

# RESEARCH WATCH

## April 2010

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

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BEEF CATTLE .....	2
Calves and The Cold .....	2
Clinical parameters for newborn calves .....	4
US: Keeping cattle cool and stress-free is goal of ARS study .....	5
DAIRY AND VEAL .....	6
Researchers Milk Reproductive Secrets From Cows .....	6
Are We Pushing Dairy Cows Too Far? .....	7
Using long-acting antibiotics to protect weaned calves from respiratory disease .....	9
Clinical parameters for newborn calves .....	10
Untied cows produce less milk than tied cattle .....	11
When does heat stress occur? .....	11
NORWAY: Cows: More freedom may mean less milk .....	12
Cow Tracks: Improving Health And Pasture .....	13
Attitudes Towards The Downer Cow .....	13
HOGS .....	18
Handling and Transport of Pigs - A Report to the Industry .....	18
Tryptophan-Enriched Diet Reduces Pig Aggression .....	20
Observe Your Pigs for Early Warning of Tail-Biting .....	21
Daylength Has Significant Impact on Summer Infertility .....	22
Research Hopes to Cut Time Sows are Restrained in Stalls .....	23
Castration: Anaesthetics could affect piglet hierarchy .....	23
Study shows moving pigs inside has huge benefit .....	24
Modified Gestation Stalls Improve Sow Well-Being .....	25
Weak Sows Will be Easier to Identify .....	28
Twisted Guts and Stomach .....	30
Boar taint vaccination: no impact on behaviour .....	33
The Behaviour of Male Fattening Pigs Following either Surgical Castration or Vaccination with a GnRF Vaccine .....	34
Weaning Age Does Not Affect Lifetime Performance .....	36
Germany: Warning system for swine aggressiveness .....	38
Biggest Ever Welfare Project in England .....	38
Taking the 'stress' out of weaning .....	40
POULTRY .....	41
Larger Enriched Cages Improve Laying Hen Health .....	41
Group begins hen housing study .....	42
MSU studies use of wireless sensors to monitor chicken well-being .....	43

Cage ban will not lead to increase in salmonella .....	45
Furnished Cages Offered Best Hen Welfare in UK Trial .....	48
Two Studies on Perches Presented at Welfare Meeting .....	49
Cannibalism in Free-Range Flocks Linked to Perches, Early Range Access ..	51
Study Looks at Group Size Effects in Furnished Cages for Laying Hens .....	53
Shade Made Little Difference to Use of Paddocks by Free-Range Hens .....	54
Foot Problems Found in 40 Per Cent of Hens in Non-Cage Systems .....	55
Beak-Trimming Discussed at WPSA Welfare Meeting .....	57
Welfare of Meat-Producing Poultry.....	60
AVMA: A scientific perspective on housing for laying hens .....	64
Laying Hen Production Systems: Welfare and Social Sustainability .....	64
Introduction to Pasture-Raised Poultry: Getting Started .....	67
OTHER .....	72
New Issue of Healthy Animals Now Online .....	72
Local Analgesia Aids Colt Castration Pain Control.....	73
Scientists learn red grouper operate as underwater architects .....	75
Bigger Not Necessarily Better, When It Comes to Brains .....	77

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## **BEEF CATTLE**

### **Calves and The Cold**

The CattleSite

January 2010

Frost bite, freezing to death and hypothermia are common causes of death of young animals from the cold. Dr W Dee Whittier, Extension Veterinarian at Virginia Tech looks at how, with appropriate management, these losses can be avoided.

Frostbite is the damage to body tissues that occurs when these tissues freeze. The extremities are most at risk. Frozen ears and tails result in changes of cattle appearance but do not affect cattle performance significantly. Frozen feet generally result in a calf that must be put to sleep or will die. Occasionally teats of a recently calved cow freeze resulting in mastitis and frequently loss of milk production in at least one quarter of the udder.

Newborn calves are most at risk because they are wet and because they have a large surface area in relation to their total body mass. Calves are not fully capable of maintaining temperature the first several hours of life. Newborn calves have a circulatory system that is less able to respond to cold changes as compared to more mature animals.

Weather conditions have a great effect on the risk of frostbite and hypothermia, above and beyond just creating low temperatures. Wind is often the biggest factor. The effect of wind is often referred to as wind chill and tells how living things “feel the temperature”. Wind chill is often many degrees colder than the actual temperature. Humidity has a large effect on cold as well since humid air can take more warmth away from animals.

The surfaces on which cattle must rest also have a great effect on the risk of frostbite. If cattle must lie on snow ice or frozen ground they will lose much more body heat than if they can rest on dry bedding or grass. Snow or ice from freezing rain on calves dramatically increases heat loss.

Calves that freeze to death are unable to maintain a high enough body temperature to keep body processes working. Newborn calves have a special body tissue called “brown adipose tissue” that is designed to help them deal with cold temperatures. During cold temperatures this special fat is broken down and creates heat that helps the calf keep warm. However, very cold conditions can overcome this protective mechanism and calves die.

Intake of the first milk (colostrum) and physical activity help calves maintain and generate the heat they need for body process to work properly. Attentive mothers vigorously clean newborn calves and stimulate this activity and the nursing of colostrums. Inexperienced or less attentive dams may let a calf get cold enough so it is sluggish and hyperthermia results.

#### Recommendations for preventing frostbite and hypothermia:

Provide windbreaks for calving cows when wind chill temperatures are below 20° F.

Provide bedding for calving cows when wind chill temperatures are below 10° F. Often the most convenient way to do this is to roll out a dry round bale of hay.

House calving cows and calves less than one day of age when wind chills are below 10° F. and calves cannot be kept dry because of snow or rain. Remember, housing can also be a negative because organisms that cause scours and pneumonia build up in barns and stalls. Finding the right balance of protecting calves from the cold but not exposing them to sickness bugs requires special skill when weather conditions are severe during calving.

#### Treatment of frostbite:

Detect frostbite early. Examine newborn calves carefully when conditions create a risk. If ear-tips are frozen there is significant risk that feet may be experiencing damage as well.

Thaw tissues as quickly as possible. Much of the damage of frostbite occurs during the thawing process. Ice crystals form that damage all tissues. A fast thaw decreases ice-crystal time.

Once tissues are thawed re-freezing must be prevented. This nearly always means housing with heat for several days. Because of damage to circulation from the initial freezing these tissues will re-freeze very easily.

Tissues that will recover from freezing should stay warm. If tissues are cold to the touch the next day there has probably been enough damage so that blood supply is gone and the feet or other parts will become gangrenous.

#### Treatment of hyperthermia:

Careful observation of newborn calves during cold conditions is crucial. Healthy calves stand often, nurse large amounts of colostrums and are alert as evidenced by their holding the head up and getting up when encouraged. Extremities should feel warm.

Cold calves should be warmed and fed warm colostrums. If they do not nurse then they should be given a bottle or tubed with colostrums or a commercial colostrums substitute.

A number of warming techniques can be successful. A few hours in the floor board of the pickup truck with the heater on high saves many calves. Hair dryers both dry and warm cold calves. Heat lamps work best if calves are already dry. Electric blankets can be very effective. Some producers have built boxes with a forced air heater that are very effective.

Severe cases of hyperthermia require special attention. Sometimes warming the outside of the calf shunts blood from the critical organs and results in death. Warm water baths can warm a very cold calf quickly, but sometimes result in death. Warm IV solutions or warm enemas administered by veterinarians can sometimes overcome this problem.

Careful attention and appropriate treatments during cold weather calving can save calves' lives and improve profitability in tough cattle economic times.

#### **Clinical parameters for newborn calves**

Sheila McGuirk, DVM, PhD, Dipl. ACVIM, University of Wisconsin  
1/22/2010

Within minutes of delivery, a normal calf is head righting and works its way to sternal recumbency within five minutes. Shortly thereafter, it begins making attempts to stand, and most are standing within an hour of a normal vaginal delivery. The selected clinical parameters of newborn calves shown here correlate well with vitality and are useful to assess newborn calves.

Rectal temperature: 102-103°F (38.8-39.4°C) right after calving, stable at 101-102°F (38.3-38.8°C) within one hour.

Heart rate: 100-150 beats per minute, rhythm is regular, pulse is strong.

Respiratory rate: 50-75 breaths per minute, primarily thoracic effort.

Hair coat appearance: Placenta covered but not discolored.

Head, limbs and tongue: No swelling, edema or discoloration.

Mucous membranes: Pink, moist and refill time < 3 seconds.

Responsiveness: Responds to stimulation with head shaking and movement of limbs, strong corneal reflex, suck reflex is present.

Muscle tone: Able to maintain sterna recumbency by five minutes, attempts to stand within 15 minutes, standing by 60 minutes.

Suckling: Ready to nurse within two hours.

Some of the most important clinical signs that alert you to a calf requiring critical care are obtundation, hypothermia (<101°F; 38.3°C), bradycardia (<80 bpm), dilated, unresponsive pupils, inactivity or flaccidity. While not considered a sensitive indicator of cardiopulmonary arrest in small animals, cyanotic mucous membranes or prolonged capillary refill time can be an indication of the need for circulatory support in newborn calves. Tachypnea (75 bpm) with expiratory cycle accentuation, an abdominal lift or snap, or expiratory grunting may indicate the need for respiratory support. An erratic breathing pattern, with long periods of primary or secondary apnea, should also be viewed as a need for critical respiratory support in the young calf.

This information was presented at the 2009 American Association of Bovine Practitioners annual meeting.

### **US: Keeping cattle cool and stress-free is goal of ARS study**

25.mar.10

United States Department of Agriculture-Research, Education, and Economics

Chris Guy

[http://www.eurekalert.org/pub\\_releases/2010-03/usdo-kcc032510.php](http://www.eurekalert.org/pub_releases/2010-03/usdo-kcc032510.php)

Identifying the causes of heat stress in cattle and finding ways to manage it are the goals of Agricultural Research Service (ARS) scientists and cooperators who are helping producers deal with this significant production problem.

Heat stress can have serious consequences. While some cattle exhibit little or no response to it, others may experience diminished appetite and feed intake, reduced growth rate, compromised disease resistance and, in extreme cases, death.

Extremely high temperatures overwhelm an animal's natural ability to regulate its body temperature. But other factors are involved, and understanding them is essential for predicting, preventing and responding to potential heat-stress

scenarios, according to scientists at the ARS Roman L. Hruska U.S. Meat Animal Research Center (USMARC) in Clay Center, Neb.

There, scientists are working together with cooperators to develop risk-assessment tools and management strategies for producers. This work has three main components: analyzing animal susceptibility, identifying contributing environmental factors, and evaluating management techniques. In one study, USMARC agricultural engineer Tami Brown-Brandl and colleagues conducted several studies to identify factors that contribute to animal susceptibility to heat stress. They identified 11 influential factors, including coat color, health history, and temperament.

In another study, Brown-Brandl and USMARC agricultural engineers Roger Eigenberg and John Nienaber looked at environmental factors affecting the intensity of heat stress. They developed a model that incorporates predictions of how temperature, humidity, sun intensity, and wind speed will affect heat stress. The model is available online at: [www.ars.usda.gov/Main/docs.htm?docid=17130](http://www.ars.usda.gov/Main/docs.htm?docid=17130).

Read more about this research in the March 2010 issue of Agricultural Research magazine, available online at: <http://www.ars.usda.gov/is/AR/archive/mar10/cattle0310.htm>.

ARS is the principal intramural scientific research agency of the U.S. Department of Agriculture. The research supports the USDA priorities of promoting international food security and responding to climate change.

## **DAIRY AND VEAL**

### **Researchers Milk Reproductive Secrets From Cows**

CBC News Online  
February 16, 2010

Scientists in Nova Scotia say they've found a way to give Bessie a longer reproductive life, and thus more milk for farmers.

Researchers at Performance Genomics Inc., a biotechnology company in Truro, have identified 25 genes that indicate whether a cow will be a good breeder.

"Based on the genetic markers, that will identify whether or not it has the ability to remain fertile for a longer period of time than other calves," said project manager Brian Matthews.

"I am not sure they will live a happier life," said Don Crober, the company's chief scientific officer, "but they will live longer because they will be in the herd longer."

That's good news for dairy farmers.

Holstein cattle have one job — to produce milk. Better breeding has allowed cows to give more milk, but that has had the unforeseen consequence of shortening their lives.

"Over the last 30 years while you've gotten more production, more superiority out of the cow that way, we've probably lost some as far as reproductivity or longevity in a cow," said John Vissers, a dairy farmer in Stewiacke, near Truro.

Vissers said it costs \$2,000 to get a cow to the point where it can produce milk, and some cows only last one lactation.

"If you can keep that cow around for three or four lactations, or five lactations after that, it pays for itself," said Visser.

The scientists used both cow hair and bull semen in their work. They also needed help from mice, whose genes are not that different from those of a cow, to find which 25 genes are connected to reproductive longevity.

### **Are We Pushing Dairy Cows Too Far?**

The DairySite

March 19, 2010

At the recent British Cattle Veterinary Association winter meeting, Karen Lancaster, Dairy Co Extension Officer discussed dairy cow welfare and asked whether we had pushed the modern UK dairy cow too far. Charlotte Johnston, TheCattleSite junior editor reports.

Milk yields are ever increasing, but it is to the detriment of animal health and welfare? Ms Lancaster said that many of the issues that are topical today, mastitis, lameness and calving difficulties are no different to those that were seen 50 years ago.

The standard Holstein looks much different to one of 50 years ago, now a much larger and leaner animal. While genetics and breeding has improved substantially, a recent European Food Safety Authority report highlights this as the main cause of poor animal health and welfare. Ms Lancaster asks whether our management and infrastructure kept up with genetics and breeding?

Mastitis remains one of the largest costs to the dairy industry

In the UK, industry standards advise farms to work towards a target of 70 cows (ideally more)/ 100 cows/ year to be clear of mastitis. In practice the incidence of clinical mastitis is closer to 47-65 cows/ 100 cows/ year.

In a study carried out in 2007, a quarter of farms reported greater than 100 cases/ 100 cows/ year.

One major change noticed in this study was that the pathogens of the clinical mastitis cases identified were dominated by environmental pathogens (80 per cent). While contagious pathogens were still of more importance on some farms, this is a dramatic shift from 50 years ago, where contagious pathogens accounted for 90 per cent of clinical mastitis cases.

This shift in pathogens is likely due to increased parlour hygiene and the introduction of the Mastitis Five Point Plan.

National statistics suggest that a herd with a bulk milk somatic cell count (BMSCC) of 200,000 cells/ml is relatively well-controlled. Ms Lancaster said that a herd with a BMSCC of 200,000 cells/ml would have 20 per cent of the herd infected.

Although the prevalence of clinical mastitis has not changed much, the use of non steroidal anti inflammatory drugs to relieve pain has greatly improved cow welfare, said Ms Lancaster.

The use of teat seals during the dry period is another example of methods which have been adopted by the industry to reduce cases of mastitis and improve welfare.

Despite this prevalence has remained much the same. DairyCo launched a national mastitis control plan last year which produces farm specific advice.

Ms Lancaster said that initial results were promising and where farmers have had good levels of compliance, reductions of more than 20 per cent in their mastitis incidence have been achieved.

### Housing issues

Another problem Ms Lancaster identified is that the cows have changed but the housing hasn't. As cows have got bigger they require larger amounts of space to move and lie down in.

Cows should ideally lie down for 14 hours a day, but in some sheds the reality is less than nine hours. Although there are a number benefits of increased time spent lying down, one of the main is reduced incidence of lameness.

The animals need appropriate access to feed, ideally there should be one feeding space per cow to allow constant access to feed for all animals. If this isn't the case then it will be heifers, sick and lame cows that will suffer.

Ms Lancaster also said that the flooring in cow sheds should be even and non slip. She advised improvements to poor flooring through the use of rubber matting along feed barriers, in the collecting yard and in sharp corners.

However as Ms Lancaster pointed out to the audience, all year round housing does not necessarily mean bad welfare. Extensive grazing in wet, muddy fields will lead also lead to serious health issues.

### Breeding and genetics

Increases in milk yields seen over the years are down to breeding genetics, is this to the detriment of cow health?

Ms Lancaster said that PLI (profitable lifetime index) is constantly improving with new traits been added. Non production traits now make up over 50 per cent of the total.

The UK is one of the countries leading the way in the development of sound methods for genetic decision making, placing much greater emphasis on health and welfare traits than other countries, Ms Lancaster said.

Current research includes finding sires to produce offspring more suited to the beef market. The Scottish Agricultural College (SAC), supported by DairyCo and EBLEX are investigating the opportunity of selecting for Holstein bulls that will sire offspring more suited for beef production by having a more muscular frame.

Introducing this trait into the PLI would improve musculature and fertility without compromising milk yield in the heifers.

Concluding Ms Lancaster said that the UK dairy industry had a duty to its dairy cows to ensure that their health and welfare is always considered in every decision and development it makes.

Whilst she pointed out a number of excellent initiatives within the industry including DairyCo mobility scoring and mastitis control plan as well as constant research by SAC and other organisations, Ms Lancaster said that the industry must ensure producers are using all the tools available to them.

### **Using long-acting antibiotics to protect weaned calves from respiratory disease**

Dairy Herd Management

Source: Dairy Calf and Heifer Association

February 8, 2010

New research from the University of Guelph looked at respiratory disease and two preventative treatment methods in calves after weaning. The study used

1,392 calves at a commercial heifer raising facility and compared treating calves with either 2 mL of a long-acting antibiotic (tulathromycin, marketed as Draxxin) or 5 mL of a short-acting antibiotic (oxytetracycline, marketed as Biomycin 200) at the time they were moved into group housing. Calves were weaned at six weeks of age and remained in individual pens for two weeks after weaning before being placed into groups.

This trial did not evaluate the impact of antibiotic treatment near weaning compared to no treatment. It was designed to compare two different treatment methods. In the six weeks following the move to group housing, 22 percent of calves treated with oxytetracycline and 13 percent of calves treated with tulathromycin developed respiratory disease. Among calves that had no respiratory disease before moving to group housing, calves treated with tulathromycin weighed more and were taller after six weeks in group housing than calves treated with oxytetracycline. Calves that were treated for respiratory disease before eight weeks of age did not respond differently to tulathromycin or oxytetracycline, perhaps because of damage due to respiratory illnesses earlier in life. Calves that experienced respiratory illness before eight weeks of age weighed 6.4 pounds less and were 0.24 inch shorter than healthy calves at 14 weeks of age. Respiratory illness during the first 6 weeks of group housing reduced 14-week body weight by 17.4 pounds and withers height by 0.5 inch.

