



## INHERITANCE OF EGG COLOUR IN MARANS

By: Dirk de Jong (NL)

Photo: Marans eggs sorted by colour.

The question of how the beautiful reddish-brown egg colour of the Marans is inherited keeps many people busy. There is one thing for certain—no one really knows how it works. It is therefore useful to put all the information I have collected over the years about the egg colour inheritance, on paper.

### Opinions about the egg colour

There are people who are of the opinion that a Marans that does not lay a red-brown egg is not really a Marans. The Marans bantams do not lay such nice dark brown eggs, therefore—these people say—they should not be called Marans bantams. However, they are not able to tell you how it works. We are told that you have to select, and only breed from the hens that lay the darkest red-brown eggs. That sometimes improves the egg colour, but they cannot even approach that really reddish-brown colour of the large fowl.

After years of breeding and also listening to stories from other breeders, I have come to the conclusion that it is most likely a sex-linked inheritance. Presumably several factors are important, but the cock must possess certain factors in double doses. It can be compared with the inheritance of the cuckoo colour—the difficulty lies in that with the rooster you cannot see whether the factor of brown eggs is present, let alone if it is duplicated. With the cuckoo colour variety you can see the cuckoo factor since the roosters are significantly lighter in colour. We call this a sex-linked inheritance.

In August 2003, at the founding of the Marans Club of Belgium in Champlon, the members were given the opportunity to ask questions to then-president of the French Marans Club, and author of the wonderful book *La Marans*, Serge Deprez. I seized this opportunity and helped by two Belgian fanciers who were perfectly bilingual (French and Dutch), I entered the discussion. However, it appeared that even Mr Deprez did not really know a lot about the inheritance of egg colour. The French are easy; the egg colour is already there, so there has been little thinking about the how and why—maintaining it is the only thing of importance.

## The inheritance of the egg colour

Patrick Verwimpt, from Belgium had some very interesting things to say that matched my own thoughts. He had practiced several crosses of other breeds with Marans.

First he mated a Marans rooster with Araucana hens which gave pullets that laid khaki-coloured eggs. Then he crossed Marans hens of a russet-brown egg laying strain with a Leghorn rooster, which produced pullets that laid tinted eggs. He next crossed a Marans rooster from a proper brown-egg strain with white-egg laying Leghorn hens which produced pullets that all laid brown eggs. Although the eggs were not as dark as the pure Marans, they were definitely darker than what is commonly called a brown egg. This proves that the cock is very important in egg colour inheritance. However, the eggs from crosses with other breeds are never as reddish-brown as the Marans eggs, so obviously it is not possible to transmit the attributes of the cells responsible for the egg colour.

