Limit feeding possible for growing heifers

DEVELOPING a session on feed restriction programs for growing heifers (Kertz, 2009) for the Florida Ruminant Nutrition Conference caused me to review this area more closely as well as to develop some background. This column is a synopsis of that paper.

Over the last 40 years, heifer growing programs have undergone various phases and encountered various issues. At one time, heifers were the forgotten animal on a dairy, often banished to the proverbial “back 40” acres. They had access to only poor pasture or poor-quality forages.

Then, in the 1970s and 1980s, it became popular to feed corn silage to dairy cows and heifers. Too often, corn silage was available free choice to heifers, which resulted in their fattening even if protein supplementation was adequate and grass or other hay was also available.

In a classic study, Jahn and Chandler (1976) showed that there was a practical limit to how much protein could compensate for this low-quality/high-fiber forage.

Stobo et al. (1986) found that with younger calves, increasing the forage level had a double-negative effect in that the average daily gain (ADG) decreased as the forage level increased from 4% to 61%, while the gut fill also increased, distorting true body growth.

As an increasing emphasis was placed on growing and harvesting higher-quality forages for dairy cows, these forages were often fed to heifers too. At the same time, an increasing emphasis was placed on higher genetic merit for cows. Consequently, the dry matter intake of heifers increased with genetic merit. With higher-quality forages, heifers could now get fat when fed virtually forage-only diets.

Some producers then began to seek and use some poorer-quality roughage to reduce dietary energy concentration and thereby limit energy intake when diets were fed free choice to heifers. That led to others seeking another approach to feeding heifers: limiting their intake. Limit feeding dairy heifers requires management attention and skill to achieve the desired results. However, good principles of feeding and management for dairy heifers must first be mastered because successful limit feeding will be dependent on achieving a higher level of feeding and management.

Limit feeding has been shown to be useful for controlling growth in other livestock animals such as beef cows (Loerch, 1996), feedlot steers (Loerch, 1990), ewes (Susin et al., 1995) and beef heifers (Wertz et al., 2001). Potential benefits include reducing the feed costs, nutrient excretion and feedstuffs needed.

In various research trials (covered in more detail in the paper), limit feeding heifers:

- Has produced targeted ADG if dietary protein and energy concentrations have been adjusted to provide the same amount of protein and energy as for ad libitum-fed heifers;
- Has resulted in similar first-lactation milk yields as ad libitum-fed heifers;
- Has decreased manure excretion and increased efficiency of nitrogen utilization and other nutrients, and
- Has been shown to work if adequate bunk space is provided for all heifers to eat at the same time. This is especially critical for heifers lower in the social order.

Hoffman (2007) cautioned that there are some limitations to implementing a limit-feeding strategy. First is the expectation that heifers will vocalize, to a minor extent, for about one week, with vocalization ending thereafter. Second, if adequate bunk space is not available for all heifers to eat at the same time, dry matter intake (DMI) may be limited for some heifers.

When heifers were fed to 80% of their intake potential, they consumed all of the feed available within one hour (Hoffman, 2007). Cows are alleloometric (Nordlund et al., 2006) in that they all want to do the same thing at the same time. However, cows and heifers also have a distinct social order. Consequently, Nordlund et al. found that transition cows responded best in subsequent milk production if the stocking density was 80-85% of the headlock space available. That means if there were 100 headlock spaces available, the pen would only contain 80–85 cows.

This response is due to the most timid cows not coming into the headlocks to eat unless there is more than one side-by-side headlock open. This is because lower-social order cows need to find a less-aggressive cow to eat alongside at the same time.

Heifers are likely to have similar social behaviors to cows. Consequently, a lack of adequate bunk space could result in uneven or lower rates of gain with heifers. Consumption of edible bedding can also confound DMI and ADG results.

It has been established in research trials cited in the full paper that limit feeding heifers can have advantages in decreasing manure output, reducing feed usage and increasing feed efficiency.

