

Group IV

AMRIT MAHAL

Origin

Amrit Mahal literally means the department of milk. Originally the rulers of Mysore State had started an establishment of cattle collected from the prevalent types of cattle within the area for the supply of milk and milk products to the palace; simultaneously the bullocks from this establishment were utilized for the movement of army equipage. The bullocks were regularly classified as gun bullocks, pack bullocks, plow bullocks, etc. They attracted great attention during the nineteenth century on account of their power of endurance and the speed with which they could move army equipment. It is claimed that they could maneuver a march of 100 miles in 2½ days.

Littlewood (1936), quoting an army officer who accompanied an army expedition to Afghanistan in 1842, says: "No draft cattle in the army were so efficient as the 230 (Mysore) bullocks which accompanied the troops to Afghanistan. It was entirely due to the superiority of these cattle that no part of the equipment was required to be abandoned when the troops were returning to India over the almost impracticable roads through the Tirah mountains. These cattle were frequently upwards of sixteen hours in yoke".

Kristnasamiengar and Pease (1912) mention that cattle of Amrit Mahal establishment originally comprised three distinct varieties: Hallikar, Hagalvadi and Chitaldroog. Prior to 1860, it

¹ See Figuree 51 and 52.

seems that these three varieties were maintained separate from each other. In 1860, the whole establishment was liquidated for reasons of economy. By the year 1866, it was realized that an establishment for the supply of cattle was a necessity, and during the year a herd was again re-established. Thus, the foundation cattle from which the Amrit Mahal breed was developed were of the Hallikar and closely related types.

Conditions in the Native Home of the Breed

Location, Topography and Soils

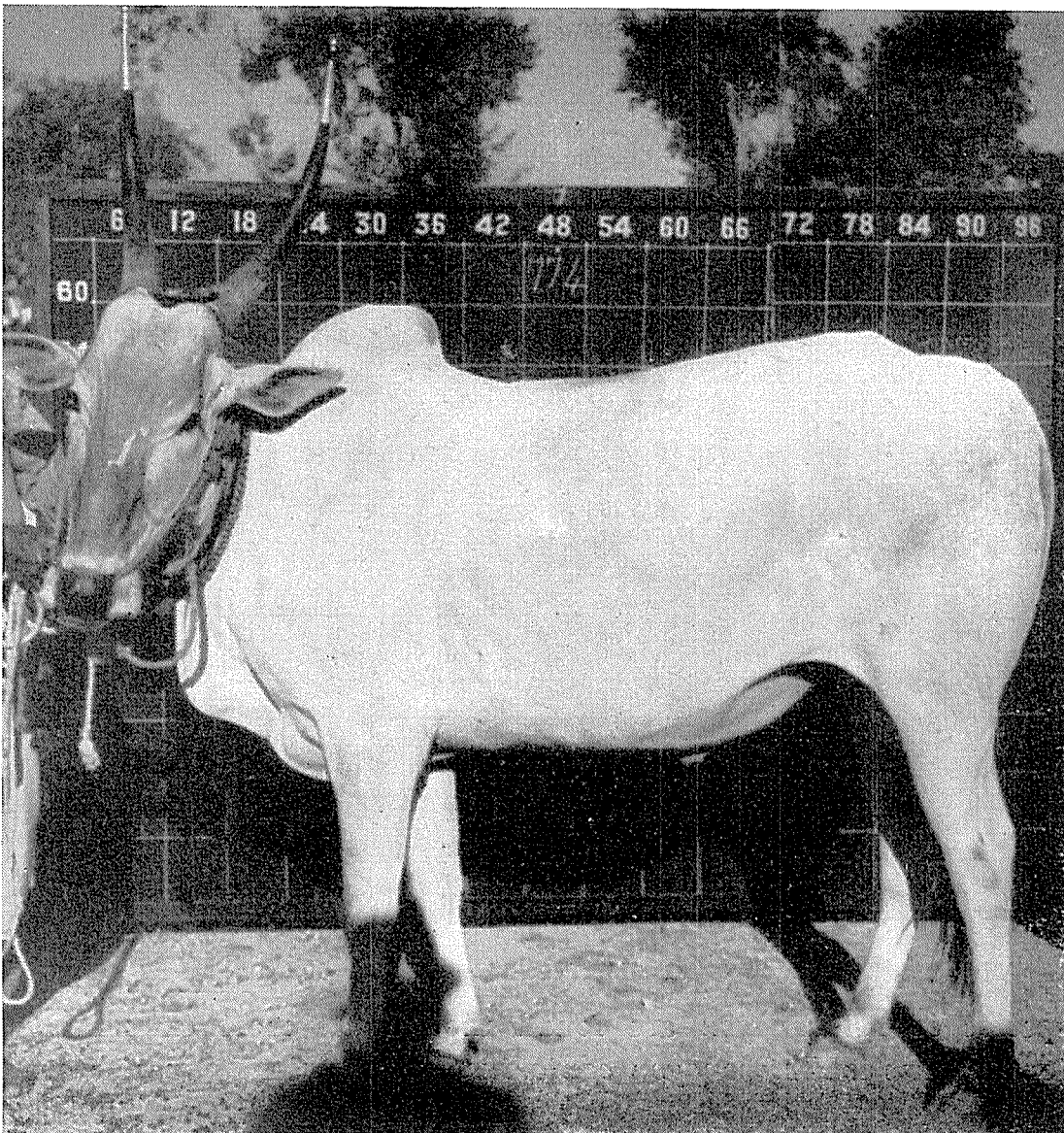
The home of Amrit Mahal cattle is in Mysore State, India. It lies between latitude $11^{\circ}36'$ and $15^{\circ}0'$ north and longitude $74^{\circ}4'$ and $78^{\circ}4'$ east. The area is an undulating tableland much broken up by chains of rocky hills and scored by deep ravines. Its form is that of a triangle with the apex to the south at the point where the western and eastern Ghat ranges of hills converge in the group of Nilgiri hills of the south. The general elevation rises from about 1,800 feet above sea level along the north and south frontiers to about 3,000 feet at the central water-parting area which separates the basin of the River Krishna to the north from that of the River Cauvery to the south. This separates the country into two nearly equal parts, a little north of latitude 13° and as far as longitude 77° , where a transverse line marks the eastern watershed. Mysore is naturally divided into two regions, the hill country called the Malnad on the west and the more open country known as the Maidan on the east.

The level plains of black soil in the north are used for crops such as cotton and millets. The tracts in the south and west, irrigated by channels drawn from rivers, are covered with plantations of sugarcane and fields of rice. The soils in the east are red colored loam or clay loam. It has been observed that these are generally deficient in phosphorus. The stony and wide-spreading pasture grounds in the central parts of the country represent very poor soil with coarse grasses.

Climate

The climate is pleasant and equable throughout the year. Mysore gets rains from both southwest as well as northeast monsoons. The rainy season begins in early June and continues with some intervals in August and September to the middle of November, closing with heavy rains of the northwest monsoon. These later rains are very useful for pastures. Then the cold season begins, which is dry and lasts until the end of February. The hot season then sets in and increases in intensity to the end of May with occasional relief owing to thunderstorms.

FIGURE 52. An Amrit Mahal bullock. This breed is famous for its great powers of endurance.



The temperature distribution for Mysore and Chitaldroog during the months of January, May, July and November set forth in Table 71, is characteristic. Climatological observations for this area are summarized in Table 72.

Table 71. Temperature Distribution for Mysore and Chitaldroog

PLACE	JANUARY		MAY		JULY		NOVEMBER	
	Mean °F.	Diurnal range	Mean °F.	Diurnal range	Mean °F.	Diurnal range	Mean °F.	Diurnal range
Mysore	72.5	24.5	80.9	22.6	75.0	15.9	73.3	18.4
Chitaldroog	73.5	22.9	82.7	22.9	75.3	13.6	73.5	18.0

Table 72. Climatological Observations of Mysore

MEASURE OF CLIMATE	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Mean maximum temp. °F.	80.8	86.2	91.1	93.5	91.7	84.9	82.2	82.0	82.3	82.1	79.8	78.9
Mean minimum temp. °F.	57.5	60.2	64.8	69.4	69.2	66.9	66.0	65.8	65.6	65.2	62.2	58.5
Humidity, per cent at 0800 hrs. I.S.T.	79.0	71.0	63.0	70.0	74.0	81.0	84.0	85.0	85.0	82.0	79.0	79.0
Rainfall, inches	0.26	0.17	0.50	1.33	4.36	2.89	4.18	5.38	6.98	5.90	2.94	0.48

Source: Indian Meteorological Department, Government of India, New Delhi.

Vegetation

Depending upon soil and water facilities, various crops are grown. In the black cotton soil in the northern area, cotton, millets, sorghum and oilseeds are extensively grown. In the south and the west sugarcane is produced. Rice is also grown in the tract. In the small gardens irrigated by tank waters, coconut and areca palms are cultivated. On the eastern side *Eleusine coracana*, millets and other dry-farming crops are grown.

