

SHEEP COLOR GENETICS

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VIRGINIATECH

color is complicated!

white is the absence of pigment

white can be regional, or the whole sheep

first, ignore the white, decide what color is present, and
then characterize the white areas

color is complicated!

several loci (genetic addresses) interact to give final color

a “one to one” correspondence of color and genotype is not always present

“genotype” and “fleece color” are two different (but related) questions

color is complicated!

the same general genotype can be different colors, but usually at least related colors

black can be black, or can fade to grey

the same lovely color might have different genotypes - lighter colors are especially notorious for this

color is complicated

color in mammals is from two different pigments

eumelanin is a black biochemical, and is responsible for black, bluegrey, chocolate brown

pheomelanin is a tan biochemical and is responsible for red, tan, yellow, off-white

color is complicated

wool sheep generally have pale pheomelanin, so red is difficult or impossible to achieve as a fleece color

hair sheep can have dark pheomelanin, and dark red hair sheep are relatively common

Agouti locus

controls patterns of tan and black

in most European sheep “tan” is modified to white

most of these patterns are symmetrical

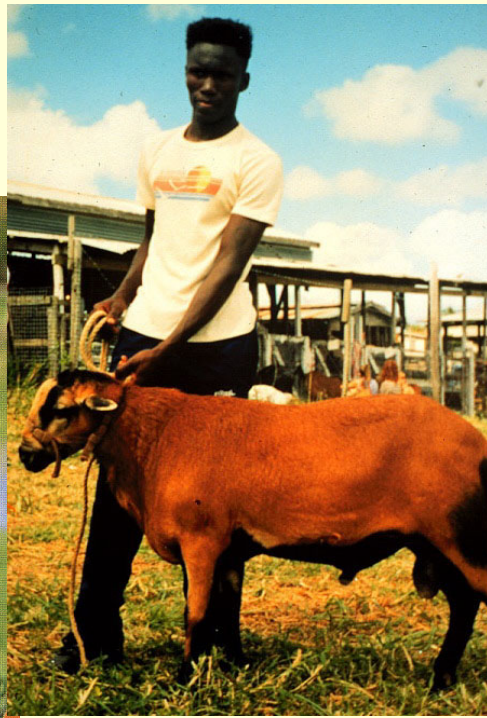
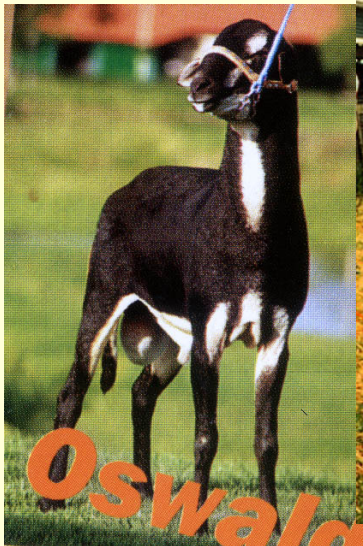
Agouti locus

A^{wt} white or tan. Usual source of white for European breeds.



Agouti locus

most of the “intermediate” patterns have striped faces and legs.



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Agouti locus

solid black is the bottom recessive, and is rare in most breeds



Brown locus

“moorit” or brown is recessive to black



eyes shine
red



mioget

mioget is a light version of moorit
likely due to a recessive modifier
may interact with black to make charcoal grey



mioget

$B^B B^B M^M M^M$ - black

$B^B B^B M^M M^m$ - black or off black

$B^B B^B M^m M^m$ - pewter?

$B^B B^b M^M M^M$ - warm “tippy” black

$B^B B^b M^M M^m$ - warm black to dark brown

$B^B B^b M^m M^m$ - charcoal or pewter

$B^b B^b M^M M^M$ - moorit

$B^b B^b M^M M^m$ - moorit to fawn

$B^b B^b M^m M^m$ - fawn to mioget

dark brown

dark brown is a dominant modifier changing black to dark brown

lambs born black, lighten somewhat
homozygotes are silvery taupe



dominant black

Dominant black is at the *Extension* locus and covers up the *Agouti* information.

Common in Karakul, Dorper, Jacob, Welsh Black



FADING WITH AGE

most colored wool sheep fade with age

polygenic control, so it is complicated

some do not fade much: some Shetlands, Black Welsh Mountain, individuals in several breeds



RED

pheomelanin is relatively easy to put into hair (kemp,
other coarse hair)

difficult to put into wool

red wool sheep fade rapidly (Tunis, Karakul, etc.)

red hair sheep can be very dark

RED



DOWN BREEDS

black points with pale fleeces
usually born dark, then lighten
crossbreeds are usually “speckle faced”



spotting patterns

spotting patterns add white areas or hairs to colored sheep

many different patterns occur

each is under separate genetic control

Piebald spotting

likely recessive



Pigmented Head

white body, colored head. dominant.
heterozygotes have spotted bodies.



AKARAMAN

white with minor colored marks. dominant.



ROAN

grey at birth. dominant, homozygotes die while young



flowery

small speckles. likely dominant.



TICKED

ticking adds colored spots into white areas
increases with age, called freckling in Jacobs



BELTED

white around barrel. likely dominant.



other spotting patterns



wool sheep strategies

white is dominant, hides a great deal

black based colors usually fade to grey

nonfading black is rare

wool sheep strategies

brown (moorit) is recessive

nonfading black can be used to strengthen moorit

mioget is recessive to moorit

wool sheep strategies

possible shades:

white

black

black faded to brown

black faded to silver

brown moorit

mioget

wool sheep strategies

crosses to recessive colors may take two generations to recover the colors:

colored from white (most european breeds)

moorit from black

mioget from moorit

hair sheep strategies

colors and patterns are crisp and clear

black is usually dominant

red dominates gold and white (usually)

stripes recessive to red

recessive black is possible from striped parents

hair sheep strategies

recessive black is the best test cross

spotting is usually dominant

most spotting patterns are poorly known

spots x solids provide for most contrast

spots x spots lead to very white animals