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Vitamin C Status of Sudanese Cattle and Sheep

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Abstract: Sudanese cattle and sheep were compared as to plasma, liver and urinary ascorbic acid concentrations. Cattle had lower hepatic ascorbic acid concentrations than sheep. Male cattle had lower plasma ascorbic acid levels and female cattle had lower urinary levels than their sheep counterparts. Concentrations of liver ascorbic acid were lower in females and urinary ascorbic acid was higher in females, irrespective of the species. It is concluded that cattle and sheep may differ as to ascorbic acid metabolism and status, but differences in environmental factors could have had an impact also.

Key words: Vitamin C, cattle, sheep, Sudan

INTRODUCTION

Vitamin C status in Sudanese camels (*Camelus dromedarius*) was described in relation to characteristics such as breed, gender, sexual activity and season^[1] and also in relation to parasite infections^[2]. From a comparative point of view, vitamin C status of Sudanese cattle and sheep was compared to determine the ascorbic acid concentrations of plasma, liver and urine from both female and male animals.

MATERIALS AND METHODS

This study analyzed samples from 120 Butana cattle (*Bos indicus*) and 120 desert sheep (*Ovis aries*) that were slaughtered during the rainy season (July-September) at the Tambul abattoir which is located at 145 km southeast of Khartoum. Sampling was done within a 3-week period. The animals had been kept under natural grazing conditions. The age of the sheep and cows was estimated to be 1.5-2 and 2-5 years, respectively. Castrated males were excluded. Upon arrival at the slaughterhouse, urine was collected in bags that had been attached to the animals. If necessary, urine release was stimulated by massage of the bladder. The cattle and sheep had no access to food or water for at least 18 h before slaughtering. Blood samples were collected by puncture of the jugular vein before slaughter and liver samples were taken on the slaughter track. The samples were processed

as described^[1,2] and ascorbic acid was analysed by the method of Behrens and Madere^[3].

Student's t-test was used to evaluate selected comparisons. The level of statistical significance was preset at $p < 0.05$.

RESULTS AND DISCUSSION

Gender had no significant effect on plasma ascorbic acid concentrations in both cattle and sheep, but liver ascorbic acid was significantly lower in females than in males (Table 1). Urinary ascorbic acid concentration was higher for females than for males, irrespective of the species. Cattle had lower ascorbic acid concentrations in plasma, liver and urine than did the sheep, but the difference for plasma ascorbic acid in the females and that for urinary ascorbic acid in the males did not reach statistical significance.

When the outcome of this study is compared with earlier studies^[1,2], it follows that vitamin C status in Sudanese camels is similar to that of Sudanese cattle, but differs from that in Sudanese sheep. The plasma ascorbic acid concentrations in the three species were similar, but the sheep had about 30% higher ascorbic acid levels in liver than did camels and cattle. Urinary ascorbic acid concentrations were of the same order of magnitude in the three species.

Liver ascorbic acid contents in Sudanese cattle are similar to those reported by Barakat and Abdalla^[4] for

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Table 1: Ascorbic acid contents in plasma, liver and urine from Sudanese cattle and sheep

Measure	Species	Males	Females
Plasma (mg L ⁻¹)	Sheep	5.42±1.11	4.99±1.54
	Cattle	4.67±0.92 ^b	4.77±0.99
Liver (mg/100 g wet wt.)	Sheep	82.1±11.6	77.8±12.4 ^a
	Cattle	60.0±12.1 ^b	53.1±13.4 ^{ab}
Urine (mg L ⁻¹)	Sheep	3.1±1.4	4.3±1.0 ^a
	Cattle	2.9±0.8	3.9±1.0 ^{ab}

Means±SD for 90 male and 30 female sheep and 32 male and 88 female cows. ^aSignificant difference for females versus males within the same species and same measure (p<0.05). ^bSignificant difference for cattle versus sheep within the same gender and same measure (p<0.05)

Egyptian cattle, but for European cattle lower values have been published^[5]. Genetic and environmental differences may play a role here. The vitamin C level in liver was significantly higher in males than in females, both in sheep and cattle. In camels we found similar values for hepatic ascorbic acid concentrations in males and females^[1].

The present data indicated that female sheep and cattle may excrete more ascorbic acid than the males. This finding is consistent with data from Neseni^[6] in cattle. In camels it is also found that females had higher ascorbic acid concentrations in urine than did males^[1]. The higher level of urinary ascorbic acid excretion in females could relate to females synthesizing more ascorbic acid than do males. The levels of urinary ascorbic acid of cattle and sheep in the present study differed somewhat from those obtained by Ugolini^[7] who showed urinary ascorbic acid contents for cattle and sheep of 5.3 and 1.8 mg L⁻¹ for cattle and sheep, respectively.

The present data indicated differences in ascorbic acid metabolism between cattle and sheep and also between females and males. As to the species difference, environmental factors in addition to genetic differences may be involved. For instance, the composition of the ration may influence vitamin C status in ruminants^[8].

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