

Interpreting Crest Breeding Results

by George Clarke

In the Sept 05 edition of Aviary Chatter (the magazine of The Rare Budgerigar Club WA) Judy Higgins related some quite unusual breeding results involving her Crest known as “Puffy“. Judy is obviously puzzled by these particular results and is seeking an explanation.

Crest breeders have developed several theories over the last 80 years in attempts to make sense of the seemingly contradictory breeding results that occur from time to time. Unfortunately none of these past theories have been able to make predictions which consistently match or explain actual breeding results. With the recent development of the PE theory (Refs 1-3) that situation has changed. There is now a proven and far more accurate theory available to assist Crest breeders.

This article examines Judy’s results and provides an explanation based on my PE theory of Crest inheritance. The explanation contains some surprises and is bound to be disputed. However, of all the possible explanations I believe it is by far the most credible explanation.

I thank Judy for providing this excellent case study which allows me to demonstrate the power of the PE theory as a tool to help us analyse and understand our Crest breeding results.

Not surprisingly, and in common with many Crest breeders, Judy holds views and uses definitions which in some areas differ from those of the PE theory. To be able to apply the PE theory it will first be necessary to express her results in terms consistent with the theory. This process in no way alters the results themselves. They are simply expressed differently.

Let us begin by condensing the information in Judy’s article to the bare essentials. This will help focus on the important Crest aspects. For clarity all varieties other than Crests will be treated simply as Non-crests or Normals.(N). Judy describes four matings.

Mating A

Normal cock x Full Circle (FC) hen

This mating produced Puffy, a Full Circle Crest cock - the star of this mystery.

Mating B

Puffy (FC) cock x Non-crest hen -(Hen1)

Progeny

4 chicks with temporary crests

1 chick with a single feather Tuft

Mating C

Crestbred cock x Normal hen

This produced Puffy’s second partner - Hen 2 - a hen showing no crest characteristics

Mating D

Puffy (FC) cock x Hen 2

Progeny (from 2 rounds with Hen2)

4 FC

1 HC

1 Tuft

1 Crestbred

1 non crest

Now to apply the PE theory to these results we have to convert Judy’s Crest and Crestbred classifications to those used in the PE theory. The results are not altered, just the names we apply are changed.

Essentially what Judy calls a Crestbred (i.e. a temporary crest) is classified as a Crest in the PE terminology.

What Judy calls Crest related is classified as a Crestbred in PE terminology.

So when expressed in terms of the PE theory, the progeny from Mating B become

5 Crests

And the progeny from Mating D become

7 Crests

1 Crestbred

Thus from these two Crest to Normal matings we have in total an unusually high proportion of visuals, (12 in 13). Statistically the probability of this result happening by chance is so extremely low that we can say it is virtually impossible. An explanation for this unexpected result is clearly required.

Let us examine Mating D.

From knowledge of the numbers of progeny (7 visuals from 8 progeny) and the predictions of the PE theory, we are able to calculate the probability that a pair having a particular genetic combination will produce this number of visuals. (To assist breeders a tabulation of probabilities for various combinations will be published shortly)

Visually the parents Puffy and Hen2 appear to be a FC and a Normal, but genetically there are a number of possibilities which present the same phenotypes (visual appearance). These are listed below together with the percentage probability that the pair will produce 7 visuals from a total of 8 progeny

DF Crest x Normal	virtually zero
SF Crest x Normal	virtually zero
DF Crest x SF Crestbred	9%
SF Crest x SF Crestbred	0.3%
DF Crest x ZF Crestbred	virtually zero
SF Crest x ZF Crestbred	virtually zero

This shows that of these possible genetic combinations the DF Crest x SF Crestbred combination is by far the most likely one to produce such a high proportion of visuals. Therefore we conclude Puffy must be a DF Crest while Hen2 must be a SF Crestbred.

Now Checking Mating C, (the mating which produced Hen 2) we see that it involved a Crestbred cock (Judys terminology) x Normal hen.

Translating to PE terminology, this was a Crest cock x Normal hen mating and without any additional details may be expected to produce about 60% SF Crestbred progeny. So it is not surprising that the results of Mating D suggest very strongly that Hen2 is a SF Crestbred.

Moving on now to Mating B.

There are 5 visuals from 5 progeny. Visually the parents Puffy and Hen1 appear to be a FC and a Normal, but again genetically there are a number of possibilities. These are listed below together with probabilities of these genetic combinations producing this result.

DF Crest x Normal	virtually zero
SF Crest x Normal	virtually zero
DF Crest x SF Crestbred	7.8%
SF Crest x SF Crestbred	0.5%
DF Crest x ZF Crestbred	virtually zero
SF Crest x ZF Crestbred	virtually zero

Clearly the only credible possibility is that a DF Crest x SF Crestbred mating produced this result. Therefore Puffy must be a DF Crest while Hen 1 must be a SF Crestbred.

Considering Mating A. The only way that Puffy can be a DF Crest is if his father, visually Normal, is in fact a SF Crestbred. (A DF Crest must inherit Crest genes from both parents.)

The conclusions show Puffy to be a DF Crest. As my articles point out, DF Crests are the ideal birds to include in any breeding program aimed at producing a high percentage of visual Crests.

We are also faced with the conclusion that three presumed “Normals” (Hens1&2 and Puffy’s father) are actually all SF Crestbreds. (Given Judy’s experience I have excluded the remote possibility that these birds may be undetected temporary Crests.) How can these three birds be Crestbreds? I am sure Judy truly believes the birds do not carry the Crest gene and may therefore have difficulty accepting my conclusions. But can we ever be certain that a bird is pure? I think not. For example it is not uncommon for recessive varieties to suddenly appear in what was thought to be a pure line free of recessive variety genes. It is well known that recessive genes can be passed down undetected through many generations before finally surfacing. The PE theory tells us that the Crest gene can also be carried invisibly for many generations by successive generations of undetected SF Crestbreds. These Crestbreds appear to be Normal birds and generally breed as such until they are reintroduced to a Crest pairing. The PE theory and Judy’s breeding results confirm that somewhere in the ancestry of these three “Normals” lies a Crest. Thereby explaining the extremely high % of visual progeny from these Crest to “Normal” matings.

Footnotes

The conclusions expressed in this article are based on my extensive research into Crest inheritance. This research conducted over the past two years includes collected breeding results from over 700 pairings and almost 3000 progeny.

I suspect the infiltration of the Crest gene into non-crested studs is far greater than most breeders realize. Judy mentions the backyard breeders who occasionally and unexpectedly produce crested birds. This phenomenon is not restricted to backyard breeders. As this case study of Judy’s experience demonstrates, exhibition breeders are also affected. My own interest in Crest genetics turned serious when I too produced very weak Crests from two pairs of purchased exhibition budgerigars which I believed to be Normals. The expressivity of the crest in these unexpected crests can be poor because they have not been bred to concentrate the Crest expressivity genes, but the Crest gene itself is present. The feather disturbance in very weak Crests can be easily overlooked or misinterpreted by a breeder not expecting a Crest, or a breeder inexperienced in breeding the Crest variety.

References

1. CRESTS - Towards a Better Understanding. George Clarke CBCA. December 2004
2. The PE Theory for the Crested Budgerigar. George Clarke. Budgerigar World. Jan 2005
3. Crests- Old Records Support New PE Theory George Clarke 2006