Summary

Biomass for animal feed and energy; Scenario analysis of shift in raw material use

It may be interesting to use certain raw materials and residual flows for the production of bio-energy rather than for animal feed. This report provides insight for four scenarios or 'global pictures' from Eururalis into the expected shift from raw materials for animal feed resulting from increased bio-energy production and the impact for the animal feed sector in the Netherlands.

Four scenarios

The calculated Eururalis scenarios mainly vary on regulation (strong versus limited regulation) and geographical scale (globalisation versus regionalisation).

The 'Global Economy' scenario combines international collaboration with a radical reform of the collective sector. The 'Global Cooperation' scenario also focuses on international collaboration related to the environment. The feature of the 'Continental Market' scenario is far-reaching reform of the collective sector. In this scenario, however, the European countries are not prepared to concede some of their sovereignty. In the 'Regional Communities' scenario, the government has strong regulatory powers and there is a strong focus on social and ecological issues.

Aim and design of calculation model

The aim of the calculation model is to indicate the effects of the production of bio-energy on the Dutch animal feed chain, without taking into account price changes. The calculations were carried out for the year 2020 and show per raw material whether there was an *excess* of raw materials in that year or whether conversely *extra import* was required (compared with basis year 2005). If the need for relatively high extra imports is indicated, then that means great pressure on the Dutch market for animal feed raw materials.

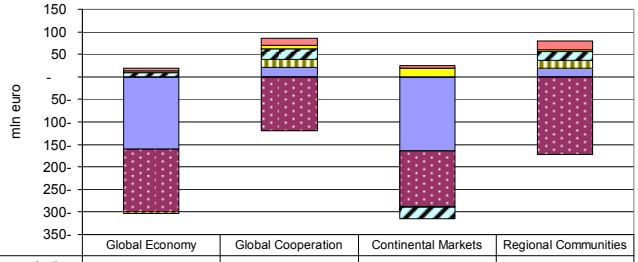
Results

In the various scenarios, shortages in the availability of animal feed raw materials[1] occur due to the production of bio-energy. Figure 1 shows that there will be

[1] Instead of 'shortage', 'extra import need' may be read.

a significant shortage of seeds and coarse meal in all scenarios in 2020 while two scenarios show a sizeable shortage of grain.

Figure 1 **Calculated excesses and shortages of raw materials for animal feed in the Netherlands in 2020 compared with 2005 (in millions of euro)**



	Global Economy	Global Cooperation	Continental Markets	Regional Communities
residual products of energy production	5	15	7	20
residual Food and Beverage products	5	7	18	5
roughage	9	24	26-	19
tapioca	3-	17	2-	18
extracted seeds and beans	139-	120-	124-	172-
cereals	161-	21	164-	18

The shortage of raw materials in the four scenarios totals:

- Global Economy: 285m. euro = 7.1% of total turnover;[1]
- Global Cooperation: 35m. euro 0.9%;
- Continental Markets: 290m. euro 7.3%;
- Regional Communities: 92m. euro 2.3%.

Interestingly, it can be concluded that the shortages in the Global Cooperation and Regional Communities scenarios were generally fairly small. This was despite the more ambitious objectives for the production of biotransport fuels in these two particular scenarios. However, in these two scenarios, the number of livestock is declining fast, meaning fewer raw materials are required for the production of animal feed. In the Global Economy and Continental Markets scenarios, there were much bigger shifts, putting the animal feed market under increasing pressure. The shortages mainly related to seeds and coarse meal and in two of the four scenarios there is also a shortage of grain.

From a subdivision humane-bio-energy-animal feed, it appears that in all scenarios the total use of raw materials is increasing compared with the situation in

[1] In order to place the amounts better, the calculated shortage is shown as a percentage of the total turnover in the mixed feed industry (4 billion euro in 2005; see Baltussen and Bolhuis, 2008).

2005, most of all in the 'Global Economy' scenario. The humane use remains around 12% of the total in all scenarios, the amount of raw materials for bio-energy increases from 2% in 2005 to 5 to 17% in 2020.

A further analysis shows that besides the objectives for the amount of bio-energy, the number of livestock is a very important factor. The productivity of agricultural land and the level of imports of biofuels also play an important role.

Discussion

For four Eururalis scenarios (or 'global pictures') with different (policy) assumptions, the calculation model shows the shifts in the use of animal feed raw materials in the Netherlands as a result of the production of bio-energy. Due to its simplicity and user-friendliness, the model can be a valuable instrument for knowledge exchange between policy makers, knowledge suppliers and people from the field.

A limitation is that the model cannot calculate the impact of a change in energy prices on the demand for raw materials, for example. Like the other models, it is also unable to determine the degree to which a (economically) suitable raw material will actually be used as a material for energy production. For these aspects, expert knowledge should be brought in.

Various studies have shown that increased production of bio-energy may have a limited impact on the animal feed market, partly because of the by-products released during the processing of arable crops for biofuels which can be used as animal feed (Silvis et al., 2009; Baltussen and Bolhuis, 2008). Nowicki et al. (2007) emphasise the effect of technology on the market for animal feed raw materials. As soon as the secondgeneration technology breaks through, the economic importance of grain and other arable crops will soon disappear.

Recommendation

This calculation model should be developed further into a policy-support tool which incorporates sustainability effects as well. The policy staff involved will then have to indicate in which form the model is best suitable for them.