

Crossbreeding 101: What Every Producer Should Know

Today, more than ever, we are asking our dairy cows to do a lot. They need to be good producers, trouble-free and consistent breeders. It is wise to occasionally ask, "Am I doing all I can to develop cows with the right genetics to meet the demands of my dairy operation?" Crossbreeding is an area some are exploring as a way to reach these goals.

Dairy producers have traditionally not utilized crossbreeding. A unique aspect of dairy cattle breeding is that the production animals are also the breeding animals. Not only do we need cows with the right genetics today, but those genetics need to be part of the solution for future profitability as well. Breeding decisions have an impact for a long time and a conservative strategy often produces the best long-term results.

Crossbreeding is the producer's choice. It is routinely and effectively used in other areas of livestock production. As various dairy breeds advance, perhaps the dairy industry has reached the point where crossbreeding is a viable alternative. Select Sires is continually asked about the best way to use crossbreeding. This article is an attempt to summarize areas producers should consider as they explore implementing a crossbreeding program.

HYBRID VIGOR

The one thing that crossbreeding provides that can't be found anywhere else is hybrid vigor. Hybrid vigor is where offspring perform better than expected based on the genetic transmitting abilities of their parents. It occurs when you combine two distinct genetic lines. The more distantly related the two lines are, the more hybrid vigor is produced. Hybrid vigor is real but only temporary. It is the key to making cross-

breeding successful. Without a plan to sustain hybrid vigor in the second and later generations, crossbreeding results will likely be disappointing.

An endless list of crossbreeding strategies exists. The key to choosing the right one is to balance the complexity of the mating scheme with the ability to maintain hybrid vigor. Table 1 indicates the amount of hybrid vigor maintained with different mating strategies. While it depends on the breeds involved, a three-breed rotation typically provides the best balance between simplicity and effectiveness.

Using purebred sires and maintaining a rotation are key concepts. For instance, in a two-breed system scheme, if crossbred sires were used on crossbred cows, only 50 percent of the hybrid vigor would be sustained as opposed to the 67 percent sustained through rotation of purebred sires.

Table 1. The amount of hybrid vigor maintained with different mating strategies.

Crossbreeding Scheme	Hybrid Vigor Sustained
Two-breed rotation	67%
Three-breed rotation	85%
Four-breed rotation	94%

CHOOSE YOUR BREEDS WISELY

Research suggests that the hybrid vigor boost is between 5 percent and 10 percent depending on the breeds crossed and the trait being measured. This is a meaningful difference but not enough to compensate for breeds or animals of inferior genetic merit.

It is imperative that the breeds included in a crossbreeding program are competitive in their genetic ability to be profitable producers. A good rule of thumb is if you wouldn't be happy milking the purebreds then you probably won't like the crossbreds either. So,

Table 2. Characteristics of the major dairy breeds.

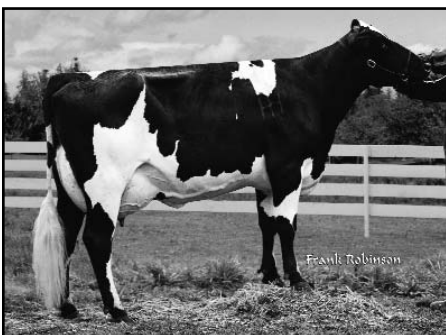
Breed	Worldwide Population	Avg. Milk	Avg. Fat	Avg. Protein	Bulls Sampled Per Year	Origin
Ayrshire	100,000	17,900	3.9%	3.1%	150	Red and white breed of cattle originating in Scotland
Brown Swiss	7 million	20,700	4.0%	3.3%	600	One of the oldest breeds of dairy cattle developed from Swiss Braunvieh cattle
Guernsey	100,000	16,800	4.5%	3.3%	80	Fawn and white breed originating in the Isle of Guernsey
Holstein	25 million	23,300	3.6%	3.0%	4,000	Black and white cattle from the Netherlands, bred for dairy since the 1800s
Jersey	1.2 million	17,600	4.6%	3.6%	630	Developed on the Isle of Jersey probably from cattle from the north coast of France
Montbeliarde	330,000	18,000	3.8%	3.4%	170	Simmental origins, selected mostly for dairy in France.
Normande	300,000	16,000	4.4%	3.6%	160	Native French breed with some Shorthorn and Jersey influence.
Norwegian Red	284,000	20,000	4.2%	3.5%	125	Amalgamation of red dairy cattle in Norway, includes some influence from Ayrshire and red breeds from Sweden.
Swedish Red	205,000	20,000	4.2%	3.5%	100	Amalgamation of red dairy cattle in Sweden, mostly Swedish Red Pied and Swedish Ayrshire.



