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Book of Abstracts

**Guest Editors: Fulvia Bovera (Coordinator),
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Gianluca Neglia, Giovanni Piccolo, Angela Salzano.**



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analytical activities, aimed to assess the health status of several substrates (soil, air, water, vegetables, animals, food) and humans, and to identify critical issues and illegal activities.

The IZSM provides continuous support to the judicial authorities in the evaluation of crimes against the environment through several activities: those defined by the Ministerial Decree 'Traceability of the Buffalo Supply Chain' (Implementation Decree 9 September 2014); those regarding the Quality and Health Assessment System for Campania Products through the 'QR CODE Campania' project; the integrated monitoring plan on environmental, animal and plant matrices 'Campania Trasparente'; the human biomonitoring plan 'SPES – Exposure Study in Susceptible Population', an epidemiological observational study on the population resident in Campania, exposed to potential sources of contamination; the monitoring plan on emerging zoonoses 'HEV Hepatitis E Virus'; the training of law enforcement agencies for recognition of Hemp authorised crops, with reference to genetic and chemotypical database 'S'Attiva'; the cancer screening plans 'First Prevention' [1–4]. The implementation of research and development activities, the monitoring and certification of food products quality and health, allowed the IZSM to combine, in an integrated action, the needs and requirements of a territory considerably vexed from environmental emergencies. This encountered the will of the scientific community and of the authorities to reply, confirming or refuting the hypotheses on causes and correlations between environment, contamination, food and health. Everything was done raising the professional figure of the Vet to guide advancement and scientific vanguard, in support of the protection of the entire environmental system.

Q5

IS009

For a better future of beef production: improved carcass grading, eating quality and livestock systems, but no cultured meat

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So far, the beef market has been driven by carcass grading to satisfy all the actors of the supply chain from farmers to butchers and retailers. Therefore, classification systems have been solely designed to describe the carcass for the purchaser, with no real objective to satisfy consumers at the end of the whole chain. However, some grading schemes (such as the USDA classification) confer both a yield grade and a quality grade to each carcass. In addition, official and commercial quality schemes for retail beef have been developed in relationship with origin, tradition

or eating quality, each with their own focus and methods of evaluating and describing carcasses and/or beef. Consequently, the definition of quality varies for each destination market and mainly depends on characteristics of farming systems and/or animal/carcass. Despite all these initiatives, there is still a high level of variability in beef palatability and a low relationship between eating quality of beef and its price, which induces consumer dissatisfaction. Therefore, a great deal of research has been developed to set up tools and equations to predict beef eating quality based on physical measurements (mechanical methods or spectroscopy) or biological markers (genomic or phenotypic predictors). However, all these approaches are confronted with the complex determinism of quality parameters, especially tenderness. Concerning spectroscopy, the main encouraging results were obtained using Near Infra-red Spectroscopy (NIR) for the prediction of the composition and nutritional value of meats.

More recently, Australia has developed a unique and consumer-driven grading system called Meat Standards Australia (MSA). It is based on different beef eating quality scores (namely tenderness, flavour liking, juiciness, and overall liking) at the muscle level in interaction with the cooking method. The four eating quality scores are then combined into a unique global quality score, which is predicted from animal and carcass traits such as sex, age, breed, marbling, hot carcass weight and fatness, ageing time, etc. An MSA-like grading scheme could be used to predict beef eating quality in Europe and other countries, including in Asia and America. Hence, it could underpin the existing official labels or commercial brands by helping them to provide beef of satisfactory eating quality, which is a prerequisite to satisfy consumers. An MSA index has recently been proposed based on the global quality scores of each cut to recalculate an eating quality potential at the carcass level. It may be implemented to improve eating quality through genetics and management. Finally, because consumers from many countries are willing to pay more for a better quality product, such an eating quality guarantee system is likely to generate economic benefits to be shared along the beef supply chain from farmers to retailers.

Nowadays, the livestock and meat sectors are facing new and important challenges such as their environmental impact and role in global climate change; the need for increased availability of food due to the human population growth, the need to address societal needs (e.g. animal welfare and ethics) and the need to produce meat of high quality (health, safety, palatability). Therefore, at the consumer or citizen level, meat quality includes intrinsic qualities (characteristics of the product itself) and extrinsic qualities (animal health and welfare, environmental impacts, etc.), but there are trade-offs among and between intrinsic and extrinsic qualities. As for eating quality with the MSA grading scheme, a relevant combination of indicators related to intrinsic and extrinsic quality traits (including carbon footprint, animal welfare, grassland biodiversity, rural development, etc.) and economic efficiency (e.g. income of farmers, price for the consumer) will allow the prediction of the overall quality of beef for consumers, but also for any stakeholder of the supply chain.

