2.1 Latin America: Also in future the powerhouse in soybeans

In recent years we have seen a significant increase in arable land use in Argentina and Brazil (Figure 2.1.2). From 2000 to 2008 in Brazil an increase of 6 % (3.3 million hectare) took place, in Argentina the respective figure stands at 15 % (4.1 million hectare). To put this increase into perspective: it equals roughly 50 % of the total arable land in Germany, South Africa or Thailand.

When looking at the composition of crops grown it shows that this increase is caused mainly by an increase in soybean acreage (Figure 2.1.3). In fact since soybeans and corn acreage grew so much, some other crops must have decreased as well. Hence, the question arises whether ***agri benchmark*** farm level data provides a source of explanation of this trend towards soybeans.

Since the US is still the largest global soybean producer this analysis will be done in comparison to the US. In the end, the question shall be answered whether there are significant differences in the economics of soybean production between Latin America and the US.

Production systems in Latin America

On typical farms in Argentina as well as in Brazil, soybeans are produced in a rotation together with corn – in Argentina and on the smaller Brazilian farm wheat is also present. Figure 2.1.1 displays the typical cropping patterns. In both systems there is double cropping on 30 to 50 % of the land available. However, the way double cropping is realized is totally different:

While on the Brazilian farm soybeans are the leading crop and corn is the secondary crop, on the Argentinean farm soybeans as a first crop make up only a small fraction (25 %) while the bulk of soybean acreage is "late soybeans" or second crop.

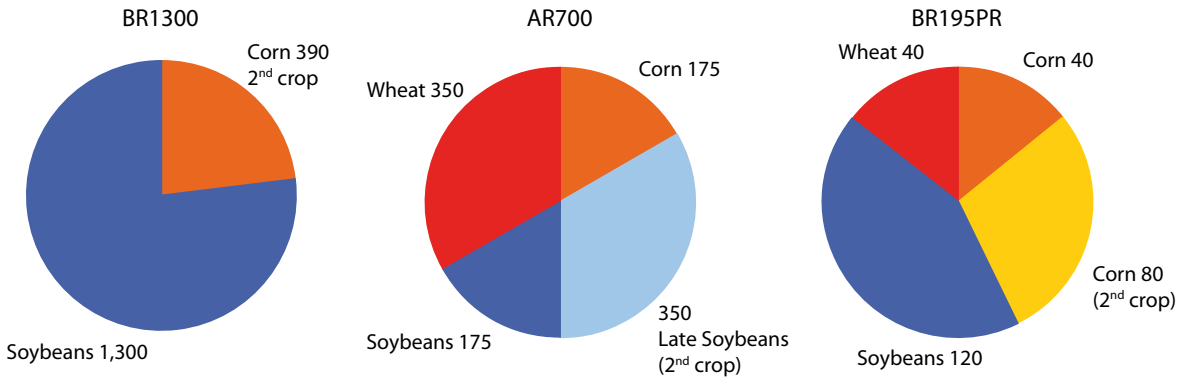
Typical farms in Latin America

The following more detailed economic analysis will focus on two Brazilian farms: BR1300MT in Mato Grosso and BR195PR in Paraná and three Argentinean farms: AR330ZN in the Zona Nucleo, AR700SBA in the South East of Buenos Aires Province (Necochea) and AR900WBA in the West of Buenos Aires Province (Trenque Lauquen). It can be assumed that in the entire province of Buenos Aires the rotation as described above is typical.

