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Coat Colors & Detailed Genetics



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An upper case "E" represents the BLACK gene. A lower case "e" would mean the foal carries RED instead of black. One upper case "E" will result in a black based foal. Two upper case "E's" will result in a homozygous black foal. The next modifier, agouti, will determine if the foal remains black based or will be bay or brown based.

"A" is represents the dominant Agouti gene. This gene restricts a BLACK base to just the points. This gene does not affect a red based coat color. (However a red based horse still has some form of agouti. It just doesn't change the color the way it does on a black horse.) Lower case "a" would mean the horse would not have the dominant agouti gene (also called recessive agouti). Two lower case a's will result in a black based foal. There is also the "Seal Brown" base caused by an "At" agouti gene- check out the article below for more details!

For breeders looking to get BLACK foals, breeding a mare that is "AA" for Agouti will NEVER result in a black foal. This is another reason to know the genetics of the parents before trying to produce a particular foal. Also, a foal receives one copy from each parent, so an "EE" horse will always give a black base to its offspring. An EE parent will never produce a foal color in the top row of the chart to the right. Likewise, an "AA" parent will never produce a foal in the bottom 2 rows of the chart.

GREAT article to check out!

'Believe in Brown' Article printed April 2010 in the Paint Horse Journal by Irene Stamatelakys about the "At" form of agouti.

Coat Colors With *Cream* Gene Added (Cr)

Coat Color Without a Cream Gene	One Cream Gene	Two Cream Genes
<u>Sorrel/Chestnut</u> ee AA ee AAt ee Aa ee AtAt ee Ata ee aa	<u>Palomino</u> ee AA CrCr ee AAt CrCr ee Aa CrCr ee AtAt CrCr ee Ata CrCr ee aa CrCr	<u>Cremello</u> ee AA CrCr ee AAt CrCr ee Aa CrCr ee AtAt CrCr ee Ata CrCr ee aa CrCr
<u>Bay</u> EE AA EE AAt EE Aa Ee AA Ee AAt Ee Aa	<u>Buckskin</u> EE AA CrCr EE AAt CrCr EE Aa CrCr Ee AA CrCr Ee AAt CrCr Ee Aa CrCr	<u>Perlino</u> EE AA CrCr EE AAt CrCr EE Aa CrCr Ee AA CrCr Ee AAt CrCr Ee Aa CrCr
<u>Seal Brown</u> EE AtAt EE Ata Ee AtAt Ee Ata	<u>Smoky Brown</u> EE AtAt CrCr EE Ata CrCr Ee AtAt CrCr Ee Ata CrCr	<u>Smoky Brown Cream</u> EE AtAt CrCr EE Ata CrCr Ee AtAt CrCr Ee Ata CrCr
<u>Black</u> EE aa Ee aa	<u>Smoky Black</u> EE aa CrCr Ee aa CrCr	<u>Smoky Black Cream</u> EE aa CrCr Ee aa CrCr

* Unlike the **Cream** gene, the **Dun**, **Roan**, and **Champagne** dilution genes are simple dominant and do not affect the coat color differently when the horse carries one or two of the genes. As you can see from above, the Cream gene will modify the color of the horse depending on whether the horse carries one or two copies of it. If the horse has at least one of the cream, dun, roan, or champagne dilutions, you will SEE it in the coat color.

Pearl and **Silver** combinations are not represented below, but they too are possible dilutions to a base.

Coat Colors With *Dun* Gene Added (D)

Two upper case D's means homozygous dun and all offspring will have at least one dun gene.

One upper case D means heterozygous dun and 50% of offspring will have dun.

If the horse carries one dun gene, its coat color will be visibly different than the base coat color.

A horse that is homozygous will look the same as a heterozygous horse.

