

**SPECIFIC
FOR YOUR
SUCCESS**

IN THE MIX

#61
SPRING 2023



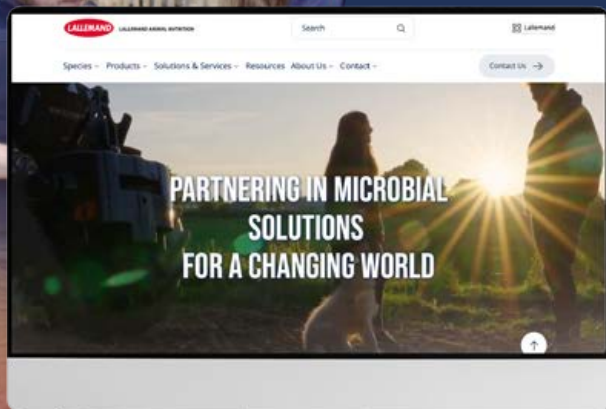
***PARTNERING IN MICROBIAL
SOLUTIONS FOR A
CHANGING WORLD***

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DISCOVER OUR NEW WEBSITE



Welcome

Partnering in microbial solutions for a changing world

With this new edition of *In The Mix*, we are thrilled to introduce our new brand image, encapsulated in the slogan: *Partnering in microbial solutions for a changing world*.

This is also reflected in our revamped website, **www.lallemandanimalnutrition.com**. With an enhanced design, the website provides an elevated user experience, complemented by a comprehensive media library featuring technical articles, expert webinars and podcasts.

The world has changed since we first introduced our brand — and so has our portfolio. Today, it is one of the broadest range of innovative microbial products, services and solutions for customers around the world, from forage to nutrition and the animal environment.

With our refreshed brand image, we reaffirm our unwavering dedication to supporting our valued customers and end-users in their day-to-day operations, reflected in our captivating sunrise to sunset visual theme. Our goal is to assist our partners in adapting to the ever-evolving challenges related to well-being of livestock, companion animals and more.

Thanks for your continued support.

Alex Turney - Country Manager

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DID YOU KNOW?

Saccharomyces boulardii was discovered in Vietnam 100 years ago ... and it comes from lychees.

Long before the land became known as Vietnam, following on the footsteps of microbiologists Alexandre Yersin and Louis Pasteur, Henri Boulard was trying to understand why locals were dying from a cholera epidemic, which was marked by severe diarrhea.

He observed those who survived drank a tea from lychee fruit skins. In 1923, upon further research, the microbiological analysis of the preparation of the skins revealed a tropical strain of *Saccharomyces* yeast that developed at a high temperature for yeasts (37°C), the temperature of the human body. The yeast did not have a name, so he gave it its own name: *Saccharomyces boulardii*.

Since then, *S. boulardii* has been documented in several acute and chronic gut disorders with 100+ clinical studies and 300+ scientific publications in human medicine.

Almost a century after its discovery, new applications are still being investigated by the scientific community, revealing the power of this unique yeast strain has for both human and animal health.

Today, the *Saccharomyces boulardii* strain is the only yeast strain used as a probiotic in human nutrition and medicine.

To learn more about this story visit:

<https://lallemandanimalnutrition.com/en/australia/sboulardii-levucellsb-origins/>



NOT ALL YEASTS ARE EQUAL:

Discovered just a century ago by Dr. Henri Boulard in Vietnam, the yeast *Saccharomyces cerevisiae* var. *boulardii* is today the most documented and widely used probiotic in human medicine and animal nutrition. Its benefits on gut health and feed digestibility are undeniable.



What makes *Saccharomyces cerevisiae* var. *boulardii* so unique?"

Unique structure

First, *S. c.* var. *boulardii* is part of the large *S. cerevisiae* species. When compared to other *S. cerevisiae* yeast, *S. c.* var. *boulardii* has a distinctive shape and characteristics:

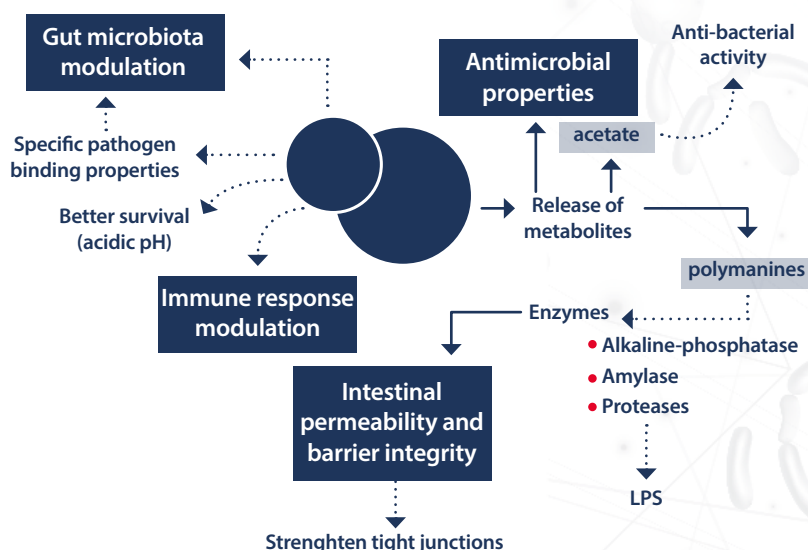
- It can grow under both aerobic and anaerobic conditions.
- It harbors a thicker cell wall than other *S. cerevisiae*.
- It is resistant to bile acids and to gastric pH.
- It survives well in the conditions of the gastrointestinal tract.
- Due to its specific cell wall structure, *S. boulardii* exhibits an interesting pathogen binding capacity.

