

## DOMESTIC CATTLE AND AUROCHS

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The true domesticated cattle are the descendants of a group of races of *Bos primigenius*, the Urus or Aurochs, as this species is commonly called in Europe. Their economic importance has increased in the course of time as civilization advanced and to-day they are perhaps the most important of all domesticated animals, as producers of meat, milk and hides. It is certain that domestication was undertaken long before 8000 B.C., but nothing is known about its actual beginnings. Many theories have been developed to explain the differences of present-day breeds by deriving them from various types of wild cattle. It is possible also that interspecific crossing has played a part in the development of some of the eastern breeds.

Wild cattle are regarded as belonging to the genus *Bos*, different from the bison (*Bison*), the yak (*Paephus*), the gaur-group (*Bibos*), the Indian buffalo (*Bubalus*), the African buffalo (*Syncerus*) and the Anoa (*Anoa*) of the Sunda archipelago. But these so-called genera are closely related to each other and able to interbreed, producing fertile progeny. Some authors give recognition to this fact by combining all the bovine cattle in one large genus, *Bos*. It is important to realize this in view of the fact that crosses between the species may have influenced the development of domesticated breeds.

The true cattle (*Bos*) are most closely related to the south Asiatic gaur and banteng, from which they appear to have become separated in the course of the upper Pliocene. In the Siwaliks of India a *Bos acutifrons* occurs, which Pilgrim regards as the possible ancestor of the Pleistocene wild cattle, i.e. of both *Bos namadicus* of India and of *Bos primigenius* of Europe. An Asiatic origin of the group is on the whole likely, since the aurochs is either very rare or altogether absent in the Lower Pleistocene of Europe. The aurochs became reasonably frequent in the Great Interglacial, but not abundant until towards the end of the Ice Age. With no ancestral forms known from anywhere in Europe (for the *Leptobos* of the Italian Villafranchian is not ancestral to *Bos*, according to Merla) this increase in the frequency of wild cattle looks very much like an invasion from elsewhere, attempted repeatedly and succeeding finally in the late Pleistocene. By this time, the species had spread as far west as Spain and Morocco and east to China and Siberia. It did not,

however, reach North America. This almost universal distribution of the wild species makes it even more difficult to discover the original centre of domestication.

The external appearance of the aurochs is well known. The last survivor died in a Polish park in 1627, and there are several good descriptions available, including illustrations. The bulls were large, up to 6½ feet at the shoulder, and often equipped with very large horns. The best picture which is available was discovered by the British zoologist Hamilton Smith in an Augsburg shop early in the last century. The picture itself is lost, but a good reproduction exists (see *Oryx*, Vol. I, No. 3, page 118). It must be noted, however, that it does not present the large type of bull which was so common in the Pleistocene and the early Holocene. This type had horns which turn first outward and then forward, with the tip slightly turned upwards. In Europe it is safe to say that rising horns, as shown in the Augsburg picture, are characteristic of weak individuals and possibly of cows.

The colour of the hair coat of the bull was black with a white stripe along the back and white curly hair between the horns; the muzzle was white or greyish. The summer coat was more sleek, especially in the southern races, whilst the winter coat was thick and somewhat curly. This appears to have been the normal coloration in central Europe. Towards the south and west, the line on the back tended to be yellowish or reddish. Other variants show a large diffused saddle of lighter colour, brown or fawn, and it is conceivable that some races normally retained such relatively light colours even in the old bulls. It appears that the cows were mostly brownish-red in colour, occasionally diffused with black, but other cows appear to have had the male colour though with a pronounced brown or fawn saddle that might spread over the sides of the belly. Domesticated cattle showing the wild colours are still to be seen in parts of south west Europe and north Africa, especially in Morocco. The calves of both sexes appear to have been red until about 6 months old.

To-day, the various characters of the aurochs, like horn shape and size, stature and coloration are still to be found in certain domesticated breeds, but they are not all combined in a single breed. If this were so, the aurochs would still be alive. In 1921 the idea occurred to Dr. Heinz Heck, Director of the Munich Zoo, that it might be possible to reconstitute the aurochs by crossing breeds of cattle that exhibit certain characteristics of the wild ancestor. From the genetic point of view, it would appear that many domesticated breeds are mutations with recessive genes,

and that many of the features, such as single-colour, are due to the absence of certain genes which are present in other breeds. If, therefore, one should mix all the available domesticated breeds, there is a chance that eventually a breed would be obtained in which many or most of the genes of the aurochs would be combined in one individual. These, though obviously not exactly identical with the ancestral aurochsen, would at least resemble them closely. Heinz Heck crossed Hungarian and Podolian steppe cattle, Scottish Highland cattle, grey and brown Alpine breeds, piebald Friesians and Corsicans. After 11 years of breeding, the first two specimens turned up, one male and one female, which had the desired characteristics of the aurochs. With these, breeding was continued and surprisingly enough, the "reconstituted" aurochsen continued to breed true to type. No throw-backs occurred at all. The only variation that is to be observed is in the intensity of coloration and the degree of development of the horns, characters which are known to have been variable in the wild ancestor too. In 1951 there were about 40 of these reconstituted aurochsen alive.

Another breeding experiment was carried out by Professor Lutz Heck in the Zoological Gardens, Berlin. Lutz Heck started from material of south-west European origin, namely Spanish fighting cattle, the Camargue breed of the Lower Rhone and Corsican cattle. Since these breeds are more like aurochsen than those used in Munich, a satisfactory result was obtained within a very short time. Unfortunately, the Berlin stock was lost during the war, but some specimens which had been placed in the famous forest of Bialowies in eastern Poland are known to have survived.

It is interesting that together with the physical characteristics, the mental properties of the aurochs re-appeared. The animals are fierce and temperamental, and extremely agile where they were allowed to run wild; and in Bialowies and the Schorfheide near Berlin they became extremely shy. The justification of these experiments undoubtedly lies in the advantage of having live animals which represent the ancestral type with fair accuracy, and thus provide a more convincing picture than any artificial reconstruction can ever do.

It may be noted that there are certain slight differences between the Berlin and Munich breeds. The former, very naturally, appear to resemble the south-west European race and some specimens can be matched almost exactly by French and Spanish cave paintings. The Munich breed is perhaps more characteristic of the aurochs of central Europe; it is more

heavily built and has a tendency to develop a dewlap. The horns of the Berlin breed are almost exactly like those of fossil aurochs though smaller. Those of the Munich stock still betray their derivation from Hungarian steppe and Scottish Highland cattle in the lateral expansion of the horns. In view of the variability of the wild ancestor, however, this matters little, nor is it important that their genetic institution is not precisely known, so long as these specimens are used merely as "living pictures".

*Ed. Note.*—The breeding back experiments referred to above were the subject of an article in *Oryx*, Vol. I, No. 3, by Heinz Heck.