



## Beef Crossbreeding Series

# Color Patterns in Crossbred Beef

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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 white, red, or roan Shorthorn. Still other breeds have multiple colors, which are unpredictable; for example, spotting, brindling, or solid colors in Longhorn.

A knowledge of the genetic aspects of hair color, and experience, allows one to predict with some degree of accuracy the color pattern to expect among calves when crossing breeds. This fact sheet is to serve only as a guide. The predictions listed here give only the major expected colors. Because of gene segregation there will be some exceptions.

Several of the available cattle breeds are categorized as to basic body color classification in Table 1. These breeds are identified with the color pattern that is most common in each breed. For example, some Simmental cattle have color markings similar to that of Herefords; however, the majority have extra white that is non-predictable as to pattern. Thus, Simmental are categorized as spotted cattle.

Table 2 illustrates the color pattern expected in progeny resulting from the matings of bulls and cows of various colors.

Certainly one of the strongest arguments for crossbreeding is the use of the crossbred cow. It has been illustrated many times that the average crossbred cow is more productive than the average straightbred cow (see OSU Fact Sheets ANSI-3152 and ANSI-3153). However, as we increase the number of breeds involved in crosses, we decrease our ability to maintain complete color control in the offspring. Table 3 illustrates the expected color pattern in offspring from three-way crossbreds utilizing the F1 cow and straightbred bulls.

On central markets, cattle are frequently sold with little, if any, information made available about breed or performance. Most buyers will estimate performance (gain, yield, liveability, etc.) in relation to the reputation of the breed; thus, they look for signs that indicate a certain breed or breeds making up crossbred cattle. Some breeds are prone to produce calves that have certain distinguished color markings, such as white-face, droopy ears, brindling, skunk-backs, and white stocking legs. Table 4 lists certain breeds that when crossed with other breeds frequently produce calves with distinct characteristics.

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Not all calves carrying this breed make-up will possess these characteristics, but many will have them.

Because of gene segregation, there are nearly always exceptions to the rule. Table 5 gives some generalizations to consider when attempting to set up a breeding program within which color is important. Producers who are unconcerned with color, should select superior breeding stock from breeds which excel in economically important traits and blend those breeds together into a breeding program to allow maximum profit.

The opportunity to combine desirable characteristics of two or more breeds (breed complementarity) and increase performance due to hybrid vigor (heterosis) makes crossbreeding a very important mating system for commercial cow herds. Experimental evidence strongly indicates total pounds of calf produced per cow in the breeding herd can be increased 15 to 25 percent in well defined and executed crossbreeding schemes. It would appear likely that with this potential for increased production, the use of crossbreeding systems by commercial cattle producers would be increasing at a rapid rate; but, this is not the case. The use of crossbreeding systems is increasing, but it has come about very slowly and with considerable resistance.

Why has there been resistance to crossbreeding beef cattle? There is not an easy answer to this question since many factors are involved when a beef producer plans his breeding program. Some commonly expressed negative viewpoints on crossbreeding are: (1) market discrimination against certain breeds and/or colors; (2) lack of uniformity because of color patterns; (3) breeding programs become more complicated because of necessity to mate a certain bull breed (or breed-cross) to a certain breed-cross cow; (4) the need for several breeds of bulls; and (5) a greater requirement for cow identification.

The purpose of this fact sheet is to provide some guidance on setting-up crossbreeding systems that should, in addition to capitalizing on breed complementarity and hybrid vigor, maintain a uniform color pattern for ease of selling the offspring. Color is a highly heritable trait, so it can be selected for (or against). In some breeds and breed crosses, the color is highly predictable; however, in some other breeds and breed crosses, color is highly unpredictable. For those producers who market cattle in groups, color can be an economically important trait.

