

RAT MARKINGS EXPLAINED

Markings work on the HOODED LOCUS (H) with the basic markings being Unmarked (H/H), Berkshire (H/h) and Hooded (h/h).

THE H-LOCUS

UNMARKED

H/H is a dominant marking causing the rat to be unmarked. This means that it will have no white markings.



BERKSHIRE

The H/h mutation is called Berkshire. In a pure Berkshire line, the rat should have a near perfect line separating the white marking on the belly and coloured sides, as well as white paws and tip of tail.



HOODED

Hooded is caused by recessive h/h. These rats have a hood over the head, neck, chest and shoulders with a stripe running down the spine to the tail. In a pure hooded line the stripe should be clear cut and unbroken.



The basic markings change when you:

- add an allele to the h-locus or
- add another marking gene next to the h-locus.

ALLELES ON THE H -LOCUS

In South Africa we only have the Essex (Roberts) allele (H^{ro}) on the H-locus and extreme (h^e), notched (h^n) and Irish (h^i) alleles on the h-locus.

Alleles carried on the dominant H-locus:

- Roberts (Essex) H^{ro}
- Restricted H^{re} - Not available in the RSA. Restricted markings / white spotting
- Downunder H^{du} - This variety was imported but since lost due to fertility issues in the line.

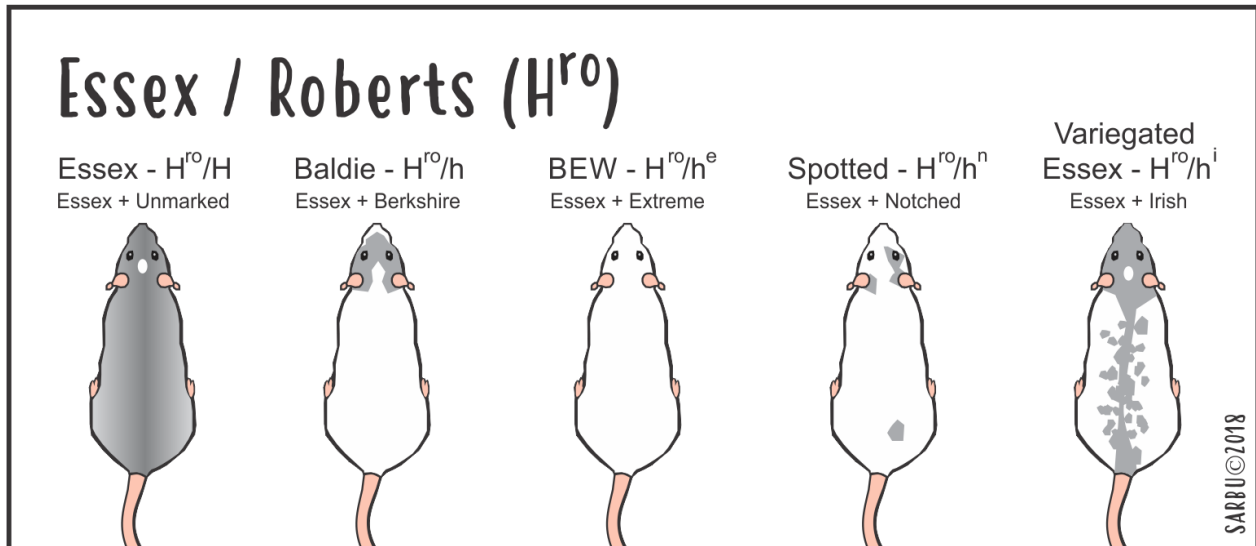
Alleles carried on the recessive h-locus:

- Irish h^i - Adds more colour / less white markings to the basic marking.
- Extreme h^e - Adds less colour / more white markings to the basic marking
- Notched h^n - Adds less colour / more white to the basic marking

