FEATURE

By: **Brian Reeder**
www.brianreederbreeder.blogspot.com

In Pursuit of Improvement:
Selection Considerations

Utility Barred Pymouth Rocks which probably wouldn't get any accolades on the show bench, but have been highly selected for utility traits

What are you selecting for? That is the question. Most of us will answer 'phenotype' (visual appearance). That is, after all, what the pursuit of a breed is, at heart. We want birds that look a certain way and that look is the phenotype, which is determined by genes. We pursue genetic conformity in the action of setting a particular line. Often with our breeds we seek to mimic the effect of nature in producing stable, self-replicating phenotypes, as seen in true species; in short, pure carriers for the genes determining visual qualities. In practice, this may not always be feasible and we have to, at times, question whether a given line is genetically capable of experiencing the type of intensive breeding that is required to create the clone-like state that a 'set' breed may show.

The greatest danger in the pursuit of genetic conformity is that inbreeding of nearly any level will concentrate negative traits (especially recessives), as well as desired traits. The incremental increase in negative, detrimental factors would suggest a quantitative model where many genes come together to create a greater overall effect. Some lines will carry a good many such factors that begin to surface and spread havoc over many generations of inbreeding and narrow selection. Some phenotype traits appear to show mild detrimental effects on vigour, fertility or chick viability. When many of these factors are combined, a greater detrimental effect can occur.

A White Phoenix cockerel (what is also called Yokohama in the UK). I have worked with many of these lines and had to be careful that selection for tail length didn't come at the expense of vigour. This, a nice specimen, belongs to Ian Cotterill. Photo courtesy of Ian Wileman

Such lines are not good candidates for any form of close breeding to enhance the purity of the genes responsible for visual qualities.

Such a line may respond well to an outcross, but the later generations are likely to see the negative traits resurface, if they are interbred to any great degree. The lines best suited for intensive inbreeding for the concentration of visual genes are those carrying none or but few detrimental factors. It can be very hard to determine such a line without studying its history and gaining experience with the line. It then becomes very important to actually note the deficiencies of any line you work with. Watch for problem areas, note them and watch how they react to selection pressure. Time will show if negative traits concentrate, becoming more extreme or if the problem can be removed through simple selection (most likely with dominant genes). However, you must be very aware of problem areas. The trait that you ignore does not go away.

What are you ignoring and selecting for passively? That is the next question. What you ignore does not go away and it has the tendency to persist, if not increase, when ignored. When you put a male bird with a female bird, how many problems are you ignoring if the major focus is the intensification of visual gene(s)? Did you use the sneezing male because he has a huge cranial herniation, while you are not using the healthier male because he doesn't have a full cranial herniation? Or did you select the male with the most fluff that attacks your hand every time you reach into the cage, instead of the gentle male with lesser fluff levels? Or did you select that hen because she is so tiny even though she lays very few eggs and many of her eggs don't hatch? What did you ignore to utilise the 'best' bird, when the yardstick of what is best is a visual consideration? It is so important to evaluate your birds based on criterion running through a range of traits, not least of which are those that may be ignored in the pursuit of a perfect-looking fowl.

The Intangible Traits

The term Intangible Traits encompasses three areas that are of importance to any line of fowl. The first is Hardiness with a focus on genetic disease resistance. The second is Viability with a focus on reproductive traits, chick survivability and to a lesser extent, egg production. The third area is Temperament with a focus on calm disposition to reduce flock stress and increase ease of handling.

The ancestor of all Wyandottes: the Silver Laced. This is a colour variety that presents many challenges which, on top of shape and vigour, is a lot to get right. A good one of these is perhaps sometimes not given as much credit as it should.

