

Calf water intake reviewed

Bottom Line

with
AL KERTZ*



CALF and heifer information are normally covered in more detail in specialized conferences held for this purpose. However, other programs also address some of these issues as well.

A practical and well-researched article on water (Beede, 2005) was presented at the Western Dairy Management Conference held March 9-11 in Reno, Nev. Quantity and quality of water can be an issue on dairies, calf and heifer operations. Since water comprises about 70% of body composition, that alone indicates the criticality of water to dairy animals.

Dave Beede provided various guidelines for water quality in his paper, as well as factors influencing its intake. For calves, there is a critical relationship to starter intake (Kertz et al., 1984).

While not foolproof, I have found that calves and heifers will drink about four times as much water as dry matter intake subject to variables such as climate, feedstuffs, etc.

Despite some continuing belief that water intake causes scouring, we found that, in reality, scouring calves begin to drink more water (Kertz et al., 1984).

I have also found that the most commonly unrecognized feeding and management problem with young calves is failure to separate water and starter containers. This guarantees that the following will happen: calves will dribble water in starter and dribble starter in water. These events will reduce the intake of both.

This is illustrated in data collected when I was at Purina (Table). The data are for calves in their second month of life after weaning.

Heifer movements

At the Midwest American Dairy Science Assn./American Society of Animal Science meeting held March 21-23 in Des Moines, Iowa, Mike Schutz (2005) summarized key aspects of U.S. heifer numbers and movements and their relationship to culling rate.

Only two figures are shown in deference to this session, which will be published in a scientific journal.

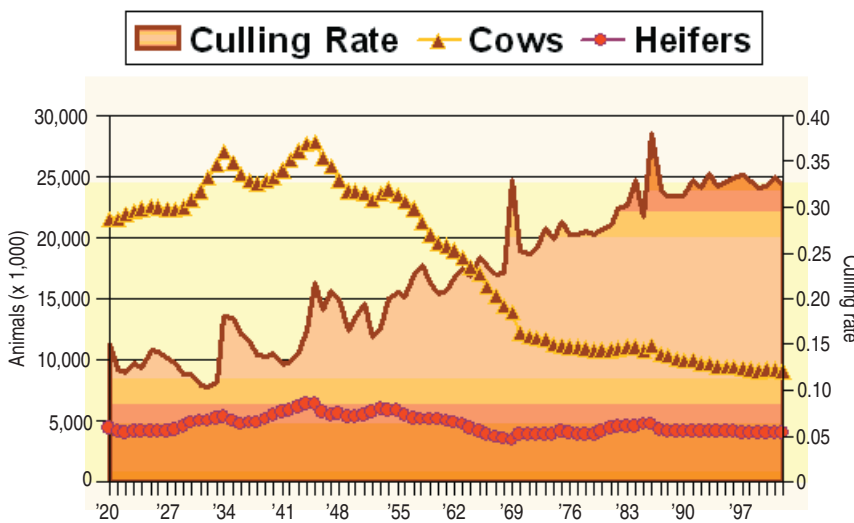
Heifer numbers stayed rather constant since 1920 (Figure 1), which

Calf performance after weaning in the second month of life with or without water and starter containers separated

	Separated	Adjacent
Weight gain, lb. per day	1.86	1.58
Starter intake, lb. per day	5.03	4.44
Water intake, lb. per day	18.0	13.6

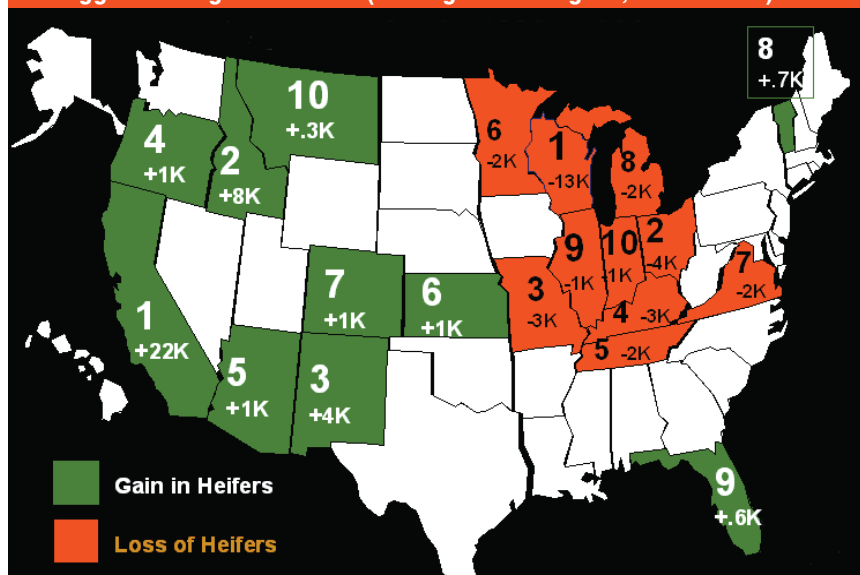
Ralston Purina Research Center, 1982.

1. Historical U.S. dairy heifer inventory (national culling rates)



Source: USDA Ag Stat.

