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International benchmarking of genetic trends of the Australian beef cattle seedstock industry

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INTERNATIONAL BENCHMARKING OF GENETIC TRENDS OF THE AUSTRALIAN BEEF CATTLE SEEDSTOCK INDUSTRY

*Report prepared for Meat and Livestock Australia
by Alex McDonald
updated 20 February 2008*

International Benchmarking of Genetic Trends of the Australian Beef Cattle Seedstock Industry

Introduction

The Australian beef seedstock industry has had access to Best Linear Unbiased Prediction (BLUP) analysis since the mid 1980's with the first multitrait analysis run for four Hereford herds in 1986. The first Angus analysis followed soon after.

The BLUP analytical model developed by the Animal Genetics and Breeding Unit (AGBU) at the University of New England was commercialised as BREEDPLAN under the National Beef Recording Scheme by the Agricultural Business Research Institute (ABRI).

Genetic evaluations are now run for 20 breeds in Australia for up to 19 different traits. All of the weight, fertility and carcass traits are run as a multitrait analysis. A single EBV for a standardised 300 kg carcass weight is published for each of rump fat depth, rib fat depth, eye muscle area and intramuscular fat depth with ultrasound scan EBVs used as correlated traits. Direct and maternal calving ease are calculated from a separate multitrait analysis incorporating gestation length and birth weight. Net Feed Efficiency EBVs are calculated in a separate threshold analysis utilising Insulin like Growth Factor (IGF-1) as a correlated trait. Docility EBVs are calculated by a single trait threshold analysis

This report benchmarks the genetic trends for nine Australian breeds against the same breeds in other countries for a range of traits.

Genetic trends for some or all of the breeds were sought from the USA, Canada, United Kingdom, France, South Africa and New Zealand. While most breeds in Australia and New Zealand run joint genetic evaluations, the genetic trends for the animals born in each country are used. Individual country trends were also used for breeds which run joint analyses in the USA and Canada.

The traits chosen as indicator traits were direct calving ease, birth weight, yearling weight, scrotal size and intramuscular fat percentage. All trends supplied for breeds in other countries which were directly comparable with these five traits in Australian breeds are included in the report. Some Australian breeds do not publish EBVs for calving ease or IMF% and some breeds in the USA and Canada publish EPDs for marbling which are not directly comparable with IMF%. Comparative trends for docility and gestation length were also included for the Limousin breed.

Birth weight and yearling weight EPDs from the USA and Canada which are published in pounds were converted to equivalent EBVs expressed in kilograms by dividing by 1.1. EPDs from the USA and Canada for calving ease, scrotal size and IMF% were multiplied by two to convert them to EBVs.

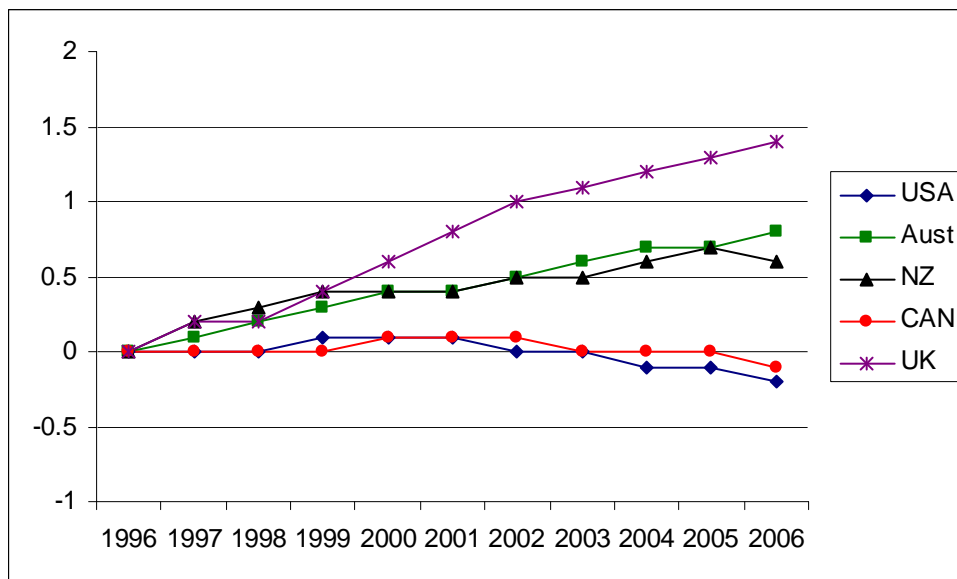
All trends are expressed with a base of zero in 1996. These trends do not indicate the relative genetic level of the breeds across countries. They simply measure the genetic change for each trait since 1996.

In addition countries were compared for one Australian Index for those breeds which publish indexes in Australia. The traits included in the index calculation were direct calving ease, birth weight, 400 day weight, scrotal size, intramuscular fat and eye muscle area if available. The shortcoming of this comparison is that a breed may have different breeding objectives in different countries due to different market requirements. However it does provide a comparison of genetic trends for a group of key calving ease, growth, fertility and carcass traits.

The comparative genetic trends for the five traits for each breed, where available, are shown below.

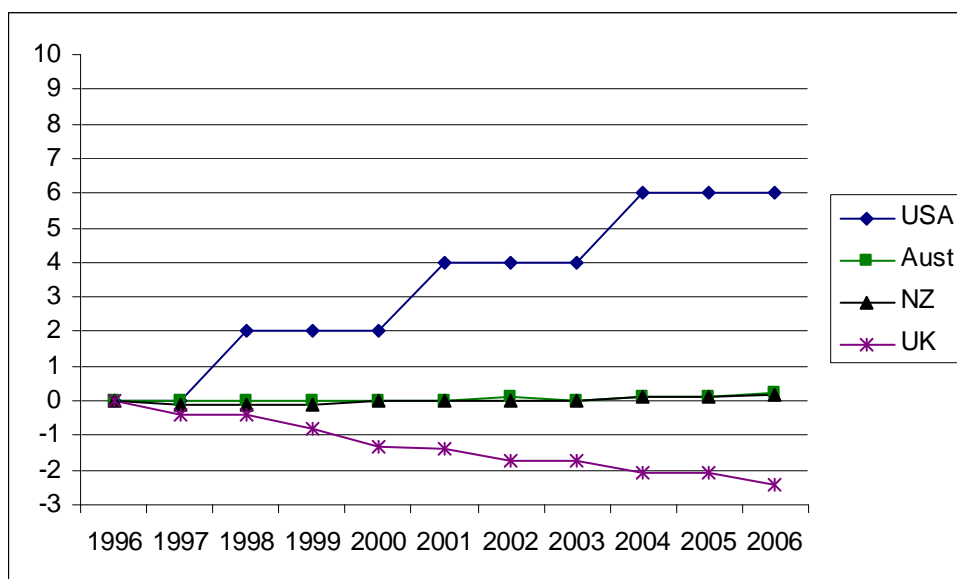
ANGUS

Birth Weight



The UK, Australia and New Zealand have had significant increases in birth weight whereas the USA and Canada have had no increase in birth weight.

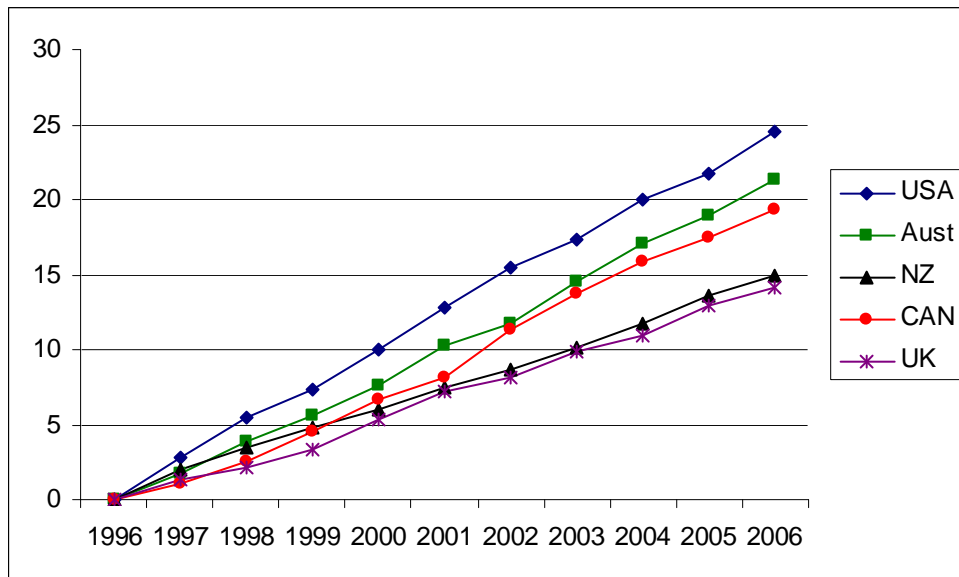
Direct Calving Ease



Australia, New Zealand and UK Angus have not matched the USA in improving calving ease.

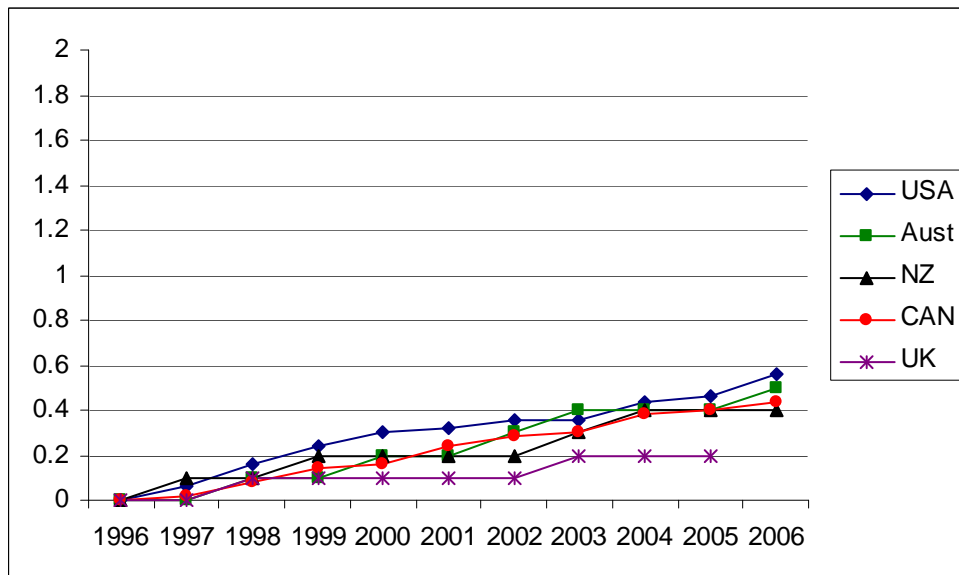
ANGUS

Yearling Weight



The increase in yearling weight is similar for all five countries with Australia near the top.

