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Cow Comfort: Can We Do Better?

The premise of free stall housing is that cows are “free” to move around, visit a feed bunk that is continuously stocked with a total mixed ration (TMR), get a drink of water, and lie down in a clean, comfortable stall whenever they want.

While that is an ideal scenario, University of Wisconsin Professor of Veterinary Medicine Nigel Cook, DVM, PhD, says it is not always reality. “I believe many of the stalls that were built in the last 10 to 15 years are failing the cow and the dairy industry,” says Cook. “The welfare, health, performance and profitability of cows can be simultaneously improved with more appropriate free stall housing.”

Cook and his colleagues have performed numerous animal-behavior studies to observe free stall usage in dairy cows, and evaluate the barriers to maximum lying and resting behavior. Table 1 shows 24-hour time budgets for 208 cows filmed in more than 250 filming periods in 17 free stall barns in Wisconsin. Previous research has shown that cows target about 12 hours per day of lying time. While the average in Table 1 (11.3 hours) is close to that, the range that produced that average is telling. “It is shocking that there were cows lying less than three hours a day, and standing — either in the alley or the stall — for nine to 13 hours a day.”

While rest itself is important, the researcher says lameness — caused by extended standing times and/or injuries in the stall — is the most damaging result of improper stall usage. “Lame cows can’t get to the bunk and eat as aggressively,” says Cook. “This

leads to lower milk production, and opens the door to a cascade of metabolic disease issues. Premature culling often is the eventual result.”

Wisconsin-based dairy nutrition consultant James Bailey, owner of Bailey Consulting Inc., has worked closely with Cook and implemented many of his housing recommendations. Based on first-hand experience, he agrees with Cook’s assessment that many current free stalls are in need of retrofitting, particularly for older cows.

“There is a considerable size difference between a first-calf heifer and a mature cow at parity three, four, five and older,” says Bailey. “Trying to put them in the same stalls short-changes the older cows, and I believe it is why we statistically see more lameness and significant milk production decreases in older cows in free stall housing.”

Cook identifies the following critical control points in optimal free stall housing:

- **Resting time** — Effort should be made to minimize travel time to and from the parlor, and overall time away from the pen. Aim for one hour or less per milking.
- **Stocking density** — Strive for a maximum cow:stall ratio of 1:1.
- **Stall surface** — In Cook’s studies, cows bedded on sand exceeded their resting goal of 12 hours per day, and had a 42% lower prevalence of lameness than cows on rubber crumb mattresses.
- **Stall dimensions and design** — In general, Cook believes many of today’s free stalls are too narrow and/or too short for the size of the cows expected to use them. Cow-friendly stall design must take into consideration not only length and width, but also lunge space; head bob space; placement of the neck rail; placement of the brisket locator; and length, height and design of stall dividers.

Using Cook’s advice, Bailey has helped several of his clients remodel free stall facilities, with dramatic results. “Sometimes they’ll choose to make the remodeling investment in just one section of the barn to start out, and they are amazed at the difference in lying down rates, milk production and lameness incidence,” he shares. “Then they are more than convinced to complete the whole project because they see how much more relaxed and healthy their cows are. It’s really a matter of just letting cows be cows.”

Dairy Housing Guide

All of the University of Wisconsin’s cow-comfort research summaries and housing recommendations are available at “The Dairy Initiative: The Guide to Welfare Friendly Dairy Cattle Housing.” The information can be accessed by consultants for a nominal fee via a restricted-access [website](#).

CONSULTANT'S CORNER

The Cows Tells Us Everything We Need to Know

By James Bailey, Bailey Consulting Inc., Sun Prairie, Wis.

After 18 years in dairy consulting, I've concluded that providing a well-balanced, high-quality ration is matched in importance by optimal housing. We work very hard to deliver cows the best possible diet every day, but they also have to live in an environment that provides them easy access to that feed, and encourages them to eat it.

Cows with comfortable stalls will have high lie-down rates, which results in improved rumination, rumen efficiency and feed efficiency. They also will have less lameness, which again encourages feed access and reduces the likelihood of a host of secondary conditions that could eventually lead to culling.

A lot of dairy construction has been based on cost per stall. I like to encourage builders, bankers and producers to instead look at profit potential per stall. I have repeatedly seen herds that improved production by five to 15 pounds per cow per day by improving surface cushion; widening stalls; providing side lung space and a smaller brisket space; and/or increasing bunk space per cow. In remodeled barns, these changes usually pay for themselves in four to 24 months by simply allowing us to get more pounds of milk per pound of feed. And, most importantly, we also have healthier, happier cows.

We need to make sure we "don't let abnormal become normal." Day in and day out, it is easy to start to accept the way cows use stalls improperly. It's important to listen with our eyes and hear what cows are telling us. One of the key indicators of discomfort is a lot of cows "perching" in the stalls with front feet in, back feet out. That means they want to lie down, but they really don't want to go through the trouble of doing so and risk injury going down or getting up.

My "top five" list of housing must-haves to promote excellent feed intake include:

1. Highly cushioned stall surface — sand is my strong preference
2. Proper stall dimensions that are sized for the herd, and allow cows to lie down and get up easily
3. Adequate bunk space (24 inches per cow for lactating groups, and 32 inches or more for pre- and post-fresh groups)
4. Good air movement and quality
5. A concrete surface that is properly grooved without too much slope.

