora	Turkey	1832 & 1833 (France) 1873 (South Africa) 1890 (USA)		Mohair Australia Ltd ABRI, University of New England Armidale, NSW 2351 Ph (02) 6773 3557 Coloured Angora Breeders of Australia Ltd. www.mohair.org.au	Large numbers of Angoras have been graded up in Australia using the Australian Feral goat as a base resource. The breed produces mohair. Staple length of between 120-150mm. They need to be shorn every 6 months. Commercial Angoras today produce yields twice as high Angoras in Australia in the 1870s.
2	Australian Heritage Angora	Turkey	1832 & 1833 from France		Erinrac Enterprises Upper Beaconsfield, Vic. 3808 jan@erinrac.com	Australian Heritage Angoras are a line of registered purebred goats which can be traced directly back to the first Australian registered Angora herd in Australia: the “Banksia” flock, registered with the Goat Breed Society of Australia (GBS) in 1947.
3	Cashmere	1788			Australian Cashmere Growers Association Ltd 30 Cann St. Guilford, NSW 2161 Ph (02) 9632 7476 Fax (02) 9632 5975 www.cashdown.com.au	Pure Cashmeres yield as much as 300g per year of cashmere fibre. (Feral goats may only produce 50g per year cashmere fibre).

<i>No.</i>	<i>Breed</i>	<i>Developed by &/or country of origin</i>	<i>Imported to Australia</i>	<i>Parent breeds</i>	<i>Breed Society in Australia</i>	<i>Description and Distribution in Australia</i>
	<i>Meat Breeds</i>					
4	Boer	South Africa	1993	Descended from nomadic goats of South Africa.	Boer Goat Breeders' Association of Australia (BGBAA) ABRI, University of New England Armidale, NSW 2351 Ph (02) 6773 5177 Fax (03) 6772 1943 www.boergoat.une.edu.au	Colours include white with red (sometimes black) head and straight red. The breed has been selected for its meat production
5	Kalahari Red	South Africa	1999		Boer Goat Breeders' Association of Australia (BGBAA) ABRI, University of New England Armidale, NSW 2351 Ph (02) 6773 5177 Fax (03) 6772 1943 www.boergoat.une.edu.au	Breed comes in colours, red and black. It is a large- framed meat breed, known as "the feral of South Africa". It is hardy and it is hoped that the Kalahari Red will add to the productiveness of Australia's growing goat meat industry.

No.	Breed	Developed by &/or country of origin	Imported to Australia	Parent breeds	Breed Society in Australia	Description and Distribution in Australia
	<i>Dairy Breeds</i>					
6	Anglo Nubian	Britain	1956-1959	Zairaibi bucks of Egypt and Jumna Pari bucks of India X British does	Anglo Nubian Society of Australia Harveys Rd Carrajung South, Vic. 3844 Ph (03) 5189 1291 http://home.vicnet.net.au/~goats/ansa/welcome.htm	Not heavy milk producers, but yield a high average fat yield – usually over 4%, and high protein content. It is a useful dual purpose breed that has a good capacity to adapt to hot climates.
7	British Alpine	Britain	1958	British goats X Alpine goats	Dairy Goat Society of Australia Ltd. PO Box 189 Kiama, NSW 2533 Ph (02) 4232 3333 Fax (02) 4232 3350	Tall, rangy breed, best suited to cooler climates with low humidity. Black colour, with white or cream markings on various body parts. Medium to heavy milk producers. Fat yield usually between 3-4%.
8	Saanen	Saane Valley, Switzerland.	1913 (France & Switzerland) 1930s (England)		Dairy Goat Society of Australia Ltd. PO Box 189 Kiama, NSW 2533 Ph (02) 4232 3333 Fax (02) 4232 3350	Most popular dairy goat in Australia. Heavy milk producers and usually yield between 3-4%fat. Performs best in cooler conditions because of the breed's sensitivity to extreme sunlight.
9	Toggenburg	Obertoggenburg, Switzerland	1947-1953		Dairy Goat Society of Australia Ltd. PO Box 189 Kiama, NSW 2533 Ph (02) 4232 3333 Fax (02) 4232 3350	
<i>10</i>	<i>Australian Melaan</i>	<i>Australia</i>			<i>Dairy Goat Society of Australia Ltd. PO Box 189 Kiama, NSW 2533 Ph (02) 4232 3333 Fax (02) 4232 3350</i>	<i>The All Black dairy goat was officially recognised as a breed in its own right and named The Australian Melaan at the 2001 Federal Council meeting of the DGSA</i>
<i>11</i>	<i>Australian All Brown</i>	<i>Australia</i>				<i>Experimental breed in the process of classification in Australia by the DGSA</i>

