

Stop Stuffing Your Heifers

Research suggests long-term implications of feeding high-energy diets to heifers to accelerate the maturation process.

by Ed Haag

A day doesn't go by when we are not subjected to another news item on how calorie-restricted diets dramatically increase the longevity of laboratory mice. The relevance of this story is greatly enhanced by the tantalizing speculation that switching our intake from fries to lettuce can help us delay meeting the grim reaper by a decade or two.

But for commercial calf producers, the significance of calorie restriction doesn't end with mice and men. Recent long-term studies — seven years to date — conducted by beef scientist Andy Roberts at the U.S. Department of Agriculture-Agricultural Research Service (USDA-ARS) Fort Keogh Research Laboratory, Miles City, Mont., reveals that portion control for heifers can have a significant long-term effect on a beef producer's bottom line.

Roberts points out that the Fort Keogh research team has identified more than one production benefit associated with restricting levels of feed during postweaning development as well as throughout winter supplementation. These include improved production efficiency due to decreased utilization of harvested feed, increased efficiency of cows and an apparent alteration of partitioning of nutrient utilization [increased body condition score (BCS) and decreased calf weight] that results in increased retention of cows beyond 5 years of age.

He adds that increasing the production lifespan can result in decreased replacement rate (more calves to sell) and greater proportion of cows at peak productivity (maximum productivity is between 5 and 11 years of age).

A new perspective

For those directly engaged in rearing mother cows, this new perspective represents a change in how we look at raising heifers. Roberts is well-aware of the research conducted on heifer development that supports the premise that postweaning growth is an important factor in affecting the age of puberty.

While agreeing with this on a physiological level, he does question the value of studies that attribute major economic advantages to those who accelerate the maturation process of heifers through enhanced diet. Roberts believes that such studies can be misleading because most of them do not take into account the long-term implications of feeding high-energy diets to heifers that are destined for commercial herds.

Looking beyond the first year

What he sees as the difference between most of these earlier studies and his work is scope and duration. "A major limitation of this research is its focus on short-term effects (single production year) with little consideration of long-term implications," he says, adding that based on his observations optimizing feeding opportunities to enhance the likelihood of early puberty may not result in maximum biological or economical efficiency in the long-term.

At the heart of the matter, he says, is a growing disconnect in feeding regimens between the herds in the beef research community and the herds of commercial producers.

"I really wonder how much of the scientific research is done on animals that are representative of those in commercial production," Roberts says. "To put it

another way: How often have you been at a university and seen a skinny cow?"

He points out that universities are under public scrutiny to maintain their animals in very good condition and, thus, a starting point of the university herds may be considerably above many extensively managed commercial herds.

For Roberts and his co-workers, it was critical to build a study model that not only looked well beyond the first year of production, but also placed their research herd well within a feeding context of most commercial herds.

"We wanted to evaluate lifetime productivity of heifers developed with either unlimited or restricted feed during the postweaning period," he recalls.

To that end, Roberts and his research team divided their herd into two groups. The first, representing the control herd, consisted of 268 animals that were placed on feed-to-appetite regimen. The second, representing the feed-restricted diet, consisted of 263 animals fed at 80% of what was consumed by the control group. Both groups participated in a 140-day postweaning trial, beginning about 2 months after weaning at 6 months of age. Heifers were fed a diet of 64% corn silage, 23% alfalfa and 13% of a protein-mineral supplement [dry-matter (DM) basis]. Restricted heifers consumed 27% less feed during the 140-day trial and had lower average daily gain [ADG; 1.1 vs. 1.5 pounds (lb.) per day] than control heifers.

After the trial, heifers were combined and subjected to an estrous synchronization protocol. Heifers were artificially inseminated (AIed) at about 14 months of age and then exposed to bulls for the remainder of a 51-day breeding season. Prior to breeding, heifers that were developed on the restricted level of feeding weighed 692 lb., whereas control-fed heifers weighed 741 lb. The proportion of heifers attaining puberty by 14 months of age was less in restricted (59%) than control-fed heifers (69%). This change

Focus on Females

in puberty was associated with a delay in conception of about 1 week in some, but not all years. However, overall pregnancy rate was not significantly influenced by restricted feeding of heifers. Overall savings in feed was \$24 per bred heifer reared on the restricted level of feeding.

Hidden costs, revealed benefits

Roberts notes that the effect of feeding the restricted diet did not end at breeding. When all heifers were placed on native grass range from May to December, those that had been restricted had an average daily gain (ADG) that was 16% higher than the control group.

