International competitiveness of oil and protein crop production systems (T)

Yelto Zimmer, Folkhard Isermeyer

Federal Agricultural Research Center (FAL), Institute of Farm Economics, 38116 Braunschweig, Germany
Email: yelto.zimmer@fal.de

Abstract

In an increasingly globalized world, agricultural production of the different products will be re-located to those regions and farms which exhibit the lowest cost of production. The ***agri benchmark*** cash crop network of farm economists, advisors and growers provides for a conceptual and infrastructural framework to run international comparison on a uniform basis. ***agri benchmark*** cost calculation for different oilseeds reveal strong variation in cost and marked disadvantages with regard to cost of production – primarily of (Western) European farms. The most important factors for differences in operating cost across the board – in itself the most important cost category – are farm size and production systems. Government payments and protection from international competition lead to large differences in returns as well. Therefore high cost of production for high return countries are in line with economic theory. However, it remains to be seen whether low cost oilseed alternatives will become relevant in the EU – especially in biodiesel production - and consequently create pressure on rapeseed prices as well as the need for adjustments on European oilseed growing farms.

Key words: cost of production, competitiveness of farms, production systems, typical farms, biodiesel.

JEL Codes: Q12, Q17, Q18

1. Introduction

The global increase in bioenergy production affects global oilseed production in three ways: On the one hand rapeseed is a major source for biodiesel, which is of particular relevance to Europe. On the other hand, on the farm level oilseeds have to compete with other agricultural raw products especially for ethanol, the most important biofuel globally. Last not least biodiesel can be produced from various feedstock – hence the question arises how competitive are the different oilseeds. In the long run cost of production of the relevant oilseed crops are the relevant indicator for competitiveness.

agri benchmark[1] provides for a network of agricultural economists and a number of tools to analyze these differences in cost of production on farm level. This analysis includes a thorough look on the different production systems which tend to have a major impact on cost of production.

2. *agri benchmark*: background, motivation and vision

Until the late 1980s, international farm comparisons were only carried out on an ad hoc-basis, mainly within the scope of Ph.D.-studies, some of which were performed by one of the authors of this paper [1, 2].

The results of these comparisons were recognized as being useful. At the same time they revealed the following problems:

- required data was either not available at all or not available in the scope required to perform total cost analysis
- available data did not allow costs to be differentiated into their price and their volume components to explain cost differences
- available data was usually not comparable across countries

In order to overcome the problems of the past as outlined above in 1997 the International Farm Comparison Network was founded which later became ***agri benchmark***. The vision of ***agri benchmark*** is 'to improve understanding of farming world-wide'.

agri benchmark is a world-wide association of agricultural scientists, advisors and farmers. Within the framework of this co-operation, farms and agricultural production systems are defined that are typical for their region. For the most important agricultural products and regions in the world, ***agri benchmark*** delivers answers to the following questions:

- How is farming done (farming systems, production technology)?
- What is the level of variable and total production cost?
- What are the reasons for advantages and disadvantages in cost of production?
- What is the perspective of agricultural production at the locations considered?

In this way, ***agri benchmark*** can be seen as a **navigation system** in the rapidly changing global agricultural sector.

The Cash Crop branch of ***agri benchmark*** was established in 2004, until now it is active in 13 countries – including

[1] *agri benchmark* is a global network of farm economists working in the branches Cash Crops, Beef and Dairy; the project is jointly managed by DLG and FAL. For further detail see www.agribenchmark.org.

countries like Brazil, Argentina, US and Canada or Ukraine. The group of international partners meets once a year in a conference to discuss results, to prepare Cash Crop Reports [3] and to decide on future projects of the network.

3. Global trends in oilseed and rapeseed markets

For a better understanding of the global oilseed market, the interaction between the different oilseed crops as well as the global trade some key figures are presented here.

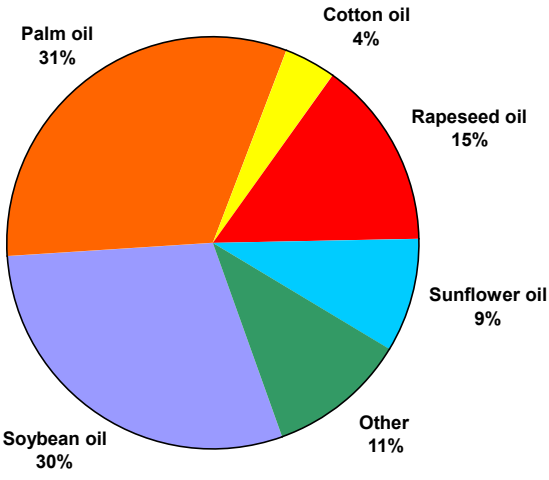

Figure 1: Global market shares of different plant oils

Figure 1 reveals that next to soybean and palm oil which are by far the most important plant oils, rapeseed oil is the #3 with a market share of 15 %. Since 1999 this pattern of market share was essentially stable, even though we have had an increase in global oil production by 40 %.