The beef industry cannot respond to these changes in demand by business as usual. It must find solutions to many issues regarding not only eating quality (as already done by the MSA grading scheme), but also nutritional quality, animal welfare, health and more generally sustainability. It has to do so in the face of competition from emerging protein products including new plant-based products and cultured meat. Despite a high media interest, the latter is probably the worst alternative for different reasons: there are still numerous technological obstacles that have to be overcome to produce in vitro meat, its safety and nutritional value are not guaranteed, its advantages for the environment and its potential acceptance by consumers have not been demonstrated yet. Furthermore, the artificial nature of cultured meat goes against the growing demand for natural products in many countries, while conventional meat producers are moving towards concepts of agroecology to develop environmentally friendly and sustainable animal production systems.

ANIMAL PHYSIOLOGY, HEALTH AND WELFARE – ANIMAL HEALTH

IS010

Oxylipids and inflammatory disorders of dairy cows

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Dairy cattle are susceptible to increased incidence and severity of health disorders during the transition period. A common link contributing to the development of both metabolic and infectious diseases in transition cows is a dysfunctional inflammatory response. The role of inflammation is to eliminate the source of infection or tissue injury and then return tissues to normal function. An unlimited inflammatory response, however, can cause damage to host tissues and contribute significantly to the pathophysiology of economically important diseases such as mastitis. A delicate balance between pro-inflammatory and pro-resolving mechanisms is needed to ensure optimal pathogen clearance and the prompt return to immune homeostasis in transition cows. Therefore, inflammatory responses must be tightly regulated to avoid bystander damage to host tissues. Oxylipids are potent lipid mediators that can regulate all aspects of the inflammatory response. The oxylipid network is complex, highly interactive, and often cell-specific in orchestrating the onset or resolution of inflammatory responses. At present, there is ample evidence in dairy cattle to suggest that oxylipid biosynthesis is controlled at several levels including the amount and availability of polyunsaturated fatty acid substrates, the relative activity and substrate preference of oxidising enzymes, and the degree to which

intermediate metabolites are catabolized to their end products. The biosynthetic profiles of oxylipids and the subsequent impact that these metabolites may have on the character of the inflammatory response is also likely dependent on the timing of their subsequent metabolism through various oxidising pathways. This presentation will provide a brief overview of the bovine inflammatory response and the role that oxylipids play in contributing to the onset and resolution of inflammation especially as it pertains to mastitis. Factors associated with transition cows that can contribute to dysfunctional regulation of inflammation as a function of altered oxylipid biosynthesis will be described. Specifically, there is a dramatic increase in linoleic and arachidonic acid concentrations in both plasma peripheral blood leukocytes during the transition period of dairy cattle. The impact that linoleic-derived oxylipids play in regulating bovine mammary gland endothelial cell functions in response to challenge with mastitis-causing pathogens will be presented. We will also show how arachidonic acid-derived lipid mediators metabolised by the cytochrome P450 enzymatic pathways can contribute to bovine vascular dysfunction during coliform mastitis. Nonsteroidal anti-inflammatory drugs are often used to modify the cyclooxygenase pathways that control prostanoid biosynthesis. However, we will show that changing substrate availability and the degree of lipid mediator metabolism are alternative approaches that can modify the expression of pro-inflammatory oxylipids. A greater understanding of the factors that can regulate the delicate balance between the initiation and resolution of inflammatory responses is needed in order to diminish the morbidity and mortality associated with health disorders of dairy cattle such as mastitis.

ANIMAL BREEDING AND GENOMIC – NEW BREEDING TECHNOLOGIES II

IS011

Emerging topics in livestock breeding and production

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The next future of livestock will be driven by two world needs, as the global population and global wealth both continue to increase so will the demand for livestock products, especially those which are highly nutritious and socially sustainable. However, high competition with other uses for land and water resources will also be intensified, hence more socially acceptable, efficient and sustainable livestock production will be needed. The application of emerging knowledge, integrated with new technologies, such as high-performance phenotyping, livestock farming precision, traits ontologies, genome editing, microbiome and deep learning,