Results of this study demonstrated the significant impact that respiratory disease can have on calves in the first three to four months of life and showed that tulathromycin may be used as an effective preventative treatment for calves during the high risk period after weaning. Long-acting antibiotic treatment at the time of group housing was more effective in calves that did not have a history of respiratory disease.

### **Clinical parameters for newborn calves**

Dairy Herd Management

February 8, 2010

The greatest risk period for dairy calf death occurs before weaning. Despite some improvement in the reported calf mortality rate between 48 hours of age and weaning within the last five years, perinatal death — defined as that occurring within the first 48 hours of life — is a problem of increasing magnitude and may be prevented with better identification of and attention to at-risk calves, says Sheila McGuirk, veterinary clinician at the University of Wisconsin.

The causes of death among calves in this age group, which include combined respiratory and metabolic acidosis, hypothermia, hypoglycemia, parturient trauma from dystocia, hypoglobulinemia, congenital conditions, sepsis or systemic disease, and blood loss, can be prevented with prompt attention and the delivery of critical care.

With improved knowledge, equipment and skills, critical care can be delivered on the farm or at the veterinary clinic or hospital.

### **Untied cows produce less milk than tied cattle**

The Hindustan Times

Tue Feb 16 2010

Section: News

Washington, Feb. 16 -- In a new research, scientists have found out that untied cattle in small herds produce less milk than cows tied to their stalls, but have a higher reproductive performance and suffer less teat injuries and metabolic diseases.

The researchers compared performance and health within the two stall types in response to a ban on the construction of new tie-stalls.

Egil Simensen from the Norwegian School of Veterinary Science, Oslo, worked with a team of researchers to investigate data on 812 herds of Norwegian Red cattle, 192 of which were kept in tie-stalls.

"Free-stall cows in smaller herds produced significantly less milk than those in tie-stalls, but more milk in larger herds," he said.

"Cattle are social animals and readily form dominance hierarchies, especially at areas of access to feed, water and rest. It may be that cattle which are free to move around spend more time fighting and less time feeding in small free-stalls, particularly when the design of the stall is suboptimal," he explained.

Since 2004, all new cattle stalls built in Norway must be of the free-stall type.

There has, however, been very little research on the impact of the interaction between housing system and herd size on animal welfare.

Speaking about these results, Simensen said, "Performance and health is not universally better in small free-stalls than in tie-stalls. Herd size must be taken into consideration when preparing and evaluating regulations regarding housing system for dairy cows".

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### **When does heat stress occur?**

By Dairy Herd staff  
Monday, January 25, 2010

Significant increases in milk-per-cow over the past several decades may force us to modify the temperature-humidity index. The index was developed using a retrospective analysis of studies from the 1950s and early 1960s. But today's cows produce a lot more milk than cows from the 1950s and 1960s did. Today's cows presumably have a lower temperature threshold for when milk losses begin to occur, since metabolic heat output is increased as production levels rise. Heat stress also has a significant impact on reproductive performance.

To study this further, researchers at the University of Arizona looked at eight different modern-day experiments involving heat stress and dairy cows. From those studies, they concluded that the temperature-humidity index is currently underestimated for today's high-producing dairy cows.

More specifically, they say a THI of 68 is where heat stress begins to affect cows adversely rather than the standard THI threshold of 72.

"Therefore, cooling methods on commercial dairy farms should be implemented earlier to prevent these effects," the researchers told those attending the Southwest Nutrition & Management Conference last winter.

Full paper:

[http://animal.cals.arizona.edu/swnmc/Proceedings/2009/14Collier\\_09.pdf](http://animal.cals.arizona.edu/swnmc/Proceedings/2009/14Collier_09.pdf)

### **NORWAY: Cows: More freedom may mean less milk**

BioMed Central

Graeme Baldwin

15.feb.10

'Free-stall', untied cattle in small herds produce less milk than cows tied to their stalls but have a higher reproductive performance and suffer less teat injuries and metabolic diseases. Researchers writing in BioMed Central's open access journal *Acta Veterinaria Scandinavica* compared performance and health within the two stall types in response to a ban on the construction of new tie-stalls.

Egil Simensen from the Norwegian School of Veterinary Science, Oslo, worked with a team of researchers to investigate data on 812 herds of Norwegian Red cattle, 192 of which were kept in tie-stalls. He said, "Free-stall cows in smaller herds produced significantly less milk than those in tie-stalls, but more milk in larger herds. Cattle are social animals and readily form dominance hierarchies, especially at areas of access to feed, water and rest. It may be that cattle which are free to move around spend more time fighting and less time feeding in small free-stalls, particularly when the design of the stall is suboptimal."

Since 2004, all new cattle stalls built in Norway must be of the free-stall type. There has, however, been very little research on the impact of the interaction

between housing system and herd size on animal welfare. Speaking about these results, Simensen said, "Performance and health is not universally better in small free-stalls than in tie-stalls. Herd size must be taken into consideration when preparing and evaluating regulations regarding housing system for dairy cows".

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Notes to Editors

1. Housing system and herd size interactions in Norwegian dairy herds; associations with performance and disease incidence  
Egil Simensen, Olav Osteras, Knut Egil Boe, Camilla Kielland, Lars Erik Ruud and Geir Naess *Acta Veterinaria Scandinavica* (in press)

### **Cow Tracks: Improving Health And Pasture**

TheDairySite

Tuesday, March 09, 2010

UK - Cow tracks should be seen as a crucial part of your farm infrastructure according to DairyCo extension officer Piers Badnell.

"Good, well maintained cow tracks allow you to extend your grazing season and reduce pasture damage and poaching in gateways," says Mr Badnell. "They also enable quicker grass recovery, and give the cows a comfortable, welfare friendly surface to move calmly and freely into and out of milking."

Whilst poorly designed or maintained cow tracks can cause lameness, a good track can actually help in the fight against lameness.

"Cows move faster on good tracks," says Piers, "reducing the amount of time taken to travel to and from the pasture. They allow cattle access to pasture for a larger part of the year, reducing the time they spend indoors."

"Cows with existing foot problems can walk more easily on a good surface, and good tracks can help improve udder cleanliness and reduce mastitis by reducing the time cows spend bunched together in muddy wet conditions."

To help farmers plan and build the right tracks, DairyCo has produced a factsheet as part of its grass+ programme, which can be downloaded from [www.dairyco.org.uk](http://www.dairyco.org.uk) or ordered by calling DairyCo Publications on 024 7647 8695.

### **Attitudes Towards The Downer Cow**

The BeefSite

March 31, 2010

Recent research by The University of Nottingham, School of Veterinary Medicine and Science, carried out an expert review to assess the attitudes of a group of respondents to the diagnosis, prognosis and treatment of recumbency in cattle. Professor Jon Huxley talked an audience through the findings at the recent British Cattle Veterinary Conference. Charlotte Johnston, TheCattleSite junior editor reports.

The expert review was conducted on 10th December 2009 at the University and consisted of members of the Nottingham Dairy Herd Health Group. The group is composed of a mixture of vets with a specialist interest and demonstrable expertise in dairy herd health.

In the first part of the review, eleven participants were asked to answer a number of questions independently.

In the second part of the review, the questions were shown again and the experts had the opportunity to discuss the questions as a group.

What is downer cow syndrome?

A downer cow is simply a cow that will not rise. The primary causes of a downer cow include traumatic calving, metabolic disorders such as milk fever and toxic diseases such as mastitis.

Often the primary cause can be identified and treated within 24 hours, however should a cow continue to stay down it is likely it has downer cow syndrome or has become recumbent.

It is difficult to assess downer cow syndrome, and there is very little research on it quantifying which indicators are prognostically useful and which aspects of management and treatment are effective.

The accurate diagnosis, prognosis and treatment of recumbency in adult cattle is notoriously complicated, says Mr Huxley, which is partly why he decided to carry out this expert review.

Results

When you first see a down cow, which has been recumbent for under 12 hours, what aspects of the history indicate a poor/ better prognosis?

When considering the aspects of case history that affect prognosis after recumbency for 12 hours, poor prognostic indicators included no attempt to rise, not up since calving and a history of a traumatic event (including dystocia).

Better or good prognostic indicators were attempts to rise, eating and drinking and a younger animal.

When you first see a down cow, which has been recumbent for under 12 hours, what clinical signs indicate a poor/ better prognosis?

When considering clinical signs that affect prognosis after recumbency for 12 hours, signs of shock or a toxic condition, abnormal leg posture and/or lying position, signs of trauma, injury or severe musculoskeletal disease as well as grunting or groaning were considered poor prognostic indicators.

Being bright, alert and responsive as well as having a normal temperature and heart rate were considered good prognostic indicators. A number of the group expressed caution over using the temperature as an indicator if the animal had been down for a period of time on concrete.

Participants agreed that a subjective assessment of the animal's demeanour and attitude based on previous experience was one of the most informative prognostic indicators.

During the general discussion the group agreed with one participant who stated "you know the ones that are going to die".

If you revisited a down cow, which had remained recumbent for three days on a deep bed of straw or at grass, even though the primary cause of recumbency was successfully treated on day one, what clinical signs indicate a poor/ better prognosis?

No attempts to move or rise, not eating and/ or drinking and lateral recumbency/ not sitting in sternal recumbency were considered the strongest indicators of a poor prognosis.

Making attempts to rise or move and eating/ drinking were seen as indicators of a good or better prognosis.

During the general discussion the group agreed that cows which always returned or flipped back to lie on one leg (those incapable of alternating lying sides) had a poor prognosis.

The group also agreed that prognosis at this point was best judged by observing the animals' attempts to rise following encouragement or the animal's response after being lifted to its feet.

A number of the group felt that lifting an animal early was beneficial.

Approximately 75 per cent of the group took a blood sample when they first saw the animal and before any treatment was administered. However most only analysed the sample if the animal failed to rise (to confirm or refute their initial diagnosis).

On average, how many days of recumbency would you allow before recommending that an animal is culled?

The mean and median responses to this were 4.7 and five days respectively (with a range of three to seven). The mode response was also five days.

During the discussion, respondents said that they would change the period depending on the farm and level of management they considered the animal would receive. For example on a farm where the respondents were confident that the animal would be well nursed and the animal remained bright, alert and responsive, periods of up to ten days of recumbency were considered acceptable.

Regardless of when a recumbent cow is examined, are there any clinical signs which always indicate a cow should be culled?

Any traumatic limb injury such as fractures, dislocation or severe soft tissue injury were considered indicators for immediate euthanasia by all respondents.

When considering a down cow, which has remained recumbent even though the primary cause of recumbency was successfully treated on day one, what aspects of nursing on farm and veterinary management have the most impact on recovery?

Availability of food and water, regular turning and lifting as well as provision of a deep soft bed with good footing were among the top aspects of nursing that would impact recovery.

Non-steroidal anti-inflammatory drugs (NSAID) was considered the veterinary treatment that would have the most impact on recovery.

However fluid therapy and hydration management were other treatments that the experts believed would help.

In the general discussion it was brought up in interest that access to good food and water were highly rated. The group agreed that good food and water provision could in fact be being used as a guide to the overall level of nursing the animal was receiving and the fact that many participants stated it, suggests that provision is below their expectations on many farms.

The group also agreed that farm nursing and management had a greater impact on outcome than veterinary treatment once the primary cause of recumbency had been treated.

For the remaining questions, respondents were asked to estimate the level of discomfort on a pain scale where 0 was no pain at all and 10 was the worst pain imaginable.

	Mean	Median	Mode	Range
<b>A first calved heifer that experienced dystocia due to foeto-maternal disproportion and was successfully calved by farm staff using a jack. The animal is recumbent at pasture 12 hours after calving.</b>	7.3	7	7	5-8
<b>A third lactation dairy cow which originally went down due to milk fever and is now suffering from 'Down Cow Syndrome'. The animal is in its third day of recumbency on a deep straw bed.</b>	4.9	4.5	4	2-6
<b>An eight year old suckler cow in condition score four which has been recumbent on a deep straw bed for seven days. The animal has been provided with appropriate food and water and rolled intermittently (twice daily).</b>	4.3	3.5	2	2-6
<b>An animal which has been recumbent for three days on a deep straw bed and is currently being lifted with a net.</b>	5.3	5	5	1-7
<b>An animal which has been recumbent for three days on a deep straw bed and is currently being lifted with two slings (one behind the fore legs and one in front of the udder).</b>	6.3	6	6	3-7
<b>An animal which has been recumbent for three days on a deep straw bed and is currently being lifted using a Bagshaw hoist (as sold by the manufacturer).</b>	7.4	7	7	3-9
<b>An animal which has been recumbent for three days on a deep straw bed and is currently being lifted with an inflatable bag.</b>	5.1	4	4	1-7
<b>An animal which has been recumbent for three days on a deep straw bed and is currently being lifted in a water flotation tank.</b>	4.7	3	3	1-7

Throughout the discussion, the group spent time arguing about the level of pain suffered by animals that had been recumbent for three and seven days. Opinions were divided between participants who felt that compression on the dependent leg made it "numb" and therefore not very painful and participants who felt that the compression was likely to be associated with significant levels of pain.

The respondents in the review considered recumbency to be a moderately painful condition; this is in part reflected in the fact that participants considered NSAIDs the most important aspect of veterinary treatment.

Mr Huxley said that scoring the pain associated with recumbency sparked an interesting debate between participants.

There was considerable variation in the median pain score attributed to methods for lifting down cows, with water flotation was considered the least painful (median pain score 3) followed by lifting on an inflatable bag (median pain score 4), lifting using a net (median pain score 5), lifting using two slings (median pain score 6) and final lifting using a Bagshaw hoist (median pain score 7).

It is expected that some discomfort will be caused by the reperfusion and movement of the dependent leg; however the increasing levels of pain association with a number of the methods suggests that the respondents considered that some of the pain is directly attributable to the lifting method itself.

Therefore respondents said that in practice, where possible, the use of the least painful lifting procedure should be used.

#### Conclusion

The down cow remains one of the most difficult cases to treat in practice. In the absence of other supporting literature it is proposed that the results of this expert review are used as part of the evidence base when formulating action plans for recumbent cattle.

## HOGS

### **Handling and Transport of Pigs - A Report to the Industry**

The PigSite

March 1, 2010

Penny Lawlis, Humane Standards Officer at Ontario Ministry of agriculture, Food and Rural Affairs (OMAFRA), provides tips on improvement of transport of pigs from the producers' perspective as well as that of the pig's.

At a recent workshop held at the University of Guelph, participants learned the results from Phase 1 of a multi-phase project designed to improve the transport of pigs – both from the producer's perspective (i.e. meat quality, death loss, etc) and the pig's perspective. Past research has shown that death losses are higher in the summer and vary among farms, truckers and the final destination. In addition, transportation contributes to other economic losses due to scratching and bruising and increased stress response – leading to either PSE or DFD pork.

Dr Harold Gonyou (Prairie Swine Centre) provided an overview of the project. The project looked at the transportation of pigs during Canadian conditions,

meaning loading and transporting pigs in summer and winter on several different types of trailers. Researchers from across the country are involved:

- Dr Renee Bergeron - University of Guelph and Laval
- Dr Trevor Crowe - University of Saskatchewan
- Dr Cate Dewy - University of Guelph
- Dr Luigi Faucitano - Agriculture and Agri-Food Canada
- Dr Harold Gonyou - Prairie Swine Centre
- Dr Nora Lewis - University of Manitoba
- Dr Stephanie Torrey - Agriculture and Agri-Food Canada
- Dr Tina Widowski - University of Guelph

Several graduate students are involved in the data collection and analysis. The project is sponsored by:

- Alberta Pork
- Sask Pork
- Manitoba Pork
- Ontario Pork
- Maple Leaf Foods
- NSERC
- Agriculture and Agri-food Canada

Phase 1 was divided into western and eastern components. The western study involved long haul trips using with handlers using electric prods. The eastern trial included short hauls with two different types of trucks with no electric prods being used to move pigs. Pigs in both trials were not fed Paylean. Researchers measured:

- behaviour
- enviromental temperature and humidity
- core body temperature
- heart rate and blood values, and
- carcass and meat quality.

#### Behaviour of Pigs Transported to Slaughter

Dr Stephanie Torrey provided the results from the investigation of the behaviour and heart rate during Phase 1 in the eastern trial.

Behaviour and heart rate data were collected from 3192 pigs in the winter and summer. Pigs were transported either on a pot belly truck with internal ramps or on a double decker hydraulic truck with no internal ramp. Pig behaviour was recorded either by skilled observers or by digital camera.

#### Key behaviour findings

- Differences in loading behaviour (the number slipping and falling, balking and running backwards) was probably due to the handler
- Differences in unloading behaviour (the number of slips and falls) was related to the unloading ramp design
- The unloading time was impacted by the number of times pigs slip and fall;

- Pigs were less likely to lie down in the winter (Figure 1), perhaps because the floor was too cold.  
A complete overview of the project and the complete results from Phase 1 can be found on the Prairie Swine Centre web site.

Phase 2 of the project involves intensive studies to identify key components of stress factors. Phase 3 of the project will involve applying the findings from Phases 1 and 2 to improve trailer design.

You can view the overview of the project and the complete results from Phase 1 on the Prairie Swine Centre web site by clicking [here](#).

### **Tryptophan-Enriched Diet Reduces Pig Aggression**

Friday, March 19, 2010

The PigSite

Washington, D.C. Scientists have found that young female pigs that have the amino acid tryptophan regularly added to their diet makes them less aggressive and easier to manage. Scientists with the Agricultural Research Service (ARS) say tryptophan is only acquired through diet and is the precursor for the calming cerebral neurotransmitter serotonin. The study was conducted in part because keeping swine calm is important as a result because their aggressive behavior can harm them and increase feed and medical costs for producers. Additionally, persistent aggression in pigs can cause chronic stress, leading to poorer welfare, increased disease susceptibility and reduced growth and efficiency. In the study, a diet with 2.5 times the normal amount of tryptophan was fed for one week to grower pigs (3 months old) and finisher pigs (6 months old).

Pigs form social groups that, over time, form stable hierarchies or "pecking orders." When new pigs are added to the group this hierarchy can waver and aggression and injury can occur in an effort to re-establish a new hierarchical order. If repeated changes in group composition occur, persistent aggression may arise, sometimes leading to physical injury and acute stress. Pigs receiving the high-tryptophan diet showed less aggression-fewer attacked the intruder pigs added to test aggression. Furthermore those that did attack were slower to do so-compared with the animals that didn't get the supplement. Researchers say a tryptophan-enriched diet may help pig farmers avoid these problems, especially when groups of pigs are mixed together.