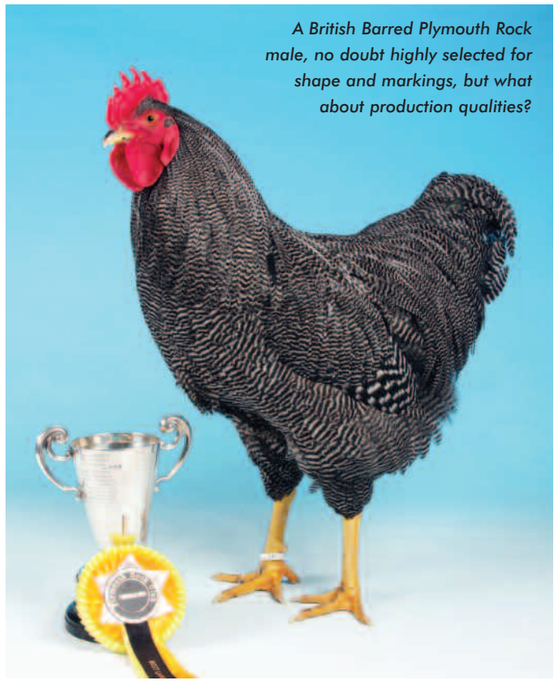
A Silver Ducking OEG bantam pullet - the ancestor, through selection, of the Modern Game

Temperament also considers negative stereotypic traits such as feather picking, egg eating, or cannibalism and seeks to reduce (or at the very least not concentrate) these traits.

The most important key to working with the intangible traits is to not ignore them. Stereotypic traits, ignored, can create surprising disasters. Weak constitution and lack of disease resistance can likewise create mayhem. Low egg production, low hatchability or high chick mortality ignored can all result in the deterioration of a line. Nervous, flighty birds are prone to suffer the effects of stress in the reduction of immunity, fertility / production and viability. Such lines are also prone to stereotypic behaviors. Some research suggests that calm lines of many domestic animals have mutations affecting the adrenal glands, reducing their function and reducing the flight or fight effect produced by adrenaline. My observation of selection for even-tempered individuals indicates a strong genetic component that responds to selection.

The Modern Game - developed through selection of OEG birds

A large fowl Blue Laced (Red in the US) Wyandotte. Considering it doesn't breed true, this variety presents even more challenges than its Silver Laced relative. Photo courtesy of Steve Dace



A British Barred Plymouth Rock male, no doubt highly selected for shape and markings, but what about production qualities?

Breeding for Extremes

It is common to select for extremes, especially in visual breeding. We are always looking for those individuals that show the greatest expression of a given trait: bigger crest, most fluff, longest tail, shortest legs, largest size, smallest size, most eggs, most meat etc, add infinitum. The history of poultry for the last century and a half has been a rush to extremes. I suspect this had already been going on for a long time before the Victorians turned to chicken showing and breed improvement as a gentlemanly pursuit. The history of modern poultry in the western world is a story of a headlong rush to the most extreme concentration of traits. Every effort has been made to conform all breeds and strains and to concentrate specific genes into extreme expression within given lines.

Show birds have come to express more and more of whatever the given breed is known for. Commercial production birds have been directed toward extremes of egg and meat production that are truly astounding. From a genetic standpoint what we have seen has been selection toward higher and higher levels of concentration and purity of specific genes and their modifier genes. Some genes have been intentionally selected for. They are visible in some manner, either as visual genes or as easily monitored traits such as egg production. However, what has been ignored? Has the value placed on certain specific traits cost selection in other areas? I have seen instances where this seems to be the case.

When our focus on breeding is toward more and more extremes in a given area, we must ask, 'What is this doing to the overall bird?' Does the extreme end of a given trait cause problems in other areas? Many phenotype traits can cause physiological issues when taken to great extremes. Others have no apparent effect. Many traits are being selected inadvertently, without being given due consideration, because other gene traits are given more emphasis. In setting up matings, always think about the overall weaknesses and strengths of the birds you are mating together. We often seek to balance traits, but there may be more wisdom in not using certain birds, no matter how good in visual traits, if they are expressing undesirable traits strongly, as well.

ABOVE LEFT: A British Buff Orpington male belonging to P&T Jones, and demonstrating the abundance of feather and lower front

ABOVE RIGHT: The Frizzle gene is in many varieties of poultry - including many backyard flocks throughout the world. With selection, it has been made into a breed of its own, but requires constant selection and monitoring to retain the correct level of expression.

