

# Chapter 56

## New Meat Without Livestock

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### ABSTRACT

*This chapter summarizes the global problems associated with livestock production and meat consumption and shows solution strategies through replacing animal products with plant-based alternatives. The positive effects of plant-based alternatives on human health and the environment are reviewed together with approaches for reducing world hunger. Psychological strategies for nutritional transitions towards more sustainable consumption patterns and criteria for market success of meat alternatives are presented. This is followed by an overview of meat alternatives – from soy<sup>1</sup>, lupine or wheat based, to bleeding burgers and artificial intelligence concepts. Marketing strategies and best practice policy suggestions complete the chapter.*

### INTRODUCTION

Global mass production of livestock and the consumption of animal products are the major cause of a wide range of serious problems – environmental, health-related, concerning animal welfare and world nutrition. Environmentally, livestock production is a, or the, leading factor in land use, water consumption, pollution, rainforest destruction, climate change, loss of biodiversity and soil erosion (Steinfeld et al., 2006). The main reason for most of these problems is the inefficiency of livestock, where the largest share of the feed calories is used in the animals' metabolism and converted to excrements instead of food for human consumption. Such lengthened food chains, namely plant to animal to human, are heavily inefficient in resource use compared to short food chains, namely plant to human (see Figure 1). This inefficiency also explains why mass production of livestock is associated with world hunger (see later for more detail).

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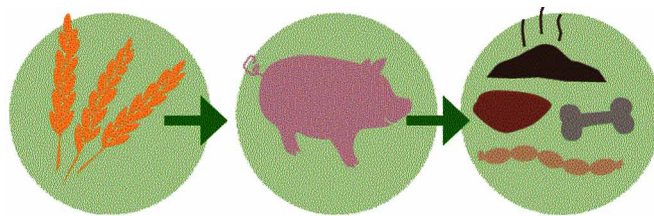
## New Meat Without Livestock

Most of the 70 billion animals (excluding sea creatures) produced annually for food consumption live in confined conditions raising severe concerns for their welfare. Although animal welfare is beyond the scope of this chapter, it is a major consideration for the wellbeing of all living beings on this planet. Intensive livestock production is a major risk factor for new global pandemics originating from industrial types of facilities as well as for antibiotic resistances while excessive consumption of meat, eggs and dairy is associated with lifestyle diseases, such as obesity, type 2 diabetes, cancer and heart disease (Schmidinger, 2012).

Given the convincing evidence about the negative impacts of animal-based dietary choices (Raphaely & Marinova, 2016), the question arises how to make consumers consume less of such food and whether a meat-free future is possible. This chapter explores plant-based alternatives to meat and other animal products together with strategies to encourage their acceptability. It also outlines criteria for market success which can trigger positive responses from the consumers and beneficial outcomes.

*Figure 1. Livestock's long food chain*

*Note: Lengthening the food chain by livestock production leads to a loss of a big share of calories from plants within the metabolism of the farmed animals, only a small share of the plant calories is converted to animal products, the major share is converted to excrements and lost for human nutrition.*



## MAKING CONSUMERS EAT LESS ANIMAL PRODUCTS

Promoting plant-based food diets has a solid environmental and especially health case and is increasingly finding space in the EU countries. This is the case in the food guidelines of Sweden (Fischer et al., 2016), France (ANSES France, 2017), the UK Eatwell Guide (Public Health England, 2017) and Germany (DGE, 2017). Producing, distributing, selling and promoting meat is a seriously lucrative business, which relies heavily on the well-established forms of animal mass production at a minimum cost for the producer and especially on the ever-increasing consumption of meat and other foods of animal origin. The existing marketing and advertising efforts aim at bolstering further the intake of animal-based proteins (Bogueva and Phau, 2016). This is despite the clear evidence about the positive consequences, for both human health and the environment, of dietary changes toward healthier and more sustainable plant-based intake (Raphaely and Marinova, 2016; Bogueva et al., 2017; Springmann et al., 2016) and meat alternatives (Schmidinger, 2012). A major shift is clearly necessary.

In principle, a shift could be achieved with existing foods which do not contain animal products, but new plant-based innovations can assist such a transition and make it more realistic (Aiking and de Boer, 2006). As it stands, at the moment the consumption of new alternatives has a long way to cut across existing habits before achieving mass popularity globally. Within any given society, the majority of people tend to adhere to an average diet. In traditional societies, this diet uses more plant-based

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