Bottom Line Affected

A four-year study of nine different production systems suggests one size doesn't fit everyone.

Story by
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For quite a long time, the beef cattle industry has been engaged in the debate over what defines the ideal brood cow. Is it the smaller cow that offers the advantage of lower maintenance cost, or the larger cow that produces a bigger calf? There are plenty of producers ready and willing to argue one side or the other. Representing a third camp are a good many producers who think the answer lies somewhere in between. They claim to be selecting for cows of "moderate" size.

A study conducted by University of Nebraska–Lincoln (UNL) researchers, including agricultural economist Matt Stockton, suggests the middle-of-the-road kind of cow may not be optimum for the industry, or for a specific operation. In fact, Stockton's analysis indicates that cows representing the extremes for size, based on mature body weight, often contribute most to profitability. It depends, however, on the overall production system, including how calves are marketed.

The researchers considered nine different production systems, comparing the relative contribution of cow size to net return for each system. In seven of those scenarios, cow age also was found to be a driver of profitability. Again, depending on the production system, cows at either end of the age range contributed most to net returns.

According to Stockton, the study used four years of cow-calf production systems data collected at the Gudmundsen Sandhills Laboratory (GSL) near Whitman, Neb. The collective GSL cow herd (787 head) included groups calving in spring (March), early summer (June) and fall (August). All cows grazed native range in the summer and, in the winter, grazed either winter range or cornstalks. Data was collected for calves that entered the feedlot immediately after weaning and those that were finished after a summer grazing period.

Inputs and production outputs based on historical prices for a 10-year period (2002-2011) were used to estimate costs, revenue and net return (profit) per cow for each of those years.
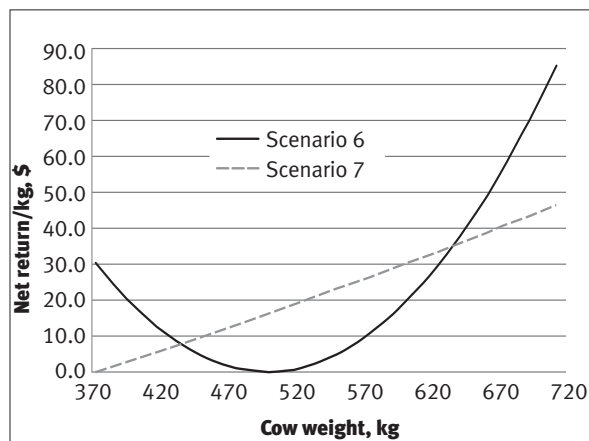
Comparisons of the contributions to net returns, from cow size and cow age, were derived for each of the following production systems:

1. Raised calves sold at weaning.
2. Purchased weaned calves grazed as yearlings and sold off grass.
3. Raised calves grazed as yearlings and sold off grass.
4. Purchased weaned calves sent directly to feedlot and sold when finished on live basis.
5. Purchased weaned calves sent directly to feedlot and sold when finished on grid-price basis.
6. Raised calves sent directly to feedlot and sold when finished on live basis.
7. Raised calves sent directly to feedlot and sold when finished

on grid-price basis.
8. Purchased yearlings off summer grass, feedlot-finished and sold on live basis.
9. Purchased yearlings off summer grass, feedlot-finished and sold on grid-price basis.

One size does *not* fit all

According to Stockton, cow weights ranged from 822 pounds (lb.) to 1,594 lb., with a mean of 1,186 lb. The "average" weight group included cows weighing 1,186 ± 132 lb. In five production-system scenarios (1, 3, 6, 8 and 9), cows representing that average weight group contributed less to profitability than did either the light- or heavy-weight groups. Scenario 5 was the only production

Fig. 1: Dam weight effects on weaned and yearling cattle net returns

Shown on the horizontal axis is the weight range of cows used in the Nebraska study, expressed in kg (1 kg = approximately 2.2046 lb.). Thus, cow weights range from 815 lb. to 1,587 lb., with a mean of 1,186 lb. Shown on the vertical axis is the relative contribution of cow weight to net return, expressed in dollars per kg.

