



**SPECIFIC
FOR YOUR
SUCCESS**

SUMMER 2021

IN THE **MIX** #56



Silage-powered lamb feedlot

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30 YEARS: CONGRATULATIONS PSC



Priebbenow Silage Contractors (PSC) from East Greenmount, QLD recently celebrated 30 years in business. A family owned and operated business, they started from humble beginnings and now operate three Class 960 Forage Harvesters, contracting down the Eastern Seaboard for most of the year.

Family, customers, suppliers and fellow contractors came to celebrate the milestone with an old fashioned bush dance from all time favorites Ridgee Didge Bush Band, along with a charity auction for Prostate Cancer and Dolly's Dream. Total funds raised were in excess of \$30,000 for causes close to their hearts.

Welcome

Welcome to another ITM! Well we thought 2020 was a rollercoaster, how's 2021 been for you? For the team at Lallemand it's been a full year. From our first stand at Beef Week with thousands of visitors to our multi-stakeholder site, to a booming silage season across Australia. The rains continue with a La Nina pattern now entrenched across Eastern Australia. The old adage was "make hay while the sun shines" is now "make silage whilst you have excess feed, future proof your business". SmaXtec, our live rumen bolus monitoring device continues to gain traction and we're seeing dairy farmers learn the real value of temp, activity and rumination monitoring delivering early intervention strategies for cows. It's amazing. Supply chains continue to be disrupted with major delays on ALL containers and prices for everything are increasing. What will 2022 bring? Who knows? I do know that the team at Lallemand are ready to help you make more money on your farm.

From all at Lallemand thanks for your support in 2021 and we all wish you the very best for 2022 and beyond.

Alex Turney - Country Manager

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DID YOU KNOW?

Microbiota or microbiome?

Unknown to the general public a decade ago, the word *microbiome* has hit the mass media in the past decade. Today, it is on everyone's lips, from the pharmacist to the bookstore or your supermarket food aisle. But what does it mean? Are **microbiome** and **microbiota** synonyms?

Not really!

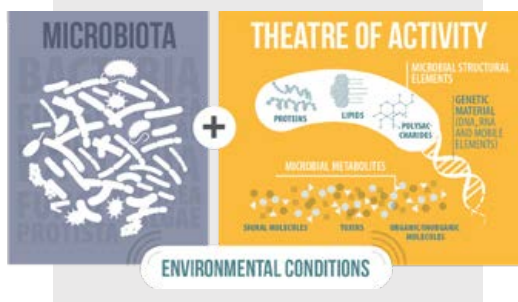
Microbiota is the collection of microbial organisms within a community, typically used in reference to an animal host. It refers to the taxonomy (name) of microorganisms present. Most common is the digestive microbiota.

Microbiome is the collection of microorganisms and their genes living in a particular environment. It refers to the bacteria (primary) and their genes (secondary). The microbiome contains both the microbiota, their 'theater of activity' and the surrounding environmental conditions (Berg, et al., 2020).

Finally, **metagenomics** is the science related to modern microbiota studies. It is the study of the **combined genomes** of a community of microorganisms, **the metagenome**. As opposed to traditional cultured based microbial studies, metagenomics involves high throughput sequencing and bioinformatics tools. It allows a better description of the microbial taxonomic diversity and of the potential biological functions carried by the whole community.

Berg, G., Rybakova, D., Fischer, D., et al. 2020. Microbiome definition re-visited: old concepts and new challenges. *Microbiome* 8(1):103.

MICROBIOME



Feedlot industry awards ALFA Community Heroes Award

Since 1991 ALFA has run a prestigious annual Recognition of Excellence Program whereby lot feeders and feedlot businesses are encouraged to apply for a range of awards and scholarships, proudly supported by a number of longstanding partners.

Traditionally awarded at the industry's annual conference, this year's awards were presented virtually due to the conference having moved online due to COVID-19 restrictions.

The virtual ceremony was hosted by Gerry Gannon, with live crosses made to award winners that made for an exciting evening of celebrations across the country.

In its inaugural year, the ALFA Community Heroes Award, proudly sponsored by Lallemand Animal Nutrition, was awarded to Smithfield Cattle Company – Smithfield Feedlot, Queensland for their community-minded initiative that is connecting students and teachers to the feedlot industry.

Lallemand Animal Nutrition Country Manager, Alex Turney, says "Lallemand is proud to support the Australian Lot Feeders Association Community Heroes Award.

"We are excited to recognise and reward someone who has made a social or environmental contribution in the rural community in which they live or work."

"It's important that we all take a step back, consider where we impact those around us. It's the community and the environment that allows us to be Lot Feeders so by rewarding the behaviour of giving back we're supporting the roots of the industry for the future."

Smithfield has received \$5,000 in funding to assist in further development and impact of their initiative. This award recognises and rewards those feedlots that are actively nourishing their local communities and environment by going above and beyond to support their community, 'give-back' and better the environment around them.

Footy Tipping results

Thank you to everyone who participated in the Lallemand Footy Tipping Competition this year. Gift cards have been sent to our winners:

■ NRL

1. Brianna Daly
2. Wayne Thompson
3. Geoff Irish

■ AFL

1. Jason Amos (Lallemand)
2. Alex Turney
3. Wayne Thompson



Silage-powered **lamb feedlot**

Western Queensland graziers, Stephen and Claire Schmidt, have established a 6,200 head feedlot in the Southern Downs region as a means of value-adding to station-bred and purchased lambs.