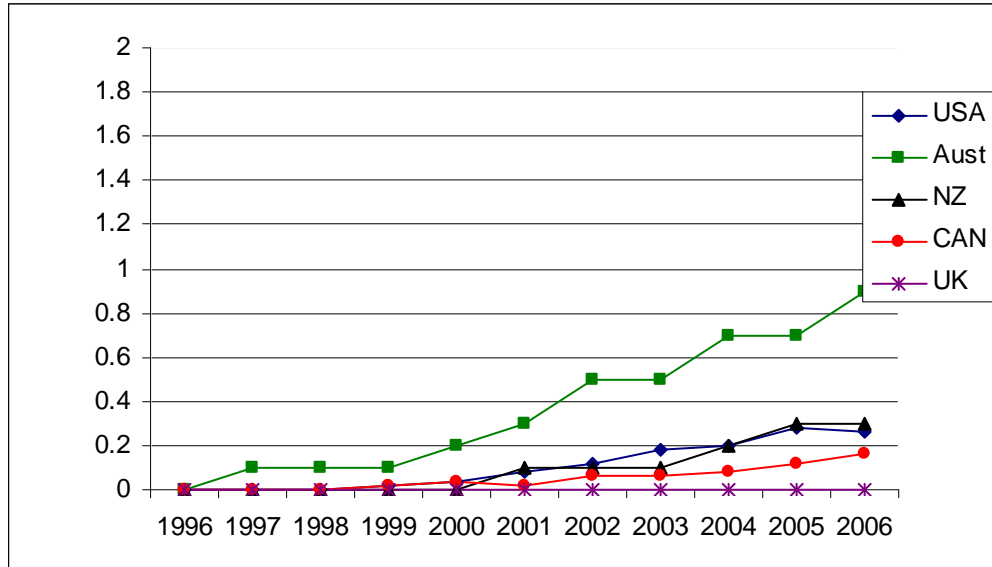
Scrotal Size



The increase in scrotal size is similar for all five countries.

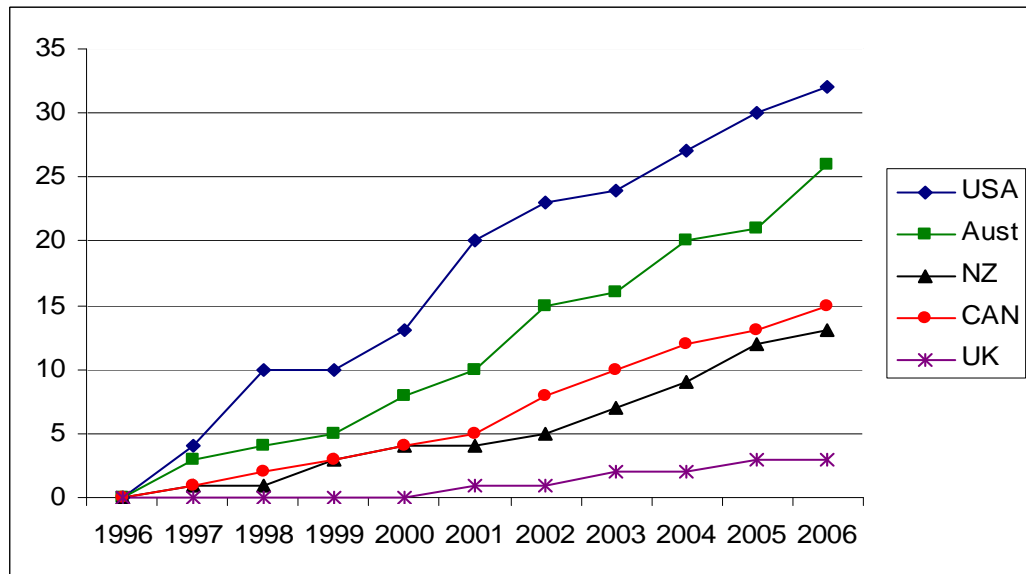
ANGUS

IMF%



The increase in IMF% of Australian Angus is superior to that in other countries.

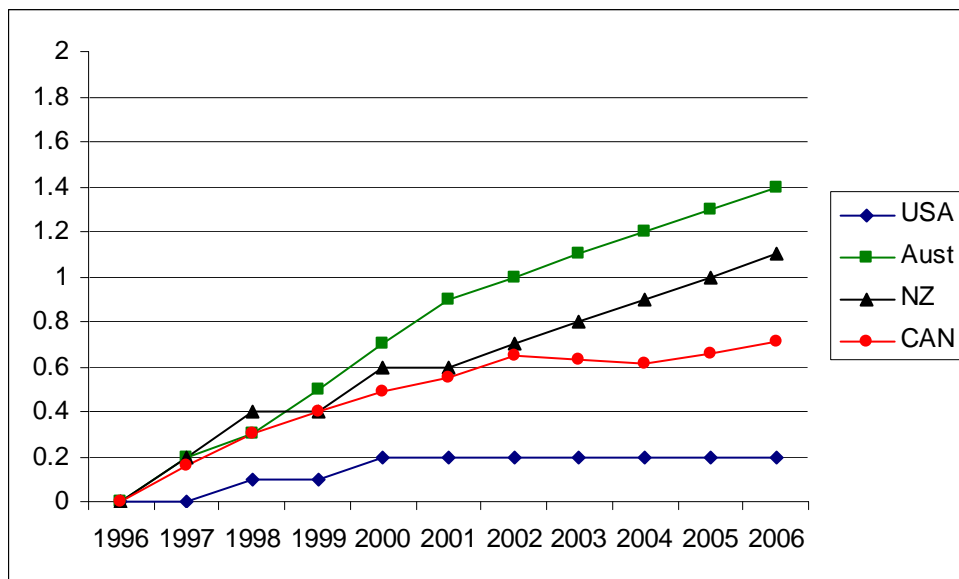
Angus B3 Japanese Export Index



Australian Angus are second only to the USA in genetic progress for this Index. This appears to be due to the larger improvement in direct calving ease in the USA

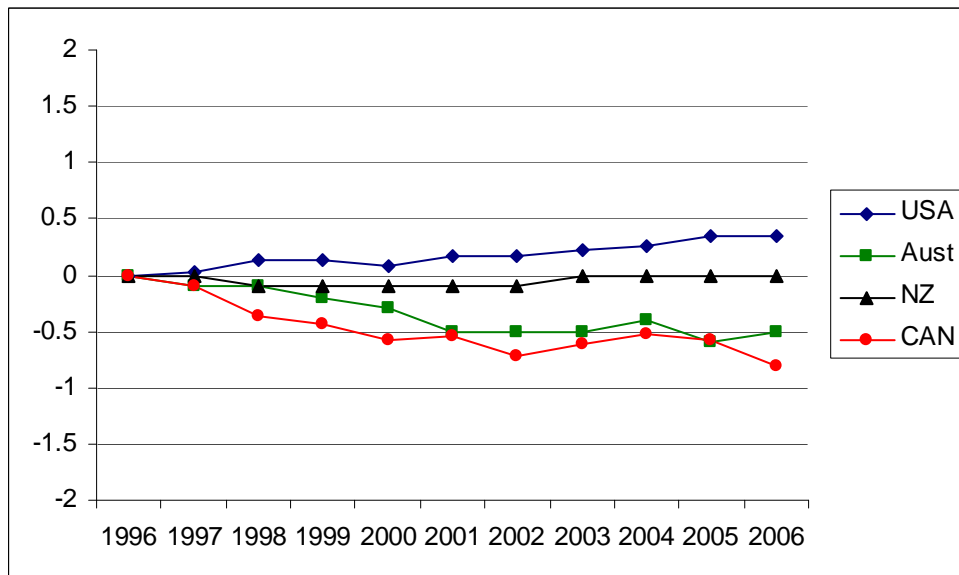
HEREFORD

Birth Weight



Birth weight of Australian and New Zealand Herefords has increased more than other countries.

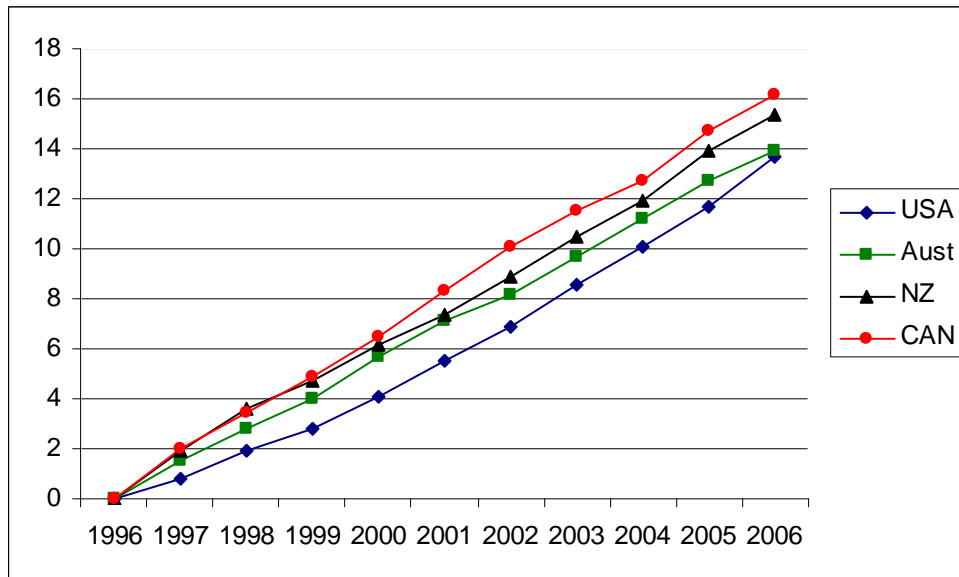
Direct Calving Ease



Direct calving ease has improved slightly for the USA but declined slightly for Australian and Canadian Herefords.

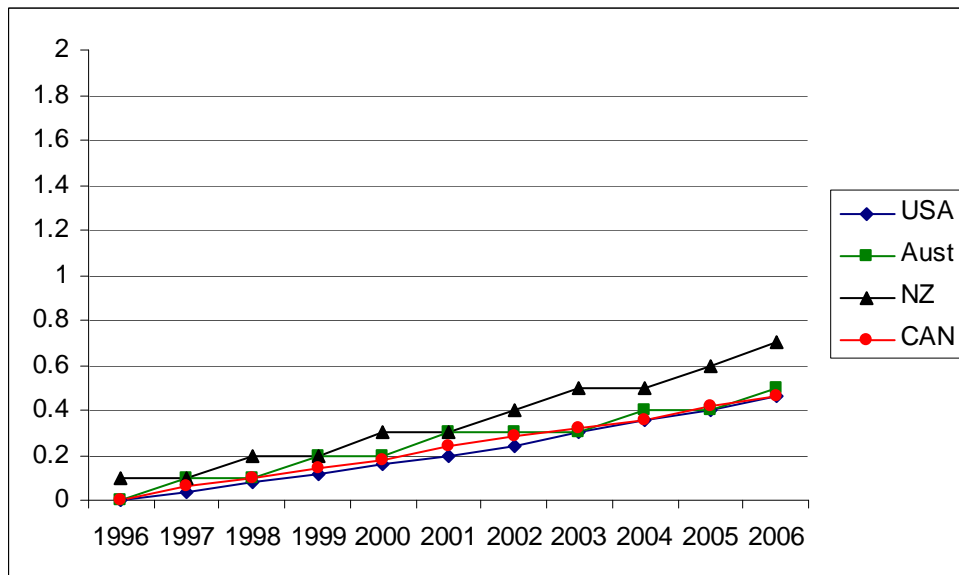
HEREFORD

Yearling Weight



The genetic trends for yearling weight are very similar for all countries.

