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Crossbreeding in Cattle: Is Higher Milk Production Always Better?

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Crossbreeding is used to improve milk production while combining useful characteristics of different cattle breeds. In India, exotic dairy breeds such as Holstein Friesian and Jersey have been crossed with indigenous breeds including Sahiwal, Gir and Tharparkar. This article outlines the characteristics of selected exotic, indigenous and crossbred cattle, including Karan Fries, Karan Swiss, Frieswal and Vrindavani. It discusses the potential benefits of crossbreeding and the importance of feed availability, heat tolerance, fertility, animal health and productive lifespan. Higher milk yield can increase income, but it may also raise feeding and management costs. Therefore, breed choice should match local climate, available resources and the farmer's capacity to manage the animal. The objective should be to maintain healthy, fertile and productive cattle that provide sustainable returns over their lifetime.

Keywords: Adaptability; Crossbreeding; Dairy cattle; Fertility; Milk production.

Article highlights

Crossbreeding can improve milk production by combining the strengths of exotic and indigenous cattle. However, more milk does not automatically mean more profit. Feed expenses, fertility, heat tolerance, health and productive life also influence farm returns. This article compares selected cattle breeds and explains how farmers can choose animals according to local conditions. Its central message is to select for balanced performance rather than milk yield alone.

Introduction

Dairy farming provides regular income to rural families in India. Farmers need cows that produce good-quality milk, remain healthy and calve regularly. Crossbreeding—mating animals of different breeds—combines the milk-producing potential of exotic cattle with useful characteristics of indigenous breeds. However, performance varies with genetics, nutrition, climate and management. A high-yielding cow under intensive care may not perform equally well where fodder, housing or veterinary services are limited. The best animal is the one that performs economically under local farm conditions.

Why is crossbreeding practised in cattle?

Exotic dairy breeds have been selected for high milk production, while indigenous cattle are valued for adaptation to local environments and as important animal genetic resources. Holstein Friesian is known for high milk-producing potential; Jersey is often valued for milk composition and smaller body size. Sahiwal, Gir and Tharparkar are important Indian breeds adapted to tropical conditions. Crossbreeding may also exploit heterosis, or hybrid vigour, whereby crossbred offspring can outperform the average of their parental breeds for some

traits. This advantage is not guaranteed: it depends on the breeds, parent selection and production environment (Hegde, 2018).

Important exotic, indigenous and crossbred cattle breeds

India uses exotic breeds in dairy improvement programmes while conserving and improving indigenous cattle. Planned breeding has produced crossbred populations such as Karan Fries (Holstein Friesian × Tharparkar), Karan Swiss (Brown Swiss × Sahiwal), Frieswal and Vrindavani. Table 1 brings together selected production and reproduction characteristics. The figures come from different recording systems and should not be treated as a controlled comparison.

Table 1. Characteristics and reported milk production performance of selected exotic, indigenous and crossbred cattle.

Breed category	Breed	Characteristics / breeding combination	Reported milk yield (kg)	Milk fat (%)	Age at first calving (months)
Exotic	Holstein Friesian (HF)	Large body; black-and-white coat	11,557	4.21	24.1
Exotic	Jersey	Small-to-medium body; reddish-fawn coat	7,563	5.28	23.1
Indigenous	Sahiwal	Reddish-dun coat; loose skin	1,942	4.5	36.6
Indigenous	Gir	Red or spotted coat; characteristic curved horns	1,414	4.4	51.0
Indigenous	Tharparkar	White-to-grey coat; strong body	1,823	4.5	38.8
Crossbred	Karan Fries	Holstein Friesian × Tharparkar	3,393	4.1	34.2
Crossbred	Karan Swiss	Brown Swiss × Sahiwal	3,316	4.2	34.6
Crossbred	Frieswal	62.5% Holstein Friesian × 37.5% Sahiwal	3,060	3.51	35.6
Crossbred	Vrindavani	Crossbred strain	3,220*	4.30	33.2*

Note: Milk-yield figures are reproduced from the respective sources and may not be directly comparable because recording periods and reporting methods differ. The Vrindavani milk yield (3,220 kg) is its reported 300-day lactation yield; age at first calving (1,012 days) has been converted to approximately 33.2 months. Sources for Table 1: Holstein Friesian and Jersey milk-yield and milk-fat data: Canadian Dairy Information Centre (2025); age at first calving: Council on Dairy Cattle Breeding (2025). Indigenous-breed values: Sarang et al. (2024). Karan Fries and Karan Swiss values: ICAR–National Dairy Research Institute (n.d.). Frieswal values: Barwal et al. (2025). Vrindavani values: ICAR (2022).

