Jan Pacas, All G CEO (above), with Jared Raynes and Shae Rickards; Melbourne mother Dominique Adamidis (right) and lactoferrin powder. Photos: Wayne Taylor, Janie Barrett

Scientists trying to make human breast milk in lab

Gemma Grant, Liam Mannix

Biotech companies are racing to be the first to fully replicate human breast milk – using genetically modified yeast – in the hopes of upending the multibillion-dollar infant formula market.

Australian biotech company All G says it will soon file a patent for what it claims is the closest infant formula to human breast milk ever invented, while on Tuesday the CSIRO also announced its spin-out, Brisbane-based Eclipse Health, had millions of dollars in funding to develop yeast-grown lactoferrin – an anti-inflammatory protein found in breast milk.

"This is the closest infant formula has ever come to the real thing," said Jan Pacas, chief executive of All G. "We've moved beyond imitation into true replication." If it makes it through the approval processes, All G could compete with formula products, most of which are derived from cow-based milk products.

The company said its formulation produced five major human breast milk proteins through a process called precision fermentation, which uses genetically modified yeast in a vat in a method similar to beer brewing. It expects the product to be available on shelves by 2028.

But some industry experts say true replication is nearly impossible to achieve within the bounds of current science.

Professor Kevin Nicholas, who has been researching breast milk composition for more than 50 years, said human breast milk had evolved over millions of years into a product perfect for babies and their nutrition. "Three, four or five proteins don't make milk. The reality is that there are hundreds of components … it's very, very complex. It's got a lot of different components in it. And a few proteins don't constitute breast milk, or any kind of milk," he said.

Like with all new health products, there would be numerous hurdles to overcome before the new breast milk substitute is available, he said.

"You have to prove your product is safe and … that it does have advantages," he said. "There are a number of regulatory bodies to pass through and a number of steps. And often an end point is clinical trials."

Associate Professor Wendy Ingman, who researches breast health at the University of Adelaide, said All G's new product was an example of positive changes within the industry over recent years.

"It's a step towards improving infant formula," Ingman said. "It's a cleaner way to make the proteins because they're able to manufacture them to be more like the human proteins in breast milk."

But Ingman said human breast milk remained a food source that specifically served babies' nutrition.

"Human breast milk has got thousands of proteins and different types of carbohydrates and fats in it. It's a very complex fluid. And while this is improving infant formula, I don't think it's going to be on par with the real thing," she said.

For Pacas, All G isn't trying to replace human milk or claiming it can directly replicate it – rather, it's aiming to provide a breast milk substitute that is more nutritionally beneficial than current formulas. "We're focused on producing the protein mix," said Jared Raynes, chief science officer at All G. "That's only one portion, but an extremely important portion, of the formula."

Pacas said All G's new product shared between 70 and 80 per cent of natural breast milk's composition when combined with essential human fats and carbohydrates. "We're not saying we're identical to breast milk … [but] it's still totally transformational to what you have out there today because [babies] are drinking basically cow milk, not human," Pacas said. "Breast milk is absolutely the best. But there are situations when you simply cannot [breastfeed]. You need to go to work, or babies are born prematurely and you don't have breast milk at all."

Melbourne mother Dominique Adamidis preferred breastfeeding for both of her children. "I wanted to try and not use formula because there are benefits of breast milk that don't exist in formula … so breast milk was always going to be my first choice," she said. But Adamidis is glad substitutes are an option for those unable to breastfeed. She said improving the nutritional value of formulas would be greatly beneficial. "Obviously, there's a myriad of reasons that … people won't be able to breastfeed, and formula is fantastic [in those instances]. I think there should be no shame around formula feeding, and there should be no concern that your baby's nutritional needs are being met …"

Nicholas said the industry should prioritise encouraging women to donate breast milk.

"We have to rely on formula and fortifiers that are largely produced from cow milk … and there's no doubt that it's not as efficacious as breast milk. We've got to do a lot of work globally with milk banks to get more donated human milk onto the wards and into hospitals and to babies that actually need it."

Adamidis donated milk when she had an oversupply while her first child was young. "It's a great thing if that's what people want to do … I had excess [milk], my baby stopped taking a bottle, so I had no real use for it myself," she said. "It didn't feel like I was going out of my way to do something special."

Clean-up after chemical turns creek blue

Hannah Hammoud
Alexander Darling

Crews working on Melbourne's North East Link road project are cleaning up a creek that turned bright blue after dust suppressant used during construction of the road project swept into the waterway.

The Environment Protection Authority is investigating the discolouration in Banyule Creek in Melbourne's north-east after a complaint over pollution, and is overseeing the clean-up by North East Link Project workers.

Footage from Wednesday afternoon showed the water's fluorescent blue hue in the creek near McCrae Road in Rosanna following the complaint. "EPA officers are continuing to investigate pollution in the Banyule Drain at Rosanna. We are advising the public to avoid contact with the water," the authority said in a statement yesterday afternoon.

"The source originated at North East Link Project … works. We are working to ensure no further escape of the dust suppressant. We're also overseeing NE Link, the duty holder, as it conducts clean-up works.

"EPA will monitor the project, which will now assess how to ensure such incidents are not repeated. EPA investigations and assessments of any harm to the environment are continuing."

Acting premier Jaclyn Symes said she did not know which chemical had leaked. "My advice is that it has been caused by rain and run-off, and there will be further information as that comes to light."

A spokesperson for Major Road Projects Victoria said the creek was affected by "construction activities" and assured there was no threat to the local community. "The site clean-up is under way. However, we recommend locals keep away from the creek until reviews have concluded," the spokesperson said. "We will continue to work closely with the EPA to ensure impacts to the local environment are minimised."

Banyule Creek's fluorescent blue hue near McCrae Road in Rosanna. Photo: Eddie Jim

Friends of Banyule president Michelle Giovas criticised the response to the spill. "They put two lots of sandbags across Banyule Creek, but that had not stopped the discharge from going further down the waterway," she said. "Residents are concerned that it has gone into the Banyule Flats wetlands.

"When things like this happen, we want to be kept informed. [North East Link Project] is not transparent about it. They don't seem to take these discharges seriously," she said. "It's this secrecy and lack of transparency … that is really upsetting. And because there's no transparency, I don't feel that they improve because it's behind closed doors, and they're in a rush to build the project."

Giovas, who is part of the North East Link Project community liaison group – a consultation forum between the project's key contractors and the local community – said the project's managers had consistently failed to adequately address community concerns. "They tell us what they want us to hear," she said. "For people living near the project, it's a nightmare with noise impacts and constant dust."