ROBERTS ALLELE (Essex) H^{ro}

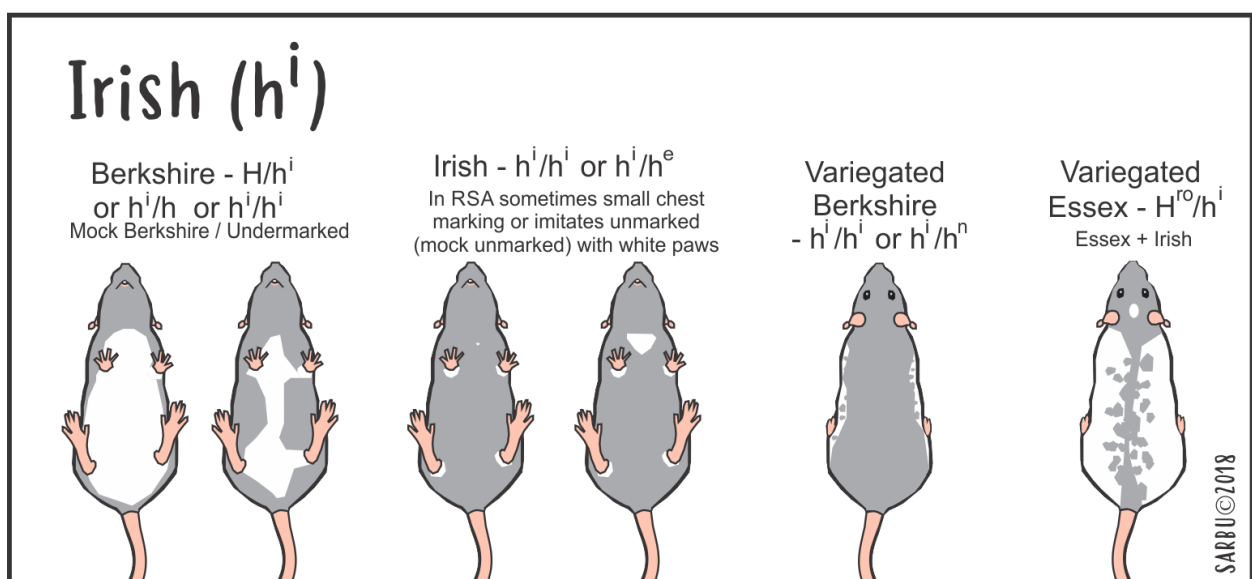
Essex is found in the imported lines. It has a slight dilution of the coat being darkest on the back fading towards the belly with a head spot. Babies are already diluted by the time their coat comes in. Only one Essex parent is needed to produce more Essex offspring and can not be carried in a line as a recessive. It is lethal when homozygous with pups dying in utero. This gene can't carry in a line as a recessive.

Essex + Berkshire dramatically reduce colour on the rat. When alleles are added to the h-locus, extreme and notched reduces colour further (adds to the white marking), while Irish adds colour to the rat (less of the white marking).



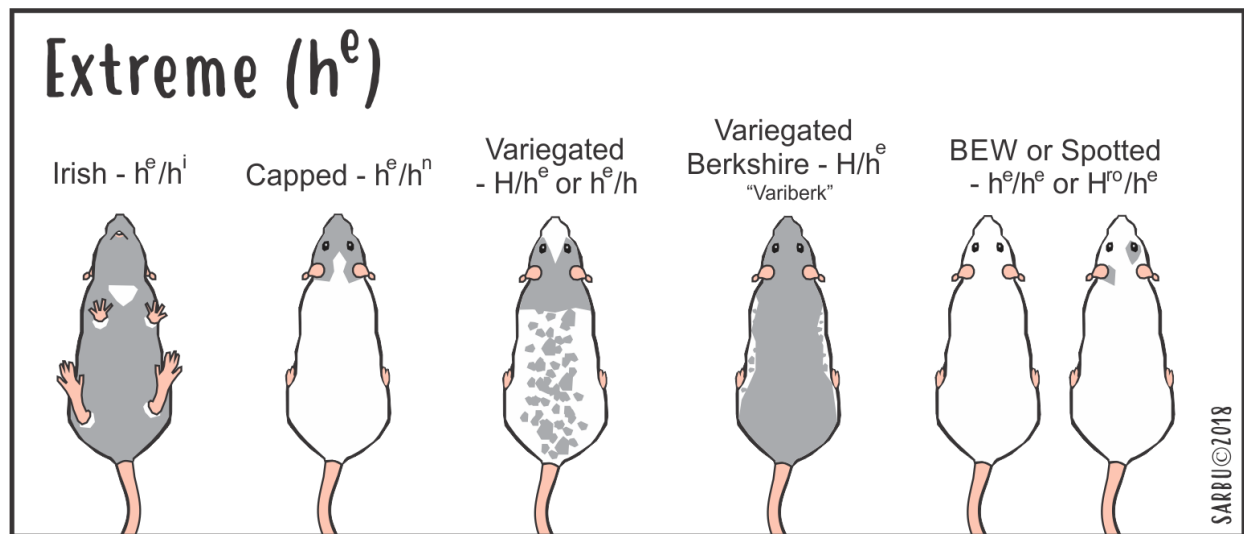
IRISH ALLELE h^i

The Irish allele is found in the imported as well as local lines. It causes the rat to be under-marked. (Less white than the basic marking). Possible markings: Mock unmarked (a South African Irish that looks like unmarked with white toes or paws or a very small marking on the chest), Irish, Variegated, mock Berkshire and sometimes Hooded.



