

RESEARCH WATCH October 2009

Research Watch is a collection of recently published research news. Research Watch contains fully credited items.

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BEEF CATTLE

Load Position May Impact Health And Performance

<http://beefmagazine.com/beefstockertrends/0721-load-position-impact-health/>
Jul 21, 2009

Add this to the potential criteria for sorting incoming stocker calves based on performance potential and health risk: calf location in the loaded trailer.

“Our current project reveals that the environment within a commercial transport carrier is not likely homogeneous. And, cattle position within the transport vehicle may result in differing health and performance outcomes,” say researchers at Kansas State University (KSU).

In this unique study spanning two years (May 2006 to May 2008), KSU researchers looked at how location within the trailers impacted the health and performance of 21 loads of calves assembled in the Southeast, commingled in Tennessee and shipped to the KSU Beef Stocker Research Unit west of Manhattan. Specifically, KSU researchers—Dale Blasi, Mark Epp and Brad White, DVM—looked at health and performance differences during 45-60 days of backgrounding ahead of pasture turn-out.

Trailer sections were identified as: bottom deck rear (BDB), bottom deck front (BDF), bottom deck (bottom deck forward and back combined, BOT), rear on top (ROT), bottom deck nose (NOB), nose on top deck (NOT), rear on bottom (ROB), top deck back (TDB), top deck forward (TDF), and top deck (top deck back and forward combined, TOP).

Approximately 24 hours post-arrival, cattle were processed with standard health protocols including castration for bulls, metaphylaxis, modified-live and viral vaccines. Vaccinations were boosted, and individual animal weights were recorded between 10 and 16 days after arrival for each load. Cattle were fed a total mixed ration twice a day that included a mixture of prairie hay, alfalfa, wet gluten feed, and cracked corn. Calves were fed for approximately 6 weeks; just prior to exit from the facility, each animal was individually weighed.

According to the results:

a.. Cattle in the middle section were significantly more likely to be treated at least once than cattle in the most forward sections.

b.. The least squares mean rate of gain (Average Daily Gain-ADG) from arrival to reweigh for cattle in the rear section (3.8 lbs./head daily) was lower than that for calves housed in the front section (4.2 lbs./head daily). Cattle in the middle section also tended to have lower least squares mean ADG during this period (4.0 lbs./head daily) than cattle in the front section.

c.. The relationship with this short-term gain was further explored when the rear of the truck (ROT, ROB) was compared with the rest of the vehicle. Cattle in the two rear truck sections had lower ADG relative to cattle in the middle and forward sections of the truck. According to the researchers, "One hypothesis to explain this finding is that potentially toxic fumes from the transport vehicle move behind the vehicle because of airflow currents and enter the rear of the truck, exposing these calves to lower quality air first. This could lead to short-term mechanical or physiological insults that limit short-term ADG. This hypothesis may be supported by the fact that one of the few associations between health outcomes and location on the truck was identified between cattle in the most forward sections (NOT, NOB) when compared with cattle in the middle (BDF, BDR, BOT, TOP, TDF, TDR) or rear (ROT, ROB) compartments.

"In many transport vehicles, the front of the first two sections is solid or directly behind the cab of the truck and thus protected from direct intake of exhaust. If airflow from the exhaust enters the trailer from the rear and sides of the truck, the most forward sections would tend to be somewhat protected from this effect."

For more information, see www.oznet.ksu.edu/library/lvstk2/SRP1010.pdf

Identifying Sick or Injured Cattle

Mississippi State University Extension Service

July 2009

Proper and timely identification of sick or injured cattle helps minimize unnecessary treatment expense and preventable production losses, write Dr.

Jane A. Parish, Associate and Dr. Justin D. Rhinehart, Mississippi State University Extension Service.

Accurately pulling cattle needing examination or treatment is difficult but essential in order to treat sick or injured cattle without unnecessarily spending money on or adding stress to healthy cattle. Sick calves can be identified in several ways. The most popular is rectal temperature and visual indications.

Identifying Sick Cattle

Body Temperature

When properly used, body temperature can be a good indicator of illness. A greater incidence of calf illness can be identified using body temperatures rather than visual observation alone. One common rule of thumb in beef cattle operations is to designate cattle with rectal temperatures of 104 °Fahrenheit or greater as sick. In addition, consider visibly ill cattle sick regardless of body temperature.

Body temperature rises in cattle infected with a disease-causing organism as the immune system begins to fight the infection. Some untreated cattle overcome infection and recover, while others suffer elevated body temperatures and show other signs of illness. In cattle that begin to succumb to disease, clinical signs worsen and body temperature eventually falls well below normal, creating a dangerous health situation. Early detection of elevated body temperatures and rapid recognition of clinical signs of illness are important for effective treatment of sick cattle.

To use body temperature properly as a measure of illness, it is necessary to know what is “normal.”

Unfortunately, normal temperatures for cattle rise during the day. Cattle producers must consider this when deciding when to use body temperature as an indicator for pulling sick cattle.

Cattle do not maintain body temperature in a tight range as humans do. Unlike humans, cattle expel body heat primarily through respiration rather than sweating. In fact, body temperature in cattle follows a daily pattern where there is a period of increasing heat load and rising body temperature followed by a period of heat dissipation and falling body temperature.

Cattle body temperatures rise during the day rather than the animals spending energy to get rid of the heat. Minimum body temperature usually occurs early in the morning, then steadily increases during the day. The heat load built up during the day is dissipated at night such that body temperature falls gradually during the night, reaching a daily low early in the morning. This process occurs even on cold days.

Cattle body temperatures tend to increase during daylight hours. Heat load is then dissipated at night. This is the case in both warm and cold weather conditions. It also occurs in controlled environments with a standard temperature, so factors other than the outside temperature have a significant influence on cattle body temperature. Feeding, activity level, solar radiation, and humidity also influence cattle body temperatures. Acute elevations in body temperature occur directly after feeding or exercise.

Fevers are identified more accurately when body temperatures are at their daily lows. For proper identification of sick cattle, make sure that body temperatures are not taken too late in the day when false positives for illness might occur.

While working cattle in the late evening may seem like a good idea, cattle generally need several hours past sundown to dissipate heat and cool down from an extremely hot day. It is critical to take temperatures before mid-morning. Producers measuring cattle temperature in the afternoon, even on a cold day, and letting cattle stand around for three or four hours before processing may identify cattle for treatment that are actually healthy.

Be careful to minimize exercise and stress just before measuring temperatures. Cattle should never stand for more than 20 minutes in alleyways or chute of handling facilities before temperatures are taken. Once in the chute, measure body temperatures immediately. It may be necessary to divide cattle into small groups that can be worked in a reasonable amount of time instead of trying to work the entire group at once.

Visual Signs of Cattle Illness

When using visual appraisal, one of the most important signals of illness is appetite suppression. Feed consumption of cattle exposed to respiratory disease begins to decrease about 48 hours before increased body temperature is observed.

The most effective time to observe the feeding behavior of cattle is when they are fed each day. Unfortunately, it is difficult to monitor daily feeding patterns of grazing cattle or calves on self feeders. In this case, observe signs of gut fill. Cattle that have not been eating and drinking properly appear gaunt, and their abdomens often bounce when they walk. Rapid weight or body condition loss also indicates illness.

Other later occurring signs of illness include labored breathing, deep coughing, eye and nasal discharge, bloody diarrhea, or depression. Depression is noted as drooping head and ears,

excessively slow movement, lagging behind the rest of the herd, and reluctance to get up when approached.

These symptoms occur after sick cattle have gone off feed and their rectal temperature has risen. Therefore, it is extremely important to thoroughly observe cattle daily to catch illness early and begin an effective treatment protocol.

Vaccination can produce signs of illness in some situations. Discuss expected effects of specific vaccines on cattle before administration to distinguish between an animal that is ill or one that is suffering a temporary side effect of vaccination.

Examining cattle manure can also help identify sick animals. Loose manure with large feed particles, mucus, or blood can indicate illness or injury. While it may be difficult to identify a specific animal in grazing situations, producers can at least be alerted to watch the herd closer. Cattle often defecate during handling, so plan to observe manure during this time.

Calf displaying classic signs of illness, including drooping head and ears

Identifying Injured Cattle

Injuries in cattle may be minor or severe. Some injuries are relatively easy to detect upon observation, such as injuries that result in lameness or inability to stand up or walk (a non-ambulatory or “downer” animal). These types of injuries can prevent marketing an animal or result in market discounts. Other injuries are more subtle, including bruising and internal organ injuries such as hardware disease. Suspect these types of injuries when cattle display behavioral changes such as appetite changes or reluctance to move.

Examine the animal’s environment for potential hazards or conditions that may have caused an injury. Horns contribute to bruising in animals housed together. Injuries to breeding animals often occur during the breeding season as a result of mounting behavior. Inadequate feed trough space increases competition for feed and chance of injury. Sharp objects such as wire and nails in pastures or handling areas also contribute to cattle injuries.

Inspect cattle closely during feeding and animal handling to identify injuries that are not easily seen in pasture settings. Foot injuries, eye injuries, mouth injuries, minor lacerations (cuts), hematomas (blood vessel rupture and blood pooling under the hide), penis injuries, and biting insect damage are examples of injuries that sometimes require close inspection to identify. By identifying injuries during animal handling, animals can be treated while restrained.

Conclusions

Identify and manage sick or injured cattle promptly. When cattle go “down,” it is often because their initial problems were ignored. A treatment plan should be in place once sick or injured cattle are identified. Consult with a veterinarian to develop this plan. Then follow the plan closely.

Seek out veterinary advice for situations that may require treatments not outlined in standard herd health plans.

It's not weaning but people who make calves sick

Stockman-Grass Farmer

September 18, 2009

by Allan Nation

Bud Williams believes that animals can sense our emotions and will mirror them. And so the first requirement for a low death loss on stocker calves was to love animals and your job.

"A healthy calf is a happy calf. Animal health problems are created by somebody," he said. "Animals don't just get sick. They decide to get sick. If you don't want to be there with that calf he knows it and it bothers him."

Williams worked as a consultant at a feedyard in Alberta, Canada for a number of years while going on the road teaching his "no stress" method of animal handling. He said showing up for work in the receiving yards in a bad mood was grounds for being sent home. "Our attitude is the most important thing in keeping stress off animals. If you are personally feeling stressed and uptight, you are going to produce sick calves," he said.

Bud believes that almost all animal sickness is due to stress. He pointed out that weaning is not inherently stressful to a calf. "You don't see calves walking fences and bawling in nature and yet I have had dozens of ranchers tell me that fence-walking and bawling is a natural part of the weaning process."

He said fence-weaning, whereby calves are gate-cut away from their mothers but can still see each other through an electric fence, results in a stress-free weaning with no bawling and no sickness. Unfortunately for graziers who buy sale barn-weaned calves, such a gentle process has not been utilized and the calves arrive at the buyer's ranch in a highly stressed and agitated state of mind. "The first thing you have got to do is to get that stress off of them to keep them healthy," he said. This includes stopping the fence-walking.

Williams said that animal movement creates animal movement and animals will always move in the same direction unless prevented from doing so. In fence-walking the calf in front pulls along the calf behind who in turn pushes the calf in front until the whole group is totally exhausted. He said that walking alongside the calves in the same direction they were going would bring them to a halt.

He said animals always want to know where you are. If you are alongside, they have to slow down to keep you in sight. If you then stop, they will stop, turn and look at you.

Conversely, walking against the direction the animals are moving will speed them up. Animals always want to go in the direction they are headed and they will escape the pressure you are putting on them by speeding up to get by you.

NEVER GET BEHIND AN ANIMAL

Bud said the absolutely highest stress you can put on a ruminant animal is to get behind them where they can't see you. He said ruminants have their eyes on the sides of their heads and can see almost 360 degrees around them. The one exception is a small area directly behind them. He said you should never be in this blind spot for more than an instant to keep animals calm. "Cattle know they are a prey animal and they absolutely hate to be chased from behind. Humans, on the other hand, are a predator species and absolutely love to chase animals. Therein, lies the source of most of our animal health problems," he said.

Animals should always be driven from the side. He said attempting to drive an animal from behind will always turn the animal around so he can see you. This, in effect, produces the exact opposite result you are trying to produce as the animal will always go in the direction he is headed. Therefore an animal should always be facing the direction you want him to go before putting any pressure on him to get him to move.

If you want an animal to go through a gate, you should stand beside the gate. Once the animal is looking at you and facing the gate, you can step toward him and he will run by you through the open gate to escape your pressure.

When working the drag position behind a herd, the motion should always be back and forth rather than static so the animals always know where you are and don't turn around to try to see you.

Williams said it was easy to work animals stress-free if you understood these concepts.

1. Walking with the animals slows them down.
2. Walking against the direction of the animal speeds them up.
3. Getting behind them in their blind spot sends them into total hysterics.
4. Animals want to go in the direction they are headed.
5. Slower is always faster with animals.

He said the sole standard of productivity at most stocker operations seemed to be how fast one can work an animal. Bud said fast movement and noise puts stress on animals, and most vaccines will not work on stressed animals. He said animals should be worked slowly and in as close to a noise-free environment as possible. Receiving crews should be trained to avoid talking and to use hand signals. All squeeze chutes and hydraulic motors should be snubbed and muffled to work silently.

Bud said he had noticed that as the drugs have gotten better the animal health problems have gotten worse because there is now an almost total reliance on the drugs to keep the animals healthy. "I am not a fan of doctoring. I would rather try to prevent sickness. The two best drugs for calves are feed and water. Most sick calves basically starve themselves to death. You've got to watch and make sure you have seen every calf eating."

"It is more important that you pull and treat animals early than what drug you use. Close observation is the key to a low death loss. If you look at a calf twice, treat him. The real trouble starts if we treat too late. We really want to doctor him the day before he is going to get sick. You need to develop the eye that allows you to see the calf that's going to be sick tomorrow.

"Always ask yourself why an animal got sick. Our job is not just to check for sick animals but to prevent the next one from getting sick."

Just as it is important to stop calves from fence-walking themselves into exhaustion, it is equally important to make sure they get exercise. "I don't like to see calves lying around all day on a straw bed. Walking and exercise are good for them."

Bud said in the winter he used to take the calves out of the feedyard every day and walk them over the frozen pastures for exercise. He said this exercise program had greatly increased the feedyard's average daily gains and the animal's health.

He has little patience with stocker graziers who don't have the "time" to practice a good preventive animal health program and look closely at their calves every day. "If you don't have the time to take care of your animals, go do something else. You can't be too busy if you are going to own cattle."

An avowed animal lover, Bud said he actually preferred the company of animals to people. "Animals learn very fast. People don't. Most ranchers don't want you to teach them something new. They want you to show them how they can keep doing what they are doing and have a different result. This (hope for a different result without any change in action) has been given as the definition of insanity."

LIVESTOCK HERDING IS THE FUTURE OF THE WEST

Bud Williams said that knowing how to practice time-control grazing through the use of herding was going to increasingly be a requirement of Federal Grazing Leases. He said the ecological benefits of controlling grazing were now widely known but that extensive fence building on Federal Lands in the West would be prohibited by both budgetary and aesthetic concerns.

He said that in extensive environments herding could be just as effective in producing time-controlled grazing as fencing. Thanks to better grazing distribution and utilization, herding can also increase the season-long stocking rate - often dramatically so.

He said cows genetically want to be in a herd. Herding is their primary protection from predators as no predator (other than man) will penetrate a tight herd of animals. Unfortunately, we have taught our animals that being in a herd is a bad thing and a precursor to being trapped in a corral and physically hurt. Therefore, we must re-teach them to form a tight herd.

He said the way to do this was to gather them and put them in a corral and not hurt them. Let them relearn the comfort of being together and then release them. After a few times, the animals learn that being put together, moved and penned together is not a bad thing and the stress of being herded is removed.

Bud said that two things have to happen before you can successfully herd them. One, the animals have to want to be in a herd. And two, the animals have to feel where you want them to be is a nice place.

"We all live where we live because we are comfortable there. If we aren't comfortable, we leave. Animals are the same way," he said.

If all of your animals are grazing in one direction, they aren't going to stay there. Animals that are comfortable and plan to stay, graze facing in different directions.

Bud said the maximum size of your herd will largely be determined by your skill as a grazier and herder. He said herds in excess of 800 to 900 head require a large amount of herding skill to successfully control graze.

University Offers New Advice on Fly Control

Tuesday, July 21, 2009

TheCattleSite News Desk

MISSOURI, US - Flies cost the cattle industry more than \$500 million each year, causing slowed weight gain, reduced milk production and diseases such as pinkeye and anaplasmosis. Effective fly control may require combined use of products, said a University of Missouri Extension livestock specialist.

The recommended economic threshold for a pesticide program is 200 flies per animal, said David Hoffman.

Face and horn flies are the two most common types that attack cattle, said Hoffman said. Face flies spread bacteria that cause pinkeye, reducing average weight gain in calves by 17 pounds when one eye is infected and 30 pounds to 65 pounds when both eyes are infected. Because these insects spend little time on the animal, they are difficult to control with pesticides.

Horn flies feed up to 30 times per day, primarily on the back and shoulders of cattle. The pest spends its entire life cycle on the animal, leaving only to lay eggs in fresh manure.

Insecticide application methods for controlling flies include ear tags, sprayers, back rubbers, dust bags and pour-on and oral application.

Organophosphate tags effectively control horn flies but are less effective with face flies. Horn flies can become resistant to pyrethroid ear tags, so Hoffman recommends alternating the two types each year. Remove ear tags at the end of the season to prevent pesticide resistance in flies through constant exposure to sublethal doses.

Regardless of the method used, timing is critical to the effectiveness of a fly control program.

If you place ear tags too early, pesticide strength can diminish before peak fly season. Pour-on liquids and sprays provide immediate control but reapplication is typically necessary every 30 days throughout the fly season. Back rubbers and dust bags can be effective when placed where cattle will come into contact with them, such as near mineral feeders and watering areas.

Start use of oral larvacides in the spring, Hoffman said. However, if your neighbor is not using a similar control method, flies may cross the fence and cause problems in your herd.

Impacts of individual animal response to heat and handling stresses on *Escherichia coli* and *E. coli* O157:H7 fecal shedding by feedlot cattle

09.sep.09

Foodborne Pathogens and Disease. September 2009, 6(7): 855-864

Tami M. Brown-Brandl, Elaine D. Berry, James E. Wells, Terrance M. Arthur, John A. Nienaber

<http://www.liebertonline.com/doi/abs/10.1089/fpd.2008.0222>

Abstract

The reduction of foodborne pathogens in cattle destined for human consumption will require knowledge of the factors that impact the carriage and shedding of these organisms. The objective of this work was to investigate the effects of heat and handling stress levels on the fecal shedding of *Escherichia coli* O157:H7 and generic *E. coli* by feedlot cattle. In year 1, 128 feedlot heifers were evaluated for heat tolerance five times per week during the 84-day finishing period from May through August. Heat stress measurements included respiration rate, panting score, and visual assessments. In year 2, panting scores were taken for a group of 256 finishing feedlot heifers on days in July and August for which the temperature humidity index (THI) was predicted to be in the "emergency" category (THI=84). For both years, animals were weighed and temperament scored to assess handling stress on a 28-day schedule. At the same time, rectal fecal samples were collected from each animal individually. The presence and concentrations of *E. coli* O157:H7 and concentrations of generic *E. coli* in feces were determined. There were no clear trends between the heat stress levels or temperament scores (as an indicator of response to handling) with either fecal generic *E. coli* concentrations or *E. coli* O157:H7 concentrations or prevalence in feces, indicating that neither heat nor handling stress contributes to the food safety risk associated with *E. coli* O157:H7-positive cattle.

