K-STATE Kansas State University Research and Extension

Beef Tips

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Will selection indexes make you money?

Twig Marston, cow/calf management specialist

Selection indexes are being developed and released by scientists and breed associations to aid in genetic decisions that will directly improve profits. With their development and release producers have several questions. What are selection indexes? How do they work? How do I use them? What are their limitations?

What are selection indexes?

A selection index is a multi-trait selection tool that calculates a monetary value for a combination of genetic influences on or within a production system. Within their computations, performance and cost of production factors are considered and combined to evaluate cattle.

Previously, **EPD**s (Expected Progeny Differences) were used for animal comparisons with each EPD focused on a single production trait such as birth weight, weaning weight, or yearling weight. The first wide spread application of multiple trait selection soon followed the release of EPDs when producers began to simultaneously select for low birth weight and high yearling weight proclaiming the procedure as "curve bending". This has led some breeders to think extreme EPD values are ideal, forgetting that many traits and relationships between traits can greatly influence profits. Most producers have found that many combinations and levels of production traits can maximize profits.

How do selection indexes work?

Through the use of selection indexes, producers will influence several traits simultaneously using one selection value. More specifically, selection indexes are multiple regression equations. The dollar value (equation solution) equals a sum of weighted traits. For the process to work correctly, the regression model must include the correct traits and weight each of them properly. Successful models produce answers that are easy to apply even though their development is complex.

Selection indexes began in the 1940's. Iowa State University researchers developed the early theory and mechanics. From that beginning they have evolved to assist genetic selection in several species of livestock. Because of complications involving data collection and cost information, the cattle industry has been slow to bring selection indexes into daily practice.

In the meantime, many producers used single trait and independent culling levels to make genetic decisions. Independent culling levels place a threshold value on one or more traits to separate potential individuals into acceptable and non-acceptable candidates. Single trait selection would allow for the greatest genetic progress for a single trait but often has adverse effects on non-selected production traits. In comparison, indexes allow the candidates to be sorted without a threshold for any particular trait but result in positive overall profit potential.

Which selection index do I use?

Cow/calf operators must first define goals for their own operations. They must discover the profit centers in their production system. The profit centers will then define the best index to use. Most selection indexes have been given names that readily identify their application to cattle producers. Table 1 lists several indexes available from beef breed associations that are unique to each particular association. Presently it is impossible to compare between the breeds because they do not share their databases or their modeling techniques.

How do I use them?

Selection indexes are used just like EPDs. The value for an individual animal means nothing by itself, but when compared to other

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Upcoming Events

Cattlemen's Day
March 3, 2006
Weber Arena
785-532-1267

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Table 1. Listing of Selection Indexes.

American Angus Association

Weaned Calf Value ($W)	Bio-economic value expressed in dollars per head assigned to Angus genetics from birth through weaning. The four primary economic impact areas are: birth weight, weaning weight, maternal milk and mature cow size.
Cow Energy Value ($EN)	Assess differences in cow energy requirements, expressed in dollars per cow per year, as an expected dollar savings difference in future daughters of sires. Considers lactation energy requirements and energy costs associated with mature cow size.
Feedlot Value ($F)	Expected average difference in future progeny performance for postweaning weight merit compared to progeny of other sires. Incorporates weaning and yearling weight EPDs along with trait relationships. Feed consumption, cost differences, days on feed, ration costs, and cash cattle prices are considered in the model.
Grid Value ($G)	Expected average difference in future progeny performance for carcass grid merit compared to progeny of other sires. Combines quality and yield grade attributes and calculates for animals with carcass and/or ultrasound EPDs. A three-year rolling carcass price average is used to establish economic values.
Beef Value ($B)	Simultaneous multi-trait genetic selection for feedlot and carcass merit. Represents the expected average dollar-per-head difference in the progeny postweaning performance and carcass value compared to progeny of other sires. It is not a simple addition of $F and $G. It is a dynamic result of commercial market values to Angus genetics for both feedlot and carcass merit.

American International Charolais Association

Terminal Sire Profitability Index	Based on producer inputs, the index will rank bulls according to herd profile and marketing scenario (customized results). The model used will weight EPDs of different growth and carcass traits according to producer inputs. It does not indicate which sires would be the most profitable when retaining replacement heifers.