Different parts of Mysore have pasture areas which are green during different seasons, depending upon the rainfall. Many species of *Andropogon* are found though the most extensively found grass is *Heteropogon contortus*. Some *Aristida* species are also encountered. In well-drained rice soils *Cynodon dactylon* is

preponderant. Varieties of sorghum and *Eleusine coracana* are specially grown as fodder by well-to-do farmers. Pulses such as *Dolichos biflorus*, *Cajanus cajan* and *Cicer arietinum* are grown and partly utilized for cattle feeding. Oilseed cakes of groundnut, sesamum and cottonseed, are extensively utilized for feeding bullocks and milking animals.

Management Practices

As is the usual practice in other parts of the country, calves are not artificially weaned; bull calves, in particular, are allowed to take all the milk from their dams, calves of cows which are very poor milkers are sometimes given extra quantities of milk. When the calves are 3 months old they are allowed to go to the grazing areas and begin to subsist partially on pasture. They are usually weaned when they are about 5 or 6 months old.

Amrit Mahal cattle are owned by well-to-do cultivators and large breeders who maintain herds in the vicinity of hills where ample grazing is available. These breeders sell their calves when they are about 1 to 1½ years old to cultivators. These cultivators, who usually own only a few cattle, rear these calves for the next 2 or 3 years and after training them for yoke, sell most of them at the cattle fairs. Their main purpose is to utilize the by-products of the farm, get manure, and meet the requirements of their own draft needs and sell any surplus stock.

The cattle of the state herds and also herds of large breeders are kept in the open all the time. The only protection from rain and sun they receive is from the trees. This weeds out any weaklings automatically. In these herds, the bull calves are castrated when they are about 18 months old, which is earlier than is customary in the village areas. Castration is usually done in the cold season.

Physical Characteristics of the Breed

The coloring of Amrit Mahal cattle is usually some shade of gray varying from almost white to nearly black, and in some cases white-gray markings of a definite pattern are present on

the face and dewlap. The muzzle, feet and tail switch are usually black, but in older animals the color looks lighter.

The most striking characteristic of these cattle is the formation of the head and horns. The head is well-shaped, long and tapering towards the muzzle. The forehead bulges out slightly and is narrow and furrowed in the middle. The horns emerge from the top of the poll, fairly close together in an upward and backward direction, and terminate in sharp points which are usually black. In old animals the long sharp points approximate each other and may even interlace to some extent. The eyes look bloodshot. The ears are small and taper to a point, being carried in a horizontal position. They are yellow inside.

The dewlap is thin and does not extend very far. The sheath and navel flap are very small and close to the body. The hump is well-developed and shapely in the bulls, rising to a height of about 8 inches. The average height of this breed behind the hump is 50 to 52 inches. The body is compact and muscular with well-formed shoulders and hindquarters. The neck is strong and fairly long. The back is level, with broad loins and level rump. Legs are of medium length and well-proportioned. The fetlocks are short and the hooves are hard, close together and small. The skin is thin, mellow and jet black in color, with short glossy hair.

Functional Characteristics of the Breed

As the cattle are maintained in the pasture areas without any restrictions and handling, they show a very impatient, wild and unruly disposition. They are at times dangerous, particularly to strangers. They need patience and care in training; hard treatment makes them stubborn. Once they are well trained they are extremely fine bullocks, particularly for quick transportation. They are observed to have great endurance. The working life of these bullocks is usually 7 to 8 years.

Heifers are usually bred from the age of 24 to 30 months. In their native tract there are said to be three different periods of the year when they come in heat; during the months of April and May when early spring showers bring forth abundance of pasturage, between October and December when the pasture is at its best in the area, and from January to February when the

cattle are fed on the refuse of the threshing floors; but definite data on the occurrence of oestrus and intervening periods are lacking.

Bulls are not put to service till they are about 4 years of age but after that they are in active service for 6 to 7 years: they are quick breeders. In the Amrit Mahal herds, bull calves are castrated when they are about 18 months old, but in the villages they are castrated much later, when they are about 4 years of age. Well-trained pairs of bullocks will carry ordinary loads of $\frac{3}{4}$ to 1 ton at the rate of 3 to 4 miles per hour. They are known to keep going with such loads for a period of 8 to 10 hours without rest (McIsaac, 1941).

The cows are very poor milkers, though more recently some attention has been paid to milking these animals systematically. At the Mysore State Cattle Breeding Station at Ajjampur, where the cows are maintained on pastures with very little concentrated feed, the cows yield 6 to 9 pounds of milk per day after feeding their calves. At the Mysore Palace Dairy Farm, 20 cows yielded from 9 to 27 pounds of milk per day in addition to that taken by the calf. An average of 14 records gives an average lactation yield of 2,210 pounds of milk exclusive of that consumed by calves. The average calving interval is estimated to be about 600 days (McIsaac, 1941-42; Sastri, 1943).

Performance in Other Areas

Amrit Mahal cattle, being primarily draft animals, have spread to other nearby areas wherever there was good demand for draft. In the southern districts of Bombay State, Amrit Mahals are bred to some extent, but it must be noted that the variety principally bred in this area is the Hallikar.

Sources of Breeding Stock and Information Regarding the Breed

For further information it is possible to apply to:

1. Animal Husbandry Commissioner to the Government of India, New Delhi, India;
2. Director of the Veterinary and Animal Husbandry Department, Mysore State, Mysore, India.

HALLIKAR

Origin

Ware (1942) mentions that the origin of most of the so-called South India breeds centers around the Hallikar breed of Mysore State¹. Kristnasamiengar and Pease (1912), from a study of historical records, state that between 1572 and 1600 A. D. a state herd establishment consisted of Hallikar cows imported from the then existing State of Vijayanagar. This very herd was later transferred to the rulers of Mysore State and was eventually known as Amrit Mahal.

Conditions in the Native Home of the Breed

Location, Topography and Soils

Hallikar cattle are bred mainly in the Tumkur, Hassan and Mysore districts of Mysore State. Apart from this area, they are also bred in the Dharwar district of Bombay State where they are known as Amrit Mahal on account of their originating from the Amrit Mahal herds of the state establishment. There is also an isolated collection of these in the Amrabad subdivision in the southern portion of Hyderabad State. Littlewood (1936) states that the chief centers where Hallikars are extensively found are Nagmangal, Kunigal, and Gubbi subdivision of Mysore State.

The country where the Hallikars are bred is undulating with an average altitude of 2,500 feet above sea level. On this western side the area approaches the precipitous hilly ranges of the Western Ghats. This hilly area is known locally as Malnad, while towards the east the country is at a slightly lower level and is a plain but with undulation known as Maidan. The principal rivers which run through the areas are the Cauvery, the Hemavati and their tributaries. It is observed that the southern part of this territory resembles in scenic effects the richest park scenery in England.

¹ See Figures 53 and 54.

