

Anatomical Studies No. 62.

On the Effect of Debudding on Skull Conformation.

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INTRODUCTION.

THE object of this paper is to draw the attention of those interested in animal husbandry to the profound changes occurring in the skull of an ox following the operation of debudding. This is a matter of particular importance to those concerned in the classification of native cattle into types and sub-types, but is to be expected in the light of Curson and Epstein's (1934) comment, namely that in the determination of cattle types "the differences depend mainly on the development of the horns and the situation of the orbit".

The three skulls, numbered 4190, 4076, and 4196, are from steers resulting from an Afrikander-Sanga (Bechuana) cross. The steers in question bore the numbers mentioned; but for museum purposes the skulls are further labelled Path. 15067 A 115, Path. 15069 A 117, and Path. 15068 A 116, respectively. The sire was an Afrikander and the dams are shown in Figs. 10, 11 and 12.

Natural cases of skull variation are seen where some of the criteria specified by Curson and Epstein (1934) do not correspond with the typical conformation, e.g., the polled condition, or variation in the shape of the frontal crest⁽¹⁾. Stewart, in an unpublished paper *The Origin of Domestic Cattle*, refers to "three skulls of cattle of the same breed, the Mysore (Zebu), which showed the three types of frontal crest", namely, markedly convex (e.g. polled cattle), slightly convex (e.g. Shorthorned Zebu), and generally horizontal with a depression of the *Torus frontalis* (e.g. Brachyceros)⁽²⁾. It is true that such variations in conformation are frequently observed, especially in cattle of mixed origin, even if they are so-called *pure-bred*, e.g. Mysore. Obviously it is in such matters that breeders endeavour to bring about uniformity.

⁽¹⁾ Referred to as frontal ridge by Curson and Epstein.

⁽²⁾ Another common form of frontal crest or ridge is the plain horizontal to concave seen in Ankole cattle. These forms were not described in the text by Stewart, but, better still, were drawn, the skull having been viewed from the front.

Actually cross-breeding is the most important *artificial* cause for variation in skull conformation; but of increasing importance is the practice of debudding. In the cases in question caustic potash was employed and the calves were debudded during the first fourteen days of life (letter 34/2 of 18.2.36 from Chief, Division of Agricultural Education and Extension).

The oxen were born at Messina on the following dates:—4190, 27th May, 1930; 4076, 20th April, 1930; and 4196, 5th June, 1930. All were slaughtered on 30th April, 1934, at the Pretoria Abattoir.

DISCUSSION ON SKULLS.

If the skulls of the three oxen are compared with that of a typical Afrikander or Sanga (Bechuana), it is obvious that in general appearance there is a striking resemblance with the *sire*. Characteristics derived from the dam, however, are also evident. It is considered best to tabulate the various features under the headings, general description and detailed description as follows:—

GENERAL DESCRIPTION.

FEATURE TYPICAL AFRIKANDER. (A. 26.)	Ox 4190. (NOT DEBUDED.) See Figs. 1, 2 and 3.	Ox 4076. (DEBUDDING IMPERFECT.) See Figs. 4, 5 and 6.	Ox 4196. (DEBUDDING EFFECTIVE.) See Figs. 7, 8 and 9.
<i>Frontal Surface.</i> 1 ⁽³⁾ General shape	Skull enlarged and narrow (coffin shaped), especially between orbits.	Skull generally long but broad, not only between, but above orbits. As horn growth arrested the cranial portion is less quadrilateral, especially along the left temporal border, where horn is absent.	Skull also in general long but broad. As both horns undeveloped, the temporal borders taper markedly from the caudal part of the orbital rim to the region of the <i>torus frontalis</i> .
2. Margin of orbit	Caudal region of orbital rim prominent.	Prominent.	Prominent.
3. Profile.....	Convex.	Less convex.	Almost straight (flat).
<i>Lateral Surface.</i> 4. Temporal fossa	Deep and curved on both sides.	Deep on both sides and curved, particularly on right side where there is a horn.	Owing to polled condition caudal part is shallow and temporal margin is not curved but horizontal.

⁽³⁾ The numerals and letters used in this study correspond with those employed in Anatomical Study No. 50, which contains a description of the skull of the Afrikander ox A26.

GENERAL DESCRIPTION—(contd.).

FEATURE TYPICAL AFRIKANDER. (A. 26.)	Ox 4190. (NOT DEBUDED.) See Figs. 1, 2 and 3.	Ox 4076. (DEBUDDING IMPERFECT.) See Figs. 4, 5 and 6.	Ox 4196. (DEBUDDING EFFECTIVE.) See Figs. 7, 8 and 9.
5. Horns.....	Well developed, lateral, slender, and oval on cross-section.	Deformed stump on right side only (Brachyceros-like).	Polled.
<i>Basal Surface.</i> Choanae.....	Anterior margin approximately 1 cm. cranial to posterior edge of third molar	Anterior margin immediately caudal to posterior edge of third molar.	Anterior margin approximately 1 cm. cranial to posterior edge of third molar.
<i>Nuchal Surface.</i> 6. General.....	Generally flat, median occipital crest well marked and external occipital protuberance prominent. Occipital condyles widely separated.	These features not so marked. The nuchal surface in general slopes basally towards foramen magnum	Generally flat. Median occipital crest and external occipital protuberance marked, but condyles not so widely spaced.

