Effects of *Lactobacillus plantarum* PCA 236 in feed administration on dairy goat faecal microbiota, plasma immunoglobulins, antioxidant status and milk fatty acid composition

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Introduction

Recently *L. plantarum* PCA 236 strain was isolated from naturally fermented Kasseri cheese. It was speculated that the particular *L. plantarum* strain of dairy origin could be an interesting candidate probiotic for dairy animals.

The aim of this work was to investigate the effects of *L. plantarum* administration, as a probiotic feed supplement in dairy goats on: the survival of the strain through the animal's gut, gut microbiota composition, plasma immunoglobulins and antioxidant capacity and milk fatty acid composition.

Materials & Methods

Twenty four goats of the Damascus breed were divided in two treatments of 12 goats each: control (CON) no addition of *L. plantarum* and probiotic (PRO) with in feed administration of *L. plantarum* at 12 log cfu/goat/day. The experiment lasted for 5 weeks and individual faecal, blood and milk samples were collected weekly. Faecal samples were examined for the presence of *L. plantarum* PCA 236 by PCR and population levels of total aerobes, coliforms lactic acid bacteria (LAB), *Streptococcus, Enterococcus,* total anaerobes, *Clostridium* and *Bacteroides* by culture techniques. Plasma IgA, IgG and IgM were determined by ELISA, plasma and milk antioxidant capacity were determined with the ORAC assay and milk fatty acid composition was determined by GC.

Results & Discussion

L. plantarum PCA 236 was recovered from day 7 until day 35 of the study at 6.5 - 7.0 log CFU/g faeces (Fig. 1). Overall significant differences between CON and PRO treatments were noted for *Streptococcus*, LAB and clostridia populations (Fig. 1).

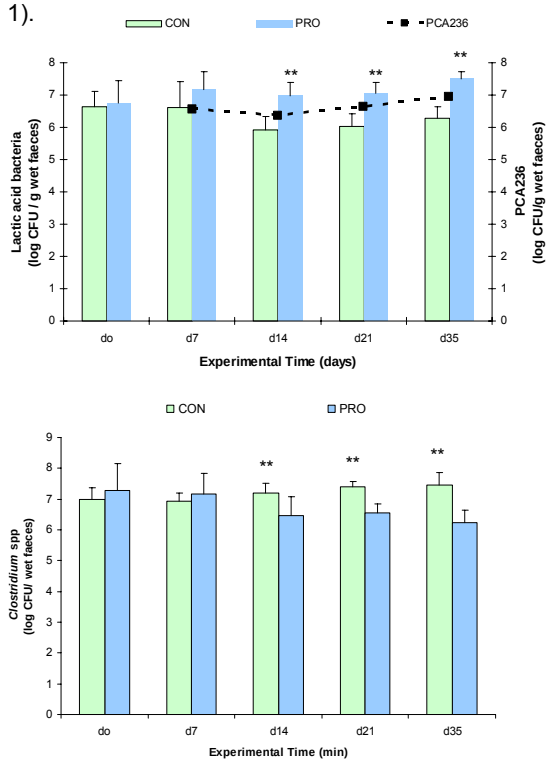

Figure 1. Microbiological analysis (log CFU/g wet faeces) of goat fecal samples from the control (CON) and probiotic (PRO) treatments at 0, 7, 14, 21 and 35 days. Data points per sampling time represent treatment means (n=12) ± SD. Significant differences notated as * (P≤0.05), ** (P<0.01).

Plasma concentrations of immunoglobulins IgG, IgM and IgA did not differ between the two treatments at any sampling time. There were also no differences regarding plasma and milk antioxidant capacity.

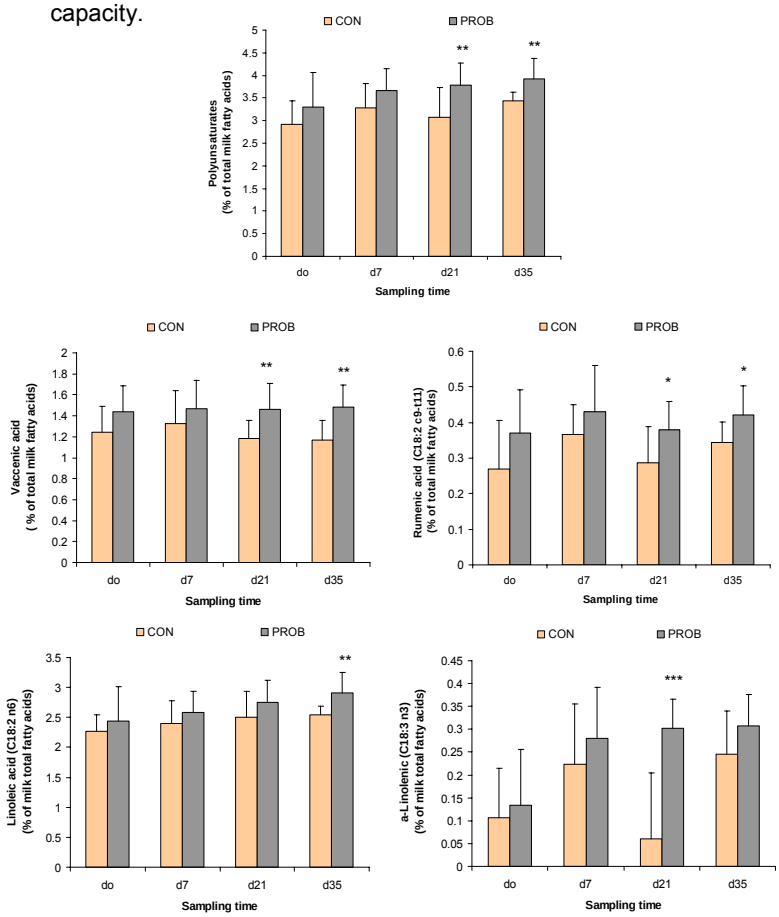

Figure 2. Fatty acid composition of goat milk samples, expressed as % of total milk fatty acids, from the control (CON) and the probiotic (PRO) treatments, at 0, 7, 21 and 35 days. Bars per sampling time represent treatment means (n=12) ± SD. Significant differences notated as * (P≤0.05), ** (P<0.01) and *** P<0.001).

Significantly higher PUFA were seen for the PRO treatment compared to CON (3.7 % vs 3.2 %). Further statistical analysis in the PUFA category revealed significant differences between the two treatments regarding the milk PUFA fatty acid components linoleic (C18: 2 n6); α-linolenic (C18:3 n3) and rumenic (C18:2 cis9, trans 11) acids, as well as the MUFA component vaccenic acid (C18:1 t11) that were all higher in the PRO treatment (Fig. 2).

The *L. plantarum* strain has displayed interesting probiotic potential in terms of gastrointestinal survival and possible beneficial modulation of gut microbiota. In addition, the strain showed an interesting potential towards the enrichment of milk in beneficial PUFA that could present opportunities for the development of functional goat milk or dairy products.

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