The Schmidts purchased Victoria Hill outside Allora, QLD about two years ago and began constructing their feedlot soon afterwards. The first phase of construction, which includes about 30 pens each holding 200 head, was completed in April this year. Once completed, the facility will host about 80 pens and a total capacity of approx 16,500 head.

Whereas most sheep feedlots utilise a grain-based ration supplied via self-feeders, 'Victoria Hill Lamb' utilises concrete feedbunks and a silage-based ration, similar to beef feedlots. "We did our homework and we decided we wanted a silage-based ration, and specifically, a cereal-based silage because of its higher starch component and palatability," Stephen says.

"Secondly, we wanted to be self-sufficient for our fibre requirements for at least 12 to 18 months at a time. We didn't have any experience with silage so we relied on the advice of our nutritionist and our silage contractor, who in turn, put us in contact with Lallemand Animal Nutrition."

Lallemand Animal Nutrition is a leading supplier of strain-specific forage inoculants and sealing systems specially selected for use in Australian conditions. The company's Toowoomba-based Technical Services Manager, Nathan Lister, says silage is a proven and cost-effective component of rations for intensively-fed ruminants.

"Silage is not widely used in lamb feedlots but we expect that to change quickly as more permanent facilities such as this come into operation," Nathan says. "It is a better way of presenting a consistent mixed ration to sheep, which often try to separate the different ingredients. As a sweet-smelling and palatable

ration, silage is also good for attracting any 'shy feeders.'"

About 100 ha of barley was grown on Victoria Hill and a neighbouring property. The crops were direct cut and processed to a chop length of 18–20 mm based on plant moisture using a CLAAS JAGUAR forage harvester owned by local silage contractors, Judd Bros Contracting. Chopped forage was treated with MAGNIVA Platinum, a new generation forage inoculant that significantly improves 'front-end' fermentation and 'back-end' aerobic stability. In effect, it ensiles silage faster, reduces losses during storage and increases feed stability during feed out.

The crop was then packed to form two 100 m long x 12 m wide bun stacks, each holding about 1000 tonnes. Both stacks were covered with an underlay of 16 m wide oxygen barrier film, Silostop Max.

The first stack was covered with an overlay of conventional white-on-black plastic for short-term storage, while the second stack was covered with SilageKeeper, a UV-stable woven cover for longer-term storage. Finally, both stacks were sealed with truck tyre walls.

Stephen works closely with his consulting nutritionist to ensure a balanced ration is delivered to the lambs. The ration, which comprises about 30% barley silage, barley grain, protein meal, vegetable oil, molasses and a vitamin and mineral premix, is prepared using a twin vertical auger feed wagon.

"We use a telehandler to cut down the face – and then across to clean up the edges – to reduce oxygen getting into the stack, which minimises spoilage risk and dry matter losses," Stephen says.

Lambs enter the feedlot at about 35–40 kg liveweight and turned off at 55–65 kg by 60 days, a representing a liveweight gain of about 0.35 kg/day.

"We add a bit of lucerne hay in the starter

ration for the first 10 days to provide a bit more fibre until they get going," Stephen says.

"The lambs hit the bunk hard and get straight into it! The palatability of the silage assists with the high feed intakes we are seeing and the lambs are not rejecting any feed. We had the silage tested and the analysis came back with higher protein and energy than we expected."

Nathan is continuing to work with Stephen and his team at 'Victoria Hill Lamb' to ensure optimal feed quality during feeding out.



▲ A sample of the feed delivered to the bunker at Victoria Hill.



Probiotic booster helps cows recover

An innovative probiotic and mineral booster is proving just the trick to restoring freshly-calved cows to full health and production.

Lallemand Animal Nutrition Technical Services Manager, David Lewis, says YMCP® is especially formulated to assist fresh cows to transition into lactation.

"When cows freshen, they lose a large reservoir of essential nutrients and enter a period of negative energy balance," David says.

"This increases the risk of a range of metabolic and periparturient diseases, including milk fever, ketosis and mastitis.

"YMCP contains a scientifically-proven probiotic that helps to create a stable rumen environment and stimulate rumen function at a time when the cow's appetite is naturally suppressed.

"In effect, it helps to reduce the amount of time that cows are energy-deficient and gets them back on feed and on their way towards peak production, setting them up for a productive lactation.

"YMCP also contains a rich source of magnesium, calcium, potassium, betaine (glycine), niacin (Vitamin B3) and electrolytes to help the cow recover from calving."

YMCP is offered to cows immediately after calving or as a follow-up to intravenous calcium treatment.

YMCP contains *Saccharomyces cerevisiae* CNCM I-1077, a natural, strain-specific live yeast that has a documented mode of action upon rumen function, rumen pH and fibre digestion.

The beneficial effects of *Saccharomyces cerevisiae* CNCM I-1077 upon the health and performance of dairy and beef cattle have been described in more than 60 scientific papers published throughout the world.

Andrew and Cassandra Kath, who share-milk 500 cows at Rochester in northern Victoria,

have been using YMCP in their herd for several months with good results.

"We installed a health monitoring system a year ago and we immediately noticed that we had a problem with a small percentage of our fresh cows," Cassandra says.

