

ERYTHROCYTE PARAMETERS RELATED WITH AGE IN SPANISH MERINO SHEEP

M.R. de la Haba, Angela Moreno, D. Llanes and A. Rodero

Dep. Genética, Instituto de Zootecnia (C.S.I.C.)
Facultad de Veterinaria, Universidad de Córdoba,
Av. Medina Azahara 9, 14005 Córdoba, SPAIN

SUMMARY

Some erythrocyte parameters have been studied in Spanish Merino sheep. Means of GSH increase significantly in animals from 0.5 to 4.5 years old, but beyond this age means have no significant decrease. Averages of erythrocyte catalase activity are decreasing in sheep from 0.5 to 8.5 years old, and the data were proved to agree with a regression line without significant deviations. Erythrocyte potassium levels do not seem to be influenced by age, so in animals from 0.5 to 8.5 years old the means are similar.

INTRODUCTION

Agar et al., (1972 a) reported an increasing in means of erythrocyte GSH levels of 1 to 5 year old Australian Merino sheep, but animals with Hb AB always had higher means than sheep with Hb B. Nevertheless, Atroshi (1979) did not find so clear an influence of both age and hemoglobin types in GSH concentrations. There were no references of relation age-GSH in sheep over 5 years old.

A relationship between age and erythrocyte catalase activity has been found by Moreno et al., (1990) in Spanish goats, but no references have been published regarding sheep.

There are many data about the influence of age on erythrocyte potassium levels during the postnatal period of lambs (Tucker et al., 1982), but no references have been presented beyond this age.

MATERIALS AND METHODS

Animals

The sheep were selected from pure Spanish Merino breed, in a farm located in northern part of Córdoba province (Spain). The studies were carried out during 1987 with 128 lambs of 6 months old and 171 adult sheep (14 rams and 157 dams), from 1.5 to 8.5 years old.

Blood

Heparinized blood samples were taken from jugular vein and refrigerated during the transportation to the laboratory. All the samples were analyzed within 48 hours after the extraction.

Laboratory procedures

Erythrocytes were separated from the plasma by centrifugation and the cells washed three times in 0.9% sodium chloride, except for K estimation of which 1 ml of erythrocyte was washed and spun three times in an ice-cold solution of 150 mM choline chloride, 10 mM Tris-HCl, pH 7.5 (Tucker et al., 1982), before measuring K levels in a Corning 405 Flame Photometer. To detect homozygous and heterozygous within LK type sheep, we used anti-Ma and anti-Mb sera, obtained from Dr. E.M. Tucker (AFRC, Babraham, Cambridge, UK). GSH concentrations were measured in red cells using the non specific thiol reagent DTNB according to Beutler et al., (1963). The method described by Aebi (1983) was used for the catalase activity determinations. Finally, hemoglobin types were separated by a starch gel electrophoresis at pH 8.1 in a Tris-EDTA buffer (Huisman et al., 1958).

RESULTS

Figure 1 presents the averages of GSH levels in groups of Spanish Merino sheep from 0.5 to 8.5 years old. The data from 0.5 to 4.5 years were shown to agree ($p < 0.001$) with the regression line of equation: $Y = 2.6420 + 58.9542$ without significative deviations.

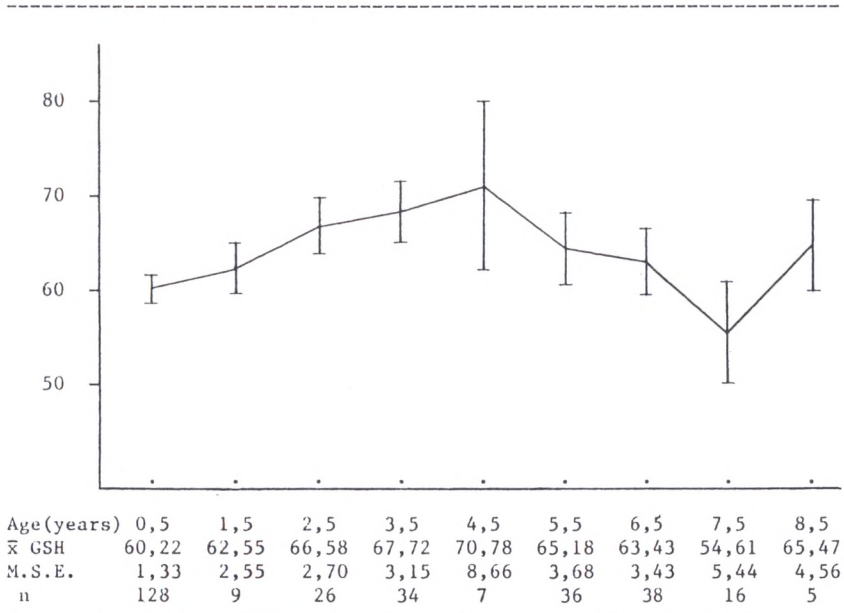


Figure 1. Mean erythrocyte GSH levels (mg/100 ml RBC) at different ages in Merino sheep (\bar{x} = mean; M.S.E. = mean standard error; n = number of animals).