Highly functional metabolites

It has been proven that *Saccharomyces cerevisiae* var. *boulardii* produces specific metabolites of great interest towards undesirable bacteria and their toxins, as well as supports the host's immune response. For instance:

- **Antimicrobial and antitoxin peptides**, such as a protease which are able to inhibit the binding of *C. difficile* toxin A and B to specific intestinal receptors.
- **Acetate**: New studies have shown *S. c. boulardii* CNCM I-1079 has the unique ability to produce **high levels of acetic acid** (about 7g/L). Acetic acid can induce antimicrobial properties thanks to its anti-bacterial activity and represents a substrate for gut microflora populations that produce butyrate.
- **Polyamines**: *S. boulardii* secretes polyamines, which play a role in gut maturation and regeneration (e.g. enhancement of the brush-border enzymes that have, among other effects, a crucial role in the energy intake process).
- **Unique set of enzymes**: Alkaline-phosphatase plays a part in dephosphorylation of bacterial LPS, amylase, sucrase, glucosaminase and n-aminopeptidase.

Our unique *S. boulardii* CNCM I-1079 yeast strain is supported by more than 60 dedicated publications. It is available in a unique microencapsulated form, Titan, for inclusion into various feed forms, including pelleted feed.





Rumen health seminar: Understanding rumen function

A technical seminar to highlight the advances that have been made in ruminant nutrition.

More than 70 livestock nutritionists and consultants were treated to a showcase of research and technology for managing rumen health at this year's Lallemand Animal Nutrition Rumen Health Seminars held in Toowoomba and Melbourne recently.

This year's program featured speakers from Canada, USA, Ireland and Australia, who presented new ideas about reducing the incidence of acidosis in early lactation; applying the Cornell Net Carbohydrate and Protein System (CNCPS) to forage-based diets; the importance of physical effective fibre on digestibility, dry matter intake and cow health; and how forage testing is the cornerstone of providing consistent, high quality and cost-effective rations.

"A well-functioning rumen is the key to optimising cow health, fertility, production and ultimately, the profitability of any dairy enterprise," Lallemand Animal Nutrition Country Manager, Alex Turney, says.

"These seminars allowed everyone to brush up on their current knowledge and to learn about new research and technologies about rumen health.

"Just as importantly, it provided an opportunity for participants to network with their industry peers."

Speaking at the event was:

- Prof. Ian Lean & Dr. Helen Golder, Scibus
- Prof. Greg Penner, University of Saskatchewan
- Dr. Mike Dineen, TEAGASC
- Tony Hall, Lallemand Animal Nutrition
- Cliff Ocker, Rock River

The seminar also saw the launch of Lallemand Animal Nutrition 'Cleanfeed' initiative.

"Cleanfeed is an integrated approach that ties animal well-being, performance and environment together," Alex says.

"This starts with using strain-specific forage inoculants to optimise fermentation and reduce wastage and then protecting nutritional quality with the use of oxygen barrier film, reusable UV covers and environmentally-friendly gravel bags during storage.

"The next step is optimising rumen function using strain-specific probiotics, yeast derivatives and antioxidants so your cattle can make the best use of that silage.

"Finally, it's important to create a beneficial microbial environment in the livestock premises to prevent the build-up of undesirable pathogens, to reduce or ideally eliminate odours and to facilitate the efficient composting of manure and bedding material.

"Lallemand has scientifically-proven solutions that can be used at every stage of the Cleanfeed process."



*Prof. Ian Lean
Scibus*

*Dr. Helen Golder
Scibus*

Rumen health seminar: Understanding acidosis

Key points

- **Acidosis remains a prevalent disease in Australian and US dairy cows.**
- **There are different types, causes and severity of acidosis.**
- **Rumen pH is only a moderately useful tool for diagnosis.**
- **Monitor cows, including feeding behaviour and production data.**
- **Maintain optimum rumen health and function by providing a consistent, balanced ration.**

With the average 300-cow dairy herd recording up to 4500 cases every lactation, ruminal acidosis remains the most prevalent disease affecting dairy cows in Australia.