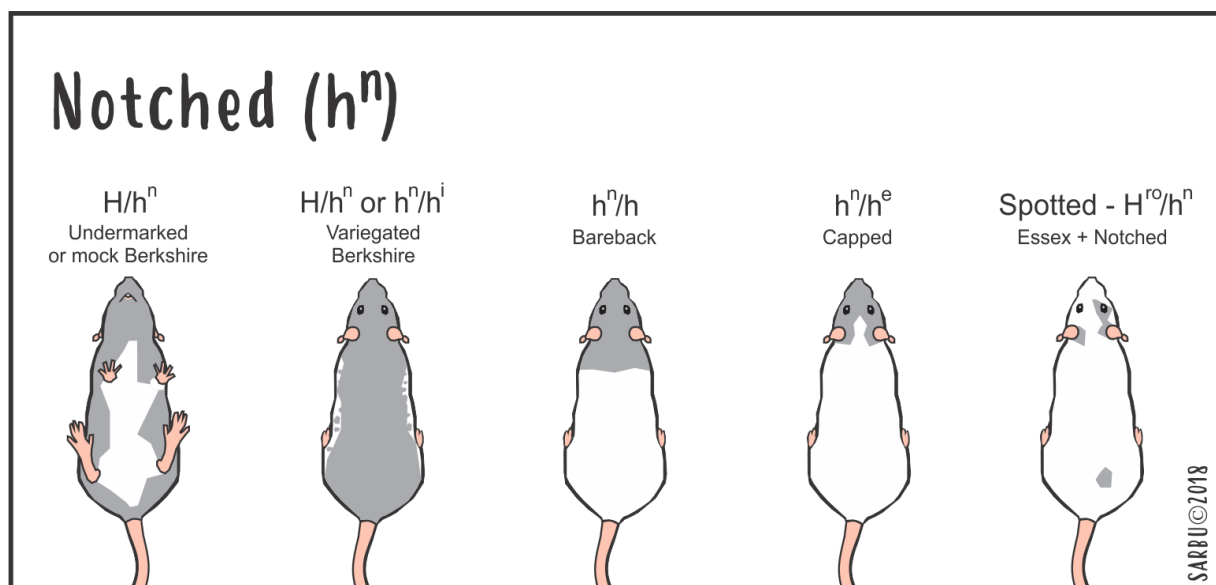
EXTREME ALLELE h^e

Found in the imported lines. Just like the notched gene, it causes the rat to be over marked (More white than the basic marking). The marking is combined with superficial black eyes (Looks dark ruby) without the p/p, r/r locus or Husky gene diluting the eye colour. Possible markings: Capped, spotted, BEW, Variegated and English Irish.



NOTCHED ALLELE h^n

The Notched gene is found in the imported as well as local rats. Just like the extreme allele, it causes the rat to be over marked (More white on body than the basic marking). It often has a notch marking at the back of the capped or bareback marking. Possible markings: Roberts Dalmatian (Spotted), Capped, Bareback, under marked Berkshire and Variegated Berkshire.