"We implement a lead feeding program using cereal hay and a PMR but we were probably not as consistent of our monitoring of body condition score as we should have been.

"Some of our fresh cows were noticeably 'off' with depressed appetite and activity and probably sub-clinical milk fever or ketosis.

"We'd put them back on hay and they would slowly get back on track but they'd never recover to their full potential so we decided to try YMCP."

"It really is a 'one hit wonder' – one treatment and they're away," Cassandra says.

"Within a couple of hours, you can see the rumen has kicked back in and they are back on their feet and eating

"You can genuinely see the difference.

Using YMCP is cheap compared to having to call a vet and more importantly, we end up with a cow that is 'off' for three hours instead of five days."

The Kath's 500-cow herd is predominantly Holstein, with some Jersey and Brown Swiss.

"I've had a soft spot for Brown Swiss ever since I started showing them during high school," Cassandra says.

"Breeding Brown Swiss cattle quickly became my 'thing' and it led me to study agriculture at the University of Sydney and my first job in the dairy genetics industry."

In the course of her work, she met Andrew, a fourth-generation Jersey breeder from Toowoomba and marriage beckoned.

"We got the opportunity to purchase the family farm in 2006," Cassandra says.

"At the time, the herd consisted of 70 registered Jersey cows.

"We wanted to grow the dairy business so we moved towards a silage-based PMR feeding system and increased the size of the herd to 170 cows on 88 ha.

"We've been working with Lallemand Animal Nutrition with our silage for more than 15 years."

Concerned about water security and urban encroachment, Andrew and Cassandra moved their herd to central NSW in 2014 and then northern Victoria in 2019.

While Andrew and Cassandra are still breeding registered cattle, with one of their cows being named Supreme Champion Cow at Sydney Royal Easter Show in 2018, they are now more focussed on management of a large scale dairy business.

"The cows are my passion but right now we are completely focussed on growing our business," Cassandra says.

"We've ramped things up nutritionally, moving from conventional irrigated pastures to growing lucerne and maize over summer for silage.

"Now we are focussed on incremental improvements in our management, the '10 percenters'.

"We are trying to get all the little things right – calf rearing, heifer rearing and dry cow management."

The Kath's implement an intensive feeding system under the supervision of Shepparton-based nutritionist, Mark Burgemeister.

Cows have access to pasture from autumn to spring and are fed up to 1.8 tonnes of grain during the lactation.

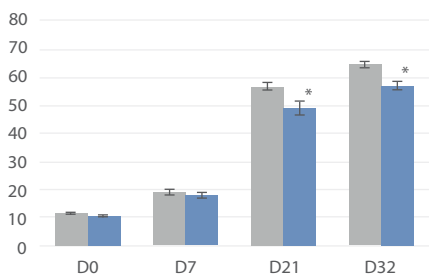
During summer, the herd receives partial mix ration comprising maize and vetch silage, grain and a premix.





Effect of a bacterial litter conditioner on broiler litter quality

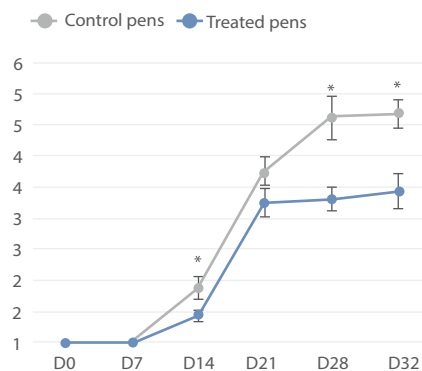
Litter moisture evolution (%)



*P<0,05

Figure 1

Litter scoring evolution (1-5)*



*P<0,05

*A score of 5 represents litter with a high level of degradation²

Figure 2

Litter quality management is essential to maintaining animal welfare and health. In turn, good health contributes to animals reaching their full genetic potential.

One way to manage broiler litter quality is to use organic materials (i.e. straw or sawdust), remove it completely at the end of the cycle, then clean and disinfect the building before setting up a new litter for the next cycle¹.

During the cycle, the use of a bacterial litter conditioner may help maintain litter quality, thus maintaining a favorable environment for broiler production. Here are some new data shared on-line ahead of the World Poultry Congress (WPC) 2022.

■ Broiler study: Experimental farm, France, 2019

A study was conducted in a French experimental farm in 2019 for one 35-day cycle (from D0 to D35) on 194 broilers ROSS 308 AP males. It aimed to assess the effect of a weekly applied bacterial litter conditioner (including an enzyme and bacteria complex) on litter quality and its impact on different broiler performance parameters.

■ Improved litter quality

- During the cycle, the litter moisture increased for both groups as expected due to accumulation of feces and urine
- However, from D21 and up to D32, the moisture level was significantly lower in the pens having received the bacterial litter conditioner compared to the control pens (Figure 1).
- The result showed an increase in scores

during breeding, reflecting a natural degradation of the litter while the broilers were growing (Figure 2).

- However by the using a bacterial litter conditioner, the increased score reached a plateau earlier (from D21 to D32) than the control pens, with a lower score overall.

■ Foot health

Thanks to improved litter quality, the incidence and severity of pododermatitis was also reduced. At D35, the number of broilers affected by pododermatitis was significantly higher in the control pens than in the pens having received the bacterial litter conditioner (83% vs 31%, P<0.05). The average severity score was also significantly higher (1.41 vs 0.54, P<0.05).