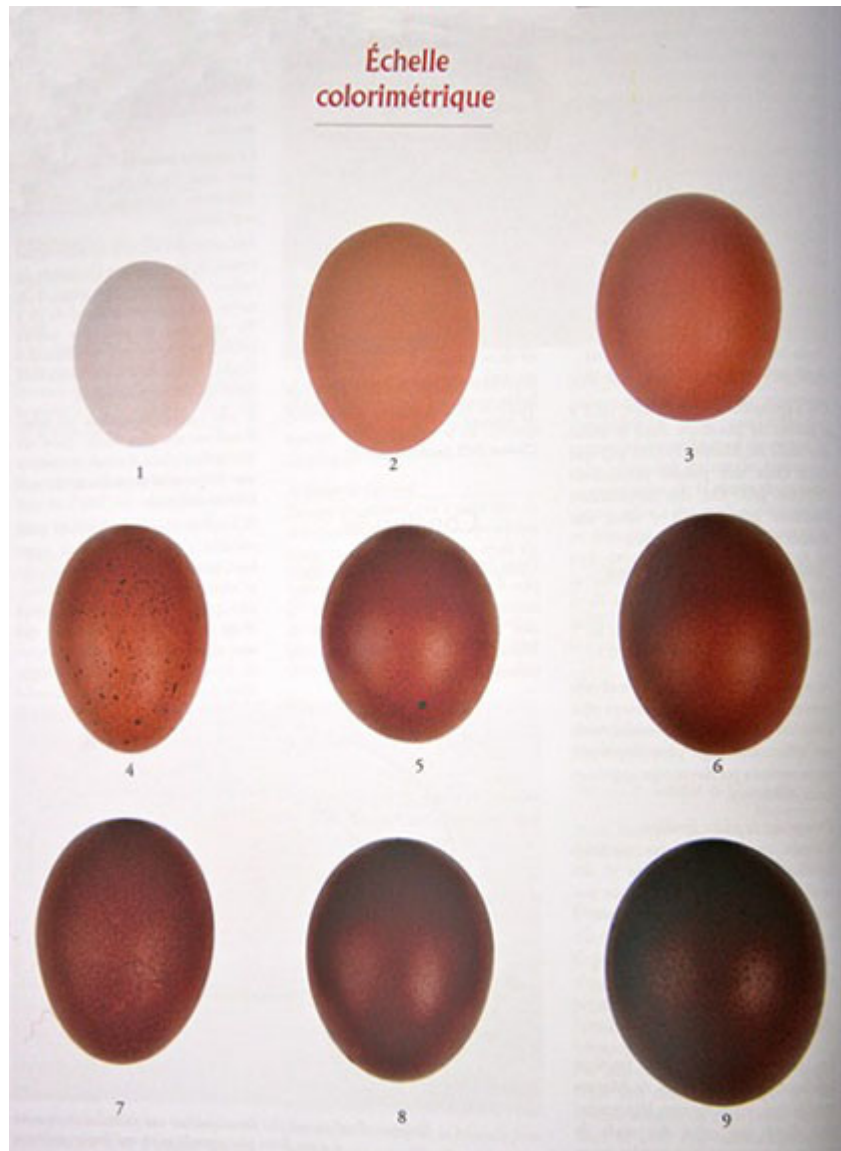
The second issue involved in the inheritance of egg colour, is the colour of the egg of the hen used in the cross. If her egg already tinted or brown, then the final result may be the beautiful reddish-brown colour that we want, however if the colour of her egg is too light, the eggs of the offspring females will never be more than a number 4 or 5 on the colour scale.

**Right: The colour chart, used by the Marans clubs in various countries.**

### Some remarkable things about brown eggs

Brown eggs tend have more blood spots than white eggs. As an egg judge, I often see this but also notice that some lines of fowls have more problems with this than do others.

The inside shell colour of the eggs from breeds that lay blue or green eggs, is just as blue or green as that of the outside. However, eggs from the Marans and Penedès are only dark brown on the outside, with the inside surface being pure white. Inheritance of the blue egg colour in the Araucana and related blue-egg laying hens is dominant, which means you can in-cross this factor to make all kinds of breeds that lay blue eggs. With the red-brown eggs of the Marans and Penedès this is not the case. In these breeds, the dark, reddish-brown egg colour is immediately lost when crossed with another breed. The manner of egg colour transference is long and complicated, but I will try to explain.





**Left: The inside of a Marans egg shell is white.**

The shape of the egg also affects the colour of the shell. Rounder eggs stay a little longer inside the hen and thus can absorb more dye. Because many people breed only with the darkest (and often round) eggs, you will see often much more rounded eggs in the Marans than in other breeds. This way, the round-shaped eggs will be unintendedly and imperceptibly bred into a strain.

**Right: Dark brown Marans eggs, blue Araucana eggs, and in the middle a few olive-coloured eggs from the crossing Marans male x Araucana females. Photo: Evert van Dijk.**



From: *A Review of Egg Color in Chickens* from the Marans Chicken Club USA website:

Once the shell is added to the egg, the epithelial cells lining the uterus add the cuticle and pigments to the shell. In the case of white eggs, pigments are not added to the shell or added to the cuticle. The colour of an egg shell is determined by the lack of a pigment (white) or the type of pigment that is added to the shell and or to the egg's cuticle.



Some brown shelled eggs will have pigments added to the palisade or outer shell layer with the majority of the pigments being added to the cuticle of the egg (Lang and Wells, 1987; Butcher and Miles, 1995). If the pigment is added to the surface (cuticle) of an egg, then with a little scrubbing the pigments can be removed exposing the white or tinted shell surface. Pigments added to the palisade layer (outside layer) of the shell cannot be rubbed off because the pigments are a part of the shell (Punnett and Bailey, 1920; Steggerda and Hollander, 1944).