No.	Breed	Developed by &/or country of origin	Imported to Australia	Parent breeds	Breed Society in Australia	Description and Distribution in Australia
	<i>Australian Feral Breeds</i>					
12	<i>Australian Feral Goat</i>	<u>Australia</u>				<u>Commercial production of cashmere fibre began in Australia in the late 1970s using feral goats as foundation animals. Observations at Avondale Research Station, Beverley, revealed that about 70 per cent of the feral goats grew some cashmere. Production ranged from nil to 200 g of cashmere per goat per year. The top 30 per cent of feral does grow 100 g or more annually. In the eastern States the upgrading process has produced fourth and fifth generation goats that grow up to 200 g of cashmere per year. Individual goats have produced up to 450 g per year. (34)</u>
13	<u>Faure Island</u>	<u>Faure, Island, Western Australia. Introduced between 1889 and 1900.</u>		<u>Angora</u>		<u>A feral goat developing in isolation on Faure Island, WA.</u>
14	<u>Bernier Island</u>	<u>Bernier Island, Western Australia, 1899, 1907, 1913.</u>		<u>Dairy goat</u>		<u>Eradicated from Bernier Island in May 1984. It is believed that no more Bernier Island goats exist.(35)</u>

Chapter 7

***Other Species of
Farmed Livestock
in Australia***

Written by Fiona Chambers.
RBTA Director & Species Coordinator.
June 2004

7.0 Assorted Breeds of Farm Livestock in Australia

The following sections provide a brief snapshot of other species of domestic farm livestock in Australia that contribute to the nation's farmed-animal genetic diversity. Together, they give perspective to the breadth of diversity across all livestock industries. These species are currently not monitored by RBTA as there are insufficient resources available to monitor populations across the major species and breeds let alone each the species occurring in much smaller numbers. They are, however, acknowledged by RBTA as important contributors to the national rural economy. Each industry utilizes animal genetic resources in some way to trade in both domestic and export markets. Many of these are emerging new industries and, as such, need to be monitored to assess the impact the industries are having on genetic diversity.

Only one of the species, the kangaroo, does not technically qualify as domestic farm livestock as it is harvested exclusively from the wild. It is included briefly in this chapter because of the increasing demand for harvested kangaroo commodities which currently amount to around 7.7 million tones of meat exports from Australia each year.

7.1 Alpacas

Australia imported alpacas in 1989. Alpacas had previously been imported into the country in 1858, but the industry failed and all were lost. In the year 2001 there were approximately 40,000 alpacas in Australia and numbers were increasing rapidly. While the outlook for fibre sales is excellent, the emphasis in this young Australian industry will be on breeding for the foreseeable future. ⁽⁴²⁾

For more information contact:

The Australian Alpaca Association
PO Box 1076
Mitcham North, Vic 3132
Ph (03) 9873 7700
Fax (03) 9873 7711
<http://www.alpaca.asn.au/index.shtml>

7.2 Bees

There are around 673,000 registered hives in Australia, producing not only honey and beeswax but also live bees (queens and package bees), and other products such as pollen and royal jelly. Around 467,000 hives are operated by beekeepers with a minimum of 200 hives, and these are considered to represent the commercial industry. It is estimated that an average of at least 30,000 tonnes of honey are produced each year in Australia, with nearly 45% of this total coming from beekeepers resident in NSW. Between 9,000 and 12,000 tonnes of honey are exported each year. ⁽⁴³⁾