The effects of transport and lairage on counts of Escherichia coli O157 in the feces and on the hides of individual cattle

24.jul.09

Foodborne Pathogens and Disease

Narelle Fegan, Glen Higgs, Lesley L. Duffy, Robert S. Barlow

<http://www.liebertonline.com/doi/abs/10.1089/fpd.2009.0338>

Abstract

Objectives: The main objective of this study was to determine the impact of transport and lairage on the isolation rate and the number of Escherichia coli O157 on cattle.

Materials: Ninety animals, divided into three groups (A, B, and C) of 30 animals each, were used in this study. Individual animals were tagged, and samples were collected from the hides and feces of each at a feedlot and again after slaughter. The carcass of each animal was also sampled. Samples were also collected from the feedlot pens, the sides and floors of the transport trucks, and abattoir holding pens. The isolation rate and the number of E. coli O157 were estimated using a combination of immunomagnetic separation and the Most Probable Number technique.

Results: Cattle hides were more likely to be contaminated with E. coli O157 at the feedlot (31%) than at the abattoir (4%). E. coli O157 was detected in 18% and 12% of cattle feces collected at the feedlot and after slaughter, respectively. E. coli O157 was isolated from truck floors (26%), truck sides (11%), abattoir pen rails (47%), and pen floors (42%). The mean count of E. coli O157 in positive feces was log₁₀ 1.17 and 2.37MPN/g at the feedlot and slaughter, respectively. A 3 log₁₀ increase in the number of E. coli O157 was observed between the feedlot (2.66MPN/g) and slaughter (5.66MPN/g) in the feces of one animal in group B. E. coli O157 was isolated from the hide and carcass of this animal.

Conclusions: Transport and lairage did not lead to an increase in the number or isolation rate of E. coli O157 from cattle. **Applications:** Intervention strategies for reducing E. coli O157 contamination of cattle carcasses should target mechanisms that limit the impact of animals shedding a high number throughout production and processing.

DAIRY AND VEAL

Abrupt weaning, mortality and BRD

Sunday, September 13, 2009
2009 AABP Conference

Philip J. Griebel, DVM, Vaccine and Infectious Disease Organization, University of Saskatchewan, says a combination of psychological and nutritional stressors associated with abrupt weaning significantly enhanced fatal BRD. These stressors appeared to have a direct effect on the amplitude of antiviral responses. Surprisingly, these stressors enhanced, rather than inhibited, innate immune responses to BHV-1 infection.

At the 2009 AABP, Griebel said functional genomic analyses suggest antiviral responses were linked to an increased capacity to respond to Gram-negative bacterial respiratory infections through increased expression of TLR4 and CD14.

These analyses provide evidence for a novel mechanism by which stress may enhance the risk of fatal BRD. In addition, modulation of TLR expression during viral infection may be of relevance for both Gram-negative and Gram-positive bacterial infections. These molecular analyses should facilitate the identification of appropriate therapeutic targets for the prevention or treatment of stress-enhanced BRD infections.

Behavior response in sick calves depends on how much milk is fed

www.dairyherd.com

September 14, 2009

As noted in the most recent Miner Institute's Farm Report, researchers from Agriculture and Agri-Food Canada and the University of British Columbia compared the behavior of calves diagnosed with either a respiratory or gastro-intestinal disease to matched (same age and feeding protocol) healthy calves when fed high (12 liters) or low (4 to 6 liters) amounts of milk or milk replacer. The amount of milk offered did not affect the likelihood of a calf developing an illness, but there were significant differences in the behavioral response. Calves offered 12 liters/day decreased their intake by roughly 2.5 liters/day, feeding time, and number of visits to the feeding compared to the healthy calves. Conversely, the calves offered 4 to 6 liters/day only decreased the time spent at the feeder. These data suggest the ability to detect illness in calves fed from automated feeders may be dependent on the amount of milk being offered. This research was presented at the Congress of International Society of Applied Ethology.

Passive transfer failure: Do calves influence their own fate?

Dairy Herd Management
October 12, 2009

Humans are not the only ones who contribute to the success or failure of passive transfer. There is evidence that the calf itself may play a role in this process. In a Virginia Tech study, 21 percent of calves experienced passive transfer failure — even though they received a sufficient volume of high-quality colostrum shortly after birth. The same phenomenon occurred in a University of Minnesota study. In that study, 28 percent of calves suffered failure of passive transfer despite proper colostrum management.

Automated measurement of changes in feeding behavior of milk-fed calves associated with illness

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There is a need for improved methods of detecting illness among group-housed milk-fed calves. In 4 separate experiments, we examined whether illness in group-housed dairy calves fed with an automated milk feeder changed their feeding behavior, and whether these changes were affected by low (n = 26) or high (n = 38) milk rations. All calves were subjected to regular health checks that included general condition, rectal temperature, lung auscultation, and fecal scoring. We match paired calves that succumbed to illness with healthy calves on the same feeding allowance. In the days following clinically identified illness (gastroenteric or respiratory affections), sick calves fed high allowances of milk or milk replacer decreased milk intake (-2.59 ± 0.7 L/d) and frequency of visits to the milk feeder (-2.43 ± 0.3 visits/d), and increased the duration of each visit to the milk feeder (1.66 ± 0.5 min/visit) compared with healthy calves fed at the same allowance. However, sick calves fed a low allowance of milk or milk replacer only decreased the duration of each visit to the milk feeder (-1.35 ± 0.2 min/visit) compared with healthy calves. Feed allowance affected feeding behavior associated with illness of milk fed calves.

Key Words: calf • feeding behavior • health • automatic milk feeder

Moving heifers together may ease introduction into mixed parity pens

Dairy Herd Management

October 12, 2009

Dairy heifers joining the milking herd face numerous challenges during the transition period, including adjustment to the milking parlor, new housing environment, new herd mates, etc. The 30% cull rate on a typical farm means that a substantial portion of the milking herd will be undergoing these stressors at any given time, so alleviation of this may have a positive influence on cow performance. Research from the Centre for Proper Housing of Ruminants and Pigs in Switzerland and the Department of Behavioural Biology in Germany evaluated the potential effects of introducing heifers either singularly or in pairs.

The study was conducted on six dairy farms and monitored the introduction of heifers over the first six days that were spent in the new housing conditions. The behavior of the cows already housed in the pen was monitored from 2 weeks prior to the introduction of the heifers to evaluate the impacts of the heifer management strategies on current residents. The pen sizes ranged from 24 to 39 animals, which begins to approach a realistic size for smaller U.S. dairies. The resident cows averaged 4 lactations and 175 DIM. The portion of the day spent at the feed bunk, lying in the freestalls, within the activity area (defined as the space between the feed bunk, water trough, and freestalls), and average path length were measured.

Before the introduction of the heifers, cows spent 52% of the day in the freestalls, 30% feeding, and 15% in the activity area; their average path length was 4 ft per min. Heifers introduced into the pen singularly spent 40% of the day in the freestalls, 30% feeding, and 30% in the activity

area; their average path length was 6.5 ft per min. The portion of time the existing cows spent on those activities didn't vary substantially from their baseline. Heifers introduced into the pen in pairs spent 53% of the day in the freestalls, 23% feeding, and 22% in the activity area with an average path length of 5 ft per min. Again, the existing cows did not substantially alter their behavior.

These data indicate that introducing heifers to a new pen of cows as part of a group rather than individually may alleviate some of the behavioral impacts of the move, as indicated by the greater portion of the day spent lying and a reduction of the portion of the day spent in nonproductive behaviors in the "activity" area. Furthermore, there was a reduction in the distance covered per min, which may indicate that the paired heifers were less flighty or were displaced less often. Scheduling pen moves to group heifers together may be one practical approach to reducing the detrimental effects of commingling heifers and cows.

Heifer competition affects feeding behavior

By Dairy Herd news staff
Friday, August 21, 2009

You know that too much competition impacts how heifers eat. A new study of Holstein heifers at the University of Guelph, published in the August Journal of Dairy Science, offers a few explanations of what happens during competition.

The researchers fed 36 heifers that were approximately eight months old in either individual or competitive eating situations. They found that while there was no difference in sorting behavior or dry matter intake between the treatments, the competition for feed among growing dairy heifers alters feeding patterns, reduces access to feed — particularly during periods of peak feeding activity — and tends to increase day-to-day variation in feeding behavior. For example, the competitively fed heifers consumed 9 percent fewer meals per day, but those meals were 10 percent longer than heifers in a non-competitive situation. Therefore, it is important to make sure there is plenty of feed available if heifers are forced to compete for feed.

The stall-design paradox: Neck rails increase lameness but improve udder and stall hygiene.

Dairy Sci. 2009. 92:3074-3080. doi:10.3168/jds.2008-1166
2009 American Dairy Science Association ®

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Housing conditions for dairy cows are thought to affect lameness, but almost no experimental work has addressed this link. The aim was to assess the effect of one feature of free-stall design, the position of the neck rail, testing the prediction that cows will be more likely to become lame if using pens with the neck rail positioned such that it prevents standing fully

inside the stall. Cows ($n = 32$) were housed in 8 pens. Treatments were tested using a crossover design; treatments were allocated alternately to pens at the beginning of the experiment and switched halfway through the 10-wk experiment. Cows spent 27 ± 3 min/d standing with all 4 feet in stalls with less restrictive neck rails. In contrast, cows averaged just 1 ± 3 min/d when the neck rail was positioned restrictively. Cows spent less time standing with only the front 2 feet in the stall with less restrictive neck rails (33 vs. 49 ± 6 min/d). Gait scores improved when cows were kept in the less restrictive stalls and worsened when cows were kept in pens with the restrictive neck rail (median score 2.5 vs. 3.5 after 5 wk on treatment). Of 13 new cases of lameness, 11 occurred in pens with the restrictive neck-rail position. Similarly, of the 16 new cases of sole lesions, 15 occurred during the period when cows were housed in pens with a restrictive neck rail. Stalls with the neck rail positioned less restrictively had higher contamination scores than stalls with the restrictive neck rails (3.7 vs. 0.4 ± 0.2), and cows using those stalls had dirtier udders and longer teat-cleaning times (8.3 vs. 7.0 ± 0.2 min for 12 cows). This study provides the first experimental evidence that aspects of stall design can reduce the risk of lameness and hoof disease. The results illustrated that changes in design that resulted in improvements in cow comfort and hoof health came at the expense of cow and stall cleanliness. Key Words: cow comfort • lameness • udder cleanliness • stall design

Watching What Cows Eat: feeding behaviour and illness.

BC SPCA

FarmSense September 2009

by Christy Goldhawk, MSc.

Christy Goldhawk has a BSc. in Animal Biology from the University of Guelph and recently completed a MSc. from the Animal Welfare Program at the University of British Columbia (UBC). This article provides a brief overview of her research at UBC, which focused on the relationship between feeding behaviours and health in dairy cattle.

Being sick is never fun. It affects your ability to be productive and also how you feel. Dairy farmers are concerned about the health of their cows for the same reasons. When dairy cows get sick, the amount of milk that they produce usually goes down in both the short and long term. Good health, however, is also critical for an animal to have good welfare. So keeping dairy cows healthy becomes a concern not only for maintaining productivity, but also for ensuring a good quality of life for the animals.

Like any mammal, milk production (lactation) in dairy cows is stimulated from changes associated with pregnancy and giving birth. The transition from pregnancy through giving birth to producing milk is full of changes and challenges, and has been aptly named the 'transition period.' Not surprisingly, some dairy cows cannot cope with all of these challenges and illness is common during the transition period.

To understand why the transition period is so challenging, and which factors influence the success of a cow's transition, researchers at UBC's Animal Welfare Program have taken the old "watch what you eat" saying to heart and are watching what cows eat, how much they eat as well as when they choose to eat and how they interact socially near the feeding area. Watching the feeding behaviours of dairy cows can give us warnings of which cows are likely to get sick before they show any overt signs of illness.

The cows don't know it, but researchers are watching them 24 hours a day, combining video surveillance with data from automatic feeders to gather information about what cows are doing at their 'dinner table.' This information is analyzed alongside detailed health records, providing some insight into what differentiates cows who have a healthy, successful transition to lactation from those who are not so lucky.

As early as one week before cows give birth, differences can be detected between the cows that will remain healthy throughout the transition period and those that will get sick. The cows that end up sick eat less feed, spend less time eating and interact less often at the feed bunk during the week before calving. It's important to note that at this point (before calving) none of the animals are actually clinically sick...yet.

Even more interesting is that the decline in feeding activity before dairy cows give birth (and before they get sick) applies to a variety of diseases, ranging from bacterial infections to abnormal metabolism. The same effect is also appearing in research on cows that are not in transition to lactation.

It is not yet clear whether the low feeding activity is a super-sensitive indicator of emerging sickness, or if it is the reduced feeding activity itself that is making cows vulnerable to disease. Both could be true.

Since reduced feeding activity is associated with cows becoming sick, it raises the question about what is causing the cow's to reduce their feed intake. To determine what might cause reduced feeding activity, researchers have used the same continuous monitoring of dairy cows' behaviour to look at factors such as stocking density and feeder design.

Stocking density refers to the number of animals in a given amount of space. This affects both the number of cows that will physically fit at the feed bunk at any point in the day and also how much competition there is for the space. Dairy cows tend to synchronize their behaviour, meaning that if one animal is doing something, the rest will often join in. When stocking densities are too high, not all of the cows in a group will be able to eat at the same time, forcing some to eat later. Since dairy cows sort through their feed for different ingredients (mainly the sweet grains), the quality of the rations changes throughout the day. Subordinate dairy cows keep their distance from dominant cows and therefore may end up with poorer quality feed by the time they get their turn at the feeder. The result could be poorer nutrition for subordinate cows, increasing their risk of illness.

Competition at the feed bunk, either because of limited space or limited time where fresh feed is available, reduces the amount of time that cows spend at the feed bunk. Feeding areas that have dividers between the heads of the cows preventing them from pushing each other away from feed) can increase the amount of time that cows spend feeding, especially for subordinate cows. Properly providing more physical barrier between the sides of cows can even further reduce competition and increase feeding activity.

Knowing that feeding behaviour can be used as an early indicator of disease has been a motivating factor in shifting the health management of dairy cows from disease management to disease prevention. Research and innovative thinking have provided us with some new knowledge of how management and feeder design can impact the feeding behaviour of dairy cows and what we should watch for in the barn. Combining this knowledge with the knowledge that reduced feeding behaviour is associated with increased risk of illness allows us to improve how we manage dairy cows and help prevent them from getting sick, especially during times such as the transition period, which are full of changes and challenges.

Food Safety Affected by Dairy Cow Housing and Husbandry

The European Food Safety Authority (EFSA) asked its Biological Hazards Panel to deliver a report on 'Food Safety aspects of dairy cows housing and husbandry systems'. The report is based on a number of findings presented by the Animal Health and Welfare Panel (AHAW),

which addressed animal welfare aspects and the BIOHAZ Panel who focused on the food safety relevance. Summarised by Charlotte Johnston for TheDairySite.

The report confirms that the main relationships between animal welfare and food safety are stress and malnutrition which lead to increased susceptibility to microbial infection. Microbial infections can be zoonotic diseases such as Salmonella, E. coli, M. bovis, which can be transmitted to humans directly or through food products. There are a number of different ways the bacteria can be transferred. The first been through cattle on farms, the original source of food borne pathogens that cause human bacterial diseases are faeces. This would be spread through direct contact, or contamination of the wider environment due to spread of organic wastes/ effluents from dairy farms.

Another way in which they can be transferred is through milk. Raw milk can be contaminated with a number of different microbial hazards, however the majority of consumption of raw milk occurs primarily on-farm. Generally, when milk is pasteurised the heat treatment makes pasteurised milk one of the safest foods from animal origin. It is suggested that milk/ milk products could be responsible for eight per cent of all food-borne illnesses, compared to 16 per cent for meat/ meat products and 24 per cent for eggs/ egg products. With regards to beef from a dairy perspective, it appears that Salmonella and verocytotoxigenic Escherichia coli are the most common bacteria.

How Does the Dairy Cow Become Infected?

The dairy cow can hold a number of infected bacteria in the intestines, hooves and hide. These can be transmitted through a number of different ways most notably contaminated feed/water supply, microorganisms on pasture through spreading of muck, faeces and contact with other infected animals.

Dairy cows with higher stress levels are more likely to pick up these pathogens. This stress is often through inappropriate handling, inadequate feeding/ watering, inappropriate temperatures, noise, high concentrations of ammonia, hydrogen sulfide or carbon dioxide in confined spaces.

How Can Feed-borne Pathogens be Prevented?

Cow housing

Effective cleaning and disinfection of all housing should be carried out regularly. With regard to flooring, from an animal welfare point of view grooved flooring provides more grip and support for the cows with less slip. However, grooved floors are difficult to clean and can increase the risk of food borne pathogens. Whatever flooring is in place, should be thoroughly cleaned with disinfectants and sanitisers. To increase the effectiveness of this try to ensure that appropriate measurements are used (avoid over diluting disinfectants), and use clean and hot water (above 25 degree Celsius). Another conflict occurs with bedding, which is beneficial for cattle welfare but is the possible host for numerous bacteria and allows contamination onto animal hides. The solution here is to provide deep, clean and dry bedding. Transportation should also undergo thorough cleaning and disinfecting.

Avoid mixing animals

- a.. Segregate young and old cattle
 - b.. Purchase cattle from known sources
 - c.. Keep new cattle purchased in isolation for a suitable period of time
 - d.. Ensure all sick animals are completely isolated from the herd, and milk if affected, i.e. through mastitis should be tipped
 - e.. Even although animals may be physically separate, bacteria can be transferred through handling facilities – regular feeding will reduce this risk
- Feeding practices and facilities

Prevention of feed borne pathogens can be done through regular cleaning and disinfecting all water troughs and feeders. It would also make a difference to the levels of pathogens whether all cows access the same feeder or whether they have individual ones. Stress can be caused through irregular and inadequate feeding.

With regard to feed it is advisable to get feed supplies from reliable sources, and use quality food/ silage/ water. It is recommended not to graze cattle on land that has been newly applied with slurry or manure. The report also found that diets with less roughage have higher risks of contamination to animals/ environment and increased mastitis.

Temperature and humidity

As mentioned earlier when temperature and humidity are unsatisfactory, stress levels in the animal will increase. Research has also found that low temperatures and higher humidity allow pathogens to survive for longer.

Indoor/outdoor facilities

Transmission is likely to increase when animals are kept in a confined space, however when animals are outdoors they are at risk from transmission from other wildlife, such as badgers.

Farm management

Effective herd health is essential and health plans should be in place. These would enable effective diagnosis and control schemes for diseases such as brucellosis, tuberculosis and mastitis. Lactating cows should have no contact with other animal species. When treating ill cows it is essential that correct quantities of antimicrobials are given. Excess usage can lead to increased risk of infection of bacterial diseases. Records should also be kept including identities of any cattle treated, batch numbers, amount of medicine given, expiry date of medicine used and any withdrawal periods.