The tryptophan-enhanced diet reduced aggression and overall behavioral activity among young female pigs during the eight-month study. Tryptophan, which is only acquired through diet, is the precursor for the calming cerebral neurotransmitter, serotonin. Keeping swine calm is important, because aggressive behaviour can harm them and increase feed and medical costs for producers.

The study was done by ARS doctoral student Rosangela Poletto and animal scientist Jeremy Marchant-Forde at the ARS Livestock Behavior Research Unit in West Lafayette, Indiana. Collaborators included biologist Heng-Wei Cheng at the ARS lab in West Lafayette and Purdue University scientists, Robert L. Meisel and Brian T. Richert.

The supplemented diet raised blood concentrations of tryptophan in three-month-old females by 180 per cent, and by 85 per cent in six-month-old females, resulting in calmer animals, mainly at the younger age. Persistent aggression in pigs can cause chronic stress, leading to poorer welfare, increased disease susceptibility and reduced growth and efficiency.

In the study, a diet with 2.5 times the normal amount of tryptophan was fed for one week to grower pigs (three months old) and finisher pigs (six months old). Another group of pigs received a normal diet. Behavioural activity and aggressiveness were measured before and after the seven days of diet supplementation.

To test aggression, researchers put an 'intruder' pig in the pen until an aggressive interaction was triggered or for a maximum of five minutes. Pigs receiving the high-tryptophan diet showed less aggression – fewer attacked the intruder, and those that did attack were slower to do so – compared with the animals that did not receive the supplement.

### **Observe Your Pigs for Early Warning of Tail-Biting**

Source: Jan 14, 2010, [thepigsite.com](http://thepigsite.com)

Netherlands - A researcher at Wageningen University has found that the way the position of a pig's tail can give the herdsman early warning of a future tail-biting problem. Pig tails reveal outbreak of tail biting. Pig farmers can take preventive action. If pigs walk around with their tail between their legs, they often become the victims of tail biting. It is therefore possible for alert pig farmers to take preventive measures to avoid tail biting. These are the findings of a study by Johan Zonderland from Wageningen University Research, published last month in Applied Animal Behaviour Science. Dr Zonderland observed nearly 1,000 weaned pigs – pigs of four to ten weeks old that had just been separated from the sow. He recorded the position of the pig tails that had not been docked. Dr Zonderland noticed that the tails were curled, pointed straight backwards, were wagging or were stuck between the hind legs. He said: "In our previous study, we noticed that pigs with curly tails virtually never had any damage. But there was always something with pigs with their tails between their legs." He has now quantified that observation. One quarter of the pigs seen to have their tails between their legs in two observations had serious wounds on their tails three days later. Bite marks from other pigs were found on 32 per cent of these pigs. Dr Zonderland explained that pigs with their tail between their legs heralds tail biting,

and that pigs already have the potential to bite but the effect is not yet seen on their tails. In this way, pig farmers can recognize and prevent an outbreak of tail-biting. Even throwing handfuls of straw or a toy into the group of pigs twice a day can make a big difference, another of his studies showed. He added: "It is much more difficult to stop the tail biting once the tails are wounded and there is blood on them." A pre-condition is that the pig farmer needs to walk attentively through the pig shed at regular intervals, surveying the pigs' behaviour and the position of their tails. The researcher admits that this is not easy if you have 3,000 pigs in your pig sheds. But there is no alternative as he has not yet found a generally applicable cause of tail biting. "Every pigsty has its own story," said Dr Zonderland.

### **Daylength Has Significant Impact on Summer Infertility**

ThePigSite News Desk  
Monday, March 22, 2010

FRANCE - Seasonal infertility was impacted mostly by daylength (photoperiod), with high temperature being an exacerbating factor, according to a long-term field study soon to be published.

A group of researchers led by V. Auvigne have conducted a five-year field study to analyse the relative roles of heat stress and photoperiod in seasonal infertility in sows. Their paper is due to be published soon in the journal, Theriogenology.

The researchers explain that the objective of their study was to analyse the relative roles of high temperature and photoperiod as environmental factors of seasonal infertility in swine.

The results of five years (2003-2007) of ultrasound pregnancy diagnosis carried out in 266 indoor farms were analysed. For all farms, the data covered the entire study period. The farms were situated in four regions of France. The data of 22,773 batches and 610,117 sows were included.

Seasonal infertility was defined as the relative difference between the fertility rate in 'summer' (inseminations in weeks 25 to 42) and 'winter' (inseminations in weeks 1 to 18 of the same year).

In each region, two meteorological variables were defined, based on the data of a reference weather station: the number of hot days (maximum temperature >25 degrees C) and tropical days (maximum temperature >32 degrees C and minimum temperature >18 degrees C).

Mean fertility was 85 per cent. The median seasonal infertility was 2.8 per cent and more than 7.1 per cent for one-quarter of farms.

Seasonal infertility did not vary between areas and was not dependent on baseline fertility (defined for each studied farm as the average winter fertility over five years).

Seasonal infertility differed with the year ( $p < 0.001$ ). Seasonal infertility was significantly higher during 2003 than in the other four years, which did not differ from one another.

In the four regions, 2003 was the year with the highest number of hot days and 2007 with the least.

The study strengthens the hypothesis of a prominent role of photoperiod in seasonal infertility and of an additional role of heat stress the hottest years, conclude Auvigne and co-authors.

#### Reference

Auvigne V., P. Leneveu, C. Jehannin, O. Peltoniemi and E. Sallé. 2010. Seasonal infertility in sows: A five year field study to analyze the relative roles of heat stress and photoperiod. *Theriogenology*. 2010 Feb 26. [Epub ahead of print].

### **Research Hopes to Cut Time Sows are Restrained in Stalls**

ThePigSite News Desk

March 1, 2010

AUSTRALIA - The Aussie pig industry could be on the verge of an animal welfare breakthrough.

According to ABC, researchers at the Pork Co-operative Research Centre (CRC) claim the amount of time a sow is kept in a narrow stall can be reduced dramatically, to only one week.

Chief executive of the Pork CRC, Roger Campbell, says the research is part of a renewed bid for Federal Government funding, to allow the centre to keep running for another five years.

"There's no argument the pork industry has got the message and you'll see the time sows spend in stalls will dramatically decline," he says.

"It's because we've come up with new technology of how sows can be mated and then how they're reared with their progeny.

"The time could be reduced from 14 weeks to one," concluded Mr Campbell.

### **Castration: Anaesthetics could affect piglet hierarchy**

Vetsweb.com

17 Feb 2010

<http://www.vetsweb.com/news/castration-anaesthetics-could-affect-piglet-hierarchy-905.html>

In castration practices, providing anaesthetic injections may influence a piglet's privileged position at the teats, due to reduced coordination capacities. Only giving a painkiller appears not to have any effect on teat hierarchy in new-born litters. This was the result of a study by the Martin Luther University in Halle-Wittenberg, Germany, performed by Prof Eberhard von Borell, the website Animal Health Online reports. In the research, the behaviour and hierarchy at the teats were compared, three hours prior to anaesthetic castration using injections, and three hours after that.

#### Piglet castration strategies

Three approaches were compared – a first group of piglets received anaesthetics (ketamin/azaperone combination) and a pain treatment (Meloxicam, Metacam, produced by Boehringer Ingelheim); group 2 only received the pain treatment, the same as group 1. A third group was castrated without any medication. All groups were taken away from the sow for three hours as anaesthetised piglets will 'sleep' for three hours and need to be protected from overlying. The method of applying anaesthetics has been widely discussed in Germany and various other countries, but so far the suckling behaviour had not been researched.

#### Results

In total, 10% of the piglets in group 1 and 14% in the control group lost their privileged position at the teats. This led the scientists to conclude that separating the piglets from the sows does have an effect at suckling behaviour.

A reduced stability at suckling hierarchy could be a cause for fights, stress and lower milk intake. This last could not be proved through a lower weight gain in the days after castration in groups 1 and 3; in any case, however, higher stress through hierarchy fights can be a result. In addition, the scientists saw that the piglets in group 2 after separating showed a growth in suckling time of 69%. Piglets in group 1, however, spent 28% less time sucking, whereas piglet behaviour in group 3 did not change.

The scientists suspect that piglets in group 2 had an advantage being only treated with a pain killer, while the extra anaesthetic in group 1 reduced the positive effect of the painkiller. This could be related to reduced coordination capacities through anaesthetics.

#### **Study shows moving pigs inside has huge benefit**

High Plains Journal Feb 19, 2010

<http://www.hpj.com/archives/2010/feb10/feb22/0202MUmovepigsinsideMRFEB8s.cfm?title=Study%20shows%20moving%20pigs%20inside%20has%20huge%20benefit>

A study by University of Missouri Extension swine experts shows that moving pigs indoors led to improved health for pigs and higher-quality product for consumers.

Since the shift to concentrated animal feeding operations, veterinarians have seen a significant decline in parasites, said Beth Young, swine veterinarian with the University of Missouri Commercial Agriculture Program. Young spoke at the 2009 Swine Institute in Columbia last November.

The Commercial Agriculture Swine Focus Team looked at changes in the swine industry since 1945.

In the 1940s, 55 to 70 percent of pigs were infected with lungworms. By the 1970s lungworm outbreaks only affected about 11 percent of farms. "In the past decade, lungworms are rarely seen," Young said.

"Likewise, 78 to 94 percent of pigs were infected with kidney worms in the 1940s, and now infestations are rarely seen," she said.

Trichinella and toxoplasma also have seen dramatic drops in recent decades. Scientists believe this is because pigs are not feeding on garbage and have no access to wildlife in CAFO facilities.

### **Modified Gestation Stalls Improve Sow Well-Being**

National Hog Farmer  
Mar 5, 2010 9:39 AM

Slight modifications to sow gestation stalls may provide solutions to one of the most controversial issues facing the swine industry, according to a University of Illinois researcher.

"In the United States, the individual gestation stall is being banned based on perception, not science," says Janeen Salak-Johnson, associate professor in animal sciences.

A number of companies and large swine operations are in the process of pulling sows out of gestation stalls and moving them to group housing. While group sow housing works, University of Illinois research shows this practice does not answer welfare concerns or improve sow performance.

“Producers are being pressured to move sows to group pens, but research is showing that overall, no real benefits are being realized by this move,” says Salak-Johnson. “Some sows do better in group housing and some do worse. We are discovering that slight modifications to current housing systems are positively affecting gestating sow behavior and performance.”

For the University of Illinois study, sows were observed in both standard gestation stalls and adjustable, flex stalls for behavior and productive performance.

The results showed that using flexible stalls positively influenced behavior, performance and productivity of sows in gestation. “Making minor changes in existing systems may truly improve the well-being of the sow and ultimately the welfare” Salak-Johnson says.

The flex stall allows the producer to increase the width but not the length of the stall. It can be adjusted midway through the gestation period to offset the sow’s growth during pregnancy.

When the flex stall width was adjusted to achieve more space between the sow and the stall when lying down, researchers observed fewer oral-nasal-facial movements and sham-chewing.

Sows also sat down more in the flex stall and drank less often. Sows in the flex stall farrowed more piglets and weaned more piglets than sows in conventional gestation stalls.

“This doesn’t solve all the issues – but it’s the first attempt in the swine industry to look at physical components and management strategies of various housing systems,” Salak-Johnson says. “Our ultimate goal is to find the components of a housing system that truly affect the well-being of a sow.”

Funding for this project was provided by Pork Checkoff and findings were presented at the Illinois Pork Expo last month in Peoria.

### **Sow group housing: system doesn't determine success**

PigProgress.net - Feb 5, 2010

Pig farmers in the Netherlands were informed yesterday about success factors when keeping sows in group housing. A lot depends on correct and careful management, researchers of Wageningen University and Research Centre revealed.

A very important finding from the researching team was that the system of group housing does not determine the success of group housing for sows within four

days post-insemination, because no effect could be seen of group housing during gestation on reproduction, welfare and condition parameters.

### Group housing

The theme of group housing for sows is extremely important for any pig breeder within the European Union as from 2013, the use of conventional sow stalls will be forbidden by law. For that reason alternative housing systems have to be implemented – and ways have to be found to make these into a success.

Researchers at the university, together with a task force from the Dutch pig industry, and supported by the Dutch ministry of agriculture (LNV) carried out a multi-year research into what creates a success – and started out with a telephone interview, contacting 900 pig farmers.

The last phase of the research included the on-site observation of 70 pig farms from close by in 2008, that had already made the switch to group housing for sows. The farms were different in size and applied a variety of sow housing systems, from floor feeding to free access stalls or Electronic Sow Feeding.

### Success factors

The following factors were found to be important to make group housing a success:

#### Management

\* Farm management and farm optimisation: it is important that entrepreneurs have good management (work plan, working accurately, measuring is knowing) and attention for farm optimisation (farm objective, work plan, evaluation). These farms have a higher farrowing rate, more weaned piglets/sow/year, fewer claw problems in sows and a better condition of the sows.

\* Animal-directed management: Farms with animal-directed management (attention for the needs of the individual animal) have fewer skin lesions and claw problems and better reproduction in sows. This is proved by, amongst others, the positive relationships with condition management, familiarisation of gilts with the feeding system during gestation, more human-directed sows and more living space during rearing and gestation.

#### Rearing gilts

\* Living space: on farms with more living space for gilts, the removal rate of cycle 1+2 sows is lower and sows have fewer skin lesions during gestation.

\* Feed during rearing: Farms that feed gilts limitedly and/or give them dry feed have a higher farrowing rate, a lower removal rate and a higher number of weaned piglets.

\* Familiarisation with the feeding system during gestation period: Familiarising gilts with the feeding system during gestation (particularly familiarisation prior to service) is positively related to reproduction and condition of the sows.

Gestation:

\* Feeding management: Too low a feed intake during early gestation can affect reproduction results negatively. In group housing with feeding stations, it is important to trace sows quickly by liquid feed. Farms that do not do this, have lower farrowing rates. Moreover, sows on farms with a lower feed ration during the entire gestation have a worse condition when placed in the farrowing stall.

\* Living space: On farms with more living space/sow, the farrowing rate is higher and the removal rate of cycle 1+2 sows lower. More living space can possibly result in a higher profit.

\* Straw: Using straw can positively affect welfare, because it can reduce claw disorders in situations of aggression. Moreover, straw offers animals the possibility of exerting explorative behaviour, which prevents development of stereotype behaviour.

\* Cubicles with indoor exercise area: Farms with a wider indoor exercise area have a higher farrowing rate, lower sow removal rate and a better condition of sows when placed in the farrowing pen. Farms where sows are locked up during eating have a higher farrowing rate in cycle 1 and fewer claw problems.

- Feeding stations: In designing stalls with feeding stations, make sure that sows that have already eaten cannot go to the entrance of the feeding station again. Farms where this short 'passage' is possible have more skin lesions in sows. For farms that use straw, it is favourable for the farrowing rate to renew straw more than once a year. Furthermore, it was proved that farms with wider and/or deeper litter experienced fewer claw problems in sows.

## **Weak Sows Will be Easier to Identify**

ThePigSite News Desk

Monday, February 01, 2010

DENMARK - Strong or weak? For a sow the difference can determine whether she is sent to the incineration plant or is allowed to live a little longer. Scientists have developed a tool that eases the task of identifying weak sows.

Dirty, harassed, weakened and maladjusted – these are seen by the farmer as indications of a weak sow. Maybe she also has lesions, is thin, or has problems walking. No matter what, a weak sow will be facing an uncertain future. This is why it is important that the farmer makes the right decision on her future, so that

the sow can either be put into a relief pen to recuperate or be sent on her last journey to the condemned animal factory. If the farmer has many weak sows, he also has to know how to prevent this from happening.

It is common good animal husbandry to examine how well your animals are doing, but with a new tool developed with the aid of scientists from the Faculty of Agricultural Sciences, this task becomes easier, safer and more systematic.

The scientific project is about the development of an index that can identify weak sows, i.e. sows that are not expected to stay the course.

"We provide farmers with a tool that helps him observe his animals in a systematic manner and to treat the observations to an index. Firstly, the assessments take place at certain times; secondly, they follow a protocol for short, systematic, clinical examinations of the individual sows in the farrowing or gestation pens, and, thirdly, they are converted into an index," explains head of research unit Jan Tind Sørensen from the Department of Animal Health and Bioscience at the Faculty of Agricultural Sciences. He has been the leader of the project that has collaborated closely with KU-Life and an advisory group with representatives from the Swine Information Centre.

Weak sows are more exposed

When the scientists started the project, their hypothesis was that a weak sow is a sow with several clinical signs that combined means she is at risk of being slaughtered early, dying or being euthanized. After extensive assessments of 36 herds of sows, the hypothesis turns out to hold true. Weak sows have an increased risk of being slaughtered early due to disease or being sent for destruction.

Through the clinical examinations in the farrowing and gestation stalls in the 36 herds, the scientists have found a number of characteristics that are both easy to observe and that are determinants for whether the sow can be defined as weak.

"We structured our data into 16 causes, 10 of which could be related to three factors directly linked to culling or disease. The analyses show that the main factors are lameness and willingness to stand as well as bites on the vulva for pregnant sows, and lesions, body condition and vulva colour for lactating sows. The factors are weighted and included in an index that can be used directly on the farm," explains Mr Sørensen.

Index with future perspectives

The project is now in its final stage that includes an analysis of risk factors that code for a high prevalence of weak sows in individual herds so the scientists can define preventative measures. They are also calculating the effect on production of a high weak-sow index.

"We see good future perspectives in continuing research into actual applications of the weak-sow index. Among other things, we would like to look at how the economy, mortality, production and reproduction are affected if you put the weak sows into relief pens. We plan to carry out this part of the study on private pig farms, because you need a large number of animals and real production conditions to ensure reliable and relevant data," says Mr Sørensen, who expects positive outcomes from the index.

"We would also like to contribute to the development of personal PDA and computer solutions that can aid the practical application of the weak-sow index on farms."

## **Twisted Guts and Stomach**

January 2010

NADIS Health Bulletin

Rotation of the intestine in the abdomen is one of the most common causes of sudden death in growing pigs, according to pig veterinarian, Mark White, in the latest Health Bulletin from NADIS.

Sudden death in the growing pig is a not uncommon finding in the modern pig herd. One of the most common causes of such losses is rotation of the intestine within the abdomen about all or part of its attachment to the body underneath the spinal column. Such a twist will cut off the blood supply to the gut, causing gangrene and rapid death. The condition may be seen sporadically or in outbreaks. Adult animals, whilst occasionally susceptible to torsion of the intestine, are more likely to suffer gastric dilation and torsion, which is equally fatal.