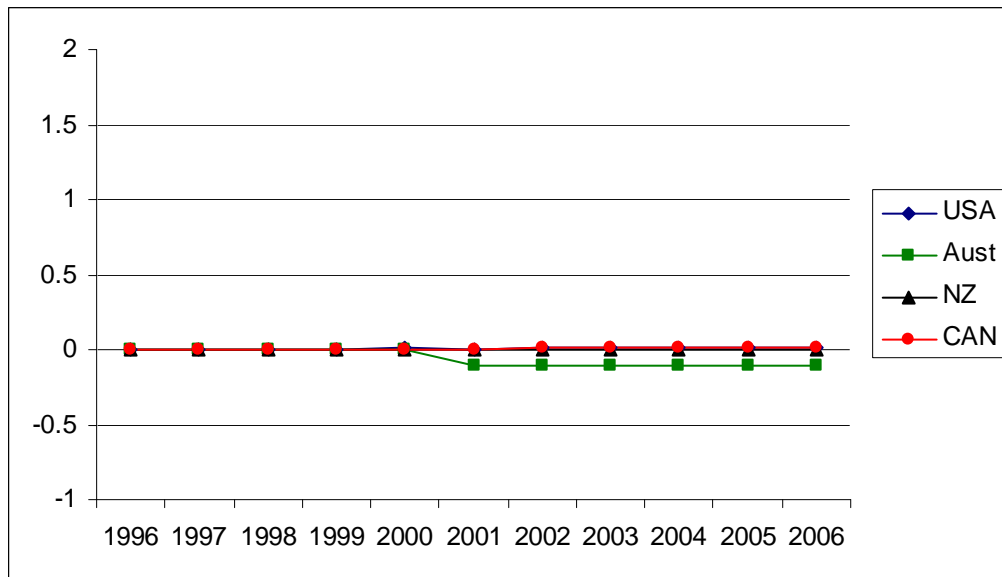
Scrotal Size



The trends for scrotal size are also very similar for all countries.

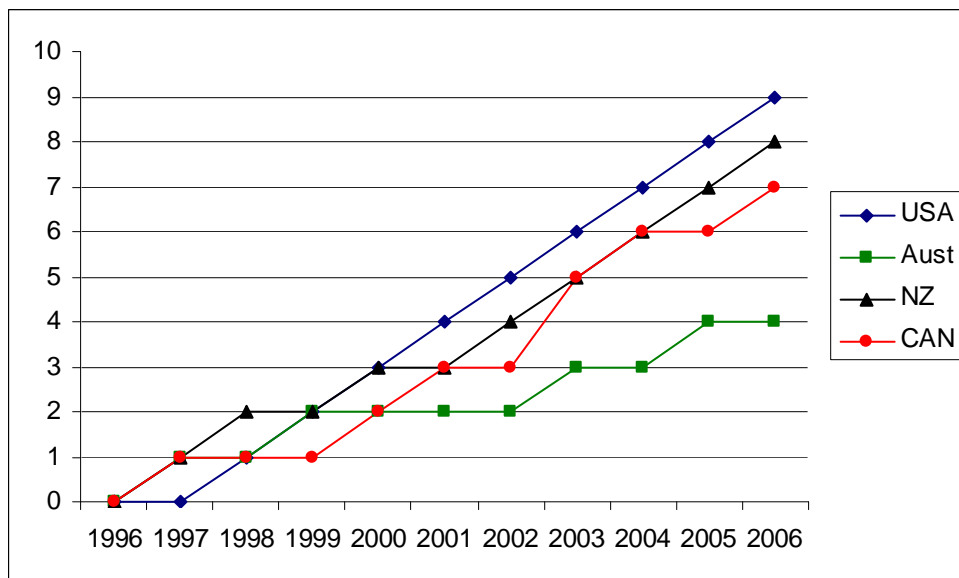
HEREFORD

IMF%



There has been no significant change in IMF% for Herefords in any of the four countries.

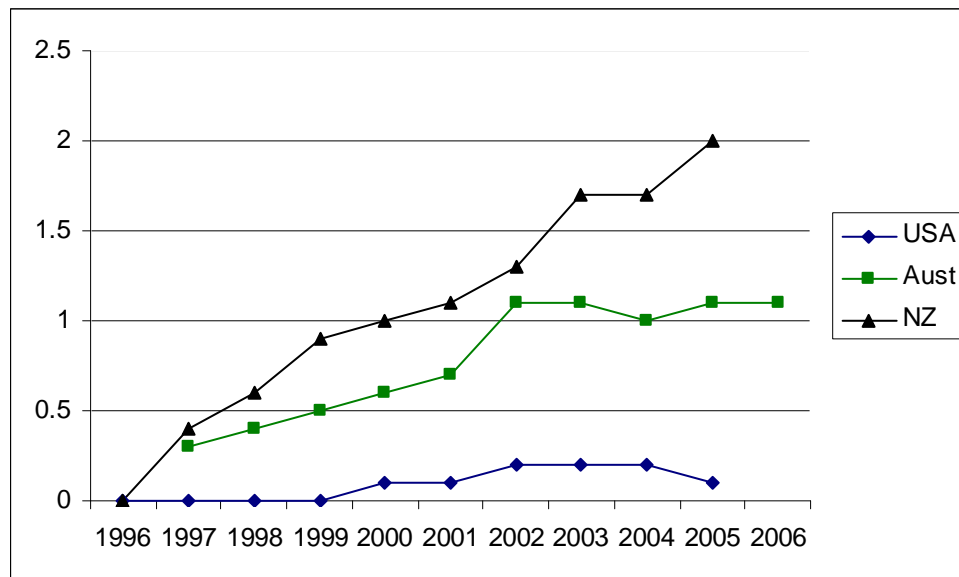
Hereford Short Fed Export Index



Australian Hereford have not made as much genetic progress for this index as other countries which appears to be related to difference in genetic change for direct calving ease.

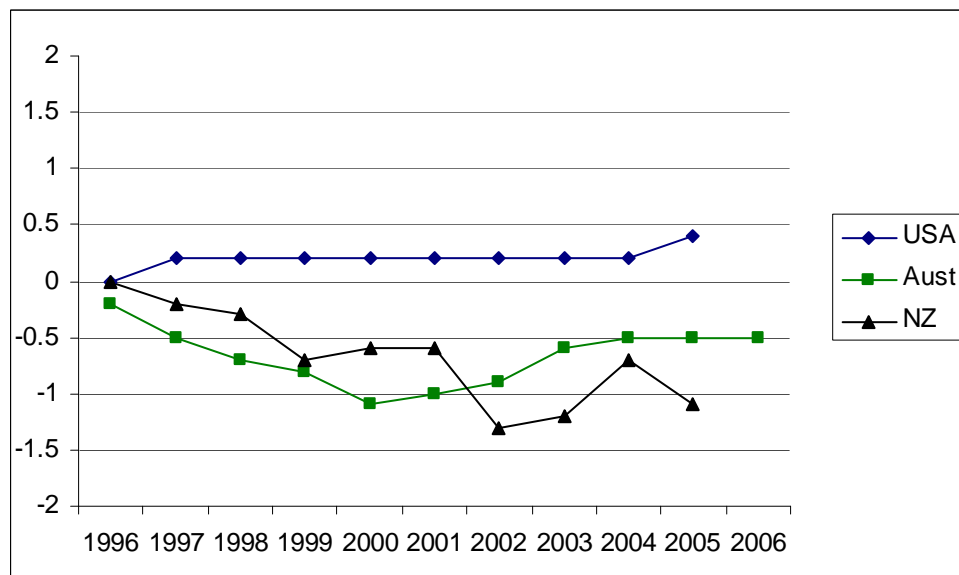
SHORTHORN

Birth Weight



There has been a significant increase in birth weight in Australia and New Zealand Shorthorns over the last ten years.

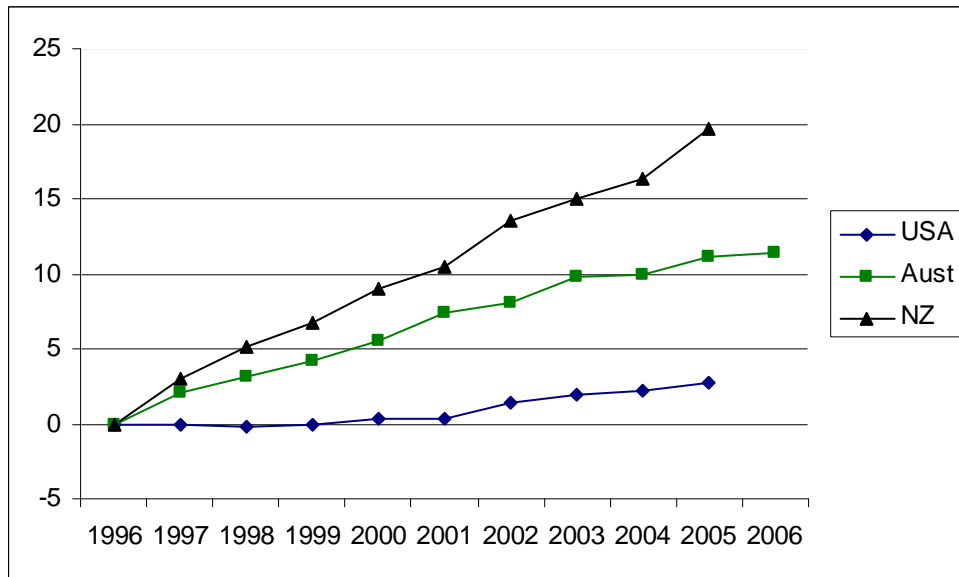
Direct Calving Ease



There has been a small decline in direct calving ease for Shorthorn in Australia and New Zealand compared to the USA.

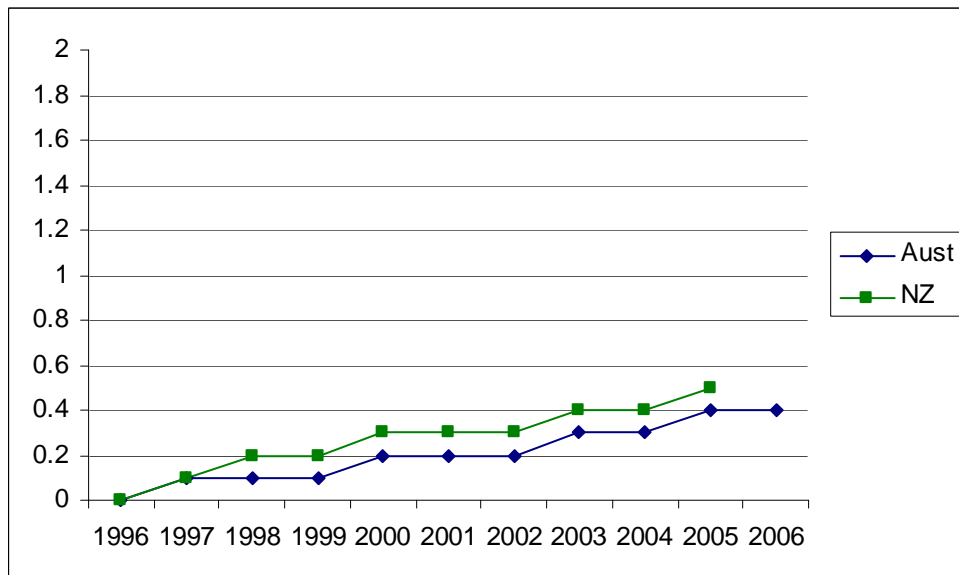
SHORTHORN

Yearling Weight



The increase in yearling weight for Australian Shorthorn is not as high as New Zealand but much greater than the USA.

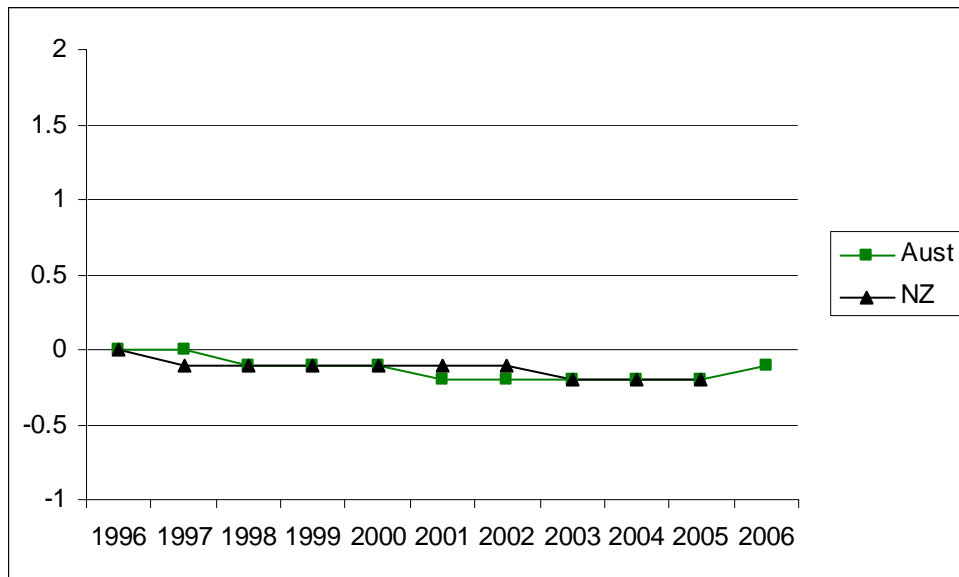
Scrotal Size



The increase in scrotal size EBVs are similar for Australia and New Zealand.