Speaking at the Lallemand Animal Nutrition Rumen Health Seminar, Professor Ian Lean, says that many studies find about 10% of cows are affected at any one time and the case duration is two days.

"That equates to 1500 cases per 100 cows each 300-day lactation," he says.

Dr Lean says despite the plethora of terms used to describe acidosis; they simply represent a spectrum of severity.

"Everybody loves to categorise things," he says.

"We've got lactic acidosis, ruminal acidosis, acute vs. sub-acute acidosis, clinical vs. sub-clinical acidosis and hindgut acidosis.

"Then we've got the sequelae of acidosis, such as liver abscess and laminitis, which are their own separate disorders but have acidosis as their cause."

"Are these definitions really useful?

"The answer is 'yes' because understanding the root causes aid in treatment and management.

"It does matter what you call it, what we are really looking at is a continuum of severity."

Professor Lean defines ruminal acidosis as being a 'complex of conditions related to the

rapid increase or change of rapidly-fermented carbohydrates when there is insufficient physically effective fibre, leading to an accumulation of organic acids that reduce microbial protein yield, fibre digestion and dry matter intake.'

"Rumen pH is only one factor that causes pathology and measuring rumen pH – whether it's less than 5.0, less than 6.0 or an average of 5.6 for three days – is far too simplistic to describe acidosis," he says.

"Rumen pH varies from cow to cow, feed, substrate, hour-to-hour, day-to-day and even within the rumen itself.

"Acidosis severity is ultimately based on the animal's ability to safely sequester hydrogen, i.e. the amount and speed of hydrogen creation and distribution. The hydrogen comes from the process of digesting feeds. Sugars and starch are digested more rapidly than forages and release hydrogen more readily.

"So how should we be assessing rumen function and acidosis risk, which is effectively a measure of hydrogen, if rumen pH is not the best measure?

"Go and listen to what your cows are telling you.

"Look at their rumen fill, the percentage of your cows that are ruminating or any sudden changes in their body condition score.

"Look for the evidence of grain, bubbles or smell in their faeces. Is there scouring? What is the incidence of lameness?

"Is the feed fully pushed up in the feed pad? Has there been sorting? What's the chop length? Do all the cows have equal access to feed?

"Look at your milk production history, particularly the milk fat: protein ratio – is it below 1:1?"

Professor Lean says the best way to manage acidosis is to create and maintain a stable and healthy rumen environment.

"And that's a rumen that has been adapted

to consistently receive a well-balanced ration with adequate protein, physically effective fibre, carbohydrates, fat, vitamins and minerals with fast, medium, and slow-fermenting components suitable for the physiological stage of the animal," he says.

"Determine feed value of all feed components and adjust the ration accordingly.

"Include rumen modifiers and buffers at the correct dose rate and ensure all ingredients are correctly processed.

"Adapt cattle to new feeds, avoid rapid feed changes and supply a transition ration for 21 days before calving.

"Feed at regular intervals rather than 'slug' feeding and ensure all cows, particularly heifers, have equal access to feed."

One of Professor Lean's colleagues, Dr Helen Golder, who has a strong record of investigating acidosis has explored genetic markers for susceptibility or resilience to acidosis. Her work is the first to link the genetics of the cow to the bugs in the rumen and rumen function.

Dr Golder found evidence of interaction between the rumen environment (particularly rumen phyla, sugar and CP), milk production and genetics.

In one of her studies conducted in Australia, the USA and Canada, 26% of cows were classified as being at high risk of acidosis based on their rumen phyla, rumen fermentation and production data.

A further 27% were classified as being at medium risk and 47% as low risk.

"We have found genetic markers for rumen environment, but as yet, not for acidosis susceptibility," she says.

"The key finding of this part of my research is that more is required, particularly a larger sample size. However, she is confident that further work will identify means to produce a better adapted cow."



Prof. Greg Penner
University of Saskatchewan

Rumen health seminar: Managing acidosis starts with the transitional COW

Key points

- **Ruminal acidosis remains a significant challenge, particularly in early lactation.**
- **Transition cows are particularly at risk due to a temporary drop in DMI that occurs prior to calving and can occur in association with metabolic disorders and/or infectious disease before and after calving.**
- **Decreased DMI causes a rapid and long-lasting impact on rumen absorptive area, impacting the animal's ability to balance acid production with buffering, acid absorption and passage.**

Transition cows are at an increased risk of ruminal acidosis during early lactation due to a 'perfect storm' of low feed intake prior to and at calving, increased feed intake after calving, abrupt dietary change and increased competition for feed, suppressed immune function and inflammation.

It is estimated that 19–26% of dairy cows are affected by sub-acute ruminal acidosis during early lactation and mid-lactation and 12–30% across the entire lactation based on a rumen pH of 5.6.