DETAILED DESCRIPTION.

<i>Frontal Bone.</i> Frontal Surface— (a) Caudal.....	Gently convex towards horn core.	Markedly convex especially on hornless side.	Flat with steep slope towards caudal aspect of temporal fossa.
(b) Cranial.....	Gently convex. No depression.	Gently convex but surface generally irregular.	Generally flat.
(c) Inter-frontal suture	Slight crest along caudal third.	No crest. Cranial third traverses slight longitudinal depression.	No crest. In vicinity of cranial third, the bone is flat.
(d) Elevation limiting (b) caudally and laterally.	Not evident.	Not evident.	Just evident.
(e) Supra-orbital groove	Broad and rounded at base.	Less marked.	As for Ox 4076.
(f) Frontal ridge from front	General line convex <i>Torus frontalis</i> not unduly prominent. Summit horizontal	More convex and <i>Torus</i> more prominent. Slope of hornless side more steep. Summit horizontal.	Not so extensive but more convex and <i>Torus</i> very prominent. Summit rounded.
(g) From back.	Ridge is thick, extensive and marked	Less extensive, especially on left side	Frontal ridge corresponds more or less to <i>Torus</i> , which is dome shaped.

DETAILED DESCRIPTION—(contd.).

FEATURE TYPICAL AFRIKANDER. (A. 26.)	Ox 4190. (NOT DEBUDDED.) See Figs. 1, 2 and 3.	Ox 4076. (DEBUDDING IMPERFECT.) See Figs. 4, 5 and 6.	Ox 4196. (DEBUDDING EFFECTIVE.) See Figs. 7, 8 and 9.
<i>Horn Core</i>	Present on both sides	On right side only.	Entirely absent.
(h) Neck.....	Stalk well marked..	Stalk evident.	—
(i) Base.....	Oval on section.	Through arrested de- velopment about half usual circum- ference. On sec- tion circular.	—
(j) Furrows....	Not discernible as horn sheath not removed.	Not discernible as horn sheath not removed.	—
(k) Orbital arch	Thin and below level of adjacent frontal surface. Lachry- mal edge promin- ent.	As for Ox 4190. Lachrymal edge less prominent.	Thicker and above level of adjoining frontal surface Lachrymal edge indented.
(l) Fronto- lachrymal suture	Direction generally straight and con- vexity of frontal part marked.	Convexity less pro- nounced.	Convexity marked.
(m) Fronto- lachrymo- nasal point.	No opening.	No opening.	No opening.
<i>Nasal Bone.</i> (n) Frontal aspect	Slight concave in its length.	Flat in its length.	Convex in its length.
<i>Premaxilla.</i> (o) Nasal process	Meets nasal bone over distance of 0.5 cm.	Meets nasal bone over distance of 1.5 cm.	Meets nasal bone over distance of 0.75 cm.
<i>Maxilla.</i> (p) Palate.....	Arched and not wide	Arched and wide.	Arched and wide.
<i>Occipital Bone.</i> (q) See 6 of Gen	eral Description.		
<i>Mandible.</i> (r) Posterior edge of ver- tical ramus and ventral bor- der of hori- zontal ramus	Approximately a right angle. A distinct neck below condyle	Greater than a right angle. No evi- dence of neck.	Approximately a right angle and neck distinct.

DISCUSSION.

It is evident from the tabulated information above that cross-breeding produced a type, irrespective of the horns, predominantly Afrikander, e.g. elongated skull with prominent frontal ridge. The Hamitic Longhorn features of the dam are, however, shown in the broad forehead, particularly in Oxen Nos. 4076 and 4196.

Debudding on the other hand so altered the appearance of the two skulls that even animal husbandry officials failed to recognise any similarity in general appearance, No. 4076 being stated to be of *Brachyceros* origin, and 4196 to be of some polled breed.

Skull No. 4076 cannot be identified as *Brachyceros* because of the *lower set* of the right horn, the convex profile, and as mentioned before the elongated skull with the well marked frontal ridge.

Skull No. 4196 has an elongated skull and dome-shaped non-extensive frontal ridge not seen in the polled breeds, *e.g.* Red Poll.

No dorsal vertebrae were available for comparison.

CONCLUSION.

It is thus possible by the operation of debudding to alter the conformation of the skull in such a marked fashion as not to be able to recognise the original type.

ACKNOWLEDGMENT.

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REFERENCE.

- CURSON, H. H., AND EPSTEIN, H. (1934). Anatomical Studies No. 50: A Comparison of Hamitic Longhorn, West African Shorthorn and Afri-kander cattle particularly with regard to the skull. *Onderstepoort J. Vet. Sc. Anim. Ind.*, Vol. 3 (2), Oct.

