

## Chapter 64

# Soybeans Consumption and Production in China: Sustainability Perspective

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### ABSTRACT

*China is the world's top consumer and largest importer of soybeans used as human food and livestock feed. Since the 1980s, China's meat consumption has been growing despite this being an inefficient way of feeding the world's largest population. It diverts resources which can be used directly for human consumption. If the Chinese people were to maintain or expand their high consumption of soybean-based foods instead of switching to a meat-rich diet, greenhouse gas emissions would be reduced, and natural resource use improved. This chapter examines the trends in soy consumption and production in China and explores people's dietary preferences for soybeans, including concerns about the import of genetically modified soybeans. Without diverting soybeans to animal feed, the demand for them will decrease and will make China more self-sufficient. This study also provides educational guidance about the health benefits of plant-based foods and environmental damage associated with high consumption of animal-based products.*

DOI: 10.4018/978-1-7998-5354-1.ch064

## INTRODUCTION

It is well known that China is not able to produce enough soybeans for processing to meet the growing demands for human soybean-based food and animal feed for livestock. With the increasing household incomes of the Chinese people, their demand for meat and other animal-based foods is also growing. Foods that were once considered unaffordable or foreign are now part of the transition to more western style dietary habits (Ma Verkuil, Reinbach, & Meinert, 2017).

Although pork continues to be the dominate animal protein, there is surging interest in beef and poultry with China's total and per capita meat consumption on the rise since the 1980s (Nam, Jo, & Lee, 2010). Meat production reached 86.45 million tonnes in 2014 and annual meat consumption was 61.82 kg per person per year in 2013 (Ritchie & Roser, 2018). In 2014, the number of livestock animals raised for human consumption in China included 480 million pigs, 114 million cattle and 5.58 billion poultry compared to respectively 326 million, 52 million and 1.18 billion in 1980 (Ritchie & Roser, 2018).

Since the discovery by animal nutritionists that combined with grain, soybean can be used very efficiently as feed for livestock and poultry to boost the production of animal protein, soybeans have been consistently given to farm animals (Brown, 2011). As China's appetite for animal-based products, such as meat and milk grew, so did the conversion of soybeans to animal meal (Brown, 2011). According to Brown from the Earth Policy Institute (2011, p. 95), "since half of the world's pigs are in China, the lion's share of soy use is in pig feed. Its fast-growing poultry industry is also dependent on soybean meal".

This is in sharp contrast with the traditional use of soy which was domesticated as a garden plant by Chinese farmers around 1100 BC (NC Soybean Producers Association, 2014). The legume plant was named "miracle crop" because of its versatile properties and its ability to produce oil and other byproducts suitable for human consumption, such as tofu and soy drinks (U.S. Soybean Export Council, 2006). More recently, soybeans have been grown commercially all around the world for animal feed. In this day and age, "[s]oybean oil is the most widely used edible oil in the world and soybean meal is the leading protein and energy source for animal feeds" (U.S. Soybean Export Council, 2006, p. 4). Soy is also used in cosmetics, pharmaceutical, manufacturing and other industries, as a lubricant, in inks, paints and varnishes as well as biofuel.

The list of applications is long, but nowhere is soy as wanted as it has been as animal feed. This has led to land clearing and conversion to grow soy in some of the most important from a biodiversity point of view places, such as the rainforests of the Amazon (Brügger, Marinova, & Raphaely, 2016). The conflict between the use of soybeans as food and feed on a limited planet has escalated to enormous proportions and China (together with all other high-meat consuming countries) is contributing to large scale deforestation, greenhouse gas emissions, biodiversity loss and inefficient ways for feeding the human population (Schmidinger, Bogueva, & Marinova, 2018). Instead of being used for feeding people directly, soybeans are prepared as animal meal and fed to livestock. In the case of pork – the most popular meat choice in China, 11 calories are fed to the animal to produce 1 calorie for human consumption (Eshel, Shepon, Makov, & Milo, 2014). The respective figures for beef are 38 and for poultry 9 (Eshel, Shepon, Makov, & Milo, 2014).

A solution to the global demand for soy has been through genetic engineering and the development of genetically modified (GM) versions of soybeans. More than 90% of the soy planted in the US is genetically engineered with the assertions that this helps increase yields and reduce the use of pesticides (Brookes & Barfoot, 2017). However, some disagree with such a view (e.g. Satheesh, 2012) and are of the opinion that GM seeds have not delivered better performance than conventional soy. There are

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