From cattle to pigs via dogs

Like many technological breakthroughs, the development of a vaccine to control boar taint was far from simple.

In 1993, an Australian Animal Health company decided to withdraw all funding from its research into a revolutionary method of neutering dogs. Although a previous study had confirmed that castration could be achieved using a vaccine, the formulation at the time was not deemed commercially viable.

And that might have been the end of the story, had it not been for one determined researcher who had already convinced the company to supply him with enough vaccine to conduct a small study in pigs. At the time Dr David Hennessy was employed by one of Australia's State government research facilities at the Victorian Institute of Animal Science (VIAS), which had been collaborating on the development of the new technology since 1988.

With his background in pig production, Dr Hennessy had seen the potential for an alternative to physical castration for swine producers – and although he had not managed to get any backing from the private sector for the pig research, he had managed to secure a small supply of vaccine for his research.

"Fortunately, I had sufficient vaccine left to complete the pig programme that I had been funding separately, and I continued with it," he explains.

The study was successful, and later that year Dr Hennessy presented the proof of concept results. As a result, the company that had withdrawn funding agreed to re-start the product development programme, but this time targeting pig production. It was a pivotal moment.

Sixteen years later, the vaccine has already been adopted in many swine producing countries around the world, with more joining all the time. But, as

with many revolutionary products, there were many problems to be ironed out along the way.

In fact, the vaccine was initially designed to prevent pregnancy in free range heifers being fattened for export in Northern Australia. The idea being to provide an easier alternative to crush side ovariectomy. It started as a joint venture between the Victorian State Government Department of Agriculture and private industry.

However, early setbacks meant the programme was switched to companion animals and VIAS was commissioned to run an experimental dog colony and to conduct endocrine and behaviour testing. Although similar research in cats proved unsuccessful, the canine results were good enough for registration trials to be planned. Just before the trials were due to start, the problems with the formulation came to light and the project was dropped.

But the pig data saved the day, and was backed up by further studies which prompted a trial programme aimed at registering the product in 1995. But that wasn't the end of the story.

"At that stage the vaccine was markedly different to the product we know today," Dr Hennessy explains. "We were using a totally different GnRF-based formulation to the one we use today."

"The coupling chemistry was so inefficient that the vast majority of the expensive GnRF and carrier protein were thrown away in the waste. As a result the company again cancelled their total involvement in the programme, withdrawing all support and funding."

Dr Hennessy admits that, at the time, he didn't believe there was another, less expensive way of coupling the GnRF to the carrier protein. But again, he refused be beaten. He put a new team together with the aim of gaining clear guidance on the target costs of production and more information on the constraints in terms of chemistry from a manufacturing perspective.

“I got the company to agree that if I could find another way to reach the target cost of production, they would recommence the registration process.”

Not only did he get that agreement but he also successfully approached VIAS management for government funding, and began studies into alternative methods of production.

“In late 1995 I presented the proof of concept results for an alternative chemistry method to the management. True to their word, they proceeded to quicken development and we embarked on the path to registration.”

The vaccine works like any other in that it stimulates the pig’s immune system to produce antibodies that, in this case, prevent boar taint. Specifically, it stimulates the pig’s immune system to create antibodies to GnRF – a protein messenger produced by the brain which ultimately controls the testicular activity that leads to boar taint development.

The vaccine that is used today uses a synthetic, version of GnRF, - so it has no physiological effect in the pig. In other words it is similar enough to the pig’s GnRF to help trigger antibodies that neutralize GnRF; but *different* enough not to *simulate* (or act like) GnRF’s role in creating boar taint.

In the final formulation, the GnRF was linked to a carrier protein which boosted the antigenicity so that the vaccine produced a strong antibody response. This carrier protein is the same one that is used in many common childhood vaccines.

In 1996 the team started to conduct the trials for registration, and to prepare for market development. Two years later the world’s first vaccine technology for the prevention of boar taint was launched in Australia and New Zealand.

According to Dr Hennessy, the recent launch in Switzerland is a testament to all those involved in the product's development, from its inception 20 years ago.

"Others were also instrumental in the frenzy of activity that occurred in 1996-1997 before registration. A key player was Dr John Walker, who led the transition from the test tube chemistry method to the full blown validated manufacturing process used today.

"Also pivotal was Dr Ross Henderson, who led the regulatory group that managed the registration process with our regulatory authorities," Dr Hennessy says.

In fact, the vaccine remained a little known antipodean curiosity until Pfizer acquired the product from the Australian Animal Health company, CSL, in May 2004. The global company had realised the international potential of this new technology, and after confirming the safety and efficacy of the product, set about registering the vaccine in swine producing countries around the world.

Dr Hennessy also became part of the Pfizer team that had the vision of introducing a paradigm shift in the global pork industry.

"The success of the boar taint vaccine is firstly due to a team of true believers who saw the vision, and secondly, had the perseverance to make it real," he said. "I wouldn't take no for an answer, and I looked under every stone. The team and I had a vision and we never gave up."

"From cattle to dogs to pigs, it's been quite a journey."

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http://www.thepigsite.com/articles/2668/persistence-the-active-ingredient-against-boar-taint.