### Intestinal Torsion

#### Presentation and Diagnosis

In most cases, pigs will be found dead. It can occur at any age, although most commonly in the grower stage between 25 and 100kg. The typical case will have a grossly swollen abdomen often with the rectum protruding and will rapidly discolour and decompose. The whole carcass will be pale.

At post mortem examination, the loops of gut will be distended with gas, have a deep purple colour and be filled with heavily blood stained liquid. (Figure 1) The wall of the gut is thin, differentiating it from acute porcine intestinal adenomatosis/proliferative haemorrhagic enteropathy. There is usually an accumulation of bloody fluid free in the abdomen. Depending on how much of the gut has twisted, a palpable knot can be found in the suspensory tissues that normally hold the gut. Twists involving the whole of the intestine can be fully 360°, although usually

are less and, as such, the most obvious part of the gut – the caecum – will not be pointing towards the pelvis and anus which is its normal orientation (Figure 2).

Just occasionally, pigs may be noticed prior to death, during which time they will be pale, depressed, inactive and, if very early, showing signs of severe pain. They will tend to lie in sternal recumbency with a hunched aspect. Teeth grinding – a sign of pain – may be evident. Once the gut tissue has died inside, the pain passes and death is peaceful.

## Causes

The pig is particularly susceptible to torsion of the gut and, as such, can be viewed as a 'design fault' that is seen equally in boars and gilts. The whole of the gut is attached to the body by a suspensory mechanism called the mesentery, which connects the 20m or so of gut loops to the underside of the spinal column within the abdomen over a length of a few centimetres. It is, thus, fundamentally unstable. The prelude to a twist is likely to be excessive filling of all or part of the gut with gas, increasing the instability of the gut as it hangs down in the abdomen. Sudden movements then allow the gut loops to rotate and cause a constrictive twist.

Therefore, the basic causes of twisted guts are conditions which encourage gas development in gut. These can be listed as:

1. Overeating
2. Winter feeding of fermentable wet feed e.g. whey – in summer, the higher storage temperatures allows some fermentation before feeding reducing gas production in the gut. This process is reversed in the winter.
3. Erratic feeding, especially but not exclusively on wet feed. Where feed supply is interrupted e.g. at weekends, following pipe breakdowns or freezing up, a surge of twisted guts may occur once supply is restored.
4. High density diets and diets including very high levels of specific raw materials e.g. soy promoting fast growth
5. Colitis – Where this condition exists, the proliferation of bacteria in the hindgut tends to create more feed fermentation and gas production and precipitate twists. As a general rule twisted guts (torsion or volvulus as it is otherwise known) are more common where there is any evidence of scour in the growing pig.

Control of twisted guts will obviously centre around control of feed intake, dietary manipulation and control of enteric disease. However, given that the condition is most common in populations where feed intake and growth are high, twisted guts

can be regarded as very much a production disease and perversely is often a sign that pigs are doing well. It will therefore require careful evaluation of the cost of deaths measured against the potential loss of growth if feed levels or nutrient density are reduced. There may be some breed influence affecting the prevalence

## Gastric Dilation and Torsion

Dry sows in stalls and tether were particular problems with gastric dilation and torsion

Compared to torsion of the intestine, gastric dilation – the massive over-inflation of the stomach with gas – and its possible rotation to create a similar pathological process to intestinal torsion are more commonly seen in adult pigs.

Ordinarily, feed is not fermented in the stomach to any great degree and small amounts of gas can be belched up. If gas production becomes excessive it gets trapped and effectively the junction between the oesophagus (gullet) and stomach closes like a valve. (The condition is similar to that seen in certain dog breeds e.g. basset hound).

Whilst there are no definitive data to measure the prevalence of the condition, the clinical impression gained is that it is far less common in dry sows than was the case when sows were stalled and tethered. In that situation, manual feeding of rows of dry sows once daily tended to lead to some sows having to wait a considerable time to receive feed once the feeding cycle has started and they became very agitated. This resulted in gorging of feed, possibly swallowing large amounts of air, which started a process of gastric dilation. However, questionable hygiene of 'river' systems may have encouraged exposure to clostridial organisms, which are important in triggering fermentation. On some farms, there appeared to be an association with *Clostridium novyi* infection (aero chocolate liver) as a separate cause of death.

With all dry sows in the UK now loose-housed and the majority on straw, the condition appears to have shifted to be more of an issue in post farrowing/early lactation, probably associated with reduction in both feed and bulk intake around this stage and a change of diet. In some cases, mycotoxins have been implicated.

## Clinical Appearance

If spotted alive, the abdomen, particularly the forward part of it, will be visibly distended and the sow will demonstrate signs of pain similar to that in growing pigs with twisted guts.

More frequently, the sow will be found dead with a hugely distended abdomen – fermentation continues or even increases after death – although pallour is not a regular feature.

At post mortem examination, the hugely dilated stomach may be twisted (along with the spleen) and the lungs will be congested as a result of the pressure on the diaphragm.

### Control

The availability of clean good quality barley straw provides the sow with large amounts of fibre, which seems to reduce the risk of gastric fermentation. Provision of bran (1kg/day) over the farrowing period may help to maintain fibre intake and avoid problems if they occur around farrowing. In the farrowing house, once lactation is well established, feeding at least twice or even three times per day reduces the risk of gastric fermentation. As always, good hygiene of feeding is also key. (Use of clostridial vaccines alone have been shown to have little value in controlling a herd problem of gastric dilation and torsion).

### Costs

Problem herds suffering ongoing cases of twisted guts in growing pigs can experience two to three per cent mortality due to this alone. If they occur in the older growing pigs – worth upwards of £100 each at current prices – a 500-sow herd can lose £500 per week of £25,000 per year. If slowing growth is a control option, this must be offset against such costs.

Outbreaks of gastric dilation and torsion have occurred (in stalls) where 10 per cent of the herd can die over a three-month period. Fifty pregnant sows dying (at different stages of gestation) can lead to a shortfall in farrowings in the sow herd over a six-month cycle, leaving the herd 500 pigs short plus the costs of the sow death themselves. More commonly, this condition is seen as a low grade grumbling problem contributing up to two per cent points of mortality over the year. Such costs are very difficult to quantify.

### **Boar taint vaccination: no impact on behaviour**

18 Feb 2010

Pig Progress

<http://www.pigprogress.net/news/boar-taint-vaccination-no-impact-on-behaviour-3955.html>

The behaviour of male pigs, vaccinated against boar taint, does not create extra problems in the fattening period, when compared to surgically castrated pigs. The study into fattening pigs was published in Applied Animal Behaviour Science.

In the Austrian/German research, carried out by scientists from the University of Veterinary Medicine Vienna, the University of Leipzig, a veterinary practice and Pfizer Animal Health, the male vaccinated pigs were housed in single sex groups of 12 individuals – and their behaviour was compared to conventionally castrated pigs, without the use of anaesthetics.

The two-shot vaccine, containing a gonadotropin releasing factor (GnRF), suppresses the development of the hormones androstenone and skatole, both identified as the major causes for the development of boar taint in pigs. The vaccine is produced and marketed as Improvac.

#### Data collection

Data collection took place in a commercial German fattening unit. Each treatment comprised eight groups of 12 pigs. Data on postures were scored from 24-hour videos recorded in every week of the fattening period (16 weeks) using scan sampling with five minute intervals.

Social behaviour was analysed in weeks 2, 4, 6, 8, 10, 12, 14, 15 and 16 by continuous behaviour recording of focus animals in four blocks of two hours phased evenly during the day. Overall, during the whole fattening period, vaccinates were more active than surgical castrates, indicated by a higher proportion of pigs standing.

Vaccinated animals showed a significant decrease in standing and an increase of sitting and lying after the second vaccination. No significant effects of treatment on the total number of agonistic interactions and on biting and fighting were found.

In the vaccinated group, the prevalence of aggressive behaviours decreased after the second vaccination, which was not found in the group with non-castrated animals during the same period.

Vaccinated animals showed a higher level of mounting behaviour compared with non-vaccinated animals, but on a very low level. Treatment had no effect on the prevalence of play behaviour and manipulating of penmates.

### **The Behaviour of Male Fattening Pigs Following either Surgical Castration or Vaccination with a GnRF Vaccine**

Johannes Baumgartner, Simone Laister, Mario Koller, André Pfützner, Mario Grodzycki, Stuart Andrews and Friedrich Schmoll, The behaviour of male fattening pigs following either surgical castration or vaccination with a GnRF vaccine, Applied Animal Behaviour Science, Article in Press, Corrected Proof,

Received 15 May 2009; revised 4 November 2009; accepted 11 January 2010, available online 12 February 2010.

Vaccination of male fattening pigs with a gonadotropin releasing factor (GnRF) vaccine is regarded as a possible solution to solve the welfare problem associated with surgical castration, which causes pain and stress even when performed under local or general anaesthesia. The objective of the present study was to compare the behaviour of male fattening pigs either surgically castrated without anaesthesia (T1) or vaccinated twice with a GnRF vaccine (T2). Data collection took place in a commercial German fattening unit. Each treatment comprised 8 groups of 12 pigs, housed in fattening pens with partially slatted floor and liquid feed provided three times a day. Data on postures were scored from 24-h videos recorded in every week of the fattening period (16 weeks) using scan sampling with 5 min intervals. Social behaviour was analysed in weeks 2, 4, 6, 8, 10, 12, 14, 15 and 16 by continuous behaviour recording of focus animals in four blocks of 2 h phased evenly during the day. Overall, during the whole fattening period, vaccinates (T2) were more active than surgical castrates (T1), indicated by a higher proportion of pigs standing (T1: 9.3%; T2: 10.74%;  $P < 0.023$ ). T2 animals showed a significant decrease in standing and an increase of sitting and lying after the second vaccination of Improvac. No significant effects of treatment on the total number of agonistic interactions ( $P = 0.064$ ) and on biting and fighting ( $P = 0.151$ ) were found. In T2 the prevalence of aggressive behaviours decreased after the second vaccination ( $P < 0.001$ ), which was not found in T1 during the same period. T2 animals showed a higher level of mounting behaviour compared with T1 animals, but on a very low level. Treatment had no effect on the prevalence of play behaviour and manipulating of pen mates. It is concluded that housing of male pigs vaccinated against GnRF in single sex groups of 12 individuals does not increase behavioural problems in the fattening period compared with surgically castrated males.

## **EU: Painreliever authorised in castrated piglets**

Pig Progress

January 28, 2010

Boehringer Ingelheim's Metacam has obtained EU wide marketing authorisation for its use as an analgesic to relieve post-operative pain associated with castration in piglets. The product (active ingredient: Meloxicam), 5mg/ml solution for injection, was granted authorisation following the positive opinion of the CVMP, the European Medicines Agency's (EMA) scientific committee.

### **Authorisation**

The authorisation was expressed based on a specific study performed at the French Research Institute CTPA (Centre technique des productions animales et agro-alimentaires). The study confirmed a large body of evidence for the efficacy of Metacam generated earlier by the Faculty of Veterinary Medicine at the Ludwig-Maximilians-University in Munich, Germany.

It demonstrated that the product, administered at 0.4 mg/kg bodyweight prior to the castration of less than seven-day old piglets, had a significant impact on blood cortisol levels, a biochemical marker for the neuro endocrine reaction of the body to stress and pain.

The study also demonstrated quicker alleviation of clinical symptoms and faster return to normal behaviour in piglets which received the product in comparison to animals which were not given analgesia.

#### Pain relief

"This decision helps veterinarians and farmers to move out of a highly uncomfortable situation of wanting to apply pain relief, but not having a legal and authorised option for effective post operative pain management," said Dr Joachim Hasenmaier, the company's head of corporate division animal health.

"In many EU markets, changing attitudes meanwhile require or recommend the use of analgesia to help piglets to better cope with pain and to more quickly recover from the castration procedure. While the rationale was quickly adapted and accepted by veterinarians and farmers alike, no labelled product options were available for use which left them with the uneasy alternative of either not applying analgesia or of entering into unauthorised, off-label use of potential product options. This situation has ended now."

The product, a non-steroidal anti-inflammatory drug of the oxicam class, was first launched for pigs in 2003, and is now licensed in over 40 countries around the world.

### **Weaning Age Does Not Affect Lifetime Performance**

Monday, February 22, 2010

The Pigsite

<http://www.thepigsite.com/swinenews/23192/weaning-age-does-not-affect-lifetime-performance>

AUSTRALIA - Weaning piglets at 13 or 21 days of age influenced growth immediately after weaning but it was not a major factor in lifetime performance or body composition at commercial slaughter weights, concluded University of Melbourne researchers.

C.L. Collins and colleagues at the University of Melbourne have investigated the effects of early weaning piglets on their lifetime performance and carcass composition. Their paper is published in the latest issue of Animal Production Science.

They explain that 240 pigs (120 entire boars and 120 gilts) were selected in three replicates of 40 boars and 40 gilts and housed in pens of 20 pigs of the same sex. Pigs were allocated to a 2×2 factorial experiment, with the respective factors being sex (entire male or female) and age at weaning (13 or 21 days).

Pigs within each replicate were weaned on the same day, with the pigs' farrowing date differing by about eight days for the two weaning ages. Pigs were offered ad libitum access to feed for the entire experimental period.

Eight, randomly selected pigs from each pen were tagged as focus animals. These animals underwent dual energy X-ray absorptiometry (DXA) scanning six times from weaning through to slaughter to measure changes in body composition.

The animals weaned at 13 days of age were significantly lighter at weaning ( $4.68 \pm 1.16$  and  $6.84 \pm 1.34$  kg, respectively, for the animals weaned at 13 and 21 days).

During the first four days after weaning, pigs weaned at 21 days of age consumed more feed (72.1 versus 30.9 g/day) and gained faster (+35.0 versus –63.0 g/day) than those weaned at 13 days. The pigs weaned at 13 days did, however, catch up to be the same weight as those weaned at 21 days by 53 days of age (17.4 and 17.8 kg, respectively).

Daily gain from birth to 146 days of age did not differ between treatments (610, 597, 640 and 657 g/day, respectively, for the gilts weaned at 13 days, gilts weaned at 21 days, boars weaned at 13 days and boars weaned at 21 days).

DXA analyses indicated that the animals weaned at 13 days had a greater percentage of lean tissue at 119 days of age (78.4 and 76.8 per cent, respectively) although this was not maintained through to slaughter.

There were no treatment effects on the percentage of adipose tissue from 90 to 146 days of age, although the DXA estimated adipose tissue mass was greater at 146 days of age in the animals weaned at 21 days (13.8 and 15.2 kg, respectively, for the animals weaned at 13 and 21 days of age).

These data suggest that weaning age predominately influences growth immediately after weaning, and does not have a major influence on lifetime growth performance or body composition at commercial slaughter weights, concluded Collins and co-authors.

#### Reference

Collins C.L., B.J. Leury and F.R. Dunshea. 2010. Early weaning has minimal effects on lifetime growth performance and body composition of pigs. *Animal Production Science* 50(2): 79–87. doi:10.1071/AN09059

## **Germany: Warning system for swine aggressiveness**

Pig Progress

05 Mar 2010

The University of Veterinary Medicine (TiHo) in Hanover, Germany has announced to develop an early warning system in relation to swine aggressiveness, Top Agrar reports.

The TiHo will develop this in the next four years in cooperation with university staff and scientific partners. The system has to warn producers for aggressive behaviour and it also has to document to what degree of severity the animals are involved in the fighting and which animal started the fight.

For that reason, the pigs will be continuously supervised and their behaviour will be described with mathematic algorithms.

Prof Jörg Hartung, TiHo, explained, „We would like to know whether there is a relationship between aggressive behaviour and housing conditions or specific environmental influences.“ Eventual goal is, to structurally improve the animals' life quality by developing prevention strategies.

### **Aggressiveness**

In Europe, it is estimated that 5% of swine kept in commercial farms suffer from aggressiveness of penmates. In addition, veterinarians and animal scientists could learn from each other and thus transcend the boundaries of their own disciplines.

For the project, the TiHo has received €210,000 from the European Union.

## **Biggest Ever Welfare Project in England**

Friday, April 09, 2010

ThePigSite News Desk

UK - Over 300 pig units will be invited to take part in the biggest ever welfare survey ever conducted by the English pig industry.

BPEX's 'real welfare' project is a new management tool for pig-keepers. It will help them improve the welfare of their pigs by scoring a number of meaningful welfare indicators, such as tail and body lesions, and lameness.

And it should also provide scientifically robust data to counter any unfounded claims by vegetarian and animal welfare groups.

European producers are likely to have their own 'welfare quality' scheme in due course, but for the present English producers are in the lead.

When the English project becomes part of farm assurance it will provide a new point of differentiation to help English producers maintain their 20p premium.

The 'real welfare' project is being run by a group comprising BPEX, producers, vets, researchers, RSPCA, and others.

It will involve specialist pig vets being trained to carry out welfare-outcome audits of pig farms, applying scores for a number of welfare indicators.

The results will be benchmarked so pig-keepers are able to compare their husbandry and take the necessary actions to improve welfare, and probably productivity too.

The RSPCA has been collecting its own welfare outcomes data for around two years and is now in a position to start analysing the data it has built up on body condition, eye and nose discharge, skin and tail lesions, limb injuries, fighting and abnormal behaviour.

All farms assured by Freedom Food and the Soil Association will be assessed and as the indicators chosen by the RSCPA are similar to those chosen for the BPEX scheme it might, in due course, be possible to compare data collected.

At a technical meeting last week, the BPEX group agreed that lesion counting was probably preferable to lesion scoring, as counting removes the subjectivity of deciding whether a flesh mark is a lesion or not.

During the scheme's pilot stage, vets will work with BPEX and others to determine lesion thresholds — in other words, how many lesions on a pig indicate a possible welfare problem.

Eighty farms of each type of finishing system — fully-slatted, part-slatted, minimum straw and deep-straw — will now be invited to take part in the welfare outcomes project, with BPEX's Lis Ravn acting as co-ordinator.

In the months ahead, the project team will provide the necessary information to producers to help them use results from the project as a useful management tool.

The five indicators to be assessed will each be the subject of an article in Pig World, explaining why the particular indicator has been chosen, and how it can be used to help assess welfare.

The BPEX 'real welfare' project could have a number of benefits as far as pig-keepers are concerned.

For instance it could help them demonstrate when welfare interventions such as tail-docking are essential in the interests of good welfare, and when the manipulable material they supply is effective as environmental enrichment.

It may also demonstrate that welfare standards on indoor units are as good as — or even better in some cases? — than on outdoor units, which are perceived by the public, and retailers, to be more welfare-friendly.

The project is underpinned by research carried out by University of Bristol. It is the result of a considerable ongoing investment of levy-payers' money.