Different results were found when a similar analysis was tried within the 3 electrophoretic types of hemoglobin (Hb A, Hb AB, Hb B). Only the Hb B sheep showed a similar relation between age and GSH levels, and the data from 0.5 to 4.5 years old were proved to agree ($p < 0.05$) with the regression line of equation: $Y = 4.1843 X + 58.4116$ with no significant deviations (data not shown).

Figure 2 presents the means of erythrocyte catalase activity in animals classified by age. Averages are decreasing from the lambs to 8.5 year old sheep, and the values show an agreement ($p < 0.001$) with the regression line of equation: $Y = - 0.0455 X + 2.1558$ without significant deviations.

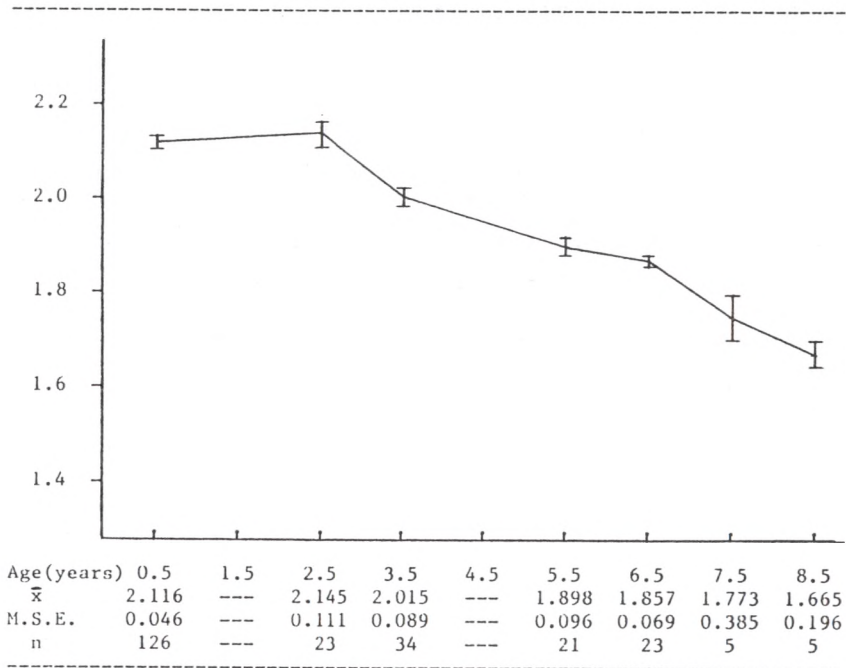


Figure 2. Erythrocyte catalase activity (I.U./g Hb $\times 10^{-4}$) in animals classified by age (\bar{x} = mean; M.S.E. = mean standard error; n = number of animals).

No relationship has been found between age and erythrocyte potassium levels in LK sheep from 0.5 to 8.5 years old. We found similar negative results when the animals were separated in homozygous (MbMb) and heterozygous (MaMb) within LK type (Table 3).

Age (years)	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	
MbMb	\bar{x}	7.20	-	7.56	6.84	-	6.22	7.42	8.02	7.50
	M.S.E.	0.33	-	0.74	0.62	-	0.32	0.48	1.20	1.00
	n	87	-	15	21	-	21	17	4	4
MaMb	\bar{x}	10.54	-	9.88	10.14	-	8.00	10.07	14.00	12.00
	M.S.E.	0.74	-	1.23	1.01	-	-	1.61	-	-
	n	36	-	7	13	-	1	4	1	1
LK	\bar{x}	8.18	-	8.30	8.11	-	6.30	7.93	9.22	8.40
	M.S.E.	0.35	-	0.67	0.60	-	0.32	0.53	1.51	1.19
	n	123	-	22	34	-	22	21	5	5

Table 3. Erythrocyte K levels in homozygous and heterozygous LK sheep classified by age (\bar{x} = mean; M.S.E. = mean standard error; n = number of animals)

DISCUSSION

Our results about the relationship between GSH and age are similar to the data of Agar et al., (1972 a), which found the highest GSH levels at 5 years old, but they did not present values beyond this age. On the other hand, when we separated the sheep by hemoglobin types only the B type showed a parallel graphic, but not the A and AB types. Perhaps, in the same way that the GSH in Spanish Merino sheep shows a different distribution (normal) to the other Merino strains (bimodal) (De la Haba et al., 1988), influence of Hb type must be different too.

As no other available data exists, we can not compare our studies about relationship catalase-age in sheep, but these results suggest that the catalase activity decrease parallelly with other physiological activities when the animals are growing older.

Our results about the relationship between age and erythrocyte K levels, in accordance with Tucker et al., (1982), agree that the LK type sheep changes its K level during the first 3-4 months of life, and the 6 month old lambs have similar K levels to the adult animals.

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