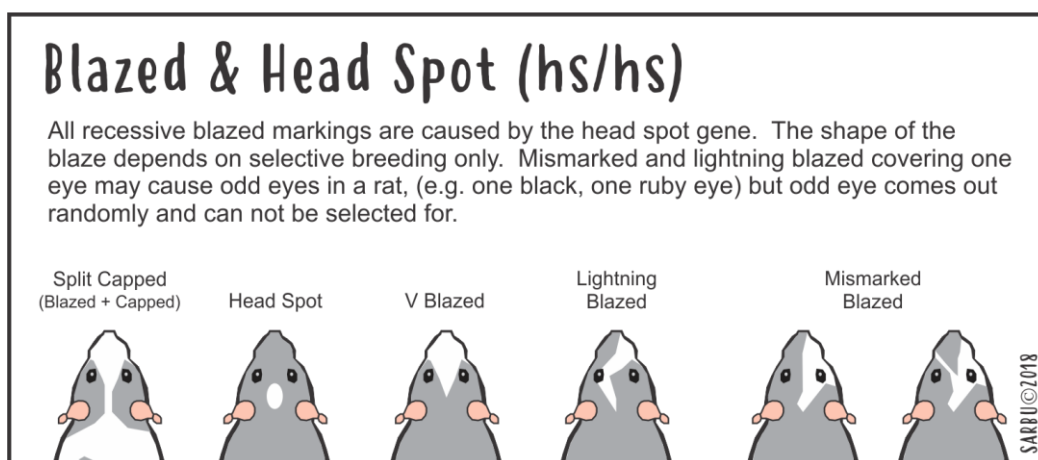
GENES NEXT TO THE H-LOCUS

- Blazed / Head spot (hs)
- Husky / Roan (ro)

Note that the same code (ro) is used for the Roberts/Essex and Husky/Roan allele and gene. Essex is written as H^r/H as it is on the H-locus and Husky as H/h ro/ro as it is next to the H-locus.

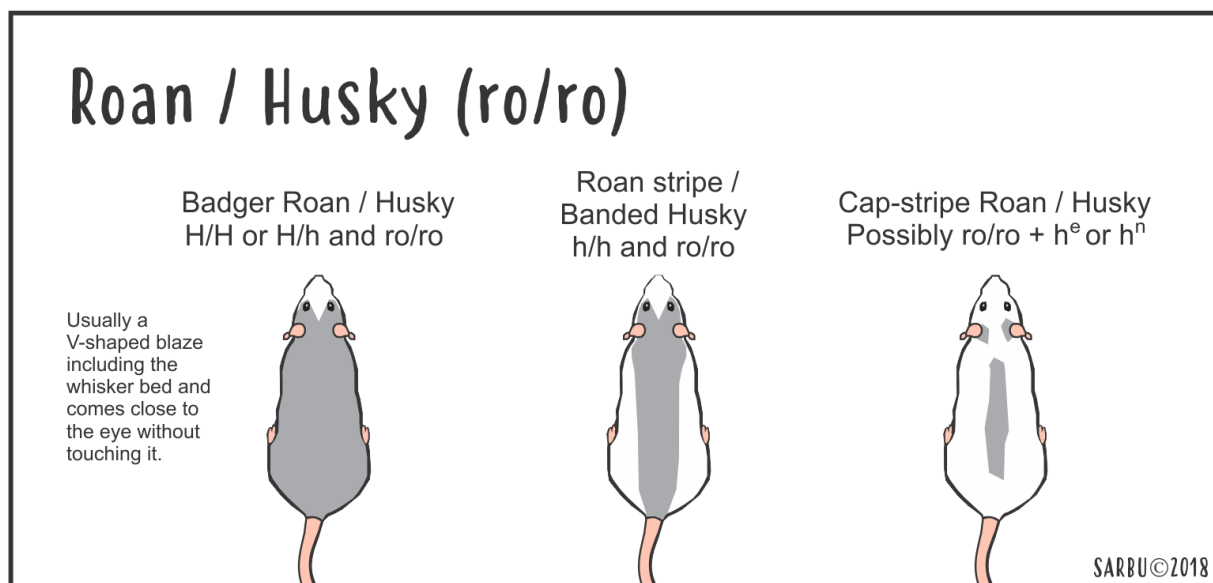
BLAZED & HEAD SPOT hs/hs

Found in the imported lines. All blazes and head spot markings in the RSA are caused by the recessive head spot gene. Blazes and head spots on Essex, variegated and roan animals are not true blazes but part of the marking. These animals can however also be genetically blazed or blazed carriers as well.



