

A bone to pick with salmon



There's a bony problem faced by New Zealand salmon growers and it's one that's putting Scott Technology's innovative thinking to the test. Emily Pope speaks with David Cole and Barbara Webster on the progress of Mount Cook Alpine Salmon's pin-bone removal project.

Using tweezers and pliers, it takes a Mt Cook Alpine Salmon worker five minutes per fillet to remove the 30-odd pin bones.

It's currently the only way the company can debone its fillets and it's very time-consuming, chief executive David Cole said.

"We only pin-bone a small proportion of our total harvest, simply because we couldn't employ that many people to pin-bone everything.

"Moreover, the cost of producing a pin-boned fillet when you're having to do it manually is just non-competitive with overseas companies who use automation to deliver the same outcome."

Seeking a solution, Mt Cook Alpine Salmon employed the help of automation and robotics company Scott Technology.

"New Zealand has a long-standing reputation of finding number eight wire solutions to difficult problems. That's exactly what this challenge presents. Scott's reputation for robotics, creativity and 3D x-ray vision capabilities absolutely meet this sort of challenge," Cole said.

While there are automated solutions available for Atlantic salmon, there's currently no equipment specific to king salmon, making the challenge at hand a tricky one.

King or chinook salmon has different qualities from Atlantic salmon. It has a different bone structure, the flesh adheres differently, and the bones are far more

brittle, often breaking during removal.

The bones are in slightly different locations and even the number of bones differ by fillet too. "The only way to know where the bones are is through 3D technology," Cole said.

Scott's dedicated team of six have spent the last six months immersed in research and development, zeroing in on ways to automate the removal of the pin bones. The researchers have been examining the intrinsic characteristics of king salmon and channelling that into "building-block" concepts which will eventually combine to form a pin bone technology that's customised to king salmon.

It's a lengthy process, but one that Scott's research



As there's no automated solution for king salmon, staff must remove each fillet's 30-odd pin bones by hand.

and development director Barbara Webster sees as an opportunity.

"The design solution has to be able to cope with natural variability in the salmon and that will require us to extend our core capabilities," she said.

"We do a lot of work for the meat sector using x-ray, but this project gives us the opportunity to branch into a new field with a New Zealand company."

One option is to use x-ray vision to create 3D views of each fillet and apply algorithms to determine the precise location of the pin bones.

It would work like a giant scanner, said Webster.

"We've used x-ray in the past as a mainstream technology for identifying where to cut a lamb carcass, so we need to tailor that by taking it down to a lower resolution to be able to detect the smallest of pin bones."

X-ray could assist in quality control too, scanning the fillets for any remnants of bones that were missed.

"We will have to do some developments, but we see it as achievable."

Once the issues around bone detection are dealt with, the team will set about using robotic techniques for automated removal.

This was very much an evolving concept, Webster said.

"We're still in the early, rapid prototyping phase of coming up with a solution. This application will be several months before we think about the fine details of a complete machine and the build of it."

Getting the foundations right will be essential.

Instead of limiting themselves to one specific technology, Webster and her team are looking at using a combination of tools for automation.

In the first instance, Scott is developing hand-held devices to make the task more efficient and less fatiguing for staff. Bespoke mechanicals tools are also being considered.

Leveraging off existing technology is another option – using simple tools like tweezers and upgrading them with robotics for removal of the bones.

"We're also looking at tools currently used in Europe that could be tailored to the chinook's delicate features."

Although the exact combination of technology won't be finalised until a later design phase, Cole is confident they'll find a solution.

"Like any new technology, it carries some risks. It might be 18 months before we have a workable

solution, but I'm confident it will happen."

For employees, the change can't come soon enough.

When Webster and her team undertook the project, removing health and safety pressures was a key objective.

"It's a very repetitive task which is dangerous for people to do for long periods of time as there's potential for repetitive strain injury," Webster said.

"Employees are also limited in the amount of product they can debone, whereas an automated solution can tick over nicely in the background without those issues. It takes the production pressures off staff."

And for those concerned about job security, Cole gives assurance that Mt Cook Alpine Salmon is not expecting to lose any staff as a result of automation.

"Pin-boning is one of the least favoured jobs amongst our staff, as you might imagine. We have ample opportunity for redeploying our people into more interesting parts of our operation that don't require standing over a line and pulling out pin bones with tweezers and pliers."

If anything, automation would release a staff bottleneck, he said.

"Pin-boning has been a restriction in growing our overall volumes and having this technology opens up our ability to pin-bone more fish without putting a strain on staff."

Once complete, Cole expects the technology will be a cornerstone in the company's growth, improving product volume and value.

"The value element is becoming more important to us. We would rather sell a bone-out portion than just a GNG [gilled and gutted] whole fish," said Cole.

"The cost of producing a pin-boned fillet or portion when you're having to do it manually is just uncompetitive, especially with overseas companies who use automation to deliver the same outcome.

"This technology will enable us to grow that value chain and produce more value-added elements to our products. We're looking forward to seeing where it takes us."

Mt Cook Alpine Salmon grows its fish in freshwater hydro canals near the South Island's Southern Alps, processing about 500,000 salmon a year which it markets around the world.

Seafood Innovations Ltd has provided \$500,000 funding to support the project. Delivery of a solution is on track for early 2020.



Mount Cook Alpine Salmon's farm, located between Lake Tekapo and Lake Pukaki, where prized king salmon are harvested. Photos courtesy of Mount Cook Alpine Salmon.