

# Family Matters: Untangling the rabbit pedigree

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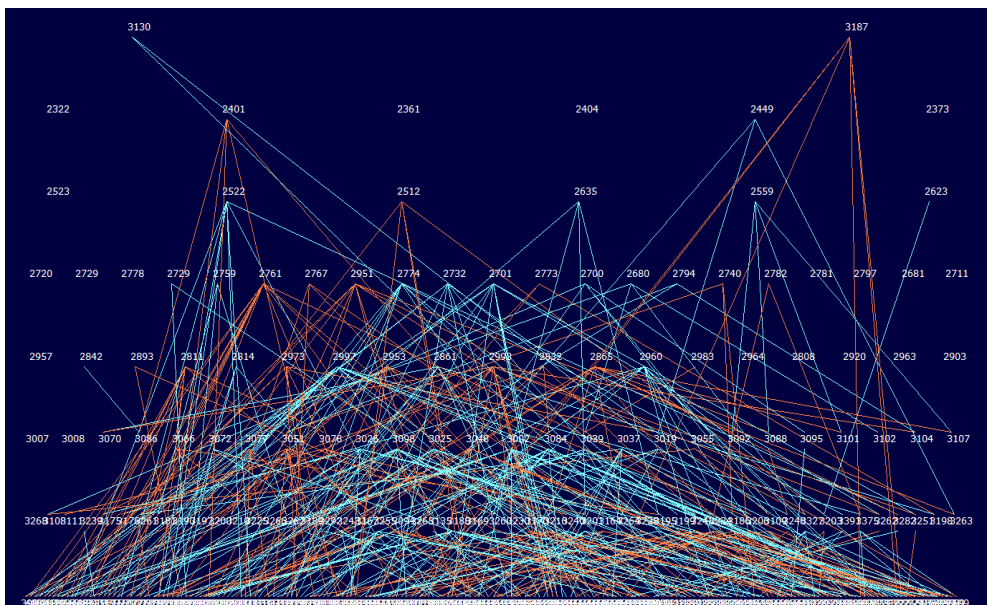
Does it matter if your surname is Montague, or Capulet?  
A rose by any other name would smell as sweet, right?  
But what about if it's Lannister, or Stark?  
What if your blood determined who lived, and who died?  
For rabbits this just might be the case.

There is evidence that rabbits are developing some resistance to the old strains of RHDV. Some rabbits are lucky enough to carry genetic mutations that give them the edge in avoiding death-by-virus. The theory is that when an outbreak occurs, those rabbits with the resistant mutations are more likely to survive, and they will then pass on the resistance genes to their offspring. If I were a rabbit, I would definitely want to be born in the resistant family.