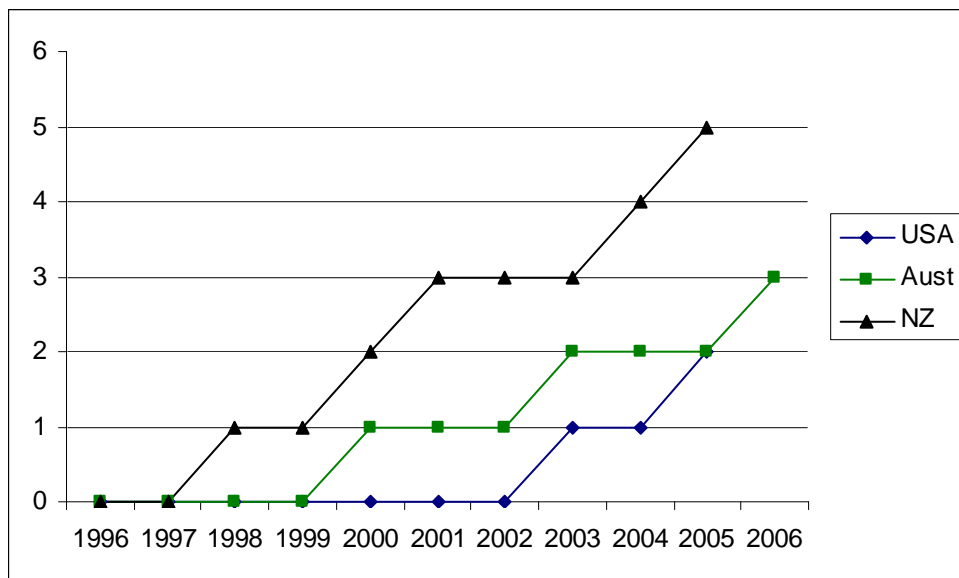
SHORTHORN

IMF%



There has been little change in IMF% EBVs for Australia and New Zealand.

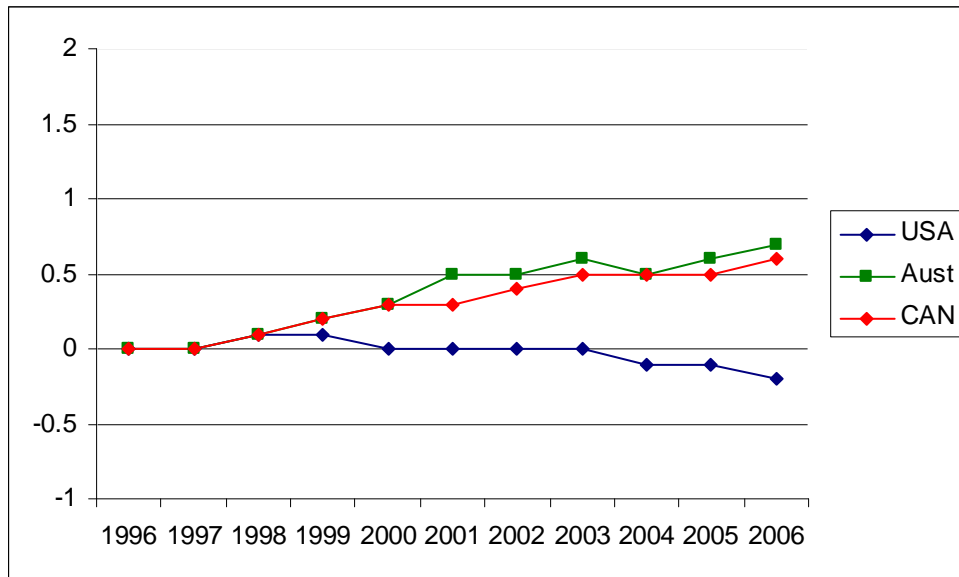
Shorthorn Domestic Restaurant Index



Australian Shorthorn have made similar progress to the USA but not as great as New Zealand for this index.

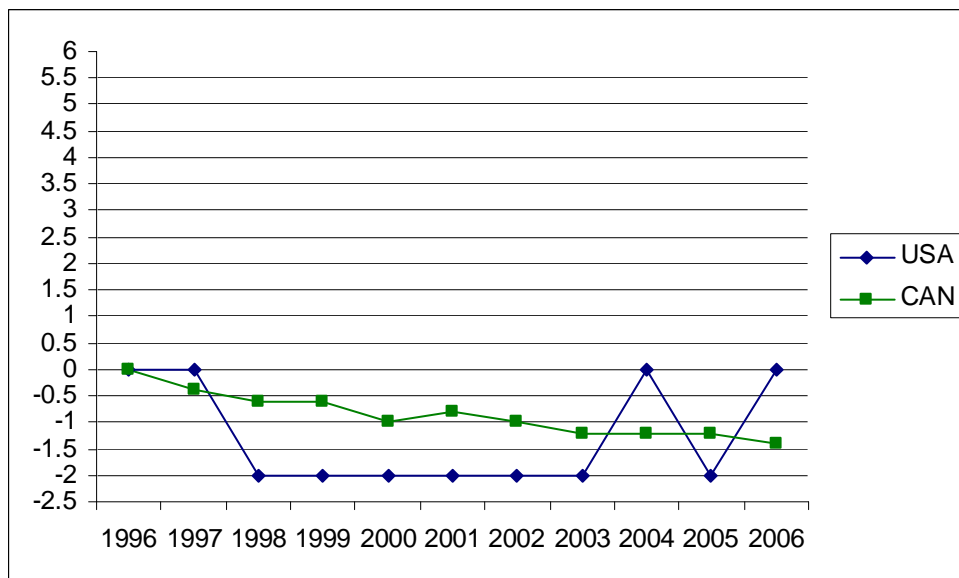
RED ANGUS

Birth Weight



Birth weight of Australian and Canadian Red Angus has increased more than for the USA

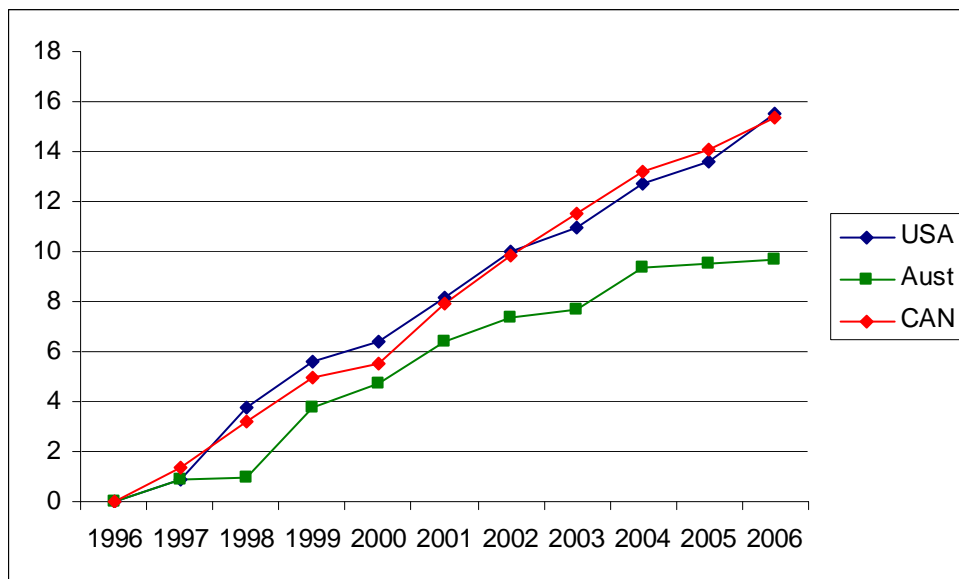
Direct Calving Ease



Australian Red Angus do not publish EBVs for direct calving ease.

RED ANGUS

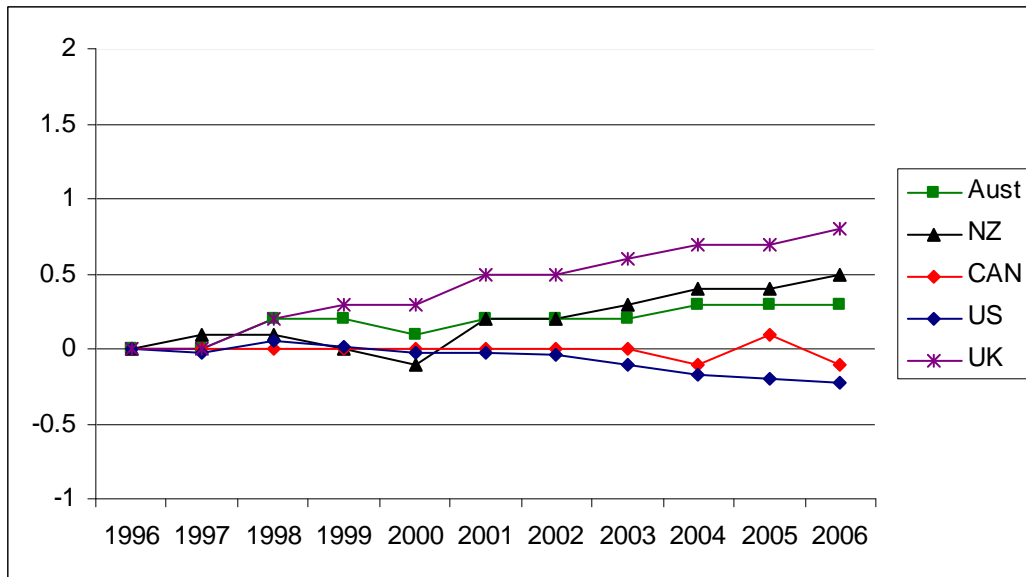
Yearling Weight



The increase in yearling weight EBV of Australian Red Angus is less than that of the USA and Canada.

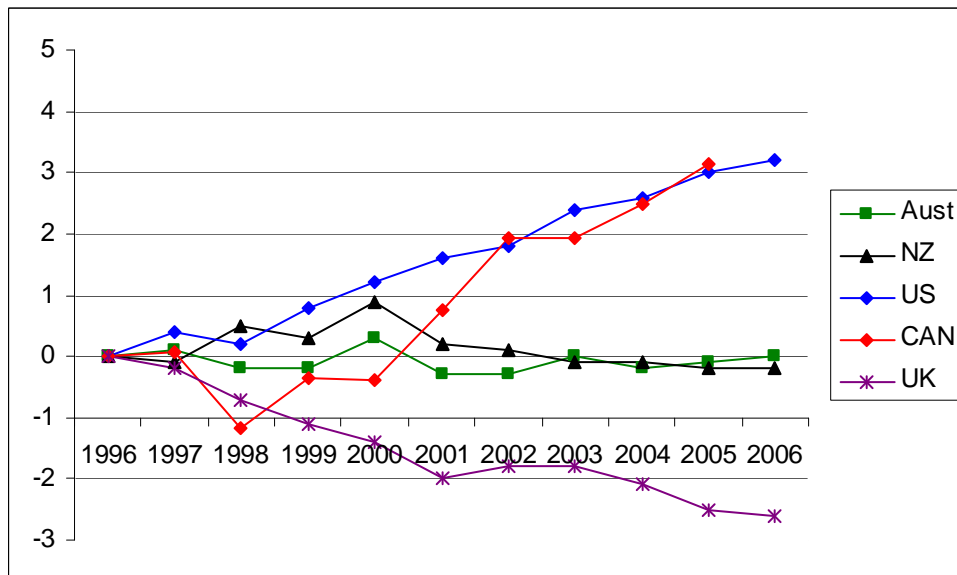
CHAROLAIS

Birth Weight



The USA and Canada have slightly reduced birth weight whereas there has been a significant increase in New Zealand and the UK.