ROAN (Husky) ro/ro

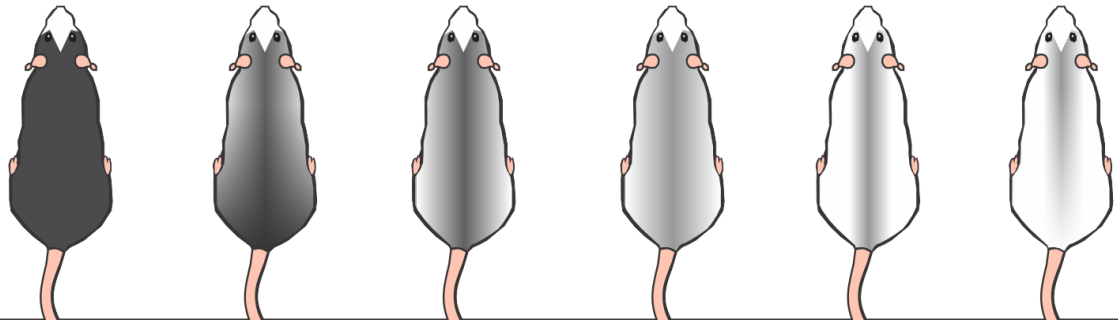
Found in the imported lines. A fading effect of the coat after 6 weeks which becomes more intense as the rat ages. The fading effect is expressed on unmarked and Berkshire as Badger Roan, Hooded as Roan stripe or mismarked when other alleles are present.



The Roan fading process

Husky rats may be any colour but darker colours like black, agouti and chocolate seems to keep their colour for longer and with a nicer roaning effect than lighter coloured rats. Husky can also be fast or slow fading with some keeping some colour into old age while others are almost completely white at about a year.

Pups start out as a solid colour with white blaze, tummy, feet and legs and start to roan after the first molt.



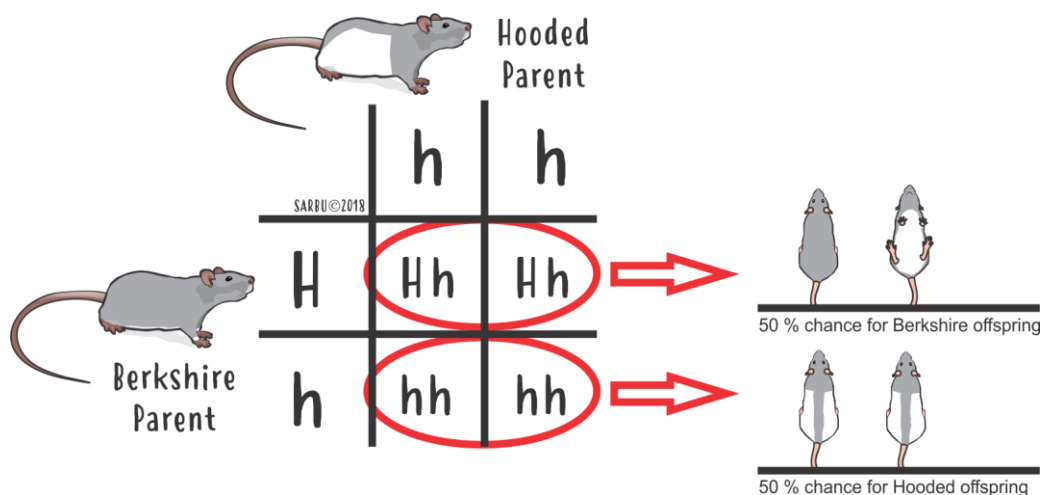
CALCULATING MARKING OUTCOMES BY USING PUNNET SQUARES

By looking at a rats' phenotype (what it looks like), it is possible to take a fairly accurate guess as to what the genetic code for its marking may be. Where there are more than one genetic possibility or where a rat is mismarked, the genotype (genetics) can sometimes only be determined after the rat has reproduced so you can see the litter outcome.

Example A

If a well-marked hooded and Berkshire rat are bred, calculating the outcome is fairly easy. If the markings on the parents are clear and not brindled or broken, chances are, they do not carry any alleles.

Berkshire X Hooded will then most likely only produce Berkshire and Hooded offspring. If other markings are produced, the Berkshire parent may be a mock Berkshire or they may carry alleles.