The table shows that breed performance differs across traits. Holstein Friesian has high milk-producing potential, while Jersey has a higher milk-fat value in the cited recording data. Indigenous breeds are valuable genetic resources adapted to Indian conditions. The crossbred figures represent particular herds or field records, not guaranteed outcomes for individual animals. Actual performance is influenced by genetic merit, lactation number, nutrition and management (Sarang et al., 2024; Barwal et al., 2025).

Benefits of crossbreeding: More than milk production

Crossbreeding can increase milk production and may improve other economic traits, depending on the breeds and animals selected. Planned mating can combine useful characteristics from different genetic backgrounds. Breeding success should be assessed through records: a high-yielding cow with repeated illness or reproductive problems may provide lower lifetime returns than a moderately yielding, healthy cow that calves regularly.

The cost of maintaining high-producing cows

High-producing cows need adequate balanced feed, clean water and suitable housing. Requirements depend on body weight, milk yield, lactation stage and health. Poor-quality or insufficient feed can limit production and affect body condition and fertility. Farmers should compare the extra income from milk with additional feed, labour, breeding and treatment costs. A cow producing 15 litres daily may sometimes be more economical than one producing 20 litres if the latter requires substantially higher maintenance. Before purchase, assess year-round fodder availability, housing, labour and access to veterinary care.

Heat stress and adaptability to Indian conditions

High temperature, especially with humidity, can reduce feed intake, milk production and reproductive performance. Indigenous cattle such as Sahiwal, Gir and Tharparkar are valued for adaptation to tropical environments and are important genetic resources (Sarang et al., 2024; Leroy et al., 2016). Crossbred cows can also perform in warm regions when provided with shade, ventilation, clean water, appropriate feeding and cooling measures. Heat-stress management is important for maintaining livestock productivity (Renaudeau et al., 2012). Neither all crossbreds are unsuitable for hot climates nor all indigenous cows perform well under every condition; genetics and management both matter.

Beyond milk yield: The importance of fertility and animal health

Fertility is essential because cows must conceive and calve regularly to sustain milk production. Delayed conception, repeat breeding and long calving intervals reduce lifetime output and raise costs. Poor nutrition, heat stress, reproductive disorders and infections may contribute. Repeated illness or lameness can also lead to treatment expenses and early removal. Breeding programmes should balance milk yield with fertility, health and productive lifespan.

Are indigenous cows always better than crossbred cows?

There is no single answer for every farm. Farmers with reliable fodder, balanced feed, suitable housing and veterinary services may manage high-producing crossbreds successfully. Those with limited resources may find locally adapted animals easier to maintain. Indigenous breeds also have value beyond current milk yield because they conserve genetic variation that may support future breeding and adaptation (Sarang et al., 2024; Leroy et al., 2016). However, it is not correct to assume that every indigenous cow is more profitable than every crossbred cow. Productivity in both groups depends on genetics, selection, nutrition and management.

Why is planned breeding important?

Crossbreeding needs a clear objective; mating an indigenous cow with an exotic bull does not guarantee superior offspring. Identify priority traits such as milk production, fertility, heat tolerance, disease resistance, longevity and maintenance cost. Select breeding animals using reliable performance information and obtain semen from selected bulls through authorised services. No single exotic inheritance level suits every region. The choice should reflect climate, feed, health challenges and management capacity. Records of milk yield, calving, conception and illness help identify suitable animals.

What should farmers consider before choosing a cow?

Before buying a cow or choosing a breeding method, farmers should ask:

- Is green and dry fodder available throughout the year?
- Can the farm provide balanced feed and clean drinking water?
- Are shade and ventilation available during summer?
- Is veterinary assistance accessible when needed?
- Are reliable milk-yield, calving and health records available?
- Will expected milk income cover feed, labour, breeding and treatment costs?

The animal's age, lactation stage, previous calvings and health history also influence its value. Where possible, consult a veterinarian or livestock specialist before purchase. Reliable records are more useful than general claims about breed superiority. The most suitable cow is one that remains healthy, productive and economical under the farm's conditions.

The way forward

India needs breeding programmes that improve milk production while maintaining health, fertility and adaptation. Crossbreeding and selection within indigenous breeds can both contribute when matched to local needs. Veterinarians, breeders and extension workers can guide farmers on breeding, feeding, heat-stress management, reproductive care and record keeping.

Summary

Crossbreeding can improve milk production, but it is not best for every farm. Success depends on breed combination, climate, feeding, health care and management. Higher yield alone does not guarantee profit; fertility, longevity and maintenance costs also affect lifetime performance. Farmers should select animals according to local resources, not breed names or advertised yield. Planned breeding, proper care and regular records support healthy, productive cattle and sustainable dairy farming.

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