Economic Selection Indices

by Larry Keenan, Director of Breed Improvement

RAAA's philosophy of only printing Expected Progeny Differences (EPDs) on Economically Relevant Traits (ERTs) has provided for simplification in selection decisions made by both purebred and commercial producers. However, some would argue that with 15 EPDs (RAAA's current suite of EPDs) commercial bull customers are overwhelmed with data to use in selection decisions. Additionally, strong proponents of the ERT philosophy would argue that selection should be based on one trait – profit, which is generally calculated using an economic selection index.

On the other hand, opponents of the economic selection index theory argue of the dangers in allowing one number to describe cattle. Additionally, concern has been expressed regarding the assumptions used in the calculation of an index being applicable to all operations in the nation.

Regardless of your position on this subject, we should all realize that education and understanding of indices is key for their proper implementation into selection decisions. RAAA leadership has recently invested in the development of indices; therefore, indices will soon become a part of RAAA's suite of ERTs.

What is an Economic Selection Index?

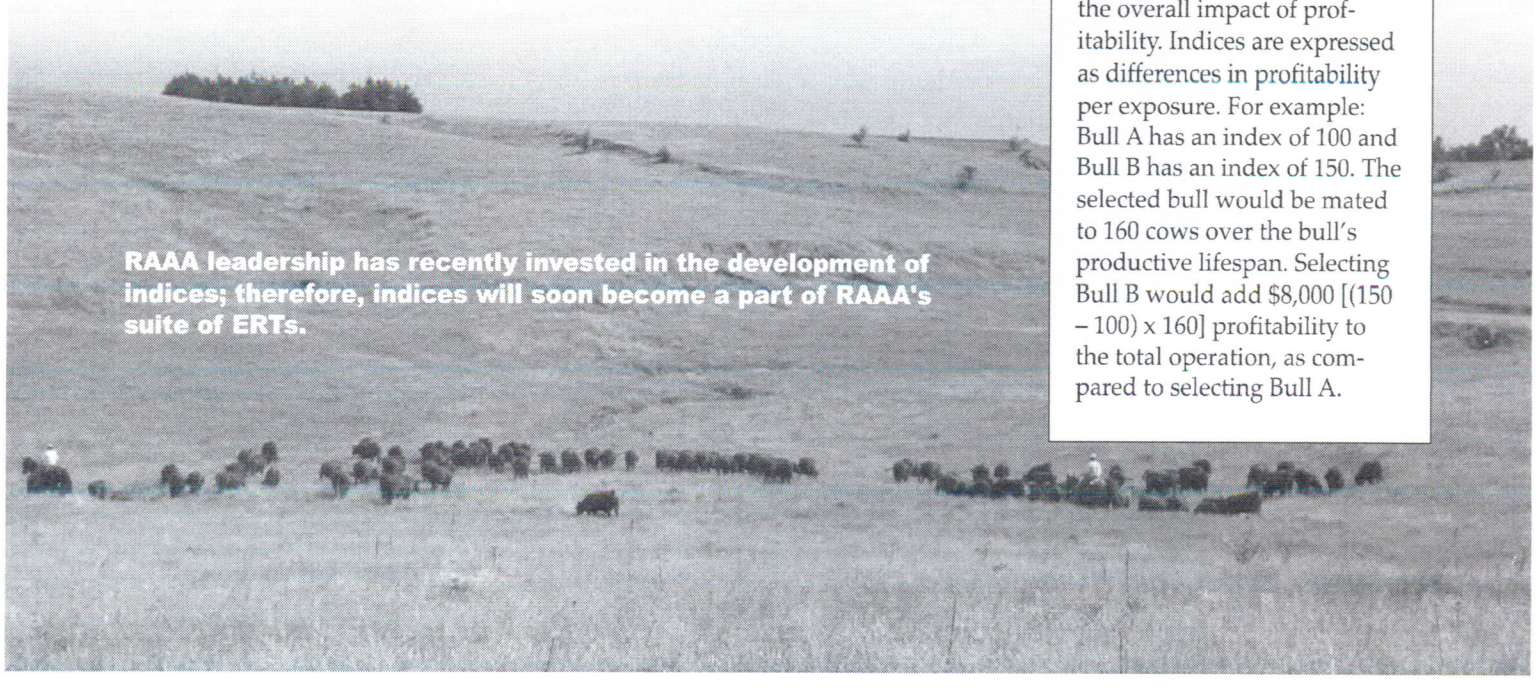
The goal of an economic selection index is to estimate the differences in profitability realized as a result of selection decisions. In order to develop such indices, assumptions must be made for production economics and genetics of the cowherd. For example, cow-calf fixed costs and Choice-Select spread are two of the many economic variables; and percent dystocia and average weaning weight are two of the many cowherd genetic variables.

Once these variables are determined, the next step is determining the impact each EPD has on the overall profitability of the commercial operation. This is achieved using a simulation model, which contains all segments of the beef supply chain. In a nutshell, each EPD is independently changed one unit, and the resulting change in overall profitability determines the weighting placed on each EPD in the calculation of the index. It should be clear that the proper development of an index does not involve a group of individuals sitting around a table determining what EPDs are important and how much weighting should be placed on each one of them.

Expected Progeny Difference (EPD)
Estimated differences in progeny performance for the trait evaluated due to the genetic contribution of the parent. EPDs are expressed in trait units (ex: WW and YW are in pounds).

Economically Relevant Trait (ERT)
An EPD describing a trait that directly impacts producer profitability. The calculation of ERTs can include indicator traits. For example, birth weight is an indicator trait for heifers calving unassisted. Selecting bulls whose calves are delivered without assistance is the true ERT, and is predicted by RAAA's CED ERT.

Index (plural – indices)
Combines all ERTs to predict the overall impact of profitability. Indices are expressed as differences in profitability per exposure. For example: Bull A has an index of 100 and Bull B has an index of 150. The selected bull would be mated to 160 cows over the bull's productive lifespan. Selecting Bull B would add $8,000 [(150 – 100) x 160] profitability to the total operation, as compared to selecting Bull A.



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Previously, RAAA leaders were hesitant to develop and release an index as they were concerned that the varying economics and production systems used across the nation could not be accounted for in one index. As a solution, RAAA supported the development of decision support software that would allow producers to input economic and production variables specific to their operation, with the output being a customized index specific to that producer operation.

Over the past decade Colorado State University (CSU) has made progress in developing decision support software; however, it remains incomplete as it does not account for post-weaning production. CSU made their decision support software available to the public, however producers did not use it as the producer-specific variables required to be input were overwhelming in number and detail.

Recent experience by RAAA and others who have adopted index technology has demonstrated that even when the economic and production assumptions used in the development of an index change, the net affect on the index is minimal – the bulls rank the same. The only restrictions to this rule are the index must encompass all segments of the beef production system and the index must be balanced.

For example, if costs of production significantly increase, the sale price of cattle will follow that trend. If it doesn't, the beef industry becomes non-profitable and non-existent. We recognize that the beef industry will have its times of high profitability and hopefully short times of economic loss, however in the development of an index it's important to use conservative, realistic economic inputs.

Due to these revolutions, RAAA leadership has instructed staff to work with industry experts in the development of index technology for Red Angus stakeholders. Following this directive, RAAA Breed Improvement and Technical Committees have worked with Dr. Mike MacNeil of Delta G, and previous researcher at USDA-ARS-Fort Keogh, in the development of index technology. Dr. MacNeil has been a leader in the development of indices for many breed associations across the globe. As the results of this effort becomes finalized, more specifics regarding the index, or indices, will be discussed in future RAAA articles. ■