

GeneSTAR[®] Marbling4 Tenderness4 Feed Efficiency4

Technical Update October 2006

The current GeneSTAR[®] test includes a suite of 12 markers:
4 markers for Marbling
4 markers for Tenderness
and 4 markers for Feed Efficiency.

Results are reported as a star result for each individual marker, and also as a combined star rating for each trait. There is a maximum of 8 stars available for any one of these traits. Results should be treated independently for each trait.

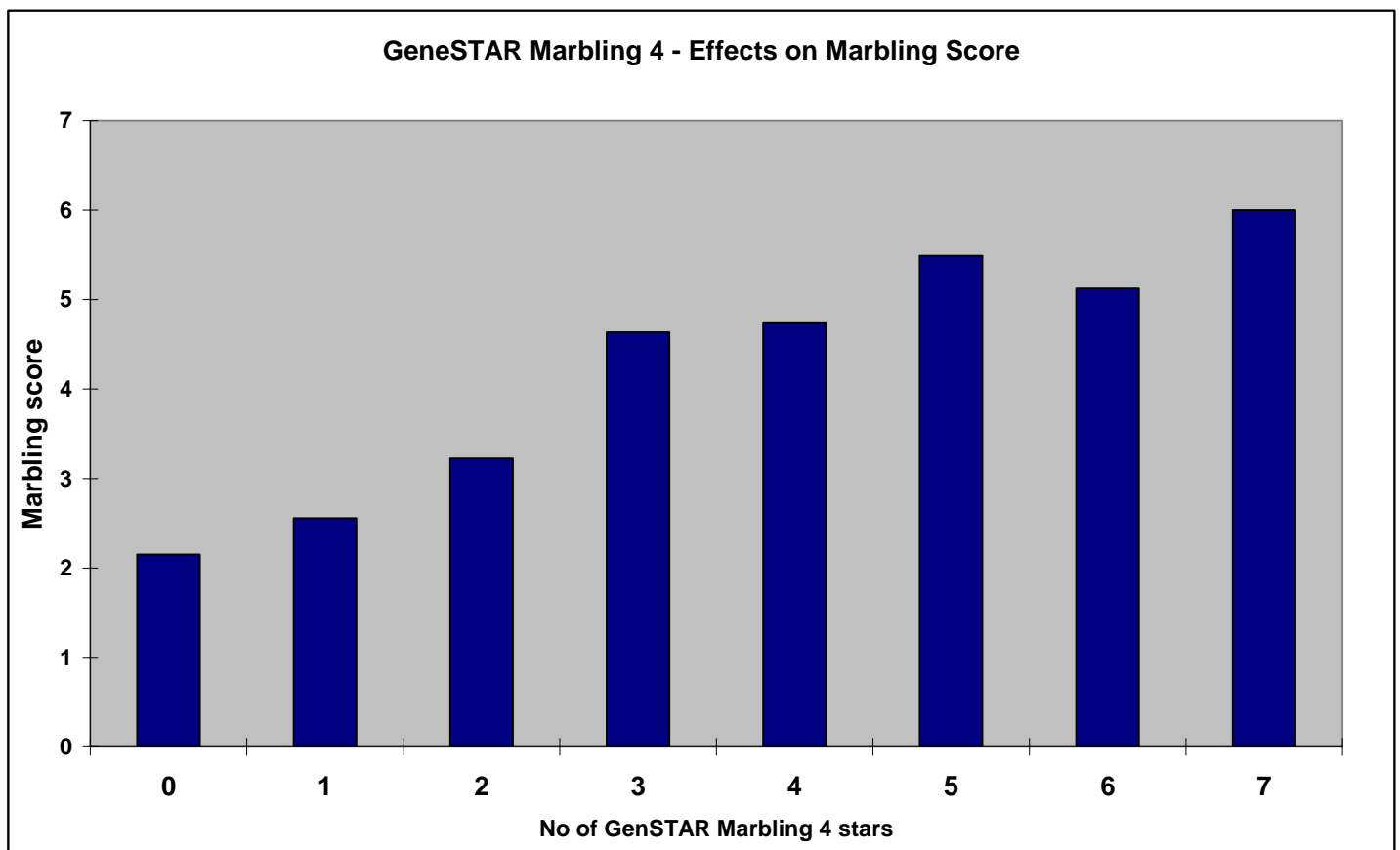
GeneSTAR[®] Marbling 4

GeneSTAR[®] Marbling 4 is an enhancement to the previous GeneSTAR[®] Marbling 3 test. Marbling 4 tests for the presence of four separate DNA markers that have a significant impact on marbling score. Results for each of the four DNA markers are reported as 0, 1 or 2 Stars, giving a combined Marbling result of 0 to 8 Stars. The four marbling DNA markers are independent and additive. This means that the result for each marker has individual value and the total, potential effect of the markers is gained by adding the four individual results together.