<u>Sorrel/Chestnut + Dun = Red Dun</u>		<u>Palomino + Dun = Dunalino</u>		<u>Cremello + Dun = Cremello Dun</u>	
ee AA DD	ee AA Dd	ee AA CrCr DD	ee AA CrCr Dd	ee AA CrCr DD	ee AA CrCr Dd
ee AAt DD	ee AAt Dd	ee AAt CrCr DD	ee AAt CrCr Dd	ee AAt CrCr DD	ee AAt CrCr Dd
ee Aa DD	ee Aa Dd	ee Aa CrCr DD	ee Aa CrCr Dd	ee Aa CrCr DD	ee Aa CrCr Dd
ee AtAt DD	ee AtAt Dd	ee AtAt CrCr DD	ee AtAt CrCr Dd	ee AtAt CrCr DD	ee AtAt CrCr Dd
ee Ata DD	ee Ata Dd	ee Ata CrCr DD	ee Ata CrCr Dd	ee Ata CrCr DD	ee Ata CrCr Dd
ee aa DD	ee aa Dd	ee aa CrCr DD	ee aa CrCr Dd	ee aa CrCr DD	ee aa CrCr Dd
<u>Bay + Dun = Dun</u>		<u>Buckskin + Dun = Dunskin</u>		<u>Perlino + Dun = Perlino Dun</u>	
EE AA DD	EE AA Dd	EE AA CrCr DD	EE AA CrCr Dd	EE AA CrCr DD	EE AA CrCr Dd
EE AAt DD	EE AAt Dd	EE AAt CrCr DD	EE AAt CrCr Dd	EE AAt CrCr DD	EE AAt CrCr Dd
EE Aa DD	EE Aa Dd	EE Aa CrCr DD	EE Aa CrCr Dd	EE Aa CrCr DD	EE Aa CrCr Dd
Ee AA DD	Ee AA Dd	Ee AA CrCr DD	Ee AA CrCr Dd	Ee AA CrCr DD	Ee AA CrCr Dd
Ee AAt DD	Ee AAt Dd	Ee AAt CrCr DD	Ee AAt CrCr Dd	Ee AAt CrCr DD	Ee AAt CrCr Dd
Ee Aa DD	Ee Aa Dd	Ee Aa CrCr DD	Ee Aa CrCr Dd	Ee Aa CrCr DD	Ee Aa CrCr Dd
<u>Brown + Dun = Brown Dun</u>		<u>Smoky Brown + Dun = Smoky Brown Dun</u>		<u>Smoky Brown Cream + Dun = Smoky Brown Cream Dun</u>	
EE AtAt DD	EE AtAt Dd	EE AtAt CrCr DD	EE AtAt CrCr Dd	EE AtAt CrCr DD	EE AtAt CrCr Dd
EE Ata DD	EE Ata Dd	EE Ata CrCr DD	EE Ata CrCr Dd	EE Ata CrCr DD	EE Ata CrCr Dd
Ee AtAt DD	Ee AtAt Dd	Ee AtAt CrCr DD	Ee AtAt CrCr Dd	Ee AtAt CrCr DD	Ee AtAt CrCr Dd
Ee Ata DD	Ee Ata Dd	Ee Ata CrCr DD	Ee Ata CrCr Dd	Ee Ata CrCr DD	Ee Ata CrCr Dd
<u>Black + Dun = Grullo</u>		<u>Smoky Black + Dun = Smoky Grullo</u>		<u>Smoky Black Cream + Dun = Smoky Black Cream Dun (Grullo)</u>	
EE aa DD	EE aa Dd	EE aa CrCr DD	EE aa CrCr Dd	EE aa CrCr DD	EE aa CrCr Dd
Ee aa DD	Ee aa Dd	Ee aa CrCr DD	Ee aa CrCr Dd	Ee aa CrCr DD	Ee aa CrCr Dd

Coat Colors With *Roan* Gene Added (R)

Two upper case R's means homozygous roan and all offspring will have at least one roan gene.

One upper case R means heterozygous roan and 50% of offspring will have roan.

If the horse carries one roan gene, its coat color will be visibly different than the base coat color.

A horse that is homozygous will look the same as a heterozygous horse.

