



Crossbreeding – the last free lunch ?

Crossbreeding – what’s in it for me?

Beef producers raise cattle across a wide variety of environments and conditions for a diverse range of markets. A beef producer needs a cow herd that will perform efficiently in his environment, whilst producing calves that will meet the needs of the off-farm supply chain. **No one breed has all the traits needed for optimum value-based beef production across all environments and market opportunities.**

Crossbreeding is the single most valuable tool available for producers in any particular environment to produce the type of cattle to best meet market requirements

Well planned crossbreeding, combining traits from two or more breeds, using specialist maternal and sire breeds, and gaining the extra boost to production that occurs in crossbred cattle (hybrid vigour), increases productivity, and profit, from any beef herd regardless of the environment.

Crossbred cows are great mums - Increased growth rate of progeny is often considered the main benefit of crossbreeding, however the real long-term benefit comes from the increased productivity of the crossbred female – greater fertility , a longer producing life, better maternal traits and increased survival rate of calves. Add the superior growth and carcass characteristics of specialist sire breeds and you have a real win-win situation.

There are many systems for crossbreeding – ranging from very simple to very complex. Generally, the more complex the system, the greater are the potential benefits and greater are the management issues. The simple systems are the most practical and easy to live with.

Before choosing a crossbreeding system, careful thought must be given to the requirements of your target market, your physical resources such as land, fencing etc, the characteristics of the breeds available, and your level of available management.

Benefits and downsides associated with crossbreeding

Where do the benefits come from.

A well planned crossbreeding program matches breed traits to environments and markets. Depending on the system used, the benefits can result from one, some or all of the following events;

Adding desirable traits of different breeds to the progeny. For example, adding the growth of the Charolais and the marbling of the Shorthorn breeds.

Complimenting the roles of specialist sires and cows – eg; using a high growth/muscling sire breed over moderate sized, fertile, easy-care crossbred cows.

Exploiting **Hybrid Vigour**, which is the boost to production that you get when different breeds are crossed. Hybrid vigour is expressed as the amount (%) by which the crossbred progeny are better than the average of the two parent breeds.

Direct hybrid vigour is the extra performance you get in the first cross progeny of two purebreds (5-10% extra calf weight). Maternal hybrid vigour is the extra performance you get by using a crossbred cow (10-20% extra calf weight).

In a well planned crossbreeding program you can get the benefit of both direct and maternal hybrid vigour, as well as the additive benefits of different breed traits.

Just how much hybrid vigour you get depends on the genetic diversity between the breeds used - for example, a Hereford/Brahman cross will express more hybrid vigour than will a Hereford/Angus cross.

Traits that are weakly inherited, such as fertility, milking ability and longevity respond more to hybrid vigour than do traits such as growth rate. Traits such as muscling and maturity are affected more by the breeds used than by hybrid vigour.

Crossbreeding also gives the beef breeding enterprise **Flexibility** – it allows you to quickly change the characteristics of progeny, or the whole herd, – often in one generation, simply by changing the sire breed used at the next joining.

For example;

- the use of European breeds to produce leaner, heavier carcasses with the first cross
- the use of Shorthorn, Angus or Wagyu bulls to produce a more marbled carcass
- the use of Brahman bulls to increase adaptation to harsh/tropical environments
- the use of dairy breed bulls to increase milk production in crossbred cows

Selection to achieve the same rate of change within a purebred herd would take many generations.

What are the downsides.

The specialized nature of high producing crossbred systems create some additional management issues compared to straight breeding, which include;

Obtaining replacement females. The supply of female replacements is one of the most challenging issues with some crossbreeding systems. Breeding female replacements within the herd means additional joining groups and breeds of bulls being run and the need to run a nucleus pure-bred herd. Purchasing is the easiest option but heifers of known breeding are not readily available on a consistent basis. Contract breeding of heifers is an option.

Managing more than one joining group - Crossbreeding systems that have additional joining groups, compared to straight bred systems, need more paddocks and good fencing to keep the groups separate. If you have trouble identifying and managing your straight bred herd, then crossbreeding is not a good option for you.

Marketing specialized crossbred lines in drought. “Designer” crossbred progeny realize their profit potential when they are marketed into their targeted value-based market. In a ‘fire sale’ situation, these markets may not be available for the stage your crossbred progeny have reached and discounting may occur.

Calving difficulty with heifers. - unfortunately hybrid vigour for growth occurs in the developing foetus as well as the growing calf or yearling, and high birth weights can result when high growth rate sires are joined to heifers of a smaller breed. In this situation, joining to low calving-risk bulls is essential.

Crossbred cows eat more – high producing crossbred cows generally require more feed than their straight-bred counterparts, however, even when a reduction in carrying capacity is required, research has shown that productivity per unit of land still favours the crossbred cow. Crossbred cows based on a high milking breed need high nutrition for sustained reproduction.