The gross value of production over all sectors of the industry is estimated as being between \$60 and \$65 million per annum, of which \$49 million comprises honey production. As expected from hive registration data, NSW beekeepers contribute around 44% of this total value of production. ⁽⁴³⁾

Honey bees, *Apis mellifera*, were introduced into Australia in 1822 to provide honey for the new settlers. Australia has over 1,500 species of native bees. Only 10 of these species are stingless, and these are the native honey-producing bees (*Trigona* and *Austroplebeia*). All of the other species of native bees in Australia can sting. Australia has no native species of bumble bees. Feral European bumble bees (*Bombus terrestris*) were accidentally introduced to Tasmania in 1992 and now have become widespread throughout that state. Fortunately, they have not reached the Australian mainland yet. Introduced bee species are cause for concern since they compete for food supplies with our own much smaller and less conspicuous native bees. ⁽⁴³⁾

For more information contact:

The Australian Honey Bee Industry Council
Executive Director,
PO Box R838,

Royal Exchange, NSW 1225,
Tel: 02 9221 0911
Fax: 02 9221 0922
Email: ahbic@honeybee.org.au

Australian Native Bee Research Centre
PO Box 74, North Richmond NSW 2754, Australia
Fax: 02-4576 1196
<http://www.zeta.org.au/~anbrc/index.html>

7.3 Buffalo

“The buffalo industry in Australia is predominately based in the Northern Territory and is still quite small with total numbers just over 40,000. Some meat is exported to South East Asia and 3,084 live buffalo were exported to Brunei, Malaysia and Sarawak in 2001 (Source: NT Buffalo Industry Council)”. (37)

There are 2 main breeds of Buffalo in Australia.

- Australian Swamp Buffalo. Introduced to Australia in the 1820s – 1830s from eastern Indonesian islands. At its peak, populations reached around 300,000. The federal and state government’s Brucellosis and Tuberculosis Eradication Campaign (BTEC) has decreased populations in the wild to around 30,000 with similar farmed numbers (10)
- Riverine Buffalo. Introduced to Australia in 1994, 1995, 1997. It is a larger, beefier breed than the Swamp Buffalo.

More information can be sourced from:

The Executive Director,
Buffalo Industry Council
Darwin, Northern Territory.

7.4 Camels

Camels were first introduced into Australia from the Canary Islands in 1840. Subsequently an estimated 12,000 camels were imported and ultimately released into the wild when road and rail transport resumed the camel’s role as a means of carrying freight. Camels are scattered through the arid interior of Australia with an estimate of 50% in Western Australia, 25% in the Northern Territory, and 25% in western Queensland and northern South Australia.

The Conservation Commission of the Northern Territory detailed aerial survey in 1994 over the southern half of the NT indicated a population of approx. 60,000 camels. The 2001 survey by the Northern Territory Parks & Wildlife Commission has estimated the present feral camel population in the Northern Territory to be in excess of 200,000. The likely Australian population is now 500,000.

As an alternative to Government controlled culling programs, Central Australian Camel Industry Association Inc CACIA has developed markets for trade in live camels and camel meat. The slaughter of camels for human consumption commenced at Alice Springs in the 1980s.

The camels brought into Australia were almost exclusively the one-humped camels (*Camelus dromedarius*) which are found in hot desert areas and are highly suited to the climate in Australia. Only about 20 of the two-humped camels (*Camelus bactrianus*) normally found in cold deserts were imported into Australia.

For more information contact:

Central Australian Camel Industry Association Inc
PO Box 8760
Alice Springs, NT, 0871
Australia
Phone: (08) 8951 8183 (within Australia)
Fax: (08) 8951 8188 (within Australia)
<http://www.camelsaust.com.au/>

7.5 Crocodiles

Commercial crocodile farming began in Australia in the 1980s. The main products are skins and meat. High quality handbags, boots, belts, briefcases, and luggage are manufactured from the skins. The Australian saltwater crocodile is reputed to produce the finest quality skin of all crocodilians.

