Colony forming units is the 'trick question' with probiotics

Three questions separate the pretenders from "the real deal" in probiotic efficacy, says the Australianborn grandfather of the live micro-organism debate.

Allan Hain, who now lives in New Zealand for half the year, says there is no longer any question that quality probiotics work, and that they are an important part of the future of dairying. However, he warns that there are some important distinctions between product strength and modes of action of which farmers should be wary.

Much of this highly focused, passionate probiotic advocate's career has been in "good bacteria", with his work in Australia giving him strong credibility on the subject on both sides of the Tasman. He believes these questions are directly linked to the results of which probiotics are capable. And... that they aren't being answered well enough...

These questions include the number of live cells per gram, expressed as "colony forming units per gram" (CFU) – or strength – the stablity/viability (liquid or powder), are they micro-encapsulated, and what they are blended with (whether that's active live yeast, enzymes and probiotics).

Allan said, "One of the problems in this business is that farmers don't have all the information they need to make informed decisions about what they are buying when it comes to probiotics.

"As soon as there is a health challenge on-farm, you need a high CFU count, viability [shelf life], and micro-encapsulation in order to change outcomes."

CREDIBILITY UNQUESTIONED

In 1998 when Allan first began marketing probiotics in Australia, he faced widespread scepticism. He slept in a swag in the back of his van, and drove up the driveways of some of Australia's highestperforming farmers. It was a brutal audience on a good day.

However, Allan earned their respect and their business, achieving some telling results.

His dogged curiosity drew him to microbiologists at the highest levels in North America, and to the best products coming out of the United States, Japan, Austria and Germany. It also helped him lay some important groundwork for vital applications for probiotics in cows and calf rearing in 2020.

Allan paid veterinarians to do autopsies in order to validate his early results and prove that his formulas promoted long-term rumen health – without the use of antibiotic-based rumen modifiers.

There is now abundant science and long-term onfarm results supporting his findings.

Allan's high-spec formulations are today gaining increasing traction through his distributors in New Zealand – **Probiotic Revolution** (owned by Chris and Matt Collier) - and their trans-Tasman counterparts, **Australian Probiotic Solutions.**

"A cow is a walking fermentation vat. If you have challenging feeds on a daily basis and you're putting an antibiotic in to control that, it might solve one problem, but it will have a negative impact in another area." - Allan Hain "If you've got strong immune function, and a strong load of beneficial organisms in the lower GI tract, it makes sense your animals can resist infection. And, healthy calves make highly productive cows." - Allan Hain



QUALITY ABOVE ALL

While part of the reason Allan spends half the year in New Zealand is because he loves the country, the other part is because he believes New Zealand's farming system is the perfect platform for probiotic formulas. Results motivate him, and he's clear after more than two decades about what it takes to achieve that.

"There are liquid supplements and other sub-par products out there now which have very low amounts of CFUs," Allan said. "And, when farmers buy very low amounts of the active ingredients in these products, it's a concern."

WHY STRENGTH MATTERS

So why does it need to be stronger?

"It's a war in there [digestive tract of cattle]. The higher levels that you deliver to the animal, the more impact you have. Our probiotics come to life in the digestive tract and multiply to outcompete the bad guys.

"The more soldiers we have in the fight the better, and some soldiers in the probiotic world come better equipped for the fight than others. It's as simple as that. I don't know anyone using higher concentrations than us."

Allan said they source one of the best quality active live yeasts from the USA, while the enzymes and micro-encapsulated high CFU probiotics come from Austria, Germany, and Japan.

"There has been a lot of work done over the years, and while people mostly focus on single-strain yeasts, the probiotics and enzymes also have a synchronistic action in the rumen. When they are formulated in the right combinations at the right strength, they make a powerful product."

The products all have high "viability" ratings, which speaks directly to their quality. Put simply, it means the biological activity and CFU counts must still match label counts at the two-year expiry date.

"Our probiotics are also chosen on antibiotic resistance, allowing them to be used in conjunction with antibiotic therapy," Allan said.

GI TRACT DRIVES IMMUNITY

Allan says the lower gastrointestinal (GI) tract drives 70-80% of a mammal's immunity, and getting the right concentrations of probiotics to that sweet spot isn't easy. So, there is no question in his mind that microencapsulated probiotics are critical.

"If the probiotics come to life in the rumen, they aren't worth two-bob. The microencapsulated coating allows them to bypass the rumen, and come to life in the lower GI tract where they outcompete pathogenic bacteria.