**Left: Marans egg with scratches in the outer colour layer.**

## To make things more complicated

As you can see from the above, we still know far too little for certain. As an example, I had purchased some gorgeous brown eggs from Christian Herment. From the chicks, I kept the four pullets that laid the darkest brown eggs and gave the other four to Co Tersteeg, the honorary president of the French Fowl Club. He in turn—from the offspring of these pullets—donated the lightest coloured eggs to Peter van de Leeden. The following year, when Peter showed me the eggs of his pullets, my mouth fell open—such beautiful brown eggs I did not get from the offspring I had kept.

**Right: Marans rooster,  
Black copper neck.**



Awe van Wulften Palthe, a well-known game fowl judge, has also bred the Penedès for several years. He observes: 'Marans and Penedès lay brown eggs, and some hens lay—for some unexplained reason—several very dark brown eggs. We see these extremely dark eggs as standard, but if we think about it, if we are going to focus on the hen that only lays one extreme brown egg a week, we will certainly bring the breed to ruin'.

**Right: Marans pullets.**



## Can we transfer the russet-brown egg colour to another breed?

I think we can, although it is a long and difficult path. One will need to breed many chickens and do many test matings. Let us try to work out a plan to transfer the egg colour of the standard Marans to the bantam Marans. We will set aside for now, the problem of getting bantams that are over-sized, as that can be easily adjusted later.

I will explain as simply as possible, and I know this will not always be 100 per cent true in practice, but I shall explain it this way to keep it understandable. One thing we know for certain is that the inheritance of the Marans egg colour is not a dominant trait, so it must be recessive or intermediate. A recessive trait is hidden until two genes for the trait are present. With intermediate inheritance the egg colour of the offspring does not look like the mother's, but is an in-between colour. Sometimes a combination of the two may occur.



**Left: Five outstanding Marans eggs.**

From the work of Patrick Verwimpt, we know that we are able to transmit a part of the egg colour to bantams, by using a standard sized cock. As starting material we use preferably, an as-small-as-possible Marans cock that has been guaranteed proven to inherit the dark brown egg colour and therefore must carry a double dose of this trait. The Marans bantam hen that we choose for this mating shall preferably be a rather small bird too, as this will help later to regain the bantam size. The offspring of this pair will be split according to the law of Mendel in approximately four equal parts. These are normally half male

chicks and half female chicks. Of the males, 50 per cent will pass on the red-brown egg colour, and the other 50 per cent will pass on the lighter bantam egg colour to their offspring. The females from this combination, half will have inherited the reddish-brown egg colour trait and the other half, the lighter bantam egg colour.

It is easy to see in the bantam pullets, if the red-brown colour-gene is present by simply looking at the colour of the eggs. They do not have to be extremely reddish brown as those we find in the large Marans, but they should be clearly darker than the Marans bantam eggs that we started with.

**Right: Marans bantam eggs; already on the right track.**



It is a lot harder in the cockerels however, as it is impossible to see whether they inherited the dark brown egg colour. To find out what egg colour each cockerel will pass on, they are test mated with a white-egg laying hen. If half of the pullets from this combination lay brown eggs, the cockerel is carrying the red-brown egg trait. This half bantam rooster is mated to those of his sisters that lay brown eggs. From this combination, 50 per cent of the cockerel chicks will have the desired double trait for the red-brown egg colour. The other half will only possess a single trait. In the pullets, half will have the wanted trait, the other 50 per cent will not.

Once a cockerel is identified from test mating with a white-egg laying hen from which all offspring pullets lay brown eggs, the goal is reached. When this cockerel is mated to his reddish-brown-egg laying sister, all the offspring will lay and inherit 100 per cent russet-brown eggs. The pullets that do not inherit reddish-brown eggs should never be used in the breeding pen. Keeping good breeding records is indispensable.

Hopefully the gene for 'dwarf' is still present in these birds, so breeding them back down to true bantam size is possible. The reward after many years of careful breeding will be Marans bantams that lay those desirable reddish-brown eggs.

The same lengthy process will have to be followed if breeding for a different colour variety or to improve a particular trait. It is understandably, no easy task to retain the proper Marans egg colour.

Although the mystery of the Marans egg colour is not solved yet, I hope I have been able to lift one corner of the veil.

*This article is a chapter from my book: Alles over Marans en hun eieren. (in Dutch) See also [Various 1a August 2012](#). If you are interested in buying this book, please contact me at [d.dejong@fransehoenderclub.eu](mailto:d.dejong@fransehoenderclub.eu)*



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