

ETHICAL AND SOCIAL CHALLENGES OF AGRICULTURAL TECHNOLOGIES – ISSUES FOR DECISION-MAKERS

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‘None of us can avoid being interested in food. Our very existence depends on the supply of safe, nutritious foods. It is then hardly surprising that food has become the focus of a wide range of ethical concerns’.

Frans W. A. Brom and Bart Gremmen, ‘Food ethics and consumer concerns’, *Journal of Agricultural and Environmental Ethics* 12: 111–112 (2000).



EGE

It's almost 10 years since the EGE produced its opinion on the ethics of new technologies in agriculture.

Much has changed since we did this, but we noted that agriculture produces food, feed, fuel and fibre. The main issues for us were food security, sustainability of production and food safety. We were specifically asked not to touch that which was then a hot potato – GM agriculture, both arable and animal; we did ask questions about risk and benefit assessment when introducing new technologies into agriculture.



EGE

- Movement of people from rural areas into cities places heavy demands on distribution and infrastructure. It changes the nature of food produced and eaten, and results in losses because of pest depredation and time taken to get food to market
- Greater yield per hectare may involve changes to the way we grow crops, the use of chemicals, the type of crop grown, the use of land and even the size of farms.



**TABLE 1: Prevalence of undernourishment
(percent)**

	1990-92	2014-16
World	18.6	10.8
Developed countries	<5.0	<5.0
Developing countries	23.3	12.9
Africa	27.6	19.8
Asia	23.6	12.1
Latin America and the Caribbean	14.7	5.5
Oceania	15.7	14.2



Agriculture (including processing) is not only technical, economic or political in nature but also inherently ethical - to feed the world's population while respecting future generations' needs and expectations in terms of food security, safety and sustainability.



Food



Feed



Fibre

Fuel

Agriculture produces **food, feed, fuel and fibre** even though the number of people directly employed in agriculture is relatively small.

We use up to 80% of our land for settlement, production systems including agriculture and forestry and infrastructure.

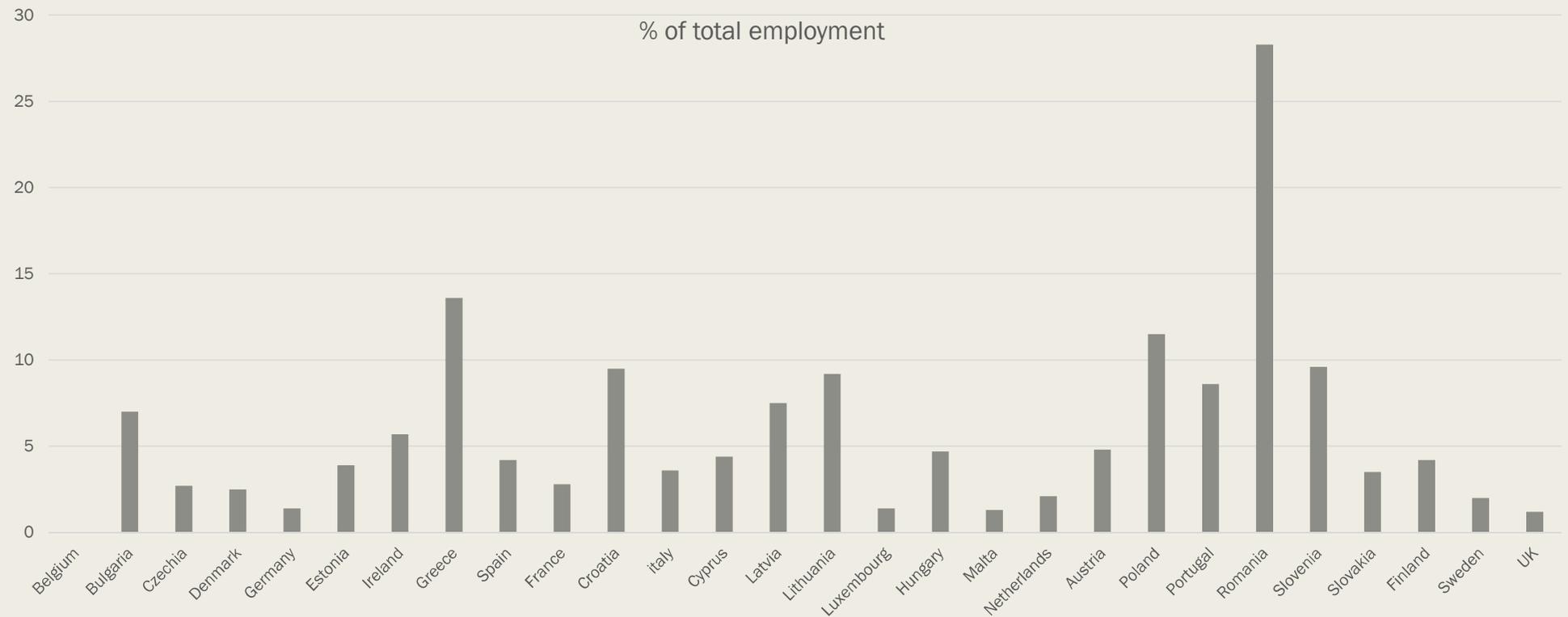
Food is more than something used to sustain us, it has cultural significance far beyond that –

“Terroir is uniqueness of place, what gives the food from that region a particular taste by virtue of what the soil brings forth, either in terms of the grass a cow eats that makes for a unique cheese or how a tomato grown in that place tastes by virtue of the particular nutrients contained in the soil. Nevertheless, it is more than just soil and climate. It is the application of the methods, techniques, habits and customs of a culture when it interacts with its soil for the purpose of growing food. Not just that of the farmer and vintner, but everyone else who is involved in transforming that food into a cuisine.”