<u>Sorrel/Chestnut + Roan = Red Roan</u>		<u>Palomino + Roan = Palomino Roan</u>		<u>Cremello + Roan = Cremello Roan</u>	
ee AA RR	ee AA Rr	ee AA CrCr RR	ee AA CrCr Rr	ee AA CrCr RR	ee AA CrCr Rr
ee AAt RR	ee AAt Rr	ee AAt CrCr RR	ee AAt CrCr Rr	ee AAt CrCr RR	ee AAt CrCr Rr
ee Aa RR	ee Aa Rr	ee Aa CrCr RR	ee Aa CrCr Rr	ee Aa CrCr RR	ee Aa CrCr Rr
ee AtAt RR	ee AtAt Rr	ee AtAt CrCr RR	ee AtAt CrCr Rr	ee AtAt CrCr RR	ee AtAt CrCr Rr
ee Ata RR	ee Ata Rr	ee Ata CrCr RR	ee Ata CrCr Rr	ee Ata CrCr RR	ee Ata CrCr Rr
ee aa RR	ee aa Rr	ee aa CrCr RR	ee aa CrCr Rr	ee aa CrCr RR	ee aa CrCr Rr
<u>Bay + Roan = Bay Roan</u>		<u>Buckskin + Roan = Buckskin Roan</u>		<u>Perlino + Roan = Perlino Roan</u>	
EE AA RR	EE AA Rr	EE AA CrCr RR	EE AA CrCr Rr	EE AA CrCr RR	EE AA CrCr Rr
EE AAt RR	EE AAt Rr	EE AAt CrCr RR	EE AAt CrCr Rr	EE AAt CrCr RR	EE AAt CrCr Rr
EE Aa RR	EE Aa Rr	EE Aa CrCr RR	EE Aa CrCr Rr	EE Aa CrCr RR	EE Aa CrCr Rr
Ee AA RR	Ee AA Rr	Ee AA CrCr RR	Ee AA CrCr Rr	Ee AA CrCr RR	Ee AA CrCr Rr
Ee AAt RR	Ee AAt Rr	Ee AAt CrCr RR	Ee AAt CrCr Rr	Ee AAt CrCr RR	Ee AAt CrCr Rr
Ee Aa RR	Ee Aa Rr	Ee Aa CrCr RR	Ee Aa CrCr Rr	Ee Aa CrCr RR	Ee Aa CrCr Rr
<u>Brown + Roan = Brown Roan</u>		<u>Smoky Brown + Roan = Smoky Brown Roan</u>		<u>Smoky Brown Cream + Roan = Smoky Brown Cream Roan</u>	
EE AtAt RR	EE AtAt Rr	EE AtAt CrCr RR	EE AtAt CrCr Rr	EE AtAt CrCr RR	EE AtAt CrCr Rr
EE Ata RR	EE Ata Rr	EE Ata CrCr RR	EE Ata CrCr Rr	EE Ata CrCr RR	EE Ata CrCr Rr
Ee AtAt RR	Ee AtAt Rr	Ee AtAt CrCr RR	Ee AtAt CrCr Rr	Ee AtAt CrCr RR	Ee AtAt CrCr Rr
Ee Ata RR	Ee Ata Rr	Ee Ata CrCr RR	Ee Ata CrCr Rr	Ee Ata CrCr RR	Ee Ata CrCr Rr
<u>Black + Roan = Blue Roan</u>		<u>Smoky Black + Roan = Smoky Blue Roan</u>		<u>Smoky Black Cream + Roan = Smoky Black Cream Roan</u>	
EE aa RR	EE aa Rr	EE aa CrCr RR	EE aa CrCr Rr	EE aa CrCr RR	EE aa CrCr Rr
Ee aa RR	Ee aa Rr	Ee aa CrCr RR	Ee aa CrCr Rr	Ee aa CrCr RR	Ee aa CrCr Rr

Coat Colors With Champagne Gene Added (Ch)

Two upper case Ch's means homozygous champagne and all offspring will have at least one champagne gene.

One upper case Ch means heterozygous champagne and 50% of offspring will have champagne.

If the horse carries one champagne gene, its coat color will be visibly different than the base coat color.

A horse that is homozygous will look the same as a heterozygous horse. (*Possibly some small differences, but testing is always best to confirm.)