■ Consequences on broiler performance

At D35, the average weight per broiler was higher in the bacterial litter conditioner pens: +84 g/broiler (Table 1).

In conclusion, the use of a bacterial litter conditioner is an effective tool to maintaining a better litter quality during animal cycle.

The bacterial litter conditioner had a direct action on litter characteristics such as moisture and, consequently, on the improvement of the incidence of pododermatitis and the performances of the animals.

¹ Institut technique de l'aviiculture (ITAVI). 2012. Brochure "Towards an effective litter management"

Table 1

	Weight at D35 (g)	Daily live weight gain (g)	Feed conversion ratio	Mortality (%)	Heterogeneity (Standard deviation/average)*100
Control pens	2,348 ^A	64,44	1,74	5,1	10,1
Bacterial litter conditioner pens	2,432 ^B	67,02	1,66	3,1	9,5



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Live yeast positively influences the broiler microbiome

EXPERT VIEW

Livia MOSCATI, IZS Istituto Zooprofilattico Sperimentale

***Faecalibacterium prausnitzii*, a gut health biomarker**

"*F. prausnitzii* plays an important role in gastrointestinal homeostasis, resulting in the reduction of enteric pathological status, becoming a gut health biomarker.

F. prausnitzii decrease in the gut microbiota is correlated with enteric disorders in both humans and animals. On the other hand, a study showed a higher proportion of the genus *Faecalibacterium* in broilers with better feed conversion rates (FCR) in comparison with those showing a low FCR; these data are in accordance with what we found in our study."

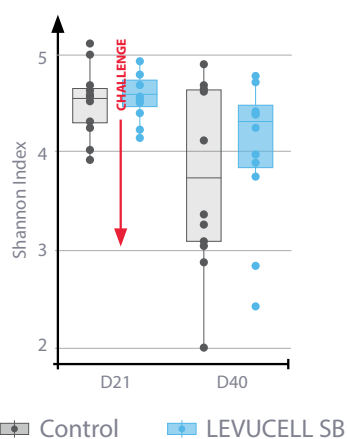


Figure 1

Effect of the live yeast supplementation on the gut microbiota alpha-diversity, before (day 21) and after (day 40) the pathogen challenge.

Our understanding the efficacy of the live yeast *Saccharomyces cerevisiae bouldarii* CNCM I-1079 (Levucell SB) on performance and microbiota balance in poultry is only enhanced by modern genome sequencing-based microbial analysis. In turn this analysis helps our understanding of some of the modulation mechanisms involved, which is the topic of a recent study discussed below. (Massacci, et al. 2019).

■ Bacterial challenging conditions

The trial was conducted by the Istituto Zooprofilattico Sperimentale dell'Umbria e delle Marche "Togo Rosati", ITALY on Ross male broilers, for 40 days.

At day 21, all the birds (control and LEVUCCELL SB group) received a *Campylobacter jejuni* oral challenge (1×10^6 CFU/bird).

The fecal and cecal microbiota composition was analysed using the 16S rRNA amplicon sequencing technique **A resilient microbiota.**

The microbiota analysis indicates that:

- Under challenged conditions, the microbiota alpha-diversity* is reduced: less different taxa (strains, genus, etc.) were identified, some species have become predominant.
- With the live yeast supplement, the microbiota shows a better resilience to the challenge. At day 40, the live yeast samples count a higher number of different species with less predominance of certain species (Figure 1).

■ A balanced microbiota

The 16S rRNA analysis confirms the higher abundance of beneficial bacteria species in the live yeast group, such as *Lactobacillus* spp. More interestingly it allows to showcase a higher presence of *Faecalibacterium prausnitzii*, a bacteria considered as a biomarker of gut

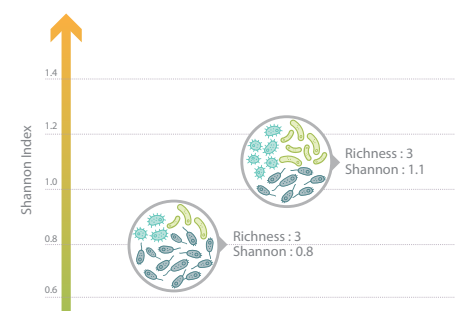
health in humans and animals (see expert view).

At the same time, a lower *Campylobacter* spp. relative abundance was found in the LEVUCCELL SB fecal samples compared to the control ones ($p < 0.01$), suggesting that the live yeast could limit the *Campylobacter* excretion in the farm environment.

This new study confirms that *S. bouldarii* supplementation can positively modulate the poultry intestinal ecosystem under challenging conditions.

*Alpha-diversity represents the diversity within one microbiota sample. **Shannon index** is one of the most used criteria to describe alpha-diversity. It considers both the total number of different taxa found in the sample, called the richness, and the abundance or predominance of some taxa among the sample.

The higher the Shannon Index, the more diverse and rich the microbiota.



Massacci FR, Lovito C, Tofani S et al., 2019. [Dietary *Saccharomyces cerevisiae bouldarii* CNCM I-1079 Positively Affects Performance and Intestinal Ecosystem in Broilers during a *Campylobacter jejuni* Infection.](#) Microorganisms. 7(12):596

What makes a good silage inoculant?