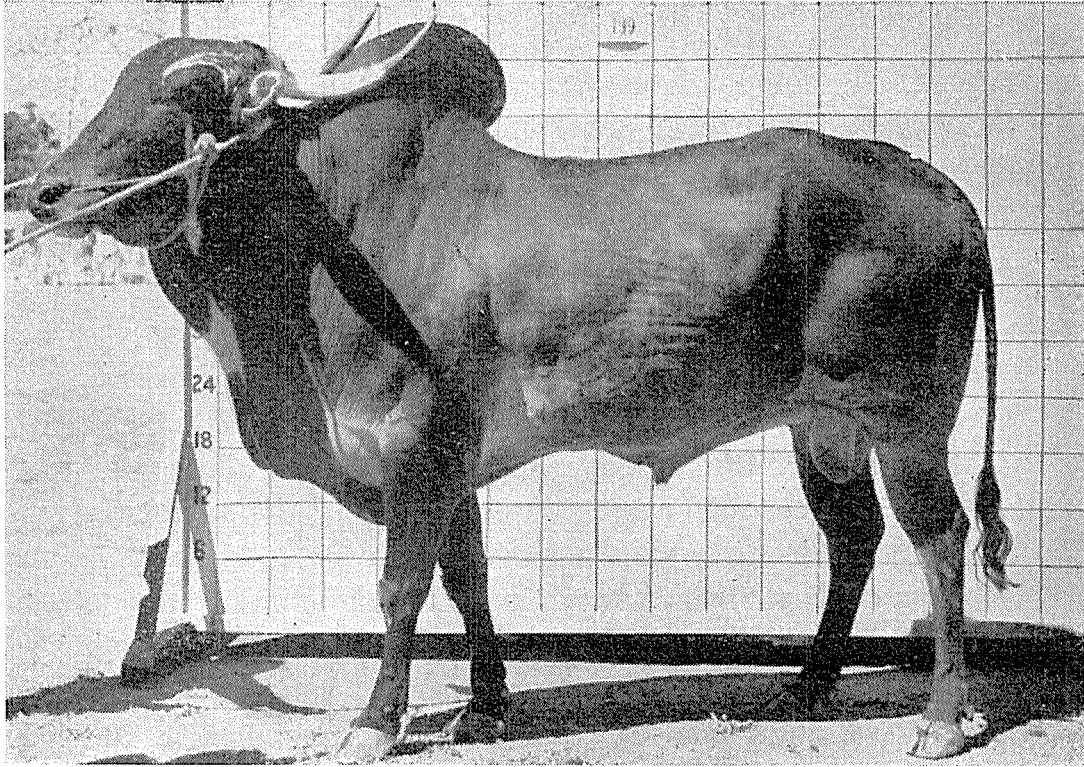
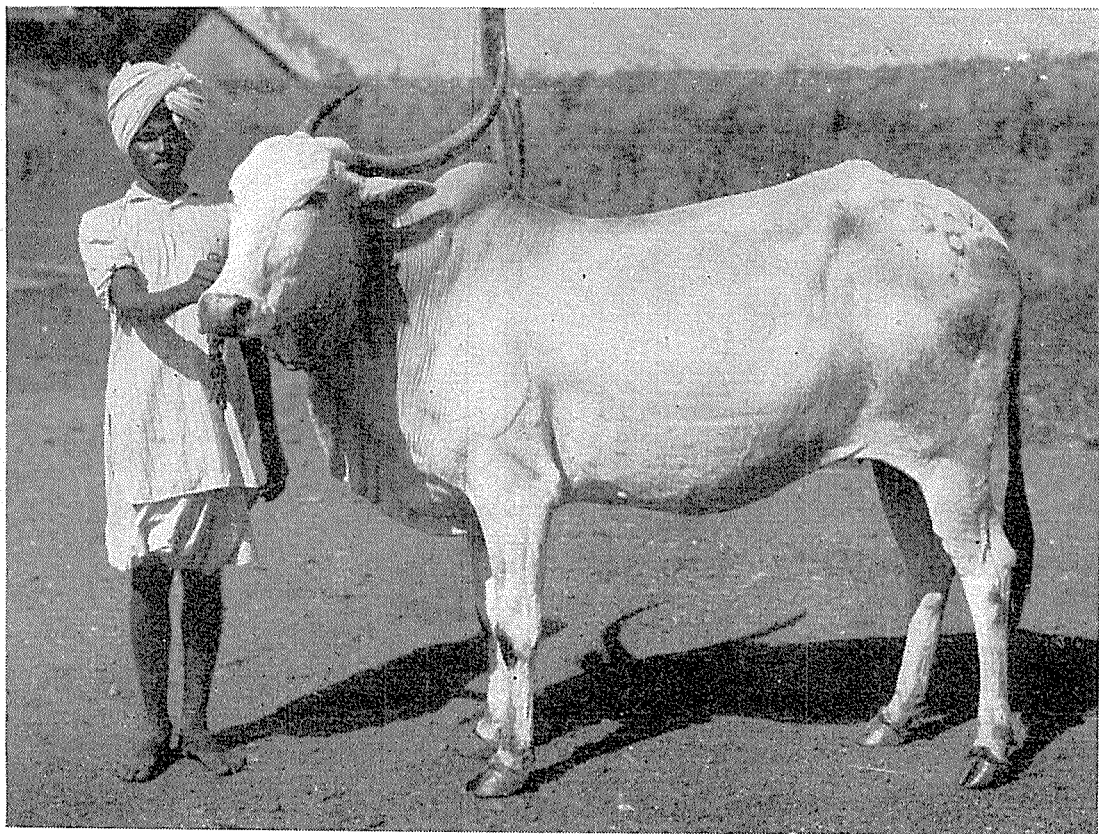


FIGURE 53. Hallikar cattle are bred chiefly in the Tumkur, Hassan and Mysore districts of Mysore State. Their head and horns are characteristic. The cows are said to be poor milkers. Above: a Hallikar bull. Below: a Hallikar cow.



In the west and south there are extensive pasture areas while the east is intensely cultivated. The soil in the depressions of the undulations is composed of rich red sedimentary deposits while on the grass covered hills the soil is red laterite. There are also extensive tracts with gravelly sandy soil, particularly on the tops of the rising grounds. It is observed that most of the soils in the east are deficient in nitrogen.

Climate

The climate of the area is equable and temperatures are moderate. The high elevation and the greenness of the surface among the hills contribute to moderate the temperatures. The heat during the months of March and April is much modified by sea breezes from the western coast and by light fogs in the mornings and evenings. During the southwest monsoon from May to August the rainfall, though not heavy, is a continuous drizzle which is good for vegetation. The area also gets rain from the northeast monsoon during the months of September to November, the greatest precipitation being in the month of October. Climatological data based on averages for 10 years for the area are summarized in Table 73.

Table 73. Climatological Data for the Hallikar Tract

MEASURE OF CLIMATE	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Mean maximum temp. °F. . . .	84.0	88.8	93.5	94.7	91.8	84.5	82.4	83.2	84.2	84.3	82.4	81.8
Mean minimum temp. °F. . . .	60.2	63.6	67.4	70.2	69.7	68.1	67.1	66.7	66.5	67.8	64.4	60.4
Humidity per cent at 0800 hrs. I.S.T. . . .	72.0	68.0	68.0	73.0	75.0	80.0	81.0	81.0	81.0	82.0	78.0	75.0
Rainfall, inches	0.13	0.22	0.34	2.34	5.18	2.93	2.63	3.27	4.93	6.46	2.55	0.37

Source: Indian Meteorological Department, Government of India, New Delhi.

Raman and Satkopan (1948) have estimated evaporation for Hassan (Mysore State) in India calculated from other meteorological factors. These are summarized in Table 74.

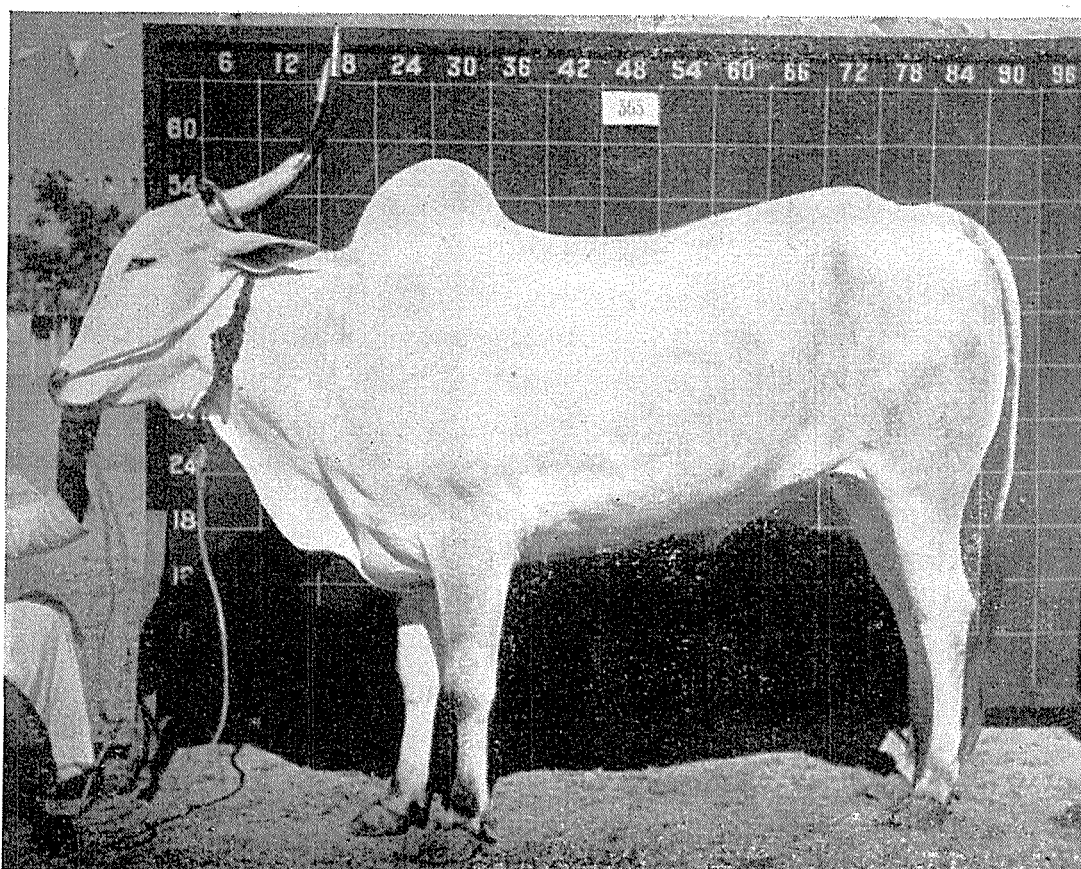


FIGURE 54. A Hallikar bullock. The animals of this breed are known as excellent draft cattle.

Table 74. Evaporation in Hassan, Mysore State

MEASURE OF CLIMATE	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Barometric pressure reduced to 32 °F.	26.85	26.83	26.80	26.76	26.73	26.67	26.67	26.70	26.73	26.77	26.80	26.84
Mean wind velocity in miles per hour	1.59	1.59	1.72	2.08	2.70	3.56	3.49	3.13	2.51	1.72	1.53	1.59
Vapour pressure in inches of mercury	0.450	0.521	0.607	0.673	0.704	0.638	0.619	0.615	0.608	0.613	0.539	0.470
Humidity, per cent	55.0	69.0	65.0	72.0	78.0	83.0	86.0	85.0	83.0	79.0	73.0	71.0
Mean monthly rainfall, in inches	0.07	0.17	0.33	2.01	4.69	4.01	5.40	3.66	4.27	6.67	3.38	0.67
Mean monthly evaporation, in inches	4.50	3.98	6.29	5.19	6.42	3.27	2.60	2.64	2.61	3.16	3.57	3.60

Calculated from other Meteorological Factors from Scientific Notes Vol. VI, No. 61
India Meteorological Department.

