Changing the game in biological controls

In my last post, I detailed ongoing and upcoming biological control projects in Australia, and expressed a degree of nervousness due to our history in biological controls - for example, the cane toad.

However, Invasive Animals CRC communications manager Glenn Conroy says biological controls have come a long way since then, and the projects to control carp and rabbits are "game-changing" technologies.

Here is his full response.

Introducing cane toads to control the cane beetle in the 1930s and introducing cats in the 1890s to combat rabbits were unsophisticated and naive attempts at biocontrol.

But in stark contrast to these and others mentioned in the article 'Playing roulette with biological controls', biological control planned for carp and rabbits in Australia in the 21st century are “game-changing” technologies.

The work over the past decade on tomorrow’s biocontrols has been done carefully and methodically by highly-skilled scientists. There is also a comprehensive set of requirements under various pieces of legislation associated with gaining approval that the biocontrol is safe and effective before the new biological agent is introduced. None of this is taken lightly or rushed into.

The article mentioned two biocontrols currently within the Invasive Animals CRC current research portfolio: rabbit haemorrhagic disease or RHD which is a strain of calicivirus, and Australia’s first carp biocontrol agent Cyprinid herpes virus-3. These two biocontrols are the most promising developments in more than two decades.

Australia’s first carp biocontrol set to revolutionise carp control in the Murray-Darling Basin

The Invasive Animals CRC, CSIRO and the Murray-Darling Basin Authority are looking at the potential of naturally occurring Cyprinid herpesvirus (CyHV-3) to revolutionise carp biocontrol in Australia.

The two other related viruses, CyHV-1 and CyHV-2, are already present in Australia.

CyHV-3 is a naturally-occurring virus, already found throughout Europe, North America, Africa and Asia including Indonesia. It specifically affects one species only, carp (Cyprinus carpio), not even affecting the closely related goldfish. The goldfish and carp are so genetically similar they can interbreed, but CyHV-3 differentiates between these two types of fish.

Australian native fish are genetically very different from carp. The introduction of CyHV-3 into Indonesia in the early 2000s led to the carp population dropping 80% to 95% in two years. CSIRO has found in laboratory experiments that the Indonesian strain of CyHV-3 is highly effective against Australian carp. An 80% plus drop in carp numbers is also expected in Australia.

CyHV-3 is a humane control method with less than 24 hours between the first appearance of clinical signs to death. Fish appear normal one day, lethargic the next morning and are dead within hours.

Maximising the benefits from Rabbit Haemorrhagic Disease virus

Since the first rabbits were introduced to Australia 150 years ago, numbers soared for almost a century. The release of the myxoma virus in the 1950s has so far benefitted Australian agriculture to the tune of tens of billions of dollars, while it allowed many native plant species to successfully recruit a new generation for the first time in decades. Myxo keeps on giving, even after 60 years since its release, it still kills about half of all rabbits born in Australia.

Since its release in 1995, Rabbit Haemorrhagic Disease virus (RHD) has worked with myxo in reducing rabbit numbers by more than 90% in many areas although its effectiveness is progressively declining. Following observations that RHD is generally more effective in arid regions and patchy or ineffective in wetter areas, research by the Invasive Animals CRC discovered that the benign virus RCV-A1 which arrived with the first rabbits into Australia gave some cross protection to lethal RHD infection and reduced its effectiveness in the cooler, wetter parts of Australia.

This was the critical key that enabled Australian scientists to try to unlock the full potential of RHD. This knowledge coincided with the growing genetic resistance to the single strain of RHD virus in Australia and the evolution of new RHD virus strains in Europe and Asia which have led to new outbreaks which have markedly reduced rabbit numbers. The Invasive Animals CRC RHD Boost project has crystallised this changing playing field by evaluating the ability of the most promising of these new naturally evolved RHD virus strains to outcompete the existing single RHD virus strain in Australia and overcome the cross-protection effects of the benign RCV-A1 virus.

However, it has never been claimed that biological control is the magic bullet solution to the rabbit problem in Australia. Follow-up conventional control is critically important to mop up as many rabbit survivors of biological control as possible.

If successful, RHD Boost has a calculated Net Present Value of $1.4 billion over 15 years ($840 million agricultural benefit) and will substantially reduce the impacts of rabbits on Australian plant biodiversity over the 5.3 million square kilometres currently infested. Aside from damage to agriculture, it only takes one rabbit per half hectare (one rabbit per rugby footy field) to stop regeneration of some of the 156 nationally listed threatened native species impacted by rabbits. There is an imperative for governments and communities together to find new ways to control rabbits. Maximising the effectiveness and value of RHD is one of those ways.

So with the current good season, pest numbers are swelling from rabbits across the landscape to carp in Australian rivers. The gamble is not about playing roulette with biocontrol measures for rabbits, carp and other pests but whether we can as a nation gamble on not controlling these pests at all.