However, according to a global authority on the subject, Dr Greg Penner, the true prevalence and severity of acidosis is probably even greater.

Dr Penner's own research shows that the prevalence of sub-acute ruminal acidosis increases markedly during the first 60 days of lactation, peaking at about three weeks.

"Surprisingly, the severity of sub-acute ruminal acidosis during early lactation does not appear to be correlated to increased dry matter intake after calving but rather reduced feed intake before calving," he says.

"This suggests that other factors, such as the adaptation of the rumen epithelium, rumen microbes and changes in eating behaviour, are involved.

"Feed intake decreases by about 30% during the eight weeks before calving, with about 90% of this happening in the week before calving.

"We need active rumen function (motility) to expose bacteria to feed substrates and then to expose volatile fatty acids to the gastrointestinal tract.

"While not commonly discussed, the rumen wall is a significant supplier of bicarbonate to the rumen via volatile fatty acid absorption and this is significantly higher than salivary bicarbonate.

"Reducing DMI reduces the amount of substrate for the bacteria to work with – and therefore the cow's ability to absorb volatile fatty acids.

"In turn, low feed intake alters intestinal morphology, reducing the height and width of villi and therefore the absorptive area.

"It takes six to eight weeks to optimise the absorptive area in the rumen and only about five days to negatively impact it, so even sub-acute ruminal acidosis has a lasting impact on the balance between acid production and acid removal."

Dr Penner says even a temporary reduction in feed intake can have acute and drastic effects on the gastrointestinal tract.

"Our work has shown that a five-day decline in feed intake can reduce the absorptive surface area in the rumen and the intestine and the size of the rumen, intestine and liver," he says.

"These are the organs that allow the cow to digest her feed and absorb the nutrients she needs to promote the onset of lactation.

"Any negative impact on gastrointestinal tract function makes the cows susceptible to ruminant acidosis at exactly the same time as feed intake is starting to increase.

"This impairment also increases 'leakiness', the ability for bacteria or antigens to cross the gut barrier."

Dr Penner says the goal is to manage cows through the transition phase to minimise insults to the gastrointestinal tract that will cause them to reduce dry matter intake.

"We want to get them off to the races and accelerate dry matter intake and nutrient absorption after calving to support maintenance and lactation," he says.

"It's really not about increasing dry matter intake after calving but preventing the negative interactions that will cause a marked decrease in dry matter intake before calving.

"For example, is there feed in the bunk? Is the feed spread out across the whole bunk? Has every cow got access to that feed?

"It's all about refining your management system to make sure every piece is correct to give those cows the best chance they have to succeed.

"Traditionally, the thinking has been to steam-up transition cows up by increasing energy density to make sure we're meeting their nutrient requirements, despite the reduction in intake.

"We've found that actually reduces dry matter intake more as those cows approach parturition, so we can actually make the situation worse.

"We've shifted away from those nutrient-dense diets more to a controlled-energy type diet.

"We also know that over-conditioned cows have a greater reduction in dry matter intake as calving approaches."



Dr. Mike Dineen
TEAGASC

Rumen health seminar: Improving the productivity and nutrient use efficiency of pasture-fed cows

Key points

- **An Irish research team, in collaboration with Cornell University, have adapted the Cornell Net Carbohydrate and Protein System (CNCPS) model to increase the model's prediction capability under pasture-based settings.**
- **By adopting the CNCPS model and new developments in feed chemistry into their research programme, the team have generated new insights into the ruminal fermentation, microbial protein synthesis and nutrient supply of pasture-fed cows.**

Cutting-edge nutritional research, being undertaken in Ireland, is unlocking new understandings of dry matter intake (DMI) regulation, rumen function and N metabolism in grazing dairy cows.

Dr Michael Dineen says well managed pasture-based systems can sustain high levels of animal performance through a keen focus on plant maturity and pasture management.

"Pasture-based dairy systems robustly convert human inedible feed into highly nutritious food, while supporting a resilient business model for the producer" he says.

"The challenge now is how to further increase productivity, to meet rising consumer demand, in an environmentally benign manner".

"There are a number of potential solutions available such as alternative pasture species, genetically improved plants and/or optimised supplementation strategies. However, to understand which solution may be optimal we first need to understand what is limiting animal performance"

"Limiting factors could potentially include rumen physical fill, metabolisable energy supply and metabolisable protein or amino acid supply"

The research team utilised the latest version of the CNCPS (version 7.0) and new in-depth feed chemistry to gain a greater understanding of these potentially limiting factors.

"We applied the new developments in fibre digestibility analysis, from the Van Amburgh lab at Cornell University, to our immature pastures and discovered the huge capacity of these pastures to digest rapidly."