Vegetation

Depending upon the soil and the availability of irrigation facilities, various crops are grown in the tract. The principal crop in the hilly area is rice which, though of an inferior quality, grows most luxuriantly in the long winding valleys and the terraced fields on the sides of the hills. Various kinds of pulses such as *Cicer arietinum*, *Cajanus cajan* and *Dolichos biflorus* and oilseeds such as sesamum and castor, are also grown. In areas where irrigation facilities are available, sugarcane, plantains and other garden crops are grown. In the hilly area towards the western side, coffee is extensively cultivated.

Pasture areas are preserved by the government for the grazing of the cattle. *Heteropogon contortus* is the dominant variety of grass in the pastures. In lands which receive an ample supply of manure, *Cynodon dactylon* is commonly found and highly relished by the cattle. Occasionally, crops such as sorghum and *Eleusine coracana* mixed with *Dolichos biflorus* are grown as fodder crops.

Management Practices

The breed is bred by both professional breeders and cultivators. Each village has a few families who have been breeding the Hallikar type of cattle for generations. These families maintain their own stud bulls and charge a small fee for service. It is said that certain families have become famous all over the state and cows are taken 60 to 100 miles to the bulls kept by such persons.

On account of the extensive demand for Hallikar bullocks, breeders pay attention to the feeding and rearing of male calves. The cows are rarely milked. Those cows which show some tendency to yield larger quantities of milk are milked only once daily, usually during the morning, and the calves are allowed to go with the mothers to the pasture, thus they are kept nursed throughout the day.

Physical Characteristics of the Breed

Hallikar cattle are medium-sized, compact and muscular in appearance. The difference between cows and bulls in size and build is not so well marked as in other breeds, for the cows have

a muscular and masculine appearance but with a smaller hump and finer horns. The head and horns of these cattle are a notable characteristic of the breed.

The forehead is prominent giving a slight bulgy appearance and is furrowed in the middle. The face is long and tapers towards the muzzle, which is usually black in color. Horns emerge near each other from the top of the poll and are carried backwards each in a straight line for nearly half their length and then with a gentle and graceful sweep bend forwards usually lightly reclining inwards towards their points, which are usually black tipped and sharp. When the animal is feeding with its head downwards the horns almost touch the neck in front of the hump. Olver (1938) states that similar horns are typical of a wide range of South Indian cattle and indicate a distinct basic type which must have existed in Mysore or the surrounding territory for a long time. Eyes are small, clear and intelligent and in some cases bloodshot. Ears are small, tapering to a point and are carried firmly in a horizontal position.

The neck is long, thin for the size of the cattle, and sinewy. The dewlap is thin and moderately developed, the hump moderately developed and in the bulls around 8 inches in height. The sheath is very small and close to the body. Forequarters are well developed and the legs are strong and set apart giving good chest development. Hooves are strong, small, tightly set and black. The back is straight and strong. In a variety of Hallikar known as Gajamavu, which is found at Karadhalli in the Nagmangal subdivision, the back is particularly long and there is usually a premium paid to the breeders for the breeding stock from the area.

The skin is fine and elastic with a coat of short, glossy hair. The tail is fine with a black switch which reaches a little below the hocks.

Hallikar cattle are gray to dark gray with deep shadings on the fore and hind quarters. Frequently there are light gray markings on the face, dewlap and under the body. Kristnamiengar and Pease (1912) give some physical measurements which are presented in Table 75 on the next page.

Table 75. Average Measurements of Hallikar Cattle

MEASUREMENTS	Male	Female
Height at shoulders, in inches	53-56	47.0
Length from poll to buttock, in inches	77-80	68.0
Length of horn, in inches	10-17	17.0
Length of ear, in inches	9-11	8.5
Girth of chest, in inches	70-80	60.0
Length of neck, in inches	17-19	16.0

Functional Characteristics of the Breed

The Hallikar is one of the best all-round draft types that is available in southern India. It is strong, spirited and quick. Thirty to forty miles a day on rough road is a common day's work. In the field it is a fast and yet steady worker, being useful for all types of cultivation. Males are castrated when they are 3 to 4 years old and then gradually broken to yoke. Prior to this period, living in a semi-wild state, they are extremely unruly and vicious. It requires several months of kind treatment and patient training to develop them into fine bullocks.

The cows are usually poor milkers. Reports from the Live-stock Research Station, Hosur Cattle Farm, (Madras - 1943-44), show that 69 cows averaged 3.5 pounds of overall daily yield, after allowing milk for the calves.

Provided that the heifer is well-fed, she is bred first when she is about 30 months old. Otherwise, heifers which are not so well cared for usually are bred from when they are 5 years old. The bulls are usually not used for service until they are 4 years old. They are used in a herd for 9 to 10 years and then castrated.

Performance in Other Areas

The breed has spread into Dharwar district, the adjoining area of Bombay State. It is mainly used for draft purposes. Bombay State has a Government farm in the Dharwar district for the production of breeding stock (Anonymous, 1926 - e).

Sources of Breeding Stock and Information Regarding the Breed

It is estimated that there are about 1,794,000 cattle of the Hallikar breed. In Mysore State there are some 22 cattle markets annually held where up to 50,000 cattle are put up for sale. The three most important ones are held at Dodbellapur in January, Harihar in February and Chickbellapur in March (Anonymous, 1946).

Further information on the breed may be had from the:

1. Director of Animal Husbandry, Mysore State, Mysore;
2. Livestock Expert to the Government of Bombay, Poona;
3. Animal Husbandry Commissioner to the Government of India, New Delhi.

KANGAYAM

Origin

Kangayam cattle¹ conform largely to the Southern Indian Mysore type, though there is evidence of the blood of the gray-white Ongole cattle in their composition (Phillips, 1944). Possibly this mixture has given the breed its larger size in comparison with other cattle of the Mysore type. This breed, in its native area, is also known by other names of Kanganad and Kongu though the name Kangayam is well-known. These cattle are bred in the southern and southeastern area of the Coimbatore district of Madras State in India. It is observed that there are two varieties of Kangayam cattle, one small and the other large. The smaller variety is found to be more numerous in the Kangayam, Dharampuram, Udmalpet, Pollachi, Paddadam and Erode subdivisions, while the larger variety is found in the areas of Karur, Aravakurchi and Dindigul subdivisions. The breed is found in its pure form in the herds of some large breeders, notably the Pattagar of Palayakottai, who is supposed to have one of the best herds of the breed in the country (Pattabhiram, 1943).

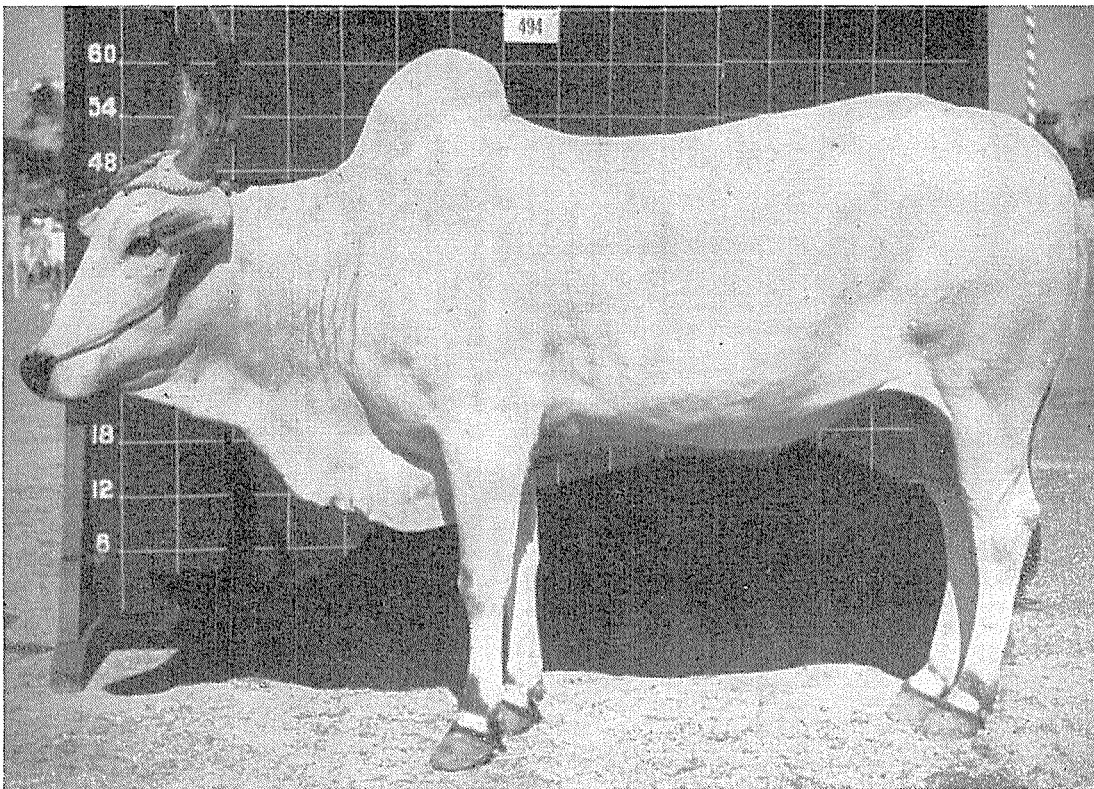
¹ See Figures 55 and 56.

