

# The Art of Poultry Breeding

By Dr. Peter J. Scott

Since childhood, I have kept many types of animals and while I have had a lot of enjoyment with the animals themselves, my main fascination has been with breeding.

I derive a great deal of satisfaction from perpetuating the results of previous breeders' work and in seeing the ancestral qualities of my stock show themselves bit by bit in the offspring.

I pursued this interest with an intensive study of genetics at the University; it was an interesting experience, because it put me back to "square one". I still have the fundamental questions about breeding that I started out with, except that I now know, why I cannot answer them.

In essence, breeding is an ART. There are no nice formulas that can be applied, except to such characters as coat colour and eye colour. Breeding involves careful observation how do characters blend? What characters do certain individuals produce consistently? What "sins" of the fathers will be visited unto the next generation (inherited diseases, etc.)? Which of the offspring is the one to keep?

I will now give you some background information and some principles of breeding.

There are some basic facts that will help in an understanding of breeding. Animals are made up of a huge number of cells; all of these cells in the body contain the same basic information, but for breeding, we need only concern ourselves with the cells that produce eggs and sperm because they pass on the genes to the next generation.

Each of these cells contains a nucleus with chromosomes, which are essentially strings of genes. For practical purposes, a gene can be thought of as the unit of a chromosome that produces a protein. Many proteins serve to make up the structure of all the parts of an animal, while others serve as enzymes in the biochemical reactions that take place throughout an animal's body; thus, genes dictate how an animal will be built and how it will function.

Each gene can occur in many forms, often as many as a thousand or more. Each 'form' is called an allele of the gene. As an example, one of the genes affect eye colour, and one of its allele might produce brown eyes while another will produce blue. Although there are hundreds or thousands of alleles in a gene, each animal will only have two. Chromosomes occur in pairs, one from each parent, and so there will be two alleles of each gene present in the cells of an individual.

Sometimes, both alleles will be the same; for example, both alleles may be for blue eyes, and this animal would be called homozygous or "pure" for blue eyes. On the other hand, the animal may have different alleles - one for brown and the other for blue, in which case, it is said to be heterozygous. If both alleles are for blue eyes, then the animal has blue eyes, but what happens when there are two different alleles?

There are two main kinds of genes: Qualitative and quantitative. Qualitative genes control characters that are easily seen and identified such as eye and coat colours, while quantitative genes affect measurable and continuously-variable characters like height and shades of blue in a Blue Pekin bantam. In the case of the Blue Pekins, a qualitative gene determines if the bird will be Black, Blue or Splashed and then the quantitative gene takes over.

When there are two different alleles of a qualitative gene, the situation of dominant and recessive alleles arises. If an allele is dominant, then only one need be present to produce its effect, and two are no better than one.



Black Pekin



Blue Pekin



Splashed Pekin

If the allele for brown eyes is dominant, then it will not matter if an animal is homozygous (pure) for it, or heterozygous (carrying blue); they will both have brown eyes. The effect of the recessive allele, in this case; blue, will be “masked” by the brown allele.

These recessive alleles can remain hidden for several generations and then they pop up. This is one reason that you must know the pedigrees of your animals. Quantitative alleles do arithmetic sorts of things; they add to or subtract from the overall effect, for example; taller or shorter and darker or lighter blue.

Quantitative and qualitative genes are fairly easy to deal with, and they are generally “under control” in purebred animals because they control the sorts of characters that define breeds.

The other characters are the tough ones and they are not easily mastered. This is where art comes in. Just as an artist does not and often, cannot know all the aspects of a paint or pigment that produces a stunning effect, so a master breeder may not fully understand all that produces an outline (silhouette) or tailset, but knows which animals to pair to produce what is wanted.

Many characters that we deal with such as head carriage are really thousands of characters produced by thousands of genes. Each gene exists as many alleles and so the likelihood of getting the two best alleles (each individual only has two alleles of each gene) of all of the genes in one individual, is like finding a needle in a haystack. This situation produces lots of variety and gray hairs in breeders.

Heads vary from that of a Pekin to that of a Leghorn, for example, which are certainly quite different from the heads of a Jungle Fowl, but in a breed of purebred chickens, the variation is narrowed considerably. However, when you look at a clutch of chicks from one pair, you realize that there is still a lot of variation.