By slightly adapting the analysis (i.e. adding an additional fermentation time point) the researchers were able to quantify the rapid digestion behaviour by fractioning the pasture fibre into 3 distinct digestion pools of fast, slow and indigestible fibre.

"Immature pasture fibre is primarily comprised of a large fast pool, which can digest at 20%/h, and small pools of slow and indigestible fibre."

These fibre pools have been demonstrated to impact animal variables such as DMI, rumen pool size, rumination and milk production.

"A large fast pool appears to result in faster ruminal disappearance, higher intakes, faster eating and more ruminal buoyancy leading to greater chewing and rumination."

As the fibre digestibility analysis was performed in the laboratory, the researcher wanted to confirm the digestion characteristics that they were observing in vivo.

"We performed an omasal sampling experiment which allowed us to quantify ruminal fibre digestion in the cow. When we offered the cows immature pasture, their rumens had a massive capacity to digest the fibre, over 70% of fibre consumed and over 80% on a total-tract basis."

The researchers then compared the in vivo observations with CNCPS predictions.

"When the model was provided with comprehensive inputs from the new fibre digestibility analysis the model could predict within 200 g of the observed in vivo fibre digestion, which also improved the model's ability to predict actual milk production" Michael says.

The researchers are now applying these tools within their research programs to describe the effect of factors such as season, weather conditions and plant genetics on animal productivity.

"The tools are unlocking the mechanisms behind rumen fill and turnover, which is helping to describe how plant species, such as white clover, can increase dry matter intake and milk solids production within our systems"

"We also wanted to utilise the CNCPS and the omasal sampling technique to gain a greater understanding of the N metabolism in pasture-fed cows. We discovered that although pasture can be high in protein, the protein is extremely digestible and there may be opportunity to refine amino acid supplies."

The researchers are now utilising these new insights to refine nutritional strategies for improving the productivity and nutrient use efficiency of pasture-fed cows.



Tony Hall
Lallemand Animal Nutrition

Rumen health seminar: Unlocking the benefits of fibre

Key points

- **Fibre plays a key role in rumen function.**
- **Regularly test for physically effective fibre.**
- **Ensure cows have sufficient ruminating time.**

Ensuring cows have access to physical effective fibre and sufficient time to ruminate is essential for maintaining rumen function, animal health and productivity.

Lallemand Animal Nutrition Technical Services – Dairy, Tony Hall, says fibre is a key determinant of digestibility, rate of passage through the gastrointestinal tract and dry matter intake.

“Our number one goal is to make sure the ration is digestible in the animal,” he says.

“Digestibility liberates the energy in the ration for the animal that will contribute to milk production or improvements in body score and fertility.

“The second goal is to make sure the ration is palatable.

“Finally, we want to make sure the ration is hygienic and does not contain anything that’s going to make them sick, disrupt rumen function or steal nutrition that should be available for the cow.

“Digestibility, palatability and hygiene go hand-in-hand with good ensiling method – cutting at the right growth stage, using a strain specific inoculant, keeping oxygen out of the bunk and managing the face during feeding out.

“Good ensiling makes sure as much of the nutrients that were in the paddock are presented to the cow, reach the rumen and are digested, rather than being wasted along the way.” Tony encourages producers to measure

physically effective fibre rather than Neutral Detergent Fibre (NDF).

Physically effective NDF considers the physical characteristics of a feed, particularly particle size, that influence chewing activity, the production of saliva and the mixing of liquids and solids in the rumen.

“Physically effective NDF should represent at least two least two thirds of the total dietary NDF,” Tony says.

“Knowing the level of physically effective fibre allows you to replace a forage or roughage in the ration so that the percentage of milk fat produced is effectively maintained.”

Forage fibre particles greater than 1.18 mm using a vertical separation test (Ro-tap sieve shaker) or greater than 4.0 mm using a horizontal separation test (Penn State shaker box) are considered physically effective.

“Even the simplest comparison of a fresh TMR or PMR before and after feeding shows that cows can easily sort ingredients by size,” Tony says.

“They don’t want to eat the long particles because they want to consume the most nutrients for least effort.

“Dry TMRs and PMRs are particularly prone to being sorted.

“Likewise, that’s why baled silage is not a great complement for PMR systems – your cows going to spend all day sorting out or chewing through the longer chop length.

“Everything is a trade-off.

“Coarse rations reduce DMI because the cow has to chew more when eating and is less efficient in terms of feed conversion.

“Processed rations increase DMI, rumen fermentation, acetate:propionate ratio and feed conversion efficiency – but can depress milk fat.” Tony says one of the greatest benefits of intensive feeding systems is that it gives cows

more time to do what they are designed to do – ruminate, especially while lying down!

“Digestibility and rate of passage are a delicate balance,” he says.

“Cows have to be able to digest forage – but they also need sufficient time to actually absorb that digested forage before it is passed.