Conditions in the Native Home of the Breed

Location, Topography and Soils

The Kangayam breeding tract is in the district of Coimbatore of Madras State. This area lies approximately between latitude $10^{\circ}15'$ and $11^{\circ}18'$ north and longitude $76^{\circ}39'$ and $78^{\circ}14'$ east. The area is on a plateau with undulations with an average altitude of about 1,300 feet above sea level. On the west and south it is bounded by the high hills of Nilgiri and Anaimalai. The River Cauvery is on the eastern side of the area while the Rivers Bhavani and Noyil run through the tract. The tract is also well-known for the large number of wells. The soil is red loam full of canker and gravel. These are usually shallow soils but are known to retain sufficient moisture for pasture production. The soil has a calcareous substrata which is reported to be favorable to pasture production.

FIGURE 55. A Kangayam bullock. These cattle are medium in size but active and powerful draft animals.



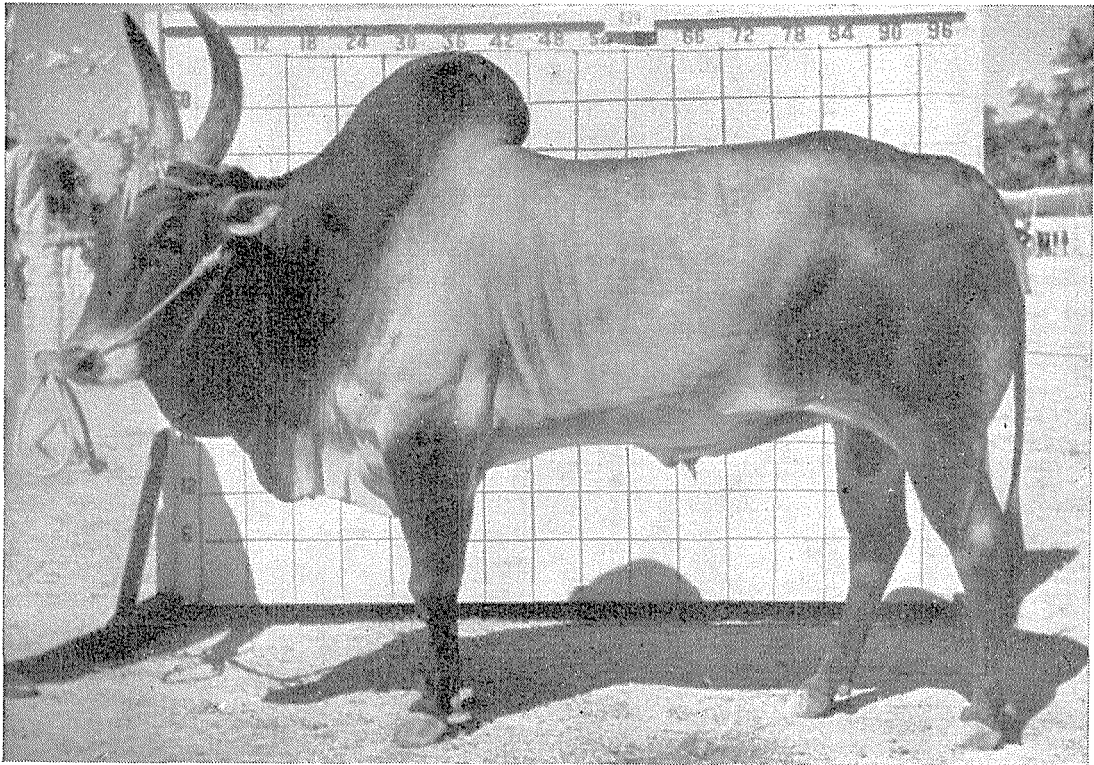
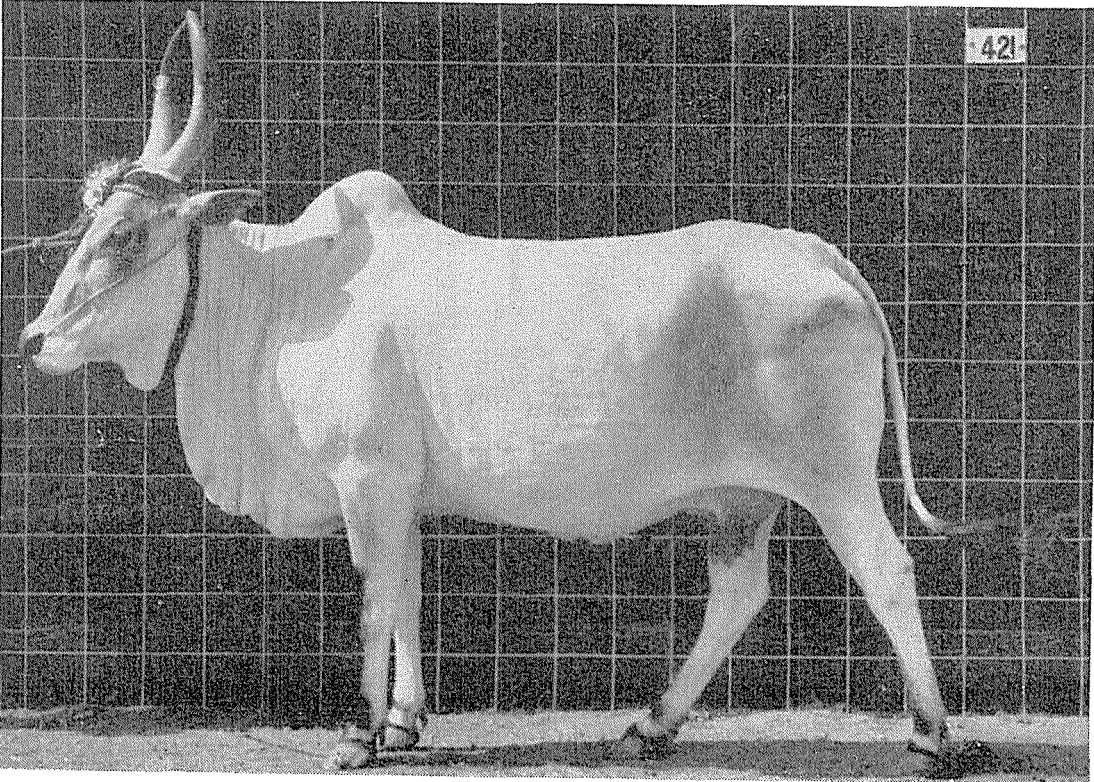


FIGURE 56. Kangayam cattle, bred in the Coimbatore district of Madras State, are very similar to Mysore type cattle. The cows are poor milkers. Above: a Kangayam bull. Below: a Kangayam cow.



Climate

The area has a very equable climate. Winters are mild and summers are not excessively warm. The rainfall, though uncertain, is spread throughout the year. There are rains during the hot weather, also from the southwest monsoon in the months of July to September, and from what is known as the northeast monsoon during the months of October and November. This spread of rain gives, if timely, abundant moisture for growth of pastures.

Average climatological data for Coimbatore are summarized in Table 76. Evaporation data calculated by Raman and Satkohan, (1948), from other meteorological factors are also included.

Table 76. Climatological Data for Coimbatore

MEASURE OF CLIMATE	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Mean maximum temp. °F.	56.4	91.5	96.1	97.3	94.8	89.3	87.5	88.1	89.1	88.0	85.8	84.7
Mean minimum temp. °F.	64.3	66.0	69.9	73.5	73.5	71.8	70.9	70.9	70.8	70.6	68.9	65.7
Humidity, per cent at 0800 hours	82.0	80.0	78.0	79.0	80.0	80.0	81.0	83.0	83.0	84.0	83.0	82.0
Rainfall, in inches	0.59	0.32	0.48	1.44	2.36	1.66	1.46	1.13	1.51	6.41	3.75	1.18
Barometric pressure reduced to 32 °F.	28.62	28.60	28.55	28.49	28.45	28.41	28.42	28.45	28.47	28.51	28.56	28.60
Mean wind velocity, in miles per hour	1.54	1.48	1.48	1.54	2.22	3.58	3.83	3.33	2.78	1.48	1.30	1.48
Humidity, per cent	75.0	69.0	66.0	70.0	74.0	73.0	74.0	76.0	77.0	80.0	82.0	79.0
Vapor pressure, in inches of mercury	0.605	0.608	0.651	0.764	0.796	0.739	0.713	0.726	0.726	0.759	0.712	0.639
Mean monthly evaporation, in inches	3.63	4.40	5.98	5.70	5.67	6.63	6.48	5.55	4.68	3.38	2.58	3.04

Source: Indian Meteorological Department, Government of India, New Delhi, and Indian Meteorological Department. Scientific Notes, Vol. VI, No. 61. Average for 10 years.