Staff management will ensure that all staff disinfect boots, equipment and are up to speed on training - regular team assessments will allow monitoring of this. Access to visitors should be restricted.

Farm design and management should make sure that all housing and feed stores are kept away from the parlour and that drives, roads etc are clean.

A biosecurity plan should be in place. This will help to prevent and control any diseases, viruses or parasites. When writing up a biosecurity plan you should consider:

- a.. the introduction of these pathogens to the farm
- b.. their exposure and spread throughout the herd
- c.. immunisation
- d.. minimising risk of export to other farms

Milking hygiene

Common practice should include cleaning and drying of udders before and after milking, effective cleaning of milking parlours and surrounding areas, maintaining and disinfecting all equipment at a suitable temperature and using suitable chemicals. Empty bags should not be milked to reduce mastitis infections. Milk should be stored below six degrees Celsius to minimise microbial growth.

Preparing cows for slaughter

Feed withdrawal prior and during transportation will reduce faeces which may put other animals at risk from contamination. Animals hides should be as clean as possible.

In conclusion, good hygiene farming practices including provision of optimal animal welfare will enhance the animals resistance to infection and will reduce the spread of food safety hazards.

Cow Comfort Improves Yields

The Dairy Site Newsletter

September 18, 2009

The Dairy Extension research team at the University of Minnesota look at optimising cow comfort and health to improve yields through reduced lameness and minimising heat stress.

In these difficult economic times, it is important to optimise cow management and housing as much as possible to improve milk production efficiency. Some aspects of cow comfort, such as quiet and calm handling, don't cost any money.

The Dairy Extension research team, has been involved in investigating the association between cow well-being and the cow's environment, especially as it relates to lameness prevalence. Lameness is the most important animal welfare issue in our industry and also of great economic significance. Each case of lameness is estimated to cost approximately \$404 (C. Guard, Cornell University).

Research showed that cows housed in an alternative bedded pack housing system known as compost barns have better feet and leg health due to the soft resting surface available to them in that system. There is also a better social environment for the cows. However, reduced availability and high cost of sawdust for bedding have limited the use of this housing system to a relatively small number of producers. Recent work by the research group showed that there are alternatives to sawdust, such as processed straw, processed corn cobs, wood chip fines, strawdust, and other locally available dry, finely processed, structural materials. Some producers use a compost bedded pack as a special needs pen for fresh and lame cows, and this is especially useful for those who have freestall barns with mattresses. Research conducted in a large sample of dairies in Minnesota showed that cows housed in freestall barns with mattresses have greater lameness prevalence than cows housed in sand-based stalls (28 per cent vs. 17 per cent prevalence).

The low availability and high cost of organic bedding materials in Minnesota has led to investigations in the use of recycled manure solids for bedding freestalls. In August, the research team started a two-year project to learn what factors are associated with somatic cell counts and mastitis incidence in herds currently using manure solids in the upper Midwest. They are also evaluating other aspects of animal welfare in these facilities to see how it compares with other types of bedding surfaces investigated in recent years. Their goal is to learn how to optimise the use of solids for good cow health and comfort. What would be better than having cows produce their own bedding? Not having to depend on external sources for bedding is a great option, from both an economic and environmental perspective.

Another area of research the research team are currently working on is the field use of thermal imaging for early detection of lameness, so producers could more easily intervene before cows become severely lame. Loss of production, risk of culling and animal discomfort increase substantially when lesions become more severe. If the problem can be corrected earlier with preventative trimming, cow productivity and well-being will improve.

Heat stress is another welfare concern and it can contribute not only to milk production loss, but also poor reproduction and increased lameness prevalence. A new housing system known as low profile cross-ventilated freestall barn is being evaluated. These barns are completely enclosed and have a line of fans on one side that blows air out of the barn whereas the other

side of the barn has a wall of evaporative cooling pads. When water is dripped down the pads and air is drawn through them into the barn, the air is evaporatively cooled. Preliminary results were presented of the descriptive phase of this study at the recent Dairy Science meetings. When cross-ventilated was compared to naturally ventilated freestall barns (all bedded with sand), very similar hygiene scores (both averaged 2.8), body condition scores (2.99 and 2.97, respectively), hock lesion prevalence (31 and 2 per cent, respectively) were found and no significant difference in lameness prevalence (14.3 and 17.8 per cent, respectively). However, older cows in cross-ventilated barns tended to have lower lameness prevalence than cows in naturally ventilated barns (15 vs. 23 per cent). Also observed was better cow comfort index in the summer for cows housed in cross-ventilated barns (85 vs. 77 per cent, respectively). It is possible that the better heat abatement provided by the cross-ventilation helped improve lying time during the summer and consequently tended to reduce lameness.

These are some brief examples of the research on cow comfort that have been conducted at the University of Minnesota. The bottom line is that various aspects of housing can influence cow comfort, and therefore cow health and productivity. Marcia Endres, Extension Dairy Scientist would like to thank all the dairy producers in Minnesota and neighboring states who have kindly agreed to participate in the studies, helping to make the research efforts possible. In addition, thanks to visiting researcher Kadir Orman from Turkey, and graduate students Abby Barberg, Luis Espejo, Adam Husfeldt, Karen Lobeck and Erika Shane for their help with the studies mentioned in this article.

Tackling Lameness Efficiently

The Cattle Site September 2009

Preventing and managing lameness in the dairy herd was up for discussion at the Dairy Event this year, reports TheCattleSite Junior Editor, Charlotte Johnston. The mobility of cows refers to the ability of the cow to walk with a regular gait, without factors of lameness having an adverse effect on the walking pattern.

Poor mobility in cows can cost farmers an average of £180 per case through lost milk sales, treatments and productivity according to research by DairyCo. It is estimated that 25 per cent of the national herd are lame at various levels at any one time. Simon Hopcraft, a foot trimmer in Northampton believes that the incidence of lameness is twice what it was when he started trimming feet back in 1992.

Mobility scoring allows stockmen to assess the levels of lameness of individual animals in the herd and allows for early intervention and treatment if necessary.

DairyCo have set up a mobility score card as below.

DairyCo Mobility Score			
Category of score	Score	Description of cow behaviour	Suggested action
Good mobility	0	Walks with even weight bearing and rhythm on all four feet, with a flat back. Long, fluid strides possible.	<ul style="list-style-type: none"> • No action needed. • Routine (preventative) foot trimming when/ if required. • Record mobility at next session.

Imperfect mobility	1	Steps uneven (rhythm or weight bearing) or strides shortened; affect limb or limbs not immediately identifiable.	<ul style="list-style-type: none"> • Could benefit from routine (preventative) foot trimming when/ if required. • Further observation recommended.
Impaired mobility	2	Uneven weight bearing on a limb that is immediately identifiable and or/ obviously shortened strides (usually with an arch to the centre of the back).	<ul style="list-style-type: none"> • Lamé and likely to benefit from treatment. • Foot should be lifted to establish the cause of lameness before treatment. • Should be attended to as soon as practically possible.
Severely impaired mobility	3	Unable to walk as fast as a brisk human pace (cannot keep up with healthy herd) and signs of score 2.	<ul style="list-style-type: none"> • Very lame. • Cow will benefit from treatment. • Cow requires urgent attention, nursing and further professional advice. • Cow should not be made to walk far and kept on a straw yard or at grass. In the most severe cases, culling may be a possible solution.



White line abscesses

Costs of lameness

When mobility scoring, it is important to be honest, only then will you have an idea of how big the problem is." He carried on to explain that recording lesions, allows stockmen to see where the problem is and take note of any monthly trends that may arise. Canadian research has shown that mobility scoring allows ulcers to be found up to four weeks earlier,

preventing the situation deteriorating.

Mr Smith, said that costs to producers of lesions such as sole ulcers, white line abscesses, bruising and digital dermatitis included reduced milk yields, cows that lie down for longer periods of time resulting in them eating less and consequently losing body condition.

Research has also shown that fertility is reduced. Lamé cows have 10 per cent lower pregnancy rate and it can take them up to 40 days to get into calf. Due to the cows being in pain, they show a less intense display of oestrus, and the stress affects fertility hormone release and interferes with ovulation.



Sole ulcer

Mr Smith, recommended that stockmen should lower the threshold of acceptance regarding lameness and act when mobility scoring moves from scores 1 -2, instead of as many farmers do, treat when mobility moves from scores 2-3. By treating the lesions earlier, by simple procedures such as trimming and regular footbathing, the costs associated with lameness should be reduced.

Although extensive research hasn't been able to find a cure for digital dermatitis, studies have proved that it can be prevented with the top 25 per cent of dairy farms in the UK only reporting 2.4 per cent of their herd being lame. Whilst the worst 25 per cent have 41.5 per cent of their lame at any one time.

Veterinary practitioner, Matt Dobbs from Westpoint Veterinary Group, went on to discuss how mobility can be improved. Measuring mobility and keeping records allows the problems to be identified. Following on from this management such as foot trimming, foot baths and modifying cows environment can prevent or control the problems. Research carried out abroad, showed that when cows feet were power washed down once a day the levels of lameness significantly reduced. Through improving hygiene, making passages wider and keeping feet clean, significant savings could be made.

Mr Dobbs said that all information should be monitored regularly to keep on top of the situation.



One form of digital dermatitis

Footbaths

Footbathing is one of the most successful methods of reducing lameness and the development of lesions in cattle, said Mr Dobbs. Many producers may use zinc, copper sulphide and parlour washings but, he stressed, these must be used daily to be completely effective as they are not as strong as other purposefully designed products.

Using a proprietary product will reduce the regularity of footbathing. When footbathing stockmen should consider what size the foot bath should be. All four feet of the cow must be medicated above the hoof where sensitive tissues are located and so a depth of 10cm is recommended. Width would be satisfactory at one metre and length should be three metres to allow all feet to contact the solution. A footbath this size would hold 200 litres of liquid.

The location of the footbath will most likely be when cows are exiting the milking parlour, it is important to ensure it is not too close to the parlour exit, recommends Mr Dobbs so as to keep the animals moving. However, the stockman may want to also consider footbathing dry stock and young stock.

Mr Dobbs recommends two of the three metre baths, the first containing only water so as to wash the cows feet before entering the footbath.

Dairy Welfare: EFSA Reinvents the Cow

TheDairySite.

July 17, 2009

A report released by the European Food Safety Authority (EFSA) finds many areas of modern dairy farming lacking in regards to cow welfare. But do farmers have the power to enforce these strict new guidelines in the face of the EU-wide dairy crisis? asks Adam Anson,

Dairy cow welfare has been widely researched by scientists across the globe, yet many of the issues raised have not been acted upon. Meanwhile, the consequences of many of these issues have become progressively more dramatic as the dairy industry adapts to cater for soaring global demand and falling milk prices.

In response to an increasingly mindful welfare-friendly public, the European Commission requested that the Animal Health and Welfare (AHAW) Panel of EFSA deliver a Scientific Opinion considering whether current farming and husbandry systems comply with the requirements of dairy cows from the pathological, zootechnical, physiological and behavioural points of view.

The information collated in the report was so wide and detailed that the resulting Scientific Opinion was released in five separate reports. Four reports covered the main pillars of dairy cow welfare, consisting of: metabolic and reproductive disorders; udder disorders; leg and locomotion problems; and behavioural disorders, fear and pain. The fifth Scientific Opinion brought these individual topics together, incorporating conclusions and recommendations for future policies in the European dairy industry. This scientific opinion on the overall effects of farming systems on dairy cow welfare and disease was adopted by the AHAW Panel on 05 June 2009.

Hot Topics

More Milk No More

"Long term genetic selection for high milk yield is the major factor causing poor welfare, in particular health problems, in dairy cows," says the report.

"The milk yield of dairy cows has risen steadily over the last thirty years in Europe with approximately 50 per cent of this increase estimated to be attributable to genetic selection for milk production efficiency."

According to the report, this desire for increased milk production has caused dairy cows to produce unnatural quantities of milk. The report goes on to say that many dairy cows are unable to eat enough food to sustain this level of production.

Holstein cows, which have been bred to produce twice as much milk as traditional breeds, suffer particularly severely. According to media reports, the accusation was summed up as "milking cows to starvation" in a BBC interview with one of the report's authors, Donald Broom, professor of animal welfare in the veterinary school at Cambridge University.

The genetic components that lead to these increases in udder size also show correlation to related diseases, including lameness, mastitis, reproductive disorders and metabolic disorders. Serious health issues can lead to the suffering of these dairy cows and their premature slaughter.

According to the recommendations of the report, farmers need to reprioritise the traits they are selecting when choosing their animals.

Prize winning dairy cows producing huge quantities of milk may be assigned to the past. The new image of a great dairy cow may give greater significance to "fitness and welfare traits" even when these conflict with milk yield.

"Genetic selection for improved fertility, health and longevity is likely to improve welfare and lead to greater profit for the farmer", suggests the Scientific Opinion.

Size and Space

Another major issue that drew concern from EFSA was the increasing size of cows in comparison with the confined space provided for them. It says that cubicles should be wide enough to minimise any movement difficulties or teat trampling. Cubicles and tie-stalls should

be designed in such a way that the forward movement of the body of the cow is not thwarted when changing position from lying to standing.

The risk assessment exercise confirmed that poor cubicle design and lack of space are the highest ranked hazards, respectively in cubicle houses and tie stalls. The Scientific Opinion recommended minimum space allowance of 8.6 m² in cubicle houses and a cubicle width 1.8 times cow hip width. It also recommended that "in cubicle houses there should be at least as many cubicles as there are cows in the house."

The report also recognised the welfare benefits to a cow if she is allowed to access well managed pasture or other suitable outdoor conditions so she can express natural social behaviours - taking time to groom and exercise, and in doing so, release stresses that have an adverse affect on production.

Hunger for Welfare

"All dairy cattle should be fed a diet that provides sufficient energy, nutrients and dietary fibre to meet the metabolic requirements in a way that is consistent with digestion," says the report. "When diet is changed there should be carefully controlled transition feeding in order to prevent poor welfare in the cattle."

Good food access is an essential priority due to the stresses of increased milk production demands. Similarly, drinking water should be safe and accessible, available at whatever time the animal desires.

Prevention and Cures

The report also advised on an increased monitoring of animal health. It recommended a series of methods to prevent the occurrence of mastitis and called on all dairy farmers to implement a lameness prevention programme. It recommended that housing conditions must be improved on animals that have a high prevalence of recognisable locomotor difficulties, e.g. approaching 10 per cent.

"Pain management should be part of the treatment of severe lameness and clinical mastitis," said the report.

Reactions and Implications

The Scientific Opinion released by EFSA concluded that the body of research should be incorporated into codes of practice and monitoring protocols throughout the EU. Animal welfare organisations have been quick to demand immediate action, but many farmers' organisations are concerned by the implications of such strict standards. Cost sharing plans for animal health proposed in the UK, will make some of the recommendations very expensive.

The enactment of many of these guidances go beyond a matter of animal understanding and become an economic issues, pitting ethical beliefs against business.

The Royal Association of British Dairy Farmers argues that dairy farmers aren't "resting on their laurels". And, while the association welcomes the report, it also says that a rise in milk prices must follow alongside any changes. The average UK milk price for May stood at 20.6ppl, well below the 26ppl cost of production, points out the association.

Throughout all of Europe a dairy crisis is already unfolding, increased costs to dairy farmers may only lead to a diminishing industry. Although, as the report suggests, higher welfare leads to increased milk production, many of the recommendations will undoubtedly not lead to increase profits for many farmers.

Report co-author, Prof Broom said that premium prices for high-welfare milk comparable to those seen on free-range eggs would help lift the dairy industry, but retailers have so far been unwilling to significantly rise the prices of milk.

But, the EFSA report is analysis of animal welfare, not of market forces and industry, and in that respect the recommendations made are of great importance. Significantly it readdresses the way in which we perceive the dairy cow, as an animal, not a machine.

HOGS

Boar Taint: U of G Research Targets Genetic Markers to Improve Pork Quality

Daily Exchange

Posted July 17, 2009

Guelph - The Ontario Genomics Institute (OGI) has invested \$100,000 in a University of Guelph project that involves developing genetic markers that may eventually help produce pigs without boar taint. The research has the potential to improve both productivity and animal welfare.

“This investment from OGI will enable us to take the final step in our work,” said Jim Squires, a U of G animal scientist who has been investigating which genes cause boar taint for more than 20 years along with colleague Prof. Flavio Schenkel.

After effective genetic markers for animals without the problem are identified, they may be used in commercial breeding programs to produce pig lines that are substantially free of boar taint, said Squires.

Boar taint is an unpleasant odour and off-flavour taste that is sometimes evident in pork products. Pigs that are tainted have a very low market value compared with those that are free of taint. Currently, castration of male pigs is common practice to prevent boar taint, but the drawbacks range from animal welfare concerns to increased feed costs and reduced lean meat yield.

Identifying promising breeding lines through genomics would allow producers to sidestep these problems and improve breeding programs.

Squires and Schenkel have already discovered and validated a subset of genetic markers. The OGI investment, along with support from industry partner JSR Genetics, the United Kingdom's leading pig breeding company, will enable the team to identify an expanded set of the most effective markers. The goal is to validate a subset that is sufficiently predictive of reduced boar taint, which could eventually lead to the development of breeding programs driven by the biomarker approach.

This would result in pig breeds with low enough levels of boar taint to eradicate the need for castration. JSR Genetics is providing samples and cell lines as well as performance and pedigree data. If successful, the same approach could be used to identify, validate and apply markers for pig breeds used by Ontario and Canadian pig breeding companies.

In Ontario, hogs are a top commodity, with \$815 million in market receipts in 2008.

The OGI funding comes from its Pre-Commercialization Business Development Fund. “OGI is pleased to be investing in a genomics research program focused on near-term positive impact on food production, with respect to both quality of product and improvement of practice,” said Christian Burks, OGI’s president and CEO.

Boar Taint Vaccine Improves More Than Welfare

The pignews July 27, 2009

A new vaccination that inhibits boar taint in meat has also been found to have other benefits for the pig producer by improving feed efficiency and delivering a leaner carcass with better meat quality, writes ThePigSite senior editor, Chris Harris.

The Improvac vaccine, developed in Australia and having been on the Asia Pacific market for several years, was launched onto the European market earlier this year. The vaccine developed by pharmaceutical company, Pfizer Animal Health, has yet to be authorised for the US market.

The vaccine was brought on to the market as a means of reducing the possibilities of boar taint without castration.

Boar taint - the offensive smell and taste in pig meat - is caused by compounds that accumulate in the fat as male pigs become sexually mature.

The two main taint compounds are androstenone, which is produced in the testicles and skatole, a by-product of bacterial activity in the gut.

The level of androstenone is directly controlled by the activity of the testicles and increases dramatically as the pig reaches puberty.

The breakdown of skatole, which is produced by both male and female pigs, is inhibited by testicular function and tends to accumulate in male pigs.

Across Europe there are specific levels of the two that are allowed in pig meat – 1mg of androstenone per gram belly fat and 2mg of skatole per gram of belly fat.