The principal markets for Australian saltwater crocodile skins are Japan, France and to a lesser extent Singapore and Italy. Zimbabwe, Papua New Guinea and Indonesia are Australia's major competitors. (39)

There are two species of crocodiles found in Australia, the saltwater or estuarine crocodile (*Crocodylus porosus*) and freshwater or Johnstone River crocodile (*Crocodylus johnstoni*). (39)

“In 2002, there were approximately 68,000 crocodiles on 13 farms. Crocodile meat products include the tail fillet either fresh, frozen or smoked”. (37)

7.6 Emu

Commercial emu farming started in Australia in 1987 in Western Australia. The first commercial slaughter of farmed emus occurred in 1990. By 1994, all states of Australia permitted Emu farming. Approximately 75,000 chicks were produced in 1994 and around 100,000 chicks in 1995. A market oversupply curtailed further growth.

USA now has the largest population of farmed emus with an estimated population of 1.5 million birds. Europe and Canada have 15-20,000 birds, NZ 2-3,000 birds.

Meat from emus is low in fat and low in cholesterol. Only one of the 4 original species exists in Australia - *Dromaius novaehollandiae*.

7.7 Kangaroo

There is no farming of kangaroos in Australia. All kangaroos hunted for commercial use are shot in the wild.

In 2001, 7,685,416 tonnes of quality fresh, chilled and frozen kangaroo cuts and value added products such as smoked fillet and jerky was exported, an increase of 33 per cent on the previous year.

Only five species out of more than 60 species of kangaroo can be harvested. It was estimated in 1997 that the population of the four most common species together numbered more than 50 million.

Over 99% of the commercial kangaroo harvest occurs in the arid grazing rangelands. The harvest is governed by the states National Parks Authority and approved by the federal conservation department, Environment Australia. Licensed harvesters are issued with sequenced, plastic lockable tags that are affixed to every kangaroo sent for processing. Every month, the processors must report back to authorities with exact details of the tags they have used, where they were used, species, sex, and weight. (38)

In 2002, Environment Australia approved a commercial quota for 6.94 million kangaroos. (38)

7.8 Llamas

Llamas are a docile camelid capable of carrying up to 40 kg for 20-30 km a day making them suitable as a pack animal. The llama is used by the native South Americans for its fleece, which is warm and windproof. It is also regarded for its hide, meat and sinew. Even the dried manure is used for fuel on fires.

In 1858, 283 alpacas and llamas landed in Sydney with the aim of establishing an Australian industry. The plans failed for a variety of reasons. By 1861 there were around 500 llama and alpaca in the colonies. With a change in direction by the Government, the Ledger flock was broken up in 1864 with the animals being sold to a diverse range of interests. None appear to have survived.

Until the early 1980's Chile, along with other South American countries, had maintained an export ban on llama and alpacas. An entrepreneurial spirit among several North Americans, New Zealanders and Australians however, capitalised on a decision by Chile, in defiance of other South American countries, which opposed the move, to allow limited exports of llama and alpaca. They then began to import in commercial quantities from Chile with a high proportion of these animals and their descendants moving to Australia.

Currently there are less than 2000 Llamas in Australia.

For more information contact:

The Llama Association of Australia
Cloverdale Park
RSD E1328 MaFarlanes Lane
Mount Egerton, Victoria 3352
Australia
Ph 03 5368 9616
Fax 03 5368 9614

7.9 Ostrich

“There are approximately 200 ostrich producers in Australia running 80,000–100,000 birds. There has been a large increase in demand for ostrich meat since the BSE and foot and mouth disease scares in Europe. In 2000-01 Australia exported over 630 tonnes of ostrich meat. In addition, approximately 30,000 ostrich skins (at green skin stage) have been exported for tanning and finishing (Source: Australian Ostrich Association)”. (37)

There are three main breeds of ostrich in Australia: The Masai, (also known as Red Neck), the Somali, (also known as the Blue Neck), and the African Black, (a stable cross between the South African and North African breeds).

