Department of
Animal Science

COLOR PATTERNS IN BEEF CATTLE

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The color of feeder cattle, and especially color patterns, affect the price of feeder cattle. Generally, feeder cattle that are uniform in color will sell for a higher price than those that are less uniform in color. Because breeding decisions made by cow-calf producers impact the color of the calf crop, they should have some knowledge of the impact of their decisions.

Color in beef cattle is a qualitative trait that is influenced by only a few pairs of genes, whereas growth traits are quantitative traits that are influenced by a number of pairs of genes. That is why it is easier to fix color patterns in cattle than it is to increase performance traits.

Most breeds of beef cattle have a fixed color pattern that is characteristic for that breed because of previous selection. For example, all Hereford cattle have a red body color with a white face, all Charolais are white and Red Poll are red. However, some other breeds may have more than one basic body color such as red or black Angus and red, white or roan Shorthorn. Other breeds have multiple colors that are not predictable; for example, spotting, brindling or solid colors in Longhorn.

Some knowledge of the inheritance of color coupled with experience allows one to predict with some degree of accuracy the color patterns to expect among calves when using different breeds in a cross-breeding program. Due to chance segregation and the fact that more than one pair of genes affect many color patterns, some exceptions will occur.

Bascially, there are three different colors in cattle — black, red and brownish-red to reddish-black. Many of the available breeds of cattle are categorized by basic body color. They are identified with the color pattern that is most common in each breed. The Simmental can be categorized with spotted cattle or solid red or solid black. Limousin, Salers and Gelbvieh are both classified with red and black. The breeds in the black category are Angus, Brangus, Chiangus, Galloway, Welch Black, Limousin, Gelbvieh, Salers and Simmental. Breeds in the red body color are Barzona, Devon, Gelbvieh, Hereford, Polled Hereford, Limousin, Lincoln Red, Norwegian Red, Red Angus, Red Poll, Salers, Santa Gertrudis, Senepol, Scotch Highland, Shorthorn, South Devon and Simmental. The white- or cream-colored breeds include Shorthorn, Charolais, White Park and Blonde'd Aquitane. Spotted color patterns are represented by the following breeds: Beef Friesian, Hays Converter, Holstein, Maine Anjou, Pinzgauer and Simmental. Mixed color breeds include Beefmaster, Braford and Longhorn. Breeds that have light-colored hair coats with dark pigment skins are Brahman, Brown Swiss, Chianina, Marchigana, Murray Grey, Romagnola, Jersey and Tarerntaise.

The brownish red to reddish black colors are represented in the Jersey, Brown Swiss and Brahman. The mode of expression is that the black is dominant to both other colors. In other words, if an animal has at least one gene for black then it will be black. The brownish-red to

reddish-black is dominant to red. Thus, if an animal has at least one brownish-red to reddish-black gene and the other gene is not black, the animal will be brownish-red to reddish-brown. Since red is recessive, a red animal will only be red if it possesses both genes for red. An animal that is solid red is said to be homozygous (both genes of the same pair are the same).

Along with these three basic color genes, there are different modifying genes that influence white spotting patterns, level of expression of the color pigment, and roaning. A homozygous pair of dilution genes can dilute the solid-colored animal to almost white and cream-colored. Most solid white or cream-colored cattle are genetically red or black but are homozygous (both genes the same) for the dilution genes that dilute the pigmentation to white or cream color. An animal that is heterozygous for the dilution gene (one gene for dilution and the other for nondilution) can influence the intensity of red pigmentation in red cattle and black pigmentation in black cattle. The offspring of a black animal bred to a white animal will most likely produce gray offspring. Likewise, red cattle mated to animals whose pigment is diluted can produce light yellow-colored offspring.

Breeds that are known to possess the dilution gene are Simmental, Charolais, Longhorn, Gelbvieh, Blonde'd Aquitaine, Murray Grey and Scotish Highland. Charolais are homozygous for the dilution gene as evidenced by their white color. Using them in a cross-breeding program will always partially dilute the color of the breed to which they are mated. For example, Charolais X Angus crossbreds are always gray. The Simmentals that are homozygous for the dilution gene are very light fawn-colored. When very light fawn-colored Simmentals are used in a cross-breeding program, they will always contribute a dilution gene to partially dilute the color of breed to which they are mated. Medium red-colored Simmentals are most likely heterozygous for the dilution gene and when used in crossbreeding, they may or may not dilute the color of the breed with which they are mated. Deep dark red Simmentals are homozygous for the nondilution gene and when used in a cross-breeding program, they will not dilute the color of the breed to which they are mated.