Traditionally, castration has been used to prevent the build-up of these compounds and in Europe about 100 million male piglets are castrated. In some cases, boar taint is avoided by early slaughter, as in the UK, but for processing systems and country tastes that require a heavier pig, castration has been essential.

However, the experts at Pfizer say that early slaughter still runs the risk of boar taint and as the pigs are intact, there is also a greater risk of undesirable behaviour such as mounting and aggression.

While in some countries the piglets are anaesthetised, there are still welfare issues to be considered as well as the financial costs to the farmer for the castration.

The vaccine, Improvac, blocks testicular function and reduces testosterone levels, so that the boars demonstrate much less behaviour such as mounting and fighting later in their finishing phase.

The pigs become easier to manage and show both physical and behavioural changes.

Pfizer says that with the vaccination, it is possible to maintain quality assurance in the production unit.

Improvac has a zero day withholding time before slaughter, so there are no concerns about affecting human health.

The treatment requires two vaccinations. The first comes at eight weeks of age and the second vaccination four to six weeks before slaughter. With the treatment, androstenone and skatole fall to negligible levels.

In consumer tests, the meat quality improves and it is shown to be at least equivalent to that of castrated pigs or female pigs, and it is significantly better than non-vaccinated boars.

Market research among consumers shows that the majority prefer to see the use of the vaccine rather than castration - 71 per cent in France, 61 per cent in Germany and 74 per cent in the Netherlands.

However for the producer one of the major benefits is that vaccinated pigs also show better feed conversion rates.

Dr Michael Pearce from Pfizer said: "Studies have shown an improvement in feed conversion with the pigs eating 10 per cent less feed.

"The lean meat content of the pigs is also one to three per cent higher in whole vaccinated pigs rather than castrated pigs.

"The backfat is 10 to 15 per cent less than in castrated pigs."

Dr Pearce added that a high protein and high energy diet appears to work best and give the best feed conversion rates.

The vaccinated pigs grow in the same way as entire male pigs, giving an advantage at the abattoir.

Part of the reason for better feed conversion is the changes that are seen in the behaviour of the vaccinated pigs and the better carcass quality is because there is less stress and aggression and this means better meat quality and fewer skin lesions. It also has the effect of producing less PSE (pale soft exudative) and DFD (dry firm dark) pig meat.

With the better feed conversion rates, there are also environmental benefits as less slurry is produced.

CANADA: Research shows pigs raised in large groups handle easier

21.jul.09

Farmscape

Dr. Harold Gonyou

<http://www.farmscape.com/f2ShowScript.aspx?i=23164>

Research conducted at the Prairie Swine Centre indicates pigs raised in large groups are much easier to handle than those raised in small groups. Researchers at the Prairie Swine Centre in

Floral, Saskatchewan have been studying the behavior of pigs raised in large groups for the past seven to eight years.

That work and reports from industry indicate during shipment pigs raised in large groups handle differently than those raised in small groups so a study was conducted to evaluate the ease of loading and the effect of transportation on meat quality.

Dr. Harold Gonyou, a research scientist in ethology, says several hundred pigs were involved, 240 of which were used for data collection, with half raised in groups of 16 to 20 and half raised in groups of 240.

Clip-Dr. Harold Gonyou-Prairie Swine Centre

There were some differences in terms of how they handled being loaded.

They both responded to stress.

We would see similar kinds of physiological response among the animals but the animals from the large groups loaded faster.

We reduced our loading time by about a third for loading those pigs.

In both groups we loaded groups of four pigs at once and measured how long it took them to go up the ramp and onto the truck.

We found that we used about the same amount of force moving each group of pigs.

There was a little difference in terms of their heat stress or their response that you would in terms of breathing and red skin et cetera.

We saw less of that within the pigs that came from the large groups.

Dr. Gonyou observes pigs raised in large groups are more willing to investigate and travel and they interact with other pigs better than those raised in small groups.

He says reports have suggested the meat from pigs raised in large groups is better than from pigs raised in small groups but this study did not show that and there have been suggestions death losses during transport will be less among pigs raised in small groups but this study was not large enough to assess that.

Swine Handling Study Expected to Influence Pen Configuration and Group Size

Farmscape

July 31, 2009

Research conducted at the Prairie Swine Centre is expected to assist hog producers in deciding penning configurations and group sizes.

A study conducted at the Prairie Swine Centre at Floral, Saskatchewan has confirmed pigs raised in large groups handle much easier than those raised in small groups. During the study pigs raised in groups of approximately 240 loaded about 30 percent faster than pigs raised in groups of 16 to 20 and exhibited lower signs of stress such as labored breathing and redness.

Dr. Harold Gonyou, a research scientist in ethology, expects the findings to be of value to producers deciding how to raise their pigs.

Clip-Dr. Harold Gonyou-Prairie Swine Centre

Certainly one of the things that we've had people ask us about is how easy is it to handle these pigs from large groups? They're concerned that just getting them out of the pen et cetera will be more difficult. What we found was that that's not really the case and that they do move easily down the hallway and up to the point of going up the ramp. It first of all says you're not going to have more problems with pigs from large groups and, in fact, you'll probably have less. The pigs simply have different experiences in their life and they're more willing to investigate and to

travel. I think that the pigs in the large group certainly have a different social pattern. They interact with other pigs much better than do pigs that come from small groups. There's no aggression et cetera when they meet with other pigs and I think part of that also relates probably to the fact that they're exploring that large pen as well. They're used to walking longer distances and traveling more and just getting to know a larger space whereas pigs from the small group are from a very restricted area and I think there may be a bit of fear when they leave their pen.

Dr. Gonyou notes additional studies are looking the handling and transport of pigs going to market and researchers are looking at designing facilities to make them low stress which would be advantageous to all pigs but especially pigs from the larger groups.

New DVD Showcases Group Gestation Housing in Ontario

Source: July 24, 2009, OPIC Enews

A new DVD showcasing 4 Ontario farms that are successfully using group gestation housing is now available at no cost through the Ontario Pork Producers Marketing Board and the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). The DVD includes a handout detailing the layout and management techniques of each farm that are discussed in the video. The DVD also includes interviews with the producers. To receive a free copy of the DVD contact: Kathy Zurbrigg, OMAFRA 519-846-3418 or Kathy.zurbrigg@ontario.ca

Improving Sow and Piglet Health

The Pigsite

August 17, 2009

An article from Hypor covering uterine and udder health and feet/leg problems in sows and gilts, and joint-ill, greasy pig disease and scours (diarrhoea) in piglets.

Health of the Sow

The health of the sow and her piglets is of great importance in determining litter weaning weight and many aspects of health influence milk production, growth to weaning and consequently Weaning Capacity.

Potential disease problems are best controlled through preventative measures including vaccination, routine treatments and attention to the environmental and management components of disease. In addition, prompt recognition and treatment of disease will help to minimise productivity losses such as a reduction in weaning weight.

Sow and Gilt Health

The gilt starts her breeding life with a low level of immunity to many of the common diseases that she will encounter in later life. Acclimatisation and vaccination programmes must therefore be designed to develop immunity so that she is not faced with a disease challenge that could reduce performance. Similarly, a range of other preventative measures – such as biosecurity procedures, parasite treatment, rodent control and hygiene routines – assist in achieving a favourable health environment.

Although there is a range of health problems in sows that can lead to reduced feed intake during lactation and lighter weaning weights, there are three that are the most damaging:

Uterine infections

An infection of the uterus may occur immediately after farrowing if the causal organisms, which are commonly occurring environmental bacteria such as Staphylococcus, Streptococcus and E. coli, enter the reproductive tract.

If this leads to the sow's body temperature increasing above 40°C, she will be lethargic and appetite will be severely reduced, therefore prompt identification and treatment is essential. An infection will be seen as a heavy white or yellow discharge from the vulva, which may occasionally contain some blood. Immediately this is seen, the sow's temperature should be monitored and, if elevated, antibiotic treatment given according to veterinary advice. Uterine infections may also be treated by giving prostaglandin by injection, which helps the lining of the uterus to recover and reduces the likelihood of problems with a discharge at or post service.

Where incidence of this problem is widespread, hygiene measures should be reviewed for room cleaning and those taken when assisting the sow. It may also be necessary to carry out routine antibiotic treatment for a period prior to farrowing in severe cases.

Udder infections

Udder infections are caused by the same bacteria that result in uterine infections and these two conditions often occur together. The symptoms are also similar – raised temperature, lethargy and lack of appetite – and also include hardening and reddening of one or more glands in the udder. It is good practice to check the sow's udder condition at farrowing, feeling for any hardness or increase in temperature, while observing for signs of inflammation. In addition to treatment of the condition using antibiotics and possibly steroids, as advised by the veterinarian, 0.5ml of oxytocin, administered every few hours, should also be given to assist milk let-down.

Prevention measures may include:

- a.. Improvements to hygiene procedures
- b.. Reducing feed level to 1.8kg (gilts) and 2.0kg (sows) for four to five days before farrowing
- c.. Ensuring water flow rate is adequate (minimum two litres/min)
- d.. Avoiding high temperatures and drafts in the farrowing room (ideally, 21 to 22°C at farrowing)

Rapid identification and treatment of udder problems helps to avoid damage to the udder that can render milk glands useless, thereby reducing the sow's ability to wean large numbers of large piglets.

Feet and leg problems

Physical damage to the sow's feet and legs, or foot infections, are common problems in many herds, which arise mainly during the breeding and gestation period. However, sows that enter the farrowing crate with injury or infection will be reluctant to stand up and eat and drink, resulting in reduced milk production. Therefore, early recognition is essential so that the problem can be resolved before the sow farrows. Infections will require antibiotic treatment, but lameness caused by physical damage requires the sow to be placed in a hospital pen, ideally with a solid floor and bedding, to recover. The sows' health, including legs and feet, should always be checked when she enters the farrowing room, so that treatment can be given if necessary.

Piglet Health

As with sows, there are a wide range of infectious diseases that can affect piglets, most of which can be well controlled by preventive measures such as vaccination. Of these, the ones that are most likely to impact piglet growth are joint-ill, greasy pig disease and scours. Herd recording data from various countries suggests that scours is the largest single infectious cause of piglet deaths and undoubtedly, it also results in significant loss of growth in some herds.

Joint-ill

Joint infections in piglets arise when bacteria enter the bloodstream through an injury to the feet, legs or the gums or tail (after teeth clipping and tail docking). The joint inflammation and swelling reduce mobility, leading to starvation or overlaying. Where the condition is widespread, piglet growth is also seriously affected. Rapid identification and antibiotic treatment is required. Where joint ill is a persistent problem the causes need to be rectified. These may be using the same implement for teeth clipping and tail docking, poor hygiene during piglet tasks or sharp edges on flooring or equipment.

Greasy pig disease

Similar to joint ill, the bacteria that cause greasy pig disease enter the skin through a wound or abrasion, often the facial wounds caused by the piglets' milk teeth as they fight for a teat, or a knee abrasion. Usually, the resulting dark skin lesions remain small because the sow passes on immunity to the piglet but in some cases, large areas of skin will be affected, becoming crinkly or leathery and greasy to the touch. Antibiotic treatment is necessary and badly affected piglets may need to be given electrolytes to stop them dehydrating. Removal of the causes of abrasion or injury helps to prevent greasy pig, in the same way as for joint ill. Again, this disease will result in reduced piglet growth rate in its chronic form.

Piglet scours

Scouring, or diarrhoea, may be caused by a variety of bacteria, viruses and parasites, but the most common cause is pathogenic *E. coli*. Scouring results loss of growth and reduced weaning weights. Irrespective of the cause, rapid diagnosis and treatment, followed by preventive measures are required.

Because of the wide range of possible organisms involved, laboratory diagnosis is essential, with an antibiotic sensitivity test, if appropriate. In addition to treatment, prevention of dehydration is necessary by providing an electrolyte solution for piglets to drink. Also, measures should be taken to reduce the spread of disease, including thorough pen cleaning and disinfection, use of separate tools for each room and disinfectant boot dips. Above all, piglets from affected litters should not be fostered to healthy litters. Measures to improve piglet comfort, such as provision of additional heat and ensuring floors are dry, should also be taken.

Once the situation is under control, the predisposing factors should be investigated, which may include reviewing the following:

- a.. Gilt acclimatisation procedures and resulting immunity
- b.. Vaccination programme (does the vaccine include the causal organism?), vaccination timing and technique
- c.. Colostrum management routines – piglet immunity
- d.. The piglets' environment – low/variable temperatures and draughts are common causes of scour
- e.. Sow feeding policy – scours may be triggered by overfeeding prior to farrowing or in the first week of lactation
- f.. Routine hygiene procedures such as cleaning and disinfection.

Good sow and piglet health plays an important role in achieving high milk yield, rapid piglet growth and large piglets at weaning. Effective health management routines will not only lead to higher weaning weights but also help to maximise Weaning Capacity.

Effect of Dam Parity on Growth Performance and Immunity of Weaned Pigs

The Pigsite

October 12, 2009

Growth performance in the nursery may be affected by dam parity. That is the conclusion from work reported by Erin E. Carney and colleagues in their paper published in the 2009 Nebraska Swine Report.

Summary

The growth performance of weaned pigs derived from different parities has not been previously evaluated; however, unpublished and anecdotal observations suggest that progeny derived from first parity (P1) dams have reduced health status and growth performance compared to progeny derived from mature sows (= P2). The objective of the current study was to evaluate the effect of dam parity on growth performance and immune response of P1 and P4 progeny during the nursery phase of production. Results from this experiment suggest that P4 progeny have increased body weight and growth performance during the nursery phase of production compared to P1 progeny. There were no effects of dam parity on immune response in this experiment.

Introduction

Parity segregation is used on some commercial swine farms. Parity 1 progeny are often segregated from the progeny of more mature dams (= P2) because of decreased growth performance and higher mortality rates. The effect of dam parity on progeny growth performance is not fully understood. However, it has been generally accepted that P1 progeny have reduced growth performance when compared to progeny of mature dams. This could be due to a lower health status in P1 progeny, causing decreased average daily gain (ADG) and increased mortality. Unpublished data suggest that P1 progeny have reduced weaning weight, decreased nursery and finishing ADG, and greater mortality than P2 progeny. The objective of the current study was to evaluate the effect of dam parity on growth performance and immune response of P1 and P4 progeny during the nursery phase of production.

Materials and Methods

Experimental Design

The experimental protocol was reviewed and approved by the Institutional Animal Care and Use committee of the University of Nebraska–Lincoln. A total of 96 weaned pigs were used in a 42-day study that is a continuation of the experiment described in a previous report (see previous article: "Effect of Dam Parity on Litter Performance and Passive Immunity"). To obtain an accurate representation of body weight (BW) as the pigs were removed from the farrowing house, BW was averaged within parity (P1 or P4), and pigs were selected based on the average BW of each parity. Initial BW of P1 and P4 pigs averaged 12.56 and 13.98 ± 0.1 lb, respectively.

Table 1. Composition of phase 1, 2, and 3 diets (as-fed basis) %.

Ingredients (%)	Control			Antibiotics		
	Phase 1	Phase 2	Phase 3	Phase 1	Phase 2	Phase 3
Corn	44.4	43.9	60.2	43.4	42.9	59.2
Soybean meal, 47.5% CP	14.8	32.0	33.8	14.8	32.0	33.8
Whey, dried	22.5	15.0	0.0	22.5	15.0	0.0
Fish meal	8.0	4.0	0.0	8.0	4.0	0.0
Animal plasma	6.0	0.0	0.0	6.0	0.0	0.0
Corn oil	3.0	3.0	3.0	3.0	3.0	3.0
Dical phosphate	0.4	1.0	1.7	0.4	1.0	1.7
Limestone	0.3	0.4	0.6	0.3	0.4	0.6
Salt	0.3	0.3	0.3	0.3	0.3	0.3
Swine vit premix	0.3	0.3	0.3	0.3	0.3	0.3
Swine TM premix	0.2	0.2	0.2	0.2	0.2	0.2
L-Lysine HCl	0.0	0.0	0.0	0.0	0.0	0.0
DL-Methionine	0.1	0.0	0.0	0.1	0.0	0.0
Mecadox - 2.5 g/lb	0.0	0.0	0.0	1.0	1.0	1.0

Six pigs were housed in each pen with four replications per treatment. Pigs within each parity were allotted to one of two dietary treatments, a control diet (CTL) or the CTL diet with the antibiotic Mecadox (50 lb/ ton; AB). This created four treatments for the nursery study, consisting of: 1) P1, CTL; 2) P1, AB; 3) P4, CTL; and 4) P4, AB (Table 1). All diets were fed in meal form and formulated to meet or exceed NRC requirements for growth. Pigs were fed in three phases: Phase I (day 0 to 7); Phase II (day 8 to 21); and Phase III (day 22 to 42). Pigs were housed in a temperature-controlled room and each pen contained a single nipple waterer and a single self-feeder to facilitate ad-libitum access to water and feed. Weight and feed disappearance were recorded on day 7, 21, and 42. Average daily gain, average daily feed intake (ADFI), and ADG:ADFI (G:F) were estimated based on the weekly pen BW and feed disappearance.

On the day of weaning (day 0), four pigs (two barrows, two gilts) per pen were randomly chosen and vaccinated against *Mycoplasma hyopneumoniae* (*M. hyo*; RESPISURE2). Two pigs (one barrow, one gilt) were given the vaccine and two pigs (one barrow, one gilt) were administered a saline control. All pigs received booster vaccinations (or the appropriate saline control) at day 14 and day 28. Serum was collected from all pigs at the conclusion of the experiment (day 42) and forwarded to the University of Minnesota Veterinary Diagnostic Laboratory to be assayed for antibodies to *M. hyo* by employing the Tween 20 diagnostic assay. Titer values from two pigs (two vaccinates, two saline controls) within pens were averaged to produce a pen mean *M. hyo* titer for statistical analysis.

Statistical Analysis

Each pen was considered an experimental unit. The model was a completely randomized design. Growth data were analyzed using the MIXED procedure of SAS with dietary treatment and parity as the main effects of the model. Pen was considered as a random effect. Pig BW on day 0 was used as a covariate in the statistical analyses.

Results and Discussion

Body weight and growth performance are reported in Table 2. There was no parity × dietary treatment interaction for BW during this experiment. However, BW of P4 progeny were greater ($P < 0.02$) than P1 progeny on day 0, 7, 21, and 42 when means were averaged among dietary treatments. There were no effects of dietary treatment (CTL or AB) on BW on day 0, 7, or 21 when means were averaged among parities; however, on day 42 pigs fed the CTL diet tended to have greater ($P = 0.054$) BW than pigs fed the AB diet.

Table 2. Effect of dam parity and dietary treatment on average body weight (BW), average daily gain (ADG), average daily feed intake (ADFI) and feed efficiency (G:F) of weaned pigs.