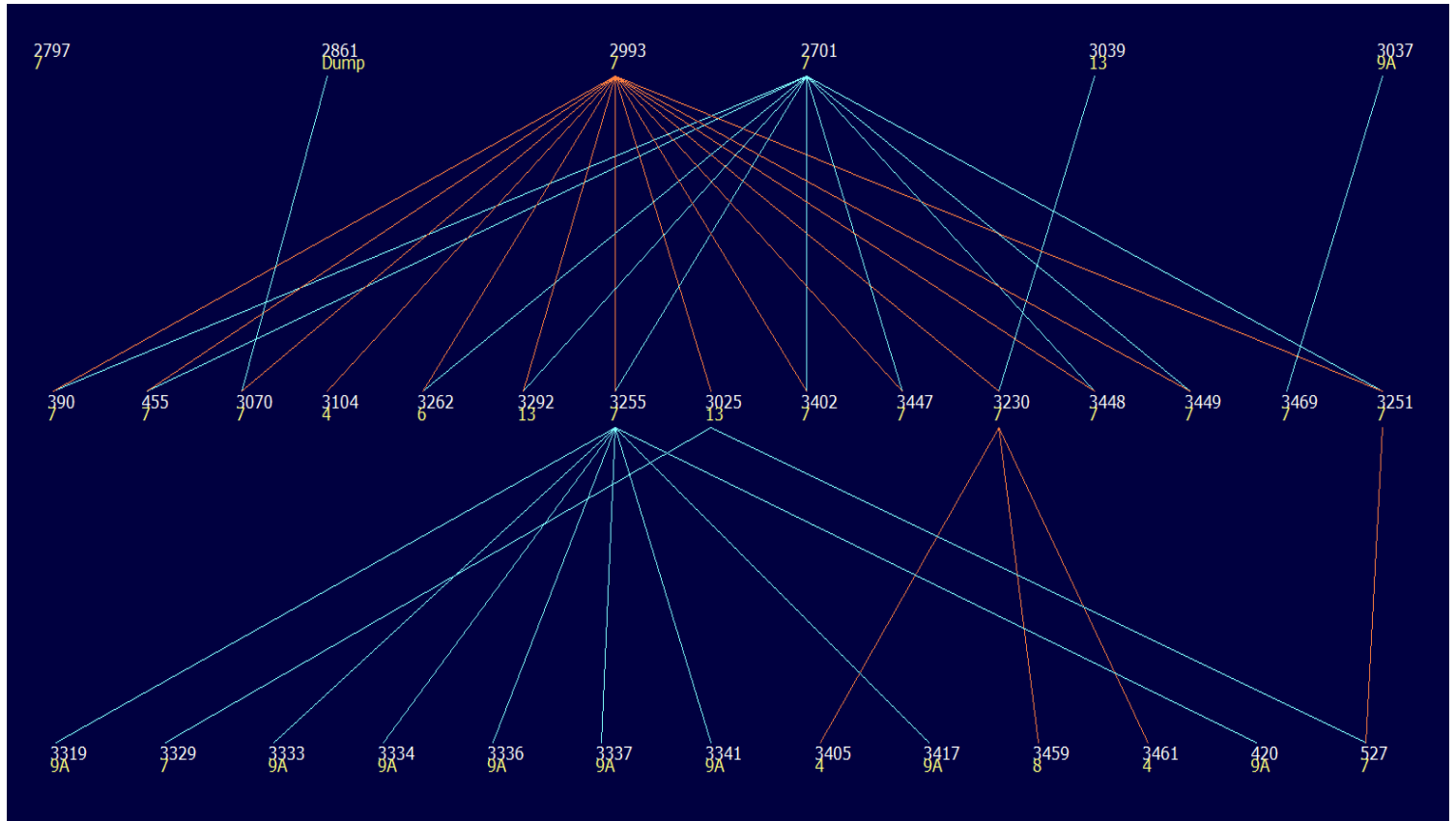
What we are trying to determine is exactly how much of an effect genetics has on rabbit survival, when compared to other factors like the size of the birth warren, age of parents and month of birth. If we can determine which factors are most important, then we may be able to harness that information to set rabbit populations back on a downward trajectory.

The first step in this process is to reconstruct the family tree of a large population of rabbits. We have achieved this by using new Next Generation Sequencing techniques to sequence bits of DNA from across the genome of each rabbit. These bits of DNA create the equivalent of a genetic fingerprint that we can use to identify each rabbit. The more similar the 'fingerprint' of two rabbits, the more closely related they are. We can use this to match the adult rabbits with their offspring, then track which offspring survive to adulthood and which never make it.

So what does a rabbit family tree look like? Here it is, in all its messy glory.



Don't worry, you're not supposed to be able to read it! Obviously this is far too dense and tangled to be of use, so we can reduce it down to just look at one warren at a time, instead of the whole 15 warren complex that we studied. Here's a nice example from Warren 7. It shows a dominant breeding pair and their offspring and grandchildren. You'll notice that while Mrs 2993 favours Mr 2701, she isn't monogamous. One of their offspring, a male tagged with number 3255 has migrated to nearby Warren 9A and become a successful breeder in his own right, while most the rest have not managed to survive to breeding age.



Pedigree of rabbits from Warren 7 and their relatives. Paternal links in blue, maternal links in orange, rabbit ID numbers in white, warren of first known residence in yellow beneath. Note the dominant breeding male 2701 and female 2993. One of their male offspring, 3255 has migrated to Warren 9A and bred successfully in that warren.

From these data we have so far found that breeding success appears to be concentrated on just a few older (and likely more dominant) rabbits. Rabbits born in July-October had the greatest chance of survival, while those few that were born through summer never stood a chance. Both of these facts very much fit our expectations and previous observations. The truly exciting bit is coming next, when we combine our family data and survival data together with statistics to really quantify the impact of genes on survival. Does a rabbit's family really matter? We'll soon find out!