Editorial

As the Northern hemisphere is hitting summer, it is time to get a refresher on the potential risks linked to heat stress in pigs (Porcine Intestinal Distension Syndrome) and cattle. Dairy and meat production are strongly affected by heat. We see how the control of feed hygiene and digestive fermentations is all the more important in hot weather when trying to help maximize production and animal welfare.

This is also the time to prepare for corn harvest. In this issue, Professor Limin Kung, from University of Delaware, USA, shares with us some tips on silage aerobic stability. You will also read about the effects of probiotics in laying hens on egg quality. In addition, a large dairy farm shares its experience discovering a new application for microbial-based solutions — the environment and manure valorization.

We hope you enjoy this issue, and we are looking forward to hearing your feedback!

The Lallemand Animal Nutrition team

News

- Barcelona hosted the 7th International LEVUCELL® SB Technical Meeting
- Nutritech International and Vitec Nutrition have merged creating New Zealand’s largest animal nutrition and forage additive supplier
- The 2nd Lallemand Aquaculture technical meeting in India was a success

For more news and events, visit: www.lallemandanimalnutrition.com

Science Supported

LEVUCELL® SC REDUCES THE IMPACT OF HEAT STRESS ON BEEF

Heat stress is becoming a growing issue for high producing cattle. In beef cattle, an estimated 10 Kg of body weight gain is lost to heat stress in fattening, which is the equivalent to seven additional days in the feedlot. The temperature humidity index (THI) is an indicator of heat stress. For beef cattle, the heat stress threshold is estimated at 74 (see THI table: http://lallemandanimalnutrition.com/news/heat-stress-is-a-reality-in-europe/). Several trials have been reported in dairy cattle, showing that the use of LEVUCELL® SC live yeast (strain Saccharomyces cerevisiae I-1077) helps stabilize rumen pH during heat stress periods, leading to improved rumen efficiency and milk production in challenging conditions.

+10% performance

Recent trial conducted in an Italian beef feedlot (Isola della Torre Farm; Consorzio agrario del nordeste) indicate similar benefits in beef cattle. The trial was conducted on 54 Charolais bulls from 420kg - 530kg for a duration of 102 days. PH boluses (Smaxtec) were used in six animals (3 per group) to monitor rumen pH variations, an indicator of rumen health and function. As shown previously in dairy cows, rumen pH was shown to be affected by heat stress (Figure 1). Under high THI, rumen pH decreases.

The supplementation with LEVUCELL® SC alleviated the negative impact of heat stress on rumen pH. Rumen pH is higher by +0.37 point (p<0.01) on average. The time spent with rumen a pH below 5.6 is reduced three-fold. During the period of increased THI (62-102 days), the impact of LEVUCELL SC on performance was estimated at 10 Kg of body weight gain (ADG) in fattening, the equivalent to seven additional days.

In terms of performances, the trial showed improved average daily gain of 10% during the whole fattening period, or + 200g/day. LEVUCELL SC appears to be a good solution to manage feed adaptation and heat stress periods in fattening, resulting in improved profit for the farmer due to higher turnover: an estimate 0.42€ can be gained/head/day.

Such innovative research reflects Lallemand approach to define rumen efficiency indicators and draw correlations between the environment (heat stress), rumen pH and growth performance.

BACTOCELL® REDUCES THE RISKS OF SUMMER MORTALITY IN FATTENING PIGS*

A costly issue
Porcine Intestinal Distension Syndrome (PIDS) — commonly called enterotoxemia — is the term used to describe sudden death during fattening. It is a frustrating disease for producers as it cannot be predicted and often occurs at the end of the cycle, affecting otherwise healthy pigs. Some studies have found it to be responsible for 50% of deaths in fattening, so the economic impact of the phenomenon is significant. PIDS generally affects older pigs weighing between 70 and 90 kg, and the deaths almost always occur with no warning signs. Necropsy often reveals intestinal torsion, the presence of blood and intestinal distension caused by gas production.

