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Editorial

Feeding Strategies and Nutritional Quality of Animal Products

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Feeding strategies play a crucial role in determining the nutritional quality of animal products. The type and composition of an animal's diet directly influence the nutritional content of the products derived from them, such as meat, milk, and eggs. Various feeding strategies, including traditional and modern approaches, impact factors like the balance of macronutrients, essential vitamins, and minerals, as well as overall product quality and safety. Alternative feed sources containing bioactive compounds are being employed as agents that improve the health of animals and enhance the quality of animal products [1]. Incorporating high-quality and well-balanced feeds, optimizing grazing practices, considering supplementary nutrients, and even implementing sustainable and ethical feeding practices can lead to animal products with enhanced nutritional profiles and improved consumer satisfaction. It is evident that the careful selection and management of feeding strategies are essential to ensure the production of animal products that meet both human dietary needs and sustainability goals. Ongoing research and developments in animal nutrition continue to refine feeding strategies. Scientists are working to identify novel feed ingredients, optimize nutrient delivery, and develop precision feeding approaches that cater to the specific needs of animals at different stages of growth.

Among the papers included in this Special Issue, ten discuss different feeding strategies for ruminants and non-ruminant farm animals (nine research studies and one review paper). The research papers regarding the nutrition of ruminants focus on enhancing the diets of sheep and lambs, bioactive feed additives for dairy cattle, beef cattle, and newly weaned Nellore cattle, and nutritional strategies for the prevention of clostridial disease in cattle. The studies on non-ruminant feeding strategies not only center around the effects of microencapsulated probiotics on weaned piglets but also the effect of age at slaughter on the meat quality of male layer-type chickens. The exposure of piglets to lower concentrations of Zearalenone mycotoxin and a natural nitrite, as well as antioxidant sources for pork mince, are also considered. The scientific subject of the lone review paper mentioned above relates to obtaining valuable pigment additives for poultry nutrition.

The papers featured in this Special Issue explore three main topics, namely, animal health and well-being, growth performance, and product quality.

Animal health is a comprehensive concept that encompasses various factors that contribute to the overall well-being of animals, with a critical focus on gut health and the immune system. These aspects are interrelated and play a pivotal role in determining animal's resilience to diseases, growth performance, and the quality of animal products. Implementing appropriate feeding strategies is integral to maintaining optimal animal health and enhanced product quality.

For this topic, Barbosa et al. [2] explored the feasibility of substituting 0.018 g of lasalocid sodium with 1.500 g of dried and milled barbatimão bark or 0.300 g of barbatimão bark extracts (*Stryphnodendron* sp.) in the diets of feedlot lambs. The findings of this study highlighted the advantageous impact of the investigated feed additives on health status by reducing total cholesterol levels when compared with synthetic feed additives. These results require further investigation into the bioavailability of bioactive compounds derived

Citation: Untea, A.E.; Saracila, M.; Vlaicu, P.A. Feeding Strategies and Nutritional Quality of Animal Products. *Agriculture* **2023**, *13*, 1788. https://doi.org/10.3390/agriculture13091788

Received: 25 August 2023
Revised: 1 September 2023
Accepted: 8 September 2023
Published: 9 September 2023