"Common sense says that you cannot get that mode of action with liquid supplements. They will give a nominal therapeutic effect, and it's better than feeding nothing. But, in my opinion, it's not the answer."

ANTIBIOTIC ISSUES

Allan saw and understood early that the dairy industry would eventually have to step away from including antibiotics in daily feed rations. And, as soon as he understood the depth of New Zealand's reliance on rye grasses, he knew probiotics would fit this country like a glove.

"A cow is a walking fermentation vat. If you have challenging feeds on a daily basis and you're putting an antibiotic in to control that, it might solve one problem, but it will have a negative impact in another area. It is well documented in microbiology.

"In the US, the FDA [Food & Drug Administration] make one of the most utilised in-feed antibiotic rumen enhancers in Australasia carry a disclaimer on its product saying that it suppresses dry matter intake [DMI] and fat, and that it is directly linked to cystic ovaries, and more open days.

"If cows are fed antibioitcs every day at low levels for rumen control, it is well documented that it will have a negative impact on immune function.

"Of course, antibiotics are definitely necessary when animals are sick, but every time an antibiotic is used for a sick animal, a quality probiotic should be used post-treatment to help recovery."

MORE THAN HERD HEALTH

Allan's work in Australia has given him the background for New Zealand.

"There are a lot of different pathways to milk production. In Australia we found the increase in the digestibility parameters in the rumen had an energy value. Put simply, because the probiotics negated the negative imbalances in feeds and increased digestibility - we could drop 1-1.5kg of grain from their ration, without impacting on production or BCS [body condition scores].

"Those early high-producing customers initially wanted the probiotics for the herd health, but we also saw good increases in solids, because it made sense that if we corrected an unbalanced rumen – because of low effective-fibre, high soluble carbohydrates and too much protein – that the fibre-digesting bacteria could then work more efficiently. That is why we see more consistent production, BCS maintenance, and consistently lower SCC [somatic cell count].

"My biggest customer feeds an average of 10kg grain a day, at peak milking 1700 cows, at Mt Gambier in South Australia. Last time I checked he had six cows in the sick pen. If my formulas couldn't control the cow's rumen, we would have had many dead cows at that feed rate."

Allan said manure tests on cows receiving the product revealed they excreted less fibre and protein in the manure, because the feed was being digested more effectively.

NZ PERFECT FOR PROBIOTICS

He said that was when the bell initially switched on for him with regard to New Zealand.

"New Zealand's dairy herd is fed a fibre-based diet. Maize silage and rye grass can be imbalanced and volatile at different times of the season. Grain is horrifically expensive, and the microbes [bacteria] fed in the right concentrations help cows digest their feed more efficiently.

"Our product is so strong we can go into a herd suffering from SARA [sub-acute ruminant acidosis] in the spring when the cows are shooting manure through the eye of a needle, and within 24 hours of introducing our formula 75-80% of the herd's manure will be stabilised.



"That percentage lifts to 90%plus within 48 hours. Good farmers know the importance in this area. SARA costs the industry a lot of money. We have also noticed on our programme, less hay – if any – needs to be used in these situations because we keep the rumen stable through natural bacterial action."

MASTITIS AND MANAGING DRY COWS

Fuelling a healthy immune system leads to other vital, yet more subtle conversations.

"There is a reason one cow gets mastitis, and another doesn't. It's usually because of suppressed immune function in those cows. It's the same for scouring dairy



Micro-encapsulated probiotics are safely delivered to the lower GI tract where up to 80% of their immune system is driven from. Photo: Probiotic Revolution.

calves.

"If you've got strong immune function, and a strong load of beneficial organisms in the lower GI tract, it makes sense your animals can resist infection. And, healthy calves make highly productive cows."

Allan points to an example in a large dairy in Mexico that had massive issues with mastitis that weren't responding to antibiotics. The microbiologist in Wisconsin that Allan has worked with, formulated a bolus to deliver extreme loads of probiotics over three days to sick cows. The milk didn't have to be kept out of the vat, and the results were impressive enough that Allan applied the science Down Under within his lead feed, Super Start.

"I thought, 'Why wait until a cow is in lactation to try and build her immunity?'. So, I formulated ultra-high loads of probiotics in Super Start to be fed to cows two weeks out from calving to set them up with a stronger immune system. And, it also sets up the calves through the colostrum. I've had farmers say the colostrum out of some of those older cows is like honey."