FROM THE MATERNITY PEN

Metabolic Profiling Provides Window to Fresh-Cow Performance

Assessing blood serum metabolites is a telling method of evaluating dry-cow nutrition, evaluating the health status of fresh cows, and predicting early lactation health and performance. Cornell University's College of Veterinary Medicine offers the following explanation of key metabolites in serum samples from immediate postpartum (3-14 days) COWS.

- Nonesterified fatty acids (NEFA) — NEFAs are a biomarker of negative energy balance. High levels are predictive of increased incidence of post-calving diseases such as displaced abomasum (DA), metritis/retained placenta and clinical ketosis.
- β -Hydroxybutyrate (BHB) — BHB is a bellwether of subclinical ketosis. High levels indicate an increased likelihood of not only clinical ketosis, but other conditions in the fresh-cow disease complex, including DA, metritis, and suppressed milk production and fertility.
- Urea — Blood urea levels are indicative of the ammonia concentration in the rumen and the protein (and energy) content in the diet. Both high and low levels indicate the need for modifying the content of the ration.
- Albumin — Albumin values reflect the nutrient and energy content of the ration, but also are affected by other conditions, including inflammatory states and diseases of the liver, kidneys and gastrointestinal system.

Table 1 shows the individual-cow goals for each of these elements in cows three to 14 days post-freshening.

BEYOND BYPASS

Rumen Temperature May Help Screen for SARA

Subacute ruminal acidosis (SARA) is a costly and difficult-to-detect disease that typically affects high-producing dairy cows. It is caused by feeding a diet rich in energy and low in structural carbohydrates, which leads to accumulation of organic acids in the rumen. Although symptoms can be vague, common signs of SARA include reduced milk production, depressed dry-matter intake, diarrhea, rumenitis, and lameness or laminitis.

Diagnosis of SARA can be confirmed by measuring rumen pH. Repeated bouts of depressed ruminal pH below 5.6 for three to five hours per day indicate the presence of SARA. However, extracting rumen fluid samples to routinely measure pH levels has proven challenging for nutritionists and veterinarians. The two most common methods are oral stomach tubing — which has a high probability of saliva contamination; and rumenocentesis — which presents cow-comfort and welfare issues.

University of Guelph Department of Animal Science researcher Ousama AlZahal conducted a

study to determine if regular monitoring of rumen temperature could be used to more accurately and less invasively diagnose SARA. AlZahal placed three rumen-fistulated cows on a standard TMR, and three on a ration specifically developed to induce SARA. After one week of dietary adaptation, ruminal temperature and pH were simultaneously recorded every minute for four days using electrodes implanted into the rumen of each animal.

The researcher found that control cows dropped below a ruminal pH 5.6 for 60 minutes per day, compared to 412 minutes (6.8 hours) per day for the cows on the SARA-inducing ration. Rumen pH in the SARA animals reached its lowest point (average of 5.8) at the same time ruminal temperature reached its highest point (above 39.4°C), leading AlZahal to conclude that ruminal pH and temperature are correlated, and that monitoring ruminal temperature can be used as a method of detecting SARA. Using once-a-day internal temping, or a wireless rumen sensor administered as a bolus, ruminal temperature could be regularly monitored via minimally invasive means.

Read a [complete summary](#) of AlZahal's study.

QUALITY CORNER

Ensuring Consistency in SoyPLUS

In the manufacturing of rumen bypass soy protein products, too much heat can damage digestibility, and too little heat will fail to create bypass proteins via the Maillard reaction. For SoyPLUS, uniform heating of each bean particle is ensured by carefully cracking of the beans prior to heating. Cracked beans are continuously monitored for particle size prior to advancing in the process stream, and must be between 2200 and 2600 microns in size. For the past 12 months, the average particle size for all cracked beans has been 2475 microns, with a standard deviation of 168.

Feed particle size can also affect degree of rumen bypass for soy protein products. Smaller particles experience more protein degradation in the rumen because they have a greater surface to mass ratio. In the production of SoyPLUS, the soybean meal leaves the expeller presses in the form of a "cake", which allows us to grind it to a specific particle size. Our quality objectives are for the final meal to be between 750 and 1,000 microns in size. For the past 12 months, the average particle size for SoyPLUS leaving our plant has been 910 microns, with a standard deviation of 64.

Crop year can influence the protein content of soy products. For the 2008 and 2009 crop years, the protein content of U.S. soybeans and soybean meals was lower than usual. Since West Central started using 2010 crop year soybeans, the average protein content of SoyPLUS has been slightly higher than in the past 2 years. West Central will make an announcement in January regarding any changes to the protein guarantee for SoyPLUS.

HAPPENINGS

Bringing to a Close 2010, and welcoming 2011

While 2010 represents a year of obstacles for many in the dairy industry, the year has also embodied a year of change for West Central's dairy nutrition team.

Over the course of the last year, West Central has introduced PasturChlor, an adaptation of SoyChlor specifically formulated for pasture fed dairy cows, West Central also began marketing PRO*CAL in the upper Midwest, and the organization worked through an agreement with the BNSF for better freight rates to ship SoyPLUS. It's been an incredible year!

In 2011, West Central is looking at investing in several relationships that will benefit customers through increased research availability. And above all, the organization remains focused on providing quality products and information, continuing our heritage of innovation and high quality value-added products.

We look forward to continuing to work with our customers, growing our leadership role in the dairy market, and all that 2011 has to offer. Seasons greetings to all!



West Central

406 First Street
Ralston, IA 51459
(800) 843-4769
www.west-central.com