PIDS: A chain reaction
The first signs are unusual feeding behavior and abnormal feed intake (eating too quickly, too much, or irregularly), which disturb the microflora in the colon. This flora imbalance produces gas and increases blood flow, which compresses the mesenteric vein. This causes a chain reaction. First, the intestine “suffocates” and lets some pathogens in (releasing toxins), while other undesirable microorganisms develop more rapidly.

A greater risk in summer?
An upsurge in sudden deaths is observed in farms during the summer months. This phenomenon might be explained by the effect of higher temperatures. In the heat, feed intake becomes less regular and microorganisms develop more rapidly.

The benefits of BACTOCELL in fattening
BACTOCELL® (Pediococcus acidilactici MA 18/5M) is a live lactic acid bacterium, and its metabolism:

- Acidifies liquid feed, making it more palatable and easier to digest
- Controls hygiene of the distribution system and of the liquid feed by balancing the microflora
- Stabilizes pigs’ intestinal microflora

In farms, producers regularly report the positive effects of BACTOCELL® in fattening pigs. Figure 1 summarizes the evolution of the mortality rate in various farms following BACTOCELL implementation in liquid feed. In the five farms followed, an improvement in mortality was consistently observed with BACTOCELL, regardless of original circumstances of death. Economic impact was evaluated for each farm by considering 80 kg pig losses and taking into account standard data for piglet cost, feed price and zootechnical performance of the fattening phase.

These field data and the well-known modes of action of BACTOCELL indicate a potential to help manage pig digestion during fattening in an overall prevention strategy of summer mortality.

PROBIOTIC IMPROVES EGG QUALITY *

Egg quality encompasses multiple criteria (eggshell quality, yolk color and composition, etc.) and can have economic implications for layer producers. As egg quality is strongly related to hens’ nutrition, let’s see how a probiotic can help improve egg quality and represent a safe and natural tool to enhance egg production.

Less broken eggs
BACTOCELL® (Pediococcus acidilactici MA 18/5M) modes of action have been well documented. These are translated into beneficial effects on laying performance. In addition, several trials indicate benefits on egg quality.

The most economically significant benefit is the probiotic’s effect on eggshell thickness and relative weight. Various trials, performed under different rearing conditions show that BACTOCELL supplementation results in lower downgraded eggs rates (Figure 1).

In the Polish trial¹, the number of broken eggs has been reduced by half and shell-less eggs have been reduced by two-thirds. The authors also measured 8% higher calcium retention in the supplemented group (p=0.064). Eggshell is made of around 38% calcium. It could thus be hypothesized that the probiotic, through its positive effect on the digestive process, increases calcium assimilation, which is translated into thicker, stronger eggshells.

Inside effect
Probiotics benefits do not stop at the shell. Various research trials have shown that egg biochemical parameters such as yolk pigmentation or yolk cholesterol content can be managed with BACTOCELL supplementation. The effect on cholesterol, interesting in terms of consumers’ health and acceptance, suggests an implication of the lactic bacteria in lipids metabolism. It is possible that probiotics could assimilate the cholesterol present in the gastrointestinal tract for their own cellular metabolism.

Figure 1 - Effect of BACTOCELL on the downgraded rate in different research trials (p<0.05).

Figure 1 - Evolution of mortality rate in fattening after BACTOCELL implementation (farm results, France).
Altogether, these data indicate a real added benefit for BACTOCELL on egg quality and production valorization, in addition to laying performance.

2-Alleman et al., 2011. 30th Poultry Science Symposium, 7-9 Sept. 2011
3-Denev S. et al., 2013. 10th JRAs, La Rochelles, 26-28th March 2013.

**PRACTICAL BENEFITS**

**HEAT STRESS IN DAIRY COWS: THE VIEW FROM JORDAN**

“With the changing climate, Jordan farms are more and more facing heat stress conditions,” says Abdelrahman Ghooday, Lallemand Animal Nutrition ruminant expert, in the Middle East. “In such high stress conditions, the cow’s rumen function is affected (lower rumen pH, with consequences on rumen microbiota, increased acidosis risks and more). Controlled trials with Saccharomyces cerevisiae I-1077 (LEVUCELL® SC) supplementation have shown that the live yeast has the ability to improve the cow’s response to stressful situations, which is linked to a beneficial effect on the rumen environment and function.”