The new four marker test has been evaluated on more than 1000 long-fed cattle that have been slaughtered and have had their actual carcass marbling scores measured. Figure 1 shows the results of an analysis of the results. You can note the incremental increase in Marbling score with the increase in Stars from the GeneSTAR[®] Marbling 4 test. Please note that there were no 8 Star Marbling animals included in this group.

Figure 1 shows that on average, an animal with a higher GeneSTAR[®] result will also have a higher marble score.

Figure 1



Use of the tests in your selections

As more markers for other marbling genes are added to the GeneSTAR[®] Marbling test, more of the genetic or observed variation in marbling for an animal is described by the GeneSTAR[®] test. This provides the ability to draft or sort commercial cattle on marbling potential and manage these cattle differently. For example cattle that have more Stars are more likely to marble and would be suited to a longer feeding program, whereas cattle that have less Stars might be more suited to a domestic feeding program that has lesser requirements for a carcass to have higher marbling scores.

Figure 2 below is an example of the difference in average marbling scores of two sets of steers from the same group, separated on the basis of their GeneSTAR® M4 result. The lower score group shows the GeneSTAR® 0 and 1 Star results and the higher score group the 2 - 7 Star results (there were no 8 star animals in this group).

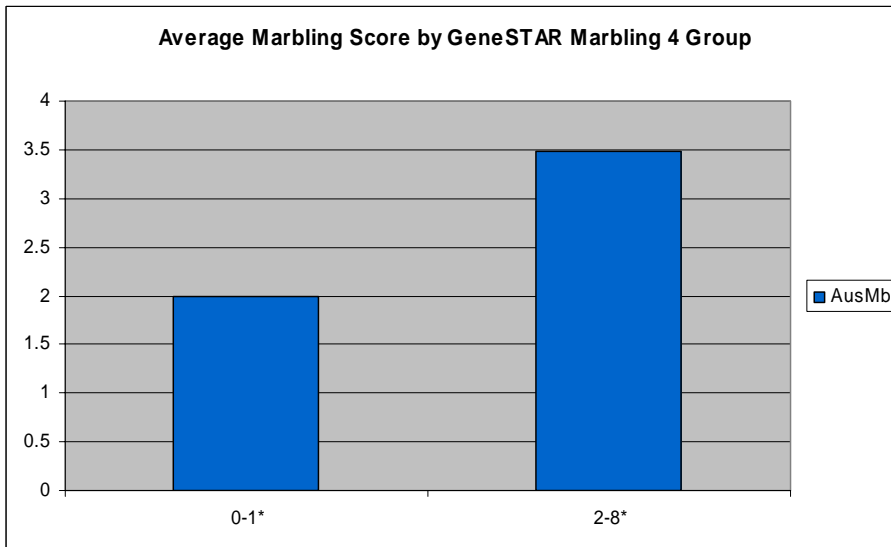


Figure 2

It can be seen that the 2-7 Star animals had a 1.5 Marbling Score advantage (3.5 vs 2) over the 0-1 Stars.