This feed efficiency was retained by the adult cows well beyond their heifer year, Roberts says, pointing out that after restriction, restricted heifers remained lighter but had greater ADG than their control counterparts.

Roberts says one of the most eye-opening observations made during the last eight years of the research facility's ongoing heifer study is the apparent effect that dietary treatment of the cows had on their daughters.

As part of the ongoing study, heifer offspring from the two original management groups were randomly assigned to restricted or non-restricted protocols, resulting in four treatments: restricted cows from restricted dams, restricted cows from control dams, control cows from restricted dams and control cows from control dams.

The preliminary analysis of animals that have had the opportunity to reach their fifth breeding season indicates the retention levels for restricted cows from restricted dams exceeded non-restricted cows from non-restricted dams by 15% (66% vs. 51%). Non-restricted cows from restricted cows ran 50%, while restricted cows from non-restricted cows were at 39%.

While summarized study data collected during the last eight years show that the heifer pregnancy rate was 3.5% less in heifers developed under restricted diet than it was in the control group, Roberts points out that this reduction in calf output could be more than compensated for by the increased longevity in mother cows and the reduced costs in feed.

The rising cost of more

So, what is the impetus behind this new look at nutritional intake and heifer development? Roberts and his colleagues at Fort Keogh Research Laboratory see this as a contemporary issue. He admits that, until recently, overfeeding heifers with \$2 corn wasn't much of a problem to beef producers.

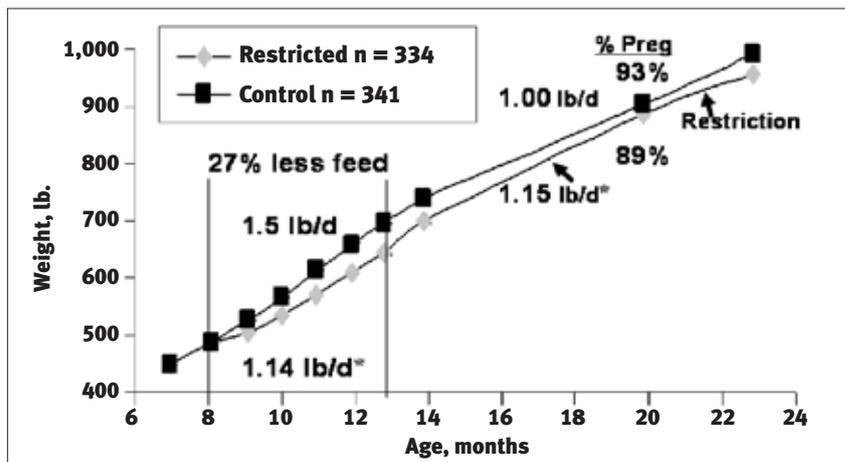
"That all changed when the cost of feeds we traditionally use to supplement our cattle went through the roof," Roberts says. "Alternative uses like biofuel production will continue to increase the competition for feedgrains and ag ground. This will push feed prices even higher."

But higher feed prices aren't the only reason

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Fig. 1: Heifer development

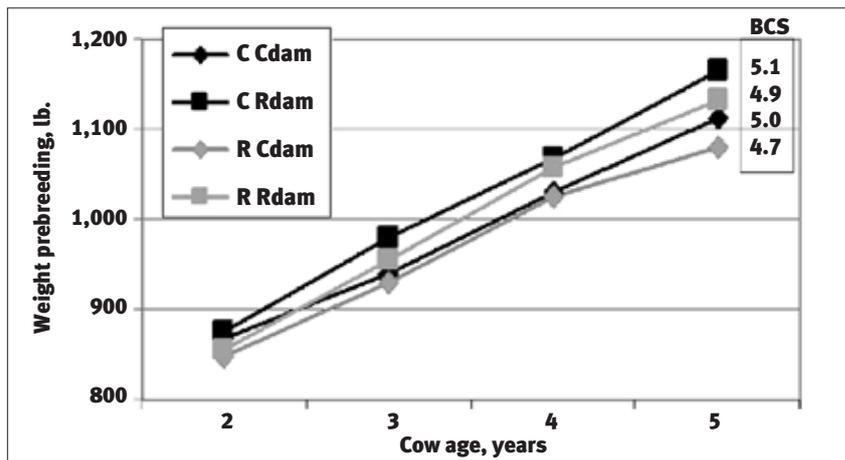
Restricted heifer development results in (a) improved efficiency, as indicated by greater gain:feed during the 140-day restriction and greater ADG, and lighter weight after restriction, when grazing on summer pasture; and (b) Less feed (~\$24) per pregnant heifer, accounting for difference in pregnancy rate.



