Acta vet. scand. 1970, *11*, 322—323.

Brief Communication

GLUCOSE-6-PHOSPHATE DEHYDROGENASE ACTIVITY AND GLUTATHIONE STABILITY IN FETAL AND ADULT BOVINE ERYTHROCYTES

Previously, we found a substantially higher glucose-6-phosphate dehydrogenase (G6PD) activity and a slightly higher 6-phosphogluconate dehydrogenase (6PGD) activity in bovine fetal erythrocytes than in bovine adult erythrocytes (*Steensgaard* 1968). Now, we have investigated whether these differences in dehydrogenase activities were followed by characteristic differences in glutathione (GSH) stability and glutathione concentration. The results are shown in Table 1, which also gives the results of the same investigations on normal and G6PD deficient human erythrocytes.

Table 1. G6PD-, 6PGD activities, GSH concentrations, and GSH stabilities in erythrocytes from man and cattle.

	G6PD[1]) u/100 ml RBC	6PGD u/100 ml RBC	GSH mg/100 ml RBC	GSH stab. %	Number examined
Adult cows	303.6±11.7	44.1± 1.7	104.8±4.9	64.8±5.1	16
Calve fetuses	703.9±23.4	65.0± 3.8	166.6±7.1	105.1±1.6	10
G6PD def. man	27	163	64	58	1
Normal man	258 ±17	176 ±16	82 ±5.4	99 ±1.9	10

[1]) Average values ± the standard error. One unit (u) is the amount of enzyme causing a turnover of 1 μmol substrate per min.

G6PD and 6PGD activities were determined by the method of *Glock & McLean* (1953) as previously described (*Steensgaard*). The GSH concentration and the GSH stability were estimated as described by *Beutler et al.* (1963) and *Mortensen* (1965), using menadione as oxidant (*Mortensen* 1964) and with addition of glucose to a final concentration of 200 mg per 100 ml. The erythrocytes were incubated 1 hr. at 37°C. The GSH stabilities measured with menadione as oxidant are approximately 10 % higher than when measured with acetylphenylhydrazine, and are expressed as per cent GSH remaining after incubation.

The table indicates that the higher dehydrogenase activities in bovine fetal erythrocytes are associated with a higher gluta-

thione stability and a higher glutathione concentration than in bovine adult erythrocytes. For comparison, the table shows the well established fact that G6PD deficient human erythrocytes have a lower glutathione stability than normal ones (*Beutler* 1965).

Thus, it appears that in cattle, as well as in man, a high activity of glucose-6-phosphate dehydrogenase and of 6-phosphogluconate dehydrogenase in the erythrocytes is accompanied by a high glutathione stability. On the other hand, the table reveals the inexplicable feature that man and cattle, having about the same G6PD activity in the erythrocytes, normally show very different glutathione stabilities.

Jens Steensgaard and *N. P. H. Møller*
The Department of Biochemistry,
University of Aarhus,
Aarhus, Denmark.

REFERENCES

Beutler, E.: Glucose-6-phosphate dehydrogenase deficiency. *In* Stanbury, Wyngaarden & Frederickson (ed.): The Metabolic Basis of Inherited Diseases, 2nd Ed. McGraw-Hill. 1965, 1060—1089.

Beutler, E., O. Duron & B. M. Kelly: Improved method for the determination of blood glutathione. J. Lab. clin. Med. 1963, *61,* 882—896.

Glock, G. E. & P. McLean: Further studies on the properties and assay of glucose-6-phosphate dehydrogenase and 6-phosphogluconate dehydrogenase of rat liver. Biochem. J. 1953, *55,* 400—408.

Mortensen, E.: Studies on the osmotic fragility of normal human erythrocytes. V. Acta med. scand. 1964, *175,* 515—522.

Mortensen, E.: Some effects of 1-methyl-2-p-(isopropylcarbamoyl)-benzyl-hydrazine and mannomustine on the metabolism of human erythrocytes in vitro. Scand. J. Haemat. 1965, *2,* 288—304.

Steensgaard, J.: On the normal activities of glucose-6-phosphate dehydrogenase and 6-phospho-gluconate dehydrogenase in bovine erythrocytes. Acta vet. scand. 1968, *9,* 223—241.

(Received March 13, 1970).