Figure 3

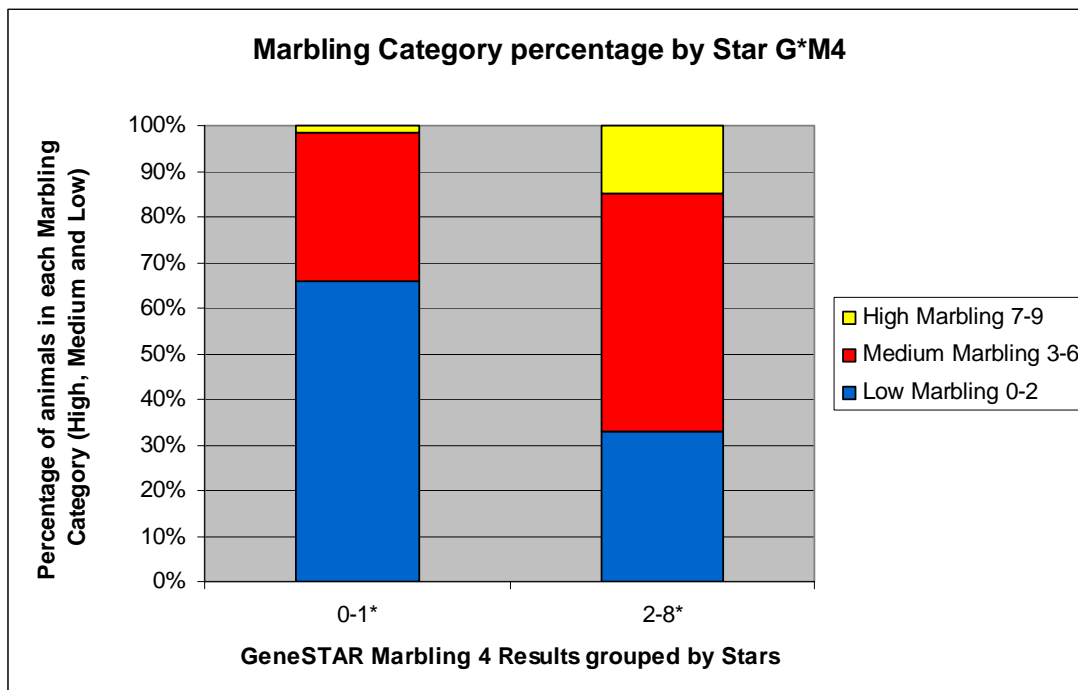


Figure 3 represents the percentages of cattle in each GeneSTAR® group that fall into 0-2, 3-6 and 7-9 marble score groups based on Aus-Meat Marbling Scores. The second group of 2-8 star animals has a substantially higher percentage of animals achieving a marble score 7 or better, and only half the percentage of animals falling into the 0-2 marble score category. For cattle aimed at long-fed markets where marbling is important, sorting cattle into these two groups can make a substantial impact on group kill data and feeding margin.

GeneSTAR® Tenderness 4

Similarly, GeneSTAR® Tenderness 4 is an upgrade to GeneSTAR® Tenderness 2. Tenderness 4 contains two additional DNA markers for Tenderness giving a total of 4 DNA markers for Tenderness. We tested and analysed large sets of carcass results with measurements of meat tenderness (i.e. mechanical shear force) as the objective measure, where lower shear force is more desirable. The results showed that the four markers are independent and the effects on tenderness are additive. The implication of this is that individual results for each marker can be added together to assess the potential impact of 0-8 Star results.

