

A rapid test for Marek's disease in chickens has been developed by researchers at The Pirbright Institute, in collaboration with Fort Dodge Animal Health, one of the world's largest poultry vaccine manufacturers. This test allows farmers to work out how much of the disease is present in their flocks and provides information about how well the vaccine is working.

"We are very pleased with this outcome because the industry can follow up animals at hundreds of thousands of farms around the world," says Professor Venugopal Nair¹ from The Pirbright Institute, the lead researcher on the project. "A patent application for this test has been filed and the test has been applied in many countries in Europe, North and South America where the disease is a major problem."

Marek's disease is a highly contagious viral illness affecting chickens. It is estimated to cost the worldwide poultry industry up to £1.4Bn a year². Vaccination is the only way to control the disease, but over time the virus becomes resistant to the vaccine, so there is a continual need for new vaccines.

A BBSRC 'stand-alone' LINK grant allowed researchers at The Pirbright Institute to work with Fort Dodge Animal Health, now part of Zoetis³, to develop a rapid test for Marek's disease. This test tells farmers exactly how many copies of the Marek's disease virus are present in a feather or dust sample from their chickens.

"If you pluck a feather from a bird and extract the DNA, you can tell precisely that this particular feather DNA has got X copies of the virus," says Nair.

This allows farmers to perform an environmental quality check of Marek's disease contamination on their poultry farm: if a farmer finds high levels of the virus in their poultry house, they know hygiene standards need to be improved.



Feather sample collection. Image: Sue Baigent, The Pirbright Institute

This is important because a single infected bird sheds millions of viruses into the environment, and these viruses can survive for ten to fifteen years.

Another important application of the test relates to the Marek's disease vaccine. The vaccine works by infecting chickens with a virus that is similar to the Marek's disease virus but doesn't cause disease. The test can be used to count the number of vaccine viruses in a sample, which gives farmers a measure of how well the vaccine is working⁴.

By offering this test for free to customers who bought their Marek's disease vaccine, Fort Dodge Animal Health became the biggest seller of the vaccine worldwide.

IMPACT SUMMARY

A test for Marek's disease in chickens, developed during this 'stand-alone' LINK project, has been applied on farms across Europe and the Americas.

This test is also allowing farmers to determine how well the Marek's disease vaccine is working and whether or not their flocks are protected from the disease.

By offering this test for free to customers who bought their Marek's disease vaccine, Fort Dodge Animal Health (now part of Zoetis) became the biggest seller of the vaccine worldwide.

BBSRC's 'stand-alone' LINK scheme

BBSRC's 'stand-alone' LINK scheme supports collaborative research between at least one company and one academic partner.

LINK projects are expected to have greater industry involvement than projects funded under BBSRC's Industrial Partnership Award (IPA) scheme, which also supports collaborative research with industry.

The LINK scheme provides funding for precompetitive research where industry makes a minimum 50% cash or 'in kind' contribution to the cost of the project.

The scheme fosters strong partnerships between academic institutions and companies, allowing high-quality science to be plugged directly into UK industry. This provides a route for research to generate economic and societal benefits, as well as opening up opportunities for further funding and providing career development for the researchers involved.

“This collaboration has brought to our company a great innovative tool to better understand Marek’s disease, to spread this expertise across the poultry industry, and ultimately to support our customers in improving the control of this major poultry disease,” says Dr Herve Le Galludec from Zoetis.

“The diagnostic test we have developed with this project is now used routinely in our facilities globally and brings high value to our customers in managing the Marek’s disease vaccination scheme.”

The researchers also worked out the minimum number of copies of the vaccine virus that need to be present in a feather sample to provide a bird with protection against the disease⁵. The test can now give farmers confidence that the level of vaccine virus in their birds is sufficient to protect the flock against Marek’s disease.

The LINK grant allowed the researchers at The Pirbright Institute to work on basic scientific questions as well as problems relevant to industry. Nair explains, “We planned the project in such a way that we could investigate some

of the molecular mechanisms by which the virus causes the disease, how the virus evolves, etc., and also develop a quick diagnostic test for industry with which they could precisely measure the amount of virus in the vaccinated bird. It was a perfect mixture of both together.”

By studying how the Marek’s disease virus produces tumours and which genes are responsible for producing these tumours, the scientists were able to identify two or three genes in the virus that are crucial for it to cause disease. By removing or modifying these genes, it may be possible to produce a new vaccine.

“There is a real danger that the viruses will continue to evolve in the future,” says Nair, “and at the moment we are using the best vaccine we have. So if there is a further increase in the virulence of the virus and this vaccine stops working, we will need a new type of vaccine.”

The researchers have patented this vaccine and are continuing to work with Zoetis, this time on a LINK grant awarded by Defra, to develop new vaccines for Marek’s disease.



Marek’s disease test is used in the Zoetis Poultry Center of Excellence Europe to support European hatcheries using Marek’s disease vaccines. Image: Zoetis

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