Parity Diet	Treatments ^a				SEM ^b	P-values		
	1 CTL	1 AB	4 CTL	4 AB		1 ^c	2 ^d	3 ^e
No. of pigs	24	24	24	24				
BW, lb								
day 0	12.681	2.44	14.10	13.85	0.11	0.0001	0.324	0.991
day 7	14.58	13.93	15.46	15.27	0.12	0.001	0.14	0.4
day 21	24.95	25.07	27.47	26.86	0.30	0.007	0.722	0.588
day 42	55.06	52.01	59.79	54.00	0.70	0.014	0.054	0.867
Phase 1 (day 0 to 7)								
ADG, lb	0.27	0.21	0.19	0.20	0.01	0.185	0.443	0.307
ADFI, lb	0.28	0.28	0.30	0.31	0.01	0.244	0.908	0.636
G:F, lb/lb	0.97	0.76	0.64	0.66	0.11	0.077	0.393	0.334
Phase 2 (day 8 to 21)								
ADG, lb	0.74	0.81	0.86	0.83	0.02	0.145	0.647	0.266
ADFI, lb	0.98	1.05	1.14	1.24	0.02	0.005	0.142	0.804
G:F, lb/lb	0.76	0.78	0.75	0.68	0.04	0.229	0.538	0.282
Phase 3 (day 22 to 42)								
ADG, lb	1.43	1.34	1.54	1.40	0.03	0.217	0.082	0.691
ADFI, lb	2.25	2.21	2.47	2.36	0.03	0.02	0.312	0.611
G:F, lb/lb	0.64	0.61	0.62	0.59	0.02	0.303	0.048	0.964
Overall (day 0 to 42)								
ADG, lb	1.01	0.97	1.09	1.01	0.02	0.092	0.088	0.554
ADFI, lb	1.50	1.49	1.66	1.64	0.02	0.09	0.641	0.878
G:F, lb/lb	0.68	0.65	0.65	0.61	0.02	0.087	0.07	0.588

^aDietary treatments included: parity 1 progeny fed the control diet (P1, CTL), parity 1 progeny fed the control diet plus antibiotic (P1, AB), parity 4 progeny fed the control diet (P4, CTL), or parity 4 progeny fed the control diet plus antibiotic (P4, AB).

^bStandard Error of the Mean.

^cMain effect of parity [(P1, CTL + P1, AB) vs. (P4, CTL + P4, AB)].

^dMain effect of dietary treatment [(P1, CTL + P4, CTL) vs. (P1, AB + P4, AB)].

^eParity × treatment interaction.

With respect to growth performance, no significant parity × dietary treatment interaction was observed for ADG, ADFI, or G:F during the entire length of the study. During Phase I, there were no significant main effects of parity or dietary treatment on ADG or ADFI; however, G:F tended ($P = 0.08$) to increase for P1 progeny compared to P4 progeny. During Phase II, there were no main effects of parity or dietary treatment on ADG or G:F; however, ADFI was greater ($P < 0.005$) for P4 progeny compared to P1 progeny. During Phase III, P4 progeny had greater ADFI compared to P1 progeny ($P < 0.02$), and pigs fed the CTL diet had greater ($P < 0.05$) G:F and tended ($P = 0.08$) to have greater ADG than pigs fed the AB diet.

Table 3. Frequency and serum antibody titers of pigs serologically positive for *Mycoplasma hyopneumoniae* (*M. hyo*) by the Tween 20 enzyme-linked immunosorbent assay (ELISA).

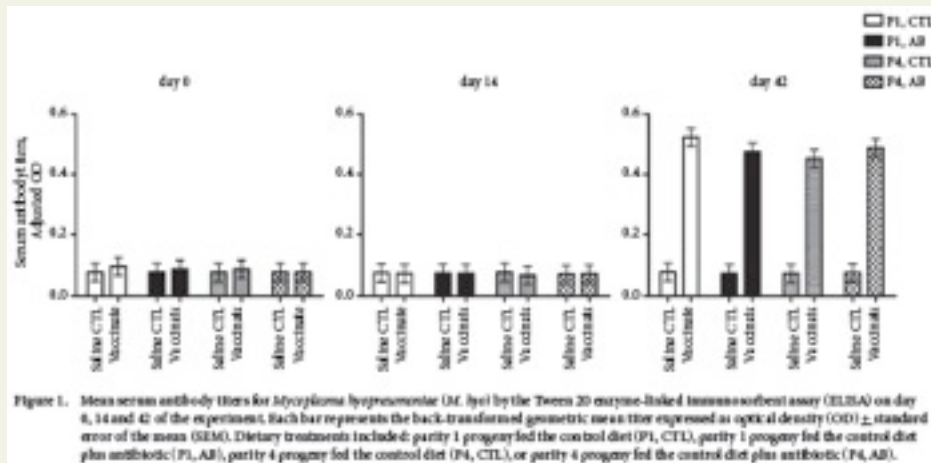
Parity	Dietary Treatment	Vaccinate or Saline Control	No. of pigs	Pigs positive (%) ^a	Tween 20 serum antibody titers (mean OD \pm SEM) ^b
1	CTL	Saline	8	0	0.081
		Vaccinate	8	8 (100)	0.523
1	AB	Saline	8	0	0.077
		Vaccinate	8	7 (87.5)	0.527
4	CTL	Saline	8	0	0.075
		Vaccinate	8	8 (100)	0.452
4	AB	Saline	8	0	0.078
		Vaccinate	8	8 (100)	0.487

^aSamples were considered positive if OD \geq 0.24.

^bBack-transformed geometric mean titer \pm standard error of the mean (SEM).

There was no main effect of antibiotic on ADFI. Overall (day 0 to 42), P4 progeny tended ($P = 0.09$) to have greater ADG and ADFI, and decreased G:F compared to P1 progeny. In addition, pigs fed the CTL diet tended to have greater ADG ($P = 0.09$) and G:F ($P = 0.07$) compared to pigs fed the AB diet. The trend for increased growth performance in P4 progeny is consistent with previous, unpublished reports; however, the tendency for AB fed pigs to have decreased growth performance is surprising. The effect (or lack thereof) of AB on growth performance in the current study may be explained by the overall high health status of the pigs and that these pigs had been reared in an environment where an antibiotic response is not typically detected.

Mean serum antibody titers for *M. hyo* are presented in Figure 1. No pigs were serologically positive for *M. hyo* antibody titers on day 0 or 14 of the experiment. As expected, all pigs vaccinated against *M. hyo* (with the exception of one pig) were seropositive on day 42.



The frequency and serum antibody titers of pigs serologically positive for *M. hyo* on day 42 of the experiment are presented in Table 3. There were no effects of parity, dietary treatment, or their interaction on *M. hyo* titers. These data are presented with the caveat that titers to *M. hyo* is only one means by which an immune response may be measured. Many factors may contribute to overall health status and more research may be warranted to adequately gauge immune response and overall health status among progeny derived from different parities.

Conclusion

Dam parity may affect growth performance of weaned pigs throughout the nursery period. Additional research is needed to determine the effects of dam parity on animal health in the nursery and on growth performance through the growing and finisher phases of production.

¹Erin E. Carney, Huyen Tran, and Justin W. Bundy are graduate students; Roman Moreno is a graduate student and research technologist; Phillip S. Miller is a professor; and Thomas E. Burkey is an assistant professor in the Animal Science Department at the University of Nebraska –Lincoln.

²The authors wish to thank Pfi zer Animal Health for providing Respire and for subsequent analytical analyses.

Possible Cures for Tail-Biting Found

2009ThePigSite News Desk

Tuesday, September 01

UK - The results of recently published research suggest that Stockholm tar and Dippel's oil may be effective in reducing tail biting.

Tail biting is a serious welfare problem in pigs raised for slaughter. In the instance of a tail biting outbreak, scientists have recommended that farmers take measures such as removal of affected animals, provision of enrichment materials and application of repellents to the pigs' tails. However, no scientific study has ever confirmed the efficacy of any of these suggestions in counteracting an ongoing outbreak.

In a recent study, published in the August edition of Animal Welfare journal, the efficacy of two repellent ointments, Dippel's oil and Stockholm tar, were examined in a tail-chew test.

For this, a novel piece of nylon rope was used as a tail model to measure biting behaviour. Analysis showed no effect of time, gender or unit but a highly significant effect of treatment, in that both Stockholm tar and Dippel's oil significantly reduced rope manipulation compared to controls.

These results suggest that Stockholm tar and Dippel's oil may be effective in reducing tail biting. The approach taken may be valuable in further testing of strategies to reduce tail biting and improving pig welfare.

How To Improve Outdoor Huts For Sows And Piglets

thepigsite.com

Aug 3, 2009

UK - In its Annual Technical Report 2008-2009, BPEX includes a short report on work to investigate ways to minimise temperature fluctuations faced by sows and piglets kept outdoors. Keeping sows cool during warmer months can aid lactation and by keeping internal hut temperatures down sows are encouraged to stay with their litters. Cold temperatures add extra pressure to the starvation hypothermia crushing complex. In the BPEX trial, 12 huts on an outdoor, free-range unit were fitted with temperature loggers from July to January and temperatures monitored. Huts were either insulated or un-insulated, and left as they were or painted with either white emulsion or greenhouse paint. After each weaning, data from the loggers were downloaded and compared to external temperatures.

In the warm summer months, painting any hut white reduced temperatures inside them by up to 7°C. Emulsion had better results than greenhouse paint, and painting was more effective than

insulation in terms of reducing temperatures. The best combination in summer was insulated huts painted with white emulsion, while the worst combination was unpainted un-insulated huts. In the cooler winter months, huts painted white were 2°C colder than unpainted huts. The best combination was un-painted insulated huts, whilst the worst combination was painted un-insulated huts. The colder it was, the more noticeable the difference. Greenhouse paint reduced the temperature by a further 2°C. In general hut alterations had a bigger effect on hut temperatures during the hotter months. The next step, says the BPEX report, will be to investigate detachable white covers. This should allow the benefits of a white surface in the summer and the normal surface in the winter to be seen.

Dietary Iron in Post-Weaning Swine Diets

The PigSite

October 12, 2009

Dr Adam Moeser of the Department of Animal Science, North Carolina State University explains how to achieve the right balance between meeting requirements and gastrointestinal health in the University's Swine News.

The rapidly growing nursery pig requires 80 – 100 mg/kg DM dietary Fe; however, commercial starter diets often exceed this requirement by up to five-fold. This is due to the fact that several swine ingredients contain high total Fe contents, including blood meal (3,000 mg/kg DM), dicalcium phosphate (10,000 mg Fe/kg DM), and limestone (3,500 mg Fe/kg DM). The role of dietary Fe supplementation in the exacerbation of intestinal inflammatory disease in humans has received considerable attention lately.¹ Excessive dietary Fe can trigger oxidative stress pathways that lead to intestinal injury through mechanisms that include lipid peroxidation, inflammation, and cellular membrane breakdown.^{2, 3} In addition, excess dietary Fe is available to opportunistic pathogens, potentially contributing to bacterial overgrowth. However, the effect of high Fe levels in swine nursery diets on gastrointestinal health has not been investigated previously. The objective of this study was to assess the effects of dietary Fe levels on post-weaning intestinal health and defense.

Material and Methods

Pigs and experimental diets. Twenty-four weaned male pigs averaging 21 d of age and 5.5 ± 0.4 kg BW were used in this study. All piglets were injected with 100 mg of Fe dextran at birth to prevent anemia while also minimizing body Fe stores prior to initiation of the trial. At weaning pigs were blocked by weight within litter and randomly assigned to one of these three treatments: (1) no supplemental Fe (low Fe; L-Fe), (2) 100 mg supplemental Fe/kg DM (adequate Fe; A-Fe), and (3) 500 mg supplemental Fe/kg DM (high Fe; H-Fe). The basal diet was formulated based on NRC recommendations to meet or exceed a pig's requirement for all nutrients except Fe. The basal diet contained 20 mg Fe/kg DM (approximately 25 per cent of a young pig's requirement for Fe), and supplemental Fe was provided as FeSO₄.

Pig feeding and management. Pigs were housed in pens of two pigs (four replicate pens per treatment) in an environmentally controlled nursery and provided ad libitum access to both feed and water for a 32-day period. At the end of the 32-day feeding trial, pigs were euthanized and each pig's duodenum was harvested and immediately mounted on Ussing chambers for measurements of transepithelial electrical resistance (TER) and mucosal-to-serosal flux of the paracellular probe [3H]-mannitol, both sensitive measures of intestinal permeability or barrier function. Intestinal tissues were fixed in 10 per cent neutral buffered formalin and processed for routine histologic analysis and Fe staining. The lipid peroxidation

product malondialdehyde (MDA) was assayed in intestinal tissues using a commercial ELISA kit.

Results

Compared with A-Fe diets, both L-Fe and H-Fe diets had a detrimental effect on intestinal barrier function in post-weaned pigs as indicated by reductions in intestinal TER ($p < 0.05$) and elevated 3H-mannitol permeability ($p < 0.05$) (Figure 1). Histological evaluation of duodenum from pigs fed the H-Fe diet revealed blunted villi and marked inflammatory cell infiltrate consisting predominantly of neutrophils (Figure 2). Fe staining of the intestinal mucosa from pigs fed H-Fe diets showed increased accumulation of Fe within enterocytes and subepithelial lamina propria cells (Figure 3). Increased inflammatory cells were noted in duodenum from pigs fed the L-Fe diet but to a lesser extent compared with H-Fe diets. The lipid peroxidation product malondialdehyde (MDA) was elevated in H-Fe tissues, suggesting that lipid peroxidation may play an important role in mucosal injury induced by H-Fe diets (not shown).

Figure 1A. Intestinal Transepithelial Electrical Resistance (TER)

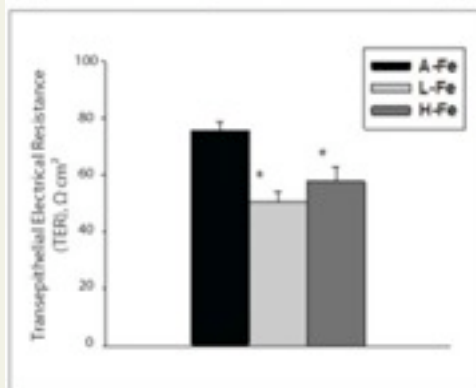


Figure 1B. Intestinal 3H-Mannitol Permeability

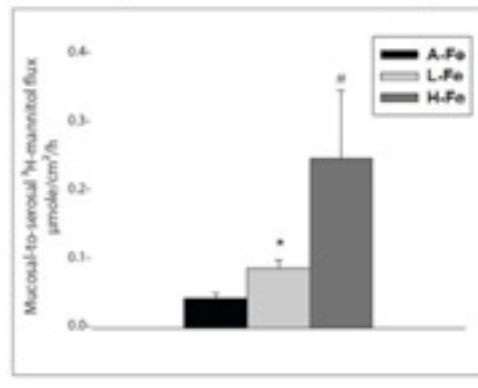
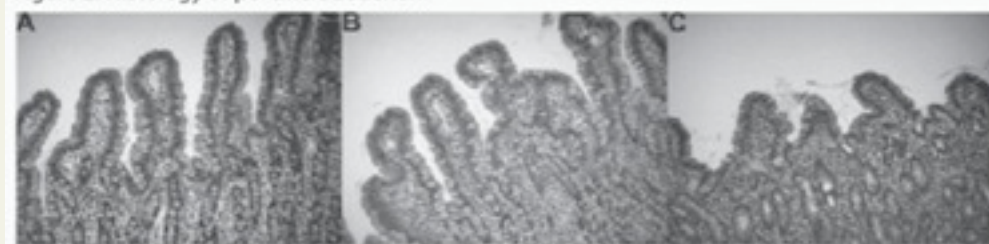
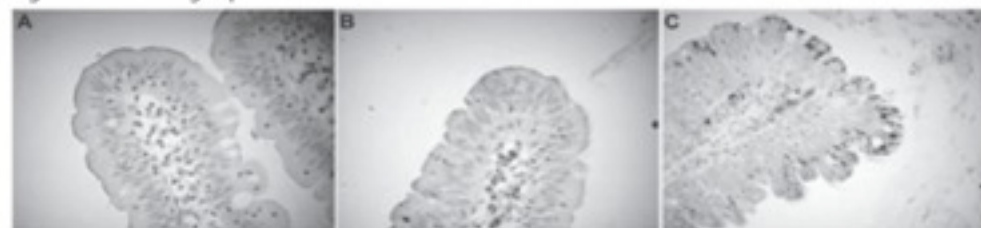


Figure 2. Histology of porcine duodenum



A: L-Fe diet; B: A-Fe diet; C: H-Fe diet

Figure 3. Fe staining in porcine duodenum



A: L-Fe diet; B: A-Fe diet; C: H-Fe diet

Discussion

In the present study, we show that dietary Fe level can directly influence mucosal barrier health in the post-weaned pig. A marked inflammatory response was observed in intestinal tissues from pigs fed H-Fe diets and was characterized by predominantly neutrophilic infiltration. The mechanism of mucosal barrier dysfunction and inflammation induced by feeding H-Fe diets is currently unclear. Elevated levels of MDA in intestinal tissues from pigs fed H-Fe diets suggest that lipid peroxidation is likely contributing to intestinal barrier injury. In the Fenton reaction, Fe reacts with free radicals produced by activated neutrophils, resulting in the production of highly toxic free radicals. Oxidative stress can induce intestinal mucosal damage through several mechanisms, including increased intestinal and vascular permeability, lipid peroxidation and destruction of enterocyte membranes, neutrophil recruitment, and activation of NF- κ B inflammatory signaling pathways.^{2, 4} In the present study, we also observed barrier dysfunction and mild intestinal inflammation in intestinal tissues from pigs fed the L-Fe diets. Given the anemic status of pigs fed L-Fe diets, it is plausible that intestinal ischemia may be a potential contributing factor to intestinal injury. However, histological analysis did not reveal any characteristic lesions associated with ischemic damage. More studies are needed to investigate the mechanisms of intestinal barrier injury triggered by low Fe status.

Summary

These data demonstrate that Fe levels in post-weaning diets have a profound influence on intestinal barrier health. Intestinal barrier function is compromised when Fe is deficient or in excess. Although the intestinal lesions and functional data in this study suggest a detrimental effect of H-Fe and L-Fe diets on GI mucosal health, the consequences of these findings with regards to animal health and intestinal defense against enteric challenges remain to be elucidated.

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This study was conducted as part of a collaborative effort with Drs Jerry Spears and Steph Hansen (NCSU Animal Science). Parallel data from this study on the effects of iron level on trace mineral metabolism are published in Hansen et al., 2009 J Nutr. 139(8):1474-9.

Submitted by Dr Chad Stahl, Department of Animal Science, North Carolina State University.

Effects Of Early Contact Between Non-Littermate Piglets And Of The Complexity Of Farrowing Conditions On Social Behaviour And Weight Gain

aasv.org
September 9, 2009,

In this study we tested if contact possibilities between non-littermate piglets and complexity of farrowing conditions affect the pre- and post-weaning behaviour, weight gain and skin lesions of piglets. Suckling sows were either kept in a group housing system (GH), in a single pen loose housing system (LH), or in conventional farrowing crates (FC). In the single pen systems a piglet door to the adjacent pen was opened on d 10 after farrowing in half of the pens so that piglets were able to enter the neighbouring pen (LH+ and FC+). For control, in the other half of single pens no piglet doors were opened (LH- and FC-). In the group housing system piglets also were allowed to freely move within the whole system on d 10 after farrowing.