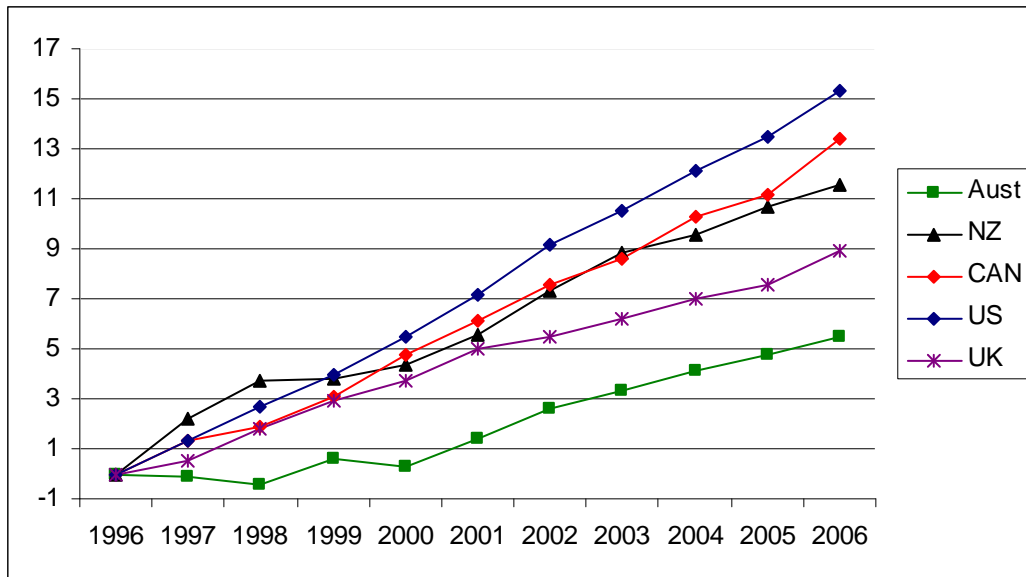
Calving Ease Direct



There has been little change in direct calving ease for Australian or New Zealand Charolais, whereas the USA and Canada have made significant gains. Direct calving ease in the UK has declined.

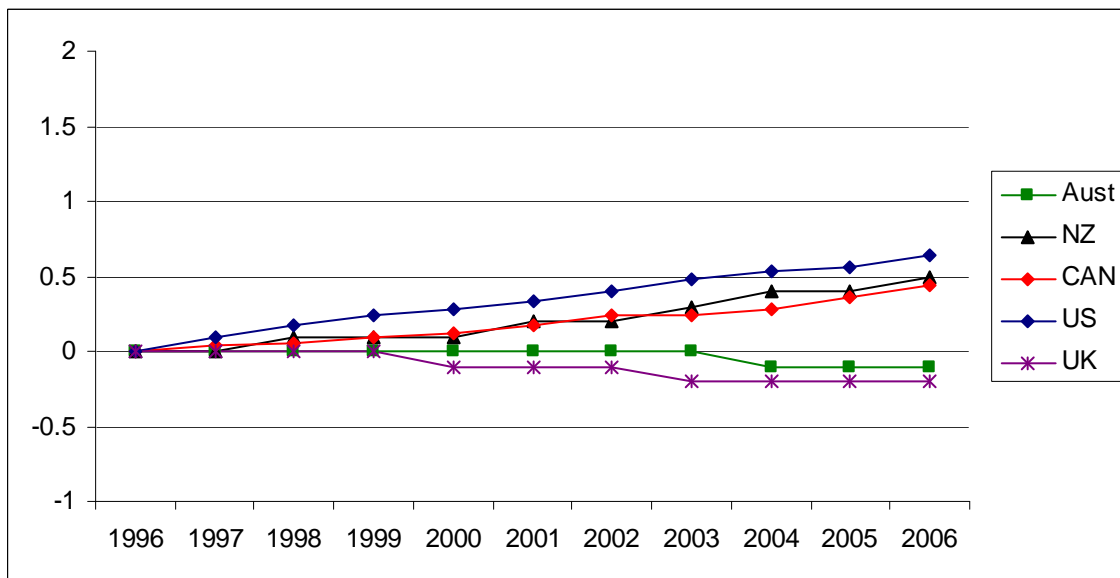
CHAROLAIS

Yearling Weight



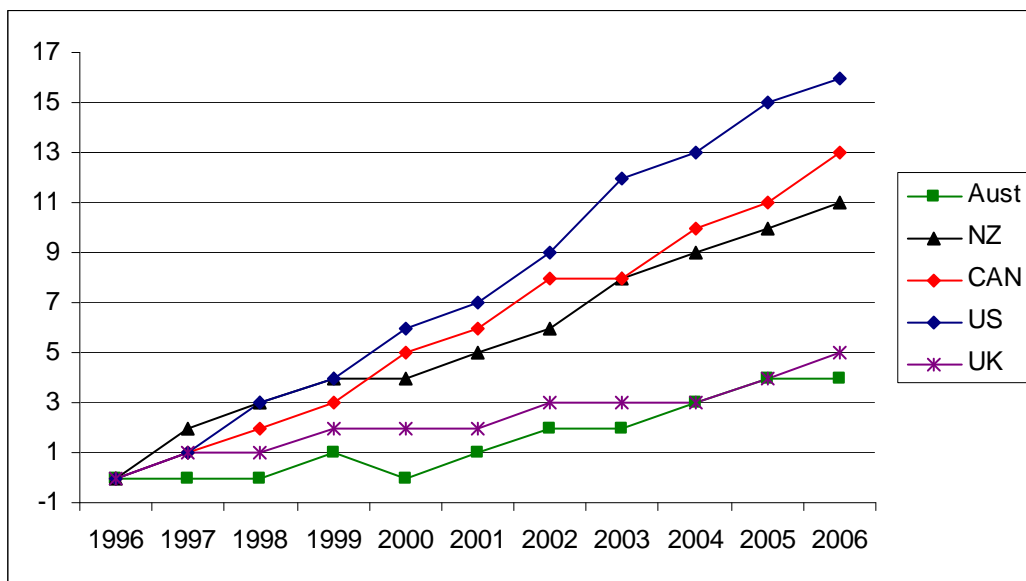
The increase in yearling weight of Australian Charolais is much less than for USA, Canada and New Zealand. The increase in yearling weight of US and Canadian Charolais has not been accompanied by an increase in birth weight.

Scrotal Size



The USA have had the largest increase in scrotal size EBVs and average scrotal size EBVs. Australia and the UK have declined slightly.

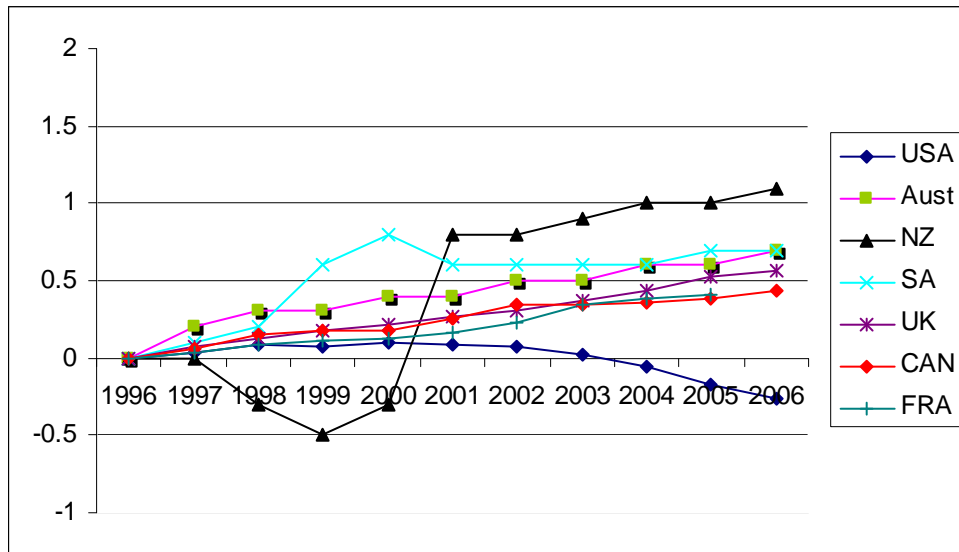
Charolais Export Index



Australian Charolais have made lower genetic gain for this index than other countries due to less progress for calving ease, scrotal size and 400 day weight.

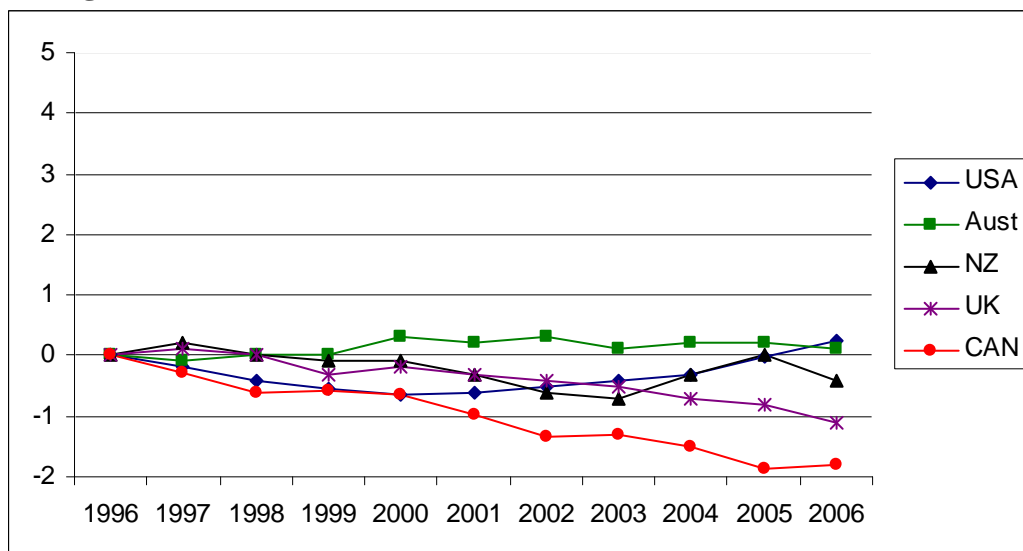
LIMOUSIN

Birth Weight



The US has been able to decrease birthweight while still increasing yearling weight. New Zealand has the largest increase in birth weight with Australia, South Africa and the UK showing moderate increases.