“We want our cows to eat everything that is presented and then go lay down and chew the cud.

“Rumination, the process of turning the rumen over, gets the fatty acids mixed in and close to the rumen wall, where they can be absorbed.

“Grazing cows are really busy – they have to walk to and from the dairy, eat as much as they can, walk to water and then walk back to the dairy.

“They simply don’t have enough time to get everything done in a 24-hour block of time, particularly eating enough and ruminating.

“Providing a TMR or PMR feeds turn the table in your favour by maximising DMI.

“Cows eating a TMR can consume 50% more feed in half the time, which gives them 50% more time for ruminating or lying down.

“In effect, TMR-fed cows are eating for 4 or 5 hours a day instead of say, 9 to 11 hours a day.

“That’s an extra 5 or 6 hours when they could be ruminating, lying down, and making more milk component yield.”

A cow’s day:

	TMR-fed cows	Pasture-fed cows
DMI (g/minute)	100-210	30-45
Eating time (minutes)	240-300	540-650
Rumination time (minutes)	480-540	330-400
Lying time (minutes)	720-810	510-570
Social, drinking, milking time (minutes)	405 max	305 max



Cliff Ocker
Rock River

Rumen health seminar: Regular forage analysis pays

Key points

- **Test all forage and key feed ingredients regularly.**
- **Be sure to submit representative samples using correct sampling techniques.**
- **Adjust ration for variation to keep a consistent diet.**

Regular testing of forage and feed ingredients can more than pay for itself by providing a consistent, high quality and cost-effective ration to livestock, according to keynote speaker, Cliff Ocker.

Cliff is the Director of Sales & Client Relations with Rock River Laboratory, a leading provider of analytical services to the agricultural industry in North America, South America and Europe.

"It's all about consistency because that's what cows like," he says.

"Any change in consistency affects livestock performance."

"One of the most important ways of keeping a consistent diet in front of them is to regularly assess the nutritional value of forages and feedstuffs."

"Some of our dairy customers in the US are sampling two and three times a week, which allows them to adjust diets before their cows tell them something's different or wrong."

"The end goal is to remove any fluctuations in average daily gain or milk production."

Cliff says routine testing can easily pay for itself in improved livestock performance and reduced feed costs.

"It's unbelievable how much profit is tucked away in there," he says.

"Say you were making a 18% CP feed using a mix of canola and corn."

"If testing showed the protein content of canola delivered had increased from say, 40% to 43%, you might be able to save \$5 tonne in the cost of delivered feed by reducing the amount of canola in the ration."

"Multiply that by a couple of hundred tonnes and the value of testing can quickly stack up."

"You can achieve major savings from measuring and adjusting just one ingredient – imagine if you do it for multiple ingredients."

Cliff says correct sampling technique is essential.

"Testing feedstuffs is like sighting a rifle," he says.

"The more shots you fire, the more you are going to get a better understanding of your accuracy and consistency, we can't pull a 100% representative sample each time."

"The average of three samples is going to be more accurate than one – and the average of 10 samples is going to be more accurate than three."

"The rules are simple: sample all the major feed ingredients routinely, particularly those that vary the most; collect representative samples; and adjust your ration for any real variation."

Cliff says improper sampling technique is the greatest source of error in forage analysis.

"A testing laboratory can determine the quality of the sample submitted – but it's not going to be very helpful in balancing a diet if the submitted sample was not representative of what's actually being fed," he says.

"When testing silage, take five to eight samples from across the face in a 'M' or 'Z' pattern."

"Take one sample at each point of the letter and half-way in between each point. Place these samples in a bucket, mix well and sub-sample from here to send to the lab."

Cliff says modern analytical methods, such as total tract neutral detergent fibre digestibility (TTNDFD), can provide a more accurate measure of fibre digestibility.

"Don't just look at traditional measures of quality like dry matter, crude protein, starch, fibre and ash – what really counts is whether your cows can actually use these nutrients," he says. "How digestible are they?"

"Determining NDF quality based on a single digestibility test at 30 hours is like watching a movie for one scene and then trying to guess what the ending's going to be."

"TTNDFD, a totally different concept, looks at 4 different NDF Digestibility time points to gain a better understanding of the rate of passage and utilisation through the digestive tract."

"It tells you what's actually happening in the rumen, not in a laboratory."

"A two- or three-point change in TTNDFD (in a diet) can correspond to a 0.5 litre/day change in milk yield."

Cliff says it is also important to monitor processing levels in silage.

"The way we measure this is by looking at the percentage of starch that will pass through a 4.75 mm screen while being shaken for 10 minutes on a Ro-Tap Sieve Shaker," he says.

"Properly processed corn silage should have a processing score of more than 60% and ideally, more than 70%."

"Conversely, poorly processed corn silage will lead to lower rumen starch degradation and lower total tract digestibility."