Silage inoculants are based on live bacteria which contribute to improving silage acidification and/or aerobic stability depending on the bacteria activities. The inoculant market is growing, with many different products on offer, claiming many benefits and various price ranges.

There are two main types of bacteria used in an inoculant formulation, depending on the desired outcome:

- Homofermentative lactic acid bacteria (LAB), which convert soluble sugars from the forage into lactic acid, for example, *Lactobacillus plantarum* or *Pediococcus pentosaceus*. These bacteria are used to speed-up the initial fermentation, helping to quickly reach a safer pH.

- Heterofermentative bacteria such as *Lactobacillus buchneri* and *Lactobacillus hilgardii* which convert soluble plants sugars into lactic and other acids which have a documented antifungal activity (acetic acid or propionic acid). They are effective to improve silage aerobic stability and hence reduce the risks of aerobic spoilage after opening.

According to Professor Limin Kung, PhD, University of Delaware, "Of the heterolactic acid bacteria, only *Lactobacillus buchneri* 40788 has proven itself (with multiple research publications) to be an effective silage inoculant."

However, in the same bacteria species (for example *L. buchneri*), each strain has its own genetic identity and commercial strains are registered with unique strain numbers (for example *L. buchneri* NCIMB 40788 from Lallemand Animal Nutrition). All documentation should be linked to a particular-strain number. This means that, for example, what has been published for one *L. buchneri* strain cannot apply to another.

All inoculant formulations are specific. Inoculants can be based on a single strain or

associate different strains with complementary activities. For example, homofermentative and heterofermentative bacteria can be combined to improve both acidification and aerobic stability of low sugar, high DM and high-nutrient content forages such as lucerne.

There is no rule as to what is the best combination, but the formulation should respond to specific issues related to each type of crop or silage challenge. For example, maize is prone to aerobic instability due to its high sugar and dry matter content. The best option for preservation is to use a proper strain of *L. buchneri* or *L. hilgardii* documented to improve aerobic stability. On the contrary, grass silages and legumes have a lower sugar and dry matter content.

In this case, acidifying bacteria is necessary to achieve an ideal acidification. Some inoculants combine bacteria with specific enzymes that raise the fibre digestibility and release soluble sugars to enhance the lactic acid and antifungal bacteria metabolism.

Inoculant formulation should be specifically adapted to the ensiling challenge in order to ensure best silage preservation.

■ Research is key

Professor L. Kung wrote, "An effective silage inoculant will have independent, statistically analysed, and published data supporting its use. Of course, the more supporting data there is, the more credibility a product has. I will take an educated guess and say that no more than 10-15% of the silage inoculants in the marketplace have more than five publications showing that they work."

It is important to check that there is independent published research related to the inoculant formulation and/or strain(s). Not all companies invest in continuous research and development to document their products. Professor Kung explains, "*Lactobacillus buchneri* NCIMB 40788 has become the gold standard



to improve aerobic stability, showing consistent results.”

Always check that the scientific and technical references provided with a product refer to the specific strain.

■ Production is essential

An inoculant's efficacy relies on the biological activity of live bacteria. Thus, efficacy of the final product relies on the survival of the bacteria, from the manufacturing plant all the way through to the silage pile.

Bacteria viability depends on the strain (its intrinsic quality), as well as the quality of the production process, formulation, and finally, storage conditions including packaging. The production of live bacteria requires expertise and stringent quality controls throughout the process.

Only a few companies possess the capability to produce bacteria and deliver pure, live, stable, and consistent blend of specific bacteria suitable for silage.

Companies that produce their own bacteria and control the whole chain from bacteria fermentation to final product packaging ensure optimal quality and traceability of the product.

When choosing an inoculant, it is important to check the reputation of the primary producer, the product shelf life and the storage conditions.

■ Importance of formulation and dosage

Not only is the bacteria composition important, but also the dosage and product formulation technology. One can select the best possible bacteria strains, but if the farmer does not end up with the right number of live and active bacteria in the silage, it is useless for them.

Hence, the number and the viability of the bacteria, as well as solubility and ease of application is very important.

Once the product's scientific documentation and technology has been checked, it is important to check the dose.

All published data are related to a recommended dose of use, which is expressed as CFU (Colony Forming Units) per gram of fresh forage treated or per gram of product.

The CFU represents the number of live and active bacteria. When comparing two products, it is important to compare the final bacteria count, as sometimes this can help explain the price difference.

For example, *L. buchneri* is effective at 300,000 CFU/g of fresh forage. Certain products could be misleading as giving the overall bacterial count. It is important to check the number of each individual bacteria to make sure the optimal dose is used.

Always compare dose according to final bacteria count in forage.

■ Dead bacteria are useless

Number of bacteria or CFU in the sachet is one thing, but the number of live bacteria reaching each part of the crop is another. Lallemand's inoculants are stored as hydro dispersible powder in an aluminium foil sachet.

The bacteria are preserved in a freeze-dried form and the bacteria are revived when mixed in water for application

However, bacteria viability after dilution is also dependent on the formulation and technology to deliver a high concentration of bacteria that remain in suspension (low sedimentation) to provide homogenous application of live bacteria throughout the silage harvest.

Look for forage inoculants with Formulation technology that helps ensure viability over time.

■ Technical support

Successful silage making can meet many challenges and requires technical knowledge.