Selecting breeds for to fit your crossbreeding program

The choice of breeds to use in a crossbreeding program depends upon the traits that are important to your breeding and marketing objective. - the traits of key importance include,

- Growth and mature size
- muscling and fattening ability
- Marbling
- Eating quality (tenderness)
- Fertility (such as age at puberty, weaning percentage)
- Mothering ability and milk production
- Adaptation to harsh environments

No one breed excels in all the traits required for optimum beef production. The purpose of crossbreeding is to blend traits from several breeds to best fit your needs. Cattle breeds can be grouped according to their general characteristics or “average performance”.

British breeds, such as Shorthorn, Angus and Hereford are recognized for their carcass quality, maternal, finishing ability and docility attributes. Angus and Shorthorn are also high marbling breeds.

European breeds such as Charolais, Limousin and Simmental are noted for their high growth rate, mature size and muscling, producing lean, high yielding carcasses. Leanness may be an advantage or disadvantage depending upon age at slaughter, available feed resources and market demands. The Simmental is a high milking breed and Simmental cross cows need good nutrition if they are to sustain high production.

Bos indicus breeds such as Brahman are noted for their feed efficiency and tolerance to heat, poor nutrition and parasites. They are also noted for reduced fertility, poor docility and reduced eating quality and within breed selection is important.

Bos indicus derived breeds such as Santa Gertrudis, Belmon Red and Droughtmaster (developed from crossing *Bos indicus* and British breeds), express attributes that reflect the percentage of the background breed types used in their development.

Sanga breeds such as the Africander, Tuli and Mashona – *Bos Taurus* breeds developed in Africa that are well adapted to tropical environments.

Dairy breeds such as Friesian and Jersey are noted for their high milk production and early puberty but must be well fed to sustain high levels of production and have limited usefulness in beef production systems.

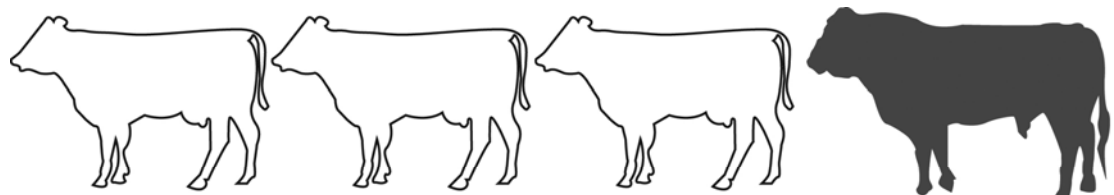
Wagyu breed is in a category of its own, being noted for very high marbling.

Breed alone is not a guarantee of achieving your goals – you need to select sires on the basis of genetic merit within the chosen breed using Breedplan EBVs (estimated breeding values). As EBVs are breed specific, you can't directly compare, say the EBV of a Hereford bull with an Angus bull, but you can get a useful guide to their relative merit by comparing their percentile band fit within the respective breeds.

A few practical crossbreeding systems

2 way Cross (*topcross*)

In this system, a bull of another breed is used over straightbred cows, which in temperate areas will usually be British breeds.



+ 5–10%
increased weaning
weight turnoff

– Easy replacements
– Increased value of heifers as:
– F1 breeders
– 'Steer' value for European crosses

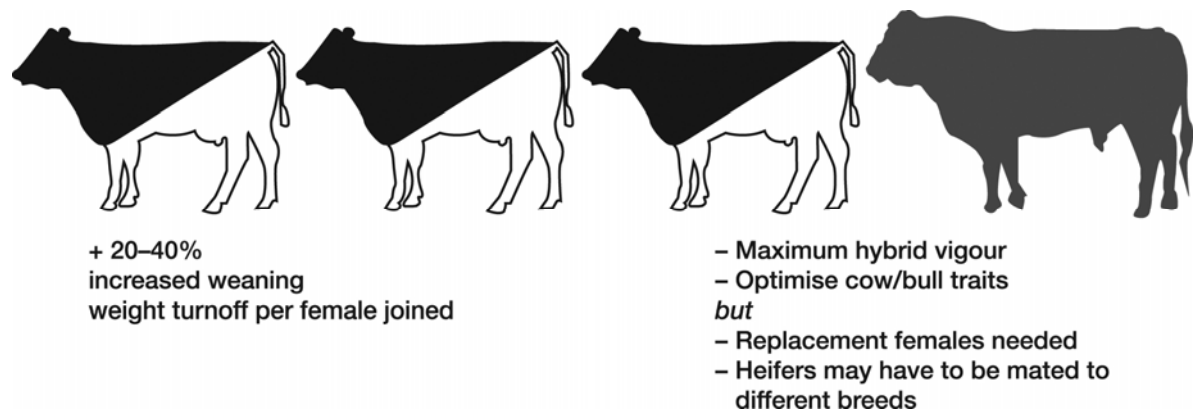
This is a simple system but does not have the benefits of hybrid cows. Replacement females have to be purchased or bred in a separate herd, however a good compromise can be had by joining the older cows in the herd to another breed bull, with straight bred replacements coming from the younger cows. This system also can be used to breed *specialised F1 dams* and crossbred sires.