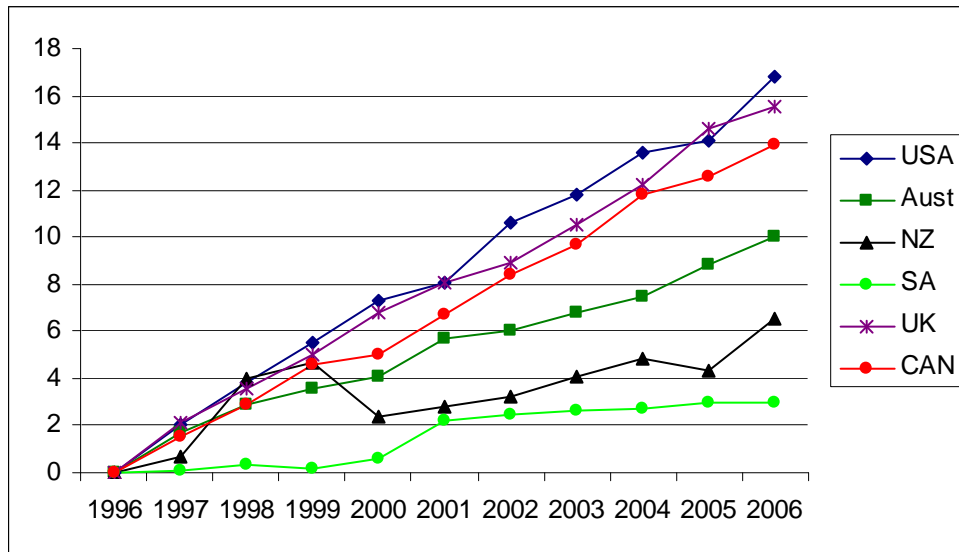
Direct Calving Ease



The change in direct calving ease for Australian Limousin is similar to the USA but superior to other countries.

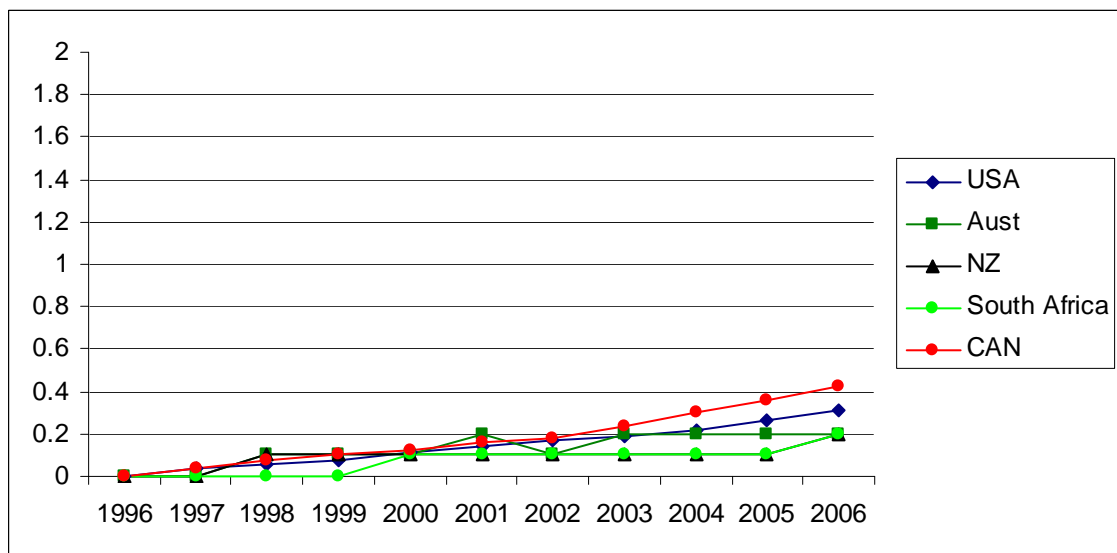
LIMOUSIN

Yearling Weight



The increase in yearling weight EBV for Australian Limousin is intermediate compared to other countries.

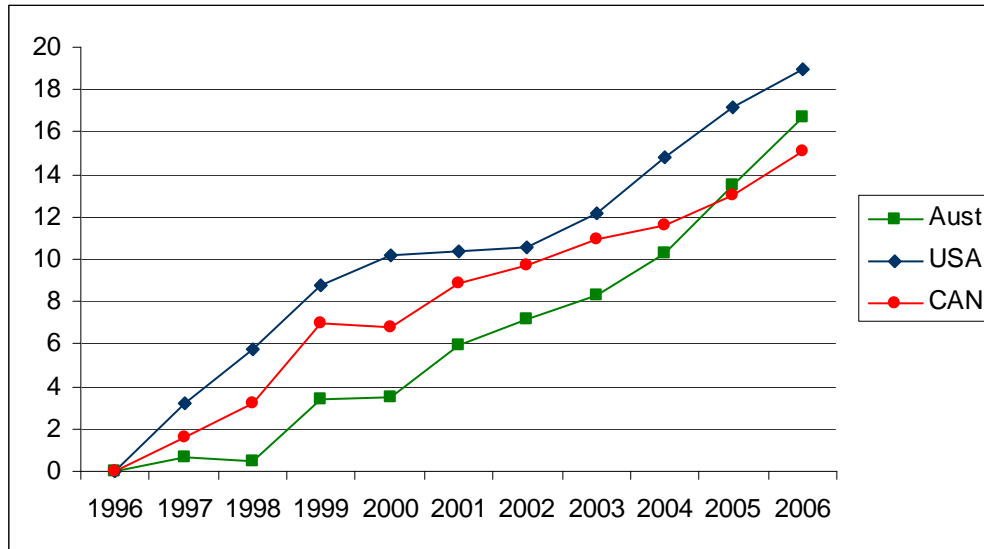
Scrotal size



The increase in scrotal size EBVs for Australian Limousin is similar to USA Limousin and superior to the other countries.

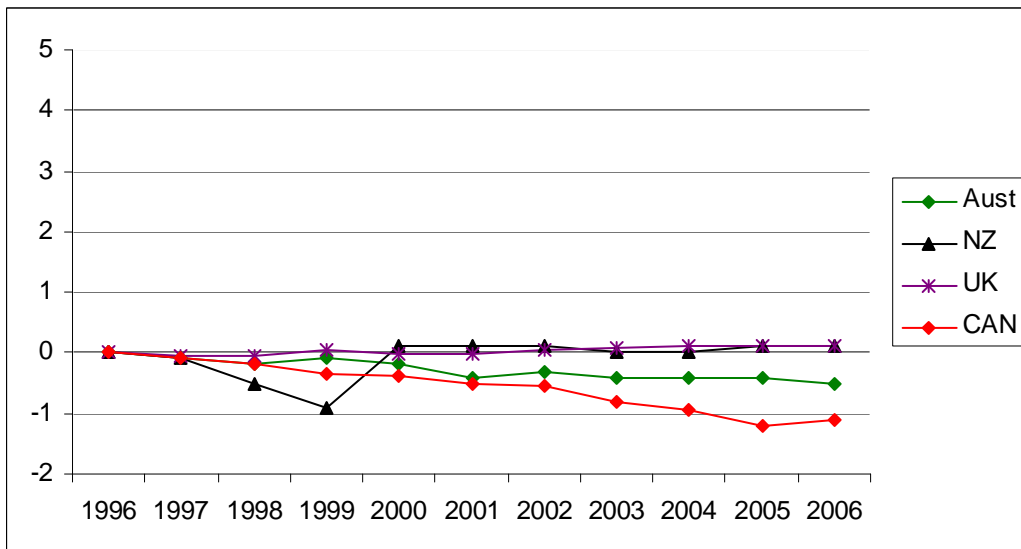
LIMOUSIN

Docility



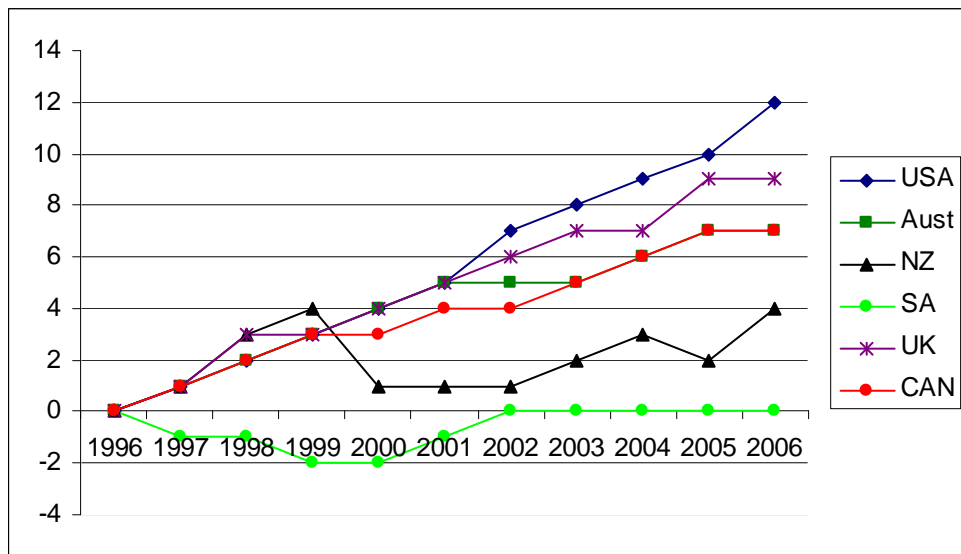
All three countries have made very good progress for docility since 1996. Canada and the USA had access to EBVs for docility about two years before Australia which first had access in 2000.

Gestation Length



Australia has decreased gestation length by 0.5 days and Canada by one day.

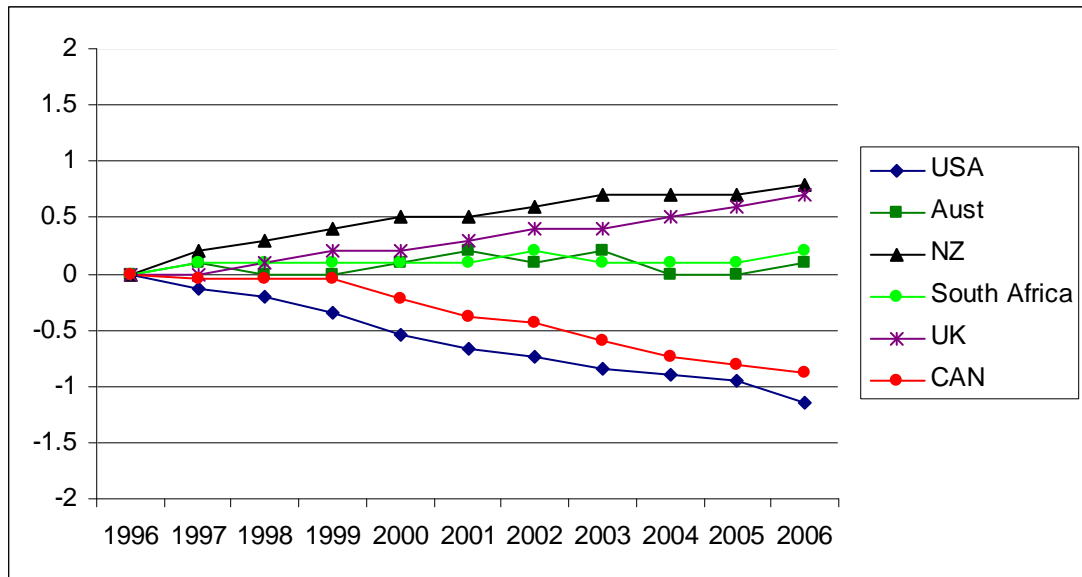
Limousin Terminal Domestic Market Index



Australian Limousin are intermediate in progress for this index

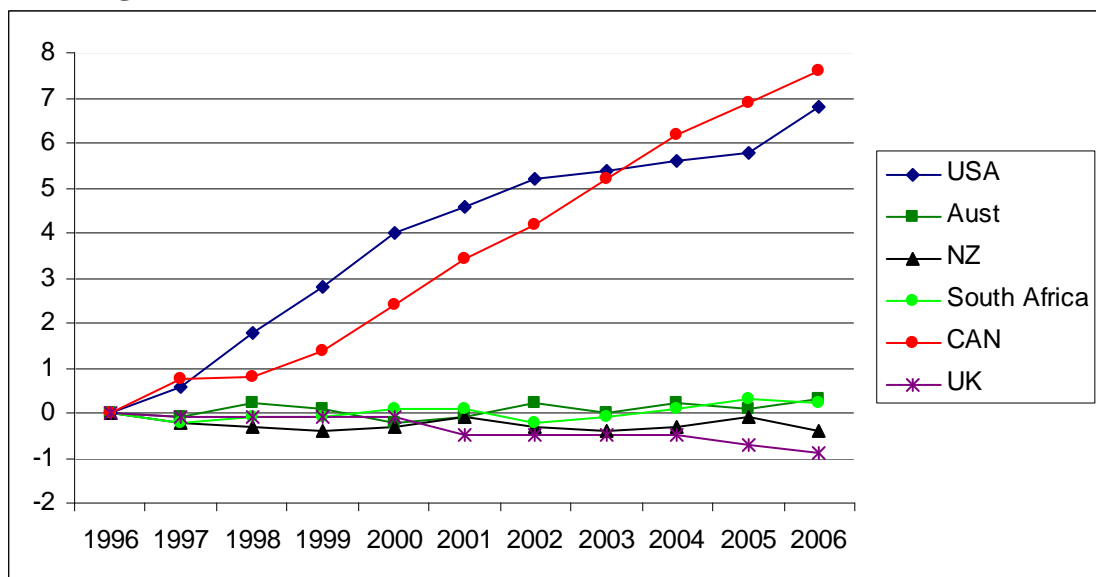
SIMMENTAL

Birth Weight



There has been little change in birth weight for Australian Simmental but the USA and Canada have significantly reduced birth weight.