Sorrel/Chestnut + Champagne = Gold Champagne		Palomino + Champagne = Gold Cream Champagne		Cremello + Champagne = Cremello Champagne	
ee AA ChCh	ee AA Chch	ee AA CrCr ChCh	ee AA CrCr Chch	ee AA CrCr ChCh	ee AA CrCr Chch
ee AAt ChCh	ee AAt Chch	ee AAt CrCr ChCh	ee AAt CrCr Chch	ee AAt CrCr ChCh	ee AAt CrCr Chch
ee Aa ChCh	ee Aa Chch	ee Aa CrCr ChCh	ee Aa CrCr Chch	ee Aa CrCr ChCh	ee Aa CrCr Chch
ee AtAt ChCh	ee AtAt Chch	ee AtAt CrCr ChCh	ee AtAt CrCr Chch	ee AtAt CrCr ChCh	ee AtAt CrCr Chch
ee Ata ChCh	ee Ata Chch	ee Ata CrCr ChCh	ee Ata CrCr Chch	ee Ata CrCr ChCh	ee Ata CrCr Chch
ee aa ChCh	ee aa Chch	ee aa CrCr ChCh	ee aa CrCr Chch	ee aa CrCr ChCh	ee aa CrCr Chch
Bay + Champagne = Amber Champagne		Buckskin + Champagne = Amber Cream Champagne		Perlino + Champagne = Perlino Champagne	
EE AA ChCh	EE AA Chch	EE AA CrCr ChCh	EE AA CrCr Chch	EE AA CrCr ChCh	EE AA CrCr Chch
EE AAt ChCh	EE AAt Chch	EE AAt CrCr ChCh	EE AAt CrCr Chch	EE AAt CrCr ChCh	EE AAt CrCr Chch
EE Aa ChCh	EE Aa Chch	EE Aa CrCr ChCh	EE Aa CrCr Chch	EE Aa CrCr ChCh	EE Aa CrCr Chch
Ee AA ChCh	Ee AA Chch	Ee AA CrCr ChCh	Ee AA CrCr Chch	Ee AA CrCr ChCh	Ee AA CrCr Chch
Ee AAt ChCh	Ee AAt Chch	Ee AAt CrCr ChCh	Ee AAt CrCr Chch	Ee AAt CrCr ChCh	Ee AAt CrCr Chch
Ee Aa ChCh	Ee Aa Chch	Ee Aa CrCr ChCh	Ee Aa CrCr Chch	Ee Aa CrCr ChCh	Ee Aa CrCr Chch
Brown + Champagne = Sable Champagne		Smoky Brown + Champagne = Sable Cream Champagne		Smoky Brown Cream + Champagne = Sable Smoky Cream Champagne	
EE AtAt ChCh	EE AtAt Chch	EE AtAt CrCr ChCh	EE AtAt CrCr Chch	EE AtAt CrCr ChCh	EE AtAt CrCr Chch
EE Ata ChCh	EE Ata Chch	EE Ata CrCr ChCh	EE Ata CrCr Chch	EE Ata CrCr ChCh	EE Ata CrCr Chch
Ee AtAt ChCh	Ee AtAt Chch	Ee AtAt CrCr ChCh	Ee AtAt CrCr Chch	Ee AtAt CrCr ChCh	Ee AtAt CrCr Chch
Ee Ata ChCh	Ee Ata Chch	Ee Ata CrCr ChCh	Ee Ata CrCr Chch	Ee Ata CrCr ChCh	Ee Ata CrCr Chch
Black + Champagne = Classic Champagne		Smoky Black + Champagne = Classic Cream Champagne		Smoky Black Cream + Champagne = Classic Smoky Cream Champagne	
EE aa ChCh	EE aa Chch	EE aa CrCr ChCh	EE aa CrCr Chch	EE aa CrCr ChCh	EE aa CrCr Chch
Ee aa ChCh	Ee aa Chch	Ee aa CrCr ChCh	Ee aa CrCr Chch	Ee aa CrCr ChCh	Ee aa CrCr Chch

Coat Colors With *Champagne* & *Dun* Genes Added (Ch) & (D)