An example of this system would be joining;

- Angus cows to Wagyu bulls to increase marbling potential for the B3 long-fed market,
- Shorthorn or Angus sires over Hereford cows to producer feeder steers for the long-fed market
- Shorthorn sires over Charolais cows to produce specialist crossbred bulls for use as terminal sires over crossbred cows (eg; Angus/Hereford) to produce high growth, high yielding, high eating quality carcasses for the domestic restaurant trade).

Terminal sire over first-cross (F1) Cows

In this system, a third breed of bull is used over first cross (F1) cows and all progeny are sold for slaughter.



This is the most productive system, as F1 females can maximise fertility and longevity while bulls can be selected for their growth and carcass traits.

The main problem with this system is sourcing replacement females. They can be bred on part of the property (or another holding) by running a herd of purebred cows, or they can be purchased. The alternative of contracting another breeder to breed F1 females for you has merit. The extra longevity of crossbred cows means less replacements are needed compared to a straight breeding system.

A good mix in temperate environments, is to use a cow breed cross of moderate mature size and milk production, such as Angus/Hereford or Shorthorn/Hereford and a terminal sire breed such as Charolais or Charolais/Shorthorn, depending on market requirements and feed resources.

Heifers need to be joined to low calving-risk sires.

In tropical or subtropical environments, or very hot dry areas, *Bos indicus* or derived cross British females should be considered.

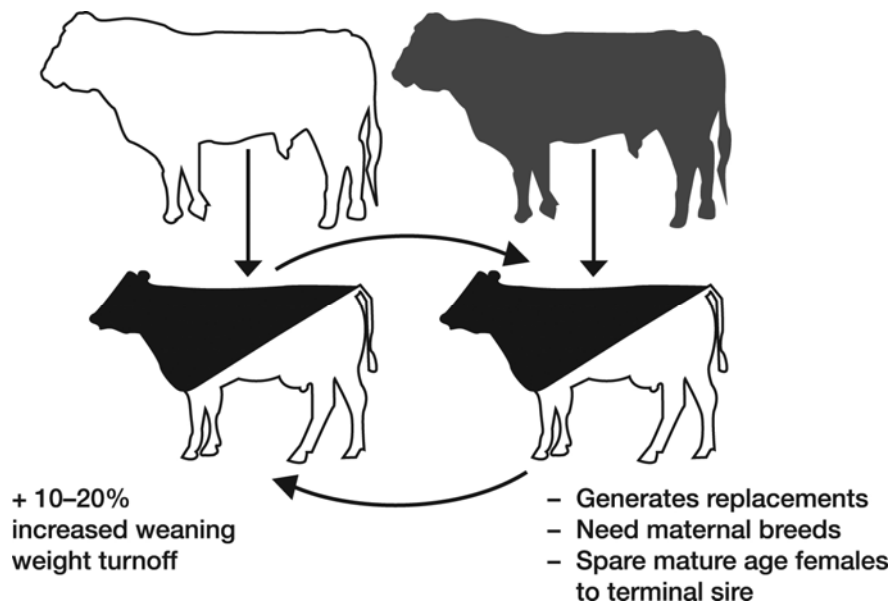
The bottom line is that the choice of breed or genotype of cow needs to match the feed environment in which the animals are being asked to perform.

Two breed rotation (criss-cross)

This system requires two joining groups and two sire breeds. The daughters of sire breed A are mated to the daughters of sire breed B and vice versa.

It is easy to introduce a two breed rotation cross into a straight bred herd. Divide the herd in two; buy a bull of a compatible breed and join him to half the herd. Join the original bull to the other half of the herd. The heifers from each joining are then joined to the bull of the other breed for the rest of their lives.

This system generates its own replacement females and provides intermediate benefits of hybrid vigour.



The breeds used in a rotational cross system need to be compatible in terms of maternal, maturity and carcass traits, otherwise variation in the two groups of progeny may create marketing problems (Progeny groups will stabilize at 2/3 breed A and 1/3 breed B, and vice versa).

British breed crosses such as Angus/Hereford, Shorthorn Hereford or Shorthorn/Angus are usually the criss-cross breeds of choice in temperate areas.

Sire Identification of progeny is essential in these systems to simplify management of females at mating and for finishing of slaughter stock (eg. an ear mark for sire breed).

Using Crossbred bulls.

Crossbred bulls can fit into a crossbreeding program where intermediate breed traits are required, for example 25% Simmental in crossbred cows or 25% Charolais in slaughter progeny in situations where 50% Euro blood would be too much.

The benefit of using crossbred bulls is the additive effect of blending traits rather than hybrid vigour. Care needs to be applied when selecting crossbred bulls, especially if comparing to purebred bulls – they benefit from the expression of hybrid vigour, but that hybrid vigour is not passed onto their progeny.

It is important that the parent animals used to breed crossbred bulls are selected for genetic merit within their respective breeds, using EBs and selection indexes.

A final reminder - Regardless of hybrid vigour, the performance of crossbred progeny depends largely on the performance of the parents and the environment in which they are run. You will not produce outstanding calves from poor producing cows or sires simply by crossbreeding.

The amount of hybrid vigour and benefit of additive traits expressed in crossbred progeny will largely depend on the breeds being used and the traits being measured.