Example B

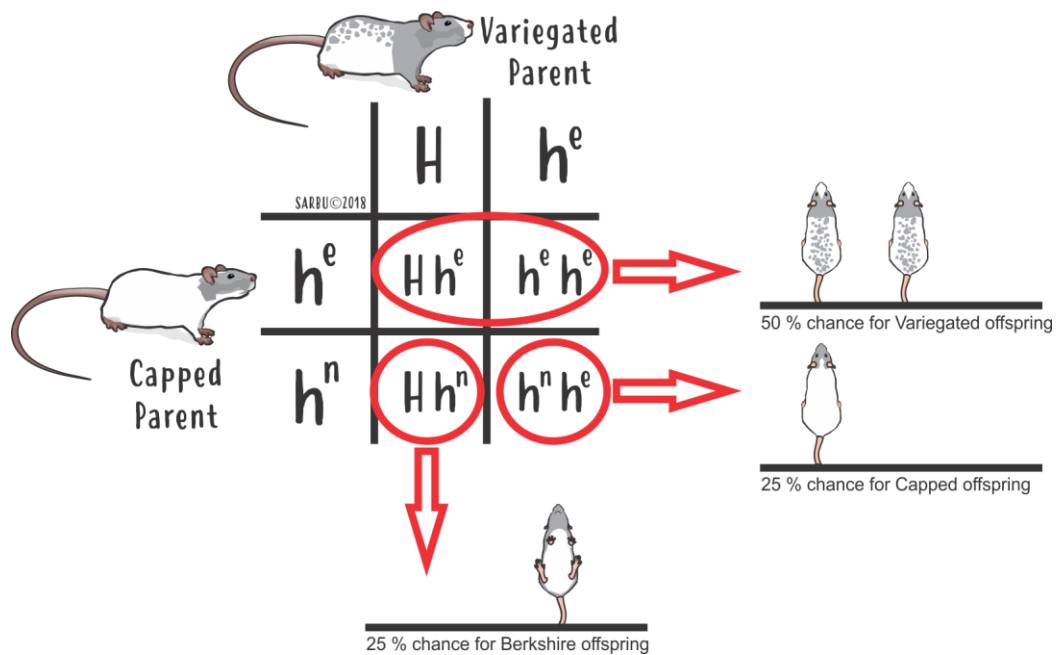
Where there is more than one possible genetic code for a marking, you can do a calculation for each possibility, but will need to see the litter outcome to determine the parents' exact genetics.

A Variegated rat may either be H/h^e or h/h^e .

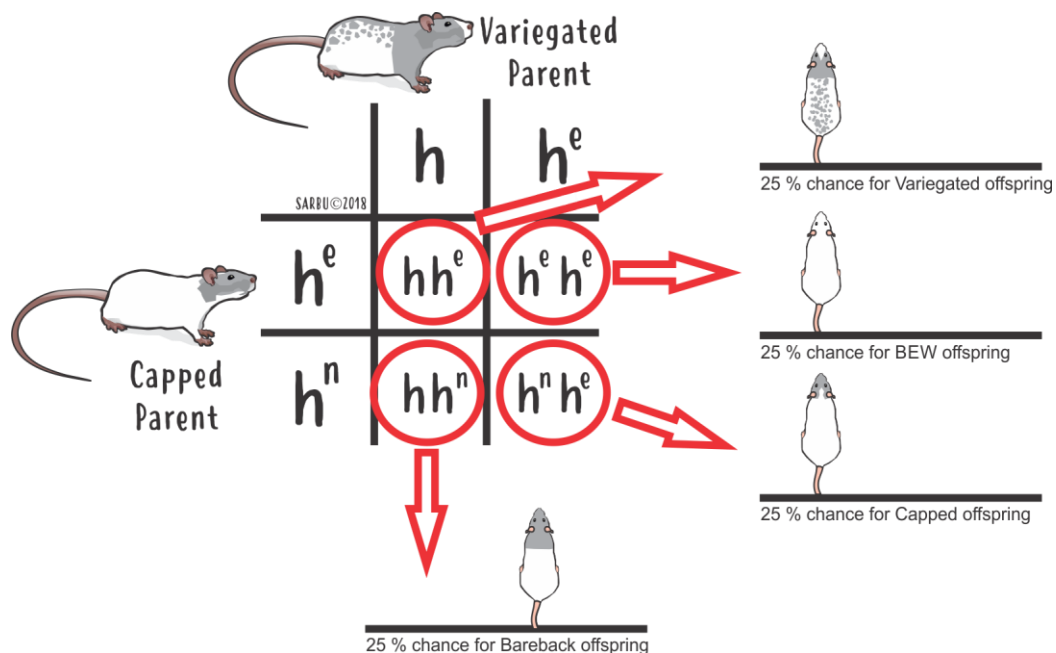
If bred to a capped (h^n/h^e) and they produce Variegated, Capped and Berkshire (Outcome 1), the Variegated parent is most likely H/h^e . If they produce Variegated, Capped, BEW and Bareback (Outcome 2), the Variegated parent is most likely h/h^e .

It is then possible to determine the genetic code for the parents as well as their offspring which will make future calculations easier.

