

## DEFINITION IN BEEF CATTLE IMPROVEMENT

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Animal livestock selection, breeding and management, except perhaps in species such as pigs and poultry, is by its very nature a long drawn-out and relatively unpredictable process. Objective methods used in most selection procedures are tending to become more sophisticated, more expensive and far more time consuming to apply than subjective methods of selection such as eye balling or natural selection.

As the genetic process is so slow breeders must be confident at the outset of a selection and breeding program not only that they are selecting for heritable and economic factors but also that their emphases are ranked in the correct priority and that these selection pressures will ultimately bring the breeder to a satisfactory conclusion as close as possible to his defined objectives.

Providing the breeder's goals are achieved the economics of the particular industry generally more than justifies the application of expensive and sophisticated selection procedures.

On the other hand a great accumulation of useless technical data can easily become either a burden misleading to the breeder himself with selection errors resulting in the breeding program or else appears as a misrepresentation of facts in promotional programs with serious economic consequences to other breeders within that particular industry.

In the cattle industry, as a segment of a generally conservative rural industry, we have a traditionally very conservative and cost conscious hard core membership which tends to resist interference and change, particularly if that change is costly, complex or its benefits unclear. I believe there are great economic benefits to be gained from the introduction of genetically sound, practically orientated improvement programs, a peasant like future and perhaps total oblivion probably awaits the ultra conservative producer who believes that what was good enough for Grandfather is good enough for him. (It is quite ironical that a person as practical as a cattleman often has difficulty in accepting and dealing with facts).

I believe there is no such thing as standing still, particularly in a breeding program. One either moves forward or backward and with only two options, who would voluntarily opt for the latter!

The tough question is - What is Forward? Having hopefully determined that, how fast can we travel in that appropriate direction? Can the hazards or side effect disadvantages along the road be foreseen and avoided? Will these disadvantages outweigh the advantages of our objectives when finally we do achieve them and if so, will we find any bridges burnt and thereby hinder our progress should we try to backtrack from that ultimate position.

All breeders must remember that not only are market demands different and changing but also that environments are different and seasons change and different livestock strains react differently. Consequently, it is vital for the individual breeder to clearly define his own production objectives and ensure that they are practical and achievable within the prevailing market and environmental circumstances.

Let me now try to be more specific. Over the years we have all seen breeds and breeders take the wrong road forward with sometimes disastrous

results. However at the time they moved in that certain direction they firmly believed or were told that their objectives were right.

For instance, in the late '40s and early '50s, many breeders selected for early maturity and easy fattening with a resultant sharp decrease in animal size. This trend was then further emphasized by heavy selection for "compact" cattle (short, low and heavy for small primal cuts) with Dwarfism suddenly emerging as a side effect. Some breeds and many breeders did not survive the results of this disastrous trend.

The pendulum immediately swung, as a corrective measure, in the reverse direction towards tall, long cattle which automatically meant late maturity as an unselected side effect. As with the previous move to compact cattle the trend back to big cattle was then also further emphasized in a second stage by the increased demand, not only for big, muscular animals but also for extra lean or trim cattle to help offset the inefficiencies and costs of grain feeding at a time when manufacturing meat was scarce world wide (which incidentally it still is). This was also the era of the Euro-exotics.

As one might expect from past experience, when humans manipulate animals to suit their own peculiar needs as opposed to Mother Nature's agonisingly slow evolutionary processes, deleterious side effects tend to emerge and multiply, whereas under natural selection such side effects tend to be self eliminating.

The manifestations of the giant animal trend appear to be very late maturity, reduced fertility, the emergence and constant use in our vocabulary of the word Dystocia, double muscling, skeletal defects, cleft palate syndrome and extreme leanness of carcass as well as higher maintenance level requirements, reducing the ability to survive environmental stress.

Surely somewhere in the "middle of the road cattle" one would expect to find safety from unwanted manifestations as well as economic and genetic security of production. Well, only maybe. The middle of the road is certainly not the place for the "Avante Garde" breeder for he is always well to the left or right of the road and no field of human endeavour can do without them, at least in small numbers. Also, I always feel that the middle of the road is the best place to get run over! Added to this, the wider the gene pool the more freedom of genetic movement we actually have and the more rapidly can we react to changing market demands.

Equally importantly, the two major changes of direction just described in livestock production with such disastrous side effects were unquestionably responses to definite existing economic pressures. One thing we can be certain of is that market demands will continue to change in the future and cattlemen will continue to react and over-react to those demands. We still see these two extreme types of animals in economic production. For instance, in the United Kingdom the small, very early maturing, overfat bull is still in high demand as a terminal crossing sire over the lean, large framed Friesian type dairy females for beef production. Contrarily, the large, lean beef sire is still popular in those areas demanding more manufacturing meat than is currently available.

Can we then learn from the lessons of the past and step with confidence into the constantly changing future where our product must equate with world market demands as they occur and not at some later point in time after the demand pendulum has again swung in a different direction.

Perhaps I should emphasize the importance of anticipation, timing and the correct ranking of priorities in any selection and breeding program of the successful livestock breeder. Little wonder that not too many of us are truly successful.

It is, I think, a genetic truism that the more selection pressures we apply the slower will be our rate of achievement towards those various goals and the fewer objectives we aim for then the faster will be our general rate of progress, providing the basis on which we make those selections are both heritable and objectively assessed.

