

Why should I improve my cattle at a

GENETIC LEVEL?

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BACKGROUND

First, it is important to understand the fundamental reason for selection of animals in pursuit of livestock improvement.

In general, selection is a process by which the best animals today are chosen to be parents of the next generation with certain desired and inborn characteristics. Genetic improvement based on within-breed selection or even cross-breeding is widely used in cattle breeding and has led to dramatic changes in beef cattle performance in recent years.

SELECTION FOR FUNCTIONALITY

Whether it is for or against a trait, selection remains the cattle breeder's most useful technique for bringing about change in the genetic composition of a herd or a breed. Using principles of selection for functional efficiency, we can visually appraise and rank cattle from best to worst given specific predetermined biological ideals. These ideals must be based on the fundamental functionality of an individual animal. But is our visually best animal, truly genetically superior?

Can we tell among the functionally sound cows of the same breed (Figure 1) as to which is genetically superior? We most definitely cannot tell for sure. We need more informa-

FIGURE 1:

Two Boran cows of sound visual appraisal. Which of the two is genetically superior?



tion than what the eye tells us (see Table 1). This is especially so because what we see also gets to be analysed at an emotional level, affecting the objectivity of the decisions that we make. When our “best” cow weans the worst calf in the contemporary group, we are often left guessing. If we knew the breeding values (genetic merit) of the parents, we would not be guessing.

Visual appraisal for functional efficiency as we know it from the distinguished work of the late Professor J Bonsma as well as breed standards as prescribed by some breeder’s societies mainly assists us in selecting a functional animal. We however need to go even further and ensure that the trait which was selected for, can possibly be transmitted to the next generation of animals. It is for this reason that Professor J Bonsma further popularised the saying: “Om te meet is om te weet” meaning, with performance measurement your knowledge increases. Breeding values on the other hand, are derived or computed from these measurements.

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What if we knew what the breeding values of the two cows were? Will our choice of the “best” cow be different? Table 1 presents the breeding values for two half-sibling cows of sound visual appraisal (see Figure 1) born from different

sires. With the breeding values at our disposal, we can immediately see the cows differ in relation to their possible contribution to herd improvement.

Notice the difference in breeding values for our best cow JNR090013 in Table 1, no matter which cow it was in Figure 1. The choice of which cow is best becomes more objective and the accuracy of what progeny can be expected (given the breeding values of the mating sire) improves considerably. In short, the breeding values cancel out the non-genetic effects of the environment allowing an accurate presentation of the genetic potential of an animal.

PHENOTYPIC AND GENETIC CHANGE

So what exactly is it that we see and measure on an animal? The short answer is: Phenotype. Expanded, phenotype is what we see and measure which is the result of a combination of genetic differences among contemporary animals for a character, and the effect of the environment on how such a character is expressed. This means then that under different environmental circumstances, the phenotype of the same animal could present differently therefore influencing our selection decision. This should be a reason enough to

consider genetic transferability of a character in order to genetically improve animals. This is ONLY achievable when we jointly use breeding values and visual characteristics for functionality. Selection based on the one

without the other is almost always ineffective.

This brings to mind a common practice among breeders. Very often breeders neglect to consider the breeding values of individual cows during annual herd selection activities. This means that cow selection will then be based only on visual appraisal, therefore delaying the process of genetic improvement. In other words, the “best bull” that a breeder buys may likely be mated to a percentage of the “worst cows” in the herd for several reproduction cycles without knowing it. The opposite is possible when all breeding values are used.

CONCLUSION

A short answer to the question “Why should I improve my cattle at a genetic level?” does exist. The answer is simply: because genetic improvement is both permanent and cumulative. The latter is only true when breeders commit to continuous and consistent selection.



TABLE 1: Breeding values of two half-sibling cows born from different sires

Animal ID Reg No.	Sire ID Dam ID	Reproduction	Birth weight		Weaning Weight		12	18	Mature	ADG
		Scrotum (mm)	Direct	Maternal	Direct	Maternal	Months (kg)	Months (kg)	Weight (kg)	(g/day)
Breed averages		6.9	0.5	0.19	6.8	2.3	9.0	12.5	8	72
*JNR080005	VXL 030358	3.6	-0.70	-0.50	1.2	5.1	0.2	-0.6	-34	75
20201901	JNR 100012	94 ₅₀	123 ₈₃	136 ₇₆	85 ₈₀	113 ₈₁	81 ₅₉	79 ₅₄	48 ₃₂	101 ₄₃
*JNR090013	VZG 040438	6.8	0.57	0.36	10.6	7.4	15.2	20.9	5	106
20201991	JNR 100012	100 ₄₅	98 ₈₁	91 ₇₉	110 ₈₀	124 ₈₂	113 ₆₈	112 ₆₇	98 ₃₄	110 ₃₇

*Animal ID's are not factual, but the data is from real half sibs.