



# Orange peels as a secondary feedstuff for dairy sheep

Karatzia M.A.<sup>1</sup>, Kotsampasi V.<sup>1</sup>, Basdagianni Z.<sup>2</sup>, Mai S.<sup>3</sup>, Barampouti E.<sup>3</sup>, Moustakas K.<sup>3</sup> & Kasapidou E.<sup>4</sup>

<sup>1</sup> Hellenic Agricultural Organisation 'Dimitra', Research Institute of Animal Science, Paralimni, Giannitsa, Greece, [karatzia@elgo.gr](mailto:karatzia@elgo.gr)

<sup>2</sup> Aristotle University of Thessaloniki, School of Agriculture, Department of Animal Production, Thessaloniki, Greece

<sup>3</sup> National Technical University of Athens School of Chemical Engineering, Unit of Environmental Science & Technology, Zografou Campus, Athens, Greece

<sup>4</sup> University of Western Macedonia, Department of Agriculture, Florina, Greece



## Introduction

In a worldwide context of increasing demand for animal-derived products, welfare trends and climatic risks, sheep farming faces the daily challenge of ensuring its sustainability. The dependence of local breeds on imported highly priced feedstuffs, exposed to the speculations of the feed market limits farms' flexibility, leading to suppressed productivity and compromised animal welfare. Rich in fibre fruit by-products pose significant interest as alternatives to commercial feeds, in an effort to enhance long-term competitiveness of the sector.

## Objective

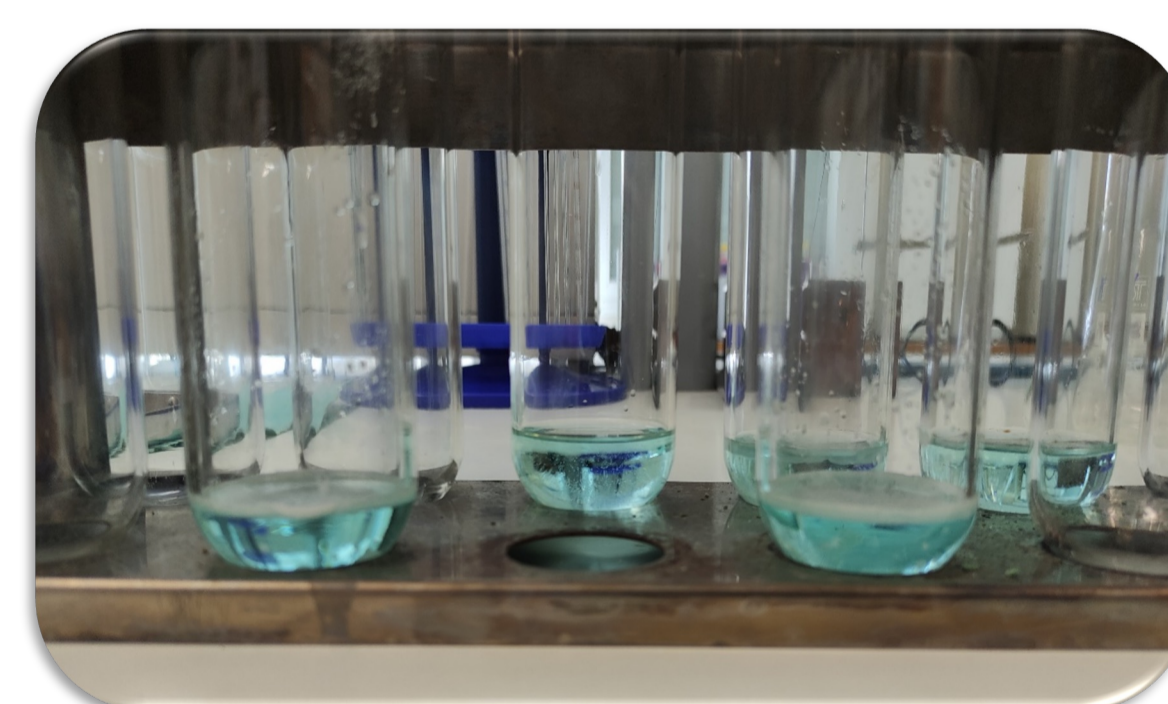
To evaluate the use of orange peel from a Greek orange juice industry to produce a high value secondary feedstuff for dairy sheep, within a circular economy approach and assess its' effects on feed consumption, productivity, milk quality and the quality characteristics produced dairy products i.e., yoghurt.

## Materials & Methods

Enzymatically hydrolyzed (processed) and unprocessed orange peels were introduced to two treatments of 12 healthy, multiparous Chios breed dairy ewes at a rate of 11% DM (groups P & U), while a treatment of 12 ewes served as controls (group C), that were housed in separate floor pens. The trial started on the day after weaning until the 16th week of lactation. The animals were individually fed for 84 days, twice a day, after milking. Each ewe received 1,6kg of concentrates, 1,3kg of alfalfa hay and 0,3kg of wheat straw, daily. Feed intake was monitored and feed refusals were collected and weighted daily. Biweekly measurements were conducted to assess milk production and chemical composition.

Bulk tank milk was collected at 2-week intervals and used for the production of yoghurt samples (4 batches). Yoghurt samples were analyzed for their proximate composition.

One way analysis of variance was used to assess differences between treatments using SPSS software (Version 29.0, SPSS Inc., Chicago, IL, USA).



## Results & Discussion

Milk yield of the trial groups was at all instances higher than that of the Controls and on most of the samplings milk fat concentration of the Unprocessed group was significantly higher ( $p < 0.05$ ) than the Controls and milk protein concentration was higher at all samplings for Unprocessed group ( $p > 0.05$ ).

The analysis of yogurt's proximate composition revealed that dietary supplementation with orange peels, especially in their unprocessed form, positively influenced the yogurt's composition. This resulted in significantly higher total solid content while ash, protein, fat and carbohydrate contents were not affected ( $p > 0.05$ ). In any case, yoghurts from milk from ewes on the processed of unprocessed group had higher but not significantly different ( $P > 0.05$ ) protein and fat contents.

It appears that Processed treatment ewes exhibited higher feed digestibility, while Unprocessed orange peel feed could increase acetic acid production in the rumen, thus finally increasing milk fat content and both treatments favorably affected yoghurt composition.

In conclusion, orange peels are a promising secondary feedstuff that can be used as a sustainable alternative ingredient for dairy sheep farming.

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