2. Biggest change in heifers (average annual gain, 1989-2003)



has enabled cow numbers to stay similar over the last 10 years while culling rates have increased. Without the additional influx of outside U.S. heifer numbers, the U.S. dairy cow population would have been in

greater decline due to a progressive increase in the culling rate.

The geographical shift in heifer numbers largely patterns the change in dairy cow numbers, as shown in Figure 2.

Calf development

The ninth annual National Dairy Calf & Heifer Conference was held March 29-April 1 in Sioux Falls, S.D., in conjunction with the Central Plains Dairy Expo.

Let's review some highlights of the last technical session, Mike Van Amburgh's on "Starting from Birth: Developing a More Systematic approach to Calf Nutrition and Management" (Meyer and Van Amburgh, 2005).

First, consider what has happened to heifer raising over the last 40 years or so. In the 1950s and 1960s, it was still too common for many heifers to be thrown out and raised on the proverbial "back 40." These heifers did not develop well because they were not fed and managed well.

That was followed in the 1970s and 1980s with corn silage feeding, often free choice. These heifers got fat, often early on, and certainly if fed heavy corn silage diets later on.

During this time period, the "fat cow syndrome" emerged. Often, this was most problematic at calving for cows as well as for first-calf heifers. They got fat before calving, which in turn led to a cascade of fresh cow and metabolic problems that included calving difficulties.

Once this problem was acknowledged and adjustments made, along came high-quality forages and higher dry matter intake heifers — reflecting genetic selection for cows with greater milk production. So, some poorer-quality forages are now needed for feeding to heifers if they are fed diets free choice to avoid fattening.

What all of this means is that there have been confounding factors in how heifers have been raised. When fattening occurs, especially earlier than six months, fattening is more due to an increase in the number of

adipocytes (hyperplasia), which later predisposes those animals to fattening more easily by increasing the size of those fat cells (hypertrophy).

In dairy breeds such as Holsteins, fattening and lipogenic activity occurs first internally in omental and perirenal areas and later subcutaneously, as I learned in a multi-component research project of which my doctoral thesis was part (Kertz, 1974).

Now, throw in concern about fattening of the mammary gland during the allometric phase pre-puberty, and how do you sort this out?

Studies (Sejrsen et al., 1982) have found that higher rates of daily gain showed less parenchyma DNA in mammary glands when heifers were slaughtered before they calved. The supposition was that less parenchyma DNA with higher growth rates would, therefore, have a negative effect on subsequent milk production. However, in this and other studies, there were often only two rates of growth: 1.4 and 2.8 lb. daily gains in this study.

What Van Amburgh and his graduate student, Matt Meyer, have done is take a different look at this area. Meyer et al. (2004) slaughtered six heifers at intervals of 100, 220, 330, 440, 550, 660 and 770 lb. after they were fed to achieve 1.4 or 2.0 lb. daily gain. Total parenchyma DNA was significantly reduced in heifers on the elevated plane of nutrition, but plane of nutrition had no effect on mammary epithelial cell proliferation or on parenchyma DNA accretion rates.

Since DNA accretion rates were the same between the two levels of nutrition, this implied that amount of time between birth and slaughter was responsible for observed differences in mammary DNA.

When the number of days was used in the statistical analysis of parenchyma DNA, there was no difference in development between heifers on the two planes of nutrition. Thus, energy level per se was not the determining factor on mammary development.

A review of data from seven other studies found that DNA accretion rate from this study in relation to number of days alive from these studies predicted "normal" and "diet impaired" mammary development

effectively. Thus, past studies and observations may have been confounded by problems associated with fatter heifers and different ages at first calving.

This should not be interpreted to mean that fattening of younger heifers is not a problem. It is a problem if for no other reason than calving difficulties and the "fat cow syndrome" problems noted above.

Tour

Another highlight of these calf and heifer conferences is that they annually move around the country to different locations; next year, it will be in Visalia, Cal. Tours then reflect local businesses. This year, the tour included:

- A local dairy that grew from 160 cows to about 1,300 cows with progressive changes in calf facilities;
- A company that is now using sexed semen to produce embryos implanted in several local dairy herds (www.transova.com);
- A local 60-cow dairy's transformation into a heifer raising operation, and
- A 3,000-cow dairy that started from "scratch" in February 2003.

Last, proceedings from both this year and previous editions of the Western Dairy Management Conference and the National Calf & Heifer Conference are available in a searchable format through S-PAC (spac.adsa.org) provided through the American Dairy Science Assn.

The Bottom Line

Water intake is critical for calves and heifers. Heifers have become a major commodity in providing cow numbers in herds across the country as culling has increased.

The story of mammary development in heifers as related to rate of body gain is opening a new chapter with respect to heifer age and rate of mammary development.

References

The list of references is available at www.feedstuffs.com or by contacting tlundeen@feedstuffs.com.

* Dr. Al Kertz is a board-certified, independent dairy nutrition consultant based out of St. Louis, Mo. His area of specialty is dairy calf and heifer nutrition and management. To expedite answers to questions concerning this article, please direct inquiries to *Feedstuffs*, Bottom Line of Nutrition, 12400 Whitewater Dr., Suite 160, Minnetonka, Minn. 55343, or e-mail comments@feedstuffs.com.