Silage inoculants are not commodity products and to make sure the investment pays-off, ideal practices should be implemented. Providers should accompany their users with strong technical support.

Professor L. Kung wrote on this matter, “Although technical service is not directly related to the effectiveness of a silage inoculant, this should be factored into your decision-making process. Certainly, companies that are willing to assist you in times of need should be highly considered.”

Check that your provider offers expert technical services on-farm.

There are many silage inoculants on the market with different claims and specifications. Before getting bogged down in the detail, check to see that the product contains bacteria, if it doesn't, it's an additive of some other type and not a silage inoculant. A better understanding of the makeup of a silage inoculant, its modes of action and specificities, help make the right decision.





Monitor livestock for early signs of heat stress this summer

Temperature	% Relative Humidity																			
°F	°C	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
72	22.0	64	65	65	65	66	67	67	68	68	69	69	69	70	70	71	71	71	71	71
73	23.0	65	66	66	66	67	67	68	68	69	69	69	70	70	71	71	71	71	71	71
74	23.5	65	66	66	67	67	68	68	69	69	70	70	70	71	71	71	71	71	71	71
75	24.0	66	66	67	67	68	68	69	69	70	70	71	71	71	71	71	71	71	71	71
76	24.5	66	67	67	68	68	69	69	70	70	71	71	71	71	71	71	71	71	71	71
77	25.0	67	67	68	68	69	69	70	70	71	71	71	71	71	71	71	71	71	71	71
78	25.5	67	68	68	69	69	70	70	71	71	71	71	71	71	71	71	71	71	71	71
79	26.0	67	68	68	69	70	70	71	71	71	71	71	71	71	71	71	71	71	71	71
80	26.5	68	68	69	70	70	71	71	71	71	71	71	71	71	71	71	71	71	71	71
81	27.0	68	69	70	70	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
82	28.0	69	69	70	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
83	28.5	69	70	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
84	29.0	70	70	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
85	29.5	70	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
86	30.0	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
87	30.5	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
88	31.0	72	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
89	31.5	72	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
90	32.0	72	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
91	33.0	72	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
92	33.5	72	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
93	34.0	72	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
94	34.5	72	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
95	35.0	72	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
96	35.5	72	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
97	36.0	72	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
98	36.5	72	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
99	37.0	72	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
100	38.0	72	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
101	38.5	72	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
102	39.0	72	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
103	39.5	72	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
104	40.0	72	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
105	40.5	72	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
106	41.0	72	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
107	41.5	72	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71

Table 1

Temperature-humidity index.¹

Stress level	THI	Duration (hours/day)	Milk production loss
Threshold	68-71 (22°C; 50% RH)	4	1.1 kg/day
Mild	72-79 (25°C; 50% RH)	9	2.7 kg/day
Moderate	80-89 (30°C; 50% RH)	12	3.9 kg/day
Severe	90-99 (34°C; 50% RH)	Not measured	

Table 2

Estimated associated milk loss according to the length of exposure to heat stress.

Reduced feed intake, rumination and rumen function caused by heat stress can have a significant impact on production.

In dairy cows, milk yield and milk components can be significantly impacted after only four hours exposure to low heat stress levels. In beef cattle, average daily gain drops with increased exposure to heat stress. In addition, decreased feed intake is often partially compensated by the mobilisation of body tissue.

Research has shown that heat-stressed livestock also experience increased oxidative stress, negatively impacting immune function, animal health, reproductive performance and meat quality.

Heat stress can be recognised by changes in animal behaviour long before any changes in milk production or growth rates can be measured. It is crucial to detect any symptoms of heat stress as early as possible in order to safeguard the health and production of your livestock.

Temperature alone is not a good measure of heat stress risk, as the relative humidity level can exacerbate the effect of heat. While the temperature-humidity index (THI) can be calculated using data from your nearest meteorological station (Table 1), it is preferable to place a thermo-hygrometer near your animals to more accurately monitor THI.

The heat stress threshold of dairy cows can be as low as 68 (T=22°C, RH=50%).¹ For beef cattle and pre-weaned calves, the heat stress threshold is estimated to be 72 (T=25°C, RH=50%)¹ and 78 (T=30°C, RH=50%)², respectively.

The thermal neutral zone for sheep and goats is 12–32°C and 12–24°C, respectively. The threshold for heat stress in dairy sheep and goats are comparable to dairy cattle but can vary depending on breed, housing and production system.

The negative impact of heat stress is linked to the THI level and the duration of exposure, both in terms of the number of hours/day and the number of consecutive days of stress.

Research has shown rumination can be reduced by one hour and milk production by 2.7 kg/day for every 10 point increase in THI.³

Observing animal behaviour is a key way to detect early signs of heat stress. Watch for signs of:

- Shallow breathing
- Increased respiration
- Profuse sweating
- Reduced feed intake / frequency
- Erratic feeding behaviour
- Reduced lying time and rumination

As digestion produces heat, ruminants tend to eat less at the coolest hours of the day. Likewise, stressed animals will spend less time lying quietly to increase heat dispersion. Combined, these effects reduce the amount of time spent ruminating.

As a guide, 50 to 60% of dairy cows should be lying in their stalls ruminating at any one time. Data collected by Lallemand Animal Nutrition suggests that rumination is sub-optimal in up to 50% of farms under heat stress conditions.