In all major uses the oils mentioned here are close substitutes, therefore it has to be assumed that prices for soybeans and palm oil respectively determine global plant oil prices.

Source: Oil world (2006), own calculations

However, as displayed in figure 2, since 2005 there has been an ongoing trend towards a stronger increase in rapeseed oil prices relative to soybean oil.

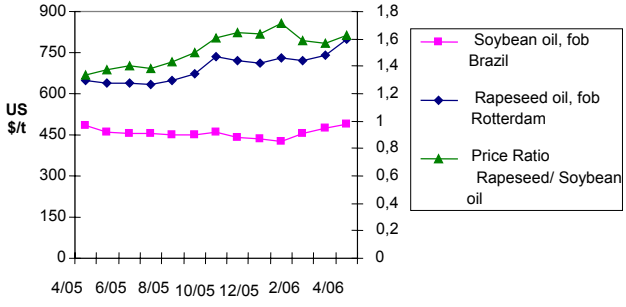

Figure 2: Evolution of soybean and rapeseed oil prices

This increase in rapeseed oil prices relative to soybean prices is primarily driven by the demand of biodiesel factories for rapeseed oil, which is almost the exclusive feedstock for European biodiesel production. Legally defined technical standards are the cause for this dominance of rapeseed oil. In 2006 about 50 % of the European rapeseed production was converted into biodiesel.

Source: USDA (2006), own calculations

Just recently the EU Commission issued a paper on biofuels [4] in which they called for lesser stringent technical standards for biodiesel which in turn might open the market for non-rapeseed oils. With regard to future development it has to be kept in mind that the three major producers of soybeans Brazil, the US and Argentina are increasingly producing biodiesel based on soybean oil.

The increase in rapeseed oil prices not only triggered increasing imports of oil but a significant increase in European rapeseed production well above the global growth. Europe now is the most important rapeseed producer; back in the 1980th China was the largest. All other major producing countries maintained their share in global output during this period even though global production increased by 200 %.

4. *agri benchmark* farm level data

The competitive position of oilseed crops can be evaluated with the help of some selected ***agri benchmark*** results.

At the first glance farm data on total **cost of production** make us believe that in a more globalized agriculture there is little room for high cost producers – primarily located in Europe. Their costs of production are currently significantly higher than those of overseas producers, especially those from South America (see figure 3). The gap between the five most expensive producers and the five least cost growers is more than 200 $/t RE[2] or 175 % respectively.

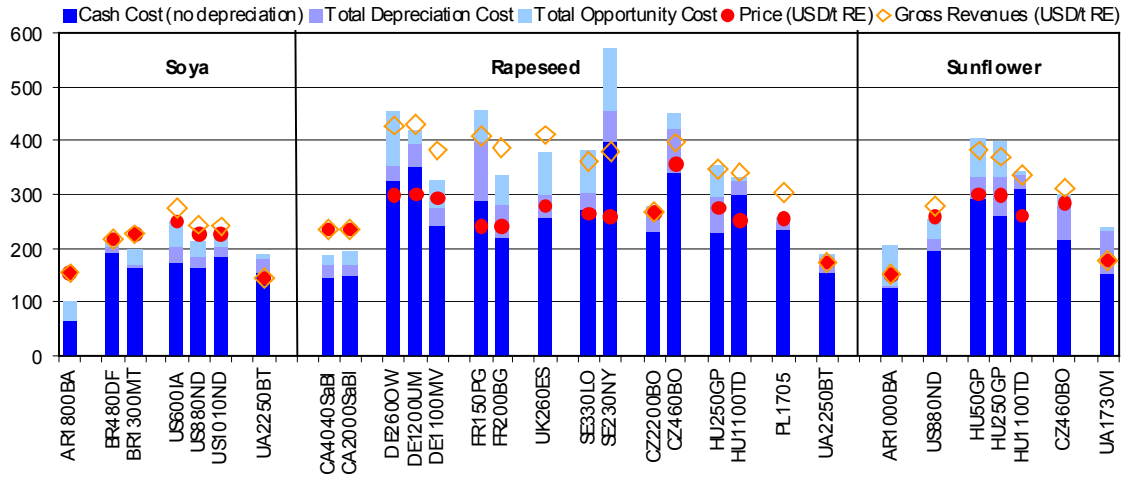

Figure 3: International cost comparison for oilseed production (USD/t RE)

Source: Zimmer et al. (2006)

Figure 3 also reveals significant differences in cost of production within the group of rapeseed producers: The two Canadian farms spend less than 200 $/t RE whereas two German, one French and the one British farm realize total cost of more than 400 $/t RE.