from such extracts. In the context of dairy cows, the persistent challenge of clostridial disease remains troubling despite the global utilization of various vaccine methodologies. Probiotics and holistic supplements are gaining prominence as preventive measures against clostridiosis. An innovative approach that has proved effective in bolstering animal resilience, particularly against *Clostridium perfringens* β-toxin, involves the amalgamation of microorganisms and bioactive substances. Nekrasov et al.'s study [3] discusses improved metabolism and heightened antioxidant status in cows. This comprehensive strategy offers valuable insights into the evolution of bovine clostridia prophylaxis. The use of biofunctional additives has emerged as a practical facet within the scope of animal biosecurity measures against toxins, paving the way for their integration into animal diets. This study marks a significant step in unraveling clostridia prevention strategies, holding potential applications in enhancing biosecurity through animal diets. Batista et al. [4] aimed to assess diverse strategies for supplementing immunomodulatory feed additives at (10 g/100 kg BW/day of NUTRA) before and after transportation in weaned Nellore calves raised on pasture and the subsequent impact on physiological parameters and performance as they progressed through the growth phase. Their findings suggest that the specific conditions of the experiment, such as the short duration of transportation stress and the relatively stress-free grazing environment, could have mitigated the detrimental effects of stress on the animals. Consequently, the anticipated advantages of employing the immunomodulatory feed additive might have been addressed. The impact of microencapsulated *Lactobacillus acidophilus* and *Lactobacillus plantarum* supplementation, individually and in combination, was studied by Lefter et al. [5] on weaning piglets. Their findings revealed a remarkable reduction in diarrhea incidence that was particularly evident in the *Lactobacillus plantarum* and combined *Lactobacillus acidophilus* + *Lactobacillus plantarum* groups. Furthermore, the use of microencapsulated probiotics exhibited distinct advantages in terms of intestinal health. These results collectively showcase the potential to mitigate instances of diarrhea while concurrently ameliorating both intestinal structure and microflora composition. Bulgaru et al. [6] concentrated on the effects of two ZEN-contaminated diets—one below (75 ppb) and one above (290 ppb) the EU's recommended levels—on immune and oxidative responses in weaned piglets. Strikingly, exposure to ZEN at both concentrations exerted minimal effects on immune markers, oxidative stress, and colon inflammation. However, for a more comprehensive understanding of ZEN's influence on immune defense, broader studies on various organs are required. These findings contribute to the assessment of suitable ZEN concentrations in piglet feed and offer insight into the underlying mechanisms driving its effects.

However, achieving this intricate equilibrium is not a solitary endeavor. Instead, it hinges on the strategic application of prudent feeding approaches. The importance of these approaches cannot be exaggerated, as they are pivotal in nurturing animal welfare and enhancing the quality of resulting products. By tailoring diets to encompass the specific nutritional needs of animals, these strategies underpin the establishment and preservation of optimal health. Consequently, the animals are not only better equipped to endure potential health challenges but also thrive, achieving their growth potential and manifesting their genetic traits to the fullest, showing the profound correlation between the growth performance and nutritional quality of animal diets. This topic is also covered in the papers published in this Special Issue.

Arcos-Álvarez et al. [7] investigated the effect of olive oil treatment on various aspects related to lactating hair sheep, including their productive traits, and their treatment strategy displayed a positive outcome, as it did not exert any detrimental influence on the productive behavior, milk production, or chemical composition of lactating sheep. In feedlot lambs, Barbosa et al. [2] showed that substituting lasalocid sodium with dried and milled barbatimão bark or barbatimão bark extracts (*Stryphnodendron* sp.) demonstrated no detrimental effects on production performances. Similarly, Batista et al. [4], after supplementing immunomodulatory feed additives in weaned Nellore calves, found that their treatment

had no effect on animal performance. Likewise, in Lefter et al. study [5] on weaning piglets, probiotics supplements showed potential in enhancing production performance.

Feeding strategies have a direct impact on quality attributes in animal products. From influencing nutritional quality and tastes to determining fatty acid profiles, the nutritional composition of diets significantly shapes the sensory and nutritional characteristics of the final meat products, thus influencing consumer preferences and choices. The effect of animals' diets on product quality is a topic of continuous interest for researchers, farmers and producers, as shown in some of the papers published in this Special Issue.