Source: Andy Roberts, USDA-ARS Fort Keogh Research Laboratory, Miles City, Mont.

Fig. 2: Cow weight

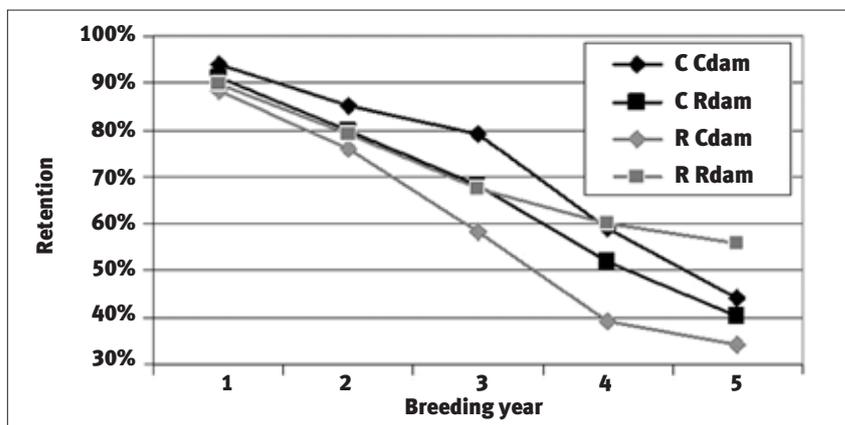
Restricted cows remained lighter than controls (grey vs. black lines), equating to reduced maintenance requirements. However, cows out of restricted dams (Rdam) were heavier than cows from control dams (Cdam) due, in part, to differences in body condition (BCS; square vs. diamond symbols). Thus, restriction has an influence on the subsequent generation.



Source: Andy Roberts, USDA-ARS Fort Keogh Research Laboratory, Miles City, Mont.

Fig. 3: Retention of CGC heifers

During first three years of production, retention was greater for control cows out of control dams (black line with diamond symbols). However, a greater retention later in life is being observed in restricted cows out of restricted dams (grey line with square symbols). Restricted cows out of control dams exhibit the least desirable retention (grey line with diamond symbols).



Source: Andy Roberts, USDA-ARS Fort Keogh Research Laboratory, Miles City, Mont.

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why scientists like Roberts are taking a second look at the nutritional criteria for developing heifers. He and others in his profession feel that females that are fed for higher levels of gain postweaning may have a tendency to require higher levels of feed in order to breed throughout their life.

Equally significant is evidence from Roberts' research showing that this trait is passed down from mother to daughter. His fear is that by artificially supplementing heifers to get them to puberty faster, ranchers are inadvertently tampering with their natural feed efficiency.

"Then when they can't get bred under range conditions they get culled," he says, noting that under drought conditions the problem would only be exacerbated.

More droughts ahead?

Richard Seager, from Columbia University's Lamont-Doherty Earth Observatory has led a research team charged with documenting, through tree ring studies and other recognized analytical methods, historic drought patterns in North America.

He points out that when our last century is compared with previous centuries, precipitation and corresponding growing conditions in North America have been exceptional, with the period from the late 1970s through the late 1990s being the wettest two decades in hundreds of years.

While we all can wish for more of the same, Seager assures us that, as we have already started to move in the direction of drier times, the likelihood of a repeat of what occurred at the end of the last century is highly improbable.

Instead, if historic patterns prove to be indicators of future climatic events, farmers and ranchers are faced with the prospect of having to deal with droughts that will be measured in decades rather than in years.

Heifer target weights revisited

With the specter of rising feed costs and less-than-favorable growing conditions in the wings, Roberts isn't the only researcher who has taken an interest in revisiting recommended heifer feeding criteria. Rick Funston at the University of Nebraska West Central Research and Extension Center in

North Platte has been conducting research that addresses some of the same issues.

"Our research has shown that heifers don't have to be at the recommended two-thirds of mature body weight to breed successfully," Funston says. "We have seen positive results with heifers at 55% and as low as 50%."

He notes that the lower target weights offer those involved in heifer development greater flexibility in terms of required daily weight gain.

"With the new target weights, a producer shouldn't have to supplement much to reach his goal," he says. "If people would just consider their weaning weight and date and then when they are going to breed and their new target weight, there should be ample time to get there."

For Funston, this lower target weight could help commercial producers expand their heifer feeding options and significantly lower their development costs. "Rather than supplementing their heifers with high-priced feed they can access more extensive systems such as cornstalks and winter grass."

