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Book of Abstracts

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immediately centrifuged and the plasma was frozen at −20 °C until analysis. Parameters expression of oxidative metabolism (superoxide dismutase, glutathione peroxidase, ROS), energy (glucose, NEFA, beta-OH butyrate, cholesterol), protein (urea, creatinine), mineral (Ca, inorganic P, Mg, Na, K, Cl), liver function (albumin, AST, gamma-GT, LDH, ALP, total bilirubin) and the inflammatory state (haptoglobin, Zn, ceruloplasmin, globulins) were determined. Data were analysed using the GLM procedure of SAS by factorial model with interactions including group, subject within group, days of control as main effects, and an error term. Least squares means were separated with the PDIFF procedure of SAS. Significance was declared at $p < .05$. No substantial differences were found between the two groups with respect to the observed mortality (1 subject per group), while the percentage of antibiotic treatment (mainly made necessary for breathing problems), within 30 days of the beginning test, was greater ($p < .05$) in the C group. From the analysis of metabolic profiles substantially it emerges a positive effect of administration of GE on the inflammatory state. In particular, treated subjects showed lower ($p < .05$) values of ROS, haptoglobin, glutathione peroxidase and greater ($p < .05$) levels of Zn.

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Influence of rumen fluid sampling techniques on assessment of fermentation parameters and microbial profile in the bovine rumen

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Variations in rumen microbial populations affect fermentations and methane emissions. Differences exist between liquid and solids, and between rumen locations. Therefore it is important to understand, and we aimed to verify, the extent to which the rumen sample collection methods affect the fermentation and microbial profile of the samples obtained from dairy cattle.
Samples of rumen fluid were obtained from three cannulated non lactating dairy cattle fed a high forage diet by three collection methods (grab sampling through rumen cannula (FIS), rumenocentesis (RC) and oral stomach tube (OGT)) before feeding (T0) and, two weeks later, 6 hours after feeding (T6). The samples (18 in total) were analysed for physico-chemical characteristics and microbial community diversity. Time points and collection technique affected rumen pH (7.06 and 6.74 for T0 and T6, respectively, $p < .001$; 6.72, 6.84 and 7.14 for FIS, RC and OGT, respectively, $p < .01$) and volatile fatty acids (VFA) concentrations ($p < .01$) but not their molar ratios ($p > .05$). Microbiota composition was qualitatively and quantitatively evaluated using culture-independent methods (PCR-DGGE, and Real-time PCR). Qualitative analysis of the Eubacteria population revealed individual profiles that differed between the sampling times but not between the sampling techniques. qPCR revealed a reduction of Eubacteria content in ruminal fluids collected from cows using the OGT ($p < .05$), not associated to a lower content of Archaea and Protozoa. Samples collected by RC give the best approximation to samples collected through FIS. Collection by OGT is associated with risks of saliva contamination and the sampling location is uncertain. Nevertheless, this does not affect proportion of VFAs and microbial profile.
This study demonstrates that sampling technique affects the comparability of the results obtained by different monitoring techniques. Understanding the effects of sampling technique is fundamental for a better understanding of biology and biochemistry of methane emissions, manipulation of the ruminal microflora and the diagnosis of digestive disorders.

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A focus on the project: bioconversion of fruit and vegetable waste to earthworm meal as novel food source

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Recycling and redevelopment of organic wastes from the food chain is a priority for a more healthy and environmental-friendly food production. Bioconversion of organic waste in a novel food source can be an alternative to waste disposal contributing to reduce GHG emissions and responding to global food demand.
This project integrates various expertise to plan the food chain based on vegetable waste bioconversion to earthworms

as potential new food. Among the terrestrial invertebrates, utilization of earthworms may be an answer ecologically, economically and socially acceptable as an alternative protein source. Vegetable waste discarded directly from the producers, complies with the relevant EU feed regulations for food producing animals.

The project follows a multi-factor approach based on demand-driven innovations and the inclusion of various partners/actors (University of Bari and IULM, CREA-FLC, SMEs). The sustainability of the entire cycle will be evaluated considering the environmental, economic, ethical and social impacts.

The main original elements of the proiect are to:

- propose *Eisenia foetida* as foodstuff
- predict the acceptability and intention of eating the new food source by a questionnaire
- evaluate of the ethical/social impact
- utilize the fruit and vegetable waste as safe, cheap and sustainable substrate of rearing
- propose an innovative and cost-effective production system
- evaluate the environmental aspects of this new process
- evaluate the HACCP of the production chain
- ensure the quality and safety of the food derivative product
- elaborate an industrial code of practices/standards
- safeguard EU animal welfare
- provide information useful for the regulatory frameworks
- propose earthworm meal for particular nutritional purposes or claim (e.g. low glycemic index, reducing blood cholesterol, high protein, source of [name of vitamin/s] and/or [name of mineral/s], high polyunsaturated fat ....)
- train sensory panel for consumer evaluation.

The first results of this project from the joint industrial stakeholders and scientists collaboration show how earthworms can be used as food source. Furthermore, our study highlights the motivational domain in promoting the intention to eat annelids-based products as new food. Some implications for practice are discussed.

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Wheat bran as dietary tool to improve dairy production, oxidative status of lactating cows and food sustainability indexes

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Wheat bran (WB), an inexpensive by-product widely available in southern Italy, is largely used as component of feed for ruminants, contributing to decrease the use of food suitable for human consumption, thus to improve the sustainability of livestock production. However, the potential benefits of WB, due to its content in polyphenolic compounds, mainly consisted of ferulic acid, in improving rumen conditions and the antioxidant balance of animals, and also providing animal products with functional properties, are not yet well known. Accordingly, this experiment was carried out for 100 days with 36 lactating Italian Simmental cows divided into 3 groups receiving one of 3 concentrates including WB at 0% (WB0), 10% (WB10) or 20% (WB20), formulated to be isoenergetic and isoproteic. During the trial, the group feed intake and the individual milk production were monitored, and cheesemaking of bulk milk were carried out. Statistical analyses were performed using MIXED (individual data) and GLM (cheese traits) procedures in SAS 9.2. Milk yield was similar among groups throughout the trial. Milk from WB20 group resulted slightly higher in casein and curd firmness (a_{2r}). In cows fed WB, the higher intake of polyphenols, especially ferulic acid, was responsible of a higher blood content of polyphenols, which had an impact on reactive oxygen metabolites (ROMs), resulted significantly higher in WB0 cows (115 *vs* 106 and 1045 U. Carr in WB0, WB10 and WB20; $p \leq .05$). WB20 cheeses showed, compared to WB0, a tendency to have greater total polyphenol content (4.21 *vs* 3.65 mg GAE/g, $p \leq .10$), lower number of peroxides (1.04 *vs* 1.30 mEqO_2/kg, $p \leq .05$) and higher antioxidant capacity (1848 *vs* 1518 μmol $FeSO_4$/g, $p \leq .10$), with intermediate values in WB10. WB20 diet, due to WB low cost, reduced the feeding cost for cow and for kg of milk yield, in comparison with the WB0 diet. In addition, the WB20 group showed the best indexes heFCE (human edible feed conversion efficiency = milk/human edible feed) and NFP (net food production = human edible food/milk), expressed as crude protein or gross energy. In conclusion, the WB ingested by dairy cows, at a level of about 12% of total DM intake seems lead to several benefits, such as the improvement of oxidative status of cows, milk quality, shelf-life characteristics and nutraceutical properties of cheese, as well as it can contribute to reduce the feeding cost per unit of product and limit the human-animal competition for feeding sources.

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