

So what does the dun gene do? It is a dilute gene that changes the coat color characteristics in equines. Some schools of thought now believe it could be a modifying gene instead, but either way, it is a gene that affects the coloring. It is sometimes called a primitive gene because it is believed to have been around as long as horses have been around. It is found with more frequency in some breeds than others. It is very prevalent in the Fjord, Mustang, and Quarter Horse breeds - but very rare to non-existent in the TB and gaited horse breeds. The gene can manifest itself on all coat colors and often appears with other modifying and dilute genes. It generally dilutes the body color, but leaves the points a darker shade of the same color. It is also responsible for the primitive markings, often called dun factor markings, you find on dun gene horses. It is a dominant gene, which means one parent must have the gene to pass it down to the offspring. It doesn't "hide" under some coat colors like agouti or silver dapple only to pop up generations down the line. So if you see a pedigree with several dun horses farther back, but the sire and dam are not dun, then neither is the horse in question.

The first, and most notable marking is the dorsal stripe. This is a darker line that runs the entire length of the back of a horse and continues on into the tail hairs. It can be a wide or narrow line and it might be wider at the hip area than it was at the wither area. It might be intersected by other dark lines (generally called barbs or transverse striping.) It should be unbroken unless the horse is spotted, and it is defined and apparent all year. The dorsal stripe is the color of the horse's points. The dorsal stripe is ALWAYS present if the dun gene is present. There are several other characteristics as well, but these may or may not be evident on a horse that has the dun gene. Generally there will be at least some, and perhaps all, of the following markings on a dun gene horse.

- A. Cobwebbing - This is an interesting pattern that appears on the horse's forehead area. It is a circular pattern of darker hairs that resembles the shape of a spider's web.
- B. Face Mask - This marking can range from a little bit of color to completely covering the face in the darker point color of the horse.
- C. Transverse Striping - These markings run perpendicular to the dorsal stripe on the horse's back and are sometimes called barbs.
- D. Shoulder Bars - These patches of darker color are found around the shoulder and neck area of the horse. Some will have very dark markings and could have two or more patches of color on each side.
- E. Mottling - This is one of my favorite markings and it is generally found at the top of the leg points. You will see random spots of color above the horse's stockings on his back and/or front legs.
- F. Leg Bars - These are the stripes you see on the back and front legs of a horse around the knee area. Sometimes they are called zebra stripes and they cross the legs from side to side.
- G. Ear Tipping - This marking is just a darker tipping on the horse's ears. You will also sometimes see that the ears are lined with the point color of the horse.
- H. Frosting - You will sometimes find frosting at the top of the tail and in the mane of a horse carrying the dun gene.

As stated earlier, the gene is present on all the different coat colors and patterns and there is a name for each color occurrence. A chestnut/sorrel horse with the dun gene is called a red dun. A bay horse with

the dun gene is called a dun or a bay dun. A black horse with the dun gene is called a grullo or grulla (pronounced grew-yo or grew-yah.) If the gene is present with other modifies, then the color would be called that name with dun (i.e. palomino dun or dunalino, spotted dun, gold champagne dun, roan dun, etc.) The dun gene patterns are fairly consistent and once you become familiar with seeing them, you can usually spot them quickly. **As of January, 2008, UC Davis does have a zygosity test for the dun gene available to the public. They have not identified the actual dun marker yet, so you have to send not only hair samples for the horse in question, but also samples from at least one parent to help insure test accuracy. You can read more on the UC Davis website.**

So where does all the confusion come into play? Usually the markings are very apparent and it is easy to spot a dun gene horse (as in the pictures above.) But that is not always the case. A dun gene horse must have a dorsal stripe. Also, some of the above characteristics should be visible, but they are not always so easy to see. It becomes confusing when you have a smutty coat or counter shading in a foal coat. Often, the smutty coat will appear to have a dorsal stripe along the back of the horse. This false dorsal does not, however, run into the tail hairs. It is usually visible during the winter months, but not in the summer. And, it is usually not defined like a true dorsal is. The darker coloring seems to fade away into the horse's coat. Also, a false dorsal occurs when a foal is shedding his foal coat. Sometimes a false dorsal stripe is very convincing, even to someone familiar with the gene and its markings. Because of this, it is important to find some of the other markings on the horse you suspect is a dun gene horse. And to complicate matters even more, some foals are born with counter shading that mimics the dun gene markings on the back and on the legs. But these markings will fade as the foal matures. Red duns are one of the harder colors to confirm because you can see the dorsal, but quite often you cannot see any leg bars. Look for darker leg points on a red horse. Also, they usually will have shoulder bars, even if they are light in color. I have seen red dun horses with very obvious leg bars, however, I have seen more with no visible leg barring at all. But all the ones I have seen do have neck bars to go along with the dorsals. When there is a question, look to the dam and sire. If one of these is an obvious dun, then there is a possibility this horse is a dun. If neither the dam nor sire were duns, then it isn't possible that this horse is a dun.