The disadvantage in cost of production is primarily driven by **operating cost**: On average almost 40 % of total costs are operating cost; they range from about 60 % down to little above 20 %. Regression reveals that over 60 % of variation in total cost of production can be explained by differences in operating cost.

Operating cost themselves are driven by the **number of operations** like spraying or cultivation carried out by the grower.

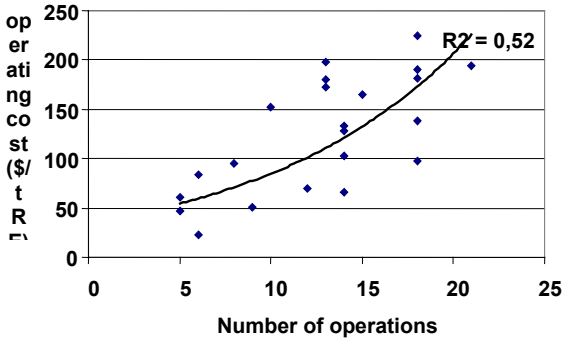

Figure 4: Number of operations: driving factor for operating cost

Production systems differ significantly between different regions and farms. In oilseed production for instance the number of operations can be as low as 5 in Argentina or as high as 21 in Germany. The impact of numbers of operations on operating cost can be analyzed with the help of a regression. As can be seen in figure 4, over 50 % of the variation in operating cost can be explained by the number of operations. The increase in yield and hence in revenue associated with more operations is not able to compensate for the increase in operating cost caused by more operations.

Source: Zimmer et al. (2006)

Due to different market prices and government payments there are **major differences in gross revenues** (see amber diamonds in figure 3), therefore cost of production are just one side of the coin. In order to take into account these differences an **analysis of economic productivity** has been carried out. The revenues per Dollar spent on operating cost are much more even across the sample than cost or revenues are. The majority of ***agri benchmark*** farms generates 2 to 3.5 $ revenue with every Dollar spent on operating cost. However, when deducting government payments from gross revenues of EU-farms most of them realize a productivity of operating cost of only 1 to 2 $.

Keeping in mind the fact that in cash crops we just started the total cost analysis and pending methodological issues like value of land have to be solved yet, these results lead to the following preliminary **conclusions**:

[2] For a comparision of different oilseed crops, a synthetic unit „Rapeseed Equivalent" (RE) has been calculated. This value is derived by the processed value of each crop relative to rapeseed taking into account different contents and values of oil and meal. For sunflower this factor is 1.034 whereas for soybeans it is 0.861. This means soybean yields expressed in RE are a bit less than originally because the accumulated value of their content is higher than the one for rapeseed.

- In oilseeds there are currently major cost advantages for overseas producers and the Ukraine relative to their EU counterparts. With the exception of Canada this implies a competitive edge of non-rapeseed oilseeds over rapeseed.
- Current high rapeseed prices relative to soybeans have widened the gap between high European gross revenues and relatively low levels for western hemisphere producers.
- High cost of production per unit of output are to a large extend driven by differences in production systems when expressed in the number of operations.

The EU is considering a mandatory blending target of 5.75 % biodiesel – even a quota of 10 % has been suggested. Due to legally defined technical standards this strategy would be primarily based on rapeseed. Therefore it seems to be likely that in future high rapeseed prices will prevail. On the other hand the low cost of production of the Ukrainian and the Canadian farms create a rather strong incentive for increasing exports to the EU and hence – depending on the volumes traded – pressure on EU price levels. This pressure will even increase to the extent future European biodiesel production will be based on cheaper non-rapeseed feedstock as suggested by the EU commission. This in turn would create the need for growers to adjust their farming systems to new price / cost ratios.

References

1 Isermeyer F. (1988), Produktionsstrukturen, Produktionskosten und Wettbewerbsstellung der Milcherzeugung in Nordamerika, Neuseeland und der EG. Kiel: Wissenschaftsverlag Vauk, Arbeit aus dem Institut für Agrarökonomie der Georg-August-Universität Göttingen [Dissertation]

2 Deblitz, C. (1994), Internationaler Vergleich von Systemen extensiver tiergebundener Grünlandnutzung: Produktionstechnische und ökonomische Analyse, Wettbewerbsfähigkeit, internationale Übertragbarkeit. Kiel: Wissenschaftsverlag Vauk, Arbeit aus dem Institut für Agrarökonomie der Georg-August-Universität Göttingen [Dissertation]

3 Zimmer, Y. et al. (2006), *agri benchmark* cash crop report 2006, Braunschweig

4 An EU strategy for biofuels, COM (2006) 34 final, p. 13