On many markets, cattle are sold with little, if any, information available about breed or performance. Most buyers will estimate performance (gain, yield, livability, etc.) in relation to the reputation of the breed; thus, they look for signs that indicate a certain breed or breeds making up cross-bred cattle. Some breeds are prone to produce calves that have certain distinguishing color markings, such as white faces, droopy ears, brindling, skunk-backs and white stocking legs. Those breeds that indicate white-faced or blaze-faced calves are Hereford, Polled Herefords and Simmentals. Brindling may indicate breeds such as Jersey, Brown Swiss, Brahman, Chianina, Tarentaise or Longhorn. Skunk-backs are indications of either Charolais or Pinzgauer. Stocking legs can come from Holstein, Beef Friesian, Maine Anjou, Simmental, Hays Converter, Hereford or Polled Hereford. Droopy ears and larger navels are indicative of Brahman, Brangus, Santa Gertrudis or Braford.

Color is an economic trait in some situations but should not be a substitute for the more important traits of beef cattle production, such as growth, reproduction and carcass traits. Not all breeds are reported in this article, and it should not be construed in any manner that they are minor breeds. Information was not available on color inheritance of those breeds.

The following appendix illustrates mode of inheritance of different colors and spotting patterns along with expected color patterns of different breeding programs.

APPENDIX

BASIC COLORS

BLACK
RED
REDDISH BROWN TO BROWNISH BLACK

MODE OF EXPRESSION (DOMINANCE)

BLACK > RDSHBRWN-BRNSHBLK > RED

> = DOMINANT

EXPECTED COLOR FROM MATING:

BLACK X RED	**BLACK (some red possible)**
BLACK X RDSHBRWN-BRNSHBLK	**BLACK (brindle)**
RDSHBRWN-BRNSHBLK X RED	**RDSHBRWN-BRNSHBLK (brindle)**
RED X RED	**RED**

POSSIBLE GENETIC MAKEUP & COLOR

COLOR	GENE PAIR
BLACK	**2 BLACK** **OR** **1 BLACK & 1 RED**
RDSHBRWN-BRNSHBLK	**2 RDSHBRWN-BRNSHBLK** **OR** **1 RDSHBRWN-BRNSHBLK & 1 RED**
RED	**2 RED**

SPOTTING COLORATIONS

PATTERN	BREEDS FOUND IN:
WHITE FACE (WF)	HEREFORD
SPOTTED (Sp)	SIMMENTAL, HOLSTEIN, ETC.
DORSAL STRIPED (DS)	PINZGAUER, CHAROLAIS, LONGHORN
SOLID COLORED (S)	SOLID COLORED BREEDS

SPOTTING COLORING MODE OF EXPRESSION

WHITE FACE = DORSAL STRIPED <> SOLID > SPOTTED

<>= INCOMPLETE DOMINANCE > = DOMINANT = NO DOMINANCE

POSSIBLE GENETIC MAKEUP & COLOR PATTERN

PATTERN	GENE PAIR
HEREFORD MARKED	2 WF GENES
DORSAL STRIPED WITH WHITE UNDERLINE	2 DORSAL STRP GENES
DORSAL STRIPED & WF	1 DORSAL STRP & 1 WF
SOLID COLOR	2 SOLID COLOR OR 1 SOLID & 1 SPOTTED
PARTIAL SKUNK TAIL	1 SOLID & 1 DORSAL STRP
BWF OR RWF	1 WF & 1 SOLID
SPOTTED	2 SPOTTED

PIGMENTATION

DILUTANTS — RED to YELLOW, BLACK to GRAY
FOUND IN SIMM. & CHAR.

BRINDLING — STRIPES
FOUND IN JERSEY, BRAHMAN, BROWN SWISS BRAUNVIEH, CHIANINA

EXPECTED COLOR OF CALVES FROM MATING:

BLACK X BLACK	BLACK(maybe some red)
BLACK X RED	BLACK(maybe some red)
RED X RED	ALL RED
BLACK X BRWNSHBLK-REDSHBRWN	BLACK (some BRINDLED)
RED X BRWNSHBLK-REDSHBRWN	BRWNSHBLK-REDSHBRWN (some BRINDLED)
BLACK X HEREFORD	BWF (maybe SOME RWF)
BWF X BLACK	BWF, BLACK MOTTLED (maybe some RWF)
BWF X HEREFORD	50% BWF, 50% RWF(some BWF & RWF HEREFORD marked)
BWF X SOLID RED	BLACK, RED, RWF & BWF
BLACK X YELLOW SPOTTED	GRAY BLZ FACE (maybe some YELLOW BLZ)
BLACK X DARK RED SPOTTED	BLK & CHARCOAL BLZ FACE
BLACK X CHAROLAIS	GRAY(BLK NOSE) (maybe some LT YELLOW)
HEREFORD X CHAROLAIS	LT YELLOW WF
BLACK X CHAROLxANGUS	BLACK, GRAY & LT YELLOW (SOME WITH SKUNK TAILS)
CHAROLAIS X BWF	GRAY & YELLOW (SOME WF) & SOME WITH SKUNK TAILS, POSSIBLY SOME BLACKS & BWF

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