

**INTERNATIONALISATION OF BEEF BREEDING
PROGRAMMES****D. Nicol****Summary**

Internationalisation of beef breeding programmes in the past has been a function of uptake of AI, entrepreneurial efforts and development of beef production in new areas. Increasing use of information technology eg. World Wide Web will accelerate trade and demands for international genetic evaluation systems.

Advancements in this area will be more focussed on genetic improvement of traits and multitrait merit. A number of countries and AB companies are ready and willing to embark on international genetic evaluation of beef breeds, but it will take some time for the commercial issues to be clarified and a coordinated approach to be developed. Application of AI at the commercial producer level is still a major constraint.

Internationalisation is inevitable because importing beef breeders are developing strong, multitrait genetic evaluation programmes and if imported bulls do not deliver merit for the importing countries, they will look elsewhere, hopefully nearer to home.

One further challenge for internationalisation of beef breeding programmes is that it requires geneticists with a strong expertise in contemporary genetic evaluation methodology but more importantly a good knowledge of the biology. Geneticists who will lead the charge into this new area will require 'mud on their boots', vision and commonsense in abundance and the persuasive powers of a career diplomat at a global warming conference.

Beef is competing worldwide for the centre of the plate with other meats, legumes and pastas. A revolution is taking place in the western world as beef producers change from a production to a consumer focus. The top twenty percent of beef producers in each country can only increase the efficiency of sustainable systems by small increments. Permanent gains from genetics have a big role to play in the future of international beef production.

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Never has the need for strong beef genetic evaluation systems been greater. Never has the need for balanced genetics in beef production been more important. Information technology like the World Wide Web is allowing beef producers to have access to research reports and sire summaries from many countries. Semen and embryos are transported globally with only health restrictions as constraints. A beef sire with demonstrated merit for a trait or traits is a valuable asset with potential global sales. Who in the Angus world does not know the name Scotch Cap, a sire with merit for growth, carcass yield and marbling traits? His semen has been exported to all corners of the globe with sons and grandsons dominating breeding programmes in many countries.

In spite of the availability of genetic rankings on donor sires from national programmes, importers still want to know how imported genetics will perform in their countries. The demand for international genetic procedures is rising each year and internationalisation of beef breeding programmes will not progress much until they are in place.

From the above you might imagine the pathway to internationalisation of breeding programmes is well planned and that coordinated efforts are being made, however this is not the case. Unlike the dairy industry where INTERBULL has led a coordinated effort for single world rankings on sires, the global beef industry has a fragmented approach to the subject.

This paper will concentrate on international genetic evaluation for beef and to a lesser extent on the commercial aspects of internationalisation.

National focus

Before an international system is possible, strong national programmes must be in place. The development of national breeding and genetic evaluation programmes is extremely varied between countries. This has been helped or hindered by a range of factors. Major factors include the following:

1. The access to and availability of genetic research groups that can blend the biology, economics and the mixed-model methodology.
2. The strength of the interface between the scientist and the producer.
3. The support of breed associations - promotion of concept to members
– supplying a national database for evaluation
4. Support from Government.
5. Strong or weak commercialisation of the technology.
6. The extension of the technology to all sectors of the industry
7. The terms of trade for beef in the country.

In Australia the model for development of our National Beef Recording Scheme and the genetic evaluation programme BREEDPLAN has worked well. Through governmental and producer funding, with the Animal Genetics

and Breeding Unit (AGBU) as the research workhorse and the Agricultural Business Research Institute (ABRI) as the commercialiser, the production and delivery of a multi-trait model has been highly effective over the last decade. This centralised process of alliances has worked well. State departments have seconded staff to take up a national extension coordinator's role, but a key to high uptake rates in this country has been the appointment of technical officers or consultants by some breed associations.

Challenges for international genetic evaluation

The technology to move to international genetic evaluation is available. INTERBULL has evaluated this for dairy and the principles apply to beef, with some variations. Leading breeds in genetic evaluation such as Angus and Simmental are probably the most advanced in readiness.

The export of pedigree and performance software systems, eg. International BREEDPLAN can be a catalyst to international genetic evaluation. Since these systems use common data collection formats, breed associations in countries using the system can move relatively easily to international evaluation. This has already commenced regionally with a number of breeds conducting an annual evaluation between Australia and New Zealand.

A single breed can make headway towards combined genetic evaluation on a regional basis, but using different input and evaluation systems eg. the joint research conducted by the Hereford and Poll Hereford breeds in North America.

There is however some conjecture about the need for a world genetic evaluation from some quarters. Some people in exporting countries believe the marketing of a sire's objective information from his national programme is all that is needed. They believe producers in importing countries just have to learn the exporting country's performance figures.

Technical limitations

Linkage between countries is assumed by many as adequate but if we are to have multi-trait evaluation the linkage for all traits needs strengthening by the nomination of international reference sires. This is a major constraint.

The question of genetic by environmental interaction (G x E) between and within countries has to be researched further. Slowly but surely GxE research can develop along the lines of Meyer and Garrick (1995) who examined potential re-rankings before the joint evaluation of the Australia and New Zealand Angus, sponsored by both breed associations.

For most breeds a huge job will be the issue of unique identification numbers. Few breeds have an international ID. format and adoption of international formats or alias systems will be an important step which will require time and coordination to expedite. Alias software systems may be more cost effective than changing to an international format.