Maintaining bedding quality can benefit udder health



Did you know that a cow spends at least 12 hours per day lying down, either resting or ruminating? It is easy to understand how the microbial quality of the bedding and manure — that are in close contact with the udder for so long — is an important factor to help maintain a healthy udder and reduce the risk of environmental mastitis.

■ From bedding to udder health

Mastitis is considered the most common disease in dairy cows. About 70% of mastitis cases are caused by bacterial infections.

Research has shown a direct correlation between the number of coliforms in the bedding material and on the cow's teats. This environment also can increase the risk of high somatic cell counts (SCC).

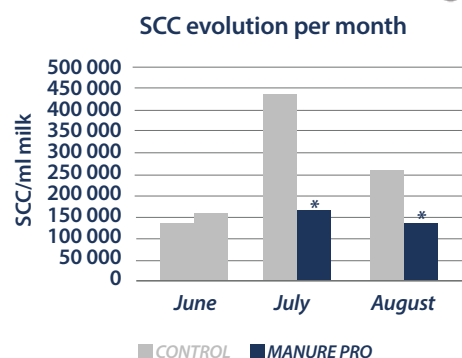


Figure 1.

Effect of MANURE PRO on the somatic cell count in milk (Lallemand Animal Nutrition, internal data, 2021)

■ A microbial management approach

Let's look at cow bedding from a microbiological point of view. We know that bedding harbors important microbial populations, organised in ecosystems. Optimising the balance of these microbial ecosystems through bedding and manure microbial management represents a valuable solution to help maintain a safe and more hygienic environment for the animal.

Studies have shown the inoculation of the bedding/manure with beneficial bacteria and enzymes, such as MANURE PRO, promote the development of these beneficial microorganisms to help maintain bedding quality.

■ Field results

A study conducted in the Czech Republic from June to September 2021 to assess the link between microbial inoculation of bedding and manure using MANURE PRO to udder health and milk quality (as measured by SCC and milk flora).

Prior to the trial, the farm had a history of high mastitis prevalence, and 90% of the time the disease was caused by environmental contaminants as analysed by farm cultures. The herd experienced peaks during the summer months.

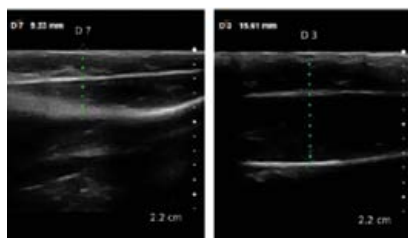
The study confirmed that MANURE PRO helped maintain bedding quality, resulting in:

- A low SCC level in milk maintained during the summer months (Figure 1)
- Reduced risk of being over 250,000 SCC by 5.3 times on average
- Tended to reduce risk of environmental mastitis

In combination with good management practices, the use of MANURE PRO is a tool to help maintain bedding quality and therefore, improve udder health and milk quality without affecting milk microflora.

Poultry microbiota update and innovative pullet quality criteria

Pectoralis muscle thickness (mm)



CONTROL

BACTOCELL

Measurement of pectoralis muscle thickness using a portable ultrasonography on farm.

REFERENCES

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³ Achard C., Chevaux E., Castex M., Ligabue M., Sacy A. Competitive exclusion to secure pullets' production: impact on microbiota establishment, relative abundance of *Enterobacteriaceae* and *Enterococcus sp.* in a large field trial. Poster. 23rd European Symposium on Poultry Nutrition - June 2023, Rimini, Italy.

The 23rd European Symposium on Poultry Nutrition (ESPN) in Rimini, Italy, was an opportunity to share new studies focusing on poultry nutrition and microbiota modulation developed using the most advanced microbiota research techniques. In addition, the team introduced a new practical method to assess pullet quality on-farm.

Assessing and improving pullet quality

It has been reported that body weight measurement is not sufficient to evaluate pullet quality.

Muscle development and protein retention are also important criteria for pullet quality and future laying performance. This is why our team developed an original, on-farm indicator to evaluate pullet quality based on the measurement of the pectoralis muscle, or breast muscle, thickness using handheld ultrasonography.¹

The study shared at ESPN reported the validation of this method in a rearing environment (30,000 pullets). The trial also evaluated the effect on pullet performance of *Pediococcus acidilactici* CNCM I-4622 supplementation (BACTOCELL). The probiotic

supplementation led to improved growth performance and thicker breast muscle.

The probiotic was considered as a promising nutritional strategy to secure laying hen performance.