Certain strains or lines will often stand out by having recognisable types of heads or backs, etc. These characters are therefore quite restricted in variation and are fairly “pure” for those characters.

We will probably never get all of the genes homozygous, but we are getting as many pairs of alleles of the genes involved in producing the head or back as much the same as possible. This concentration of desirable characters is only possible by linebreeding.

There are many definitions and interpretations of the terms:- “Inbreeding and Linebreeding.” “Inbreeding” is the breeding of closely related individuals, and “Linebreeding” or Back-crossing, in the strictest sense, involves the use of a recurrent parent.

In animal and plant breeding for commercial varieties, this involves using an exceptional individual as a parent for several generations to concentrate its exceptional qualities. If the individual is a male, then he is mated with his daughters, granddaughters (they are also his daughters), etc. Some breeders tend to use “linebreeding” when an individual appears several times in a pedigree. There are many charts and magic formulas for working out breeding programmes on paper, but be very cautious of these. They over-simplify and thus, give false security.

They encourage you to look at the paper before you look at your breeding stock. Never do that; always do it the other way around.

The method that I use is to find stock that I like, and then study their pedigrees. These will show mating patterns that have worked.

Linebreeding and Inbreeding bring out the recessive alleles as well as concentrate (or bring to a homozygous state) the good characters. This type of breeding requires rigorous culling, or you will soon end up in real trouble. I have found that the first problems to arise are in reproduction (reduced fertility, still births, chicks dying in the egg early in development, etc.), and then temperament suffers in some of the offspring.



White Leghorns

In some linebreeding that I did with rabbits, I got a Black doe after several generations that was really something. She had beautiful conformation but was senselessly aggressive. She would attack you for trying to feed her! Who needs an attacking rabbit? She was culled but some of her litter mates were fine and were used in my breeding programme.

It may take three or four generations to produce the first good one in a linebreeding programme. Culling must be severe if success is to be achieved. You must select for the whole animal; select for health first. Your stock must be strong and vigorous; coupled with this, is sound structure and proper temperament for the breed. Then select for breeding ability. There is no point in trying to breed good stock if your males will not breed freely, and your females will not deliver the young easily and make good mothers.

The last consideration, but certainly not the least, is type. If you select your foundation stock carefully, there should be no need to compromise. However, if you find that you are compromising any of these essentials at any time in your breeding programme, then some sincere soul-searching is in order.

After more setbacks than successes, you may find a line of fine animals emerging from the litters. When you are getting results from a linebreeding programme, then you will have animals that are producers. The fine points are being concentrated and the hidden 'nasties' (recessive alleles that are undesirable) are rising to the surface and being skimmed off.

Outcrossing and random breeding is really pot luck; you could get anything. Sometimes you get a great one, but it rarely reproduces itself in its offspring. Linebreeding (inbreeding) produces producers. What they produce in their offspring, however, reflects how well you have managed the breeding programme.

In the twenty or so years that I have been breeding various kinds of animals, there are several basic rules that help achieve success that have worked for me. They have been gleaned from extensive reading and tested.

I define a successful breeding programme as one that produces above-average animals consistently, and an above-average number of "good ones". When establishing a breeding programme, some compromise will be necessary. After a lot of study and thought, decide what you think a good example of your chosen breed must possess. Maybe you will settle on colour or head type or outline. Try to find out what characters are hard to retain or get in the breed, then acquire the best female that you can, that has these main features, and that come from a good, vigorous line.

Mate a male with your female, that has the good characters found in your female and something else to offer. Study his pedigree to see if he should, in theory, be a producer. Use him with a number of females and see what he is producing consistently in his offspring. Take your time and look at all possibilities.

The assessment of the off-spring from a mating is critical. Is there one worth keeping in the litter for future breeding? The answer must be based on the whole litter. Only retain offspring for breeding when the young flock is fairly even in quality and all above-average. Keep only those that are better than the female parent. If there are little "black sheep" in the offspring, then there is too much inconsistency in the background and more surprises in the future.

Aim for predictable results and do not sacrifice the essentials mentioned earlier. If the results did not work, try again. Be selective.

In a number of purebred animals (rabbits, pigeons, poultry, etc.), people keep stock for showing and others for breeding. The breeding stock is not second class by any means. The show stock will generally

