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A NEW HEMOGLOBIN IN CATTLE*)

By

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Three hemoglobin phenotypes explained by two alleles were found by *Cabannes & Serain* (1955). The controlling alleles are now usually called Hb^A and Hb^B (*Bangham* 1957). Homozygous individuals show one component by electrophoresis as the heterozygous animal has two. Hemoglobin A is the slowest migrating. In 1963 *Crockett et al.* reported a third Hb allele which they called Hb^C and whose product had a migration rate intermediate to that of the hemoglobin components A and B.

The present report deals with the finding of a new cattle hemoglobin.

MATERIALS AND METHODS

Heparinized and streptomycin treated blood samples were obtained from 31 African cattle of which 19 were Shuwa-Arab (Zebu-type) and 12 were Muturu (West-African Dwarf Short-horn). The samples used 6 days in travelling but were in good condition by arrival at our laboratory. A sample from an 8 days old Norwegian calf was included for demonstration of foetal Hb.

Hemoglobin types were investigated by use of starch gel electrophoresis. The buffers of *Gahne et al.* (1960) were used. The bridge buffer contained 20.2 g Sigma 7—9, (tris) 2 g EDTA and 1.5 g boric acid per litre, pH = 9.0. This same buffer diluted 1:7 with distilled water was mixed with 10 % starch for prepa-

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ration of gels. Dimensions of tray were 20 cm \times 13 cm \times 0.6 cm. Insertions were made with filterpaper. Voltage output of power supply was 450 volts. Running time was one hour. Staining was done with benzidine.

RESULTS

The new type is shown in Fig. 1 which is a photograph of a stained gel where six samples were examined. These are chosen to show the positions of Hb A, Hb B and Hb F in relation to the new type which we have called D. The Hb D has a slightly slower rate of migration by electrophoresis than Hb A. The D hemoglobin is furthermore characterized in having a second band migrating slightly slower than the D band. This second band we have called D₂. Hemoglobin D was found alone and in combination with Hb A as can be seen in Fig. 1.

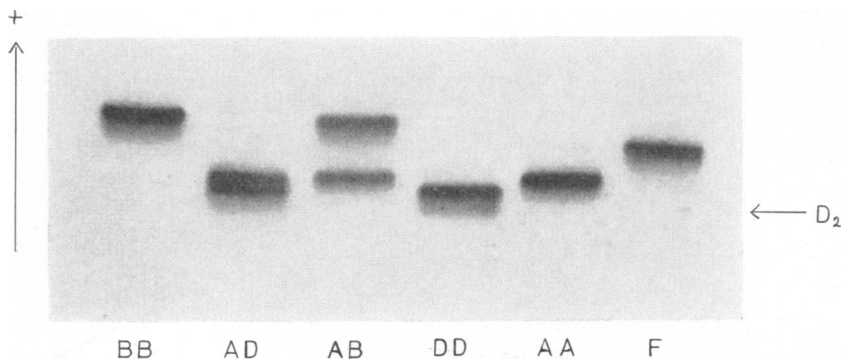


Fig. 1. Photograph of a stained gel showing position of Hb D relative to the hemoglobins A, B and F.

The distribution of Hb phenotypes is shown in Table 1. Hemoglobin D was found alone in two animals of the Muturu breed. In combination with Hb A it occurred in 6 animals. The appearance of bands in the AD phenotype indicates heterozygosity, the

Table 1.

Distribution of Hb phenotypes in some cattle of two African breeds.

Breed	AA	AB	AD	BB	BD	DD	Total
Shuwa-Arab	6	10	—	3	—	—	19
Muturu	4	—	6	—	—	2	12

amount of Hb of each band being approximately half of the hemoglobin amount found when Hb A or Hb D is occurring alone. These results, even if the number of animals investigated is small, indicate and also fit with the occurrence of a fourth Hb allele, *Hb^D* in cattle.

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SUMMARY

A new type of cattle hemoglobin is found in animals of the African Muturu breed. It is called D, has a slower rate of migration than Hb A on starch gels and can be explained by the occurrence of a fourth allele *Hb^D*.

ZUSAMMENFASSUNG

Ein neuer Haemoglobintyp beim Rind.

Ein neuer Typ des Rinderhaemoglobins ist bei Tieren der afrikanischen Muturu-Rasse festgestellt worden. Der Typ hat die Bezeichnung D bekommen. Er wanderte langsamer als Hb A in einem Stärke-Gel, was durch das Auftreten eines vierten Alleles *Hb^D* erklärt werden kann.

SAMMENDRAG

En ny type storfe hemoglobin.

En ny type storfe hemoglobin er påvist hos dyr av den afrikanske Muturu rase. Den er blitt kalt Hb D, har en saktere vandringshastighet enn Hb A på stivelsesgel og kan forklares ved en fjerde allel *Hb^D*.

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