Measuring Genetic Progress: Where Do We Stand?

"How are we doing?" is a question all organizations need to ask themselves from time to time. I suspect that if the question were posed to several ASA members we would get a wide variety of answers. This is to be expected. Our judgment is highly influence by our perspective — and, even though we are all ASA members, our perspectives tend to be shaped through very different prisms. For example, a member who does not own a computer may feel the resources ASA devotes to developing computer software are a waste of time and money while a technologically savvy member may feel we are not spending enough.

Happily, in the world of genetic progress, the answer to the "how are we doing" question is pretty straightforward (at least it is from my perspective!) Though some may wax and wane about the genetic progress we have made while others lament that we are spinning our wheels or even going down the wrong path, when it comes to genetic progress in the seedstock business there is only room for one perspective — genetic progress is determined by the change in profit we have provided the commercial cattle industry.

Fortunately, we do not need to speculate on or debate about the financial benefit we have delivered to the industry. We can simply plot the change in our economic indexes (All Purpose Index (API) and Terminal Index (TI)) over time — a procedure for measuring genetic progress routinely used by the animal breeding community. Without any further ado, let's take a look at how we have been doing:

As you can see from **Table 1**, we predict that the average bull born in 2008 will improve the profit of an integrated beef cattle production system over a 2000-born bull by around $16/exposure if used to produce replacements and $6/exposure if used as a terminal sire.

Is that decent progress? To that question Jerry Lipsey would retort, "compared to what?" One rational comparison would be with other breeds; though our indexes do not allow for comparison across breeds, by plugging the change in a breed's

Table 1. Purebred Simmental index value by year of birth

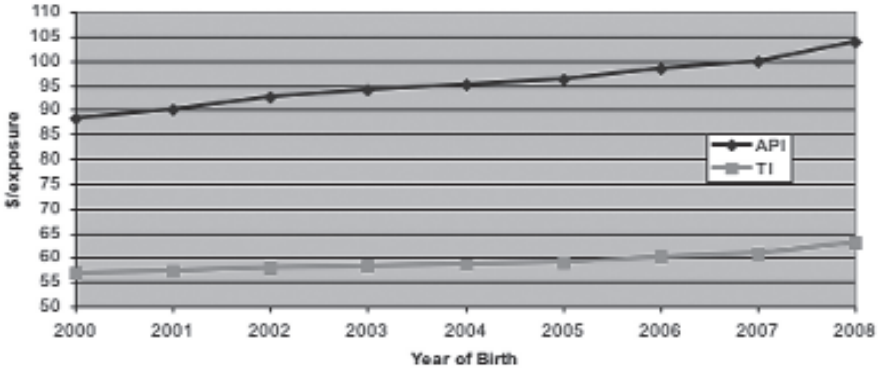


Table 2. Change in average profit between 2000 & 2008 by breed

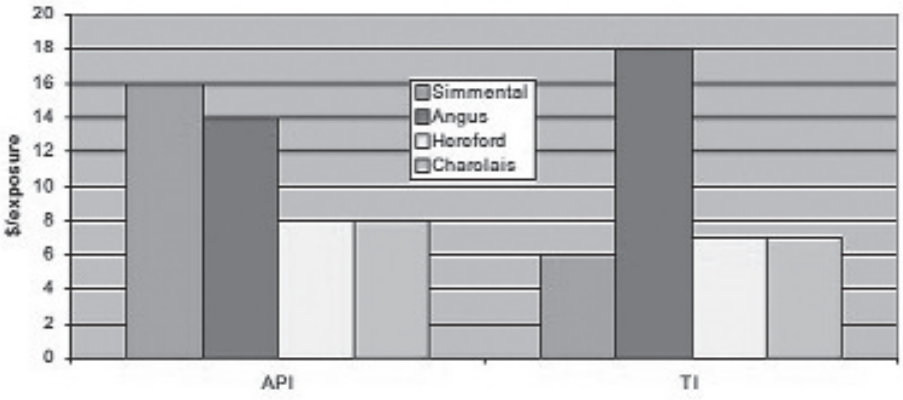
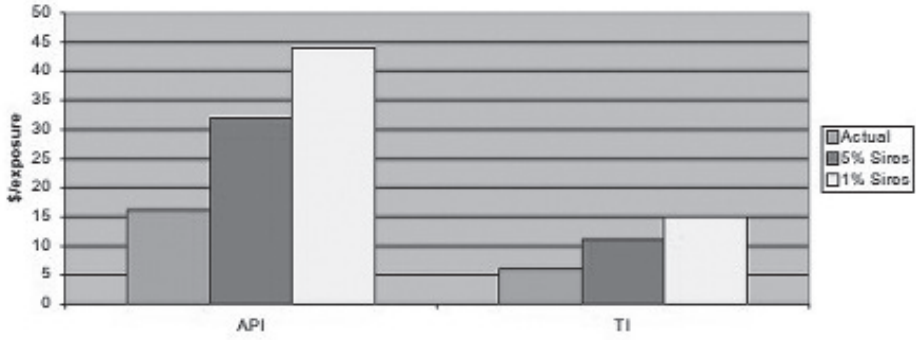