Figure 4

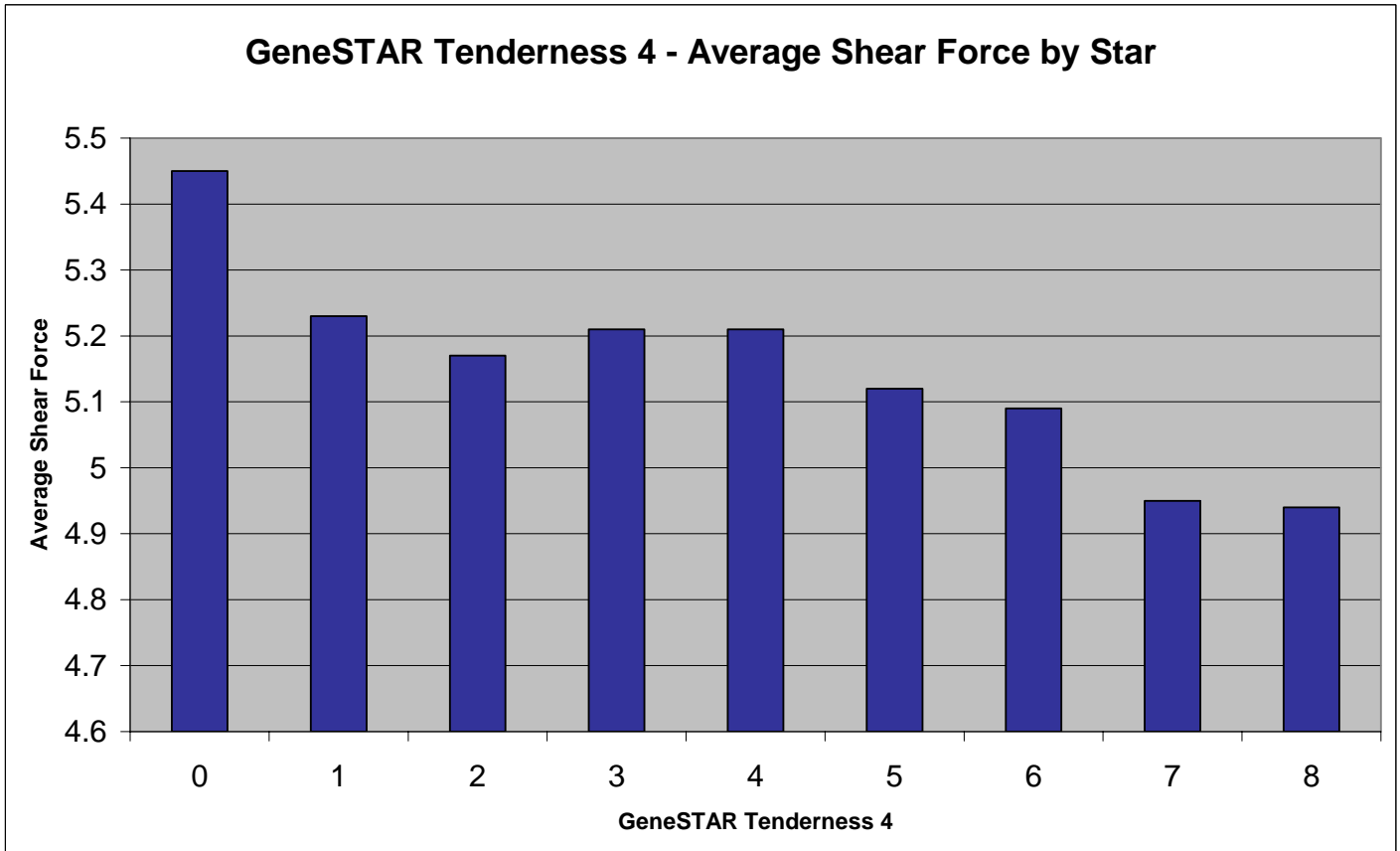


Figure 4 shows the decrease in toughness as the number of Stars increase in the total data set of over 3000 carcasses from 7 breeds. There is some variation in the 2, 3 and 4 Star carcasses however the progressive effect of the increasing number of Stars is significant.

Use of the Tests in your selections

Producers can confidently select for tenderness in two ways. Firstly, selectively breed for more 5, 6, 7 and 8-Star animals and secondly, avoid using 0-Star animals as key breeding animals. A 0-Star sire will leave daughters that will remain in your herd a for a decade!

While there is a progressive increase in tenderness potential as an animal has more Stars for GeneSTAR® Tenderness 4, just as importantly there is also a change in the proportion of animals in each tenderness category. Animals or carcasses can be separated into tenderness categories on their shear force result. Shear force results greater than 6kgs are the toughest and results less than 4kgs are the most tender.

Figure 5

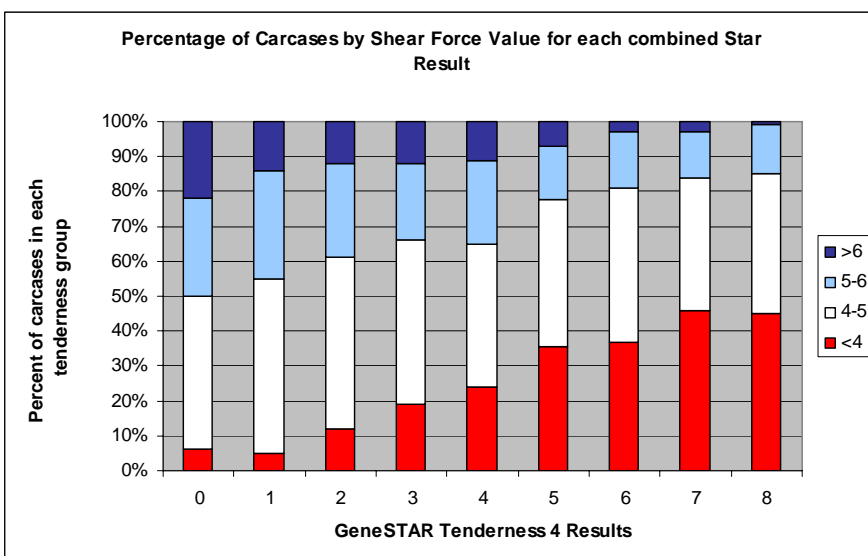


Figure 5 shows there is an important increase in the percentage of more tender carcasses as the number of Stars for GeneSTAR® Tenderness 4 increases, and also a significant reduction in the percentage of tougher carcasses.

GeneSTAR® Feed Efficiency 4

The latest addition to the GeneSTAR® suite of tests is GeneSTAR® Feed Efficiency 4. This is a four marker test that has been evaluated on animals with measured feed efficiency. As with GeneSTAR® Marbling 4 and GeneSTAR® Tenderness 4 the 4 GeneSTAR® Feed Efficiency markers are all independent and additive. The result therefore will be reported in the same format as the Tenderness and Marbling tests on a 0 to 8 star scale with 0 being the least favourable and 8 being the most favourable.

