

Cross-breeding experiments with cattle in the Madras Presidency (South India)*

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Introduction. It is difficult to state when exactly cross-breeding as such was started in this Presidency. The European military, officials and settlers including missionaries have no doubt been pioneers in trying to bring breeds from Europe in order to evolve better milk breeds in this Presidency. The Livestock Section of the Agricultural Department, however, did not start the experiment with cross-breeding until early 1923 when 32 half-bred cows were acquired from the Military Dairy Farm at Bangalore. The object was to evolve a cross-bred herd which would give better yield than the indigenous breeds like the Ongole and Sind, so as to solve the growing demand for milk in the cities.

Material. There were two herds maintained at the Livestock Research Station, Hosur for this experiment. One herd called the Bangalore herd named after the place from where the foundation stock was acquired. With this herd, Ayrshire bulls were used for producing halfbreds and these half-breds were mated to produce various generations, but it would be mentioned that perhaps owing to difficulties with regard to number of animals available and funds for purchasing them, breeding from the point of view of pure genetical science was not possible always. It should be borne in mind that this is a point which is not widely known to people who are not actually working with cattle. The other herd called the Coimbatore herd, again named after the place of origin of the foundation stock. These are really grades consisting of various proportions of bloods.

Most of the experiment was done at the Livestock Research Station, Hosur which is about 28 miles from Bangalore, about the same altitude of 3000 ft. above sea-level and having that equitable climate experienced on similar elevations in the tropics. The herds were maintained under ideal conditions from all points of view. There was always a Veterinary Assistant Surgeon who was available on the spot. The calves, except the first generation calves born to indigenous cows, were weaned as in the case of European cattle and hand-fed. In the method of hand-feeding, all possible care was taken but there is always the difficulty about the humane factor especially when dealing with untrained and illiterate cattlemen. It is just likely that some of the deaths among calves may have been caused by this factor.

In the case of adult stock, irregular breeders and poor milkers were eliminated from the herd and bulls were used for work. Large number of bull calves were however sold away so as to minimise the cost of maintenance of the herds.

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Discussion. Colour:—As the foundation stock was purchased from Bangalore it was not possible to note the colour of the parents in all cases. The following diagrammatic explanation is given in the actual known cases:—

Ayrshire Sind.

<i>Sire.</i>		<i>Dam.</i>
(1) Red and white	X F. I. Light brown.	Fawn and white
(2) Red and white	X F. I. Dark brown with or without star.	Red.
(3) Red and white	X F. I. Red and white.	Roan

Ayrshire Montgomery.

(1) Red and white	X F. I. Red with white star.	L. Red and face and chest white.
(2) Red and white	X F. I. Black with white patches.	Red
(3) Red and white	X F. I. Red.	Fawn.
(4) Red and white	X F. I. Brown with white star.	Red.

Second Generation.**Ayrshire Sind.**

<i>Sire.</i>		<i>Dam.</i>
(1) Brindle and white	X Red with white belly.	Brindle and white.
(2) Brindle and white	X Red.	Dark brown.
(3) Black	X Light Red	Red and white
(4) Dark red	X Dark brown & white.	Dark brown.
(5) Dark brown	X Red.	Red & white.
(6) Dark red	X Red & white.	Red & white.
(7) Dark red	X Red with white patches on chest.	Fawn & black.

Ayrshires Sahiwal.

White with black ears and eyes	X Brown	Brown.
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Ayrshire Sind Sahiwal.

(1) White with black ears and eyes	X White with brown ears.	Black and white.
(2) White with black ears & eyes.	X	Red and white
(3) White with black ears and eyes	X Black and white.	Dark brown.

Third Generation.		
Ayrshire Sind.		
(1) Red	X Light red or Red and white	Light red.
(2) Red	X Red.	Red and white.
(3) Red	X Red.	Red.
(4) Black	X Dark Red.	Brown.
(5) Red	X Light red & white patches.	Brindle & white.
Ayrshire Sind Sahiwal F. 3.		
(1) White with black ears and eyes.	X Red.	Dark brown & white
(2) Black and white	X Red.	Dark brown.
Fourth Generation.		
Ayrshire Sind.		
(1) Red and white	X Black & white.	Dark Red.
Ayrshire Sind Sahiwal.		
(1) Black	X Red.	Brown.

As the number available are so few and there is the difficulty of not being sure whether the nomenclature with regard to shades of colour used is constant, the colour factor has not been worked out on Mendelian lines. It is, however, apparent, that the colour factor is inherited in the Mendelian fashion.

Humps. The 'Bos Indicus' cow has a prominent hump and when it is crossed with European cattle the hump disappears but traces are seen in some of the third and fourth generations in the half-breds. In the case of grades when back crossing with the Sind is adopted as in the case of $\frac{1}{4}$ or $\frac{1}{8}$, the humps soon appear.

Coat. The coat of indigenous breeds is generally very short and the skin fairly tight, but the half-breds and grades which do not resemble the indigenous breed, as a rule have thick coat and the skin more loose.

Udder. The shape and capaciousness of the bag and the placing of the teats in the case of Indian cows are not ideal. In the case of Sind, the shape of the udder and placing of the teats are much better, but in the older animals there is a tendency for the former to be pendulous. In almost all the crosses, however, the formation of the udder is more after types possessed by the European breeds.

Milk Yield. Much has already been said by workers in other parts of the country and abroad but remarks made here will be confined to the data on hand.

The milk yield in the first generation is invariably higher than the average yield for the indigenous breed, but it is not known how the yield compares with the herd from which the bull was purchased. Lack of information on this point slightly mitigates the accuracy of the data. As a rule,

however, one can generalise and say that in the case of F₁ they are robust (due to heterosis) and thrive under Indian conditions and give appreciably high milk yield. In the case of further generations, not strictly filial crosses, there are large numbers of animals with various faults as conformation and general weakness and a tendency to be stunted in size. As regards milk inheritance however, conclusions cannot be definite as the number involved are small. However, some of the animals have given large quantities of milk which goes to show that in the half-bred herd where the proportion of blood which is thought to be equal may not be true to facts.

In the case of grades those animals with high proportion of indigenous blood have a tendency to be robust and there is the difficulty of recognising the differences between $\frac{1}{8}$ Sind-grade and pure Sind which is to be expected.

Fat in Milk. It will be seen from the data that the fat percentage of all crossbred animals is generally above 4. 'Bos Indicus' generally gives above 4 per cent fat while all the European breeds do not tend to give a high percentage. It would therefore appear from the data on hand that the factor for fat inheritance is dominant.

Stamina and Resistance to disease. The first cross bulls and bullocks are generally robust and halfbreds and grades which have no defects seem to stand up to Indian conditions. There are a number of such animals working both here and on the hills in the Presidency. It is just likely that the nature of the skin and coat of crossbreds are not favourable to them under tropical conditions. As a rule however, the crosses as a whole cannot be expected to compete with Indian breeds on the plains under semi-starvation conditions and intense heat. Compared with the Indian breeds, greater care is essential for successful management of crossbred animals.

Data have been obtained to show how the crossbred stock fare under ideal conditions with regard to resistance to disease. As the numbers and stock of crosses under consideration are few, no definite conclusions can be drawn from the point of view of resistance to disease. The losses however, among crossbreds are somewhat higher.

Summary. The history and the nature of the crossbreeding experiments in the Madras Presidency have been explained. Inheritance of colour, hump, shape of udder and placing of teats, milk yield, fat and stamina and resistance to disease have been discussed.

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Reference. Littlewood R. W., Captain, Crossbreeding for Milk, *Tropical Agriculturist* Vol. X No. 4 pages 80 to 82.

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