

Perspectives on crop research: food vs fuel

D L Easson

Agri-Food and Biosciences Institute, Northern Ireland, United Kingdom

Email: lindsay.easson@afbini.gov.uk

Arable farming was once a major component of Northern Ireland agriculture. In the 1850's 40% of farmed land was ploughed, some 400,000 ha. Potatoes, flax and turnips were important crops, but by far the greatest proportion of land was in oats, and most of the oats were fed to the work-horses that ploughed the land and carried out the cultivations. Until the advent of the tractor about 50% of ploughed land was essentially in an 'energy' crop, and not in the human food chain. These figures are a stark warning, if one is required, that to generate any meaningful quantities of biofuel and biomass for energy in Northern Ireland will require a huge commitment of land and a significant shift in the nature of our agriculture. However, the figures also indicate that if the 'climate' were right in all the senses of the word (physical, economic, political, social) there is a precedent to the devoting of a significant proportion of our country to 'energy crops' in the widest sense.

The debate on 'fuel vs fuel' has shifted because there is a greater understanding that the issue is not fundamentally 'fuel' but is being driven by the need to reduce greenhouse gas (GHG) emissions. We need therefore to look at the role Northern Ireland agriculture might have in achieving reductions in GHG emissions through the production of biomass and biofuel. Looking at the situation today, we have the lowest self sufficiency for animal feed in Europe, with 80% being imported. Furthermore the initial surge for the production of 1st generation biofuels (wheat to ethanol and vegetable oil to biodiesel) has now been shown to be of relatively little benefit in terms of reduction in fossil fuel use and GHG savings.

The food vs fuel debate was 'fuelled' by the increasing proportion of world cereal production being devoted to ethanol production, principally in the USA and currently at about 10%. In 2007 and 2008 when world grain reserves fell due to droughts, poor harvests, increasing demand and diversion of supplies to biofuel, commodity prices rose and penalised the world's poor disproportionately. However, as a result of record world harvests of cereals in 2008 and 2009, world cereal stocks have recovered, and in spite of devoting a proportion of cereals to biofuel, grain supplies have increased more rapidly than world population over the last 50 years. The scare of 2007/08 made people realise that food is a scarcer source than fuel, and its production has to be maintained on a continuous basis. Solar energy, the gravitational pull that generates the tides, nuclear power and even fossil fuels for all their failings are more consistent, predictable, and dependable than our sources of food production. Thus food production commands the greatest proportion of our efforts, and food use will out-bid fuel uses for scarce resources, pushing up the prices in times of shortage.

Any move from Northern Ireland to devote part our arable area into biofuel crops will result in an increase in imported feeds, and in a very small way reduce world cereal stocks while making very little impact on the reduction of GHG emissions. However we need to consider the impact of bringing grassland back into energy crop production. Grassland in NI supports the dairy, beef and sheep industries. Rough grazing and hill ground could be considered for forestation, but the more productive grass land that was, perhaps, once under the plough could have the potential for energy cropping in some form. The motivation for doing this might also be economic as the FAPRI-Ireland model (Breen, Hennessy and Thorne, 2008) indicated that 80% of beef farms in Ireland were not economically viable and the projection was that the position may worsen in the future.

While there is certainly an increasing market for meat particularly in the developing countries, changing land use from unviable animal production in NI to energy cropping will reduce imports of feedstuffs, release cereals for human consumption and therefore contribute to both more fuel and more food, a win/win situation. If ruminant GHGs also fall then it is a win/win/win situation!

Thus, if economically viable, possible options may be short rotation coppice (SRC) Willow and Miscanthus for dry biomass and the anaerobic digestion of fresh or ensiled grass. Of the 1000 or so hectares of SRC willows in Northern Ireland most has been planted in arable areas because it has been the more progressive forward thinking farmers who have taken up this opportunity. However, the real need is, through research, to develop economically viable SRC systems and markets for willow biomass in the predominantly grassland areas, and it will take community involvement to create local markets for biomass which cannot be economically transported great distances. Miscanthus has made little headway in Northern Ireland, principally through the lack of a market for this bulky material which is less suitable than wood chips for smaller scale markets.

The most exciting possibility for Northern Ireland is the potential to remain in grass production, build on the skill and experience of local farmers to grow and conserve digestible, high energy grass and use it to generate biogas methane. The technology is there to use this to generate electricity and heat, or even better to refine biogas into vehicle fuel. In Europe progress is being made into the gasification of dry lingo-cellulosic materials such as wood chips into vehicle fuels, but as yet only one such plant is operating in Europe and this is on a scale and requires capital investment that beyond our scope at present. Significant challenges therefore remain for the research community, government policy makers and for the agriculture industry if in Northern Ireland we are to see anything like to amount of biofuel grown than was the case in 1850.

Reference

Breen, J., Hennessy, T., and Thorne, J., (2008) Medium Term Outlook for the Beef, Tillage and Dairy Farm Sectors, FAPRI-Ireland, Teagasc