For more information see “English pig industry launches real welfare for pigs”, Pig World, March 2010.

The five measures to be assessed are:

- Lameness
- Tail lesions
- Body lesions
- 'Hospitalisation'
- Enrichment use.

### **Taking the 'stress' out of weaning**

Pig Progress 29 Mar 2010

Author: David Burch

The prevalence of E. coli infections after weaning fell dramatically in the UK in the late 1990s, even when PMWS was soaring to its heights – what was happening?

We had just had the changes in husbandry from the banning of sow stalls and the introduction of straw-based systems, which also led to the increased use of straw yards for weaning piglets. When PMWS hit, greater care was taken to reduce the stress of weaning and thereby reduce the initial damaging effects of porcine circovirus (PCV2) in non-immune herds. This led to many farms moving the weaning age towards 28 days from 21 days, before the EU regulations came in 2003.

In some units, where they used straw for nurseries, the nursery mortality (4-10 weeks of age) was reduced to below 1% (see Photo 1) even in the presence of PCV2 infections. Even in the cold north of Great Britain (GB), pigs would thrive in airy barns, providing there was enough straw to keep them warm, protected and unstressed.

The shift to 4-week weaning has also made an impact, as the pigs are older and stronger and more able to withstand the stresses of weaning. The normal check associated with weaning lasts for about one week instead of two when they were weaned at 3 weeks of age.

The addition of zinc oxide (Pigzin® - DSM; and ZincoTec® - Provimi) to provide 2500ppm of zinc in feed has also made an outstanding difference to the performance of pigs post weaning over the last 15-20 years. In a recent review of 10 trials (see Figure 2) there were reductions in mortality and diarrhoea associated with the effects on post-weaning *E. coli* infections, which resulted in dramatic dose-related improvements in growth rate seen in the post-weaning period. Therapeutic levels above 1000ppm were required for consistent performance, with the optimum being achieved at 2500ppm (average 25.2% improvement in growth).

The mode of action of zinc oxide is still a matter of debate but recent work from Denmark (Aarestrup & Hasman, 2004) showed that zinc, as the chloride, does have an antimicrobial effect and inhibits *E. coli* in an acid environment (see Figure 3) at a lower concentration, in comparison with an earlier study carried out at pH 7.2 using zinc acetate (Soderberg and others, 1990).

There have been some concerns over the use of zinc in feed from an environmental pollution perspective in some countries but the use of pure, European pharmaceutical-grade materials, rather than greyish substitutes, means that there are controlled, low levels of heavy metals such as cadmium and lead. Coupled with the limited duration of use around the weaning period, it means that there are relatively low and acceptable concentrations of zinc in the overall farm manure output, lower than normal human waste, according to the Danes.

Controlling stress is very important for successful weaning. Attention to temperature, comfort, hygiene, age of pig and control of *E. coli* gut colonisation is vital. Good control can also reduce a farmer's stress too.

## **POULTRY**

### **Larger Enriched Cages Improve Laying Hen Health**

Monday, February 01, 2010

ThePoultrySite News Desk

CANADA - Research conducted by the University of Manitoba shows using alternative enriched cages to house laying hens results in improved health, according to Bruce Cochrane.

The University of Manitoba's Faculty of Agricultural and Food Sciences has been evaluating the Hellmann cage, one of several enriched cages for housing laying hens.

A conventional cage usually houses four to six birds and provides 72 to 73 square inches per bird.

The cage being evaluated houses 24 to 26 birds and provides almost 100 square inches and such amenities as a scratch pad and perching and nesting areas.

Animal Science Professor Emeritus Dr. Bill Guenter says egg production, feed consumption, behavior, body weight, feather condition and biological factors that indicate stress were measured over a 40-week production cycle.

Dr Bill Guenter-University of Manitoba

The only significant difference we found between these cages was better bone density, better bone structure in the hens that were in the enriched cage.

That's probably because they had more space to exercise and they used the perches which helps to also strengthen bone.

So it indicates that the birds are probably in a better physical condition and therefore less chance of breakage and pain being imposed on them.

If you have six birds in a small cage that has 73 square inches if five of them crowd into one area there's still very little space left for that one extra bird but if you've got 24 birds in one cage at 100 square inches and they concentrate in one area, for instance by the scratch pad or something, there might be five or six birds that have 250 inches space because they're able to roam around more.

Dr Guenter says, even though the space allocation per bird overall isn't that much greater, the individual bird can get periods of time where they have way more space.

### **Group begins hen housing study**

Feedstuffs Magazine

(4/9/2010)

Rod Smith

Coalition of producers, restaurants, universities and others start study to determine ethical, scientific and economic framework for hen housing systems.

A NUMBER of parties -- from Bob Evans Farms Inc. and McDonald's Corp. to the United Egg Producers (UEP) -- have organized the Coalition for Sustainable Egg Supply (CSES), which is working to evaluate the extent to which different

housing systems for egg-laying hens can provide both hen well-being and an egg supply that is affordable and sustainable.

Other members of the coalition include commercial egg producer Daybreak Foods Inc., Cargill Inc., Iowa State University, Michigan State University, the University of California-Davis and the American Humane Assn. The American Veterinary Medical Assn. and U.S. Department of Agriculture are member advisers, and the Environmental Defense Fund is a non-member adviser.

CSES anticipates that the participation of these companies and other parties will contribute to "a balanced and holistic evaluation of egg production that includes all aspects of sustainability," said Terry Fleck, executive director of the Center for Food Integrity, which is facilitating the CSES effort.

Bob Evans supports such a holistic strategy, said Dr. Sommer Mueller, the company's director of food safety and regulatory compliance.

CSES will seek to determine an egg production system that delivers a balance of animal health and well-being, food affordability and safety, worker safety and environmental stewardship, he said.

Dr. Wendy Wintersteen, dean of Iowa State's College of Agriculture & Life Sciences, added that the coalition will pursue a practical, science-based solution to issues surrounding hen housing.

Those issues range from cage and cage-free housing systems to aviary and other kinds of confinement housing and trade-offs from one to another in terms of animal welfare and food production. CSES believes there is "a significant gap" in research and scientific knowledge concerning these various kinds of housing systems, according to the announcement.

CSES said commercial-scale studies already are underway at Michigan State and California-Davis to compare cage housing -- like what most commercial egg producers use -- with aviaries and comparing enriched housing with nests and perches.

CSES said the research, when completed, will give egg producers, food manufacturers, restaurant managers and retailers information to make "ethically grounded, scientifically verified, economically viable" decisions regarding egg production that are aligned with consumer desires.

Additional information is available at [www.SustainableEggCoalition.org](http://www.SustainableEggCoalition.org).

**MSU studies use of wireless sensors to monitor chicken well-being**  
MSU News

Michigan State University

Published: Feb. 03, 2010 E-mail Editor

<http://news.msu.edu/story/7397/>

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MSU researchers are exploring the use of new wireless technology to determine its effectiveness in monitoring the welfare of chickens.

Janice Siegford, assistant professor of animal science, is a member of a team of researchers that are exploring the use of wireless sensors to monitor the welfare of egg-laying chickens.

EAST LANSING, Mich. — A team of Michigan State University researchers will explore the use of new wireless technology to determine its effectiveness in monitoring the welfare of egg-laying chickens.

Using a grant of \$375,000 from the U.S. Department of Agriculture, the researchers will test wearable sensors that will monitor how hens use space and resources in non-cage environments.

The team has developed a hen-mountable wireless sensor system for tracking a hen's activity profile, including its movement with respect to other hens and fixed items such as nest-boxes, perches and water station. The sensor weighs less than one ounce.

"Wearable and networked wireless sensor technology is currently being explored in academia and in the industry primarily for human health monitoring," said Subir Biswas, an associate professor of electrical and computer engineering and one of the team members. "We wanted to develop applications for such technology in the context of animal health and well-being monitoring."

"The purpose of the USDA grant is to use the wearable sensors to understand how laying hens use space and resources, like perches and nest boxes, in non-cage housing systems," said Janice Siegford, team member and professor of animal science. "Ultimately, the sensors will also tell us what behavior a hen is performing. Is she laying an egg? Eating? Or roosting on a perch? Does she fly or walk to move around?"

The information will serve as an important basis for how to provide hens with key resources and how much space they really need. Such information will provide a scientific basis for designing non-cage housing systems for laying hens that provide the best possible welfare for the animals.

The long-term implications include improving non-cage housing design and creating an automated monitoring system to monitor welfare with potential commercial applications.

“The general public is showing concern over how animals in production are housed and whether they can show natural behaviors,” Siegford said. “In response, the egg industry in the United States is considering adopting non-cage housing systems for their laying hens.

“But non-cage systems that are poorly designed can cause health problems and can lead to feather pecking and cannibalism. So in order to design non-cage systems that really improve the welfare of laying hens, we need to understand how these housing systems affect the behavior and health of the individual birds living in these systems.” Siegford said that the cage-free housing systems the team is developing will first be used by producers. The monitors and sensors, which are being used now for development of the housing systems, will be available to producers at a later date.

Other team members include Janice Swanson, a professor of animal science and large animal clinical science; Darrin Karcher from the Department of Animal Science; Ruth Newberry and Marvin Pitts from Washington State University; and Joy Mench from University of California, Davis. The project is funded by two grants. The first grant, issued by the MSU Animal Agriculture Initiative for \$50,000, was received by the team on July 1. The second grant came from the United States Department of Agriculture. The team received the \$375,000 grant in the fall. The MSU team is the only group conducting this type of research in the U.S., and possibly in the world, Siegford said.

### **Cage ban will not lead to increase in salmonella**

Source: FarmingUK Newsdesk

15/02/2010

Scientists who have been studying the impact of different egg production systems on the incidence of salmonella say that the move away from conventional cage production to free range and other systems should not lead to an increase in salmonella.

Eggs from welfare-friendly cages and free range systems are no more likely to have instances of salmonella than eggs from caged systems

Animal health scientists in five different countries combined to carry out the study, which has taken 18 months to complete. The research was carried out between the spring of 2007 and the autumn of 2008. The work was commissioned by the European Union, which is imposing a ban on producing eggs in conventional cages in January 2012. The EU wanted the scientists to examine whether the

fears of some people that a switch from conventional cages to alternative forms of production would lead to an increase in salmonella were justified. The results of the scientists' work have now been published, and they should allay any fears that the cage ban could lead to increased salmonella problems.

"There was a fear that if hens had too much contact with each other there would be a rise in salmonella incidence in the alternative systems. That is why I was specifically researching the influence of the housing systems. The main conclusion was that the alternative systems did not lead to any higher incidence of salmonella compared to the conventional battery cages. In fact, based on our studies, you could say that the alternative systems were better than the battery cages," said Sebastiaan Van Hoorebeke, who was one of the scientists involved in the study.

Sebastiaan is based at Ghent University in Belgium. Working with him in Ghent were Jantina De Vylder, Frank Pasmans, Richard Ducatelle, Freddy Haesebrouck, Jeroen Dewulf and Filip Van Immerseel. The departments at the university involved in the research were the Veterinary Epidemiology Unit, the Department of Reproduction, Obstetrics and Herd Health, the Faculty of Veterinary Medicine, the Department of Pathology, Bacteriology and Avian Diseases and the Faculty of Veterinary Medicine. They were joined in the work by the Institute for Animal Hygiene, Animal Welfare and Farm Animal Behaviour at the University of Veterinary Medicine in Hanover, Germany; the Veterinary Public Health Institute, Vetsuisse Faculty at the University of Bern, Switzerland; the Public Health and Risk Analysis Department, Istituto Zooprofilattico Sperimentale delle Venezie in Italy and the Department of Anatomy & Physiology of Farm Animals, Faculty of Animal Science and Hydrobiology, at the Agricultural University of Athens in Greece. The report was completed at the end of 2009.

Sebastiaan Van Hoorebeke said that in terms of salmonella incidence there was nothing to choose between each of the various alternatives to conventional cages, but hens in all of the alternatives achieved better results than birds in battery cages. "We couldn't see any difference between the floor raised (barn), aviaries, free range or organic, but comparing all those alternative systems to conventional battery cages then there certainly was a risk of salmonella to house them in battery cages compared to the alternative systems. The worst ones to have salmonella were the conventional battery cages," he said. "So the hypothesis was the fear that there would be more salmonella in non-cage systems. Was that correct or not? We say, based on the results of our study, that there is no reason to conclude that the fear of more salmonella is justified. We couldn't see it. There are not more problems with zoonotic pathogens like salmonella in the alternative systems compared to the battery cages."

The study was conducted on units in five different European countries. The countries were Belgium, Germany, Greece, Italy and Switzerland. "Switzerland was a bit of an outlier because they have not had battery cages since 1992, but

we chose countries where we had good relations with the institutions," said Sebastiaan.

A total of 292 laying hen farms were sampled in the month prior to depopulation. An on-farm questionnaire was used to collect information on general management practices and specific characteristics of the sampled flock. During the study all of the birds were orally inoculated with salmonella enteritidis at 18 weeks of age. Shedding and colonisation were measured at regular time points.

Twenty-nine flocks were found positive for at least one salmonella serotype. In these flocks, the within flock prevalence of shedding hens, determined by individual sampling of 40 hens, varied between zero per cent and 27.50 per cent. A wide variety of serotypes was isolated, with salmonella enteritidis being the most common. Housing in conventional battery cages, the absence of dry cleaning in between production rounds and sampling in winter turned out to be risk factors for the shedding of salmonella enteritidis or typhimurium.

Sebastiaan Van Hoorebeke said scientists involved in the research were not surprised by the results because of the results of previous work some years earlier. "If you look at a base line study from 2004/2005, then we have already seen that housing in battery cages was a risk factor and that alternative systems were better. That is for salmonella. Mortality was higher in the alternative systems than in conventional cages in our study. On the issue of anti-microbial resistance, we didn't see much better results in the alternative results compared to battery cages, but purely focusing on salmonella we can say that battery cages are worse than alternative systems, although there are extra factors that need to be taken into account. For example we see that more and more animal diseases or laying hen diseases occur in the alternative systems compared to the battery cages, so the farmer could use more often and a larger amount of anti-microbials in alternative systems. That is a discussion that is now going on."

On the central issue that he and his colleagues were asked to give an opinion he said the results were clear – alternative systems of production were better than conventional cages on salmonella incidence. "They come out better. There is no doubt about it. We checked it. When you look into the statistics in detail, the alternative systems are better than the conventional cages."

The ban on the use of conventional cages for layers is due to come into force on January 1 2012. Many in the industry believe that a number of other EU countries will fail to meet the deadline, although politicians are currently insisting that the ban will go ahead as planned. The UK Government has warned that any flock that is to complete a full cycle will have to be in place towards the end of this year. It says that conventional cage flocks in place when the ban comes in to force will not be allowed to continue.

## **Furnished Cages Offered Best Hen Welfare in UK Trial**

<http://www.thepoultrysite.com/articles/1656/furnished-cages-offered-best-hen-welfare-in-uk-trial>

Feb 25, 2010

The welfare of hens in the system with furnished (enriched) cages was better than that of hens in other systems, concluded Professor Nicol of the University of Bristol in her paper to the European Symposium on Poultry Welfare last year.

Laying hens are kept in a range of housing systems but there have been few studies that have collected comprehensive, valid, un-confounded data to compare hen welfare across these systems.

A total of 26 flocks representing conventional cages (6 CC), furnished cages (6 FC), barn (7 B) and free-range (7 FR) systems were studied and data collected in three ways.

Each flock was visited three times throughout the laying period and detailed data collected on the history, housing, husbandry, climate, health and welfare of the hens.

The producers were asked to complete and return a weekly questionnaire on welfare and husbandry. At the end of lay, 150 hens from each flock underwent post-mortem examination.

Indicators assessed by the researchers that were significantly (repeated measures ANOVA) influenced by housing system included:

gentle feather pecks (CC=0.01; FC=0.06; B=0.16; FR=0.38 pecks/hen/minute), mean percentage of hens with feather damage (FR=15.0; CC=24.7; FC=24.9; B=26.9) and faecal corticosterone (FC=11.2; CC=14.3; FR=16.1; B=21.6 ng/g). Post mortem analysis revealed that housing system significantly influenced levels of the following variables (assessed on ordinal scales of 0 (least damage) to 3 (most damage)):

skin damage (CC=0.59; FC=1.05; B=1.31; FR=1.68) and keel protrusion (CC=0.91; FC=1.00; B=1.12; FR=1.21).

The percentage of birds with old keel fractures also varied with housing system (CC=17.7; FC=31.7; FR=59.8; B=69.1) as did the percentage with keel fractures incurred at depopulation (B=1.2; FR=1.33; FC=3.63; CC=24.6) and the percentage of hens that were vent pecked (FC=1.6; CC=6.2; B=10.0; FR=22.5).

Weekly questionnaires from the producers revealed significant effects of housing system on the percentage of eggs with blood on (FC=0.83; CC=0.98; FR=1.42; B=2.05), and eggs with calcification spots (FC=1.2; FR=1.7; CC=3.5; B=4.1).

This study did not include a detailed analysis of all hen behaviours but, considering the indicators of physical well-being and stress response that were measured, the welfare of hens in the FC system appeared to be better than that of hens in other systems, concluded Professor Nicol.

#### Reference

Nicol, C.J., S.N. Brown, S.M. Haslam, B. Hothersall, L. Melotti, G.J. Richards and C.M. Sherwin. 2009. The welfare of laying hens in four different housing systems in the UK. Proceedings of 8th Poultry Welfare Symposium, Cervia, Italy, 18-22 May 2009, p12.

### **Two Studies on Perches Presented at Welfare Meeting**

The PoultrySite  
March 18, 2010

From an oral paper presented at the European Symposium on Poultry Welfare last year, it emerged that hens rest on perches when they are provided and had higher feed efficiency. From a poster, it was concluded that the profile of the perch was more important than the material from which it was made in determining the use of perches by hens.

#### Hens' Use of Perches

E. Valkonen from MTT Agrifood Research Finland and colleagues presented a paper on their study into the effects of perches in furnished cages on hen behaviour. They found that the hens used the perches to rest, if provided, and they were less likely to spend the night in the next area.

They explained that the aim of their study was to inspect the effects of perches in furnished cages (FC) on the behaviour, egg production and feed consumption of laying hens. Perches in conventional cages (CC) diminish activity and feed intake of laying hens. In FC, group size and total area are greater than in CC. These factors tend to increase the activity, and thus the energy requirement and feed intake of the hens.

A total of 352 hens were housed at 16 weeks of age in eight-hen FC. There were 44 cages together: 12 cages had perches all the time from the housing until the end of the experiment (control or P16); from 32 of the cages the perches had been removed. Perches were installed into 12 of these cages when the hens were 19 weeks of age (P19) and 20 cages remained without perches (NP). The experiment lasted for seven four-week periods or 28 weeks.