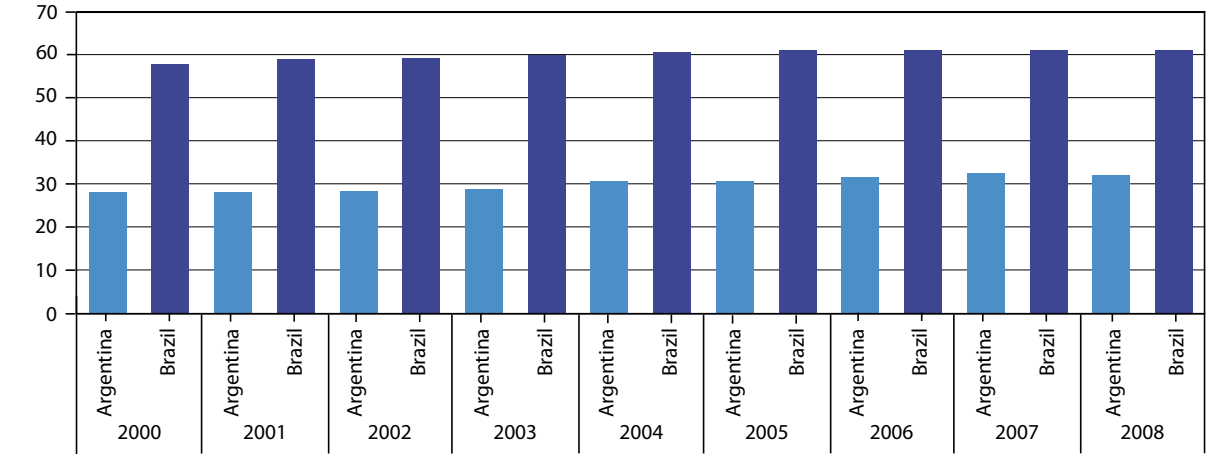
Production systems in the US

In order to compare South American systems with the USA the two typical ***agri benchmark*** farms US700IA in Iowa and US900ND in North Dakota are used. While the farm in Iowa normally operates on a 50:50 rotation of soybeans and corn the farm in North Dakota is practicing a soy-corn-soy-spring wheat rotation. Due to climatic conditions, neither of the two farms is doing any double cropping.