American Gelbvieh Association

Grid Merit EPD	Measures the dollar value associated with marketing progeny on a value-based grid. The carcass value is based on quality grade, yield grade, and fitting weight specifications.
Feedlot Merit EPD	Measures the dollar value associated with the expected gain and feedlot efficiency of progeny when fed in a "typical" feedlot arrangement.

American Hereford Association

Baldy Maternal Index (BMI$)	For commercial cow-calf operations using Hereford bulls in rotational crossbreeding programs on Angus-based cows and heifers. Retained ownership of calves to be marketed on a Certified Hereford Beef LLC pricing grid.
Brahman Influence Index (BII$)	For commercial cow-calf operations using Hereford bulls in rotational crossing with Brahman. Emphasizes fertility and age at puberty, more than growth and calving ease when compared to BMI$.
Certified Hereford Beef Index (CHB$)	A terminal sire index, Hereford bulls mated to British-cross cows and all offspring are sold as fed cattle on a CHB LLC pricing grid.
Calving EZ Index (CAZ$)	Similar to BMI$, except Hereford bulls are mated only to yearling heifers. Emphasis on direct and maternal calving ease compared to the other Hereford indexes.

American Simmental Association

All-Purpose Index	Evaluates sires being bred to both first-calf heifers and mature cows with a portion of their daughters being retained for breeding and the remaining heifers and steers put on feed.
Terminal-Sire Index	Designed for evaluating sires' economic merit in situations where they are bred to mature cows and all offspring go to the feedlot.
Heifer-Sire Index	Appropriate for selecting sires to use on first-calf heifers in situations where a portion of their daughters will be used as replacements, while the rest of their offspring are fed for slaughter.

North American Limousin Foundation

Mainstream Terminal Index	A profit-based index which is determined by growth (weaning weight and post weaning weight gain), yield grade and quality grade.

"Don't Leave it on the Dashboard of your Pickup" Part II

Larry C. Hollis, D.V.M., M.Ag

If you take the time to treat or vaccinate an animal you want to maximize the potential benefits. How you handle and administer the product can greatly influence its effectiveness. Part I of this series (Beef Tips, November 2005) gave general handling guidelines. Part II continues with specific recommendations based on product type.

PHARMACEUTICALS:

● Products in a brown bottle can be inactivated by sunlight. Keep them out of direct sunlight. This means off the dashboard of your pickup!

● The injectable avermectins (Ivomec®, Dectomax®) are susceptible to inactivation by sunlight. The cardboard carton containing a plastic bottle of Ivomec® will protect the bottle from sunlight, but the product is susceptible to inactivation once the plastic bottle is outside the carton. Don't leave the plastic bottle laying on the tailgate of your pickup all day while processing cattle. Dectomax® comes in a brown bottle, so it is less likely to be damaged by sunlight. However, once you load either product into a syringe, the sunlight can affect it while in the syringe.

● Do not get water in syringes or equipment used to administer injectable Dectomax. More importantly, be sure not to inject any water back into the product bottle. Water will cause the product to precipitate out (you will see little crystals) and render it useless.

● Even when using injectable antibiotics, cleanliness is essential. The antibiotic in the bottle will not necessarily kill any and all contamination that you get in it!

● Do not mix different antibiotics in the same syringe or bottle – some cause an obvious physical reaction, some cause an unseen chemical reaction, and some antibiotics work by conflicting modes of action which may neutralize the activity of each other.

VACCINES:

● All modified live viral (MLV) vaccines are susceptible to inactivation by sunlight. When using them, keep the bottles in the cooler out of the sunlight. Also, keep the syringes out of the sunlight – sunlight will kill the vaccine in the syringe if left exposed to sunlight for more than a few minutes. Use of a cardboard box laid on its' side with the open side facing away from the sun will serve as a shade over the syringe.

● Modified live bacterial vaccines should be handled in the same manner as MLV vaccines.

● Do not reconstitute (mix up) more MLV vaccine than you will use in 1 hour. As soon as this type of vaccine is reconstituted the viral particles come to life then gradually start to die off. If you take too long to use all the product after reconstitution, enough virus may die to make the vaccine ineffective.

● Keep the reconstituted product cool.

● Do not combine different vaccines in the same syringe unless they are manufactured to be mixed together (i.e., do not mix Lepto-5 from one manufacturer with MLV IBR-BVD from another manufacturer, even though each manufacturer may sell a combination product containing both MLV IBR-BRD and Lepto-5. Unless the components are specifically made to be mixed together by the manufacturer, one portion of your mix may inactivate the other portion.).