To give an actuarial example of this formidable problem I could quote the story of the very fastidious bachelor who seeks to take unto himself a wife. First he insists that she must have a pretty face and maybe only one girl in a hundred is so blessed. He then insists that she must have pretty legs (again ratio one in a hundred), result - only one in ten thousand combine both attributes. Then on the more practical side this veritable paragon of a wife must also be a good cook (again say ratio one in a hundred), result - only one in a million can be found blessed with these three highly prized attributes. Then sensibly and most importantly she must have a good sense of humour (ratio one in a hundred). If the mathematics work out, and I am not too sure that it does, then this delightful girl will occur only once in one hundred million. That is why, after having done his sums, this poor benighted bachelor migrated to Mainland China, as being the only source of sufficient population genetics!

Of course the moral to the story is that if we can confine our selection parameters to only one factor then we can make rapid progress but as these are added to, if only up to four, then the task of the determined, intelligent breeder becomes almost impossible.

Perhaps in the interests of progress our selection procedures should be limited to only one factor or may be two at the most and also perhaps the one parameter we select for should simply be the one economic factor with the highest degree of genetic heritability.

The above statement begs the question regarding present performance testing procedures. Is maximized growth rate the correct objective? What are the side effect disadvantages of this pressure, if any, and most importantly, what is the relative cost of improved growth rate in terms of feed conversion and efficiency? Further, what is the composition of that growth rate in terms of muscle, bone and fat?

If every cattleman in Australia decided to record and performance test his breeding herd, say on the basis of growth rate alone, would we become locked in to an inflexible genetic position when nutrition and pasture production become even more important on the cost input side to the extent of diseconomies of scale resulting in the literal sense?

To continue my appointed role as Devil's Advocate of performance testing it seems that most growth rate selection programs are built around the pin-pointing of superior sires (by testing growth rate of their progeny) and then stepping backwards, genetically speaking, by reusing and over-exposing that individual superior progenitor.

Apart from the obvious risk by such practice of compounding as yet hidden deleterious genetic side effects, I should imagine there must be a very narrowing or constricting effect on the gene pool resource base.

Those who know me will now smile in recognition of my hobby horse in the form of rapid generation turnover. Only by the early use and the early discarding of superior sires in preference for their superior progeny (as opposed to over-exposure of superior sires or grandsires) can the benefits of an ever widening gene pool be capitalized on. Why cannot we project our selection emphases forward instead of backward?

Having already seen that we must not only severely limit numerically our selection pressures but also ensure that those pressures are the correct ones, I would hazard a guess that in the higher rainfall areas of Australia, successful selection for parasite tolerance (be it ticks at Townsville or worms at Wallamumbi), and I mean natural tolerance rather than at this stage induced immunity, could easily have a bigger, more salutary economic impact than all the growth rate selection pressure we could apply. Despite all its inherent genetic potential for growing, a worm or tick infested animal has a very poor growth rate! The cost of keeping animals parasite free to allow that growth potential to manifest itself can be a huge economic burden in the form of aricicides, anthelmintics, labour inputs and even production losses.

Despite the fact that I have long been an ardent and practising enthusiast of performance testing, and to continue my appointed role of Devil's Advocate I feel the need to re-examine and if possible, re-affirm our existing priorities and procedures.

To precis the points I have attempted to make in this paper, I now pose the following questions.

- a) Can we afford to objectively measure, record and select for any more than one factor of industry economic importance?
- b) Could or should we be allowed the luxury of choice - e.g. fertility or lactation, or growth rate, or early coat shedding, etc.?
- c) Is growth rate selection the best, simplest and most effective road to take and if so, what are the side effect disadvantages?
- d) Might some other parameter be of greater economic significance, e.g. tolerance to parasites or disease, improved fertility and fecundity resulting in greater cash flow and greater numbers for selection?
- e) How do we achieve wider industry acceptance by both pedigreed and commercial breeders of the present or some future improved performance testing program? Should we in fact seek such wide acceptance?
- f) To what extent should any performance testing program be tied into an economic analysis of production costs and potential market availability and specification, e.g. early or late maturity or fat or lean meat production?
- g) What is the effect on management costs and rate of fodder disappearance and conversion efficiency resulting in changes from the status quo of animal performance?
- h) We performance test live animals for increased efficiency but what of the end product, the carcass? Do we in reality end up with maximum muscle, minimum bone and optimum fat and is the end product profitable for the producer and processor, acceptable to the consumer and in line with changing market demands? Or put another way, is

there any relativity between the producer's most profitable beast, the processor's most profitable carcass and the consumer's most palatable product? If not we are on the wrong tram!

- i) Would we not be better served by forward projection in the selection and introduction of superior genes as opposed to looking over our shoulder for superior ancestors?
- j) Is cross breeding a faster and more efficient way of achieving our objectives through increased gene pool size? If so, how much of the benefit is simply a result of heterosis?
- k) How transitory is hybrid vigour and to what extent does heterosis muddy the already murky waters of the breeder who is seeking to improve those more permanent, heritable factors affected by true genetic vigour?

I have long felt that genetics as understood and practised by the breeder left a lot to be desired. I see this gathering as the ideal forum to analyse and assess the many questions appertaining to industry problems and to recommend solutions acceptable to the breeder and fruitful in their ultimate application.

In conclusion I welcome the setting up of the Australian Association of Animal Breeding and Genetics and congratulate those people responsible for its conception, gestation and birth. I trust that this new being will have a rapid growth rate, enjoy mini care management, introduce no deleterious side effects, live up to its expected performance, satisfy industry demand and find a ready market for its diverse and complex products.

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