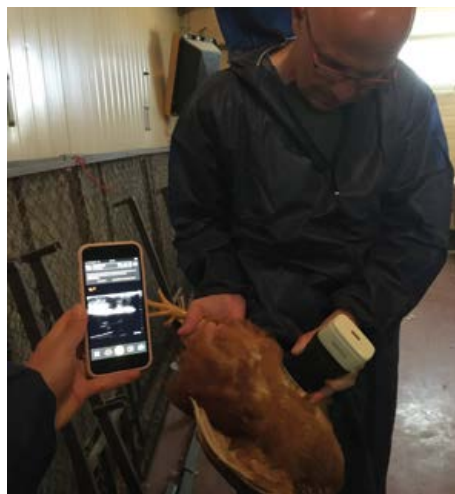
Deep diving into poultry microbiota

Two other studies used metagenomic techniques to assess the effects of microbiota modulation on poultry using either *P. acidilactici* CNCM I-4622 (BACTOCELL), or the natural microbiota for avian species (AVIGUARD).

In the first study, probiotic supplementation during the late phase of the production cycle favored a more diverse and resilient gut microbiota. It was concluded that, by changing the microbiota profile of the birds, *P. acidilactici* CNCM I-4622 improves gut health and laying performance, even during the late phase of laying production cycle.

The third trial, conducted with AVIGUARD in pullets, confirmed the benefits of the solution to enhance intestinal development and immune maturation and showed a reduction of opportunistic pathogenic bacteria in the pullet gut (*Enterobacteriaceae* and *Enterococcus sp.*).

By favoring the good development of gut microbiota and immune system, AVIGUARD enhances pullet robustness and resilience to potential pathogens at a time when the early colonization by opportunistic pathogenic bacteria represents a major threat for the health of a flock.



Making clean, hygienic quality grass silage is key to offset rising feed prices

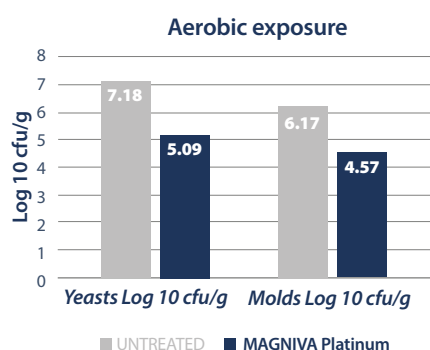


Figure 1:

Yeast and mould levels after 30 days ensiling and 5 days aerobic exposure.

	Untreated grass silage	MAGNIVA treated grass silage	Increase due to MAGNIVA
ME (MJ/Kg/DM)	10.386	11.129	+0.743
CP(%)	14.504	15.128	+0.624%
D-Value (%)	64.954	69.591	+4.46%

Table 1:

Average ME and protein levels of untreated and treated with MAGNIVA inoculant silage samples.

After a wet spring last year that led to poor quality forages being made, this coming season livestock producers will be wanting to make the best silage possible as purchased feed, energy and other inputs continue to rise. Granted, the cost of making grass silage has also risen due to widespread inflation effecting energy and input costs. However, it still offers exceptionally good value - as home grown forages will be crucial to offsetting higher feed costs. Managing and making small changes to your grass silage production process can achieve improvements in silage quality and palatability, which offer significant cost benefits when fed.

Cleaner silage

When it comes to making the best silage possible, management from the field to the bunker and to the feed bunk is critical. Using MAGNIVA inoculants are crucial as strain specific inoculants ensure an efficient fermentation and reduce undesirable microbial growth, which ensures the silage made is clean and hygienic as well as nutrient and energy rich.

Trials show that after 30 days ensiling and five days after opening, MAGNIVA Platinum reduces yeast and mould levels by over 100 times compared to untreated grass silage (Figure 1).

Maintain nutritional value

Making cleaner silage by controlling both yeast and mould growth through the ensiling and storage phases protects the aerobic exposure period and results in a silage that better maintains nutritional and energy levels compared to untreated grass silage.

This was highlighted in independent analysis

of more than 100 first-cut grass silage samples undertaken by Trouw Nutrition (UK), which clearly shows that using MAGNIVA inoculants resulted in grass silage with higher energy (ME), improved digestibility and protein levels compared to untreated grass silage (Table 1).

Improve return on investment

The resulting improvement in energy and protein levels seen in MAGNIVA treated grass silages has a positive impact on milk and meat production as the maintained feed quality of MAGNIVA grass silage means there's a reduced reliance on costly purchased feed.

Even taking the cost of the inoculant into account, MAGNIVA treated grass silage offers a significant return on investment (ROI) for the producer: up to 1:7 ROI has been calculated.

Making small changes to grass silage management practices such as: ensuring optimum cutting times, using best practices during harvesting or baling, rapid sealing for ensiling, and applying MAGNIVA forage inoculants correctly can result in significant improvements of grass silage quality.

Farmers can gain more practical tips and expert guidance to improve silage quality by visiting MAGNIVA.com or better still ring your local Lallemand Technical Services Manager for assistance with providing forage and nutrition technologies to aim for a better forage outcome for your farm and livestock.

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