For Scenario 2 (dotted line), smaller cows contributed the most to calf-seller profitability. Note that cows of "average" size contributed the least for Scenario 1 (solid line) and Scenario 3 (dashed line), with smaller cows having an advantage over large cows when calves are sold as yearlings off grass.
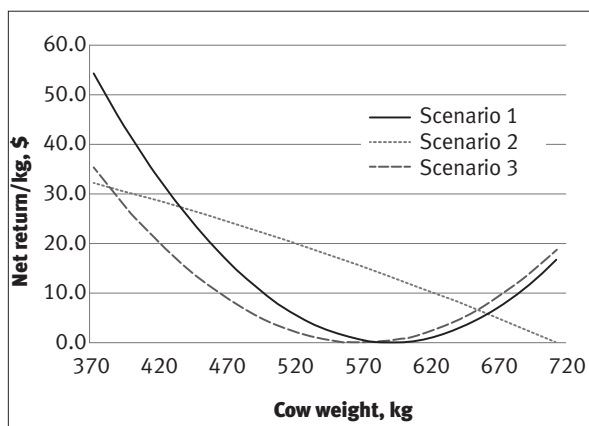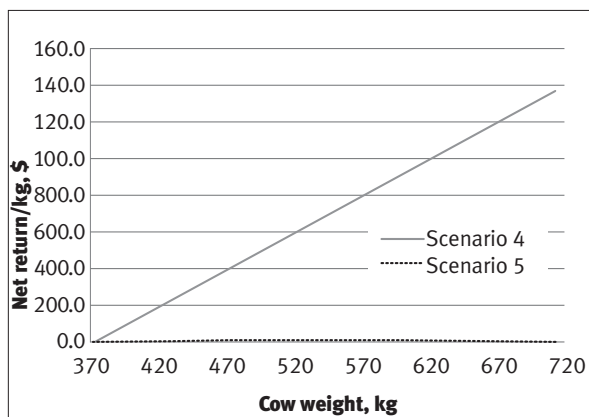

Fig. 2: Dam weight effect on net returns of bought weaned calves sold as fed cattle

For Scenario 4 (grey line), bigger cows contributed more to net return from fed cattle sold live. When purchased calves ultimately were sold on a grid, according to Scenario 5 (black dotted line), cow size makes no difference.

Fig. 3: Dam weight effect on net returns of raised calves sold as fed cattle

This graph illustrates how large cows contributed more to production systems involving retained ownership of raised calves. However, in Scenario 6 (solid line), where calves ultimately were sold live, cows representing the "average" weight group contributed less than smaller cows.

Fig. 4: Dam weight effect on net returns of bought yearlings sold as fed cattle

In production systems where purchased yearlings were finished and sold either live or on a grid, cows representing the "average" weight group contributed less than smaller or larger cows.
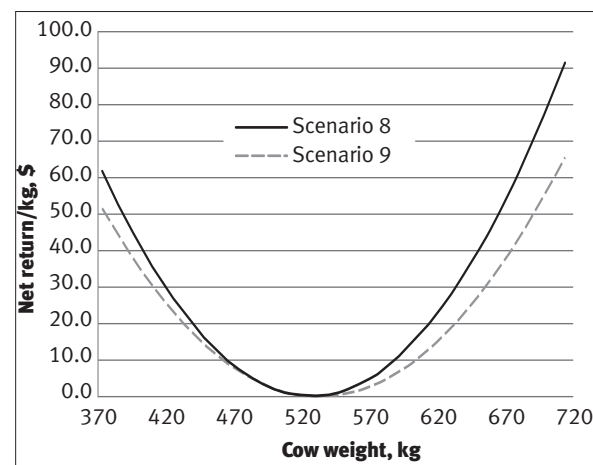
by Cow Size and Age

system in which cows weighing near the average contributed as much to net return as either smaller or larger cows.

"All of the remaining scenarios have their greatest contribution to net returns at one of the weight extremes," explains Stockton. "In scenarios where either raised or purchased calves were sold as weaned calves or yearlings (Scenarios 1-3), the lightest cows contribute more to net returns. However, in scenarios where calves are sold as finished cattle, either live or on a marketing grid (Scenarios 4, and 6-9), the largest cows outperform the smallest cows in contribution to net returns."

Stockton says the results of the study are consistent with two popular notions about cow size. The first is that cow-calf producers maximize profits with calves out of smaller brood cows. Second is that feedlot operators maximize profits when feeding large calves born to larger cows.

"This suggests that if you are a cow-calf producer who retains ownership of calves all the way to slaughter, you might want large cows. Just the opposite may be true if you sell weaned calves or yearlings off grass," adds Stockton.