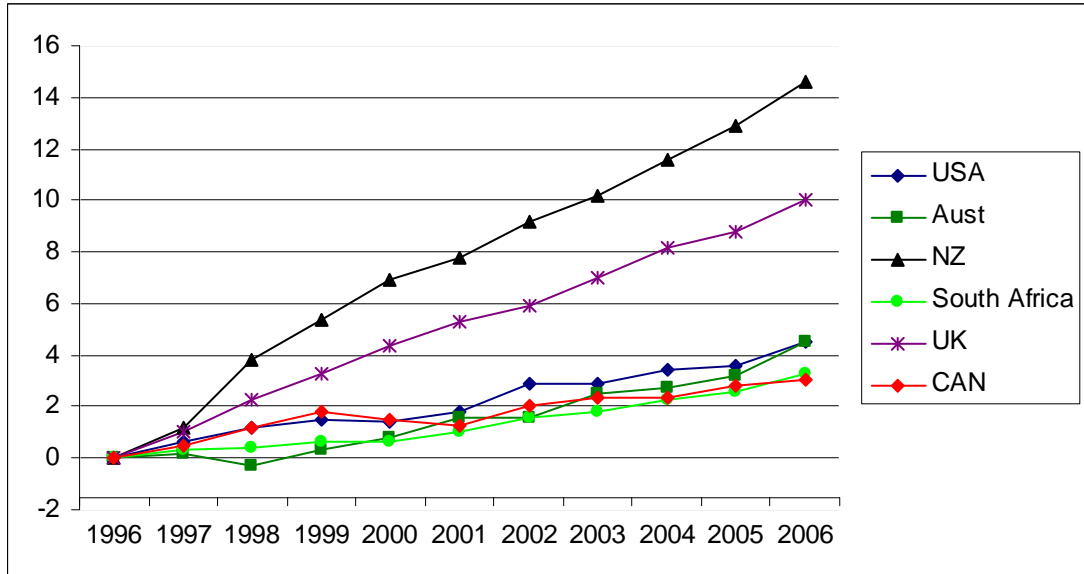
Direct Calving Ease



Australian Simmental have not changed direct calving ease compared to the USA and Canada who have excellent genetic trends for this trait.

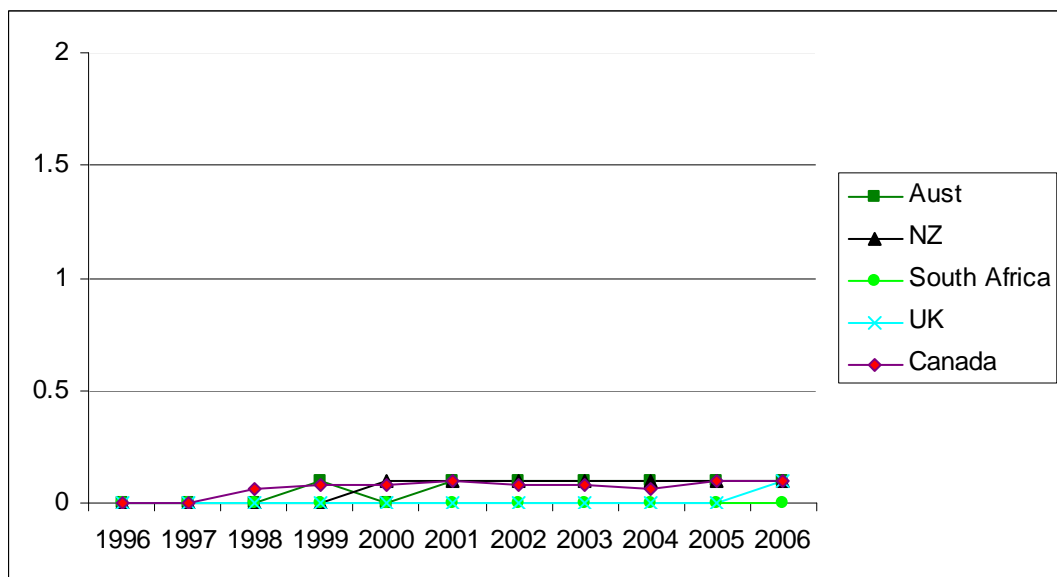
SIMMENTAL

Yearling Weight



New Zealand have the largest genetic trends for yearling weight followed by the UK. Australia's genetic trend has been relatively small but similar to the US, Canada and South Africa.

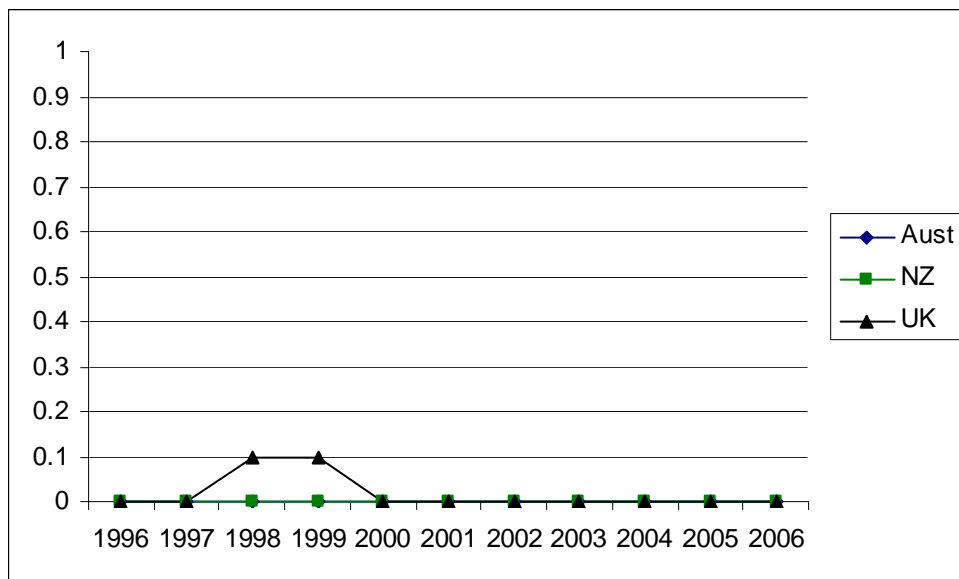
Scrotal Size



There has been minimal genetic change in scrotal size for any country reflecting little selection for larger scrotal size.

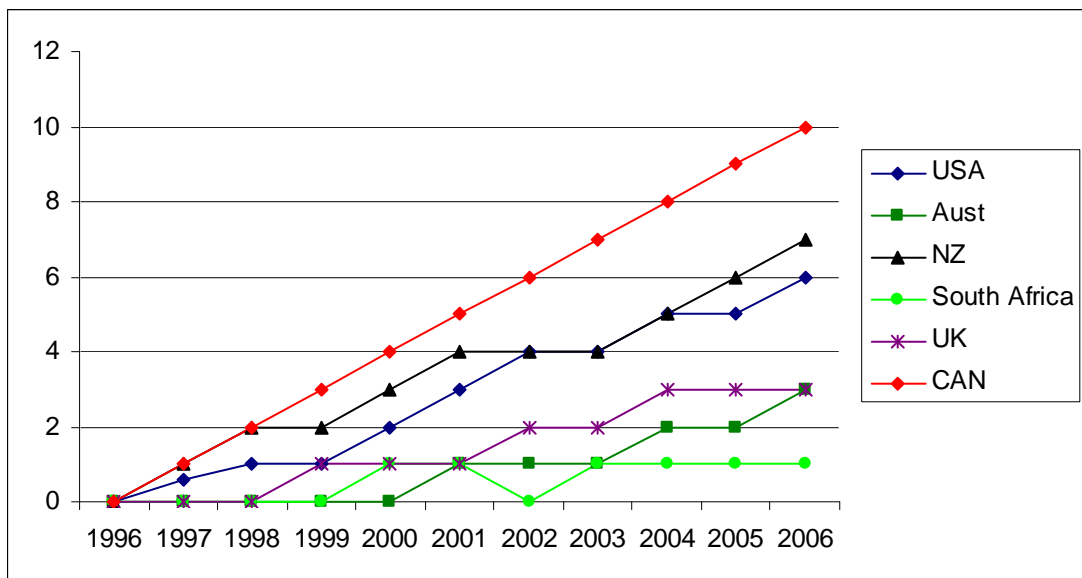
SIMMENTAL

IMF%



There has been minimal change in IMF% for Simmental in any of the three countries compared.

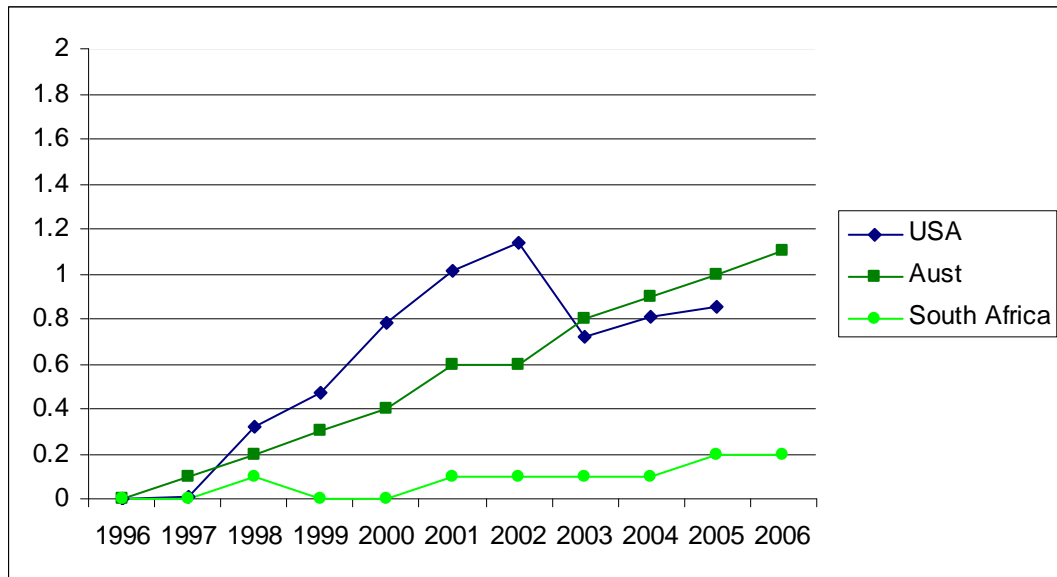
Simmental Supermarket Index



Australian Simmental have not progressed as much as most other countries for this index.