After weaning on d 28 piglets were kept in littered rearing pens in an open stable holding 20 piglets each. Piglets from contact pens were mixed with those they previously had contact to whereas piglets from control pens were mixed with unfamiliar litters. Data were obtained from 230 litters (113 sows with 1935 farrowed piglets). All piglets were scored for skin lesions immediately before and 4 days after opening the piglet doors, as well as immediately before and 4 days after moving into rearing pens. Behaviour (biting, fighting, drinking and laying) of piglets was recorded in the rearing pens in a 48-h period after weaning for 2 × 4 h. Treatments did not affect the level of skin lesions in the rearing period ($H = 8.72$, $df 4$, ns) nor daily weight gain until weaning ($F_{4,216} = 1.21$, ns). In the 48 h after moving to rearing pens, less intensive agonistic behaviour (fighting and biting) was observed in contact piglets ($H = 53.36$, $df 4$, $P < 0.0001$). Four days after weaning control piglets showed significantly higher numbers and more severe skin lesions than contact piglets and, in addition, lesion scores of piglets from the larger single farrowing pens with straw bedding were significantly lower compared to the single farrowing crate ($H = 33.86$, $df 4$, $P < 0.0001$). The latency for lying in the new rearing pen was decreasing ($F_{4,93} = 25.76$, $P < 0.001$) and the latency for drinking ($F_{4,81} = 3.43$, $P = 0.01$) was increasing with decreasing complexity and space allotment of the housing system but were not related to whether the piglets have had contact to other litters before weaning. Five weeks after weaning weight gain ($F_{4,204} = 7.01$, $P < 0.0001$) and BW ($F_{4,207} = 5.34$, $P < 0.001$) were higher in treatments offering contact.

Our results show that familiarising piglets from different litters 10 day post partum by establishing contact possibilities through a piglet door reduces social stress at weaning and increases weight gain after weaning. Farrowing pens with straw bedding and enlarged space as offered in the farrowing pens and the group housing system can further decrease the level of harmful agonistic interactions after mixing unacquainted litters at weaning and can improve the adaptation of piglets towards the new environment of the rearing pen.

Effects of Ambient Temperature and Transportation Distances on the Resulting Pork Quality

July 2009

Factors beyond the farm gate can affect the quality pork product, among them temperature and time in transport. This study, by Ray Hansen (Iowa State University) and Kelly and Nina Biensen (Eden Natural State Center) examines how these factors affect producers selling in the niche pork market. It was published by Leopold Center for Sustainable Agriculture.

Q Do handling protocol and hauling temperature impact the meat's final pH levels, and therefore impact meat colour and quality?

A The levels of pH and pork meat colour have long been observed to be affected by stress; including heat-related stress. However, it has proven difficult to isolate specific producer related methods which could be shown to have measurable improvement on carcass pH. Variables include handling facilities, trailer condition and size, weather conditions including humidity; hauling distance, rations, access to water and specific genetics of the hogs.

The study was not specifically looking at genetics as it was hoped that a specific management practice or set of practices would emerge to benefit producers of high quality pork.

Prudent handling to avoid stress remains a common-sense recommendation consistent with Pork Quality Assurance standards. But, the results of this study did not find a statistically significant cause and effect.

It now appears more likely genetics will play a major role in identifying a discrete solution to variable cutting characteristics such as pH and pork colour.

Background

Niche pork marketers emphasise the quality and consistency of their products. Specific factors (temperature and time on the truck) have been identified in other studies as potential causes of product variability and lower quality. Also, Berkshire hogs frequently are chosen for niche production, and little research has been conducted on this breed.

In order to identify opportunities to more effectively manage product variability, this project was structured to test and control for the ways temperature and travel times can affect product quality. The investigators attempted to evaluate the combined effects on pork quality of the ambient weather and transportation distance. Niche-marketed hogs from Eden Natural producers were used in the study.

Approach and Methods

The study evaluated 14,857 Berkshire hogs raised by 26 producers – most in Iowa but also from farms in Illinois, Wisconsin and Kansas. Pine Ridge Farms (PRF), a harvest facility in Des Moines, assisted with the study. The average live weight of the hogs at the harvest facility was 291 pounds.

Among the measurements:

- a.. Distance from the Des Moines facility to each producer's farmstead
- b.. Weather conditions each time the pigs were sorted, loaded and hauled
- c.. Weights of hogs checked at PRF and after slaughter, and
- d.. Inspection of carcasses and evaluation of pH, back fat, and muscle and fat colour.

Data collection periods were chosen to include both very hot and very cold periods with moderate weather included as a base for comparison. A spreadsheet was designed for collecting data related to these two variables.

Additional data was monitored for any other exogenous effects that might skew portions of the core data or identify additional specific management factors for future study.

Results and Discussion

The average pH of the Berkshire market hog loin evaluated by this study was 6.38 and seasonal effects were observed. Lower pH readings occurred in the summer and higher pH ratings were found in the winter. The pH readings were not influenced by the miles traveled to market, transportation method used, or the length of time feed was withheld. The finishing facility, the load-out facilities or an additional stop at a buying station did not affect pH readings.

Loin defects are a matter of concern and 83 loins were rejected during the study for a variety of reasons. Some were too light in colour, some were subject to cutting errors at the plant, and others had spinal defects that affected loin trimming. Each bone-in loin is worth \$60 (\$120 per pig) in the Eden Natural pricing system, and the loss of both loins can have an economic effect on all producers who marketed their hogs that week. All producers are paid equally for their hogs, based on live weight. The Eden Natural board voted to penalize each identifiable producer who delivered pigs with loin defects.

Conclusions

The ultimate pH of Berkshire loins appears to be relatively stable, despite the stresses of sorting and shipping procedures prior to slaughter. However, management practices to ensure the health of the animals will help generate the quality pork that niche marketers want to produce.

It is not easy to pinpoint specific ways to improve pork quality within the value chain. While ambient temperature is a factor in porcine stress, the way the producer responds to this and other stress factors is more critical. Gathering data that isolate individual factors is challenging, and within this study proved unsatisfactory to ISU scientists who examined the data sets. It appears that the outcomes of stress are more of a "syndrome" than single elements of easily traceable cause-and-effect mechanisms.

Producers need to plan for the effects of weather extremes in their hog management set-up. As producers, such as those in Eden Natural, gain ownership of the downstream transactions, it is in their best interest to understand the incremental management responses that mitigate stress and reduce costs.

Impact of Results

Niche pork operations must successfully balance production management skills, product value and consumer satisfaction. This study of the impact of ambient temperature and transport time on carcass quality is a beginning attempt to provide producers with objective measurements of factors that can affect product condition and profitability. Good handling facilities and procedures can help ease the impact of extremes in weather or transportation arrangements.

Education and outreach: Results, conclusions, and continued research based on this project have and will continue to be shared with participants in the Pork Niche Market Working Group of swine production professionals. Leveraged funds: In-kind contributions were received from the Iowa State University Meat Laboratory and Pine Ridge Packing in Des Moines, Iowa.

Transport Study Shows Pork Quality Varies According To Truck Compartment

Farmscape

September 14, 2009,

A just completed transportation study shows the quality of pork will vary depending on the compartment of the truck in which pigs are transported. A team of scientists looked at the transport of market pigs in summer and winter in eastern and western Canada using conventional pot bellied trucks used for moving cattle or pigs. Dr. Harold Gonyou, a research scientist in animal behavior with the Prairie Swine Centre, says the effect of different variables on meat quality such as temperature in the 10 compartments, the difficulty of moving pigs into and out of each compartment and physiological measures of the pig at slaughter were examined.

Clip-Dr. Harold Gonyou-Prairie Swine Centre: We wanted to look at really the effect of different compartments on the truck. We know that during transport there is a significant loss of pigs and

also of pork quality. We lose several thousand pigs a year within Canada. Although it's usually less than a half a pig per load on average, it does amount to considerable amounts of losses overall. But probably the greater losses are in the reduction of pork quality, of meat quality in pigs due to the stress that occurs while they're being shipped. That's very important in terms of the quality that comes back so we have both a strong economic concern and we also have a strong animal care concern in terms of improving conditions for shipping.

Dr. Gonyou says we see variation in temperature within the different compartments, in the ease of loading and unloading and in terms of stress on the pig. He says studies are now being conducted looking modifications aimed at improving the movement of pigs into and out of the different compartments and improving air flow to balance temperature. For more information on the study visit the Prairie Swine Centre web site and search transport gonyou.

Piglet's Posture Is Best Guide To Its Comfort

thepigsite.com

September 18, 2009,

Norway - Piglets tend to make changes in posture rather than huddling in order to keep comfortable, according to research published by G. Vasdal of the Norwegian University of Life Sciences and co-authors. The objective of the study published in the Cambridge journal, *Animal*, was to investigate the effect of infrared (IR) temperature on thermoregulatory behaviour in suckling piglets in the first three weeks after farrowing. A total of 10 piglets from each of the 16 litters were exposed to recommended IR temperature conditions at 1, 2 and 3 weeks of age, with a mild offset (4°C) in IR temperature during the first experiment and a more challenging offset (8°C) during the second experiment. Digital photos were taken when all piglets had settled in the creep area, and the lying posture and huddling behaviour were analysed. A lying posture score and a huddling score was calculated by multiplying the number of piglets in each category with a given value for each category, based on different lying postures and different degrees of huddling behaviour. With a 4°C change in IR temperature, the piglets tended to alter their lying posture, while an 8°C change had a significant effect on lying posture ($P < 0.01$). A change in IR temperature of 4°C had no effect on the degree of huddling. The huddling score decreased significantly with 8°C change in IR temperature ($P < 0.05$). Postural changes, rather than changes in degree of huddling were the preferred thermoregulatory strategy for suckling piglets, concluded Vasdal and co-authors.

Higher Risk of Abnormal Gait in Intensive Systems

The Pigsite

Tuesday, September 22, 2009

UK - In a study of commercial farms, researchers found fewer cases of abnormal gait in finishing pigs than sows or gilts. Pigs kept outdoors or on solid floors with straw had fewer mobility problems than those housed on fully or partly slatted floors.

The prevalence and risks for abnormal gait in finishing pigs, gilts and pregnant sows from a representative cross-section of indoor and outdoor herds in the United Kingdom were investigated in a report published by KilBride and colleagues in the journal, *Animal Welfare*.

The prevalence of abnormal gait in finishing pigs, maiden gilts, pregnant gilts and pregnant sows from 88 herds was 19.7, 11.8, 14.4 and 16.9 per cent, respectively.

In a multi-variable analysis of 98 herds, there was an increased risk of abnormal gait in pregnant sows housed on slatted floors compared with pregnant sows housed on solid concrete floors with straw bedding or sows housed outdoors on soil.

The lowest prevalence of abnormal gait in finishing pigs occurred in pigs housed outdoors (3.4 versus 19.7 per cent in indoor-housed finishing pigs). However, the difference was not significant because only three farms in the study housed finishing pigs outdoors. In indoor-housed finishing pigs, there was an increased risk of abnormal gait in pigs housed on solid concrete floors with sparse bedding, partly slatted floors or fully slatted floors compared with those housed on solid concrete floors with deep bedding in all areas. However, there were no significant associations between floor type and abnormal gait in gilts.

There was an increased risk of abnormal gait associated with increasing callus, bursitis and capped hock score on the limbs of finishing pigs. This might have occurred because limb lesions cause discomfort or because lame pigs spend more time lying and this increases the risk of limb lesions developing.

Reference

KilBride, A.L., C.E. Gillman and L.E. Green. 2009. A cross-sectional study of the prevalence of lameness in finishing pigs, gilts and pregnant sows and associations with limb lesions and floor types on commercial farms in England. *Animal Welfare*, 18 (3): 215-224.

Pigs learn to understand mirrors

PhysOrg.com via Sciencenews.org
October 9th, 2009 by Lin Edwards

The study, carried out by Donald M. Broom, Professor of Animal Welfare at Cambridge University in the U.K., found that given a chance to familiarize themselves with a mirror first, most pigs can find food based only on its reflection. Pigs that are not familiar with mirrors look behind them for the food.

In the study, soon to be published in the journal *Animal Behaviour*, four pairs of domesticated pigs were allowed to familiarize themselves with a mirror for five hours. They generally approached it cautiously at first, ending with their noses pressed against the mirror, but one pig charged at its reflection and broke the mirror. They looked behind the mirror, and watched their own reflections moving in front of it.

After familiarization, each pig was placed in a pen with an angled mirror and a partition, behind which were treats such as apple slices or M&Ms. Seven of the eight pigs immediately looked behind the partition and found the food. A control group of pigs that had never seen a mirror before searched behind it for the food.

Professor Broom said the study shows pigs have a high degree of what he terms assessment awareness, or the ability to use memories and observations to quickly learn to assess a situation and act on it.

According to Marc Hauser of Harvard's Cognitive Evolution laboratory, an understanding of reflections in mirrors has been demonstrated in other nonhuman animals before, but it is paradoxical that many don't seem to recognize their own reflections.

Researchers have confirmed this by marking a spot on the animal with dye and seeing if they try to remove the spot when they see it reflected in a mirror. Only a few, such as bottlenose dolphins, apes, elephants, and magpies, recognize the mark as being on their own bodies. Professor Broom said he had tried marking the pigs, but they took no notice. He said this is hardly surprising because pigs often get marks on their bodies.

The study proves pigs have awareness, and Broom said that if an animal is known to be clever it is less likely to be treated as a food-producing machine and more like a sentient being. Perhaps the conditions in which pigs are raised, including overcrowding, which do not meet the needs of the animal, may be improved as a result of the study.

Management for High Sow Longevity

The Pig Site

October 5, 2009-10-05

Early departures from the breeding herd are costly, according to this article from Hypor.

The number of litters per sow lifetime is an important component of Weaning Capacity, and therefore maximizing sow longevity should be a key management objective in the breeding herd. Increasing the number of litters over the sow's reproductive life by just 0.5 will improve Weaning Capacity by up to eight per cent. Unfortunately, culling rate and death loss is on the rise in many countries around the world, leading to reduced longevity.

Both culling rate and death loss have increased between 2000 and 2007, except in Great Britain. One reason for the lower death loss in Britain could be that all sows are housed in group systems, the majority with solid floors and bedding. There are significant differences between countries, for example in Denmark between 1996 and 2006 culling rate increased from 44 per cent to 51 per cent, while sow death loss increased from around eight per cent to over 15 per cent. However, in France, average death loss has remained at about five per cent and culling rate around 38 per cent.

Possible Reasons for Reduced Longevity

There seems no doubt that the greater nutritional and physical strain on the sow as a result of the increased productivity that has occurred over the last 10 to 15 years is a major factor. Also, the decrease in gilt and sow backfat levels as a result of selective breeding for leaner, faster growing and efficient pigs, means that they have less tolerance to deficiencies in management, environment and nutrition.

Lean animals are more prone to physical injury, notably shoulder and leg abrasions, which may lead to culling. Another factor is the intensification of production systems leading to harsher conditions, which are more likely to lead to injury, combined with a lack of suitable hospital facilities to deal with sick, injured or disadvantaged gilts and sows. In most countries, increasingly stringent legislation on the transport of unfit animals means that more sows that would previously have been sold are now being destroyed on the farm.

Increasing Sow Longevity

Genetic influences

There are certainly differences in longevity due to genetics. Longevity and related factors are now becoming a more important part of genetic selection programmes.

Within the Hypor breeding programme, backfat is viewed as an optimum trait and the company does not focus on getting its sows as lean as can be, but rather aims for an optimal and uniform level of back fat. Overly lean sows tend to have more problems in regaining body condition after lactation and are more likely to suffer the so-called 'second litter dip'.

Additionally in the breeding programme, there is a balanced approach with the inclusion of traits related to robustness and longevity. Many generations of strong attention to conformation traits, especially feet and legs, has resulted in a sow that lasts longer and produces consistently well in intensive production environments.

In a further step, Hypor started estimating breeding values for 'staying power' as a direct measure of longevity. This trait focuses on the probability that a gilt once she has entered the herd, stays in production until parity 4. This trait exhibits a reasonable heritability and is clearly linked to the other traits that are known to influence longevity. Direct selection emphasis on this trait is expected to further improve this trait in our sows.

A benchmark survey of herds using Hypor sows shows that average sow loss (5.92 per cent) in those herds is below the Canadian industry average (9.2 per cent).

Management of the young female

Herd recording data from a number of sources suggests that poor retention rate of young females over the first three parities is the primary reason for reduced longevity. Therefore management effort should be focused on ensuring that a high percentage of gilts reach the most productive 3 to 6 parity stage. Some of the management strategies that should be considered are:

- Implementing good acclimatisation procedures to provide adequate immunity to herd diseases
- Ensuring gilts are bred at a weight of 135 to 150 kg, to farrow at a weight of 180 to 190 kg (See: WC#3 Gilt management for maximum lifetime productivity)
- Avoiding overfeeding gilts in gestation because this reduces feed intake in first lactation (See: WC#5 Feeding the sow and gilt in gestation)
- Feeding a higher lysine lactation diet to gilts where possible, or to the whole herd (1.2 per cent total lysine)
- Maximising lactation feed intake through attention to pre-farrowing feed levels, room temperature, water availability, feed freshness, frequency of feeding and feed scale
- Feeding gilts and, if necessary, second parity sows 0.5 kg of a high protein/energy top dressing for the last seven days of lactation and from weaning to breeding
- Consider delaying breeding of weaned gilts by using Altrenogest: a 14-day treatment period has been shown to increase the number of embryos at day 50 by two.
- Ensuring that feed levels over each cycle are adequate to allow females to reach their genetically-determined mature body size at parity 4 to 5

Reducing culls and deaths for health reasons

Far too many young females leave the herd due to physical injury, loss of condition or lameness, leading to reduced longevity. It has been speculated that the lower backfat depth in today's gilts is the cause of many of these problems. However, recent work in the UK (Figure 1) suggests that there is no relationship between backfat level at first breeding and the number of litters completed. Nevertheless, it appears that the level of backfat may have an impact on the level of injuries, especially shoulder lesions.

Danish work that measured backfat at farrowing showed that sows with less than 15 mm of backfat had a very high risk of shoulder abrasions, while those with a backfat measurement of 25 mm had a lower lactation feed intake and consequently higher bodyweight and backfat loss prior to weaning. This relationship will be especially relevant in the gilt, where feed intake during the suckling period is so critical to subsequent productivity. There is clearly a balance to be made between having gilts too fat at first farrowing and having sufficient fat cover to minimize injury.

The quality of flooring materials has a large influence on injury levels and the use of non-injurious materials combined with prompt repair of damaged flooring will help to reduce the incidence of injury. For gilts prior to first breeding, provision of high quality flooring, ideally with bedding, and sufficient space (minimum 1.4 square metres, 15 square feet) to allow exercise and development of strong legs and feet, will help to improve longevity.

Close attention to preventative health procedures and ensuring rapid detection and treatment of sick, injured and disadvantaged sows and gilts is crucial to reducing enforced culling and death loss. Recent research work in Denmark has highlighted the importance of hospital pens to speed up the recovery of sick or injured animals. Trials showed that it is possible to reduce the percentage of sows that die or have to be destroyed if there are sufficient hospital pens available and a treatment strategy is drawn up by the vet.

