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Short communication

Changes in physiological and immunological parameters during the peripartum period in Zerasca sheep

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Abstract

The aim of this study was to provide the picture of the dynamics of some blood parameters in the native Zerasca sheep breed during the peripartum period. Blood samples were collected from peripheral blood of 14 ewes at different times: from 21 d before lambing to 42 d after. Physiological and immunological parameters were evaluated: aspartate-aminotransferase, creatine kinase, lactate dehydrogenase, non-esterified fatty acids, total protein, total antioxidant capacity, free radicals, serum bactericidal activity and serum lysozyme. One-way repeated measures ANOVA test was performed. Results showed a significant influence of the peripartum and the deviation from the normal range on many parameters.

Key words: sheep, lambing, peripartum, biochemical parameters, immunological parameters

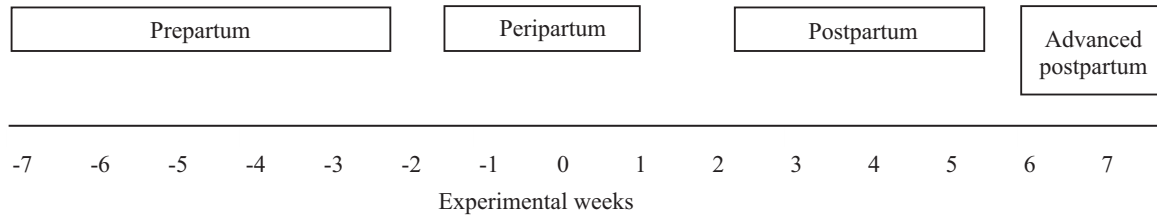
Materials and Methods

Introduction

Last pregnancy and lactation represent critical phases causing changes and adaptation in metabolism (Piccione et al. 2009) and in immune responsiveness (Lacetera et al. 2004).

Since there is not a great availability of this kind of information on meat sheep breed the aim of this study was to investigate the influence of the periods around lambing on some physiological and immunological parameters in an Italian native meat sheep breed.

The experiment was performed in accordance with the European Union directive 86/609/EEC regarding animal care. The study was carried out in a farm of Zerasca ewes, a native breed of endangered status, located in the Zeri district (Massa Carrara, Italy) at an altitude of 800 m a.s.l. Animals are raised almost all year round on open pastures. Fourteen pluriparous and clinically healthy ewes, reared in natural condition were randomly selected. From the jugular vein, 56 blood samples were collected in the morning, in tubes with K3-EDTA and without. Four blood samplings were performed according to the following scheme 1.



Scheme 1. Sampling time.

Table 1. Trend of the examined parameters with relation to the period around lambing.

	Normal range	UM	Prepartum		Peripartum		Postpartum		Advanced postpartum		P
			mean	SE	mean	SE	mean	SE	mean	SE	
AST	40-123	U/L	88.00 ^A	3.973	94.87 ^A	3.869	111.14 ^B	3.973	140.80 ^{BC} ↑	4.910	**
LDH	<530	U/L	432.86 ^A	12.639	506.29 ^B	11.685	507.57 ^B	12.639	502.20 ^B	15.567	**
NEFA	102-450	μmoli/L	934.29 ^B ↑	98.073	459.75 ^A ↑	95.503	278.14 ^A	98.073	371.40 ^A	121.214	**
TP	6-7.9	g/dl	6.71 ^A	0.111	6.79 ^A	0.102	7.41 ^B	0.111	7.53 ^B	0.128	**
CK	<130	U/L	161.93↑	32.033	252.50↑	31.194	190.93↑	32.033	181.70↑	39.592	NS
TAOC	200-300	μg/dl	334.79 ^A ↑	10.857	358.53 ^A ↑	10.038	340.00 ^A ↑	10.857	393.73 ^B ↑	12.603	**
OFR	44-88	U/Carr	76.07 ^{Aa}	9.500	107.87 ^b ↑	9.251	116.43 ^B ↑	9.500	129.30 ^{Bc} ↑	11.741	**
SL	1-3	μg/dl	3.28 ^B ↑	0.408	2.11 ^{Bb}	0.377	1.14 ^{Aa}	0.408	0.27 ^A ↓	0.473	**
SBA	>90	%	80.64↓	2.625	78.44↓	2.543	78.50↓	2.625	74.64↓	3.049	NS

** : P ≤ 0,001; NS: not significant; ↑ values over the threshold of the normal range; ↓ values under the threshold of the normal range.

Means followed by lowercase letters were significantly different: p≤0.05. Means followed by capital letters were significantly different: p≤0.01.

Aspartate-aminotransferase (AST), lactate dehydrogenase (LDH), non-esterified fatty acids (NEFA), total proteins (TP), creatine kinase (CK), were measured by an automatic biochemical analyser (Olympus AU 400). Total antioxidant capacity (TAOC) and oxygen free radicals (OFR) were monitored by a colorimetric method (DIACRON). Lysozyme (SL) and bactericidal activity (SBA) determinations were performed by bacteriological assay (Osserman and Lawlor 1966, Amadori et al. 2002). One-way repeated measures ANOVA test was performed. Statistical analysis was performed by JMP (SAS Institute 2002).

Results and Discussion

Values of each parameter during the sampling period and their normal range are illustrated in Table 1. The period around lambing significantly affected several physiological and immunological parameters.

The trend of AST showed a significant increase in the postpartum exceeding the normal range in the last sampling, whereas LDH displayed a fluctuating trend with significant variation: this trend would suggest an overloading of liver functionality as already observed in ewes by El-Sherif and Assad (2001). NEFA was significantly affected by the physiological phase and

exceeded the normal range in the prepartum and in the peripartum; high nutritional requirements during the last weeks of pregnancy and the decrease of voluntary feed intake during late pregnancy might mobilize body reserves resulting in NEFA release into the bloodstream (Joy et al. 2014). A significant increase in TP values were observed in the postpartum in accordance with Piccione et al. (2009). CK exceeded the normal range in each sampling, indicating a muscle effort, probably linked to the grazing activity on sloping ground. TAOC significantly increased in the advanced postpartum showing values over the normal range in each sampling, this trend could indicate an oxidative stress as previously reported in the peripartum by Celi et al. (2010). After lambing, a significant and progressive increase of OFR occurred as it appears within the normal range only in the prepartum. The farming system and the rusticity of the Zerasca sheep likely make rare the occurrence of conditioned diseases, therefore the oxidative stress is rather induced from lambing and lactation. SL constantly decreased, showing extremes out of the normal range; regarding this parameter, inter-breed differences in sheep values were found (Sotirov et al. 2005). SBA was always under the normal range indicating a restricted innate immunity capacity.

The study evidenced that the peripartum signifi-

cantly affected many biochemical and immune parameters, often inducing deviations from the normal range. Furthermore, results pointed out the sensibility of the Zerasca breed in the peripartum, suggesting the need of a proper management of sheep especially in terms of feeding.

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