2.1.1 Cropping patterns (ha)

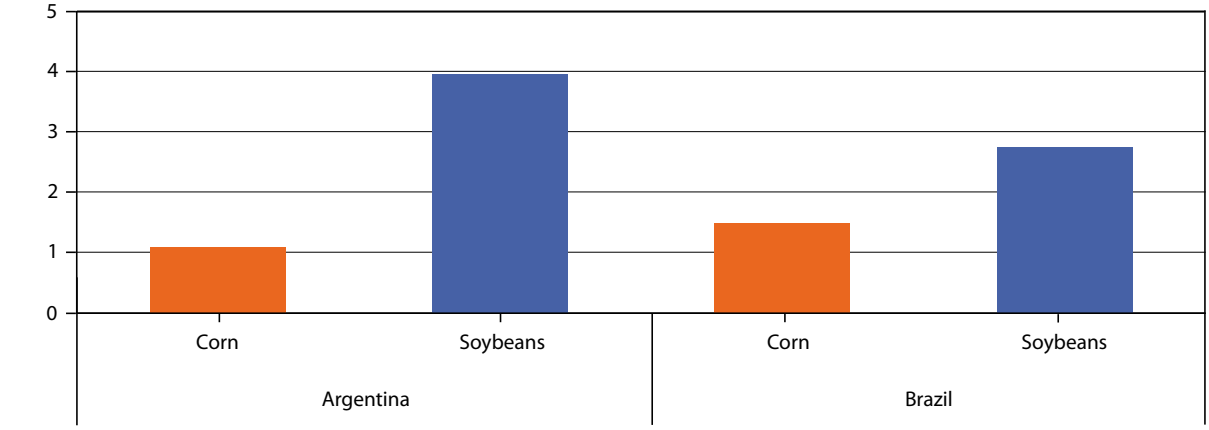


2.1.2 Evolution of arable land use in Brazil and Argentina (million hectare)

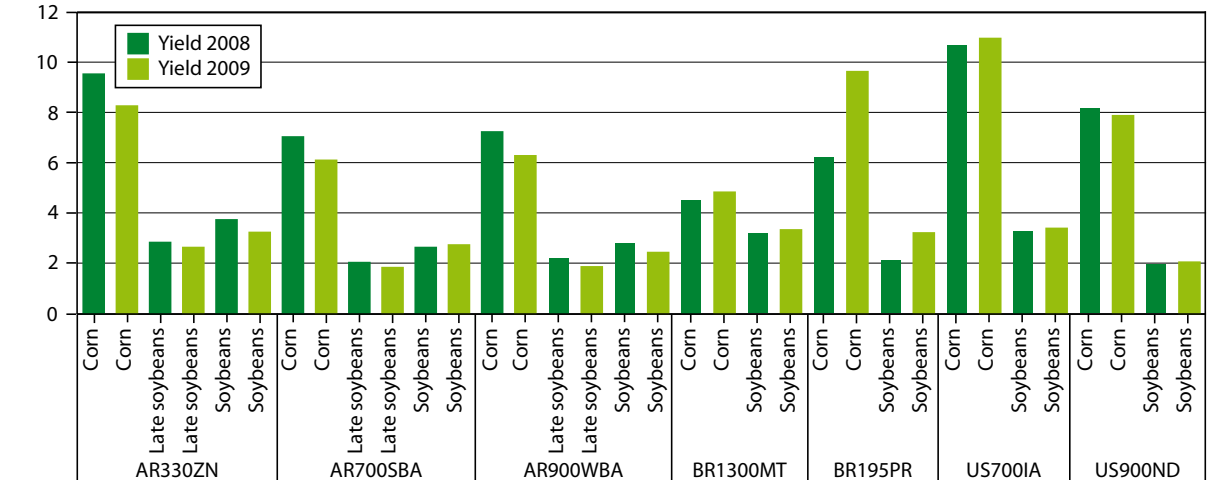


Source: FAOSTAT

2.1.3 Increase of soybean and corn acreage in Brazil and Argentina 2003–2008 (million hectare)



2.1.4 Yields 2008 and 2009 on typical farms in Argentina, Brazil and USA (t/ha)



2.1 Latin America: Also in future the powerhouse in soybeans

Yields and input levels

When comparing the different production systems in economic terms, different yields and input levels are the starting point (Figure 2.1.4). Late soybeans or soybeans as a 2nd crop which are grown on the Argentinean farms yield about 2 to 2.5 t/ha while soybeans as a 1st crop yield about 3 to 3.5 t/ha. Yields in Argentina tend to be lower than in Brazil – except for the farm in the Zona Nucleo which has the best soils of the three Argentinean farms.

Typical yield levels in soybeans in the US are divers: While the typical farm in Iowa is producing 3 t/ha the farm in North Dakota only harvests 2 t/ha.

When looking at direct inputs (Figure 2.1.5), the differences in seeding cost appears to be obvious. Since all farms are using Roundup Ready soybeans this difference is caused by different market conditions which again are driven by differences in executing patent rights.

Brazilian farms are rather input intensive...

On a per hectare basis, the large Brazilian farm realizes the highest spending in phosphate (app. 110 USD/ha) while the Argentinean farm only spends 40 USD and US700IA is in the middle with 70 USD/ha. The US farm in North Dakota with low soybean yields is spending just 30 USD/ha. Due to higher phosphate prices in the US compared to Argentina and Brazil, this difference in intensity is even stronger when looking at the physical input. While the large Brazilian farm applies 90 kg/ha, US700IA is spreading just 45 kg/ha; US900ND just over 20 kg.

… especially in plant protection

The most striking difference between the US and Latin America in soybean production is in fungicide and insecticide: High expenditures at Brazilian farms are caused by up to eight plant protection applications; spending of typical Argentinean farms are the result of only one pass with fungicide and insecticide. US farms tend to be less intensive; just the Iowa farm has two passes with herbicides. The farm in North Dakota only adds one insecticide.

Brazil: high direct cost per tonne

This high input intensity for Brazilian farms is not compensated by higher yields as can be seen in Figure 2.1.6. Compared to Argentina, direct cost per tonne is about two times higher. Relative to the typical Iowa farm, depending on the year, the gap is only 30 to 40 USD/t or 20 to 30 %.

High input intensity in Brazil and the US relative to Argentina is mirrored in operating cost per hectare. While the Argentinean farms face operating costs of about 130 to 150 USD/ha Brazilian values go up to 200 to 300 USD/ha; a similar situation can be found in the US. Given the yield differences the cost per tonne gets closer as can be seen in Figure 2.1.7 but Brazilian and US farms still produce at about 50 USD/t higher cost when compared to Argentinean farms, which operate at 50 to 60 USD/t. However, when taking into account different land costs as well, the results for the Latin America farms come even closer while the US farms are much more expensive.