Possible outcome 1



Possible outcome 2



Example C

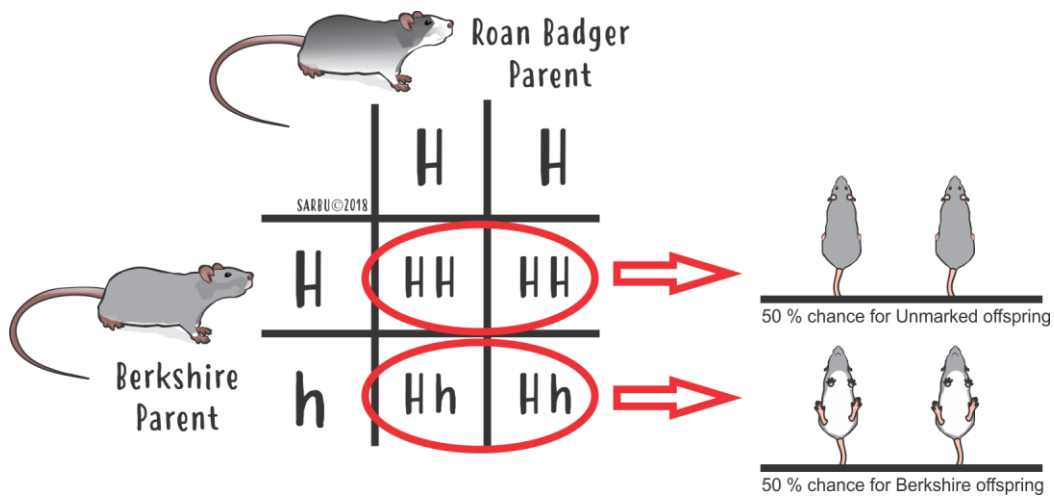
If a Badger Roan (Husky) and Berkshire with unknown pedigrees are bred, you will not know if the Berkshire parent carries Roan or if the Roan parent is H/H or H/h until you see the litter outcome.

Determining if the Roan parent is H/H or H/h

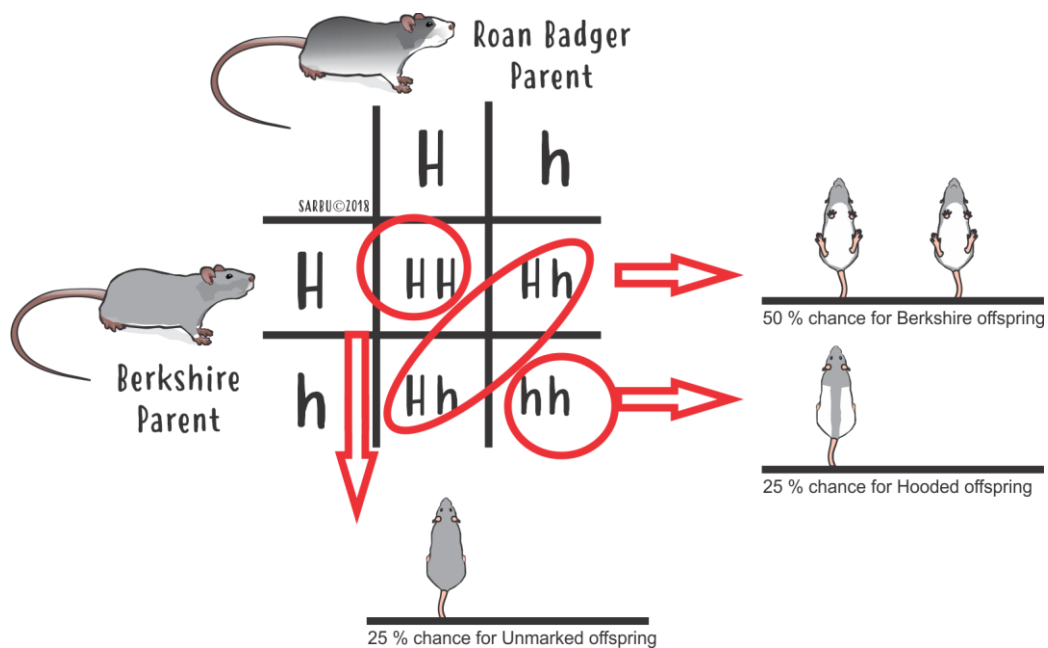
If breeding roan it will not really matter if your rats are H/H or H/h as the marking looks similar. This example is just to show how you will be able to determine which marking it is. It can be applied to other situations.