Sorrel/Chestnut + Champagne & Dun = Gold Dun Champagne		Palomino + Champagne & Dun = Gold Cream Dun Champagne		Cremello + Champagne & Dun = Cremello Dun Champagne	
ee AA ChCh DD	ee AA Chch DD	ee AA CrCr ChCh DD	ee AA CrCr Chch DD	ee AA CrCr ChCh DD	ee AA CrCr Chch DD
ee AAt ChCh DD	ee AAt Chch DD	ee AAt CrCr ChCh DD	ee AAt CrCr Chch DD	ee AAt CrCr ChCh DD	ee AAt CrCr Chch DD
ee Aa ChCh DD	ee Aa Chch DD	ee Aa CrCr ChCh DD	ee Aa CrCr Chch DD	ee Aa CrCr ChCh DD	ee Aa CrCr Chch DD
ee AtAt ChCh DD	ee AtAt Chch DD	ee AtAt CrCr ChCh DD	ee AtAt CrCr Chch DD	ee AtAt CrCr ChCh DD	ee AtAt CrCr Chch DD
ee Ata ChCh DD	ee Ata Chch DD	ee Ata CrCr ChCh DD	ee Ata CrCr Chch DD	ee Ata CrCr ChCh DD	ee Ata CrCr Chch DD
ee aa ChCh DD	ee aa Chch DD	ee aa CrCr ChCh DD	ee aa CrCr Chch DD	ee aa CrCr ChCh DD	ee aa CrCr Chch DD
ee AA ChCh Dd	ee AA Chch Dd	ee AA CrCr ChCh Dd	ee AA CrCr Chch Dd	ee AA CrCr ChCh Dd	ee AA CrCr Chch Dd
ee AAt ChCh Dd	ee AAt Chch Dd	ee AAt CrCr ChCh Dd	ee AAt CrCr Chch Dd	ee AAt CrCr ChCh Dd	ee AAt CrCr Chch Dd
ee Aa ChCh Dd	ee Aa Chch Dd	ee Aa CrCr ChCh Dd	ee Aa CrCr Chch Dd	ee Aa CrCr ChCh Dd	ee Aa CrCr Chch Dd
ee AtAt ChCh Dd	ee AtAt Chch Dd	ee AtAt CrCr ChCh Dd	ee AtAt CrCr Chch Dd	ee AtAt CrCr ChCh Dd	ee AtAt CrCr Chch Dd
ee Ata ChCh Dd	ee Ata Chch Dd	ee Ata CrCr ChCh Dd	ee Ata CrCr Chch Dd	ee Ata CrCr ChCh Dd	ee Ata CrCr Chch Dd
ee aa ChCh Dd	ee aa Chch Dd	ee aa CrCr ChCh Dd	ee aa CrCr Chch Dd	ee aa CrCr ChCh Dd	ee aa CrCr Chch Dd
Bay + Champagne & Dun = Amber Dun Champagne		Buckskin + Champagne & Dun = Amber Cream Dun Champagne		Perlino + Champagne & Dun = Perlino Dun Champagne	
EE AA ChCh DD	EE AA Chch DD	EE AA CrCr ChCh DD	EE AA CrCr Chch DD	EE AA CrCr ChCh DD	EE AA CrCr Chch DD
EE AAt ChCh DD	EE AAt Chch DD	EE AAt CrCr ChCh DD	EE AAt CrCr Chch DD	EE AAt CrCr ChCh DD	EE AAt CrCr Chch DD
EE Aa ChCh DD	EE Aa Chch DD	EE Aa CrCr ChCh DD	EE Aa CrCr Chch DD	EE Aa CrCr ChCh DD	EE Aa CrCr Chch DD
Ee AA ChCh DD	Ee AA Chch DD	Ee AA CrCr ChCh DD	Ee AA CrCr Chch DD	Ee AA CrCr ChCh DD	Ee AA CrCr Chch DD
Ee AAt ChCh DD	Ee AAt Chch DD	Ee AAt CrCr ChCh DD	Ee AAt CrCr Chch DD	Ee AAt CrCr ChCh DD	Ee AAt CrCr Chch DD
Ee Aa ChCh DD	Ee Aa Chch DD	Ee Aa CrCr ChCh DD	Ee Aa CrCr Chch DD	Ee Aa CrCr ChCh DD	Ee Aa CrCr Chch DD