Vegetation

The most prominent grass in all the pastures is *Pennisetum cenchroides*. As a matter of fact the seeds are regularly collected and pastures are seeded with this grass. The main unirrigated

cereal crop in the area is *Pennisetum typhoideum*. The grains are utilized for human consumption while the stalk is utilized for cattle fodder. There is a particular variety of *Pennisetum typhoideum* which has a branching habit and the leafy growth is also more abundant and the stalk is comparatively thin. It matures within a few months. The plant therefore gives very good quality straw and an abundance of leafy material. Along with this, *Cajanus indicus* or *Dolichos biflorus* is usually grown, so that the straw becomes very valuable. Wherever irrigation facilities are available, sorghum is sown thickly and then part of the plants used as fodder crop while the rest is allowed to produce grain. *Eleusine coracana* and *Paspalum scrobiculatum* are also extensively grown. Groundnuts, cotton, and sugarcane are also grown in parts of the area where water facilities are available. In the pasture areas wild *Acacia alba* is extensively grown. The trees provide shade, as well as the pods which are utilized as cattle feed.

Management Practices

Every breeder, whether small or large, keeps his cattle in the open in fenced fields. In Southern Coimbatore, though the cattle are not protected against sun and rain, they are protected against strong winds by screens of bamboo mats formed into a pen. Large breeders have the advantage of fencing their large pasture grounds into paddocks, thus maintaining the cattle of different sex and age groups separately. This gives the large breeders some control over the breeding of their cattle. These large breeders also take care that cows which are not regular breeders are disposed of. Such discarded cows are usually purchased by small breeders who use them for work. Occasionally they are bred. Use of cows for work and owning of small private pastures which are fenced are peculiar features of this tract.

The rearing and feeding practices are more or less the same among the large and small breeders. The calf is allowed to suck as much milk as it requires from its mother for the first six weeks. During this period the calf is kept tied up in the farmer's home and not allowed to go to the pasture grounds with its mother. The amount of milk after that period is gradually reduced and the calf is put to green grass and at times this is supplemented

by a gruel made of bean and lentil husks, bran, rice water and ground pods of *Acacia alba*. Male calves are weaned later than female calves.

Young bulls are castrated when they are about 2 to 3 years of age. They are also broken for light work at this age. Kangayam breeders always sell their bullocks well-trained (Littlewood, 1936).

Physical Characteristics of the Breed

Both varieties of this breed are strong and active, with compact bodies and short, stout legs with strong hooves. Horns in the smaller variety spread apart nearly straight, with a slight curve backwards. In the larger variety, the horns are much longer, curve outwards and backwards and almost complete a circle at the point where they approach the tips. The head is of moderate size with only slightly prominent forehead. The head is more proportionate to the body with a straighter profile than in most of the Mysore type cattle. The ears are small, erect and pointed. The eyes are dark and prominent with black rings around them.

The neck is short and thick. The back is short, broad and level. The body is compact, with well sprung ribs. The quarters are slightly drooping. The dewlap is thin and extends only up to the sternum. The sheath is well tucked up to the body. The hump in the bulls, though well-developed, is firm. The hair is fine and short and the skin is dark in pigment and fine in texture. The tail is of moderate length with a black switch reaching well below the hocks.

Kangayam color is usually gray or white; the males generally are gray with black or very dark gray coloring on the head, neck, hump and quarters. In the cows, the prevailing color is white and gray with deep markings on the knees, and just above the fetlocks on all four legs. Benjamin and Raju (1949) observe that the coat color in Kangayam cattle changes. The calves are light or dark brown with gray or white on the inside of the thighs, ears and forelegs, and occasionally with gray or white rings on the pasterns and fetlocks. At two years the heifer turns gray or dark gray and retains this color but with advancing age after maturity the color fades and becomes white. Male calves become dark gray or iron gray with black shading over the head,

neck, hump, dewlap, fore and hind quarters. With maturity the black shading becomes intensified. Castrated males, however, show fading of the color.

Average data on certain body measurements are summarized in Table 77.

Table 77. Average Measurements of Kangayam Cattle

MEASURE	At one year	At two years	Mature
Females			
Weight, in pounds	340 (20)	560 (20)	850 (20)
Length from shoulder point to pin bones, in inches	42 (20)	51 (20)	56 (20)
Height at withers, in inches	42 (20)	46 (20)	48 (20)
Depth of chest, in inches			
Width of hips, in inches	12 (20)	16 (20)	18 (20)
Heart girth, in inches	50 (20)	57 (20)	67 (20)

MEASURE	At one year	At two years	Mature Bull	Mature Bullock
Males				
Weight, in pounds	360 (20)	570 (20)	1 200 (8)	1 150 (16)
Length from shoulder point to pin bones, in inches	42 (20)	48 (20)	63 (8)	64 (16)
Height at withers, in inches	43 (20)	48 (20)	54 (8)	56 (16)
Depth of chest, in inches				
Width of hips, in inches	13 (20)	16 (20)	20 (8)	21 (16)
Heart girth, in inches	51 (20)	60 (20)	76 (8)	73 (16)

Numbers sampled are shown in brackets.

Functional Characteristics of the Breed

Kangayam cattle are of moderate size, active and powerful, and are highly prized draft animals. The cows are generally poor milkers though it has been observed that occasionally cows of fair producing abilities are encountered.

At the Livestock Research Station, Hosur Cattle Farm, Madras State, a herd of Kangayam cattle is maintained. The cows are milked to ascertain their producing capacity. The average yield of the foundation cows was 1,493 pounds with a daily

average of 6.2 pounds. The average yield of farm-bred animals is 1,615 pounds with a daily average of 6.6 pounds in 244 days, the average dry period being 184 days. The average production of 17 best cows was 2,627 pounds. The herd average of 187 cows was over 1,800 pounds during the year 1943-44. Another sample of 68 cows of the Kangayam breed averaged 1,910 pounds of milk in 289 days with 151 days dry. Superior production of the Kangayam is reported to be as much as 4,709 pounds.

The average weight at birth is 42 pounds for heifer calves and 46 pounds for bull calves. Heifers calve at the average age of about 39 months. Kangayam cattle are observed to be fairly regular breeders with a calving interval of about 15 months. Bhattacharya *et al.* (1950) report from a study of 590 calvings amongst 143 Kangayam cows that the average gestation period for male births was 288.21 days, while for female births it was 285.35 days. From the same study it was shown that for every 100 females born, the number of males born was 102.75. It has been observed that the largest concentration of calvings occur during the period January to March, and July to October. Well-fed male calves are ready for service when they are about 2 years of age. They are quick breeders and are observed to be in good breeding condition for a period of 10 years.

As draft animals they are trained for work when they are about 2 to 3 years of age. Usually the bullocks receive good training and as such they are very willing and active workers. They are used for all agricultural work including plowing, cultivation, drawing water from the wells, and carting. A pair of bullocks will carry a load of one ton in an iron-tired cart at the rate of about 4 miles per hour. Good specimens have carried such loads on a hard road for 38 miles in 8 hours at a stretch. Usually the bullocks are worked for 8 to 10 hours a day. Kangayam bullocks are observed to be very hardy and will actively work for a period of 10 to 12 years.

Performance in Other Areas

A large percentage of the bullocks produced in the tract are sold to the cultivators of black cotton soil of the south where there are a large number of wells for irrigation purposes. Cultivators of these areas (districts of Madura, Tinnevely, etc.) buy

these bullocks at high prices as they are observed to be good workers and last longer than other cattle prevalent in the area.

Kangayam cattle are also exported to Ceylon for draft purposes.

Sources of Breeding Stock and Information Regarding the Breed

It is estimated that there are over a million head of Kangayam cattle in the native area of the breed. There are two important cattle fairs held annually at Avanashit Titupur where Kangayam cattle are sold. The Pattagar of Palayakottai is the largest cattle breeder in the area and the family has been breeding Kangayams for over 100 years: he has supplied nucleus breeding stock to the Governments of Madras and Ceylon in the past. More recently a Kangayam Cattle Breeders' Association has been established at Erode, Coimbatore district, Madras State. Since 1949, the Government of India has initiated herd book registration of Kangayam cattle.

For further information, the Animal Husbandry Commissioner to the Government of India, New Delhi, may be approached.

KHILLARI

Origin

There is every reason to believe that the Khillari breed¹, with its several varieties, owes its origin to the Hallikar breed of cattle from Mysore State. Unlike some of the other breeds of cattle in India, it does not take its name from a geographical area. Khillar means a herd of cattle, while Khillari means belonging to Khillar, hence the herdsman is known as Khillari; in the Satpura range of hills, he is known as Thillari. There is a special tribe of professional cattle breeders in this region known as Thillaris [Anonymous, 1926 (d)].

