Simplify Multi-trait Selection

Indexes account for economics and breeding objectives.

*by **Shane Bedwell***

Shane Bedwell is the chief operating officer and director of breed improvement of the American Hereford Association. He can be reached at sbedwell@hereford.org.

Economic selection indexes offer commercial producers a powerful opportunity to select bulls for specific production scenarios without having to consider individual expected progeny differences (EPDs).

Consider the sheer number of EPDs. As an example, the American Hereford Association (AHA) calculates EPDs for 17 different traits. Next, think about the natural antagonisms existing between traits such as growth and calving ease. Making genetic improvement in specific areas without sacrificing gains in others can be challenging. That's why selection indexes are so useful.

In simple terms, these indexes provide a single, economically weighted value aimed at breeding objectives for specific production scenarios. They account for multiple and antagonistic traits for each scenario.

Baldy Maternal Index

For instance, the American Hereford Association (AHA) Baldy Maternal Profit Index (BMI$) is a maternally focused index for producers breeding registered Hereford bulls to Angus cows. It assumes some daughters are retained as replacements in the herd and the remainder of the calf crop is finished and marketed on a quality-based grid.

Essentially, all traits are important in this scenario, but Sustained Cow Fertility (SCF) is clearly the driver when you look at the average EPDs and percentile rankings for the top 20 active BMI$ sires in the Hereford breed (Table 1).

SCF is a longevity trait, which predicts a sire's ability to produce daughters that last longer in the herd. A cow that lasts longer in a commercial herd is going to bring more revenue back to the operation. So, it makes sense that this trait tops the list of importance for commercial producers building sought after F1 black baldy females.

Along with SCF, Weaning Weight (WW), Mature Cow Weight (MCW) and Milk (MM) are weighted slightly positively in the BMI$, ensuring females have adequate growth without increasing inputs. There is some negative emphasis on Dry Matter Intake (DMI), but a positive emphasis on Carcass Weight (CW), aimed at enhancing profitability from finishing non-replacement females and castrated males. Marbling (MARB) and Ribeye Area (REA) are also positively weighted with Certified Hereford Beef® (CHB) success in mind.

The top 20 BMI$ bulls are also above breed average for all other traits in the index, except for Yearling Weight (YW) and Backfat (FAT), which are slightly below breed average. Arguably, moderate growth and more fleshing ability (FAT) make sense when producing females that last longer in production.

Consider the suite of traits utilized in the BMI$ (Table 1) and the percentile rankings of EPDs for the top 20 BMI$ bulls. Think about the genetic merit of the black baldy females these bulls will sire — efficient, moderate mature size, high-quality udder and carcass traits beyond breed average.

> **"Selection indexes help producers more simply and consistently place selection pressure on economically relevant traits that drive profitability in specific production systems."**

Table 1: Average EPD Values for the Top 20 Active Sires for BMI$ as of June 6, 2023

Trait	CE	BW	WW	YW	DMI	SC	SCF	Milk	M&G	MCE	MCW	UDDR	TEAT	CWT	FAT	REA	MARB	BMI	BII	CHB
EPD	8.5	0.5	54	86	0.14	1.4	30.5	39	66	5.7	62	1.4	1.5	68	0.035	0.44	0.32	571	666	135
% Rank	15	15	60	60	40	20	1	5	15	20	15	10	10	55	70	50	15	1	1	25

In theory, using the index value (expressed as dollars) enables selection of bulls with appropriate levels of performance in all traits used in the index. Again, selection indexes assume specific production systems, so the economic weighting of each trait is different among indexes.

Other Hereford indexes

AHA offers two other economic selection indexes — the Brahman Influence Index (BII$) and Certified Hereford Beef® Index (CHB$).

The Brahman Influence Index (BII$) is also a maternally focused index based on a production system using Brahman-Hereford-cross cows. Progeny of these cows are directed toward a commodity beef market, since CHB does not accept Brahman-influenced cattle. This index is similar in trait weighting to BMI$, but there is more emphasis on SCF and MARB. This is an all-purpose index where F1 females are retained; remaining cull progeny are marketed through commodity-based programs.

The Certified Hereford Beef Index (CHB$) is a terminal sire index that is built around a production system where Hereford bulls are mated to mature commercial Angus cows and all progeny will be targeted for CHB after the finishing phase. This index has significant weight on CW and MARB to ensure profit on the rail. As well, there is a positive weighting for Average Daily Gain along with a negative weighting on DMI to ensure efficient pounds of growth in the feedyard. In addition, there is a positive weighting for REA and a negative weighting for FAT to maintain desirable USDA Yield Grades. This is the only index that has no emphasis on fertility. Remember that no replacement heifers are being retained.

Bottom line, selection indexes help producers more simply and consistently place selection pressure on economically relevant traits that drive profitability in specific production systems.

Value-added commercial opportunities

AHA selection indexes also serve as the cornerstone to several programs designed to help commercial producers select Hereford seedstock and to market subsequent progeny. AHA economic selection indexes serve as genetic qualifiers for these programs since commercial cattle profitability is the basic premise of these indexes.

Hereford Advantage is designed for commercial producers selecting Hereford bulls ranking at or above the top 50% of the breed for CHB$. Progeny from these bulls should be equipped with the necessary feedlot performance, efficiency and end-product merit, to warrant added buyer attention regardless of when they are marketed.

Examples of economic index values:

CHB$	
Sire A:	$130
Sire B:	$100
Difference:	$30

Explanation — Sire A will sire progeny that should be $30 more profitable when fed out and marketed on a dual-based grid when compared to the progeny of Sire B, if comparably mated.

BMI$	
Sire A:	$450
Sire B:	$300
Difference:	$150

Explanation — Sire A will sire daughters that are $150 more profitable over their lifetime due to their added longevity and/or their ability to raise more profitable offspring when compared to daughters of Sire B, when comparably mated.

The **Premium Red Baldy** program is geared toward commercial producers building red baldy females, who select Hereford bulls ranking at or above the top 50% of the breed for BMI$. Also supported by the Red Angus Association of America, this female-only program promotes the storied quality of red baldy females. Qualifying females are recognized with a special tag denoting their genetic promise of additional longevity, docility and profitability.

The **Maternal Advantage** program is designed for commercial producers selecting Hereford bulls ranking at or above the top 50% of the breed for either BMI$ (Angus-based) or BII$ (Brahman-based). This program also recognizes the added longevity, docitlity and profit potential of the F1 female resulting from crossbreeding Hereford bulls to Angus or Brahman-based females. **B**A

For more information about AHA economic selection indexes, please go to *Hereford.org/genetics/breed-improvement/trait-definitions*. For more information about AHA commercial programs, please see *Hereford.org/commercial/programs*.