Below is a listing of the basic dun colors:

Red Dun - A red dun is beautiful and can range from an almost pink cast to his coat to an almost chestnut color. He can have an almost flaxen mane and tail to a mane and tail that look almost black. His points can be very light and almost invisible to very very dark red (again looking almost black.) Every chestnut or sorrel horse out there is e/e. All you need to do is add the dun gene and you are there. This is by far the simplest dun color to get, especially since we have so many red based horses in our breed. If the base color of a mare and the base color of the dun could make a sorrel foal, then you can get a red dun from that same breeding.

Palomino Dun - Some people call this a dunalino, but the genetics are the same. He is basically a palomino horse with the dun gene - two red genes, one creme gene and one dun gene. A palomino dun has a lighter body coat color than your average palomino coloring and the tail has silver/grey/red hairs running through it as a result of the dorsal stripe running into the tail hairs. He should have darker

points and you should be able to see leg bars. Of course he will have a dorsal stripe too. Quite often these markings are easy to miss, especially in the foals, and they are often misregistered as palominos.

Dun or Bay Dun - Now we are getting a little more complicated. A bay dun is either an E/e or E/E with an agouti gene and a dun gene. So this horse is black based. The coat color is usually a golden or a light brown, but can run the full gambit of shades for a bay horse (muted.) The points are dark brown.

Buckskin Dun - Genetically this one is even more complicated. You have to have an E/e or E/E horse with agouti, creme, and a dun gene. A buckskin dun generally looks like buckskin with a shade lighter body color and he has the dun factor markings. A buckskin dun is often confused with a sooty buckskin and most of the times when someone thinks he has a dun and does not, it is either a buckskin or a bay. This is generally because the horse is also sooty and the sooty markings can mimic the dun markings very well.

Grulla or Grullo - This is my favorite dun color and it is sometimes called Black Dun. It isn't genetically complicated - just an E/e or E/E horse with a dun gene. But for some reason it is rare and hard to get. The terms are used interchangeably, but the "o" ending is generally used for a colt and the "a" ending is used for a filly. This color changes in intensity depending on the time of the year, but looks a lot like a roan from a distance. Up close you can see that there is not a mix of white and black hairs, but all the hairs are one color. The points stay dark and the body color ranges from silver to a very dark, almost black, color. You will often see grulla coats with a brown cast to them in the winter.

How about a new color of dun? Well, OK, it isn't really a "new" color as it has been around as long as the other colors of dun but it is a new "verifiable" color through genetic testing and very exciting. Pet DNA in AZ has developed a new test for the Seal Brown version of agouti (At instead of A) which just slightly restricts black pigment as opposed to the "A" which totally restricts black to the points. When a horse carries the Seal Brown and Dun gene it will sometimes look more grulla in color and sometimes look more like a bay dun. With the introduction of this test we can now determine if the horse is actually a grulla (dun on black) or a **Seal Dun** (dun on brown.)

Others - You can also have spotted duns, champagne duns, roan duns, etc. The gene can be present with any other dilute gene or modifier. You can find cremello or perlino duns as well. In some of the other registries, the trend now is to mix the dun gene with these other modifying genes to see just what fancy colors they can get. I saw a beautiful roan grullo stallion not long ago and he looked like a shiny silver medallion. I would like to see some champagne duns in the future because I think that gleaming color would be accentuated by the dun markings.

Breeding for the Grullo coloring:

The best and easiest way to get your grulla is to buy one already on the ground if you can find one. It is by far the quickest way and may turn out to be the least expensive way as well if you have to pay to AI to a dun stallion several times trying to get the elusive grulla coloring out of your mare. But if you can't wait or can't find one already on the ground, your best bet is to breed grulla to grullo. You will have around a 70% chance of getting a grulla foal. I know in our breed that is next to impossible. So the next

best thing is to breed a HZ black mare to a dun stallion of any color. The mare will always throw the black and all you need to do is wait for the stallion to throw his dun gene for you and you will have your grulla. Of course it is also difficult to find a HZ black mare in our breed. I know they are out there, but they are few and far between. It will take a while, but this match will throw grulla foals. One has to throw the black gene and the stallion has to throw his dun to get a grulla. It will really be lucky if both throw black and he throws his dun because then you would have a grulla foal that is HZ black and that would be a great asset to a breeding program. You can also get the color with a bay or buckskin as they are also black based. But if they throw the agouti, then you will not have a grulla as the black will be restricted to the points only.