



## ESTIMATED RELATIVE PRODUCING ABILITY

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One critical management decision made on dairy farms is to allow selected cows to freshen again and remain in the herd. Economic factors dictate these decisions, with value of milk produced being a determining factor. What tools are available in DHI records to assist in these decisions?

Our best culling guide is Estimated Relative Producing Ability, ERPA. ERPA is an estimate of subsequent lactation yield. ERPA is relative in that yield is expressed relative to herdmates - as a deviation from herdmate production.

In a nutshell, ERPA is our best prediction of a cow's future yield relative to other cows currently in the herd, with all yields standardized to a 305d-2X-ME basis.

### How is ERPA calculated?

ERPA is the average production of a cow, deviated from her herdmates, and weighted for the number of records involved in the average. Records in progress are extended and included in ERPA. The formula for ERPA is:

$$ERPA = R \text{ (Average deviation from herdmates)}$$

$$R \text{ is } \frac{0.5n}{1 + 0.5(n-1)} \text{ and } n \text{ is th number of records.}$$

<u>n</u>	<u>R</u>	
1	0.50	As n increases, R increases.
2	0.67	As a cow has more and more records, we
3	0.75	become more confident that her previous
4	0.80	average deviation from herdmates will appear
10	0.91	again in her next lactation.

Example: A cow has one record with 305d-2X-ME yield of 21,310 for milk and 812 for fat. Her herdmates averaged 16,750 milk and 572 fat. Her ERPA is

$$\begin{aligned} ERPA \text{ milk} &= 0.5 (21,310 - 16,750) = +2,280 \\ ERPA \text{ fat} &= 0.5 (812 - 572) = +120 \end{aligned}$$

Had this cow averaged 21,310 for milk and 812 for fat for 3 lactations with the same average herdmate yield, her ERPA would have been:

$$\begin{aligned} ERPA \text{ milk} &= 0.75 (21,310 - 16,750) = +3,420 \\ ERPA \text{ fat} &= 0.75 (812 - 572) = +180 \end{aligned}$$

0655  
0762  
70.404-083  
992  
1/11  
pec

We expect higher yield from the cow in her fourth lactation than we did in her second; not because she was older, but because she demonstrated superiority to herdmates across several lactations. ERPA's are adjusted for age, season of freshening, frequency of milking, length of record, and number of records.

How should ERPA's be used?

Use ERPA's to decide which cows to cull. Other factors such as reproductive status, ease of management, general health and vigor, and possible value of offspring enter the picture for culling decisions; but, for production, ERPA is the best predictor of future yield. You can remove the bottom 15-20% of your herd for ERPA without risking loss of an average producer, providing the cull candidates have been given the opportunity to produce through proper feeding and health care.

ERPA's can be compared to each other without confusion from number of records, age, length of lactation, season of freshening, or frequency of milking. Cow rankings based on ERPA's will identify cows with greatest and least probability of profitable production in succeeding lactations. Can you afford to maintain the bottom group of cows in your herd? The same feed and facility space could give you greater returns if made available to the better cows in your herd.

ERPA calculations make no adjustment for genetic merit of herdmates as is done for Cow Indexes. Therefore, ERPA's are useful only within the herd where they were calculated. Using ERPA for a cow in one herd to predict performance in another herd is risky unless genetic merit of the two herds is close to identical.

Who receives ERPA's?

ERPA's are mailed without additional charge to all dairymen on DHI test in April of each year on DHI Form 206. An additional list is available each November at a cost 3¢/cow on test for the test day proceeding the listing. Both mailings are from the DHI office at Virginia Tech, though ERPA's are calculated at DRPC in Raleigh, NC.

Some ERPA's always negative

If all cows with minus ERPA's are removed from a herd by culling, what will happen to ERPA's calculated in the future? Some of the new ERPA's will still be negative! Remember that ERPA's are deviations from herdmate average. No matter how high the herdmate average goes, some cows in the herd will always exceed it, and some cows will fall below it. You will always have some negative ERPA's in your herd.

ERPA and Cow Indexes

These two values are designed for different purposes. ERPA predicts yield, while Cow Index predicts the genetic contribution to production that a cow transmits to her offspring. The two numbers can be quite different. CI's will usually be lower than ERPA's, but don't be surprised if an individual cow ranks higher or lower in the herd on CI than she does on ERPA. For example, Cow #32 on the attached DHI Form 206 is probably better genetically than her production indicates. We would expect her daughter's ERPA to exceed her own. There will be instances where you will want to keep a cow for the milk she puts in the bulk tank, but you may not want to raise her heifer calf as a replacement animal. Keep in mind that the sires of calves are important too. If you cull calves, do so on the basis of pedigree index ( $1/2$  sire PD +  $1/2$  dam Cow Index).

DHI Form 206

A sample of DHI Form 206 is included in this Guideline to familiarize you with its contents. Form 206 includes cow identification, most recent lactation credits, most current USDA Cow Index, a summary of all lactation credits for each cow, the average of herdmates across all records of the cow, and the ERPA values themselves. The column labeled \$\$ Value is the product value of ERPA estimates for milk and fat. The latest milk prices and fat differentials reported for each herd are used to calculate \$\$ Value. ERPA lists are in ERPA order for milk. Thus, the bottom of the list contains the "cull candidates" in a herd. For the Henry Smith herd, cows 61, 27, and 467 could be removed from the herd with risk of losing an average producer.

Cow Indexes and ERPA's can be compared using DHI Form 206. In the Henry Smith herd, cow 457 is second in the herd for ERPA for milk. However, her Cow Index for milk (+600), places her 7th in the herd. Cow 499 is 6th for milk on ERPA and 14th for Cow Index Milk. Remember that ERPA evaluates producing ability and Cow Index evaluates transmitting ability. These two "abilities" are not one and the same. Cows do not always produce well because of genetics.

The bottom section of DHI Form 206 contains valuable information about the impact of involuntary culling (cows that cull themselves) on genetic and producing ability of a herd. State averages can be used for comparison. Henry Smith culls fewer cows for low production than his state average, 10 versus 14%. These culls, however, were lower than state average for ERPA milk, -1141 versus -860. Henry Smith has a problem with involuntary culling, the "left herd-all other reasons" section. He lost 20% of his herd for such reasons compared to state average of 9%. More importantly, Henry's involuntary culls were better cattle than state average, +200 versus +24 for ERPA milk, +150 versus +4 for Cow Index milk. If Henry could reduce his involuntary culls, he could remove more of his poor producers. Instead of culling the bottom 3 cows on Form 206, perhaps he could remove the bottom 6 or 7.

The more often dairymen can cull cows by choice instead of necessity, the more profitable their herd becomes. DHI Form 206 and ERPA's can help dairymen make intelligent culling decisions.