Feed intake and egg production were measured over each four-week period.

The behaviour of nine focal hens was observed using instantaneous sampling at five-minute intervals. The sampling took place during a two-week period at the age of 35–36 weeks, so that the observations of each focal hen covered one light period (14.5 hrs). The number of hens on perches and in nests was recorded at 17, 20, 23, 26, 34 and 42 weeks of age, on three consecutive days, and three times each day (at six and 11.5 hours after lights-on, and one hour after lights-off). The use of the litter box was recorded on the same days.

Statistical analysis (Chi<sup>2</sup>-test or ANOVA) were performed using SAS (SAS Institute Inc. Cary, NC).

The presence or absence of perches affected feed intake only during the first four-week period. From the 2nd to 4th period, feed conversion ratio was poorer in the group without perches than in the control group. No effects of perches were found on laying rate or egg production.

Hens without perches were more active (70 per cent of observations) than those with perches (61 and 63 per cent of observations in P19 and P16 groups, respectively). Hens in cages with perches sat more often than those without perches, whilst the hens without perches stood and walked more often.

During the observations in the dark, there were more hens in nests, in the cages without perches (20 per cent) than in cages with perches (12 per cent).

Based on the results of this study, Valkonen and colleagues concluded that perches reduce bird activity in FC, and help to reduce the number of hens spending their night in nests.

#### Refining Perch Design

In a poster, M. Cox of the Provincial Centre for Applied Poultry Research of the province of Antwerp in Belgium and co-authors from Wageningen UR in the Netherlands showed their results on the effect of perch material and profile on the use of perches by hens. They found a rectangular profile to be best, and that the material was of less importance.

At the Provincial Centre in Antwerp, different perches were tested during consecutive laying periods. The perches differed in materials used and in the profile of the perch. The perches were placed in enriched cages which housed 39 to 43 animals and different breeds were used through the different production periods.

The use of the perches was evaluated by observations after the lighting period in which the number of animals on the perches were counted.

The researchers commented that, although at first there seemed to be an impact of the material (wood, plastic or metal) on the occupation of the perch, further tests showed that the profile of the perch had more impact.

Results showed a higher use of perches when rectangular profiles were used.

In order to provide the birds with suitable perches and to make sure the perches are used, the right material and profile is necessary, concluded Cox and colleagues.

#### References

Cox M., K. De Baere, E. Vervaet, J. Zoons and T. Fiks-van Nierkek. 2009. Effect of perch material and profile on the use of perches. Proceedings of 8th Poultry Welfare Symposium, Cervia, Italy, 18-22 May 2009, p19.

Valkonen E., R. Rinne and J. Valaja. 2009. The effects of perches in furnished cages. Proceedings of 8th Poultry Welfare Symposium, Cervia, Italy, 18-22 May 2009, p18.

### **Cannibalism in Free-Range Flocks Linked to Perches, Early Range Access**

ThePoultrySite

March 4, 3010

<http://www.thepoultrysite.com/articles/1668/cannibalism-in-freerange-flocks-linked-to-perches-early-range-access>

Vent pecking and cannibalism were observed in about one quarter of the UK free-range and organic laying flocks surveyed, and these behaviours were associated with early access to the range and the provision of perches and nipple drinkers, according to S.L. Lambton of the University of Bristol in a paper presented at the European Symposium on Poultry Welfare last year.

Vent pecking (VP) and cannibalism remain some of the biggest problems challenging free-range egg producers, with both economic implications for farmers and welfare implications for birds.

S.L. Lambton from the University of Bristol explained that this prospective epidemiological study investigated the development of vent pecking and cannibalism on 62 barn, free-range and organic UK farms (119 flocks).

Flocks were visited at 25 and 40 weeks, when rates of vent pecking, and incidence of cannibalism, were recorded. Environmental and management data were collected for each flock.

Factors affecting the development of these behaviours were modelled using the multilevel modelling program, MLwiN.

According to the Bristol researchers, VP was observed in 24.8 per cent of flocks, at a mean rate of 0.064 bouts per bird per hour. Cannibalism was recorded by farmers in 28.4 per cent of flocks. Farmers recorded the mean age of onset as 20.9 and 20.7 weeks for VP and cannibalism, respectively.

Risk of VP increased with rate of severe feather pecking ( $Z=5.43$ ,  $p<0.001$ ), at all ages, as did risk of cannibalism ( $Z=3.85$ ,  $p<0.001$ ).

Risk of VP decreased with a later age of light period increase ( $Z=3.29$ ,  $p=0.001$ ). This light increase is associated with the onset of lay, and often range access.

Interpretation of the correlation was complicated by an effect of range use: rate of VP at 40 weeks decreased with range use at 40 weeks ( $Z=11.58$ ,  $p<0.001$ ) but increased with range use at 25 weeks ( $z=3.99$ ,  $p<0.001$ ). Analyses suggested there was a detrimental effect of allowing range access before onset of lay.

A variety of other factors that could have been associated with range use were also significant, including:

an increase in risk of VP with pop hole size ( $Z=2.46$ ,  $p=0.007$ )

use of perches more than 0.5 metres high increased the risk of vent pecking (Odds Ratio (OR)=6.94,  $Z=2.44$ ,  $p=0.007$ )

use of perches increased the risk of cannibalism (OR=7.37,  $Z=3.02$ ,  $p=0.003$ ).

use of nipple drinkers increased the risk of VP (OR=6.26,  $Z=1.98$ ,  $p=0.048$ ), and it was hypothesised this was due to their use as perches.

Lambton and co-authors conclude that the risk of VP and cannibalism may be lowered by reducing the rate of severe feather pecking. Although the use of perches for birds during early rearing is thought to protect against vent pecking (Gunnarsson et al., 1999) allowing adult birds to perch presented a clear risk.

Risk of VP may also be reduced by delaying the onset of lay and subsequently encouraging range use, although more research is required to elucidate the interaction between the two factors.

#### Reference

Lambton S.L., T.G. Knowles, C. Yorke and C.J. Nicol. 2009. Risk factors affecting the development of vent pecking and cannibalism in loose housed laying hen flocks. Proceedings of 8th Poultry Welfare Symposium, Cervia, Italy, 18-22 May 2009, p13.

## **Study Looks at Group Size Effects in Furnished Cages for Laying Hens**

ThePoultrySite Newsletter - 11 March 2010

The advantages of the large group size (60 hens per cage) included a greater proportion of eggs laid in the nest and more perching behaviour, and there were no effects on laying rate, feed intake or dust bathing behaviour, according to M. Guinebretiere in a paper presented at the European Symposium on Poultry Welfare last year. The provision of litter in the form of feed seemed to improve the use of the pecking and scratching area.

In the context of the Directive 1999/74/EC, M. Guinebretiere from the French agency for food safety (AFSSA) in Ploufragan explained that the trial compared furnished cages (enriched cages) in term of animal welfare, health and zootechnical performance.

In the experiment, six treatments of 18 furnished cages were compared in a 3×2 experimental trial: three group sizes with the same space per hen (small (SC, 20 hens per cage), medium (MC, 40) and large (LC, 60)), with or without litter (feed) distributed automatically on a mat in the pecking and scratching area.

The impacts of group size and litter distribution were evaluated on laying (rate, eggs laid in the nest or outside the nest), feed intake, perching and dust bathing.

The group reported that litter distribution did not influence laying rate, location of eggs nor number of hens in the nest.

Group size influenced the laying location but not the laying rate: percentage of eggs laid outside the nest was higher in SC and MC (8.4 and 4.5 per cent, respectively) than LC (3.9 per cent,  $p < 0.01$ ).

This was confirmed by video analyses on space occupation: percentage of hens in the nest was higher in LC (39.9 versus 25.0 per cent in SC and MC), especially during laying period (07:00 to 10:00).

Feed intake from the trough was lower for hens receiving litter (116.7 versus 119.3 g/hen/day) but the difference was only statistically significant on the first measure at 25 weeks of age, and did not persist at week 48 (109.2 versus 110.9 g/hen/day).

As the litter provided was feed, hens ate most of it, giving a higher total feed intake. The amount of feed distributed this way was around 5g/hen/day.

Percentage of hens perching at night perched was lower in SC (56 per cent) than with the other cages (60 and 67 per cent for MC and LC, respectively).

Dust bathing in the pecking and scratching area was unaffected by litter provision or group size, and neither was mortality.

The researchers report the advantages of the large group size being more frequent visits to the nest, and more eggs laid there as well as more perching behaviour (in LC and MC), without any effects on laying rate, feed intake or dust bathing behaviour.

Litter provision did not affect laying, perching or dust bathing data, except for a slight difference in feed intake, probably balanced by litter consumption for although some litter was scattered, most of it seemed to have been eaten.

General observation of the pecking and scratching area showed that occupation was high, and seemed better with litter, concluded Guinebretiere.

#### Reference

Guinebretiere M., D. Huonnic, M. de Treglode, A. Huneausalaun and V. Michel. 2009. Furnished cages for laying hens: effect of group size and litter provision on laying, feeding, perching and dust bathing behaviours. Proceedings of 8th Poultry Welfare Symposium, Cervia, Italy, 18-22 May 2009, p17.

### **Shade Made Little Difference to Use of Paddocks by Free-Range Hens**

The PoultrySite

Feb 18, 2010

<http://www.thepoultrysite.com/articles/1643/shade-made-little-difference-to-use-of-paddocks-by-freerange-hens>

In his presentation at the 8th European Symposium on Poultry Welfare, P. Glatz from the Pig and Poultry Production Institute at Roseworthy in South Australia reported that providing shade only slightly increased the use of the range area by laying hens, and there were no advantages in terms of egg output or feather score.

A concern for the free-range layer system reported by Hegelund et al. (2005) is that only nine per cent of birds use the range area. The factors which influence use of the range include weather (temperature, wind and rain), season, age, flock size, time of day and shade (Hegelund et al., 2005).

This current trial examined the role of shade areas in attracting laying hens into the range. A total of 120 laying hens (Hy-Line Brown) were housed at 18 weeks in an eco-shelter (6m × 6m) located in the centre of a paddock with dimensions 66m × 66m. The eco-shelter had six internal pens of equal size (2m × 3m) with a free-range area (726m<sup>2</sup>) adjoining the shelter.

Hens were provided feeders, drinkers, nest boxes and perches in each pen but no artificial light. Layers were randomly allocated into six groups of 20 birds.

There were two treatments provided in the range, shade versus no shade, with each treatment replicated three times. The control hens were not provided with outdoor shade while the treatment hens were provided with a shaded area (3m × 2m × 1m = l × b × h) fitted with shade cloth located 10 m and 20 m from the shed.

Over the late summer period from 32-44 weeks (March-May 2008), hens were allowed access to the range and measurements were made daily for egg production, weekly for egg weight and every four weeks for feather score.

There was little forage available for birds due to prevailing drought conditions in South Australia.

Video records were made of hens from each of the replicates using the shade or in the range for a one-hour period in the morning and afternoon at 38 weeks when average maximum temperature was 27.5°C. A total of 12 hours of video tape was assessed. Data were analysed using ANOVA in the Systat software.

In the morning, shaded areas were visited by 18 per cent of the hens with a tendency (P=0.07) for more hens to be in the paddock; 43 per cent for paddocks with shade compared to 25 per cent for the paddocks with no shade provided.

In the afternoon, there were no difference between treatments for hens that used the range (30 per cent for shade treatment versus 40 per cent for no shade; P=0.49). Only 10 per cent of hens used the shade in the afternoon.

There was no significant difference (P=0.22) for hens (12 per cent) in the shade closer to the shelter versus the shade (six per cent) provided 20m from the shelter.

There was no significant effect on production and feather score of hens whether they were provided shade or no shade on the range.

The provision of shaded areas in the free range attracted some additional hens into the range but other attractants are needed to encourage more hens into the paddocks, particularly during the summer season.

#### Reference

Glatz P.C. 2009. Attracting laying hens into range areas using shade. Proceedings of 8th Poultry Welfare Symposium, Cervia, Italy, 18-22 May 2009, p8.

### **Foot Problems Found in 40 Per Cent of Hens in Non-Cage Systems**

The PoultrySite

<http://www.thepoultrysite.com/articles/1637/foot-problems-found-in-40-per-cent-of-hens-in-noncage-systems>

In their presentation at the 8th European Symposium on Poultry Welfare, K. Niebuhr and colleagues from the University of Veterinary Medicine in Vienna, Austria, reported finding foot pad dermatitis in an average of 40 per cent of hens housed on free-range or deep litter systems.

Foot pad dermatitis in chickens may vary from superficial lesions accompanied by hyperkeratosis to profound lesions affecting not only the epidermis but as well the underlying tissue accompanied by acute or chronic inflammations and ulceration.

Although foot pad dermatitis has gained considerable attention in broilers, little attention has been paid so far to foot pad dermatitis in laying hens. Only a few studies regarding the prevalence of foot pad dermatitis in laying hens or possible influencing factors are available. The aim of this study by the researchers from Vienna was to evaluate data gathered in laying hen holdings in Austria to gain new information about this welfare problem.

Data obtained during farm visits of 297 laying hen flocks (aged 18 to 83 weeks) kept in free-range (n=234, of which 103 were organic) and deep litter systems (n=65) were used for the evaluation.

During these visits, system and management characteristics were recorded.

Foot pads of both feet of 20 randomly selected hens in each flock were visually inspected for the occurrence of ulcerative foot pad dermatitis (Y/N) and the percentage of hens with these lesions was calculated per flock. Data were analysed with the help of SPSS software using the Spearman rank correlation and the Mann-Whitney-U test.

Ulcerative foot pad dermatitis was found on median in 40 per cent of hens per flock (mean = 38.75 per cent; STD=23.29 per cent; minimum = 0 per cent; maximum = 95 per cent).

Formation of foot pad dermatitis was influenced by hybrid ( $p < 0.001$ ), age ( $r_s = 0.17$ ,  $p = 0.003$ ) and average weight of hens ( $r_s = 0.17$ ,  $p = 0.003$ ).

Regarding housing conditions, both flock size ( $r_s = 0.12$ ,  $p = 0.03$ ) and stocking density ( $r_s = 0.15$ ,  $p = 0.009$ ) showed a positive correlation as did dimension (height) of perches ( $r_s = 0.15$ ,  $p = 0.02$ ,  $n = 241$ ).

Compared with results in the literature, the incidence of foot pad dermatitis seems to be slightly higher in the non-cage flocks surveyed. For instance,

Rönchen et al. (2007) found in three flocks between 25 and 37 per cent of aviary hens with foot pad lesions.

Dr Niebuhr and his colleagues conclude that their evaluation found some indications of influencing factors but they suggested further research to understand the complex interactions between housing conditions and foot pad dermatitis in order to be able to reduce the number of hens affected.

#### Reference

Niebuhr, K., C. Arhant, A. Lugmair, B. Gruber and K. Zaludik. 2009. Foot Pad Dermatitis in Laying Hens Kept in Non-Cage Systems in Austria. Proceedings of 8th Poultry Welfare Symposium, Cervia, Italy, 18-22 May 2009, p8.

### **Beak-Trimming Discussed at WPSA Welfare Meeting**

European Symposium on Poultry Welfare

The PoultrySite

March 25, 2010

The need to carry out beak-trimming of Muscovy ducks was investigated and reported by a French group at the European Symposium on Poultry Welfare in Italy last year, and two posters were presented relating to beak-trimming pullets destined for the laying flock. Editor, Jackie Linden, summarises these papers for ThePoultrySite.

#### Infra-Red Beak Trimming of Muscovy Ducks Shows Promise

O. Rochard (Grimaud, Roussay) and co-authors at the French institutes ITAVI and INRA presented a paper comparing manual and infra-red beak trimming treatments of Muscovy ducks and the consequences on welfare.

Because beak trimming has been shown to be the potential source of stress and pain, they explained that the practice is banned in Pekin ducks and only tolerated in limited circumstances in Muscovy ducks. On the other hand, they pointed out that feather peaking and cannibalism are of major concern in Muscovy ducks, and beak trimming prevents the expression of these behaviours, which lead to injuries and mortality.

In practice, beak trimming is systematically practiced between 14 and 21 days of age for this species, they said. Although some specific preliminary data obtained in ducks contradict those from chickens and turkeys, it is normally recommended to practice beak trimming before 10 days of age.

Rochard explained that the objectives of their two trials were to test beak infra-red treatment after hatching with manual beak trimming carried out at different ages.

The first trial, conducted in an experimental research unit, consisted in four different conditions: no beak treatment (control), manual beak trimming with scissors or infra-red treatment of the beak at the time of hatching and manual beak trimming with scissors at 21 days of age.

The second trial, conducted on male ducks under field conditions, consisted in two different treatments with infra-red treatment of the beak at the time of hatching or manual beak trimming with scissors at 15 days of age.

The researchers found that the practice of beak-trimming was necessary later in the rearing period in both the control group (BT at 46 days of age) and the group of ducks submitted to manual beak-trimming at one day of age (BT at 51 days of age). Infra-red beak trimming on day 1 of age did prevent the expression of aggressive behaviours leading to feather pecking and cannibalism without compromising the expression of the duck's genetic potential for growth.

Rochard and co-authors concluded that infra-red beak trimming ducklings at day-old offered a technical alternative although they felt that the welfare implications of the practice require further investigation.

#### Comparison of Hot Blade and Infra-Red to Beak-Trim Laying Hens

"The IR method needs further development to reduce the incidence of neuromas"

The effect of hot blade (HB) and infra-red (IR) beak trimming methods on beak condition and production in hens was evaluated and presented as a poster by Phil Glatz of the Pig and Poultry Production Institute at Roseworthy in South Australia.

Dr Glatz explained that IR trimming is undertaken by industry at day-old, while HB trimming is done at 10 days. In the trial he reported, 50 Hy-Line Brown chicks were treated at hatch using an IR machine, which directs heat onto the inner tissue of the beak. After a few weeks, the tip of the upper and lower beak dies and the beak becomes shorter with blunt tips. Another 50 chicks were HB trimmed at 10 days with one half of upper beak and one third of lower beak removed using a Lyon machine.

Pullets from both treatments (ten replicates of five birds per treatment) were housed in rearing cages until 18 weeks and in layer cages (545 square centimetres per bird) until 66 weeks.

Beak length, beak step, beak condition and production were measured. Beak condition was measured qualitatively using a 1-3 grading system using beak pictures as a guide. Data were analysed with ANOVA using Systat software.