E.g. If the Berkshire parent does not carry Roan, offspring will either be unmarked and Berkshire (Outcome 1) in which case the Roan parent is unmarked. If the offspring are unmarked, Berkshire and Hooded (Outcome 2) the Roan parent is Berkshire.

Possible outcome 1



Possible outcome 2

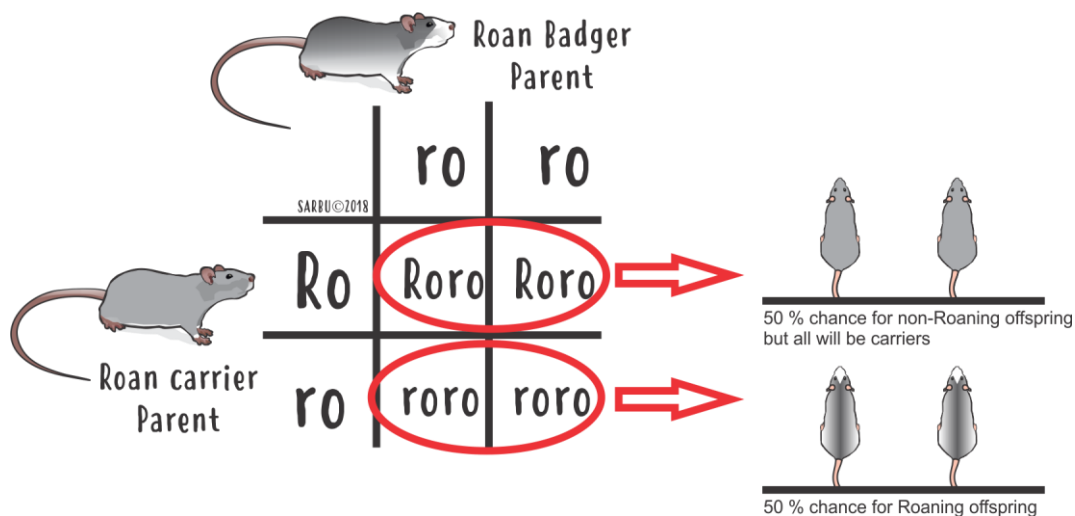


Determining if the Berkshire parent is carrying Roan

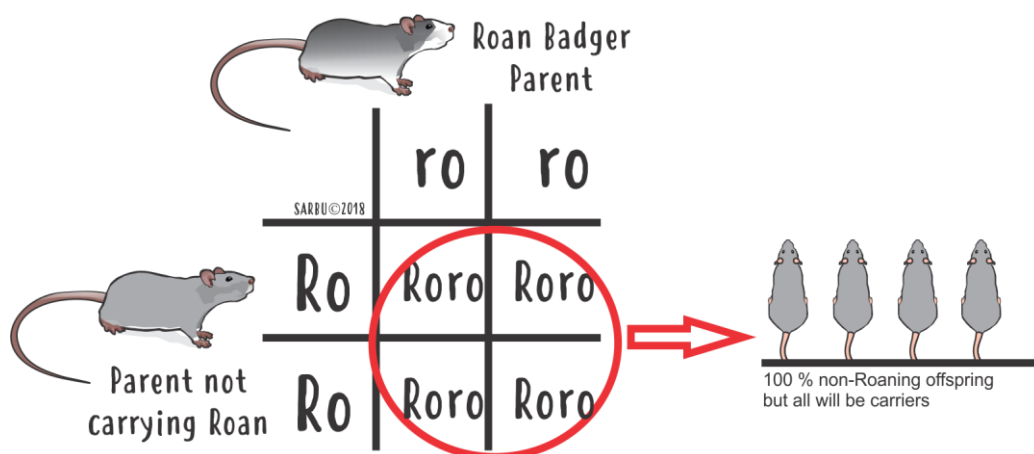
If the Berkshire parent carries Roan, some pups will be Roan and the non-roan will all be Roan carriers (Outcome 1).

If the Berkshire parent does not carry Roan, no offspring will be Roan, but all will be Roan carriers (Outcome 2).

Possible outcome 1



Possible outcome 2



Reference:

The Markings – Hooded-locus; Head spot and Roan. Written by Annalie (Combrink) Prinsloo, 2015

Ronel Pienaar © 2016
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