Figures (all reduced to $\frac{1}{2}$ of original).

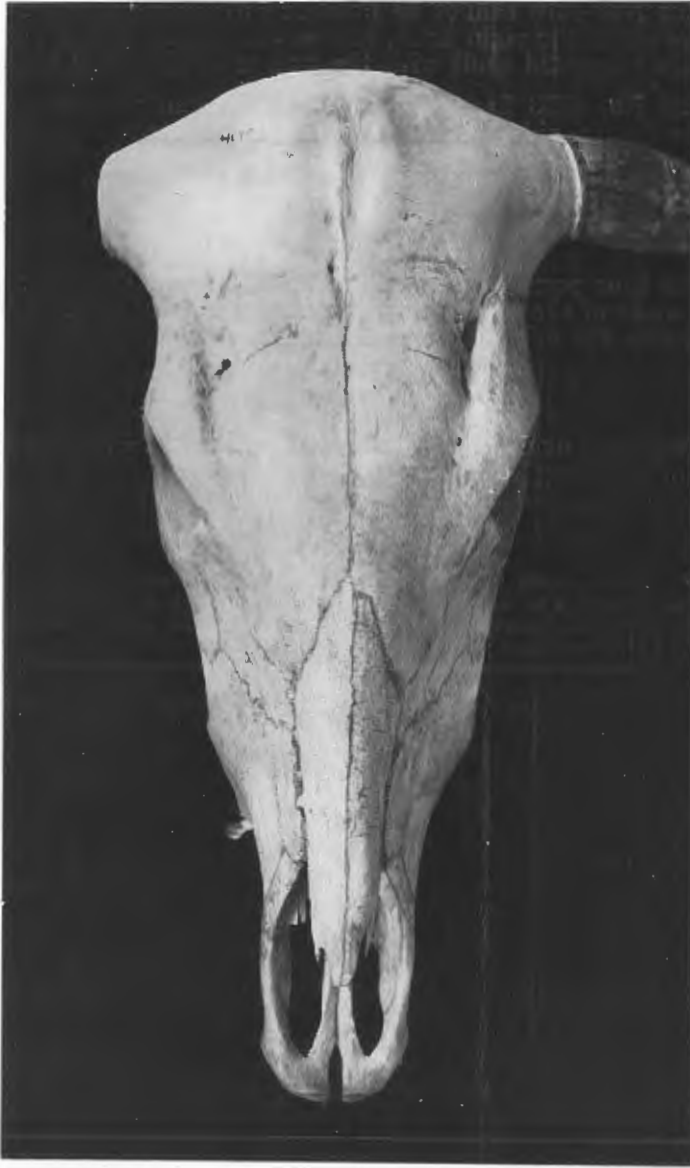


FIG. 1.—*Afrikander-Sanga* ox 4190. Skull, front view. Not debudded but right horn sawn off for photograph. Note elongated skull and convex frontal ridge.



FIG. 2.—Ox 4190 Observe convex profile on lateral view.



FIG. 3.—Ox 4190. Nuchal aspect. Note well-marked frontal ridge and distinct neck of horn core.



FIG. 4.—Ox 4076 of *Afrikander-Sanga* cross. Skull, front view. Debudding imperfect on right side and the horn resembles that of *Brachyceros*. Note elongated skull and convex frontal ridge.



FIG. 5.—Ox 4076. Lateral view. See convex profile.

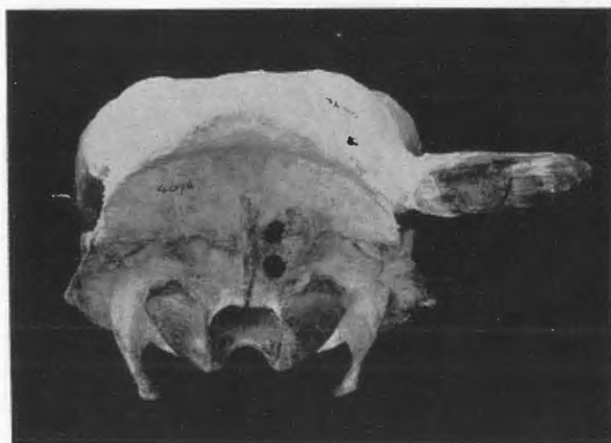


FIG. 6.—Ox 4076. Nuchal view. Note the level from which the horn springs as compared with *Brachyceros*.



FIG. 7.—Ox 4196 of *Afrikander-Sanga* cross. Front view of skull. Debudding perfect. Note elongated skull.



FIG. 8.—Or 4196. Lateral view shows an almost straight profile.



FIG. 9.—Ox 4196. Nuchal aspect shows domeshaped appearance of *Torus frontalis*.



FIG. 10.—Cow 3879, dam of ox 4190 which was born 27.5.30 and slaughtered 30.4.34.



FIG. 11.—Cow 3891, dam of ox 4076 which was born 20.4.30 and slaughtered 30.4.34.



FIG. 12.—Cow 3896, dam of ox 4196 which was born 5.6.30 and slaughtered 30.4.34.