EE AA ChCh Dd	EE AA Chch Dd	EE AA CrCr ChCh Dd	EE AA CrCr Chch Dd	EE AA CrCr ChCh Dd	EE AA CrCr Chch Dd
EE AAt ChCh Dd	EE AAt Chch Dd	EE AAt CrCr ChCh Dd	EE AAt CrCr Chch Dd	EE AAt CrCr ChCh Dd	EE AAt CrCr Chch Dd
EE Aa ChCh Dd	EE Aa Chch Dd	EE Aa CrCr ChCh Dd	EE Aa CrCr Chch Dd	EE Aa CrCr ChCh Dd	EE Aa CrCr Chch Dd
Ee AA ChCh Dd	Ee AA Chch Dd	Ee AA CrCr ChCh Dd	Ee AA CrCr Chch Dd	Ee AA CrCr ChCh Dd	Ee AA CrCr Chch Dd
Ee AAt ChCh Dd	Ee AAt Chch Dd	Ee AAt CrCr ChCh Dd	Ee AAt CrCr Chch Dd	Ee AAt CrCr ChCh Dd	Ee AAt CrCr Chch Dd
Ee Aa ChCh Dd	Ee Aa Chch Dd	Ee Aa CrCr ChCh Dd	Ee Aa CrCr Chch Dd	Ee Aa CrCr ChCh Dd	Ee Aa CrCr Chch Dd
Brown + Champagne & Dun = Sable Dun Champagne		Smoky Brown + Champagne & Dun = Sable Cream Dun Champagne		Smoky Brown Cream + Champagne & Dun = Sable Smoky Cream Dun Champagne	
EE AtAt ChCh DD	EE AtAt Chch DD	EE AtAt CrCr ChCh DD	EE AtAt CrCr Chch DD	EE AtAt CrCr ChCh DD	EE AtAt CrCr Chch DD
EE Ata ChCh DD	EE Ata Chch DD	EE Ata CrCr ChCh DD	EE Ata CrCr Chch DD	EE Ata CrCr ChCh DD	EE Ata CrCr Chch DD
Ee AtAt ChCh DD	Ee AtAt Chch DD	Ee AtAt CrCr ChCh DD	Ee AtAt CrCr Chch DD	Ee AtAt CrCr ChCh DD	Ee AtAt CrCr Chch DD
Ee Ata ChCh DD	Ee Ata Chch DD	Ee Ata CrCr ChCh DD	Ee Ata CrCr Chch DD	Ee Ata CrCr ChCh DD	Ee Ata CrCr Chch DD
EE AtAt ChCh Dd	EE AtAt Chch Dd	EE AtAt CrCr ChCh Dd	EE AtAt CrCr Chch Dd	EE AtAt CrCr ChCh Dd	EE AtAt CrCr Chch Dd
EE Ata ChCh Dd	EE Ata Chch Dd	EE Ata CrCr ChCh Dd	EE Ata CrCr Chch Dd	EE Ata CrCr ChCh Dd	EE Ata CrCr Chch Dd
Ee AtAt ChCh Dd	Ee AtAt Chch Dd	Ee AtAt CrCr ChCh Dd	Ee AtAt CrCr Chch Dd	Ee AtAt CrCr ChCh Dd	Ee AtAt CrCr Chch Dd
Ee Ata ChCh Dd	Ee Ata Chch Dd	Ee Ata CrCr ChCh Dd	Ee Ata CrCr Chch Dd	Ee Ata CrCr ChCh Dd	Ee Ata CrCr Chch Dd
Black + Champagne & Dun = Classic Dun (Grullo) Champagne		Smoky Black + Champagne & Dun = Classic Cream Dun (Grullo) Champagne		Smoky Black Cream + Champagne & Dun = Classic Smoky Cream Dun (Grullo) Champagne	
EE aa ChCh DD	EE aa Chch DD	EE aa CrCr ChCh DD	EE aa CrCr Chch DD	EE aa CrCr ChCh DD	EE aa CrCr Chch DD
Ee aa ChCh DD	Ee aa Chch DD	Ee aa CrCr ChCh DD	Ee aa CrCr Chch DD	Ee aa CrCr ChCh DD	Ee aa CrCr Chch DD
EE aa ChCh Dd	EE aa Chch Dd	EE aa CrCr ChCh Dd	EE aa CrCr Chch Dd	EE aa CrCr ChCh Dd	EE aa CrCr Chch Dd
Ee aa ChCh Dd	Ee aa Chch Dd	Ee aa CrCr ChCh Dd	Ee aa CrCr Chch Dd	Ee aa CrCr ChCh Dd	Ee aa CrCr Chch Dd