In turn, reduced rumination can negatively impact rumen function. Besides the animal behaviours noted above, the following symptoms can indicate sub-optimal rumen function:

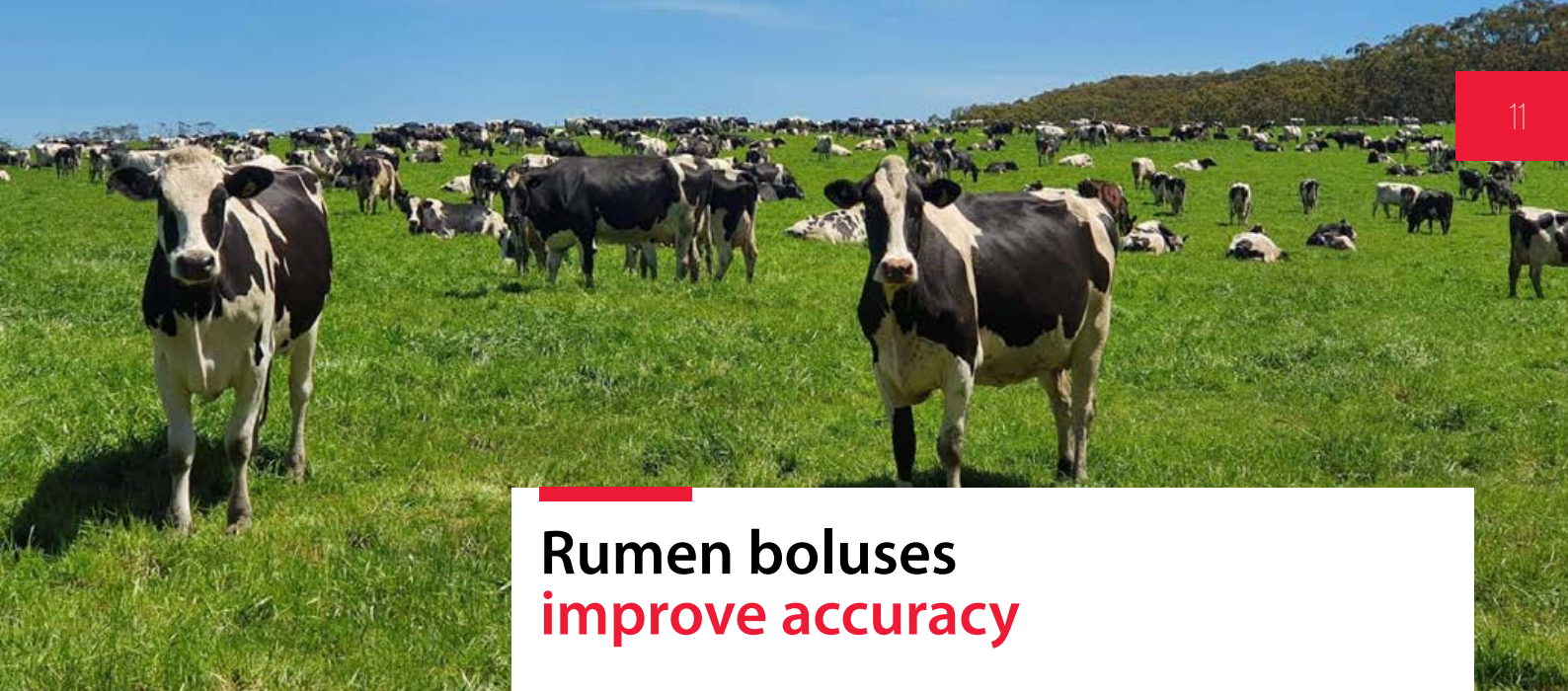
- Loss of saliva through panting
- Manure colour and consistency (particularly the presence of undigested grain)
- Reduced locomotion
- Lameness

During hot weather, it is essential to ensure a sufficient intake of fibre in the diet.

Supplementation with the strain-specific live yeast, *Saccharomyces cerevisiae* CNCM I-1077 (LEVUCCELL SC), can help to stabilise the rumen environment and rumen function during times of heat stress.^{4,5}

Supplementation with *Saccharomyces cerevisiae* CNCM I-1077 should continue after the heat stress event to support recovery until the cow can produce sufficient saliva to restore its natural rumen buffer capacity.

References: 1. Burgos and Collier, 2011. 2. Kovacs et al., 2020. 3. Haan, 2016. 4. Fustini et al., 2013. 5. Perdomo et al., 2020.



Rumen boluses improve accuracy



The smaXtec herd monitoring system sets a new benchmark in early detection and intervention.

It utilises state-of-the-art rumen boluses to monitor body temperature, activity, water intake and rumination around the clock, providing an accurate and real-time assessment of cow health, reproductive and feeding status.

Collected data is transferred to the cloud via readers positioned around the property and easily accessed using a smartphone, tablet or computer.

The dashboard provides a clear and precise overview of the health, reproductive and feeding status of the herd and individual cows.

Automatic alerts and recommended actions can be sent via any nominated messenger service.

Smaxtec Country Manager – Australia & New Zealand, Clint Brereton, says the smaXtec system is the only rumen bolus on the market and the only one that monitors internal body temperature.

“The rumen is where the action is and that’s where monitoring should be based, not outside the cow using collars or ear tags” he says.