Upper beak samples were obtained from five birds for each of the IR and HB treatments at 32, 144 and 420 days of age. The presence of neuromas (tumours of nerve tissue) was assessed by fixing and decalcifying the beaks, embedding in wax and making consecutive seven micrometre sagittal sections of the entire beak. Sections were stained with haematoxylin and eosin.

Beak condition (a measure of its appearance and shape) was significantly better ( $P < 0.05$ ) for IR-treated birds in the rearing period, said Dr Glatz but by mid-lay, it was similar for both treatments. The upper beak length of IR trimmed birds was consistently ( $P < 0.05$ ) longer (4mm) than HB trimmed birds throughout the laying period. The amount of beak exposure, lamp power and duration resulted in IR beaks, which were considerably longer than the HB beaks.

No difference in egg production was observed throughout the production period between the beak-trimming treatments, which is consistent with previous findings but body weight of IR birds was higher ( $P < 0.05$ ) and egg weights lower ( $P < 0.05$ ).

The histopathology of beaks showed that traumatic neuromas persisted to adulthood with both IR and HB trimming, said Dr Glatz, and he added that the IR method needs further development to reduce the incidence of neuromas, perhaps by reducing IR lamp power and beak exposure time. According to the Australian Code of Practice, he said, HB trimming should be done at day-old to allow neuromas to resolve and reduce chronic pain.

#### Handbook Published to Advise on Beak Trimming

In a related poster, Dr Glatz explained that he co-wrote a handbook on beak-trimming in response to the many enquiries on beak from the industry that had been received by the Pig and Poultry Production Institute from around Australia and worldwide.

It was felt that there was a need to consolidate all the information available in the literature into an easy-to-read handbook for producers as an educational resource to service these enquiries.

To obtain information for the handbook, Dr Glatz explained that a questionnaire was developed and sent to industry specialists with knowledge or experience with beak trimming or alternatives to trimming. The survey of experienced beak-trimmers, egg producers and veterinary and industry consultants in Australia was undertaken to obtain practical knowledge on beak trimming and possible alternatives to trimming in Australia.

The survey requested industry people to comment on the advantages and disadvantages of beak-trimming, bird welfare considerations, current methods, costs of trimming and methods to minimise use of trimming.

The information provided by industry was used to write a chapter in the handbook that reflected the current state of industry knowledge about beak trimming.

The handbook was produced to improve knowledge on why, when and how birds are trimmed, responses of birds to trimming, management of beak-trimmed birds and alternative strategies to trimming. The target audience is farm managers.

The Beak Trimming Handbook for Egg Producers: Best Practice for Minimising Cannibalism in Poultry was funded by the Australian Poultry Co-operative Research Centre and published by CSIRO Publishing in 2006. (For more information on the beak trimming handbook, [click here.](#))

Dr Glatz highlighted that the beak trimming handbook project is a resource for farm managers in the egg industry to support their commitment to maintaining high standards of beak trimming as well as their search for methods that do not require beak trimming. The handbook is aimed to enable farm managers to manage beak-trimmed birds with greater confidence, improve standards of beak trimming and welfare of birds.

#### References

Glatz P.C. 2009a. Effect of hot blade and infrared beak trimming on beak condition, production and mortality of laying hens. Proceedings of 8th Poultry Welfare Symposium, Cervia, Italy, 18-22 May 2009, p24.

Glatz P.C. 2009b. Beak trimming handbook. Proceedings of 8th Poultry Welfare Symposium, Cervia, Italy, 18-22 May 2009, p25.

Rochard O., S. Lubac, A. Aliner, H. Morini, L. Mirabito and D. Guémené. 2009. Beak trimming or infra-red beak treatment in Muscovy ducks and its consequences on welfare. Proceedings of 8th Poultry Welfare Symposium, Cervia, Italy, 18-22 May 2009, p129.

#### **Welfare of Meat-Producing Poultry**

Poultry Site April 7, 2010

B.L. Nielsen from Aarhus University in Denmark selected stocking density, foot pad scoring and genetic of the modern broiler as the most important aspects in the welfare of meat-producing poultry at the European Symposium on Poultry Welfare in Italy last year.

#### Summary

Scientific investigations of the welfare of meat producing poultry have focussed mainly on broilers. The welfare of any individual bird depends on its genetic make-up and the environment in which the bird is reared. Factors such as stocking density, litter moisture and food availability are aspects of the

environment which affect the welfare of not only broilers, but all meat producing birds. In this short paper, Dr Nielsen raised a few of these issues and discussed them briefly in the context of meat poultry welfare.

### Introduction

Poultry for meat production includes species such as the domestic hen, turkey, quail, duck, goose and ostrich, and in this context also game birds such as partridge and pheasant reared primarily for hunting, said Dr Nielsen. In terms of meat produced and consumed, the broiler industry far outsize the others, and in 2007 the production of broiler meat was 8.3 million tons in the EU-27. In comparison, the number for USA was 16.2 million tons, equivalent to almost 8.9 billion broilers. China and Brazil produced 11.4 and 10.3 million tons, respectively, in the same year (USDA, 2008).

This does not mean that the welfare of the other species is not of interest or is less important, but the majority of scientific studies on welfare of meat-producing poultry has concentrated on broilers and – to a lesser extent – turkeys. A search in the scientific literature on 'welfare' combined with each of the species mentioned above yielded 40 and 29 references on quail and ducks, 20 and 11 on ostriches and geese, five and four on pheasants and partridges, but 393 hits on broilers and 93 on turkeys. Thus, more is known about the welfare of these two types of meat poultry, although we should bear in mind that the difference between different strains of broilers may be as vast as the difference between a goose and a duck.

A number of review papers deal with the welfare of one or more of these types of fowl (e.g. Martrenchar, 1999; Mench, 2002; Bessei, 2006), and instead of re-iterating these overviews, Dr Nielsen entered into the welfare discussion and briefly highlighted three examples, primarily from the broiler literature, that touch upon issues of great importance to the producer, the consumer, and – not least – the birds themselves. Although the emphasis is on broilers, many of the issues raised are of relevance to many of the other types and species of meat producing poultry as well.

### Stocking Density – How to Assess Quality of the Space

In legislation regarding the housing of broilers thresholds for stocking density are defined as a maximum permissible live weight in kg per square metre (Bessei, 2004). The EU broiler directive 2007/43/EF of 28th of June 2007 allows up to 42 kg/square metre provided certain conditions are met, especially in terms of maximum mortality. However, in terms of animal welfare and the experience of the individual bird of its surroundings, stocking density in terms of birds per square metre may be a more relevant measure. One absurd consequence of only limiting live weight per area is that it in effect allows 1,000 day-old chicks per square metre before maximum density is reached, which would be more than two layers of birds.

For fast growing broilers, there is of course a predictable relationship between the number of birds and the maximum density at slaughter depending on the final live weight. A density of 40 kg/square metre could, for example, be reached by 20 birds each weighing 2.0 kg, or by 16 birds each weighing 2.5 kg.

The main issues of stocking density in relation to welfare are:

- i. access to resources such as food and water (Leone and Estevez, 2008a)
- ii. how stocking density affects the immediate environment of the birds in terms of litter moisture, ambient temperature and relative humidity (e.g. Meluzzi et al., 2008), and
- iii. enclosure size and its effects on locomotion (Leone and Estevez, 2008b).

These issues are pertinent to welfare independent of the growth rate of the birds in question, although faster growth is more likely to have adverse effects on litter moisture, for example. Thus, stocking density affects the health and welfare of broilers, not least through changes in the quality of the environment (Dawkins et al., 2004, Estevez, 2007).

#### Foot Pad Dermatitis as an Animal-Based Welfare Indicator

Assessment of foot pad dermatitis in broilers (Berg, 1998; Ekstrand et al., 1998) has been compulsory in Sweden since 1994 and in Denmark since 2002, and more countries are considering the system. In Denmark, the legislation stipulates that representative samples of 100 feet are to be taken from all flocks of broilers delivered to Danish slaughterhouses. These feet are each scored on an integer scale of 0, 1 and 2 by independent, competent assessors. Score 0 is assigned to feet with no or very superficial signs of dermatitis; score 1 is given to feet with mild or intermediate dermatitis and score 2 is given to feet with severe dermatitis causing wounds, scabs or bleeding (Ekstrand et al., 1998).

The introduction of compulsory and systematic foot pad assessment has led to a decrease in the prevalence and severity of foot-pad dermatitis in broilers over time in Sweden (Berg and Algers, 2004) as well as in Denmark (Figure 1). The improvements have been achieved through a combination of measures such as prevention of water leakage from the drinkers, and heating the chicken houses prior to introducing the litter to prevent condensation between floor and litter. Most of the improvements occur during the first three years after the system is introduced (Berg and Algers, 2004) but annual decreases in the prevalence and severity of foot-pad dermatitis are still seen in Denmark during the winter months (Figure 1), when it is usually more of a challenge to keep the litter dry and friable.

The prevention of foot pad dermatitis is, of course, not the only improvement necessary to ensure the welfare of meat poultry. However, as an example of an animal-based welfare indicator foot pad assessment is fast and simple, yet robust and relatively cheap.

#### Fast, Lean and Efficient: Modern Broilers and Their Parents

Genetic selection for efficient and fast meat production has led to increases in the growth rates of broilers of more than 65 per cent in the last 30 years. This

has been achieved through focused quantitative selection without invoking more recent techniques of genetic assessment and manipulation. The goal of profitable and efficient meat production has been fulfilled; however, this vastly increased yield has come at a cost.

As a direct consequence of their genetic make-up, modern broiler chickens are prone to a number of diseases and pathological conditions, such as lameness and cardio-vascular problems. In addition, behavioural changes are seen, in particular when comparing modern broiler strains with slower growing breeds. Some of these changes, such as decreased activity, are a result of the massive increase in protein deposition seen in these birds.

In order to obtain production animals with a high genetic potential for growth, the parent stock have to be in possession of these traits as well. However, in order to be able to breed, the hens are fed restrictively for long periods of time during rearing. The level of restriction of these females corresponds to 30 to 50 per cent of their ad libitum energy intake. Smaller pellets with more fibre are now fed to broilers breeders often directly into the litter with an aim to extend foraging, reduce hunger and prolong satiety; and breeding companies currently include more welfare-related traits, such as actively selecting against leg problems.

But are these efforts too little too late, and do we have to start from scratch to be able to engage the full genetic diversity (Muir et al., 2008), asked Dr Nielsen

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### **AVMA: A scientific perspective on housing for laying hens**

JAVMA News

April 9, 2010

AVMA recently updated its backgrounder on the welfare implications of laying-hen housing. The backgrounder, prepared by the AVMA Animal Welfare Division, scientifically addresses the advantages and disadvantages of the various housing systems used today.

[http://www.avma.org/issues/animal\\_welfare/laying\\_hen\\_housing\\_bgnd.asp](http://www.avma.org/issues/animal_welfare/laying_hen_housing_bgnd.asp)

### **Laying Hen Production Systems: Welfare and Social Sustainability**

The poultrysite

January 21, 2010

In her presentation at the 8th European Symposium on Poultry Welfare, Dr Joy Mench of University of California Davis and co-authors describes a project to investigate the impact of shifting from conventional battery cages to alternative housing systems on layer welfare.

There is growing concern in many countries about the confinement of laying hens in behaviourally restrictive housing systems like conventional cages, and an increasing number of eggs are being produced in alternative housing systems in some countries. In the US where, unlike in the EU, conventional cages have not been banned, these changes have been until now entirely market-driven and non-cage eggs still make up a relatively small percentage of the shell egg market (about five per cent). However, there is now increasing legislative pressure in this

regard, and the citizens of California recently passed a ballot initiative that will effectively ban hen cages in the state as of 2015.

In this presentation, Dr Mench and co-authors describe a project that has been undertaken in the US to examine the potential outcomes of this shift in production practices not just on hen welfare, but on multiple aspects of sustainability, including egg safety and quality, human health, economics of production, public acceptability and environmental sustainability. This project involves input from experts and diverse stakeholder groups, and will lead to an integrated framework for predicting impacts.

The conventional cage production system is still the predominant system worldwide for housing laying hens. However, ethical concern about the degree of restriction of the hens' behaviour and movement in conventional cages has led to an increasing movement towards alternative systems. Some of this is driven by consumer purchasing preferences, and some by legislation.

The most sweeping legislation in the European Union, which in 1999 announced that conventional cages would be banned in 2012, a decision recently upheld by the European Commission despite pressure to delay the implementation date.

In the United States, there are no federal laws that prohibit particular types of housing systems for farm animals, nor indeed that regulate any aspects of animal welfare onfarm. Approximately 95 per cent of egg-laying hens in the US are housed in conventional cages, a percentage that has only decreased slightly (from about 98 per cent) in the last decade.

In 2008, however, voters in California passed a ballot initiative that, because of definitional language stating that hens must be able to 'stretch both wings without touching another hen or the sides of their enclosure', will effectively ban the use of cages for laying hens in the state as of 2015. It is likely that similar initiatives will be introduced in other states, and that there will be continuing pressure on retailers by animal protection groups to increase the percentage of non-cage eggs that they purchase.

During the lead-up to the EU cage ban, there has been considerable development of alternative housing systems in Europe, as well as a significant amount of research on various aspects of hen welfare, especially behaviour. However, animal welfare is not the only factor that affects the public acceptability of animal production systems. Other factors include food safety, product nutritional quality, human health, environmental impact and other social values such as local quality of life – all elements of agricultural sustainability. Different hen production systems have the potential to affect these different aspects of sustainability in different ways. However, research on these other aspects has lagged behind research on hen welfare until only recently.

In 2006, the EU funded the SAFEHOUSE and RESCAPE projects to examine housing factors affecting the potential for microbial contamination of eggs and to develop new methods to reduce egg contamination. The EU Welfare Quality Assurance Project, although not focusing specifically on laying hens, created a research framework for social scientists to assess the attitudes of EU consumers towards animal welfare and towards purchasing 'welfare friendly' products. Although these are helpful developments, there are still significant information gaps in our knowledge of the sustainability of different hen production systems, and challenges in understanding how to integrate diverse information into a framework or model for assessing those impacts.

In an attempt to take a structured, holistic approach to addressing the problem of sustainability of hen housing systems in the US, the American Egg Board, AEB, has funded a project to examine the likely impacts of egg production shifting from conventional cages to alternative housing systems. The AEB is a 'checkoff' organisation, which means that it is funded via a legislatively mandated contribution from egg producers, with the producers contributing an amount for each carton of eggs sold which is then used for egg marketing and research.

The initial phase of this project involves the development of white papers on the following topics: values and public acceptability dimensions; economic issues; hen welfare; food safety, quality, and security; human health; and environmental sustainability.

These white papers will outline what is known about each of these topics and identify information gaps.

Over-arching research priorities will also be formulated. The teams writing the white papers are comprised of biological scientists, social scientists and ethicists from the US and other countries.

The second phase of the project involves gathering broad-based stakeholder input. Stakeholders representing consumer groups, animal welfare groups, environmental groups, human health organisations, groups concerned with sustainability and rural community development, retailers, egg producers and others will review the white papers, provide input into prioritizing research priorities, and work through scenarios that will lead to the development of an integrated framework paper.

The final phase of the project will involve identifying funding sources and assembling multi-institutional, multi-disciplinary teams to address critical research areas.

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Mench J.A., J.C. Swanson and P.B Thompson, 2009 Laying Hen Production Systems: Welfare and Social Sustainability. Proceedings of 8th Poultry Welfare Symposium, Cervia, Italy, 18-22 May 2009, p2-3.

## **Introduction to Pasture-Raised Poultry: Getting Started**

The PoultrySite

March 18, 2010

This article, by B. Burbaugh, E. Toro, and A. Gernat, is one of a series titled Introduction to Pasture-Raised Poultry of the Animal Science Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. It offers tips on pasture-raised poultry production.

### Introduction

There are several important points for small- and medium-scale poultry producers to consider when thinking about producing pasture-raised poultry as an alternative to traditional production. This document provides information that will help identify the characteristics of alternative poultry production, explain the opportunities and challenges associated with pasture based production systems, provide an overview of breed selection for egg-type laying hens and meat-type birds, as well as discussing to the equipment and practices that facilitate getting birds off to a good start.

### Alternative Poultry Production

Using the word 'alternative' in this context is a misnomer. Many types of poultry have been raised on pasture for hundreds of years. Pastured poultry production is used to describe a variety of production systems in which birds have access to pasture on a regular basis. Production systems vary widely from stationary houses with permanent yards to portable houses that are moved frequently to a new pasture (Fanatico, 2007). Additionally, birds may be allowed to free range in the pasture (Figure 1), most commonly seen in laying flocks or be confined to a portable house that is rotated throughout the pastures (Figure 2). There are no parameters for stocking rates on pastured poultry in the US.

### Organic Production

Any number of pasture-based systems can be classified as organic if the producer chooses to follow the certification process which requires that feed, pasture and processor be certified organic. In terms of organic production, the USDA'S National Organic Program requires outdoor access and organic feeds produced without synthetic chemicals and prohibits the use of antibiotics (USDA NOP, 2006; Fanatico, 2007). In Florida, there are a number of producers that follow organic standards for raising their flock but have chosen not to become certified organic for various reasons. For more information on organic standards in Florida contact Florida Organic Growers Association. The main drawback of organic production is the elevated cost of feed and the lack of processing facilities that offer services for certified organic producers.

### Opportunities of Pastured Poultry Production

According to the National Center for Appropriate Technology (NCAT), there is a strong demand for pasture-raised poultry products when marketed directly to consumers. These types of operations can be managed by one person and producers can start small and grow as they become proficient in producing and marketing poultry and/or eggs. There is minimal initial capital investment compared to most agricultural enterprises. However, poultry products can also attract customers for other products. Moreover, pastured poultry production is arguably a more sustainable system because the nutrients in poultry excreta are being deposited into the soil. These deposits serve as a source of organic matter and nutrients that help build soil fertility, assist water retention and increase forage production. This can be especially beneficial in areas with deep sandy soils and low fertility.

### Challenges of Pastured Poultry Production

The challenges associated with pasture-raised poultry are labour, seasonality and processing. This is a labour-intensive operation: the birds will need to be fed, watered and moved at least once – and sometimes twice – daily. Meat production in north Florida is mostly seasonal with production and harvest ranging from February to June and August to December in order to avoid extremes in temperature. The climatic conditions will dictate how early or late in the season birds can stay in the pasture because weather related stress can affect feed conversion and meat quality. On the other hand, laying flocks can cope with varying climatic conditions if adequate housing is provided. Predation pressure also presents challenges, especially for new producers because it takes time to develop predator control strategies to minimise losses.