<http://zesterdaily.com/cooking/food-terroir/>

The European Union is the world's largest import market for agricultural commodities and food

<https://www.fas.usda.gov/data/agricultural-exports-european-union-opportunities-and-challenges>



Most people in developing countries live in rural areas, and most of them depend on agriculture for their livelihoods.

Over the past 50 years, growth in crop production has been driven largely by higher yields per unit of land, and crop intensification. Trends are not uniform across regions, however. Most of the growth in wheat and rice production in Asia and Northern Africa has been from gains in yield, while expansion of harvested land has led to production growth of maize in Latin America and in sub-Saharan Africa.



Cereals, which include wheat, rice, barley, maize, rye, oats and millet, make up the majority of the production of the crop sector. They continue to be the most important food source for human consumption. Yet external factors, such as rising incomes and urbanization, are causing diets to shift towards diets that are higher in protein, fats and sugar.

In addition, livestock and biofuel production have and will most likely grow at a faster rate than crop production. This is causing a shift away from crops, like wheat and rice, towards coarse grains and oilseeds to meet demands for food, feed and biofuel.



Land is necessary for sustainable agricultural development, essential ecosystem functions and food security.

More than 1.5 billion hectares – about 12 percent of the world's land area – are used for crop production.

Although large amounts of land are potentially suitable for agriculture, much of it is covered by forests, protected for environmental reasons or are part of urban areas.

Some 90 percent of agricultural land is in Latin America and sub-Saharan Africa. At the other extreme, there is almost none available for agricultural expansion in Southern Asia, the Western Asia and Northern Africa.

Global demand for water has risen sharply over the last century. Total annual water withdrawal from agriculture, municipalities and industries rose from less than 580 km³ 1900 to more than 3 900 km³ in 2010.

Agriculture accounts for approximately 70 percent of total freshwater withdrawal in the world, mostly through irrigation.

This has been crucial for gains in food production since irrigation reduces drought risk and encourages crop diversification, thus also enhancing rural incomes. While irrigated agriculture represents about 20 percent of the cultivated land, it contributes to 40 percent of global food production.

Technology must be used to improve productivity and provide Europeans with food, feed, fuel and fibre considering:

- Food (and water) security*
- Food must be safe*
- Sustainable use of resources and fair trade at world level in agricultural products – respect for future generation's needs*
- Ethically sound design of sustainable agriculture policies*

Technology must be used to improve productivity and provide Europeans with food, feed, fuel and fibre considering:

- Much food and feed is wasted – either due to the methods used for distribution and pest depredation or through consumer waste.



New technologies, whether they modify the genes in the commodity or not, can increase yield, improve the way we use land, improve our use of water where it is scarce, improve storage and distribution.



- Every single major science academy in the world has come out and said GMOs are safe. But Greenpeace and other green parties continue to deny it because this is the very best fundraising they have ever had. They have made huge amounts of money in funding as a result of being anti-GMO.
- We now have 30 years of experience, we now know that it s perfectly safe. There has not been one documented case of any problem, and there have been thousands upon thousands upon thousands of hectares of these crops. Not one incident.
- I don t like people telling lies about science. Science is a very factual way of looking at the world.

Richard Roberts, Nobel Laureate

- Only two traits—insect resistance and herbicide resistance—had been genetically engineered into a few crop species and were in widespread use in 2015.
- Many claims of positive and negative effects of existing genetically engineered (GE) crops have been made.
- For a variety of scientific, economic, social, and regulatory reasons, most genetically engineered (GE) traits and crop varieties that have been developed are not in commercial production.
- “The available evidence indicates that GE soybean, cotton, and maize have generally had favorable economic outcomes for producers who have adopted these crops, but outcomes have been heterogeneous depending on pest abundance, farming practices, and agricultural infrastructure.

Genetically Engineered Crops: Experiences and Prospects,, NAS 2016

- When new technologies are introduced an impact assessment should be performed – it should examine both the risks and benefits to human and animal health and to the environment and should include the risks and benefits of retaining current technologies. The assessment should take into account safety, security and sustainability of the product and the manner in which the new technology may impact on the environment and the human cost of changing the manner in which food is produced
- It is the characteristics of the (biotechnology) product, the environment into which it will be introduced, and the application of the product that determine its risk (or lack thereof). – new US coordinated strategy document



A new generation of crops known as gene-edited rather than genetically modified is coming to the market. Created through new tools that snip and tweak DNA at precise locations, they, at least for now, largely fall outside of current regulations.

New York Times 9th January 2017