**Table 1. Basic body colors of cattle and the breeds identified with those colors**

Black	Red	White or Cream	Light hair color with dark pigment skins	Spotted	Mixed colors
Angus Brangus Ankina Galloway Welch Black	Barzona Devon Gelbvieh Herford Polled Hereford Limousin Lincoln Red Norwegian Red Red Angus Red Poll Salers Santa Gertrudis Scotch Highland Shorthorn South Devon	Shorthorn Charolais White Park Blonde'd Aquitaine	Brahman Brown Swiss Chianina Marchigiana Murray Grey Romagnola Jersey Tarentaise	Beef Friesian Hays Converter Holstein Maine Anjou Normande MRI Pinzquaur Simmental	Beefmaster Braford Longhorn

**Table 2. Expected color patterns when crossing breeds of various colors**

	Black	Red	White	Light hair with dark skin	Spotted	Mixed colors
Black	Black	Black	Black-smokey	Black-some brindling	Black-few spots	Mostly Black
Red		Red	Red-roan	Red-some brindling	Red- or Black-some spots	Some Red-mostly mixed
White			White	White-Grey	Most spotted-some white	Mixed
Light hair with dark skin				Grey	Grey-some spotted	Mixed
Spotted					Spotted	Mixed
No fixed color						Mixed

**Table 3. Expected offspring color patterns (from a three-way cross using the F1 cow)**

	Black	Red	White	Spot	Mixed
Black x Black x Red x White x Spot x Mixed	Black Black Black Black Black	Black Black & Red Black & Red Black & Red & Spots Black & Mixed	Mostly Black Black & Red Black-smokey Black-mixed Black-mixed	Mostly Black Variable Black-mixed Black & Spots Mixed	Mostly Black Mixed Mixed Mixed Mixed
Red x White x Spot x Mixed	Black Mostly Black Mostly Black	Mostly Red Mostly Red Mostly Red	Mixed Mixed Mixed	Mixed Mostly Spots Mixed	Mixed Mixed Mixed
White x White x Spot x White	Diluted Black Mostly Black Mostly Black	Red-roan Red-spot Mixed	White White-spot Mixed	Spots-white Spots-mixed Mixed	Mixed Mixed Mixed
Spot x Spot x Mixed	Spots-mostly black Spots-mostly black	Red-spot Spot-mixed	Spot Spot	Spot Spot	Mixed Mixed
Mixed x Mixed	Brindling-mostly black	Mixed	Mixed	Mixed	Mixed

**Table 4. Breeds which commonly leave specific color markings suggesting their presence in crossbred calves**

White-face	Brindling	Skunk-backs	Stocking legs	Droopy ear and navel
Hereford Polled Hereford Simmental	Jersey Brown Swiss Brahman Chiania Tarentaise Longhorn	Charolais Pinzquar	Holstein Beef Friesian Maine Anjou Simmental Hays Converter Hereford Polled Hereford	Brahman Brangus Santa Gertrudis Braford

**Table 5. Generalizations to remember if trying to create a certain color pattern.**

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Things to do:

1. Want to create a black baldy?
    - a) Infusion of Hereford (H or P) will put white or brockle face on essentially any color of cow.
    - b) Infusion of Simmental will put striped or blazed face on solid colored cows but white face on white faced cows (i.e. Hereford or baldy cows)
    - c) Black is dominant to red color in cattle. Thus the first cross between black and red will produce essentially all black (depends upon frequency of black cows or bulls that are red carriers) calves. If the second cross is to a red bull the color of calves will be 1/2 black:1/2 red, but by using a black bull the calves will again be essentially all black.
    - d) Breed examples

Angus		Hereford	
Brangus	X	(H or P)	→ Black baldy calf
Galloway		Simmental	
  
  2. Only want one body color from three-breed cross program?
    - a) If red is desired, producer must use only red breeds.
    - b) If black is desired producer must use only black breeds.
    - c) A mixture of red and black breeds will produce black offspring the first cross but a mixture of red and black (close to 50-50) in second and third crosses.
  
  3. Color not important?
    - a) Use any breed, just concentrate on blending breeds for production traits such as milk production, fertility, growth, etc.
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