“The practical benefit of this is improved accuracy, which allows you to detect any changes in heat or health and take appropriate action sooner.”

smaXtec has been commercially available in Australia for five years.

Initially used by research facilities, the technology has gradually made its way into more than 50 commercial herds in Australia and New Zealand.

“As a guide, a complete system might cost about \$50,000 in hardware and \$15,000 a year in subscription fees for a 500-cow dairy but it

can quickly pay for itself,” Clint says.

“Labour is one of the greatest limitations on every dairy farm.

“SmaXtec provides 24/7 monitoring, allowing you to detect the slightest changes in behaviour more accurately and regardless of the weather.

“It allows you to intervene before sub-clinical cases of milk fever, ketosis or mastitis become expensive clinical cases.

“A single case of mastitis can easily cost \$500 to \$800 in veterinary bills.

“One of our customers has reduced their antibiotic usage by 75%, which is a massive saving.

“The other big thing is that it keeps cows in the milking herd – once a cow is sick, it never recovers its peak production potential!”

“Improved heat detection is the low hanging fruit – every cow in calf one heat cycle earlier represents a saving of \$150.

“Another customer estimates he has saved 300 inseminations.”

Clint estimates that about 10% of the 16,000 dairy farmers in Australia and New Zealand now use herd monitoring systems.

“In the early days, adoption was driven by heat detection because that’s the easy pay-back,” he says.

“Now it’s health – but the long-term picture is animal welfare.

“Consumers want to know that their milk is coming from happy, healthy cows.

“This technology is changing dairy herd management.”

smaXtec

THE TITAN CHALLENGE: ADAPTING TO EVER-CHANGING FEEDMILL CONSTRAINTS



The viability of a probiotic is a key parameter to ensure its metabolic activity once ingested by the animal. Many experts insist that probiotics must be alive and viable to exert an effect on the microflora within the digestive system. Indeed, several national authorities will only authorize a claim for performance when the probiotic microorganism is viable. For example, the European Commission considers microorganisms as probiotic feed additives only in their live form. Today, the increased demand for pelleted feed, coupled with increasingly stringent feed mill processes, could limit the inclusion of probiotic yeast in this form of feed. This is why Lallemand continues to invest in process development to ensure that TITAN, its unique patented yeast protection technology remains at the top of the game when it comes to withstanding stringent pelleting conditions.

The stress of pelleting

When selecting a probiotic yeast, it is crucial to ensure the live yeast will: survive feed or premix processing; tolerate the combination of other ingredients; and endure storage prior to reaching the animal. Feed manufacturing processes are constantly evolving to answer market needs and safety challenges. Feed pelleting processes represent many stress factors for live yeast, such as temperature, pressure or moisture. For example, yeast stability depends on the die temperature during the pelleting process, but also on the die compression, conditioner temperature and process duration.

New data on TITAN stability

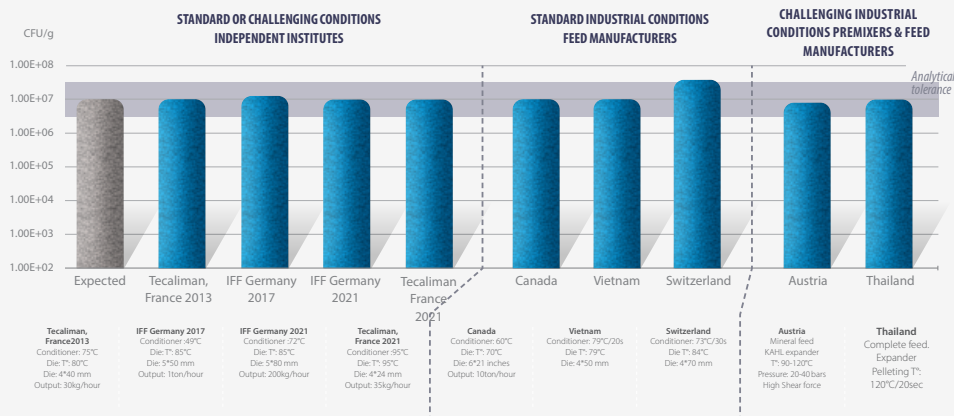
An analysis was conducted in 2017 by the independent institute IFF (International Research Association of Feed Technology) in Germany to compare the stability and the resistance of a TITAN live yeast form to other commercial yeast sources under different pelleting conditions. This study showed that **only TITAN yeast remains stable throughout the various pelleting processes** (at least 85°C).

Earlier this year, the same institute conducted a new stability study using even more stringent conditions and comparing the stability of TITAN yeast to non-coated forms of competitor's live yeast products marketed for use in pelleted feed.

In this new trial, pelleting conditions were more challenging than in the 2017 trial with a **higher conditioner temperature and increased die compression** (5/80 die in 2021 vs. 5/50 die in 2017).

TITAN confirmed its full potential to preserve yeast viability in this new trial. It ensures a better survival of the live yeast as compared to the competitors' products even under drastic pelleting conditions.

In conclusion, TITAN, thanks to its unique microencapsulation technology, gives live yeast probiotics optimal stability and resistance to the drastic industrial feed manufacturing process found in standard pelleting conditions.



Lallemand Titan technology has been patented for 15 years and is to date the only coated or micro-encapsulated probiotic yeast technology on the market.

IN THE MIX

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