

## **THE BUSINESS OF SERVICING SEEDSTOCK BREEDING PROGRAMS**

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### **SUMMARY**

The Australian dairy industry is the beneficiary of a national genetic improvement program. The foundation of genetic progress is the Australian Breeding Value (ABV) system managed by the Australian Dairy Herd Improvement Scheme (ADHIS). Long term progress is driven by the economic importance of production. The economic benefits justify large scale progeny testing to identify superior bulls for widespread use through artificial insemination.

Seed-stock production can be seen as operating within a pool of genetics, both within Australia and globally. Artificial breeding centres, of which *Genetics Australia* is the largest, are important contributors to this pool by way of elite Australian proven bulls, high Estimated Genetic Value (EGV) progeny test bulls and by way of females born from imported embryos. Australian registered breeders play a critical part in producing high Estimated Genetic Value progeny test bulls by using the best of overseas bulls and more and more the best Australian proven bulls.

**Keywords:** Dairy, breeding objectives, ABV's, GXE

### **INTRODUCTION**

Genetic progress for the dairy industry is commercially driven. Artificial breeding centres, of which Genetics is the largest, have an important role. Understanding the interaction between commercial artificial breeding centres and breeders depends on an understanding of what drives genetic progress within Australia and the realities of a growing internationalisation of dairy genetics.

### **THE AUSTRALIAN DAIRY INDUSTRY AND GENETIC PROGRESS**

Australia has a well established national genetic improvement program which is able to demonstrate substantial genetic progress over the past ten to twenty years.

The foundation of national genetic progress is the Australian Breeding Value (ABV) system.

The ABV system is managed by the Australian Dairy Herd Improvement Scheme (ADHIS). The ADHIS is owned and run by the Australian Dairy Farmers Federation, representatives of dairy farmers who are the end users and beneficiaries of the system.

The Australian dairy herd is bred predominantly by artificial insemination, and herd recording is practiced in around 60% of herds.

The ADHIS co-ordinates activity by herd recording organisations, data processing centres, breed societies and artificial breeding centres to enable the calculation and dissemination of ABV's for production and non-production traits.

Production ABV's are calculated for kg protein, kg fat, litres of milk and for protein percent and fat percent. Non production ABV's are calculated for conformation traits and for workability traits (milking speed, temperament and likeability).

While non production traits are important to individual farmers, long term progress is driven by the economic importance of production. Recently an Australian Selection Index (ASI) has been introduced which provides weightings for protein to fat of 3 to 1 and a negative weighting to milk volume. The introduction of the ASI is expected to sharpen the focus on a breeding objective relevant to the economic goals of dairy farmers.

The emphasis on production traits is not difficult to understand. Milk production has a high economic value and is easily measured.

The fact that herd recording (to measure milk production) is used regularly for a range of management decisions further enhances the capacity of the dairy industry to operate a comprehensive genetic improvement system.

Superior bulls identified by progeny testing are widely and intensively used by dairy farmers. Only one bull for every 30 tested by *Genetics Australia* will be returned to active service. The top bulls sell in excess of 100,000 doses in a year and are priced at over \$20 per dose. The widespread use of artificial insemination ensures that economic returns are high enough to justify the costs of progeny testing large numbers of young bulls.

#### **THE GLOBALISATION OF GENETICS**

The Australian genetic improvement program can not be seen in isolation from genetic improvement for the dairy industry on a global scale at least as far as the Holstein breed, the predominant breed, is concerned.

For a period the USA could lay claim to superiority for dairy (Holstein) genetics. However, the free movement of dairy genetics from country to country and the rapid genetic improvement possible through planned breeding programs has changed that situation.

Major dairy countries have sourced the best USA genetics, breeding sons of the top bulls, for progeny testing and identifying superior bulls for their conditions and breeding objectives.

This process has resulted in a number of countries, rapidly becoming competitive with USA genetics.

### **AUSTRALIAN STRATEGIES TO ENSURE GENETIC COMPETITIVENESS**

In Australia's case the dairy industry has always made the best use of overseas genetics. Semen from the UK (and Canada via the UK) was used in the 1960's. New Zealand semen was also used around this time. In the early 1980's Canadian semen became available followed by USA in the mid 1980's.

Our response to the availability of USA genetics was to directly import a large number of live young bulls in the late 1980's and particularly during the early 1990's. These bulls were sons of the top USA bulls and destined for progeny testing in Australia. The performance of these young bulls (obtaining ABV's between 1990 and 1995) was critical to maintaining the competitiveness of Australian artificial breeding.

Within a few years of the inflow of USA semen it became possible to source young bulls from Australian breeders with EGV's competitive with, or better than, directly imported young bulls. These bulls are now receiving ABV's and the best are performing at the top of the ABV rankings.

The evidence of the effectiveness of our strategies for bull sourcing and of our progeny test programs is clear. Of the top 34 available Holstein bulls (ADHIS rankings on ASI), 19 are *Genetics Australia* bulls and another 7 are Australian standing bulls. Only 8 are overseas bulls.

It is clear that we are meeting the challenge to be competitive by producing genetics that generally out performs the very best genetics from overseas where performance under our conditions is the measure.

The success of our strategies is reinforced by the existence of a genotype by environment (GXE) interaction.

The existence of a GXE was only slowly recognised by dairy geneticists, but is now accepted both within Australia and internationally. The existence of a clear GXE between performance in Australia and the Northern hemisphere strengthens the case for identifying genetics suited to Australian conditions.

