EFFECT OF AGE AND SEX ON PLASMATIC LEVELS OF CORTISOL AND SOME HAEMATIC PARAMETERS IN SHEEP SUBJECTED TO SHEARING

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Introduction

Many routine sheep handling procedures are stressful in that they result in elevated level of cortisol, glucose, haematocrit and heart rate (Hargreaven and Hutson, 1990b). The most stressful of these procedures is shearing (Hargreaven and Hutson, 1990a). The manipulations involved in shearing showed that the most stressful component of this procedure was removal of the wool. Animal's reaction to stresses depend also on individual temperament: rough handling may be more detrimental and stressful to animals with an excitable temperament compared to animals with a more placid nature. Temperament may be under genetic control in many different animals. Another important aspect is constituted by previous experiences. In fact novelty is a known strong stressor (Stephens and Toner, 1975; Moberg and Wood, 1982; Dantzer and Mormede, 1983). Gradual exposure of animals to novel experiences enables them to become accustomed to nonpainful stimuli that had previously evoked a flight reaction. Huston (1993) said that stress in sheep during routine handling could be reduced if the animals were conditioned gradually to handling procedures. However, animals do not habituate to procedures that are very aversive (Hudson, 1993). With the aim of investigating how much a stressor like shearing could be affected by age or sex, cortisol and some haematic parameters were studied in Sarda sheep breed.

MATERIALS AN METHODS

For this project n.10 one year old ewes (animals sheared for the first time) (Group A), n.10 three years old ewes (animals sheared in previous seasons) (Group B) and n.8 three years old males (Group C), were used. The animals led to natural pasture during the day, but were penned at night where they received 200g/each of feed supplement in form of commercial concentrate. Hay and water were ad libitum. From each sheep 4 blood samples were collected: the first, the day before and the remaining throughout shearing (isolation from the group, in the middle and at the end of shearing). Blood samples were taken by jugular venipuncture with lithium heparin as anticoagulant. Samples were immediately centrifuged at 3000 rpm for 20 min, and the plasma frozen at – 20 °C until assayed. Cortisol level was evaluated by RIA, glucose, Mg, Na and K by colorimetric assay. The data were submitted to ANOVA.

RESULTS AND CONCLUSION

Cortisol plasmatic concentration showed lower values the day before of shearing ($P<0,01$). During this practice was registered an increasing of the cortisol level in all the groups (Figure 1). Males showed the lowest cortisol and glucose levels, whereas the group A (animals at first shearing) presented highest values of this two parameters ($P<0,01$). Glucose haematic levels showed a simultaneous rise at the increasing ($P<0,01$) of the cortisol. Mg and Na haematic concentrations displayed increasing values ($P<0,01$ and $P<0,05$ respectively) in the second blood withdrawal in A and B groups, instead K plasmatic level showed a decreasing trend only in the females ($P<0,01$) (Table 1). Result obtained indicate that the reaction to shearing stress is affected both by age and sex of the animals. In fact the subjects with previous experiences, in this practice, showed a minor response to stress caused by wool removal.

Figure 1 – Cortisol plasmatic levels in the three groups.

Evidently, novelty is an important factor in stresses response (Grandin, 1997). The low values of the cortisol registered in the males indicate that sex too influences physiological responses to stress. This difference between two sexes depends on the social status or temperament of the animals. The strong link between glucose and cortisol plasmatic levels are due to the effect carried out on metabolism of glucose caused by this hormone. The variation of mineral plasmatic concentration, above all for K, could be imputed to mineral corticoids effect released from ACTH which increases greatly during stress

	Glucosio (mg/ml)				Mg (mg/dl)			
Gruppo	1°	2°	3°	4°	1°	2°	3°	4°
A	$56,5^{A}$	$68,7^{B}$	$111,4^{C}$	$117,1^{C}$	$2,2^{A}$	$2,8^{B}$	$3,7^{B}$	$3,1^{C}$
B	$50,1^{A}$	$58,5^{B}$	$74,2^{B}$	$88,9^{C}$	$2,3^{A}$	$2,9^{B}$	$3,0^{B}$	$3,7^{C}$
C	$50,5^{A}$	$62,2^{B}$	$89,7^{B}$	$113,6^{C}$	$2,1^{A}$	$2,5^{B}$	$2,6^{B}$	$3,4^{C}$
	Na (mEq/l)				K (mEq/l)			
	1°	2°	3°	4°	1°	2°	3°	4°
A	$140,3^{a}$	$145,3^{b}$	$147,0^{b}$	$148,4^{b}$	$5,5^{B}$	$5,4^{B}$	$5,2^{A}$	$5,0^{A}$
B	$140,1^{a}$	$146,4^{b}$	$150,3^{b}$	$144,5^{b}$	$5,2^{B}$	$5,3^{B}$	$5,4^{B}$	$5,0^{A}$
C	140,1	150,1	148,3	149,9	5,1	5,0	5,2	5,1

In conclusion stress from shearing stimulated a remarkable response in the animals as underlined by high cortisol levels. Age and sex resulted very important in conditioning the stress response.

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	Glucosio (mg/ml)				Mg (mg/dl)			
Gruppo	1°	2°	3°	4°	1°	2°	3°	4°
A	$56,5^{A}$	$68,7^{B}$	$111,4^{C}$	$117,1^{C}$	$2,2^{A}$	$2,1^{A}$	$3,7^{B}$	$3,1^{C}$
B	$50,1^{A}$	$55,5^{A}$	$74,2^{B}$	$88,9^{BC}$	$2,3^{A}$	$2,3^{B}$	$3,0^{B}$	$3,7^{C}$
C	54,5	62,2	89,7	113,6	$2,3^{A}$	$2,3^{A}$	$2,6^{B}$	$3,4^{C}$
	Na (mEq/l)				K (mEq/l)			
	1°	2°	3°	4°	1°	2°	3°	4°
A	$144,3^{a}$	$145,3^{a}$	$147,0^{b}$	$148,4^{b}$	$5,5^{B}$	$5,4^{B}$	$5,2^{AB}$	$5,0^{A}$
B	$141,1^{a}$	$143,4^{a}$	$150,3^{b}$	$144,5^{b}$	$5,2^{B}$	$5,3^{B}$	$5,4^{B}$	$5,0^{A}$
C	140,1	150,1	148,3	149,9	5,1	5,0	5,2	5,1