

Effect of PEG administration to growing lambs feeding *sulla*.

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INTRODUCTION: Reactive oxygen species (ROS) are produced by metabolic processes, but their amount may be increased by exogenous factors, such as solar radiation, fungal toxins, and pesticides (Machlin and Bendich, 1987). The body is protected against ROS and their toxic products by a wide range of antioxidant systems. Increased frequency or amount of metabolic processes, during growth, is associated to enhanced production of ROS. The imbalance between ROS production and antioxidant defence mechanisms can lead to "oxidative stress", that may impair animal's health and performance (Miller et al., 1992). Retinol (Ret) and α -tocopherol (Toc), the major liposoluble antioxidants, effectively integrate the endogenous antioxidant activities to scavenge ROS and prevent oxidative damages (Miller et al., 1992). In particular, Ret acts directly on leukocytes to prevent their generation of hydroxyl radicals, and possess immunomodulatory activity (Bendich, 1993; Chew, 1993). Toc is essential for growth, reproduction, prevention of various diseases, and protection of the integrity of tissues (McDowell et al., 1996).

Condensed tannins are oligomers or polymers of flavonoid units, that can confer nutritional advantages to ruminants by reducing protein degradation in the rumen and increasing the flow of protein and essential amino acids toward the intestine (McNabb et al., 1996), thus improving protein utilization. Condensed tannins also improve live-weight gain, milk yield and protein concentration, and ovulation rate. Beneficial effects depend on the chemical and physical structure, and on their concentration in the diet. Polyethylene glycol (PEG) reacts preferentially with condensed tannins and prevents the formation of tannin-protein complexes (Jones and Mangan, 1977). PEG does not affect digestion and can be added to feed or given by oral or ruminal routes to ruminants as a means for eliminating condensed tannins effects (Waghorn et al., 1999).

The aim of this study was to analyse the effect of a diet, containing condensed tannins, on redox and energy status in growing lambs.

MATERIALS AND METHODS: Twenty-four lambs were split into two homogeneous groups. Twelve lambs were fed, for two months, by grazing on *sulla* (*Hedysarum coronarium* L.), which contains condensed tannins (5 hours/day), and on Italian ryegrass sward (20 hours/day) for three months. Twelve lambs received the same diet, daily supplemented by 100 ml of a 50/50 water solution of polyethylene glycol (PEG). Blood samples were collected weekly and plasma was obtained by centrifugation (500 g, 4° C, 15 min). Plasma concentration of retinol and α -tocopherol was evaluated by HPLC, according to a published protocol (Cigliano et al, 2002). Plasma levels of cholesterol, triglycerides, and glucose were titrated by common laboratory procedures. Nitro-tyrosine (N-tyr) levels were estimated by enzyme linked immunosorbent assay (ELISA), essentially as previously reported (Spagnuolo et al, 2001)

RESULTS and DISCUSSION: Plasma levels of cholesterol, triglycerides and glucose, haematic parameters used as markers of energetic status, were found not significantly different between control and PEG group. Similarly, plasma concentration of retinol and α -tocopherol did not significantly differ between the two groups (Fig. 1, Fig. 2). The concentration of N-Tyr residues, that is widely used as marker of oxidative stress induced by peroxynitrite (Halliwell, 1997), was found not different between control and PEG group. In particular, N-tyr levels did not change, during the growth, in the PEG group, while increased in the control group (P = 0.03, Fig. 3).

Ret and Toc are major liposoluble antioxidants, widely distributed in nature, with different biological activities. They can stabilize highly reactive free radicals, and are responsible for protecting membranes against lipid peroxidation, thus maintaining the structural integrity of cells and tissues. Retinol and α -tocopherol possess immunomodulatory activities in humans and animals. It is worth to mention that oxidative damage to proteins can result in structural and functional modifications. N-tyr production is widely used as marker of oxidative damages to proteins. Our data demonstrate that plasma levels of the analysed parameters were not affected by PEG administration, and suggest that condensed tannins, as not influencing energy and redox status, might regulate other physiological functions of growing lambs.

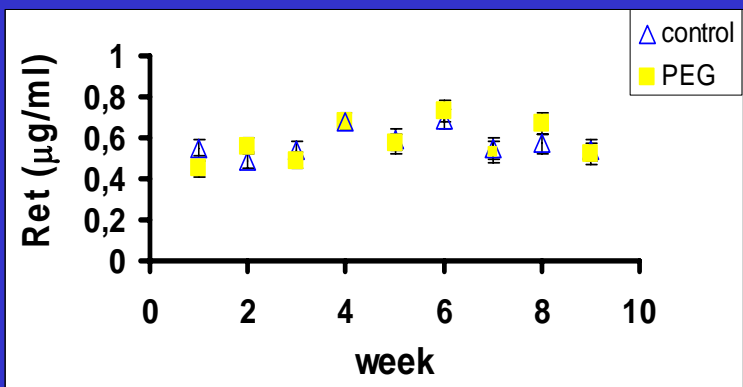


Fig. 1

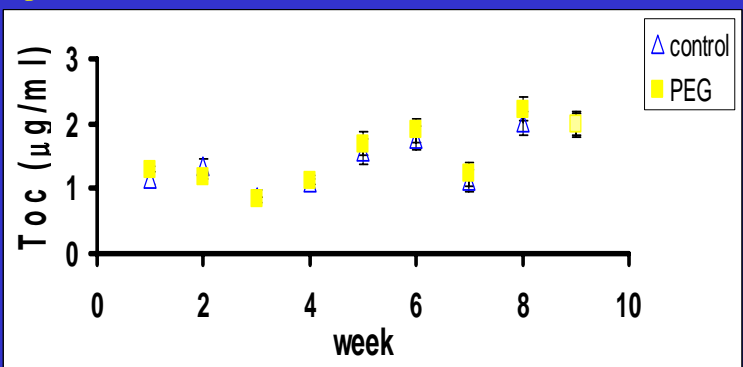


Fig. 2

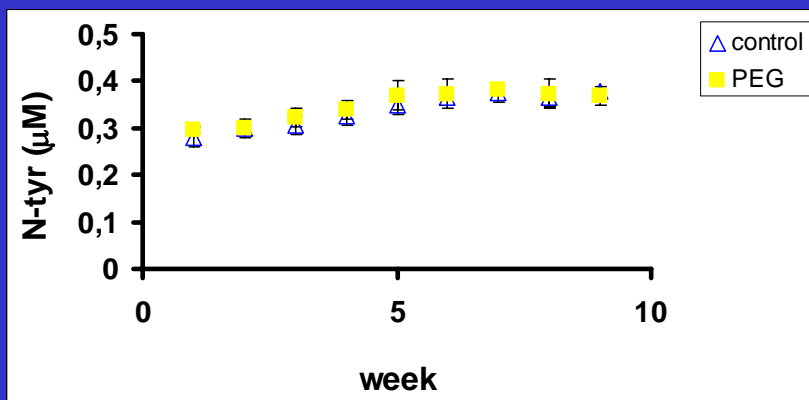


Fig. 3