This picture demonstrates from the US perspective, how British Buff Orpingtons have changed between 2000 and 2007

I would suggest that in selecting for extremes, those extremes must be carefully monitored. A good many mutations become detrimental as they reach great extremes. However, many important traits, genetic in nature and amenable to selection, do not show harmful effects when concentrated. I would then encourage breeders to watch for traits that enhance the bird, can be concentrated through selection and do not cause detrimental secondary effects. When such genes can improve the intangible qualities of the bird through increasing hardiness, viability or temperament, it would be wise to build strains around such traits.

Selecting for Improvement

What does improvement mean? Is it simply making a few visual traits bigger, more extreme and concentrated, or is it about creating more balanced birds, encompassing many fine traits, combined with a pleasing appearance? Birds don't have to be ugly to be productive, nor does a refined bird have to be unproductive. Selection for the intangible traits can occur in any line. Some lines will have a great many problems and may take a major project to restore. Other lines are carrying the desired traits and simply need selection for these traits applied. Some lines are lacking some of the intangible traits, but could be improved through judicious outcrossing and subsequent selection.

My personal definition of improvement is to make an increase in the overall intangible qualities of the birds in each generation. Using quantitative selection, I may be watching for even a small percentage of increase (perhaps even as little as 10-15%) to show that there is some plasticity for the selection of the trait(s). Any line that can show small increases in any direction each generation, will be amenable to selection and concentration of traits. If no variability is occurring in your line, then you will need to find new material to work with or to bring into your own line. If a genetic trait is not present in a line, you can wait for a mutation or outcross to bring in that genetic trait. The latter is much faster, usually. Once you have a basic trait in your line, then through selecting in a quantitative manner each generation, you will concentrate that trait and bring it to fuller expression.

It is well worth making improvements in your own lines. There are many breeding systems that could be applied to making a top aesthetically pleasing line stronger. My preferred method involves making multiple outcrosses and forming several family lines that can be selected for specific aspects of the overall phenotype. Later, these family lines are intertwined through interbreeding to combine many traits together in as few lines as possible. Eventually, after several generations, you come up with a vastly superior new line that incorporates many new genes and useful traits.

The formation of a superior line, where many intangible traits have been combined with specific (non-detrimental) visual genes can take many generations to complete. The wise breeder can create one single superior line or several interrelated lines that are used to produce superior birds. The potential for development is limited only by space, expense and creativity. However, even on the most meager budget or with limited space, one variety of one breed can be upgraded with the use of one or two exceptional birds.

Frizzled-Poland breeders have the challenge of not only producing a strict pattern on birds with features such as crests, but also ensuring the correct level of frizzling and saturation of colour (especially in the Chamois version). Not a beginner's choice!

With so much emphasis placed on shape, conformation and markings, some strains of Light Sussex lay fewer eggs than they should and very small ones at that

Those exceptional birds may be of the same variety or breed, or even another breed to use as an outcross. From the initial cross, very few individuals have to be raised. Really, you only need one or two good birds from each cross to move forward. They will be blended together or backcrossed to an exceptional parent. The goal of improvement is to find one or two exceptional birds that express many intangible traits and utilise those birds to concentrate their traits. Using the quantitative approach, we watch for incremental increases of the trait(s) in each generation.

We must watch closely for hidden detrimental recessives that may surface when inbreeding. However, if such factors do not become present, then careful inbreeding of exceptional individuals becomes a recommended course of action. In this manner, you can more quickly set the intangible traits of the exceptional individuals. Crossing exceptional individuals is an excellent way to concentrate good traits and form the basis for line development. In an ideal setting the breeder has a line(s) focused on phenotype and a line(s) with the phenotype genes that is focused on intangibles. The two (or more) lines are interbred from time to time to increase intangibles in the phenotype line(s) and phenotype traits in the intangibles line(s), always striving toward a greater concentration of many improvements.