Traits

A problem with internationalisation of breed programmes has been the traits measured or the measurement unit eg. weights versus weight gains or pounds versus kilograms. Some countries have a wide range of traits being measured, others have few. Some have traits measured in the fertility, growth and carcass areas others are dominated by weight traits.

The language of genetic evaluation is different too with some countries adopting EBVs and other Expected Progeny Differences or EPDs.

Carcass traits

With the increasing focus on the customer, the country or breed with carcass rankings on qualitative and quantitative meat traits has the high ground at this point. The challenges are to initiate progeny tests in commercial herds. In Australia, the Beef CRC progeny test featuring a number of breeds plus commercial Angus, Hereford and Murray Grey progeny tests such as that conducted by Elders IGM, are crucial to provide the carcass information on sires which will provide the information the commercial producer requires. This combined with ultrasonic real-time scanning and DNA marker tests will be the tools for carcass improvement. Many more breeds need to be involved in progeny testing for carcass traits in Australia and in other countries. Work on carcass evaluation will require a very high level of cooperation between all sectors of the beef industry to track the genetics through the many phases. This carcass data is so important yet so difficult and costly to obtain that many producers believe there is a justification for international genetic evaluations on the basis of carcass traits alone.

International breeding objectives

A weakness in the development of performance recording systems at the national level has been the lack of work on formalised breeding objectives for beef.

The weighting to give to traits in the breeding objectives has largely been ignored or assumed. As evaluation systems move to multi-trait, more attention will be focussed on reproductive performance and carcass traits which in the early stages will move the research effort back to national goals rather than international goals. Here again the Australian beef genetic evaluation system is prepared with the development of BREEDOBJECT, a PC-based programme to give producers weightings on traits and customised selection indexes.

Tropical and extensive

The tropical breeds and tropical zones have been slower to adopt the aforementioned technologies. Is there a role for internationalisation of tropical breeding programmes? The dissemination of tropical genetics has been slower than the temperate genetics because of the inherent problems of development in the tropical zones. However when one considers the size of the recorded Nellore herd in Brasil or the Sanga and Sanga-derived breeds in Africa and Australia, or the spread of the Brahman breed from its southern USA origins throughout the southern hemisphere and back into Asia, there is great scope for internationalisation. The export of Belmont Red semen from Australia to compare with the Bonsmara in South Africa (Seifert et al., 1985) is the type of international project which is of value for internationalisation of beef breeding.

The benefits from such projects may not be in the spread of genetic merit but rather in a greater understanding of breeding objectives for sustainable breeding programmes for harsh or fragile environments plus the interactions between scientists from relevant zones.

A recent trend is the development of new tropically-adapted, multi-breed composites. Most of these include more than four breeds including *Bos indicus*, Adapted Taurines (*Bos taurus* breeds adapted to the tropics, mainly Sanga breeds), and *Bos taurus* (British or Continental European) breeds in various combinations. This movement has led to international exchange of semen and in time no doubt will lead to multibreed genetic evaluation. Mate selection programmes have a strong role to play here.

The identification of major genes eg. the anti-tick gene (Kerr et al. 1994) will lead to international exchange of semen and new breeding developments.

Whereas beef seedstock herds around the world are traditionally small (<40 head) the development of breeding programmes in the tropics often involves large companies and herds. This in itself will encourage internationalisation as well as the vertical integration possibilities of enhanced conception to consumption supply of consistent product.

A range of little known tropical breeds could be exported widely in the future. An example is the Senepol breed from St Croix in the Virgin Islands

which has been exported to Zimbabwe, Paraguay, Australia and Venezuela in the last two or three years or the Belmont Red which has been exported from Australia to South and Central America and Oceania.

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INTERNACIONALIZACIJA UZGOJA MESNOG GOVEDA

Sažetak

Internacionalizacija uzgoja mesnog goveda bila je u prošlosti u funkciji shvaćanja AI, nastojanja poduzetnika i razvoja proizvodnje govedeg mesa u novim područjima. Sve veća primjena informacijske tehnologije, npr. World Wide Web-a ubrzat će trgovinu i potražnju za međunaradnim sistemima genetske procjene.

Napredak na tom području bit će više usmjeren na genetsko poboljšanje osobina i prednosti više osobina. Izvjestan broj zemalja i AB poduzeća spremni su i voljni započeti međunarodnu genetsku procjenu pasmina ali trebat će vremena da se razjasne komercijalna pitanja i razvije usklađeni pristup. Primjena AI na razini komercijalnih proizvođača još je uvijek velika zapreka.

Internacionalizacija je neizbježna jer uzgajачi uvezenih goveda razvijaju jake programe genetske procjene mnogih osobina i ako uvezeni bikovi ne donesu koristi zemljama uvoznicama potražit će drugdje, nadajmo se bliže doma.

Još jedan izazov za internacionalizaciju programa uzgoja mesnog goveda je potreba za genetičarima s velikim stručnim znanjem u suvremenoj metodologiji genetske procjene, a još više dobrim poznavanjem biologije. Genetičari koji će nositi teret u ovom novom području trebat će "blatne cipele", viziju i mnogo zdravog razuma, te uvjerljivu moć diplomata na svjetskim promotivnim konferencijama.

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