Understanding Red Factor/Agouti Coat Color Test

Heterozygous Black = E/e, a/a

Homozygous Black= E/E, a/a

Agouti (Bay/Black)

The Agouti gene controls the distribution of black pigment. The dominant allele **A** restricts black pigment to the points of the horse (mane, tail, lower legs and ear rims), as seen, for example, in bays and buckskins. The recessive allele **a** uniformly distributes black pigment over the entire body.

Breeders interested in producing black horses need to have breeding stock carrying the **a** allele, in addition to the **E** allele of the Extension gene.
Agouti results are reported as:

A/A	2 copies of agouti present. If present, black pigment is restricted to the points.
A/a	1 copy of agouti. If present, black pigment is restricted to the points.
a/a	If present, black pigment is distributed uniformly over the body.

Red Factor

The Extension gene (red factor) has two alternative states (alleles). The dominant allele **E** produces black pigment in the coat. The recessive allele e produces red pigment. Red horses (chestnuts, sorrels, palominos and red duns, to name a few) are homozygous, that is they have two alleles, for the recessive red allele **ee**. Black pigmented horses (black, bay, brown, buckskin and grullo, to name a few) have at least one **E** allele. They can be homozygous **EE** or heterozygous **Ee**. A horse that is homozygous **EE** will not produce red offspring, regardless of the color of the mate.

The DNA diagnostic test for red factor can be used to identify those black horses for which neither pedigree nor breeding records is informative for identifying carriers of the recessive red factor. Since red is inherited as a recessive trait, it is relatively easy to start up a breeding program that will produce only red horses. It has been more difficult to initiate a black breeding program as black **Ee** horses can produce red foals. Prior to the development of this test, only pedigree or breeding records, not phenotype, could provide information about whether black horses are **EE** or **Ee**.

Red Factor results are reported as:

e/e	Only red factor detected. Basic color is red in the absence of modifying genes.
E/e	Both black and red factors detected.
E/E	No red factor detected. Offspring cannot be chestnut/sorrel.