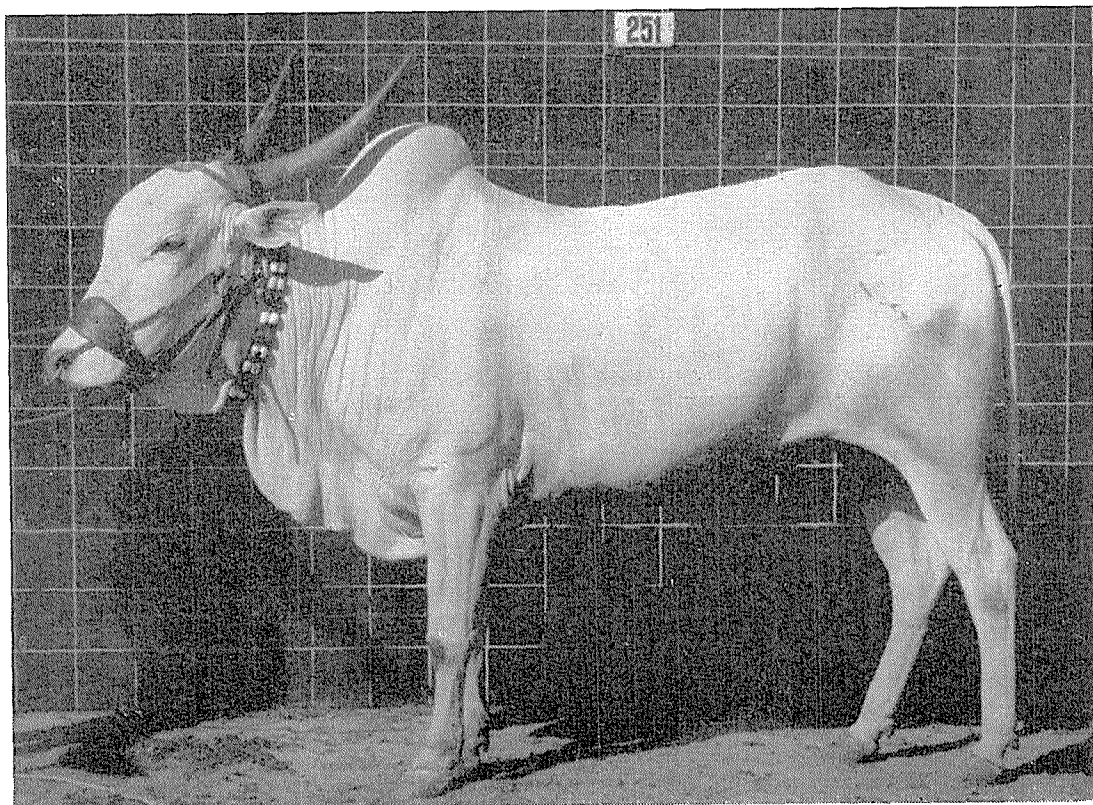
There are four principal types of Khillaris prevalent in the different regions of Bombay State. The variety Hanam Khillar, or sometimes known as Atpadi Mahal (the word Mahal shows

¹ See Figures 57 and 58.

strong similarity to Amrit Mahal cattle of Mysore State), is prevalent in the southern Mahratta States of Bombay. In the districts of Sholapur and Satara and the adjoining areas the variety known as Mhaswad Khillari is prevalent. In the area of the Satpura range of hills comprising the West Khandesh district the variety prevalent is known as Tapi Khillari or Thillari. A variety of more recent origin known as Nakali Khillari — Nakali means “imitation” — is found in the adjacent areas of these regions.

In the southern Mahratta States and the districts of Sholapur and Satara the Khillaris are bred by cultivators. In these regions the size of the herd is small, usually not more than one or two cows. In the Satpura ranges the Khillaris are bred by professional breeders known as Thillaris. These breeders produce bulls and bullocks for which there is always a very good demand. Besides their extensive use in their home tracts they are used in the adjacent districts of Poona, Ahmednagar, Nasik and Bijapur. Khillaris are classified as “medium fast draft.”

FIGURE 57. A Khillari bullock. This breed is well-known for producing powerful draft animals.



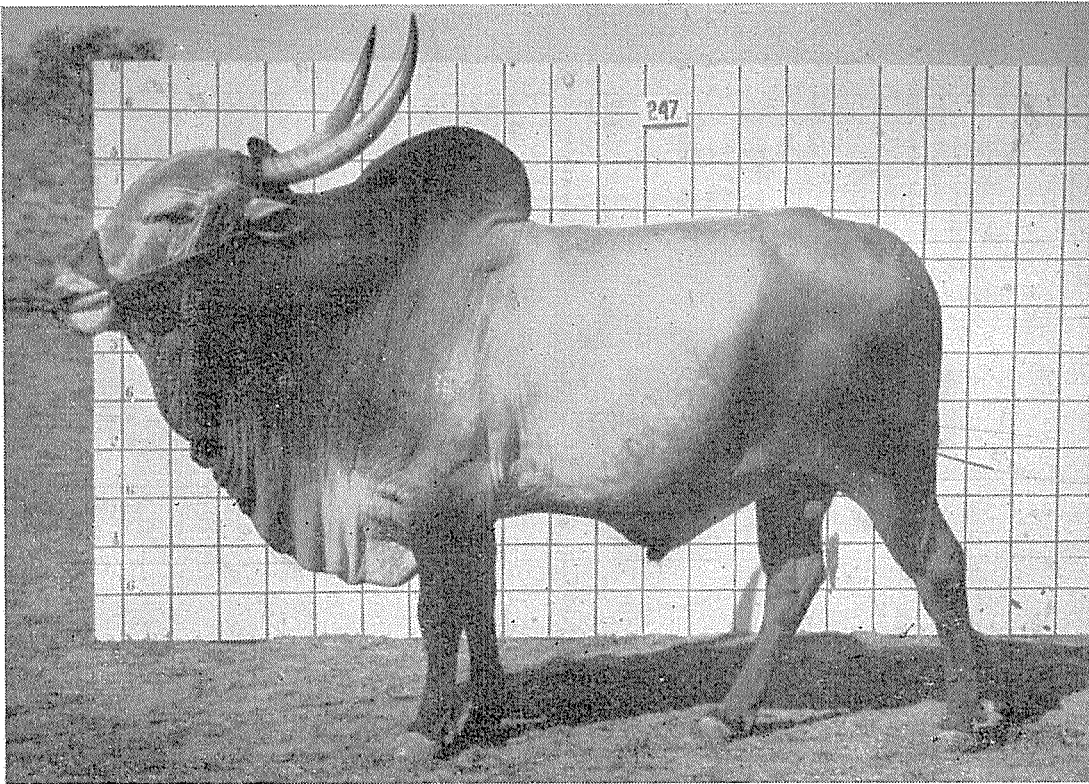
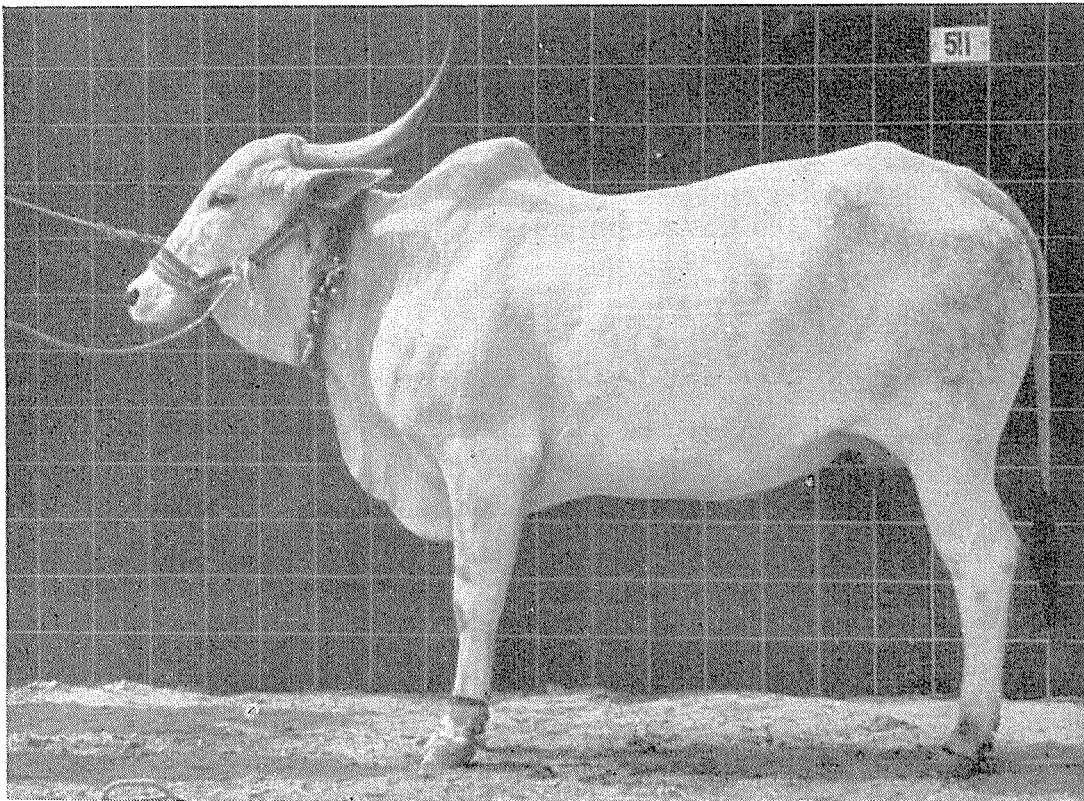


FIGURE 58. The Khillari, similar to the Amrit Mahal and the Hallikar, is found in the south of Bombay State. The type is not uniform: there is some fusion from the gray-white cattle of the north. The cows are poor milkers. Above: a Khillari bull. Below: a Khillari cow.