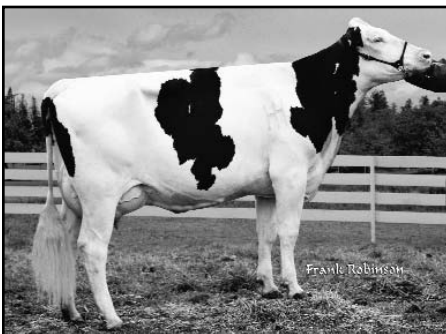
Jersey x Holstein Cross



Brown Swiss x Holstein Cross



Norwegian Red x Holstein Cross



Montbeliarde x Holstein Cross



Three-way cross: Swedish Red x Holstein-Jersey (HoJo)

choose breeds that have a reasonable population size and an ongoing and effective breed improvement program. Table 2 is a summary of the characteristics of the major dairy breeds.

An additional consideration in choosing breeds is to find a combination that is complimentary. Jerseys make a good match for Holsteins because they provide higher component milk and calving ease to go along with the Holstein's high production volume and good udders. If you are looking to maintain more size and substance, Brown Swiss would be an appropriate third breed to use in the rotation. Several of the European red breeds have been selected for improved health and fertility. If these traits are a priority for you, then including the Swedish Red, Norwegian Red or Montbeliarde should be considered as a third breed.

CHOOSE THE BEST BULLS

The need for selecting bulls that transmit good production, good udders, good feet and legs and are well sampled is important regardless of the mating strategy. In most cases, this information is only available on purebred, progeny-tested sires. The difference between the genetic evaluations of two bulls will be maintained even if they are mated to cows of different breeds.

EXPECTED CROSSBREEDING RESULTS

The success of a crossbreeding program will depend on the quality of breeds chosen and how effectively the program is implemented. Crossbreeding does not simplify a breeding program but does offer the opportunity to take advantage of hybrid vigor.

We have a lot to learn about the effectiveness of crossbreeding in dairy cattle. Some projects are underway that will be helpful. However, research will not likely provide us with absolute answers on the best way to crossbreed. There simply isn't enough funding to conduct enough breeding projects fast enough to compare all the potential breed combinations. Some trial and error, at the farm level, will be needed as we learn the strengths and weaknesses of the various breeds.

Previous research results suggest that use of sires of other breeds on Holsteins can lead to sustained improvement in fat and protein percentages, calving

ease, more replacements and perhaps improved fertility and general health. These benefits do not come free. To achieve these you will likely have more variety in the overall size and conformation of cows, sacrifice some overall conformation (especially udders) and, in the long run, will have slightly lower yield of milk components.

It is also important to realize that the early results of crossbreeding will likely be better than what can be sustained in the long run. You will achieve more hybrid vigor in the early generations as the new breeds are introduced. It is also possible, in theory, that important gene combinations, built through within breed selection, could be lost as crossing continues for several generations.

THE BOTTOM LINE

- Crossbreeding can produce benefits if closely competitive breeds are available.
- Select Sires cannot recommend crossbreeding with confidence at this point because we don't have sound comparisons on currently available dairy breeds.
- Research is underway that will help provide these answers and Select Sires supports this work.
- Producers that try crossbreeding should use a three-breed rotation.
- The breeds used should be competitive and have effective genetic improvement programs.
- Producers should use the best available bulls from those breeds.

MORE INFORMATION

For further information about the dairy breeds and their genetic evaluations, visit the breed Web sites listed below:

Ayrshire	www.usayrshire.com
Brown Swiss	www.brownswissusa.com
Guernsey	www.usguernsey.com
Holstein	www.holsteinusa.com
Jersey	www.usjersey.com
Montbeliarde	www.coopex.com
Normande	www.normandegenetics.com
Norwegian Red	www.geno.no
Swedish Red	www.svenskavel.com



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