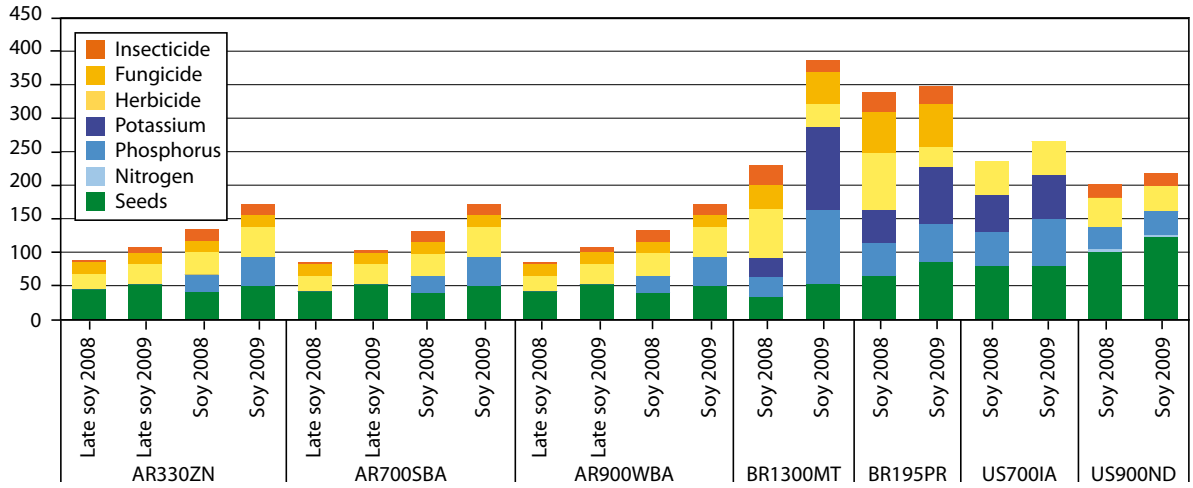
When comparing cost differences, prices received have to be taken into account. Farms in Argentina are facing a 30 % export tax; in Brazil high logistics and transport costs reduce farm gate prices significantly.

What about opportunity cost for land?

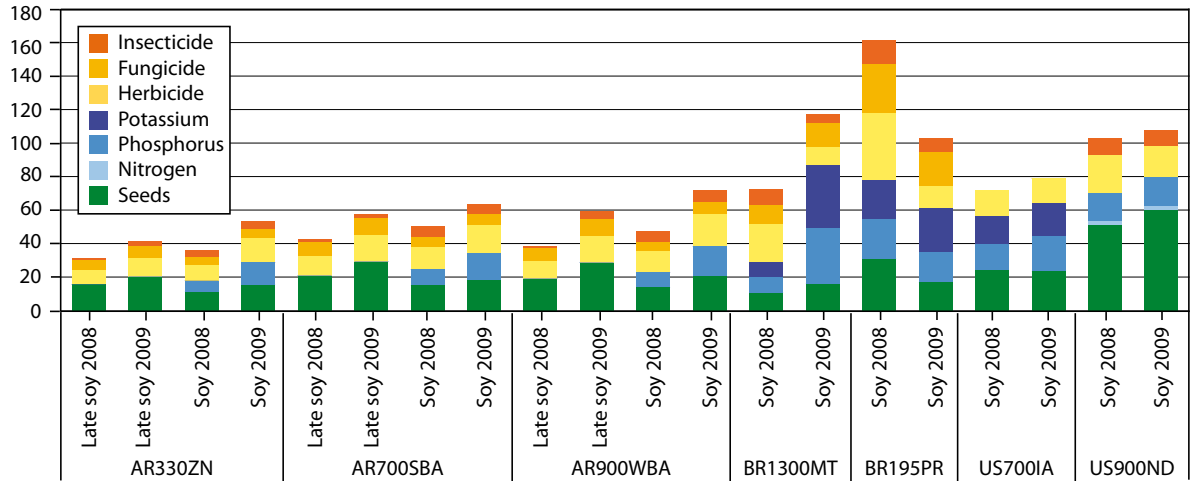
When looking at the competitiveness of farming systems opportunity cost for land is key: What alternative revenues could be realized on a given land when cropped with another crop. As mentioned in the introduction in all three locations corn is the relevant alternative.

Therefore, in the next part we will have a closer look at gross margins for soybeans and corn.