Conditions in the Native Home of the Breed

Location, Topography and Soils

Khillari cattle are spread over the Deccan plateau of Bombay State, particularly in the areas covered by the southern Mahratta States of Aundh, Jat, Sangli, Miraj and adjoining areas: Sholapur and Satara districts; the Satpura range of Khandesh district. This area lies approximately between longitude 73°25' and 76°24' east and latitude 16° and 22°2' north. The whole of the the area is plateau land with an average elevation of 1,700 to 2,000 feet above sea level. On the northern side it is hilly, while in other parts it is undulating with small hillocks spread here and there. The uplands are gently rounded swellings of trap overgrown with stunted grasses. The geological formation is trap covered in most places with a shallow layer of very light soil and in parts with a good depth of rich loam having medium black to deep black hue and suited for cotton. Light soils sometimes mixed with gravel are good enough for growing millets, groundnuts and sorghum.

Climate

The climate on the average is mild and dry, and though summer temperatures during the day may go high, nights are pleasant and cool. The rainy season extends from June to October and is normally pleasant. Winters are very mild, minimum temperature rarely going below 55°F. The average climatological data for the area are given in Table 78.

Table 78. Climatological Data for the Khillar Area

MEASURE OF CLIMATE	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Mean maximum temp. °F. . . .	87.4	92.0	99.6	104.1	104.5	95.0	89.4	88.8	88.6	90.6	87.7	85.5
Mean minimum temp. °F. . . .	59.1	62.5	69.1	75.3	76.7	73.6	72.0	70.9	70.8	68.7	62.8	58.3
Mean daily relative humidity, per cent	48.0	58.0	83.0	36.0	47.0	68.0	75.0	76.0	77.0	61.0	53.0	50.0
Rainfall, in inch.	0.15	0.00	0.19	0.44	1.03	4.68	4.32	4.87	7.98	3.23	1.05	0.45

Average of 10 years supplied by the Indian Meteorological Department, Government of India, New Delhi, India.

Vegetation

Sorghum vulgare and *Pennisetum typhoideum* are extensively grown in the area covered by the breed. The grains are used for human consumption, while the stovers are utilized as cattle feed. Maize and certain varieties of sorghum are grown for fodder purposes as well: they are used as green fodder at flowering or after flowering. Maize is fed from May to August and sorghum is fed from April to July and also late sown sorghum is fed during the months of December and January.

Besides these crops, cotton, groundnut (*Arachis hypogaea*), pulses such as *Cajanus cajan*, *Cicer arietinum*, are extensively grown and by-products from these crops are used for cattle feeding. During recent years loppings of the fodder tree, *Hardwickia binata*, have been extensively used for feeding cattle. Also loppings of *Sesbania aegyptiaca*, particularly in the watershed of the River Krishna, are used throughout the year. The following are some of the important grasses which are available as green or semi-green from August to November: *Dichanthium (Andropogon) annulatum*, *Dichanthium caricosum*, *Sehima (Ischaemum) nervosum*, *Chloris virgata*, *Heteropogon contortus*, *Eragrostis bifaria*, *Ischaemum pilosum* and *Sehima (Ischaemum) sulcatum*. *Aristida* and *Indigofera cordifolia* are also extensively found in the area (Kumar, 1952).

Management Practices

The importance of the breed lies in the quick draft power it furnishes. Most of the area where this breed flourishes has scanty rainfall, and famines are quite frequent. Under such circumstances quick agricultural operations, such as plowing and sowing are of prime importance to make maximum use of rainfall.

Because of this, breeders have paid great attention to the feeding and care of bull calves and also to the selection of bulls for mating. When a bull calf is born his dam is not usually milked. The bull calf is allowed to have all the milk it can take until the cow goes dry. If a female calf is born then the cow is usually partially milked. Young stock are usually sold to well-to-do cultivators when they are about 1 to 1½ years old. With these cultivators they receive much better feed and attention. Possibly on account of this extra attention, Khillari cattle are observed to

be sexually mature earlier than some of the other breeds in the neighboring localities.

Physical Characteristics of the Breed

The typical Khillari animal is compact and tight skinned, with clean cut features. The whole appearance is like a compact cylinder with stout, strongly set limbs. There is a slight rise in the level of the back towards the pelvis. The ribs are well sprung and give the trunk a barrel shape. The hindquarters are squarely developed and the coup is well-moulded. The gait of the Khillari is quick and spirited.

The Khillaris of the Deccan plateau, the Mhaswad and the Atpadi Mahal types are grayish white in color. The color in the males is deeper over the forequarters and hindquarters, with peculiar gray and white mottled markings on the face. The Tapti Khillari is white with carrotty nose and carrotty hooves. The Nakali Khillari is gray with tawny or brickdust color over the forequarters. Newly born calves have rusty red colored polls, but this color disappears within a couple of months.

The forehead in Khillaris is long and narrow with a gradual convex bulge backwards towards the horns. A distinct groove runs in the center of the forehead from the nasal bridge to the center of the poll. The face is lean and long with smooth, tightly-drawn skin. The nasal bridge is sharp and prominent. The muzzle is frequently mottled in color, a pink muzzle is not liked by some breeders. Eyes are set in elongated fashion and are rather small, though prominent and often a little bulging; thick, wavy skin folds around the eyes give them a dull appearance and is not often liked. Ears are small, pointed and always held sideways. They are on an average 8.2 inches long in females and 9 inches in males, while the average greatest width is 5 inches in females and 4.5 in males. The ears are pale yellow colored inside. Horns are long and pointed and follow the backward curve of the forehead. They are placed close together at the root and grow backwards for half the length and then turn upwards in a smooth bow shape peculiar to this breed. The horns are thick at the base and taper to a fine point. Black colored horns are preferred though pink colored horns are frequently seen, especially in Tapti Khillaris.

The neck is rather short. The dewlap is light with very little fold. The hump in males is firm fleshed and of moderate size. The shoulders are tightly muscled, well set in and merge smoothly with the cylindrical shape of the body. The legs are clean cut, round and straight. The hooves are black with digits closely set. The base of the hoof is small. The barrel is cylindrical. The lines of the back and the belly are observed to be almost parallel. The navel flap, as well as the sheath, is tight and close to the abdomen. Hindquarters are well muscled. The tail is just touching the hock joint. The skin is soft and pliable though tightly drawn over the body. The hairs are fine, short and glossy.

The average measurements of typical Khillari animals are summarized in Table 79.

Table 79. Average Measurements of Khillari Cattle (Ware, 1941)

MEASURE	Maximum	Minimum	Average
Females			
Weight, in pounds	800	700	750.0
Length from shoulder point to pin bones, in inches	49	40	43.8
Height at withers, in inches	51	46	49.0
Depth of chest, in inches			21.4
Width of hips, in inches	20	15	16.0
Heart girth, in inches	77	60	66.0
Males			
Weight, in pounds	1 400	1 000	1 100
Length from shoulder point to pin bones, in inches	58	49	53
Height at withers, in inches	56	51	54
Depth of chest, in inches			26
Width of hips, in inches	21	18	19
Heart girth, in inches	83	74	78

Functional Characteristics of the Breed

Khillari bullocks are highly valued as fast powerful draft cattle, for they can travel miles without showing any signs of fatigue. Female stock, however, produce very little milk: besides nursing calves satisfactorily, they produce very little extra milk.

Heifers, when reared under favorable conditions, attain maturity early and are observed to calve as early as at 30 months. Female calves at birth weigh from 38 to 43 pounds, while male calves weigh from 40 to 45 pounds. Well-fed cows are observed to calve every 14 or 15 months.

Bulls are observed to start their first service when they are about 2 to 2½ years old and are quick breeders. They are known to have an active breeding life of 6 to 10 years.

Bulls are broken for yoke when they are between 2 to 3 years of age and have an average weight of 600 to 800 pounds. Though they are broken for work early they are not castrated till they are 5 to 5½ years old.

The bullocks are very active and willing workers but are apt to be vicious at times. On the average, a pair of bullocks will haul about 1,500 pounds of load in an iron-tired cart at the rate of 3 to 4 miles per hour and will cover within a working day a distance of 25 to 30 miles. It is observed that they are very good for all agricultural operations and perform work for 200 to 300 days in a year at the rate of 8 to 10 hours per day.

Performance in Other Areas

Ceylon

It is only recently that Khillari cattle were exported to the northwestern part of Ceylon, particularly with the intention of improving the draft qualities of the local cattle. So far, no records are available.

Sources of Breeding Stock and Information Regarding the Breed

The total Khillari cattle population is estimated to be 675,000 (Anonymous, 1946). During the last famine, though the total cattle population of the Bombay State went down, it was observed that the population of Khillari had gone up slightly. Khillari cattle can be bought at a number of local fairs in the tract. They are generally held from November to January each year. There are also fairs at Jath, Aundh and Chinchli. Hundreds of animals are also bought for sale at the Mhaswad and Nagoba fairs which are held during the months of November and December.

Recently a Provincial Herd Book has been established for the registration of purebred Khillari cattle in the rural areas.

Further information regarding the breed may be had from the:

1. Livestock Expert to the Government of Bombay, Poona, Bombay State, India;
2. Animal Husbandry Commissioner to the Government of India, New Delhi.