For more information, contact:

The Australian Ostrich Association
45 Settlement Road
Bellarine Victoria 3223
Ph (03) 5251 3610
E-mail: terry@aoa.asn.au
<http://aoa.asn.au:8080/Menu/index.html>

7.10 Venison

“There are approximately 180,000 deer being farmed in Australia on approximately 1000 farms. Export markets are still being developed, however, some venison goes to countries in the Pacific Rim, Malaysia and the Republic of Korea”. (37) Other commodities include velvet from antlers.

Six species of deer are established in the wild in Australia. (40)

The Chital (*Axis axis*) is also known as the Indian Spotted Deer. The Chital was the first species of deer introduced into Australia in the early 1800s by Dr. John Harris, surgeon to the New South Wales Corps and he had about 400 of these animals on his property by 1813. These did not survive and the primary range of the chital is now confined to a few cattle stations in North Queensland near Charters Towers. While some of the stock originated from Sri Lanka (Ceylon), it is likely that the Indian race is also represented. (40)

Fallow deer (*Dama dama*) were first introduced into Tasmania prior to 1850 with releases taking place in all of the eastern states of Australia - they are not known to be present in either Western Australia or the Northern Territory, but populations are thriving in all other states. Of more recent times, it is believed that escapes from deer farms, particularly during troubled times within the industry, may have contributed to expansion of the fallow deer range. (40) This is the most numerous breed to be farmed in Australia and is used for velvet and venison production. (41)

Hog deer (*Axis porcinus*), were first liberated in Victoria in 1865 and they have established their range in the coastal regions of South and East Gippsland. (40)

Red deer (*Cervus elaphus*), were introduced into Australia from Britain about 1860 (predominantly from Windsor Great Park - a gift from His Royal Highness Prince Albert), releases subsequently took place in all mainland states. The most successful of these releases was in Queensland, however Victoria retains a thriving population in the Grampians National Park and its surrounds. (40) This breed is the second most numerous farmed in Australia and is used for both venison and velvet production. (41)

Rusa (*Cervus timorensis*) The original stock of Rusa which reached New South Wales from New Caledonia between 1861 and 1885 was the Javan race - a smaller subspecies, the Moluccan rusa, is located on some of the offshore islands north of the mainland. Liberations were made in New South Wales, Victoria and Western Australia with the surviving population centred around Sydney's Royal National Park and its surroundings. (40) Rusa deer are well suited to tropical areas and are the second most numerous breed in Queensland. The bred is mainly used in venison production. (41)

Sambar (*Cervus unicolor*) Sambar were first released in Victoria in 1863 and while the original animals were received from Ceylon (the Ceylon Elk), others were also obtained from India and Malaysia. Following subsequent releases, the sambar has extended its range throughout the Central Highlands of eastern Victoria and into southern New South Wales. (40)

Elk (wapiti) are closely related to Red deer. They are not found in the wild and are only in small numbers in Australia. They are a large breed and are primarily used for velvet production. (41)

For more information contact:

The Deer Industry Association of Australia
191 Hamilton Highway
Lismore, Vic 3324
Ph (03) 5596 2323
Fax (03) 5596 2313

7.11 Farmed Species Not Included in This Report

Other species not included in this report include:

- Aquatic species (including fish, eels, yabbies)
- Possums
- Rabbits

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- (2) Source: Fiona Chambers, Pig Coordinator, Rare Breeds Trust of Australia- Estimates based on APBA herd book figures and word of mouth discussions with breeders. These estimates are subject to further investigation.
- (3) The British Saddleback breed of pig was formed by the amalgamation of the Wessex and Essex Saddleback herd books in UK in 1967. Both of these breeds had kept separate herd books from 1918 when the respective breed societies were inaugurated).
- (4) PIGBLUP is a PC based genetic evaluation system for pigs. It has been designed to help breeders make the best selection decisions and to control their breeding programs better. (BLUP stands for Best Linear Unbiased Prediction- the most commonly used statistical method of assessing the breeding values of animals)
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