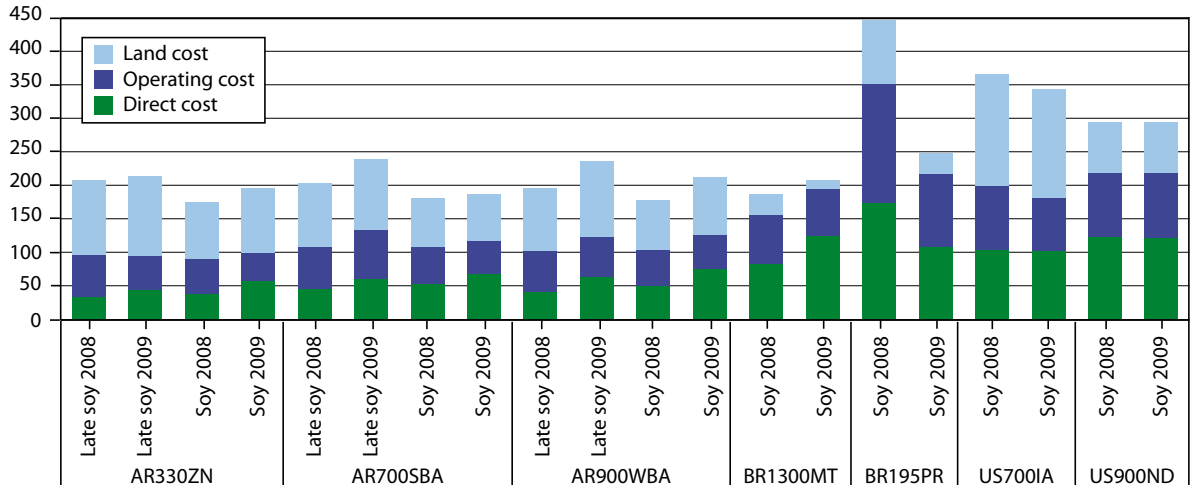
2.1.5 Crop establishment cost soybeans in 2008 and 2009 (USD/ha)



2.1.6 Crop establishment cost soybeans in 2008 and 2009 (USD/t)



2.1.7 Key cost items soybeans (USD/t)



2.1 Latin America: Also in future the powerhouse in soybeans

Gross margins: Soybeans vs. corn

In Figure 2.1.8 the difference between gross margins in soybeans and in corn are plotted. In order to compare the correct figures, in Latin America the soybeans which have been produced as a main crop went into this comparison. It can be seen that:

- Under the circumstances of the year 2008, the US farms' corn production was much more economical than that of soybean. The reverse is true for farms in Latin America.
- Under 2009 conditions, also in the US, soybean production was more attractive than corn, however, the gap between the two crops tends to be larger in Latin America, especially in the Brazilian farm in Mato Grosso, which is considered to be the "Soy State".
- In 2009 the two larger Argentinean farms realized very poor yields, particularly in soybean (Figure 2.1.4). With a normal yield ratio such as in 2008, the advantage of soybean gross margins over corn would have been in the range of 230 to 280 USD/ha.
- When comparing the two regions, it has to be kept in mind that in Argentina there is also soybean as a 2nd crop. This implies land cost allocated here are to a certain degree arbitrary (Figure 2.1.7). Hence, total cost of production may be significantly lower.

Price ratios that drive soybeans in Latin America

The main driver for this difference in relative economic performance is the ratio of soybean and corn prices. Therefore in Figure 2.1.9 these ratios are displayed. The following conclusions can be drawn:

- Even though in 2008 the price ratio in the US was in the range of 1:2.4, the gross margin in soybeans was much lower than in corn.
- On the other hand: Even with a price ratio of just 1:2 which was realized by the Argentinean farms in 2008 soybeans have been as good as corn or slightly better than corn.
- At a price ratio of 1:2.5 which was realized in 2009, the gross margin advantage of soybeans over corn produced on typical Argentinean and Brazilian farms was in the range of 200 to 300 USD/ha. The respective value for the two typical US farms was just 100 USD/ha.

Latin America will remain the global soybean powerhouse, but…

- In order to supply global soybean markets the ratio of soybean and corn prices in the USA needs to be in the range of 1:2.3.
- For growers in Latin America this price ratio implies a very strong incentive to focus on soybean production rather than on a more even distribution of acreage between soybean and corn as is the case in the USA.
- Whether US growers will move to more corn driven rotations when price ratios are lower than 1:2.5 depends on fertilizer and corn prices. Reasons: the average yield advantage of corn following soy vs. a corn-corn-rotation is app. 12 %. In addition, the nitrogen leftovers from soybeans are currently valued at approximately 35 USD/ha.
- From this finding it can be concluded that the USA has become a marginal soybean producer in the sense that even though cost of production is higher than in other parts of the world, the output is needed in order to supply the global markets with vegetable oil and protein.
- Whether the economic incentive to focus on soybeans in Latin America will cause problems remains to be seen. The Argentinean ***agri benchmark*** partner Martin Otero from Hillock raises two issues which may prevent Latin American growers from constantly running rotations with high soybean shares: Firstly, this concept is considered to be rather humus consuming which in the long run will negatively affect soil productivity. Secondly, such a rotation does not make use of the rotational benefits from having corn as a previous crop for soybeans.

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