Table 3. Potential vs. actual change in profit between 2000 & 2008



By Wade Shafer, Ph.D., ASA Director of Performance Programs

EPD profile into our economic index equations we can get a ballpark estimate of how much economic progress has been made within a breed.

To provide a yard stick to size up our progress against other breeds, I dug up data from the Angus, Hereford and Charolais websites. Being the dominant breed in the industry, Angus was an obvious choice. I chose Hereford and Charolais because, after Angus, they represent the breeds most heavily used in maternal and terminal sire situations, respectively. **Table 2** displays the results:

From **Table 2** we can glean that, compared to the 3 other breeds, Simmental has made the most progress in API and the least in TI. Our movement in API is largely due to sizable improvement in calving ease, maternal calving ease, marbling and stayability. Angus dominated improvement in terminal value primarily through their edge in increasing growth and marbling over the time period.

Keep in mind, these are only measures of improvement made within each breed—they do not tell us how breeds actually stack up for all-purpose and terminal scenarios. For example, a breed could have made lots of progress over these years yet be dismal because the breed was a mile behind to start with.

How do we interpret Simmental's progress based on breed comparison? If our customers are keeping replacement females out of Simmental bulls, one would conclude that we have improved our value to the industry substantially when compared to other breeds. On the other hand, if our customers are using Simmental strictly as terminal sires, our improvement ranks with the pack but is a stretch behind Angus.

Another, maybe even more relevant, method of sizing up our progress would be to estimate the improvement possible in each index if we increased our selection pressure and compare that to the progress actually made. To come up with the theoretical progress possible in API, I assumed that breeders used sires averaging in the top 1% for the index. I made the same assumption to calculate the improvement achievable in TI[1]. To provide an estimate of the result of lesser selection pressure, I also made calculations reflecting the use of sires in the top 5%.

By taking a few liberties and making a few more assumptions (e.g., annually retaining the top half of your heifers based in index values), I came up with the calculations displayed in **Table 3**.

As you can see, we would almost double our current progress by using bulls in the top 5% and nearly triple it with 1% bulls! The $44/exposure projected increase over this time span with top 1% API sires translates into an additional return of $6,600/sire for a commercial producer who exposed their bull to 30 cows over 5 years ($44 x 30 cows x 5 years). I would hardly be going out on a limb in saying that an across-the-board impact to our customers' bottom line of that magnitude would likely set the industry on fire and make our members the most successful in the business.

To make this bin-busting progress, we have to work together. This level of improvement is only possible if we all use top sires, which accelerates the economic value of the sire pool we all have to select from for subsequent generations. If you think goals of this size are out of reach[2], keep in mind that improvement of this nature is regularly achieved by our major competitors — the swine and poultry industries.

So . . . how are we doing when it comes to genetic progress? My report card would say that we have done well over the last decade; however, we now have the scientific tools to make genetic progress like never before. My challenge to you, ASA members, is to pull together to achieve the tremendous potential laying in front of us — let's triple our progress in the next decade!

[1]*I checked our database, and there were over 320 purebred bulls that met the 1% API criteria and 600+ for TI. Furthermore, there were 141 bulls in the top 1% for both indexes. Given these numbers, this level of selection pressure on sires appears achievable.*

[2]*It is interesting to note that the 10 most heavily used bulls over the last two years average at the top 10% level for both API and TI.*

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