Figure 6

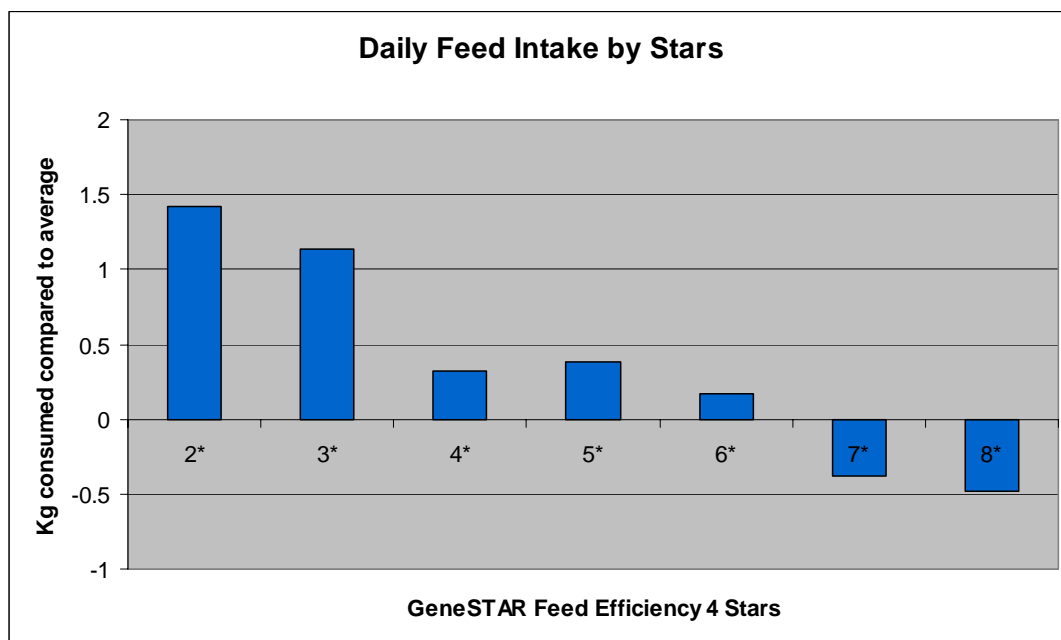


Figure 6 shows the variation and impact for each star value from the average in terms of Daily Feed Intake. The measurement highlights the variation between animals for feed consumed on a daily basis.

All animals performed similarly in terms of weight gain. The effect of the star result is consistent when evaluated against Net Feed Intake however Daily Feed Intake was used as it is more applicable to daily savings on an animal.

Note: there were no 0 or 1 Star animals in this group of over 1200 animals.

One of the highlights for the GeneSTAR® Feed Efficiency 4 test is that the frequency of better star results is quite high across all 7 breeds in the trial, yet there is still a significant difference between the 2 and the 8 star animals (more than 1.8 kg of feed per day).

Use of the Tests in your Selections

Practically the application of the test at the seedstock level will be identifying breeding animals that can produce more feed efficient progeny. However at the Feedlot level the application will be the ability to sort cattle into two groups (high and low feed efficient animals) prior to making feeding decisions. If this is done drawing a sort line between the 3 and 4 star animals you have two groups (0-3 star and 4-8 stars) where there is a difference between the groups of approximately 1 kg per day of feed consumed (with the 4-8 star group eating less).

Combining GeneSTAR Marbling 4 and GeneSTAR Feed Efficiency 4 for feedlot selection

With the addition of the fourth marbling marker and Feed Efficiency as a new trait the ability to effectively sort long fed cattle for the higher marbling markets has been greatly enhanced. The feedlot test reports total star ratings for each trait, which provides a simple tool for making effective selection and sorting decisions.

A typical set of over 850 steers fed for 250 days were evaluated using GeneSTAR Marbling 4 and GeneSTAR Feed Efficiency 4. If these steers had been tested prior to feedlot entry and sorted into high marbling/high feed efficiency and low marbling/low feed efficiency groups there would have been a major difference in performance. The high marbling/high feed efficient group averaged 1 Marble score greater and would have eaten on average 1 kg less feed per day.

A major advantage of having 4 markers in each test is that the tests allow more accurate sort lines to be identified between high and low performers, getting a higher percentage of high performing cattle in the favourable group. In this set of animals the high marbling/high feed efficient group included 62% of the steers from the total group.

For more information on the new suite of GeneSTAR® DNA markers please contact Catapult Genetics:

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