Preliminary results suggest that lameness was the primary cause (75 per cent of sows) for transfer to a hospital pen. Sows stayed in the hospital pen for an average of 22 days and 80 per cent of sows were able to return to the gestation pens or move to the farrowing house. Of the sows that were due for culling, there were 25 per cent fewer deaths or destroyed sows.

Conclusion

Sow longevity, and the factors that influence it, have not been given sufficient attention in the past and this is reflected in the reduced longevity noted in herd performance data from many countries. However, longevity has such a major influence on total lifetime production, or Weaning Capacity, that it justifies intense effort to improve it.

The key to this is focussing on management of the young female in order to maximise retention rate to third parity, resulting in a longer productive life and a high Weaning Capacity. From the improvement standpoint Hypor gives a lot of attention in the selection program to all those factors mentioned that influence longevity.

Rectal Prolapse and Rectal Stricture

Pig veterinarian, Mark White, explains the causes, identification and treatment of these conditions in the July 2009 Health Bulletin from NADIS.

Compared to other farm species, the pig appears to be particularly vulnerable to prolapse of the rectal tissue through the anus, which can be seen in any age group from as early as 1-2 days old up to adults. The fundamental cause of the prolapse is an increase in abdominal pressure, forcing a breakdown in the weak muscular support mechanism of the pelvis, which normally retains the rectum in place. There may well be both breed and gender differences in the vulnerability of individuals to prolapse occurring.

Causes of Prolapse

The following list provides an outline of the most common causes of prolapse, as seen in commercial pig farms:-

- 1.. Diarrhoea or dysentery – particularly associated with large intestine inflammation that may include rectal inflammation (e.g. Salmonella, swine fever, swine dysentery).
- 2.. Constipation most likely to be seen in the adult close to farrowing.
- 3.. Parturition – as a result of excessive straining.
- 4.. Water shortage – leading to reduce water content of the faeces and increase straining to pass.

5.. Medicines. Certain antibiotics (tylosin, lincocin) have been associated with oedema (swelling) of the lining of the rectum and subsequent prolapse. This is most likely seen with high doses.

6.. Toxins. Some mycotoxins from feed or straw can be associated with rectal swelling and straining.

7.. Rectal damage, e.g. as a result of boars riding each other.

8.. Coughing. The process of coughing causes an increase in abdominal pressure and, in some cases, this may be sufficient to push out the rectum.

Many animals will expel faeces as they cough and the rectal lining will penetrate through the anus. In extreme cases, it does not return and remains prolapsed.

9.. Fast growth. Prolapsing can often be a problem in fast growing pigs, particularly from 30-60kg on very high-density diets.

Variable temperatures. Pigs have a poor ability to control their body temperature and tend to be adversely affected by variation in the ambient temperature and prone to chilling. The consequence is huddling and piling on top of one another. If a pig then coughs while another is lying on top of it, the abdominal pressure will be even higher than normal and the only place that the pressure can be relieved is at the anus.

Consequences

Once a prolapse has occurred, a number of events may follow:

1.. It rapidly returns into the anus.

2.. It remains outside the anus and, due to the constrictive effect on blood and fluid drainage, it generally swells up. It is thus easily damaged by trauma on pen divisions, feeders etc.

3.. It is eaten by other pigs in the pen. It is not uncommon to find blood in a pen and around the mouths of pigs but with no obvious prolapse in any other animals, i.e. the prolapse will have been completely chewed off. Long term consequences may be:

1.. No effect – particularly if the prolapse returns without damage.

2.. Slow dying off of the prolapsed material over several weeks with the chances of secondary infection arising from rotting tissue.

3.. Rectal stricture. The prolapse resolves but the scar tissue left forms a ring of slowly constricting tissue that eventually blocks the rectum leading to a "blown up" pig (Figure 3). Such animals require euthanasia.

Rectal Strictures

Rectal stricture is a common condition in growing pigs in which scar tissue forms a ring inside the terminal rectum which slowly closes, obstructing the bowel and preventing defecation.

The result is that faecal material accumulates in the colon, caecum and rectum (large intestine) leading to distension of the abdomen. Body condition is lost and the pig ultimately becomes gaunt and hairy.

Occasionally the skin may take on a yellow tint as bile, which would normally be excreted, is reabsorbed. Death is a natural end point but humane destruction will be required before this. Affected pigs are not suitable for slaughter for human consumption.

At post-mortem examination the large intestine will be hugely distended and inflamed (Figure 4) and dissection of the rectum from within the pelvis will reveal a ring or band of scar tissue – sometimes extending well up into the colon – obstructing the gut (Figure 5). Frequently, micro-abscesses will be present around the rectum.

If the stricture starts adjacent to the anus, it is reasonable to assume that a prolapse previously bitten off by another pig was the start point of the stricture. However, in many cases, there is a section of normal mucosa between the anus and the stricture, suggesting that a prolapse had not been the root cause. This area of the rectum has a poor blood supply and the primary damage leading to scarring may be due to either trauma (e.g. penile penetration) or inflammation/infection either locally in the rectum or via the blood supply. *Salmonella sp.*, *Haemophilus parasuis* and *Streptococcus suis* have been implicated.

Where strictures occur not associated with prolapses, it is essential to establish the primary cause and address that to prevent further causes. If strictures can be detected early, before the rectum is completely blocked, it may be possible to gently stretch the stricture by digital manipulation to allow the pig to continue to defecate. Great care is needed not to rupture the rectum.

On some farms, losses resulting from rectal strictures can account for one percentage point of production, i.e. 5-10 per cent of all deaths in the feeding herd).

Action

Any animal noticed with a prolapsed rectum should be isolated away from other pigs. If it is of slaughter weight, it can immediately be despatched for slaughter with a food chain information declaration. It should be transported in isolation.

If swollen but undamaged, it may be possible to replace the prolapse by sprinkling sugar or salt on it, leaving it 30 minutes and then gently pushing it back in. The osmotic effects of the salt/sugar draws out the fluid and shrinks the prolapse.

It may be necessary to place a purse string suture around the anus to retain the rectum once replaced.

In a large animal (sow), a rubber washing up glove placed over an undamaged prolapse may exert enough pressure to shrink the tissue and return it inside the rectum.

Where a prolapse is damaged and clearly not in a state to replace, it must be amputated. The easiest way to achieve this is to insert a pipe (one-inch diameter for a growing pig, one-and-a-half-inch for sows) into the prolapse and tie a ligature around the prolapse baring down onto the pipe. It is necessary to tie the pipe in with the loose ends of the ligature. This will cut the blood supply to the prolapsed material and allow it to dry up and drop off, usually in less than seven days, although it may be necessary to re-tie the ligature after three to four days as the tissue shrinks. If corrugated pipe is available (e.g. electrical conduit), heavy-duty rubber bands or even lamb elastrator rings can be used as a ligature.

In all cases, antibiotic cover should be provided.

Where damage is so great that intestinal tissue prolapses through the open wound, immediate humane slaughter is required. Similarly where a rectal stricture has resulted, the animal will lose body condition whilst the abdomen continues to swell and reabsorption of bile in the gut produces clinical jaundice. Such animals are practically untreatable and unmarketable and must be humanely destroyed.

Prevention

Clearly, prevention of rectal prolapses rests in being able to identify and correct the cause of the problem.

Costs

It is extremely difficult to quantify the financial losses associated with rectal prolapse as in most cases it is underlying disease which precipitates the prolapse and it is the cost of the disease itself, which is most important.

However, where there is no underlying disease, a prolapse in growing pigs is the result of high growth rates: it is possible to give examples. A farm typically affected can lose two per cent of all growing pigs as a result of prolapse/stricture at an average cost of say £80 per head (including lost profit opportunity). Therefore for a 500-sow breeder feeder farm over a year, this could add up to a loss of 230 growing pigs worth £18,400/year. This cost would then have to be offset by the cost of slowing growth to prevent prolapse. For example, if 50g daily live weight gain was sacrificed between 30 and 100kg, this would add six days to reach slaughter weight; with additional feed and facility costs this would incur a cost of at least £1 per pig. On the model, 500-sow breeder-feeder farm, this would add costs of approximately £11,000 per year. (If space does not permit retention for this extra six days, up to 3kg would be lost from the carcass weight and the losses would triple). Of course, the absolute financial cost of incurring/preventing rectal prolapse would have to be viewed in the light of the welfare cost to the animals affected.

POULTRY

Omega-3: Happier, Healthier, More Productive Hens?

ThePoultrySite News Desk
Tuesday, July 14, 2009

UK - Most of us are aware of the potential health benefits of omega-3 found in fish oil and flax seed. Now researchers are looking at how omega-3 may help laying hens avoid bone damage.

A grant of £1.7 million has been awarded to Dr John Tarlton of the University of Bristol's Matrix Biology Research Group in the School of Clinical Veterinary Sciences by the Biotechnology and Biological Sciences Research Council (BBSRC) and industrial partner, Noble Foods, the UK's leading egg production company. The three-year research project will investigate the benefits of omega-3 supplemented diets in laying hens.

Eighteen million laying hens in the UK will need to be "re-housed" within the next four years as a result of a EU ruling banning conventional cage systems. Because of greater rates of bone breakage in free-range systems this represents a serious welfare issue for the poultry and egg production industry.

Concern about the welfare of laying hens housed in non-cage systems was expressed in the 1990s, when the issue of broken bones within flocks was reported. Latest evidence suggests this is getting worse, with many birds from barn and free range flocks having sustained breaks or fractures by the end of their lifetime.

Fractures of the sternum (keel) are common, causing pain, preventing important behaviours and leading to an increase in infection rate. Chickens possess sensitive pain perception mechanisms and can suffer from chronic pain.

Constraints on movement due to fractures may last for many weeks, resulting in restricted access to food, water, and perches, compromising the welfare benefits of free-range systems.

The research group has identified a high incidence of broken bones in hens housed in free-range systems. However, preliminary studies suggest that by providing a diet supplemented with omega-3, found in fish and flax seed oils, breakages could be substantially reduced.

Dr Tarlton said, "The EU ruling represents an impending welfare crisis in which millions more laying hens may suffer bone breakage or fractures in the UK each year.

"Fractures vary in severity and often result in gross skeletal damage and even death in some birds. Other than the welfare issue, wastage and loss in production are a considerable financial burden to the industry, reducing economic viability and increasing costs. By feeding the hens on omega-3 we hope to substantially improve their welfare and reduce costs due to injury, with the bonus that the eggs produced are also better for us."

The study will house sixteen flocks of 1,500 hens each in identical dedicated free-range systems provided by Noble Foods.

In the first year the researchers will compare a high omega-3 "Goldenlay" diet, fed from 16 weeks, with a standard diet. In the second year all hens will be fed on the "Goldenlay" diet from 16 weeks but with half transferred to a standard diet at 35 weeks. This will allow the researchers to find out if an omega-3 diet has direct welfare and bone benefits in laying hens, and whether these benefits persist even when taken off the diet.

Dr Tarlton will lead a multidisciplinary team to investigate the benefits of supplemented omega-3 diets in laying hens. They will look at the full biochemical and cellular mechanisms through which omega-3 is able to improve bone health. This research will also relate to osteoporosis in humans, a disease that affects six million sufferers in the UK.

Dr Tarlton added, "By supplementing with omega-3 we hope to be able to retain the environmental benefits of free range systems without incurring a welfare cost in terms of increased bone breakage. Also by studying the mechanisms of improved bone strength we plan to demonstrate how this may help human patients suffering from osteoporosis."

Intelligent Automated Transfer of Live Birds to Shackle Line

Wednesday, July 22, 2009

US - US Poultry & Egg Association has announced the completion of a research project: intelligent automated transfer of live birds to the shackle line

Project 631 was carried out by Kok-Meng Lee, PhD (The George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology), Bruce Webster, PhD (Department of Poultry Science, University of Georgia), Gary McMurray (Food Processing Technology Division, Georgia Tech Research Institute) and Richard J. Buhr, PhD (USDA-ARS, Russell Research Center, Athens).

This report – "Continuation of Automated Chicken Processing Research" – covers the funding period November 2006 to May 2009 on the project entitled 'Intelligent Automated Transfer of Live Birds to Shackle Line'. The project continued to make good progress in developing an automated system for transferring live birds from a moving conveyor belt to a moving shackle line.

The project team focused on three tasks:

- 1.. Develop methods to integrate/synchronise previously developed individual processes, which include singulating randomly oriented birds on an incoming conveyor, separating singulated birds to maintain uniform spacing, and body-grasping processes.
- 2.. Develop methods to integrate an electrical stunner in the humane transfer system.
- 3.. Design a prototype for the continuous handling of a large number of live birds for use in a field evaluation.

Specific research findings are briefly outlined as follows: The group investigated two preliminary-handler designs for integrating previously developed individual processes: singulating randomly oriented birds on an incoming conveyor and shackling both legs of the bird, with inverting/stunning/transferring of the bird to a moving kill-line; multi-conveyor preliminary handler and sensor-based active singulation. Experiments showed that birds react to motion-related changes as they move from one conveyor to the next. Although birds 'rehabilitate' when they experience more than one handling, the multi-conveyor system takes up excessive room space. To minimise the number of conveyors and the undesirable bird reaction, an active singulation algorithm was developed which estimates the spacing between two incoming birds with line-scan sensors which control bird arrival.

Motivated by the desire to eliminate wing-flapping due to free-fall inversion, the group compared two classes of designs to integrate electrical stunning immediately after the bird legs are shackled. In the first, birds are cradled while undergoing electrical stunning and neck-cut or decapitation before being transferred to the moving kill line shackles. The second design bases its principle on an earlier version patented by Georgia Tech (US Patent 7,134,956) except that birds are shackled on a separate track. Tests with live birds confirmed the concept feasibility of body-supported inversion to eliminate wing flapping.

The interest to shorten the time for technology transfer from laboratory prototype to shop-floor implementation led us to direct our efforts towards designing a human-assisted sensor-based live-bird transfer system. It is based on the second design which offers two major advantages of low-cost and high-throughput. Through realistic simulation, the prototype design for continuous handling of large numbers of live birds has been numerically demonstrated. We have also formed a team with several equipment companies (Georgia Mechatronics LLC previously InControl Inc., Banner, Turck, Stober and Fuji) to seek additional funding from the Georgia FoodPAC to design and fabricate an industrial-hardened prototype for experiments with large numbers of birds.

US: Breeding gentler laying hens that still produce eggs to industry standard

10.jun.09

ARS News Service

Sharon Durham

<http://www.ars.usda.gov/is/pr/2009/090610.htm>

A team of scientists led by Agricultural Research Service (ARS) biologist Heng-wei Cheng at the agency's Livestock Behavior Research Unit in West Lafayette, Ind., and William M. Muir of Purdue University, also at West Lafayette, has developed a line of laying hens that display far less aggression than their commercial counterparts, while maintaining industry-standard egg production. As a result of this development, the researchers were able to cut mortality losses among the birds without the usual beak-trimming. At 58 weeks of age, the selected line of hens had significantly lower annual mortality than another group of hens—called a "control group"—and a commercial line of laying hens.

When housed in communal cages, the kinder, gentler line had a 20 percent mortality rate, compared to 54 percent for the control line and 89 percent for the commercial line. Egg

production was increased in the gentler birds, compared to the control line and the commercial line under the same conditions. Most breeding programs in the past 50 years have concentrated only on traits related to production. For instance, through more than 20 years of breeding selection, egg production has increased significantly in one commercial line of laying hens, while mortality due to aggression and cannibalism among the birds with untrimmed beaks has also increased about 10-fold. Cheng and his colleagues selected breeding birds based not just on production traits, but also took into account competitive interactions among the birds in a group, or communal, setting. This selection program turns "survival of the fittest"—which emphasizes the individual—into "survival of the adequate," which emphasizes the group. Cheng is conducting further research to look at physiological alterations that explain the less aggressive behavior in the new line of hens. His preliminary work indicates this may be due to a decrease in dopamine levels in the birds. Dopamine is a neurotransmitter that has been associated with dysfunctional behavior, as well as with a decline in the ability to cope with stress.

Broilers Raised on Fibrous Litter are More Uniform

Friday, September 11, 2009

Poultry Site News Desk

AUSTRALIA - A study at Poultry CRC has found greater uniformity in birds raised on fibrous litter.

A recent Poultry CRC study has shown that broilers raised on fibrous litter are generally more uniform in feed consumption, Feed Conversion Ratio (FCR) and, most importantly, body weight. This potentially greater uniformity holds the promise of less out of specification birds at the processing plant.

Moreen Ali, Laboratory Manager at Inghams, undertook comparative studies of the productivity and health of broilers raised on rice hulls, softwood sawdust, pine shavings, re-used single batch pine shavings litter, shredded paper, chopped straw or hardwood sawdust.

Dr Ali said: "Birds consume some of these materials used for bedding, which stimulates development of the gizzard, the main 'grinding' organ of a chicken's gut. What was surprising was that although the birds raised on the fibrous litter types had larger, more muscular gizzards than those reared on shredded paper, they did not have improved live weight, feed consumption or FCR at 42 days. Birds reared on hardwood sawdust were generally the most uniform in feed consumption and body weight."

Greater uniformity could lead to benefits in processing efficiency. It is not yet known why birds raised on hard litter material achieved greater uniformity. It may be that an earlier development of the gizzard – as observed in birds reared on hardwood sawdust – caused gut stabilisation and hence more uniform production at 42 days. Thus, through self-regulation of litter intake and early gizzard stimulation, the birds were able to achieve optimum gut development.

Lloyd Thomson, the CRC's Commercial Manager, said: "Despite some differences among litter types, most of the fibrous materials tested gave equally beneficial gut development and live performance results, suggesting a wide range of options for farmers to pursue to best manage litter availability and cost."

Free-range hens 'more likely to suffer fractures'

The Daily Telegraph

Mon Sep 14 2009

Page: 008
Section: News
Byline: Auslan Cramb, Scottish Correspondent

FREE-RANGE hens are more likely to suffer painful injuries than battery hens, researchers have claimed.

A study has found that free-range birds and those allowed the freedom of a barn are almost twice as likely to suffer bone fractures. Many of the injuries are caused by attempts to fly in crowded barns, where hens crash into each other or land awkwardly.

The researchers suggest the solution could be a compromise in which chickens are kept in larger cages, but with nesting areas to avoid the worst effects of overcrowding.

Jamie Oliver and Hugh Fearnley-Whittingstall, the television chefs, have been campaigning to wean British consumers off cheap produce from battery farms.

Criticism of the farms has resulted in retailers including Marks & Spencer, Sainsbury's, Waitrose and the Co-op stopping the sale of eggs from battery hens, ahead of a Europe-wide ban in 2012.

Of the 29 million laying hens in Britain, about 40 per cent are free-range or kept in barn systems in which they have room to move, perches and nest boxes.

Free-range birds are housed in barns but also have access to an outdoor area.

The study by the Scottish Agricultural College's avian science research centre found that 53 per cent of birds kept in barns and free-range systems suffered bone fractures, compared with only 30 per cent of caged birds.

Dr Victoria Sandilands, a poultry behaviour and welfare scientist and the author of the report, said: "Jamie Oliver, Hugh Fearnley-Whittingstall and many others tend to focus on the importance of animals being able to express 'natural behaviour', and I can understand that. I don't deny that a free-range hen has greater freedom to behave naturally, but there are other potential risks, and bone fracture is one of them.