Fig. 5: Dam age effect on net returns of weaned and yearling calves

Interesting here is Scenario 3 (dashed line), showing how return from raised calves sold as yearlings was maximized when calves were born to older cows.
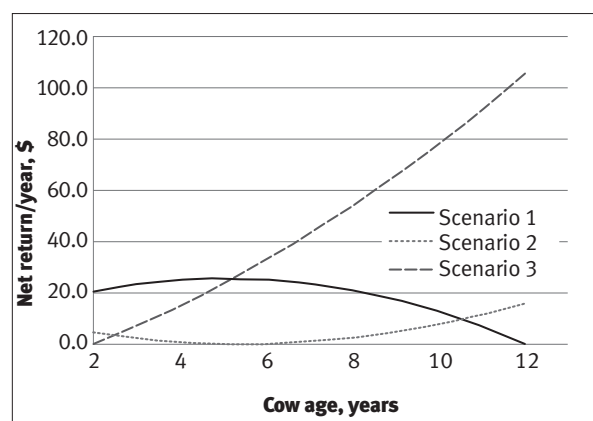

Fig. 6: Dam age effect on net returns of bought weaned calves sold as fed cattle

Returns from purchased calves sold live, as in Scenario 4 (dashed line), were maximized when calves were born to the youngest cows. The opposite is true for Scenario 5 (solid line) when the cattle were sold on a grid.
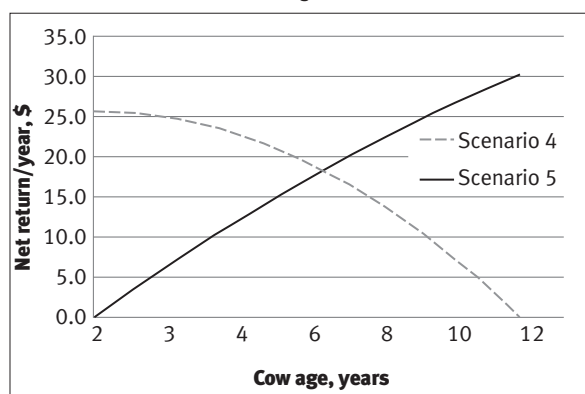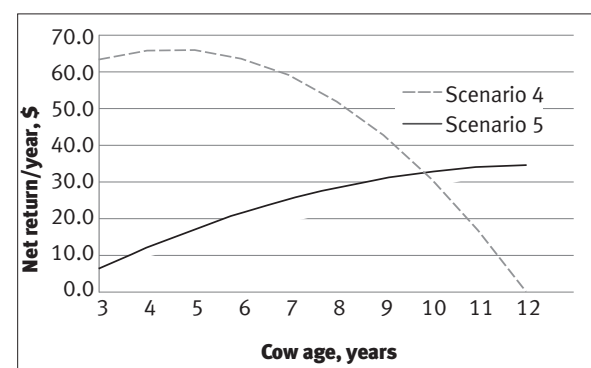

Fig. 7: Dam age effect on net returns of raised calves sold as fed cattle

Retained ownership scenarios are illustrated here. Scenario 6 (dashed line) shows returns of home-raised cattle sold live were maximized when calves were born to younger cows. Scenario 7 (solid line) shows calves sold on a grid returned more when born to older dams.

Bottom Line Affected by Cow Size and Age *(from page 69)*

He points out, however, that the study does not account for potential buyer bias against lighter calves out of smaller cows.

Cow age matters, too

What does cow age have to do with it? More than you might think, according to the Nebraska study. The contribution of cow age to net returns in the nine different production systems varied by as much as $130 per head among cows of different ages. However, age of dam was inconsequential to production systems involving purchased yearlings that are finished and marketed live or on a grid-price basis (Scenarios 8 and 9).

To the system that sold weaned calves (Scenario 1), the youngest cows contributed more to net return than older, mature cows. Younger cows also contributed more to profitability in systems where raised calves or calves purchased at weaning were ultimately marketed as live fed cattle (Scenarios 4 and 6).

Calves born to older dams ultimately returned more profit to the system

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>
> — *Matt Stockton*

involving the purchase of weaned calves that were fed to finish and sold on a grid-price basis (Scenario 5). The same was true when ownership of raised calves was retained all the way to harvest and fed cattle were sold on a grid (Scenario 7). Older cows also contributed more to profitability of production systems marketing cattle as yearlings coming off grass, regardless of whether the calves were home-raised or purchased (Scenarios 2 and 3).

Stockton says the differences in profitability attributed to cow age were surprising. Age of dam made a significant difference in most production systems, but he doesn't know why.

"The data suggests that young cows are most profitable for the calf seller, while older cows contribute more to the producer that sells yearlings. It suggests that calves out of older cows are more profitable for the producer that buys weaned calves and sells finished cattle on a grid, but not if the producer sells the cattle live. For the producer that retains ownership of raised calves, younger cows are better when finished cattle are sold live, but old cows contribute more to net return from cattle sold on a grid," summarizes Stockton.

"I can't explain it, but age of dam is a factor. It points to a need for research to figure out why," he adds.

"What all of this tells me is that cow size matters and so does cow age. But the differences in profitability are related to marketing," states Stockton. "It depends on what you're going to do with the calves."

Researchers contributing to the cited UNL research also included reproductive physiologist Rick Funston and beef range systems specialist Aaron Stalker.