According to Arcos-Álvarez et al. [7], including extra virgin olive oil in the diets of lactating sheep appears to offer a viable approach to mitigate saturated fatty acids while simultaneously elevating the levels of monounsaturated and polyunsaturated fatty acids. The utilization of extra virgin olive oil contributed to significant enhancements in specific fatty acid contents, including linoleic, linolenic, and eicosapentaenoic acids with potential positive impact on heart health. Soares et al. [8] presumed that the incorporation of 1.6 g/kg supplement dry matter of a blend of live yeast (*Saccharomyces cerevisiae* strains) and organic trace minerals, particularly chromium, could effectively replace the conventional monensin (30 mg/kg) and inorganic trace minerals during the finishing phase of beef cattle, and their study reports favorable effects on feed efficiency and carcass traits. In fact, the inclusion of a blend of live yeast and organic trace minerals exhibited notable benefits in terms of animal growth and meat color, all of which were attributed to elevated concentrate intake and heightened diet digestibility facilitated by the utilization of live yeast and organic minerals. The insights derived from the research of Popova et al. [9] contributed to understanding how the meat quality of slow-growing chicken male layer-type chickens differs according to meat portions, particularly regarding chicken breasts and thighs. In terms of nutritional constituents, advancing age was linked to a noteworthy reduction in intramuscular fat content in thighs, with a similar trend observed in breast meat. Collectively, the meat from nine-week-old male layer-type chickens displayed certain drawbacks regarding fatty acid profiles. This aspect unveils potential avenues for future studies to explore diverse feeding strategies or housing systems to enhance this particular trait. The impact of introducing varying levels of ethanolic hawthorn berry extract in conjunction with a consistent concentration of fermented parsnip juice on factors like lipid stability, heme pigment conversion, residual nitrite content, and the growth of spoilage bacteria in refrigerated pork mince was investigated by Predescu et al. [10]. Coupling fermented parsnip juice with hawthorn extract exhibits a notable inhibitory impact on spoilage bacteria that break down nitrogen compounds, leading to enhanced stability in unsaturated fatty acids that are prone to oxidation in minced pork. In this study, the interplay between the hawthorn extract and the fermented parsnip juice appeared to be pivotal in governing color and lipid stability.

In response to the growing emphasis on natural products within the food and feed markets, the demand for organic ingredients is on the rise. Current trends in livestock nutrition research are leaning toward feed formulation diets that incorporate natural and organic feed additives [11]. These additives encompass active elements that impact plants, animals, and microorganisms, yielding valuable biocompounds. Notably, yeast pigments offer a wealth of natural colors, coupled with a broad spectrum of nutritional and medicinal attributes, as noted by Grigore et al. in their review [12]. Achieving these optimizations hinges on strategic approaches involving strain genetic engineering and process development, often utilizing cost-effective organic substrates. According to Grigore et al. [12], investigations into the effects of value-added yeast pigment additives on livestock well-being, productivity, and product quality are essential in substantiating their nutritional and medicinal potential. It is equally important to consider the perspectives and preferences of consumers regarding purchasing animal products derived from microbial pigment additives, as well as the need for an enhanced understanding of these additives and their implications.

In summary, the presented works contribute towards solving issues regarding the development of "Feeding Strategies and Nutritional Quality of Animal Products" in differ-

ent livestock systems. The reported results addressing sheep, lambs, dairy cattle, weaned cattle, and piglets, as well as product quality, are of interest to specialists and scientists involved not only in research but also in daily farm support and management. The feeding strategies presented in the works published in this Special Issue address some important aspects in terms of animal health, production performance, and product quality.

Author Contributions: Conceptualization, A.E.U., M.S. and P.A.V.; writing—original draft preparation, A.E.U., M.S. and P.A.V.; writing—review and editing, A.E.U., M.S. and P.A.V.; visualization, A.E.U., M.S. and P.A.V. All authors have read and agreed to the published version of the manuscript.

Funding: The GE would like to thank to the Romanian Ministry of Research, Innovation and Digitalization, project PED 631/2022 and the support provided by the program National Research Development Project to Finance Excellence (PFE)—8/2021, which facilitated the studies published in this Special Issue.

Acknowledgments: The Guest Editors would also like to thank all of the authors who contributed to this Special Issue, as well as the reviewers who reviewed these papers and the Managing Editors.

Conflicts of Interest: The authors declare no conflict of interest.

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