How well might that work on an actual calf/heifer operation? Mason Dixon Farms in Gettysburg, Pa., has been a family operation since 1784 and has a history of

**Mason Dixon Farms typical limit-fed heifer diets in January 2009**

<table>
<thead>
<tr>
<th>Heifer weight group, lb.</th>
<th>As-fed intake, lb/day</th>
<th>Diet CP, % of DM</th>
<th>Diet ME, Mcal/lb.</th>
<th>% forage in diet</th>
<th>Forage sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>350</td>
<td>8.0</td>
<td>17.6</td>
<td>1.25</td>
<td>58</td>
<td>Corn and barley slages, alfalfa hay</td>
</tr>
<tr>
<td>490</td>
<td>10.2</td>
<td>15.5</td>
<td>1.26</td>
<td>50</td>
<td>Barley silage, corn silage</td>
</tr>
<tr>
<td>600</td>
<td>12.6</td>
<td>16.8</td>
<td>1.17</td>
<td>50</td>
<td>Barley silage</td>
</tr>
<tr>
<td>850</td>
<td>14.7</td>
<td>15.2</td>
<td>1.11</td>
<td>54</td>
<td>Barley silage</td>
</tr>
<tr>
<td>1,050</td>
<td>16.2</td>
<td>14.6</td>
<td>1.08</td>
<td>62</td>
<td>Barley silage</td>
</tr>
</tbody>
</table>

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innovation and progressive adoption of new ideas and technology.

Mason Dixon Farms began utilizing limit feeding of high-energy diets for its heifers in July 2006 under the management of Alan Waybright by following the initial recommendations of A.J. Heinrichs of Pennsylvania State University and ongoing diet formulation by nutritionist Robert Fry of Atlantic Dairy Management Services.

By October 2006, all heifers were on this program, and as of January 2009, about 2,000 had their first calf. Currently, most Holsteins are being bred to Normande Reds. About 250 of the present 2,000 heifers are crossbred, and only 30 crossbred cows are in lactation.

The average first-calf heifer age is 23 months, with Holstein pre-calving bodyweights ranging from 1,224 lb. to 1,400 lb. and crossbred bodyweights ranging from 1,050 lb. to 1,125 lb. Heifers start the limit feeding program at about four months of age and 275-300 lb. of bodyweight.

The primary benefits realized are lower feed costs and less manure. While Mason Dixon Farms has operated a methane generator since 1979, it is not clear if the manure from heifers fed less forage works better since it now is more like lactating cow manure.

There are five groupings of heifers, each with their own ration, as noted in the Table. These diets have been developed by trial and error at Mason Dixon Farms by the nutritionist and the calf/heifer manager.

The nutritionist indicates the need for published, credible data showing the absolute amount of metabolizable energy (ME) and metabolizable protein for limit-fed heifers and for a software program to optimize diets. In addition, he has made the following observations about this limit-fed program for heifers:

- The program has resulted in a reduction in feed costs due to improved conversion efficiencies.
- Adequate bunk space is required for all stock to eat at one time.
- Bawling is common in the barn when people or feed equipment are nearby.
- Boredom is a concern with an empty bunk for as long as 16 hours per day, which means more tongue lolling and pen mate sucking.
- Body condition will be normal, but heifers will have a much smaller abdominal fill. They have a “barrel” more like a finished feeder animal, and feed delivery is easy since no one needs to make a bunk call; the heifers are just fed to the head count.

The Bottom Line

Limit feeding heifers can reduce feed costs, nutrient excretion and the feedstuffs needed. However, a higher level of feeding and management would be needed.

A large dairy herd has successfully used limit feeding since 2006 for all of its dairy heifers beginning at 286 lb. of bodyweight. Separate rations with different protein and energy concentrations are provided for five groupings. The primary benefits have been lower feed costs and less manure production. Other observations have also been noted.

References