Well-controlled trials with LEVUCELL SC show that:

- Rumen pH is improved.
- The detrimental effect of heat stress on rumen pH is reduced.
- The number of cows in the herd under acidosis is reduced by 4 to 5 times.
- Rumination is improved, which is a good indicator of digestive comfort and welfare. Under heat stress, the number of cows achieving optimal rumination time (400-500 min/day) is increased by 25% with the live yeast. This increased rumination will induce and increase saliva production, helping the animal to maintain optimal rumen pH.
- Feed efficiency is improved by around 7%.
- Fiber degradation is improved.

Most of the visible indicators (see diagram) of rumen efficiency are regularly reported at the farm level. The expert added, “Those tools are relevant to discuss with dairy farmers and monitor cows’ rumen efficiency on farm.”

**Improved milk fat and protein**

A dairy producer from Jordan has observed many of these signs after implementation of LEVUCELL SC in his herd during heat stress: “We have seen an important improvement of fiber degradation, thanks to the manure screening test. In addition, we are seeing better starch digestion as we are observing less cows with sticky dung around the tail head. There is no acidosis in this herd. With the aid of LEVUCELL SC, we have been able to use lower quality forage without affecting milk yield or milk composition: milk fat and protein where improved and remained stable.”

**DID YOU KNOW?**

**PROBIOTICS ARE RECOGNIZED FOR THEIR ANTI-STRESS EFFECT**

In both ruminants and monogastrics, we have been talking more and more about the relationship between the “gut-brain axis” and the digestive microbiota and the effects certain probiotics or microbiota management approaches could have, for example, on animal feeding behavior and welfare. The Canadian Health Authorities have now approved for the first time health claims in the gut-brain area for a probiotic (Probio'Stick®, Lallemand Health Solutions), recognizing benefits on stress, anxiety, and mood balance (such as “helps to moderate general feelings of anxiety,” or “promotes a healthy mood balance,” etc.).

These claims are based on two clinical studies. In the first study, it was proven that, in chronically stressed people, gastrointestinal symptoms linked to stress were reduced. The second study looked at the psychological symptoms of stress, anxiety and depression in stressed individuals and demonstrated the probiotic also played a role on psychological signs. These are, to date, the first and only conclusive human studies in this area.

No doubt it is extremely promising that probiotics could represent safe and natural alternatives for stress management.

1- Diop et al., 2008 Nutr Res 28(1) 1-5
2- Messaoudi et al., 2010. Br J Nutr 26 1-9
Manure represents important fertilizing value. However, manure management, from the farm to the field, can be challenging — especially in large herds.

In the SCL Lait Pis Carde, in the North of France, each day, 90-100m³ manure must be turned from waste to valuable fertilizer. Since the farm started in September 2014, a phase separator was set up, which produced solid manure amounting to about 8,000 tons per year. The enzymatic and bacterial complex MANURE PRO is applied to the solid manure for treatment. The objectives of such treatment are: reduction of odors and volume to handle, as well as increasing manure fertilizing value, including increasing nitrogen and phosphorus levels.

The enzymes and bacteria contained in MANURE PRO enabled the farm to positively control the fermentation of the solid phase and lead to a:

- 30% reduction of the volume to handle after four months in storage,
- A compost-like aspect
- A stable product (lower carbon:nitrogen ratio), with higher levels of fertilizing elements (nitrogen and phosphorus).

The bacteria, fed on the sugar released by the enzymes, are able to retain a m o n i a c , preventing its volatilization, and thus increasing the nitrogen value of the manure. As a result, the nitrogen level is increased by 50% at the end of the storage period.

Michel Welter, Farm Manager, explains: “At the end of the treatment period, the manure consistency is close to compost and ‘powdery’, hence easier to spread in the fields. Crop management is simplified since we now have a good fertilization plan due to the homogenous repartition of the product, which is better valorized. Moreover, the unpleasant odors have been replaced by an undergrowth-like smell, which is much more pleasant for us but also for our neighborhood!”

**FEED UPDATE**

- Feed Update is published by Lallemand with the purpose of keeping the feed business informed about new developments and tools arising from research.
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