● Keep vaccines thoroughly mixed until bottle is completely empty. This is especially critical with any non-clear vaccines (such as blackleg). Suspended particles will settle out over time.

● Do not "beat" vaccines to get them into suspension. Swirl them gently to keep from damaging cellular particles and/or releasing endotoxins.

● Use disinfectant-soaked sponges in a plastic paint tray to disinfect needles between animals. Stick the needle into the sponge to physically clean the needle. Change the sponge when it becomes visibly soiled.

● DO NOT use disinfectants with MLV vaccines. The disinfectant will kill the vaccine! Wash out the syringe and other equipment utilized with MLV vaccines with sterile water only. Change needles at least every 10 head instead of using the disinfectant-soaked sponge and paint tray.

● It is safe to use disinfectants with killed vaccines (blackleg, killed IBR-BVD, etc.), antibiotics and other pharmaceuticals.

"If you take the time to treat or vaccinate an animal you want to maximize the potential benefits."

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IMPLANTS:

- Make sure the ear is clean before implanting. Clean it with disinfectant and dry with paper towel if necessary.

- Ear tag before implanting -- avoid knocking out implant with the ear tag!

- Use disinfectant-soaked sponge and plastic paint tray with implant guns. Wipe both sides of the needle on the top of the sponge.
- Insert the implant needle at a point that will allow you to deposit the implant in the middle 1/3 of ear. Avoid existing implants, ear tags and tag holes.

- Feel the implant to make sure that you did not fire a blank!

MISCELLANEOUS:

- Cattle should be held off feed 12 hours before treatment with any of the white drench dewormers (Safeguard, Synanthic, Valbazen). The presence of feed in the rumen will reduce the effectiveness of these dewormers.

ALL PRODUCTS:

Use Beef Quality Assurance (BQA) techniques and guidelines.

- DO NOT inject products into top butt or leg.

- Inject all products in neck.

- Use subcutaneous (SC) route of administration unless intramuscular (IM) route is specified.

- Select a clean area, or clean the area prior to injection.

- Use the proper needle diameter. For water products, use an 18 or 16 gauge needle. Make sure you have adequate restraint to prevent needle breakage if you plan to use 18 gauge needles. For thicker products use a 16 gauge needle. Never use a 14 gauge needle except for intravenous (IV) injections.

- Use either ¾ inch or 1 inch length needles for subcutaneous (SC) injections.

- Use 1½ inch length needles for intramuscular (IM) injections in larger cattle. It may be necessary to restrict needle length to 1 inch in smaller calves to avoid hitting the bones in the neck.

- Follow label instructions or veterinarian's recommendations for proper dose of product.

- Follow label instructions regarding maximum volume per injection site. Most products are limited to 10 to 15 ml per injection site.

- Space injection sites at least 4 inches apart. This is a normal hand's width.

- Place injections side-by-side instead of one over another. This is especially critical with subcutaneous injections where the materials may gravitate and run together under the skin.

- Be sure to observe withdrawal times.

SUMMARY:

- Cleanliness is next to Godliness.
- Most products will work best if kept in a cooler out of the sunlight while in use.
- How you handle and administer a product will determine if it has a chance to work at all in the animal!
- Eat BEEF!

Selection Indexes, from page 1

animals within the database the difference in values is expressed. The difference between the dollar values reflect the expected advantage, similarity, or disadvantage between the progeny of the individuals evaluated.

What are the limitations?

Cow/calf operators must understand their production costs and profit centers and have defined goals for their own operation. Some producers will not find an index that perfectly fits their production system. They will have to either develop their own or utilize a customizable index. Presently, few customized selection indexes are operational, however, scientists and breed associations are working on these models. .

Summary

If cow/calf operations have defined production goals that combine profit and animal performance, managers can use economic selection or multi-trait selection indexes to direct their programs. Selection indexes can be difficult to develop because of the many variables influencing profits but once perfected the end results are simple to apply.

Selection indexes are the next step but not the final step in genetic evaluation and management decision tools. Future development will allow producers to define their own particular traits and coefficients that will improve the robustness of the models. Additionally, molecular genetic evaluations (DNA) will be used in conjunction with selection models to improve accuracy and precision of the genetic estimates.