Other observations also strengthened Allan's resolve.

"Farmers using the Super Start have also noticed that they don't know when the cow is calving, because the cows no longer stop eating and go off on their own before calving.

"So, there is no drop off in DMI, which means they have more available energy. Easy calving and early milk-flow is all about energy, so the cows calve and clean up effectively; we are also seeing heavy reductions in pointof-calving mastitis and greatly reduced drug bills.

"The calves are also healthier on the ground. A calf's first exposure to bacteria is the birth canal and suckling, if they pick up a pathogen at this stage the calf will be compromised. Together with our post-calving probiotic paste and microbial milk additive calf powder, we are improving all of those processes."

Allan is also looking to include a new product in Super Start. He has aligned with Blue Pacific Minerals, near Tokoroa in NZ to include OptiMate – a premium finely milled zeolite – which will further help reduce oedema and milk fever in the lead-up to calving.

SOLUTION TO DRY COW TREATMENT

Taking the mastitis-protection theory a step further, Allan said feeding high loads of probiotics late in lactation to stimulate immune function could also be part of the solution to the threat of traditional antibioticbased dry cow treatments being banned in New Zealand.

"I think we've hit the nail right on the head with the concentrations. If you look at the SCC in cows in the second year of using BR100 [daily probiotics in the dairy ration] it has given us a direct indication of immune systems responding to the product – especially in second and third lactations in herds.

"And, we're now getting consistent reports of two-yearolds which have been raised on the product, consistently showing up as the top producers in their herds."

NEW PRODUCTS

Probiotic Revolution is about to introduce a new product to the market, which is getting rave reviews in Australia. BioRumen paste is a potent probiotic paste, which is 40 times stronger than any product currently on the New Zealand or Australian market. It is designed as a spot treatment for new, sick and stressed calves. It is also ideal for sick and off-feed cows.

The product's success comes down to its strength, according to Australian veterinarian and former dairy farmer Dr Robyn Plunkett.

Robyn said, "New Zealand farmers may not be aware, but to this point everyone has been talking about millions of CFUs in probiotics. In Allan's formulations, we're talking billions – and, that's the critical difference. "Farming is so intense nowadays that calves are exposed to more harmful bacteria than ever before. The traditional rates of probiotics in milk are no longer relevant in modern calf-rearing practice."

Best used in unison with a daily dose of probiotic Calf Xtreme,



Australian dairywoman Annie Newton says her dependence on antibiotics has dropped by 70% in her calf shed, thanks to Probiotic Revolution's sister products. Photo: Daviesway.

calf rearers can start the season with confidence.

Northern Victorian farmer Annie Newton was one of the first to say that using both products had reduced her dependence on antibiotics by up to 70%.

Her partner Greg Perry and Greg's son Scott milk 1400 cows between two rotary dairies on 500 hectares (1250 acres) at Tatura.

Annie rears 300 calves a year in one of the most challenging climates to farm, with sub-zero temperatures in winter and upwards of 40 degrees Celsius in



Allan Hain (right, pictured with Probiotic Revolution's Matt Collier) paved the way for probiotics to reach achieve meaningful concentrations in Australasia. Photo: Probiotics Revolution.

the summer. They calve all year around.

Annie said, "If something doesn't look quite right they get the paste, and we include the powder in their milk every day. I know I say it's cut our antibiotic use by more than 70%, but in all honesty it may be even higher than that.

"It's not only the expense when you have to use antibiotics, it's also the stress for the calves, and the worry and extra work for our staff."

ALLAN'S 'WHY'

Allan said having the Australian market embrace his work openly now is gratifying.

"One of my proudest achievements was when respected Australian company Daviesway did a survey in the Australian market for the best quality probiotic in the calf rearing space because they could see strong potential. And, after evaluating the choices they picked my formulas.

"And, they are getting wonderful feedback from their farmers for making that decision."

Allan says the continual need for probiotics to keep moving forward, and his ongoing curiosity in using the science to help farmers, is what keeps him involved.

"It has always been about the results for me. I love hearing the positive stories coming back from farmers.

"And, with feed expenses continually mounting, it's important that farmers have all the information they need to get these purchases right."

FOR MORE INFORMATION: Manufactured by: **Bio Australia & Micro Proteins Australia** Distributed by: **Probiotic Revolution** 25B Norman St, New Plymouth, 4310, NZ. P – Matt Collier +64 21 234 1713 E - matt@probioticrevolution.co.nz