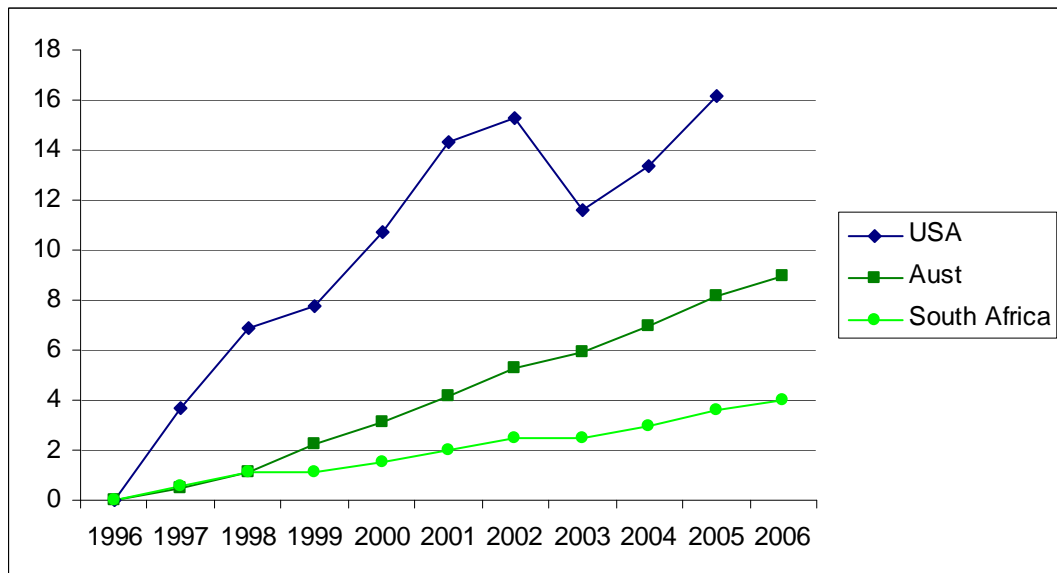
BRAHMAN

Birth Weight



Birth weight has increased for Australian Brahman similar to the increase in the USA.

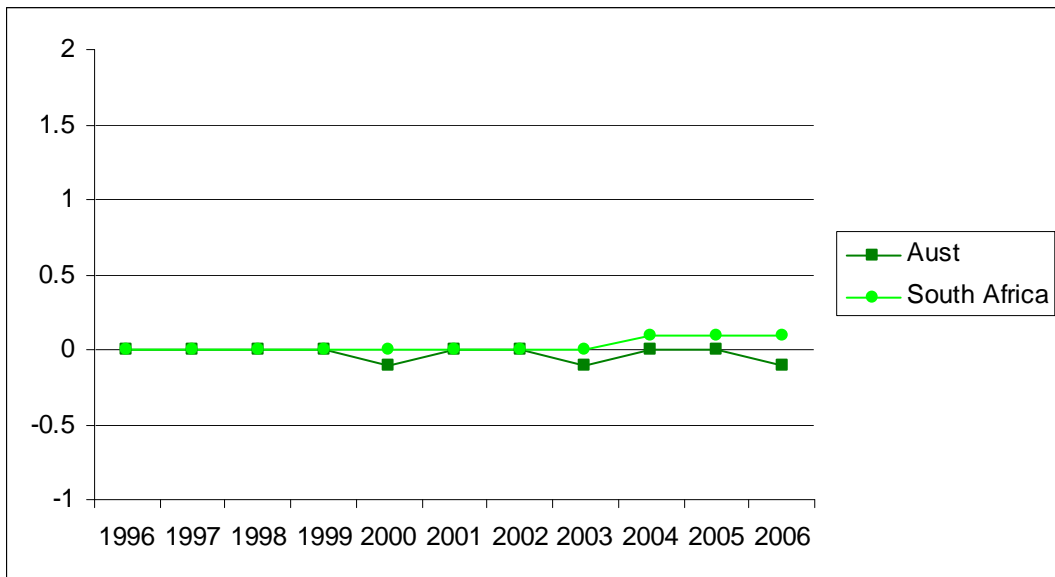
Yearling Weight



Yearling weight EBVs for Australian Brahman have increased steadily and while superior to South Africa do not match the USA.

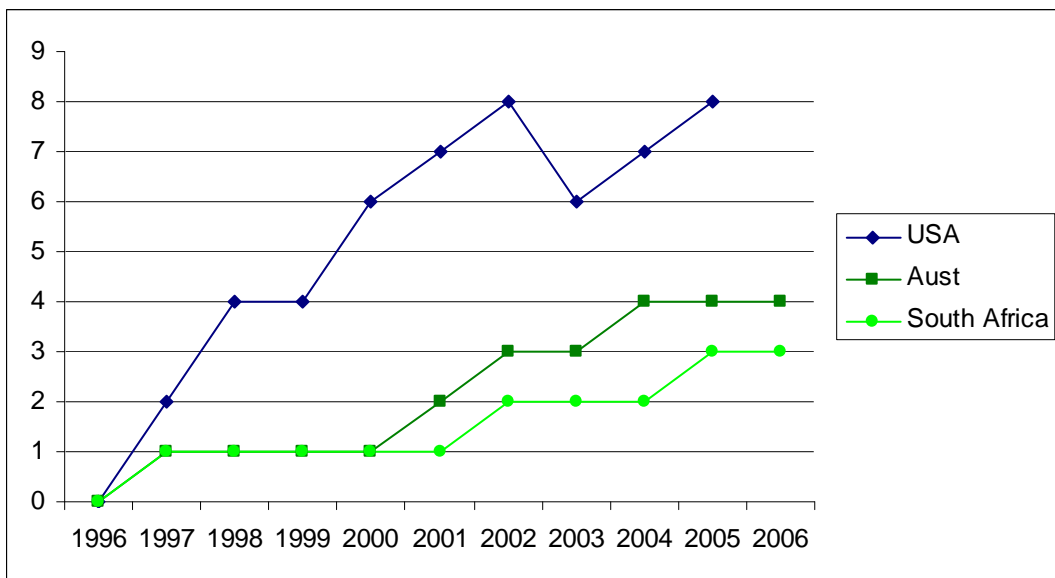
BRAHMAN

Scrotal Size



There has been little change in scrotal size in Australia and South Africa.

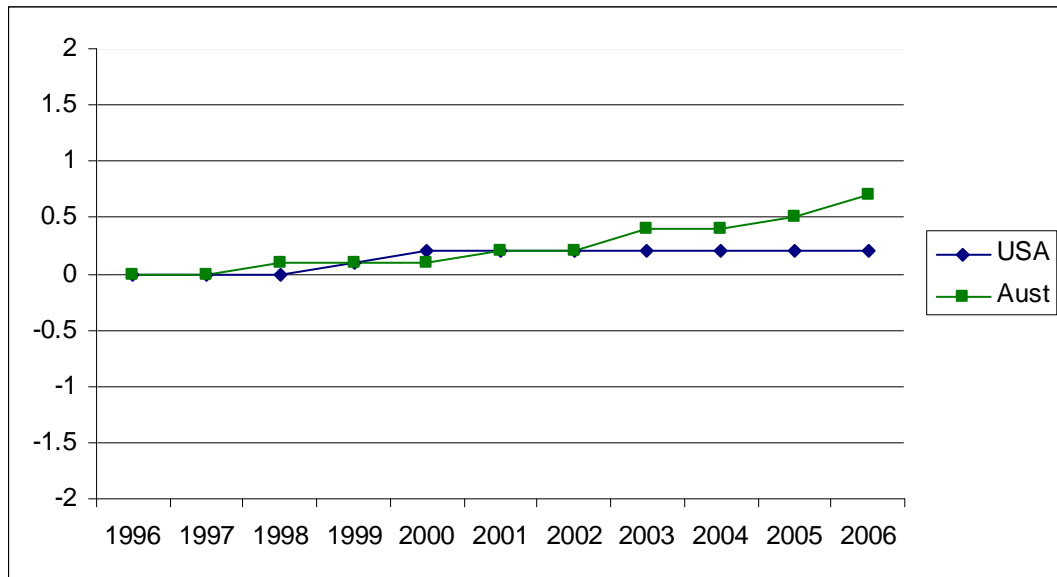
Brahman Grass fed Export Index



Australian Brahman are intermediate for progress for this index

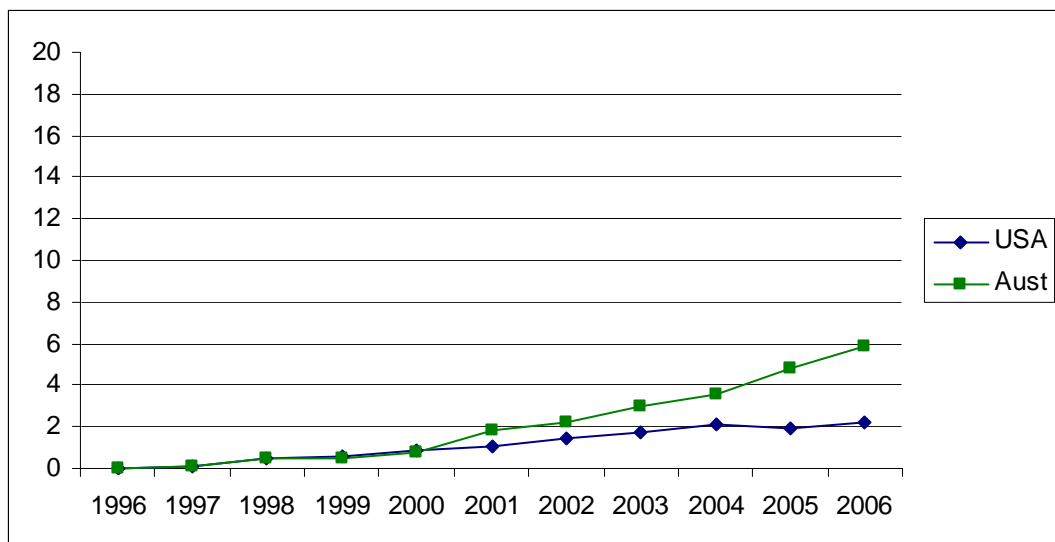
SANTA GERTRUDIS

Birth Weight



The increase in birth weight in Australia is slightly greater than the USA.

Yearling Weight



The increase in yearling weight is moderate but above that of the USA.

SUMMARY

General Comments

There was considerable variation in the genetic trends across countries and across breeds reflecting different breeding goals, different target markets (e.g. premiums for marbling in the USA and Japan) and different nutrition levels e.g. in South Africa where nutrition levels are lower and cow efficiency is considered the most important trait compared to the high nutrition grass and grain finishing systems in the UK, USA, Canada and Australia.

This analysis shows that while there is considerable variation in genetic trends for the same trait in Australian breeds the genetic trends of individual breeds are generally similar to the trends of that breed in other countries.

One exception is the consistent trend of breeds in the USA and Canada of reduced birth weight and improved direct calving ease while the trends for yearling weight are equal to or better than the trends for other countries including Australia.

ACKNOWLEDGEMENTS

The willingness of breed associations around the world to make available the genetic trends from their breed is gratefully acknowledged.

The results of this first international comparison of genetic trends for beef breeds has been made available to the cooperating breed associations from other countries.