The biggest challenge is finding processing facilities that will kill and process birds for small producers. The Florida Department of Agriculture and Consumer Services/Division of Food Safety is responsible for regulating poultry processing when 20,000 birds or less are processed per calendar year by an individual. To learn more about the regulations that must be followed to process dressed poultry visit [UF/IFAS Pastured-Poultry Virtual Field day](#) [click here] or contact the Florida Department of Agriculture/Division of Food Safety. Exemptions from inspection requirements of the Poultry Products Inspection Act provided by the USDA for small scale poultry slaughter and processing are not valid in Florida. All labels for poultry products should follow guidelines established by the US Food and Drug Administration (FDA) Food Labeling Guide. For more information, click [here](#).

### Meat Birds: Breed Selection

Unlike laying hens, there are limited breed options for meat birds. The options include the Cornish cross hybrids, which are selected for commercial production systems. Cornish crosses are considered a fast-growing broiler. These broilers reach a market weight of five to six pounds in approximately seven to eight weeks. Due to the fact that Cornish cross broilers are harvested at a younger

age, their meat tends to be more tender and juicy and does not exhibit the strong flavour of heritage birds (Chambers et al. 1989).

An emerging trend in pastured poultry production is the use of dual-purpose heritage breeds to help preserve the genetic pool of poultry in the United States. Heritage breeds are breeds recognized by the American Poultry Association prior to the mid 20th century. Heritage breeds include barred silvers and dual purpose breeds like New Hampshire, Buff Orpington (Figure 3) and Barred Rocks (Figure 4). With dual-purpose poultry breeds males are selected for meat production and females for egg production. The dual-purpose chicken will not provide a large carcass as a meat bird, nor lay as many eggs as an egg layer (ALBC, 2009). These birds tend to grow slowly, eat more feed and may take up to 12 weeks to reach market weight. Heritage breeds are also considered to have a stronger flavour because the age at which the birds are killed and processed is an important factor that contributes to flavour (Le Bihan-Duval, 2003; Fanatico, 2007). For more information on raising heritage chickens, [click here](#).

Breed selection will be based on your preferences and in some instances the preferences of your market and consumer demand.

#### Selecting Laying Hens

Commercial hatcheries offer a wide variety of options when it comes to laying hens. A common misconception is that hybrids are man-made breeds. In reality, hybrids are a cross between known breeds whose offspring will usually grow faster, provide flock uniformity and increased egg production. This is often referred to as hybrid vigour. Some examples of hybrids include red sex links, production reds and white leghorns. Once again, personal preference and market will drive the breed selection process.

Heritage breeds are also an option in a layer operation. A benefit of using heritage breeds is the conservation of genetic diversity. Some of the breeds in this category include New Hampshire, Rhode Island Red (Figure 5), Buff Orpington, Minorca and Ancona. Additionally, heritage breeds have adapted to changing environmental conditions and are natural and efficient foragers. Using this type of bird in a pasture-based production system can also be used as a marketing tool.

Some producers prefer to select a breed based on the color of eggs desired. A rule of thumb for brown and white egg layers is the colour of the bird's ear lobes will, in many cases, correspond to the colour of the eggs that they will lay. White Leghorns are among the most popular and productive layers of white eggs, whereas Rhode Island Reds are the second most popular and produce large brown eggs. If more unique shell colour or 'designer eggs' are desired, the Araucana and Ameracana breeds will provide these results. For more information, characteristics of representative breeds of chickens can be found in Table 1.

**Table 1. Characteristics of some representative breeds of chickens**

BREED	Standard		Type of Comb	Colour of Earlobe	Colour of Skin	Colour of Shank	Shanks Feathered?	Colour of Egg
	Weight (lbs)							
	Cock	Hen						
<b>American Breeds</b>								
Plymouth Rock	9 1/2	7 1/2	Single	Red	Yellow	Yellow	No	Brown
Wyandotte	8 1/2	6 1/2	Rose	Red	Yellow	Yellow	No	Brown
Rhode Island Red	8 1/2	6 1/2	Single and rose	Red	Yellow	Yellow	No	Brown
Jersey Black Giant	13	10	Single	Red	Yellow	Black	No	Brown
New Hampshire	8 1/2	6 1/2	Single	Red	Yellow	Yellow	No	Brown
<b>Asiatic Breeds</b>								
Brahma (light)	12	9 1/2	Pea	Red	Yellow	Yellow	Yes	Brown
Cochin	10	8 1/2	Single	Red	Yellow	Yellow	Yes	Brown
Langshan (black)	9 1/2	7 1/2	Single	Red	White	Bluish-black	Yes	Brown
<b>English Breeds</b>								
Australorp	8 1/2	6 1/2	Single	Red	White	Dark Slate	No	Brown
Cornish (dark)	10	7 1/2	Pea	Red	Yellow	Yellow	No	Brown
Dorking (Silver-gray)	9	7	Single	Red	White	White	No	White
Orpington (buff and white)	10	8	Single	Red	White	White	No	Brown
Sussex	9	7	Single	Red	White	White	No	Brown
<b>Mediterranean Breeds</b>								
Leghorn	6	4 1/2	Single and rose	White	Yellow	Yellow	No	White
Minorca (S.C. black)	9	7 1/2	Single	White	White	White	No	White
Ancona	6	4 1/2	Single and rose	White	Yellow	Yellow	No	White
Andalusian (blue)	7	5 1/2	Single	White	White	White	No	White

Source: Neisham et al., 1979

### Starting the Birds

In a pasture-based poultry system, newly hatched chicks will not go directly into the pasture. During the first couple of weeks, an enclosed structure is needed in order to provide temperature regulation, feed and water. This enclosed structure is more commonly known as a brooder. In the case of broilers, the chicks will remain in the brooder for approximately three weeks or until they are sufficiently feathered to withstand climatic conditions. In contrast, chicks that will later become layers will need to remain in the brooder for approximately six weeks. These first couple of weeks will determine the long-term survival, development and health of the flock in the pasture.

The brooder should meet the following requirements:

- One-half of a square foot per bird
- A heat source (infra-red lamps are recommended, have two in case one burns out)
- Three inches of dry bedding such as wood shavings, hay or straw. Try to avoid slippery surfaces like newspaper
- One quart of water for every 25 birds
- Clean feeders. The feeder should be placed near the heat source, but not directly underneath it, and
- Some form of ventilation. Chicks need draft protection, but proper ventilation during the brooding period is very important (DeCubellis, 2007).

During the first week, the temperature in the brooder should remain a constant 95 degrees Fahrenheit. After the first week, the temperature should be lowered five degrees per week for the next two to three weeks and after the third week, the birds are typically ready to be moved into the pasture. The temperature in the brooder can be decreased by raising the heat source. It is very important that fresh water and feed be offered ad libitum (free choice) daily because it is vital for their growth and health once they are in the pastures. Care should be taken to ensure that the feed and water are not allowed to become too warm because this will result in the chicks not eating and drinking as much as they need.

On delivery day, you need to have the brooder up and running 24 hours before the chicks arrive in order to detect any problems beforehand. Also make sure that the hatchery sends the chicks via overnight mail to avoid losses and to get the chicks to starting drinking and eating feed (Figure 6). When placing the birds in the brooder, each bird should be introduced to the water source by dipping their beak directly into the water.

### Conclusion

US consumers are increasingly interested in products they perceive as naturally produced or environmentally-friendly, that provide a high level of nutrition, good flavour, improved welfare for the birds, and provide information about how the food was produced. These interests have led to speciality markets for poultry produced in alternative systems such as free-range or organic (Fanatico, 2007). In Florida, the producers of pastured poultry can meet the demands of this growing segment of consumers. However, the lack of processing facilities is the main challenge that producers will need to overcome either by building their own facilities, retrofitting existing ones or working collaboratively to gain access to mobile processing units.

### Further Information

For production system examples, educational videos, and science-based presentations online visit the pastured poultry virtual field day by clicking [here](#).

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March 2010

## **OTHER**

### **New Issue of Healthy Animals Now Online**

Agricultural Research

By Chris Guy

April 14, 2010

<http://www.ars.usda.gov/is/pr/2010/100414.htm>

The Agricultural Research Service (ARS) today posted a new issue of Healthy Animals. This quarterly online newsletter compiles ARS news and expert resources on the health and well-being of agricultural livestock, poultry and fish. The current issue discusses ARS research on ways to reduce the spread of

cattle viruses. An index lists ARS research locations covering 70 animal health topics. These range from specific diseases, such as Lyme disease to broad subjects such as nutrition or parasites. The site also provides complete contact information for the 25 ARS research groups that conduct studies aimed at protecting and improving farm animal health. To receive an email alert about each issue's online posting, contact Chris Guy, ARS Information Staff, or sign up on line. ARS is the principal intramural scientific research agency of the U.S. Department of Agriculture.

### **Local Analgesia Aids Colt Castration Pain Control**

by: Marie Rosenthal, MS

February 01 2010, Article # 15742

TheHorse.com

Adding a local analgesic to the systemic pain medications used during castration relieved pain in colts, researchers recently reported.

The researchers observed three groups of 12 colts. All of the horses received pain medication before and after surgery. One group received butorphanol, a morphine derivative; one received phenylbutazone, an anti-inflammatory; and the third received both drugs. All of the horses also received an injection of lidocaine into each testicle at the time of castration.

The researchers assessed the horses' pain several times a day before, during, and for four days after castration by reviewing the animals' cortisol levels, pain scores, behavior, body weight, eating and drinking, gastrointestinal motility, and physical activity.

"Our study showed that when a local anesthetic like lidocaine is used under anesthesia, there is no advantage of using butorphanol over phenylbutazone," said Macarena G. Sanz, DVM, MS, Dipl. ACVIM, who was with Washington State University during the study, but is now with the University of Pretoria in South Africa.

Because butorphanol, a controlled substance, is more expensive and harder to administer than phenylbutazone, phenylbutazone might be a better choice for pain management during castration when lidocaine is added. The group did not observe an advantage to pairing butorphanol and phenylbutazone.

"It is important to understand that castration is a surgery, and like any surgery, causes pain," Sanz said. "In the past, we did not pay sufficient attention to the management of the pain and inflammation after castration. The fact that we didn't do it doesn't mean that it is not important. We have all realized the importance of animal welfare. As veterinarians and horse owners it is our responsibility to provide the best care for our animals."

The study, "Analgesic effects of butorphanol tartrate and phenylbutazone administered alone and in combination in young horses undergoing routine castration," was published in the Nov. 15, 2009, Journal of the American Veterinary Medical Association. The abstract is available on PubMed.

### **Common Castration Complications**

(AAEP 2009)

by: Stacey Oke, DVM, MSc

TheHorse.com

January 26 2010

Complications associated with equine castrations occur commonly and should be identified and treated properly in the field, relayed Liberty M. Getman, DVM, Dipl. ACVS, from the University of Pennsylvania's New Bolton Center. She presented "Review of castration complications: Strategies for treatment in the field" at the American Association of Equine Practitioners Convention, held Dec. 5-9 in Las Vegas, Nev.

Even though castration (removal of the testicles) is the most commonly performed surgical procedure in equine practice, it does not mean it is simple or without risk.

"Approximately one-third of all castrations develop some form of post-surgical complication, and these complications constitute the number one reason of malpractice claims against North American veterinarians," said Getman.

Postoperative castration complications that veterinarians see most often include:

- Swelling;
- Infection;
- Hemorrhage;
- Eventration (evisceration, protrusion of intestine through the inguinal ring into the scrotum);
- Peritonitis (inflammation of the lining of the abdominal and pelvic cavities);
- Damage to the penis; and
- Hydrocele formation (a collection of fluid in a cavity; in this case fluid within the vaginal cavity, where the testicle resided).

"Prompt recognition of post-castration complications and expedited application of appropriate treatment is essential in all cases," concluded Getman. "Most cases can be successfully managed in the field, but some cases will require referral to an equine hospital for advanced treatment."

Details regarding field management strategies for the above-described complications were described in Getman's full-length abstract, which is available in the conference proceedings.

### **Scientists learn red grouper operate as underwater architects**

The Washington Post - Monday, March 8, 2010; A05

By Juliet Eilperin, Washington Post Staff Writer

<http://www.washingtonpost.com/wp-dyn/content/article/2010/03/07/AR2010030703126.html>

Red grouper are known for a few key characteristics -- their hue, which can range from pink to bright orange; their tastiness, whether they're grilled or sautéed; and their predation method, in which they ambush fellow sea creatures and swallow them whole.

But their least-known attribute might be the most valuable of all: They operate as underwater architects, transforming the seascape for myriad other forms of underwater life, rather than just residing there. That surprising discovery is forcing scientists and policymakers to recalibrate their approach to preserving the ocean's natural order -- and heightening tensions with those who fish for a living or as a hobby.

A team of scientists, led by Florida State University's Felicia Coleman, recently found that the red grouper off Florida's east and west coasts and throughout the Gulf of Mexico have created entire ocean communities by digging large holes in the sea's sandy bottom. In the same way beavers construct dams, red grouper excavate and maintain distinct holes whose rocky surfaces provide a place for coral, sponges and other marine life to congregate.

The discovery, published in January in the Open Fish Science Journal, highlights the extent to which researchers are just beginning to grasp the complexity of marine creatures' behavior.

"Our view of fish is changing," said Marine Conservation Biology Institute president Elliott Norse, whose group helped fund Coleman's research. "We now see fish as living, breathing entities, not only as meat."

This new understanding is changing the way federal and state authorities manage ocean habitats and is creating a stark new rift with fishermen. "The people who are in control want to prohibit fishing as much as possible," said Bob Jones, executive director of the Southeastern Fisheries Association. He added that the recent revelations about red grouper amount to an "excuse they can use to restrict fishing, commercial or recreational."

But to many researchers, fishery officials and even some fishermen, the fact that fish act as environmental engineers provides a compelling reason to protect them from exploitation.

"If you remove that fish, it puts into motion a whole chain of events," said Don deMaria, who used to fish for red grouper near Key Largo, Fla., but no longer does. "There's a whole lot of other critters that are affected. I'm not saying you can't catch them. But you can't do it to the extent we've been doing for the last 20 years."

Coleman didn't suspect initially that red grouper were capable of such engineering feats. Years ago, she was on a National Oceanic and Atmospheric Administration vessel in the Gulf of Mexico looking at images from a remotely operated camera and noticed the large holes on the sea floor.

"I was just sitting there, thinking, 'Why are there holes?' It came like a flash: The only thing it could be is red grouper," she said.

Coleman and a few colleagues, including her husband, Christopher Koenig, a fellow FSU professor, and Margaret Miller, an ecologist at the NOAA's Southeast Fisheries Science Center, tested her hypothesis. They trapped red grouper in a cage without a bottom; the fish dug out of it. The scientists placed black charcoal the size of sand grains on the sea floor to see whether the fish would move it; they scattered it everywhere.

"They started digging almost right away," Coleman said of the fish, adding that it was almost as if the scientists had offended the grouper's aesthetic sensibilities. "It was like, 'I just cleaned this place.'"

By building complex, three-dimensional structures that expose the hard rock beneath the sand, Miller said, red grouper create an environment in which seaweed, coral and sponges can thrive. These communities then attract everything from cleaner fish to female grouper seeking a mate.

"It's just a very cool ecological story," Miller said. "They really have this tremendous ability in getting these diverse communities of organisms to exist in a place that otherwise wouldn't be there."

Steve Bortone, executive director of the Gulf of Mexico Fishery Management Council, said he and other managers need to consider the environmental impact of red grouper digging patterns when they set future commercial and recreational catch quotas for the species. "We need to take into account this community aspect, which I think has been neglected," Bortone said.

Red grouper are not the only underwater architects. Tilefish construct some of the largest burrows in the sea, forming pueblos similar to those American Indians

built on land centuries ago. In a 2002 scientific paper, Coleman and University of California at Davis professor Susan L. Williams described them as "virtual condominiums of burrows that are oriented horizontally in vertical cliffs."

Thomas Bigford, chief of NOAA Fisheries' habitat protection division, said researchers are looking in a different way at ecosystems they thought they knew. "We're learning the engineering happens at all sorts of different scales, at all sorts of different levels," Bigford said. "It changes the way we do things. It changes what we think of as protected habitat."

### **Bigger Not Necessarily Better, When It Comes to Brains**

ScienceDaily (Nov. 18, 2009) <http://www.sciencedaily.com/releases/2009/11/091117124009.htm>

Tiny insects could be as intelligent as much bigger animals, despite only having a brain the size of a pinhead, say scientists at Queen Mary, University of London. "Animals with bigger brains are not necessarily more intelligent," according to Lars Chittka, Professor of Sensory and Behavioural Ecology at Queen Mary's Research Centre for Psychology and University of Cambridge colleague, Jeremy Niven. This begs the important question: what are they for?

Research repeatedly shows how insects are capable of some intelligent behaviours scientists previously thought was unique to larger animals. Honeybees, for example, can count, categorise similar objects like dogs or human faces, understand 'same' and 'different', and differentiate between shapes that are symmetrical and asymmetrical.

"We know that body size is the single best way to predict an animal's brain size," explains Chittka, writing in the journal *Current Biology*. "However, contrary to popular belief, we can't say that brain size predicts their capacity for intelligent behaviour."

Differences in brain size between animals is extreme: a whale's brain can weigh up to 9 kg (with over 200 billion nerve cells), and human brains vary between 1.25 kg and 1.45 kg (with an estimated 85 billion nerve cells). A honeybee's brain weighs only 1 milligram and contains fewer than a million nerve cells.

While some increases in brain size do affect an animal's capability for intelligent behaviour, many size differences only exist in a specific brain region. This is often seen in animals with highly developed senses (like sight or hearing) or an ability to make very precise movements. The size increase allows the brain to function in greater detail, finer resolution, higher sensitivity or greater precision: in other words, more of the same.

Research suggests that bigger animals may need bigger brains simply because there is more to control -- for example they need to move bigger muscles and therefore need more and bigger nerves to move them.

Chittka says: "In bigger brains we often don't find more complexity, just an endless repetition of the same neural circuits over and over. This might add detail to remembered images or sounds, but not add any degree of complexity. To use a computer analogy, bigger brains might in many cases be bigger hard drives, not necessarily better processors."

This must mean that much 'advanced' thinking can actually be done with very limited neuron numbers. Computer modelling shows that even consciousness can be generated with very small neural circuits, which could in theory easily fit into an insect brain.

In fact, the models suggest that counting could be achieved with only a few hundred nerve cells and only a few thousand could be enough to generate consciousness. Engineers hope that this kind of research will lead to smarter computing with the ability to recognise human facial expressions and emotions.