Green Economy and Meat Processing–Future Prospects

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Green Economy and Meat Processing – Future Prospects

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Abstract. This paper provides a brief overview of the possible strategies for reducing hydrocarbon emissions from the meat industry according to the Green Deal program of the EU in the next decades. An overview of emerging technologies (**h**igh-pressure processing (HPP), **s**hock wave technology (SW), **o**hmic heating (OH) **and p**ulsed electric field (PEF), cultured meat) that should reduce gas emissions is given, as well as methodologies that can be applied (labelling, sustainable cooking, product lifecycle management (PLM) and product data management (PDM) applications). Noticeably, most novel strategies draw the conclusion that we should go for lower consumption of meat, especially beef, and change habits to eat and prepare foods in energy and environmentally friendly ways, as well as apply the so-called "green" food declaration in the future. Transforming into a climate-friendly economy, protecting biodiversity, and reorienting the agri-food industry growth can contribute to creating greater resilience of society.

1.Introduction

Climate change has significant effects on food systems [1]. There is no single and generally accepted definition of the concept of a green economy, but it is certainly the result of efforts to make the economy more environmentally responsible and at the same time create a balanced and positive impact on the economy, society and the environment. Consumers are generally interested in how food production affects the state of the environment but also expect food quality to be preserved, safe and affordable [2]. Climate change should be at the heart of the European Union's economic strategy: "transforming into a climate-friendly economy, protecting biodiversity, and reorienting the agri-food industry growth" and can contribute to creating greater resilience of society. According to that program (the Green Deal), the European Union would have to legally commit itself to achieving "climate neutrality" by 2050 [3]. The main goal of this strategy is to support industry to innovate and to become global leaders in the green economy.

Many sources, including scientific publications, suggest various methods to produce and consume food economically to reduce gas emissions, but the majority of them claim that global reduction in meat consumption is required in the future [4]. Consuming smaller amounts of meat or eating more chicken, eggs or pork is a good way to individually reduce emissions, but it is unrealistic to expect that farming to be discontinued in order to quickly eliminate this contribution [5]. However, the rise in the availability of alternative protein sources, coupled with the associated health, environmental and economic benefits from eating less meat, is bolstering a plant-based food system [6]. A significant share of gas emissions in the food sector stems from losses in distribution chains or excessive food wasting by consumers (24%). Within this contribution, almost 15% belongs to food degradation because of inadequate food storage and handling (inadequate storage temperatures, food spoilage during the transport and mistakes in production processes). The remaining 9% is due to returns in retail because of food past it´s expiration date. Finally, it was estimated food waste is responsible for 6% of global greenhouse gas emissions [7]. In the European Union, a slight decline in meat consumption is predicted by about 1.1 kg on average annually by 2030. This is primarily because of

changes in food consumption habits and higher amount of chicken consumption. There is also an increase in awareness of the impact of food production on global climate change among the world population as well as the consumption of organic and environmentally certified food. Also, this decline in consumption occurs in the period when efforts are being made to introduce innovative production technologies, modernization of production processes, with the aim of environmentally efficient production. COVID 19 pandemic is projected to affect beef consumption in the EU by 2030, it could drop from 10.6 kg to 9.7 kg per capita [8].

2.Strategies to lower the footprint of meat processing

According to World Resources Institute (WRI), the world has to close a gap of 56% between the amount of food available today and that required by 2050. The world is projected to hold nearly 10 billion people by 2050. The same source says that consumption of milk and meat—foods that rely heavily on pasture for their production—is likely to grow by 68%. These rates of growth exceed those that prevailed from 1962 to 2010. Strategies to secure a sustainable food future should incorporate analyses, research and business measures. The WRI program includes methods to reduce food production`s impact on the environment (such as climate smart agriculture, climate friendly diets, reducing food loss and waste, green labelling) [9]. Clear communication of food to consumers in the food chain is essential. The open statement that certain food is produced in an environmentally friendly way in the food trade is very suggestive for the consumer. They decide which food to buy, so it is up to the producer to describe product transparently to the customer through an improved strategy of it´s labeling [10]. The EU estimates that more than 80% of a product's environmental impact is determined in the product conception phase. Product lifecycle management (PLM) refers to the management of data and processes used in the design, engineering, manufacturing, sales and service of a product across its entire lifecycle and across the supply chain. According to Maarit [11], Green PLM can be summarized as: "product conception processes that help to minimize the product's impact on the environment throughout its entire lifecycle." Hence application of PLM and also product data management (PDM) applications from vendors uniquely dedicated to food can contribute to future strategies to lower gas emissions from the food industry. There is also one more strategy, that of encouraging more sustainable cooking. The conversation about sustainable cooking clearly needs to be louder. This policy would make a contribution to a sustainable food environment in the future [12].

3.New technologies in meat processing and climate change

The meat industry has undergone significant changes recently by developing and introducing new technologies in the whole food chain (precision livestock farming, involving sensors and robotics in slaughterhouses and cutting departments and improvement of fermentation processes in the production) [13]. Application of emerging meat-processing technologies (high-pressure processing (HPP), shock wave technology (SW), ohmic heating (OH) and pulsed electric field (PEF)) to replace conventional energy-intensive processes has potential to reduce energy consumption and production costs, and improve the sustainability of the meat sector. These technologies are indicated to be more environmentally friendly. The design of HPP, PEF, OH and SW equipment should be advanced to achieve more environmentally friendly and energy efficient options for meat processing [14]. On August 5, 2013, the first hamburger grown from stem cells in a laboratory, and not in a cow, was served in London. This event was a milestone in the development of the scientific and technological capability to produce factory-grown, or cultured, meat [15]. Economically observed, meat from the laboratory is still an experimental technology under development. Although it is assumed that the new breeding technology will greatly help to preserve the environment, it is not possible to predict the real environmental and social implications. Cultivated, also known as artificial, *in vitro* meat, is considered as the product which is obtained from domestic animal cells. The cultivation process begins by taking cells of interest from a donor animal without injuring them. In the next step, under controlled

conditions with the addition of nutrients and growth factors, the culture will proliferate and increase in overall mass [16].

4.Conclusion

The green economy is an important part of the economy today, nationally and globally, and we now need to work on it in a more sustainable, comprehensive way. Influenced by new emission reduction strategies, the meat industry must also find ways to produce food in an environmentally friendly manner. Future design of emerging technologies and equipment included in modern meat processing should be advanced to achieve more environmentally friendly and energy efficient options. The future production and sale of ″green″ food products including meat becomes more profitable in domestic and international market. There is also growth in the number of consumers who prefer purchasing products that meet high standards of environmental protection. Understanding consumer needs and attitudes towards green products is good starting point in sustainability planning for green food producers. Consumer self-identification with characteristics related to the friendly attitude towards the environment is driving force of buying green products.

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