"Chickens are clumsy flyers. Barn systems are huge and there's more movement up and down, and that's probably the problem. Oliver and Fearnley-Whittingstall have a lot of influence on consumers but they're not really being fair to the consumer or to themselves if they haven't taken the effort to find out all the facts."

The findings have been passed to the Department for Environment, Food and Rural Affairs. However, they have been dismissed by animal welfare organisations. Lasse Bruun, the head of campaigns at Compassion in World Farming, said: "A cage is still a cage. Even if enriched, it doesn't allow hens to express their natural behaviour." Amanda Holden, the actress and patron of the Battery Hen Welfare Trust, added: "In my view, it is not acceptable to keep birds in cages."

Considerations in Poultry Drinker Line Management

Practical tips on managing water lines in broiler houses from Brian D. Fairchild, Extension Poultry Scientist at the University of Georgia. His article is published in the University's Poultry Tips, July 2009 issue.

One of the basic needs of poultry is unlimited access to clean water. The US poultry industry has for the most part adopted totally enclosed drinker systems, reducing contamination from foreign debris, such as shavings, feed and faeces. Another benefit of enclosed drinker systems is minimal water leakage onto the floor. Birds obtain water from the enclosed systems by pushing a metal pin that in turn pushes the internal mechanism of the drinker system, allowing water to pass through. Drinker systems should be monitored daily and have routine maintenance performed to maximise water flow and minimise water leakage.

The following are factors and tasks that should be considered in a successful drinker line management programme.

Water Line Management Tips

1. Well and pump capacity

The number of houses and birds per house should be considered when sizing well, well pump and water pipes. The system should be able to provide enough water for bird consumption and to meet evaporative cooling system requirements on the hottest day of the year with market age birds. General rules on broiler farm water usage and pipe sizing have been reported by Czarick, 2007.

2. Level the drinker lines

Un-level drinker lines can lead to air locks and reduce drinking opportunities for birds. This could result in restricting access for birds in areas where the drinker system is too high and result in water wastage where it is too low.

3. Minimise restrictions

Water filters reduce drinking water particulates but should be sized so that they do not restrict water entering the house. Any valves that are used on the water panel should also be sized so they do not restrict water flow. Proper pipe sizing must be assured during house construction to guarantee maximum water availability.

4. Remove trapped air

Any trapped air should be removed from the line. Installing air vents/standpipes in conjunction with performing a high pressure flush will remove trapped air from the water line. Air locks can restrict water availability. High pressure water flushing will remove air locks from the line. To prevent air locks, there should be no high points between the two ends of the drinker line, and mid-line air vents/standpipes should be installed on lines that are longer than 150 feet.

5. Perform regular flushing

A high pressure flush should be conducted after running ANY product through the water line. This will remove residual contaminants and limit bacterial growth. In addition, flushing the water line will provide cooler water to birds which may stimulate water consumption. Water lines should be flushed between flocks as the water in the lines will have been sitting for several days.

6. Sanitise regularly

Bacteria and fungi can be introduced into the drinker line over time at the well, from bird usage and through introduction of other materials through medicators.

There are a wide variety of products available for drinker sanitation. Approved products for drinker and water sanitation as well as bird consumption should be used. Special care should be taken to use these products according to the instructions on the label so that bird water consumption is not reduced and that the drinker equipment is not damaged. Using the correct sanitiser is important because sanitizers can be affected by water pH, hardness, mineral content

and biofilms and other organic material. In order to ensure maximum product efficacy, information about the quality of the water being treated should be considered.

A variety of products are available and some are listed in Table 1.

Table 1. Some products available for cleaning water lines ¹

Agri Zone Flush
Agri Quat S
Anthium Dioxide
Aqua Max
Acetic Acid
Aqua Vite Citric Acid
Hydrogen Peroxide (35%)
HydroLine
Iodine
Oxy Blast
Proxy Clean PWT
Sodium Hypochlorite (12.5%)
Sodium Hypochlorite (2.5 %)
Sterilex
Z-Series

¹ Use of trade names does not imply endorsement by the authors or The University of Georgia to the exclusion of others not mentioned

7. Manage height according to bird age

Drinker line height should be increased as the birds grow. On the day of placement, the drinker line height should be adjusted so that the pin is at the eye level of the bird. As birds age, the line height should be adjusted so that pin is slightly above the birds head, requiring a slight upward angle to activate the pin. Birds should not have to strain to reach the pin.

8. Manage water pressure according to bird age

Pressure dictates how much water the bird gets when the drinker pin is activated. High pressure will provide more water than low pressure. At placement, water pressure should be low to allow the chicks to easily activate the drinker pin and prevent water wastage onto the litter. Pressure must be increased as the birds age to meet bird water demand. Litter condition under the drinkers should be monitored when determining water pressure. If the litter is too damp, lower the pressure.

9. Change water filters regularly

As particulates accumulate in the filter, water pressure will drop. Water pressure should be monitored prior to and after the water filter. Filters must be changed when pressure drops to maximise drinker system operation.

10. Conducted routine water tests

Water quality can change over time. These changes can reduce the efficacy of water line sanitation products and may impact the performance of products used to treat water. Water tests should be conducted annually. Consider testing water during periods of drought or high rainfall to ensure that water quality has not changed.

11. Operate drinker system according the manufacturer's guidelines

Drinker systems are designed to provide birds unrestricted access to water. All drinker manufacturers provide guidelines for their products and these should be followed to ensure optimal performance.

A study comparing five different drinker systems found no differences in broiler performance when the systems were operated according to the manufacturer's guidelines (Cornelison et al, 2005)

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Feeding strategy aims to boost broiler leg strength

31/07/2009 08:53:00

Farmers Weekly (UK)

July 31, 2009

Author: Richard Allison

Animal welfare is a complex concept but there is general agreement within the scientific community and beyond that farm animals should be able to move easily and be in good health.

One welfare issue of particular interest in the poultry sector is lameness in broiler chickens. According to a group of French researchers, producers often underestimate the amount of lameness in their broiler flocks and in doing so they risk reducing the birds' welfare as well as product quality and profitability.

Between 10 and 30% of birds in European broiler flocks have abnormal gait and some leg disorders caused by bone and joint infections as well as skeletal abnormalities may be painful. The former are a result of a fast growth rate during the first few weeks of life. Fast growth placed abnormally high loads on relatively immature bones and joints, causing skeletal abnormalities.

One possible solution is to design a feed strategy that can reduce growth at this early stage, so significantly reduce lameness and, thereby, improve animal welfare. "But our key challenge was to reduce growth without adversely affecting flock performance," says Christine Leterrier of the French National Institute For Agricultural Research (INRA).

So she led a project with the aim of developing a successful diet regime to reduce lameness based on slowing down the speed at which birds grow during their first few weeks and then speeding it up once their bones have developed. "By using a new combination of two diets and a sequential feeding method, we discovered that this can be achieved without any reduction in final carcass weight," she says.

So what does the feeding strategy involve? They recommend a 48-hour feeding cycle with two diets instead of the traditional continuous distribution of a single diet.

For the first seven days of life, broiler chicks should be fed a standard starter diet. Then, from day eight to day 28 the diets should rotate every 24 hours between a low energy, high protein (E-P+) diet and a high energy, low protein (E+P-) diet.

That makes for a total of 10 cycles of E-P+, E+P-. Following this, birds should then be given a standard finishing diet from day 29 onwards.

"In total, this novel regime not only reduced instances of lameness, but also brought the broilers up to standard slaughter weight without the need any additional feeding days."

For this to work, the E-P+ diet should contain about 97% of the energy and 121% of the protein of a standard diet while the E+P- diet should be 103% of the energy of a standard one with 79% of the protein.

To conclude, we believe the sequential feeding method could prove to be a win-win situation for both birds and producers. It could improve the birds' welfare by reducing lameness at no extra cost while safeguarding the producers' profits at the same time.

However, the researchers added that the low energy diet should be given first in order to avoid any reduction in body weight at slaughter.

Another advantage was that the cost of the sequential diet may be lower than a standard diet, as it can contain more cost effective protein-rich feeds such as rapeseed and Dried Distillers Grains with Solubles (DDGS) - a byproduct from bioethanol production. This is because rapeseed meal and DDGS can effectively replace other more expensive protein rich feeds in the E-P+ part of the cycle.

Project at a glance

* **The Problem:** Between 10 and 30% of birds in European flocks have abnormal gait and some may suffer from leg disorders and most of these are the result of a fast growth rate during the bird's first few weeks of life. To address this, French researchers designed a new strategy aimed at reducing growth without compromising carcass yield.

* **Who carried it out:** The project was led by Christine Leterrier of the French National Institute For Agricultural Research (INRA). Also involved were C Vallee, Paul Constantin, Anne Marie Chagneau, Michel Lessire, Philippe Lescoat, Cécile Berri and Elisabeth Baeza of INRA, Nouzilly; Dorothee Bizeray of the Institut Polytechnique LaSalle Beauvais, Beauvais cedex; and Isabelle Bouvarel of the Institut Technique de L'Aviculture, Nouzilly.

* **Funder:** This work was carried as part of a larger project - (Welfare Quality) funded by the EU.

Key findings

- * Feeding an alternating slow-fast growth ration can prevent lameness in broilers
- * This reduction in lameness was achieved without compromising carcass weight
- * This approach could also reduce feed cost by allowing the use of biofuel byproducts

Welfare Quality

* Welfare Quality is a European research project focusing on the integration of animal welfare in the food quality chain. The project aims to accommodate consumer concerns and market demands, develop reliable on-farm monitoring systems, product information systems, and practical species-specific strategies to improve farm animal welfare. Starting in 2004, the five year project involves 44 institutes and universities from Europe and Latin America.

OTHER

Just reward; Island bio-science company awarded for research done on beta-carotene compound

PUBLICATION: The Guardian (Charlottetown)
DATE: 2009.08.01
SECTION: Business
PAGE: B7
SOURCE: The Guardian
BYLINE: Nathan Rochford

Livestock and companion animals could soon have an alternative nutritional supplement, thanks to research being done by one Prince Edward Island bio-science company.

Chemaphor Inc., was recently awarded the Canadian Innovation Leader Award and \$300,000 in funding for work it's doing on a beta-carotene compound found to strengthen animal immune systems and promote healthy growth.

Known as OxBC (short for oxidized beta-carotene) the compound has been tested for a number of years now and has revealed that beta-carotene is most effective when in it's broken down or in its oxidized form.

Using that knowledge, scientists tested the compound as a feed additive for livestock as an alternative to antibiotics, which are used to promote growth.

Likewise, the company is testing the applications of the compound on companion animals potentially as a nutritional supplement capable of strengthening the animals' immune system.

According to Jamie Nickerson, senior research scientist with Chemaphor's bio-science group, the discovery could open up a lot of doors in the agriculture and livestock industry.

"The common practice of putting antibiotics in feed has been banned in Europe, so this could replace that," he said, adding unlike antibiotics, the compound increases growth without affecting bacteria. "There's pressure worldwide for producers to stop using antibiotics in feed."

This is because although the antibiotics used in feed are miniscule amounts, having it constantly in the animal's system risks creating super bacteria immune to the antibiotics. By not affecting bacteria at all, OxBC does not risk this affect.

Likewise, for companion animals, like dogs, the compound appears to have anti-inflammatory applications capable of fighting arthritis in animals.

Can stress in farm animals increase food safety risk?

08.sep.09

Foodborne Pathogens and Disease. September 2009, 6(7): 767-776.

doi:10.1089/fpd.2009.0315.

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<http://www.liebertonline.com/doi/abs/10.1089/fpd.2009.0315>

Abstract

All farm animals will experience some level of stress during their lives.

Stress reduces the fitness of an animal, which can be expressed through failure to achieve production performance standards, or through disease and death. Stress in farm animals can also have detrimental effects on the quality of food products. However, although a common assumption of a potential effect of stress on food safety exists, little is actually known about how this interaction may occur. The aim of this review was to examine the current knowledge of the potential impact of stress in farm animals on food safety risk. Colonization of farm animals by enteric pathogens such as *Escherichia coli* O157:H7, *Salmonella*, and *Campylobacter*, and their subsequent dissemination into the human food chain are a major public health and economic concern for the food industries.

This review shows that there is increasing evidence to demonstrate that stress can have a significant deleterious effect on food safety through a variety of potential mechanisms. However, as the impact of stress is difficult to precisely determine, it is imperative that the issue receives more research attention in the interests of optimizing animal welfare and minimizing losses in product yield and quality, as well as to food safety risks to consumers. While there is some evidence linking stress with pathogen carriage and shedding in farm animals, the mechanisms underlying this effect have not been fully elucidated. Understanding when pathogen loads on the farm are the highest or when animals are most susceptible to infection will help identifying times when intervention strategies for pathogen control may be most effective, and consequently, increase the safety of food of animal origin.

Neurophysiology and assessment of welfare

Author: X. Manteca

Meat Science, Vol. 49, No. Suppl. , S205~S218, 1998

Concern for animal welfare is a major consideration in meat production and is based upon the belief that animals can suffer. Welfare may be considered in terms of the subjective experiences of animals; preference testing is often used in this approach. Neurophysiology has provided insight into the biological basis of emotions and into the mechanisms of learning and memory, which are important to interpret the results of preference tests. Welfare may also be defined in terms of the biological functioning of the animals; physiological measures of stress such as plasma levels of glucocorticoids, catecholamines, prolactin and endorphins, as well as heart rate and brain levels of neurotransmitters are then used to assess welfare. Individual differences in the stress response are important in welfare issues. Slaughter poses particular problems and neurophysiology has provided objective criteria to assess the effectiveness of electrical stunning. It is concluded that neurophysiology has made important contributions to assess and improve animal welfare.

Wageningen To Study Behaviour For Better Welfare

thepigsite.com

September 25, 2009

Netherlands - Wageningen University, together with other partners, has received funding for three projects that will investigate the effect of social interactions in pigs and hens with the view to improving the welfare of these animals kept in groups. Social interactions have a large impact when animals are kept in groups. The social environment will likely have an even greater impact in the future because group sizes are increasing and treatments such as beak trimming and tail docking will probably be banned. Breeding programmes and rearing conditions will have to be modified in order to limit the risk of certain forms of damaging behaviour and to promote pro-social behaviour. The Animal Breeding and Genomics Centre (ABGC), together with the Adaptation Physiology Group and other partners, has received funding from the STW, the NWO-ALW and the Dutch Ministry of Agriculture, Nature and Food Quality (Research programme 'Value of Animal Welfare') for three projects which will investigate the effect of social interactions in pigs and poultry.

Wageningen University and Research Centre is joining forces with partners to develop methods that will not only lead to an improvement in animal welfare, but will also be accepted by the various stakeholders including producers, consumers and animal welfare organisations. The project 'Genetics of social interactions in livestock: Improving health, welfare and productivity in laying hens and pigs' is funded by the STW and will be carried out in cooperation with Hendrix Genetics and the Institute of Pig Genetics (IPG). This project aims to increase our understanding of the inheritance of socially affected traits, which will facilitate balanced genetic improvement in commercial populations of laying hens and pigs. The NWO-ALW and the Dutch Ministry of Agriculture, Nature and Food Quality have funded the projects 'Preventing feather pecking in laying hens: from principle to practice' and 'Seeking Sociable Swine'. The aim of the first project is to study whether early predictors of feather pecking can be identified and to investigate the effects of rearing environment on feather pecking in commercial rearing flocks. This project is being conducted in cooperation with the University of Groningen, Utrecht University, Wageningen UR Livestock Research in Lelystad and Ter Heerdt BV. The aim of the second project is to improve social interactions among pigs by incorporating social genetic effects in the breeding programme and by investigating the implications of this novel selection method for behaviour and welfare. This project is being conducted in cooperation with Wageningen UR Livestock Research in Lelystad, VU University Amsterdam and the Institute of Pig Genetics (IPG).

Animals feel the pain of religious slaughter

New Scientist

13 October 2009 by Andy Coghlan

Journal reference: New Zealand Veterinary Journal, vol 57, p 77

Brain signals have shown that calves do appear to feel pain when slaughtered according to Jewish and Muslim religious law, strengthening the case for adapting the practices to make them more humane. "I think our work is the best evidence yet that it's painful," says Craig Johnson, who led the study at Massey University in Palmerston North, New Zealand.

Johnson summarised his results last week in London when receiving an award from the UK Humane Slaughter Association. His team also showed that if the animal is concussed through stunning, signals corresponding to pain disappear.

The findings increase pressure on religious groups that practice slaughter without stunning to reconsider. "It provides further evidence, if it was needed, that slaughtering an animal without

stunning it first is painful," says Christopher Wathes of the UK Farm Animal Welfare Council, which has long argued for the practice to end.

Stunning result

In most western countries, animals must be stunned before they are slaughtered, but there is an exemption for religious practice, most prominently Jewish shechita and Muslim dhabiha. Animal welfare groups have long argued that on welfare grounds, the exemptions should be lifted, as they have been in Norway.

Johnson's work, funded by the UK and New Zealand agriculture ministries, builds on findings in human volunteers of specific patterns of brain electrical activity when they feel pain. Recorded with electroencephalograms, the patterns were reproducible in at least eight other mammal species known to be experiencing pain.

Johnson developed a way of lightly anaesthetising animals so that although they experienced no pain, the same electrical pain signals could be reliably detected, showing they would have suffered pain if awake.

The team first cut calves' throats in a procedure matching that of Jewish and Muslim slaughter methods. They detected a pain signal lasting for up to 2 minutes after the incision. When their throats are cut, calves generally lose consciousness after 10 to 30 seconds, sometimes longer.

Cut-throat practice

The researchers then showed that the pain originates from cutting throat nerves, not from the loss of blood, suggesting the severed nerves send pain signals until the time of death. Finally, they stunned animals 5 seconds after incision and showed that this makes the pain signal disappear instantly.

"It wasn't a surprise to me, but in terms of the religious community, they are adamant animals don't experience any pain, so the results might be a surprise to them," says Johnson.

He praised Muslim dhabiha practitioners in New Zealand and elsewhere who have already adopted stunning prior to slaughter. They use a form of electrical stunning which animals quickly recover from if not slaughtered, proving that the stunned animal is "healthy", thereby qualifying as halal.

Pressure drop

Representatives for both faiths responded by claiming that stunning itself hurts animals. A spokesman for Shechita UK says that the throat cut is so rapid that it serves as its own "stun", adding that there is abundant evidence shechita is humane.

"Shechita is instantaneous, and due to the immediate drop in blood pressure and [oxygen starvation] of the brain, the animal loses consciousness within 2 seconds," he says. "It conforms to the statutory definition of stunning, in that it is a process which causes the immediate loss of consciousness which lasts until death."

Ahmed Ghanem, a halal slaughterman based in New Zealand, says that blood doesn't drain properly from stunned animals, although this has been countered by recent research at the University of Bristol in the UK.

Ghanem cites a 1978 study relying on EEG measurements led by Wilhelm Schulze of the University of Hanover, Germany, apparently concluding that halal slaughter was more humane than slaughter following stunning. But Schulze himself, who died in 2002, warned in his report that the stunning technique may not have functioned properly.