It is also fair to say that the contribution of USA genetics to Australia was at first over rated. As more information on the performance of overseas bulls in Australia has become available, expectations (expressed in the form of ADHIS converted ABV's) have been adjusted downwards.

The introduction of the ASI as an industry breeding objective has further sharpened the focus on achieving genetic progress relevant to Australian requirements. Prior to the introduction of the ASI the industry, by default and by marketing pressures, selected on protein and milk volume. The ASI introduces a weighting for fat based on its economic value relative to protein and a negative weighting for milk volume based on the economic costs. This breeding objective is relevant to Australia and has highlighted the need to be more selective of overseas genetics, particularly from the USA population where the selection drive is milk volume.

Our strategies for remaining competitive continue to be based on the aim of progeny testing bulls of the highest EGV possible. Our strategic approach is to source a selection of the best genetics from overseas (Europe and North America) together with competitive genetics from within Australia. This approach ensures young bull teams of at least equivalent quality to overseas AB Centres, and of superior quality when performance under Australian conditions is the measure. The number of bulls tested is also important. Our aim, as an industry Co-operative, is to maximise the number of bulls tested consistent with the willingness of farmers to test them and of our ability to generate the revenues required. Our goal is a selection pressure at least as high as one bull in thirty. Our present progeny test numbers are approaching 150 bulls which will allow us to return four or five top proven bulls each year.

We are striving to increase progeny test numbers. The immediate effect will be to increase genetic progress and intensify the selection of proven bulls.

The availability of North American genetics has made a real contribution to the genetic progress of the Australian dairy herd, as had previous waves of imported genetics. However, the variability of performance of North American genetics and the tendency to initially overrate its contribution emphasises the need for performance testing under Australian conditions, and the need to be selective regardless of the future sources of overseas genetics. Without doubt the most effective way of using the best genetics available from overseas sources is to incorporate it in bulls tested through comprehensive progeny test programs.

Thus, in sourcing young bulls for progeny testing we use two avenues:-

- Australian registered Holstein breeders for Australian bred high EGV bulls
- The importation of a selection of the best of overseas genetics by way of embryos through the **Genetics Australia** EUREKA program.

Due to our particular Australian circumstances we presently find it unnecessary to work with the wider Australian cow population. The easily accessible pool of global genetics and the existence of a GXE effect mean that a relatively small part of our registered breeding sector is capable of producing the bulls required. In short, these are breeders that use the best of overseas genetics (at a high price) and understand how to systematically build high EGV pedigrees. We are able to select the highest EGV young bulls - choosing pedigrees where the overseas genetics has performed under Australian conditions and leaving behind pedigrees where overseas bulls have failed to perform. In other words we rely on Australian breeders to screen out the non-performing overseas bulls.

A high EGV is not **Genetics Australia's** only criteria for sourcing young bulls but it is the most critical measure of the potential of a young bull to eventually emerge as a superior proven bull.

Now that our own Australian standing bulls are out performing the best from overseas, our own bulls are finding their place in elite breeding programs. In 1996 over one-third of the progeny test team will be sons of *Genetics Australia* proven bulls. The increasing use of our own Australian proven bulls may lead to a broadening of the cow population we use for progeny test bulls.

On the other hand overseas populations will remain an important direct source of high EGV young bulls. The breeding progress possible within large overseas cow populations, their heavy investment in breeding programs using the latest embryo technologies, and the need to inject outcross bloodlines means Australia must access the global pool of genetics.

*Genetics Australia* has invested heavily to facilitate the direct introduction of a selection of the highest rated overseas genetics. The Eureka program has been established around a herd of recipient cows allowing us to import and implant over 200 frozen embryos each year. The aim is to produce around forty of the 150 to 200 Holstein bulls progeny tested annually. The females produced from these embryos are sold to Australian breeders, further enriching our Australian population with directly imported genetics and providing *Genetics Australia* with a future source of bull mothers.

The Eureka program gives *Genetics Australia* some direct control over the genetics imported into our population. It has also allowed us to enter a strategic alliance with Holland Genetics giving access to advanced breeding programs considered by many to be at the leading edge of world dairy genetics.

Bulls produced by the Eureka program while fully owned by *Genetics Australia* will be progeny tested in Australia and The Netherlands. We expect at least fifty young bulls will be jointly tested during 1996 and 1997 with the first breeding values in each country expected in the year 2000.

This alliance and overseas proofs achieved on some other individual *Genetics Australia* bulls, will give Australian genetics a presence in the growing world genetics scene.

The investment in the Eureka program is substantial. By the time the first bulls receive ABV's *Genetics Australia* will have invested over 2 million dollars on behalf of Australia's dairy farmers.

#### **INTERNATIONAL GENETIC RANKINGS - INTERBULL**

The gene flow between countries, made possible by freeing of disease controls and by the use of frozen embryos, has stimulated a desire for international genetic rankings. The international organisation Interbull is developing systems for processing data to produce genetic rankings across countries. Australia will supply official data to Interbull in early 1997. Interbull rankings for countries such as Australia will be heavily based on the Australian performance of a bull's progeny (recognising the existence of a GXE effect) and bulls ranked on the basis of Australian Breeding Values. Interbull rankings will not vary greatly from existing measures used by ADHIS to compare the likely performance of overseas bulls with ABV rated bulls. They will however,

assist industry understanding of between country comparisons and ensure Australian stands alongside other countries in the growing globalisation of dairy genetics.

**FURTHER INFORMATION**

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