SELECTED RESULTS OF THE IFCN BEEF NETWORK

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ABSTRACT

The global players in beef production are North America, Brazil, Argentina, Australia and the EU-25. In value-terms, the main exporters are North America, Australia, Brazil and Argentina. Main importers are again North America, Japan and the Far East. Within the framework of the International Farm Comparison Network (IFCN), and using harmonised methods for analysis, a total of 29 typical beef finishing farms in 15 important beef producing countries were analysed. The farms show significant differences in production systems and productivity levels. The highest cost of beef production is found in the EU-countries (US$ 350–500 per 100 kg carcass weight), the lowest in Argentina, Uruguay and Pakistan (US$ 100–130). In the case of trade liberalisation, farms with low costs of production have an incentive to export to markets with higher price levels. A benchmarking example is given for Brazilian, German and Argentinian farms revealing the specific strengths and weaknesses of the typical farms. Further, the time series analysis of identical farms illustrates the necessity of regular cost and price comparisons. The future potential of beef production depends on availability of land, possibilities for intensifying production and the competition with other land uses. Whether an increase in production leads to a net trade surplus depends mainly on the development of the demand for beef.

Keywords: Beef production, international competitiveness, International Farm Comparison Network

INTRODUCTION

This paper presents a selection of results obtained within the IFCN Beef Network in the last four years. For the background, objectives, general methods, organisational issues and further steps of the IFCN, please check the separate paper on IFCN. In this paper, specific methods applied in the IFCN Beef Network are briefly described and then an overview of results is given.

Specific methods in the IFCN Beef Network

The product or output of the beef finishing enterprise is defined as: animals of different categories (bulls, steers, heifers, calves, cows) that are exclusively reared for slaughter. Hence, it does not include cull animals from the dairy or cow-calf enterprise. So far the results presented are restricted to heavy male animals that are produced for export, can potentially be exported, or replace imports. The beef finishing enterprise starts when animals are bought from outside the farm and/or when animals are transferred from the dairy or the cow-calf enterprise to the finishing enterprise on the same farm. The cost allocation of labour, land, machinery, buildings and overhead costs from whole farm level to the beef and cow-calf enterprise in the TIPI-CAL model is done semi-automatically by applying enterprise codes. Based on these codes, various return shares are then calculated and used to allocate the above-mentioned costs to the beef finishing and the cow-calf enterprise.

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Global overview

Main beef producers and traders

Fig. 1 shows the importance of world regions for cattle inventories, production and trade and Fig. 2 provides an overview of the most important countries for beef and buffalo meat trade. Approximately 60 percent of the world's cattle inventory can be found in South America, South Asia and Africa. On the other hand, almost 60 percent of the world beef production comes from North America, South America and the EU-15. These figures reveal the enormous productivity differences between North America and the EU-15 on the one hand and the Asian and African states on the other hand. The United States is by far the largest beef producer, followed by the EU-15 and Brazil, which in the meantime has caught up with the European Union.

When it comes to trade, the concentration on a few regions becomes even more obvious (see Fig. 2). North America, South America and Australia/New Zealand combine approximately 85 percent of the total export value, whereas imports are dominated by Japan and the U.S. at comparable levels, followed by the Far East (without Japan) with growing importance. The EU external trade (i.e., the internal EU-trade is not reflected) has a share of only around five percent for both exports and imports. These shares changed in 2004 due the BSE-outbreaks in North America and the subsequent import-bans for U.S.-beef that were still in force at the time this paper was written. The presentation will provide a few more illustrative world maps on key beef indicators.

Fig. 1. Regional shares in cattle inventories, beef production and trade, averages of the years 2001-2003

	Percentage share of the regions in ...			
	Inventory (mill. head)	Production (mill. tons)	Export (mill. US$)	Import (mill. US$)
EU-15	6	13	5	7
North America	8	23	42	27
South America	23	21	16	3
South Asia	20	3	1	-
Far East Asia	9	12	2	12
Japan	0	1	-	27
Oceania	3	5	27	-
Africa	17	7	2	3
Ex-USSR	4	7	2	5
Rest	10	8	3	16
World	100	100	100	100

Source: FAOSTAT

Milk and beef countries

Cattle for finishing may come from dairy cows or from suckler cows. The countries can be grouped by their percentage of suckler cows into total cow numbers (see Fig. 3):

– 'Milk countries' with a share of the suckler cows of < 25 percent of the total number of cows are Poland, Pakistan, Hungary, the Czech Republic and Germany.

– 'Mix countries' with a share of between 25 and 75 percent of the suckler cows in the total number of cows are New Zealand, Austria, France, Ireland and Spain.

– 'Beef countries' with > 75 percent of the suckler cows in the total number of cows

are the U.S., Canada, Brazil, Australia, Argentina and Uruguay.

Due to different productivity levels of the suckler cow and the dairy cow herds, their share in total beef production may differ from the cow-ratios, but these figures provide at least an idea of the herd composition (for more details on selected countries see IFCN Beef Report 2003). This composition is relevant for an explanation of different production systems, meat quality and the impacts of agricultural policies if dairy and cow-calf farms are affected to different extents.

Farm data and results

A total of 29 farms with beef finishing enterprises in 15 countries were selected and analysed within the framework of the International Farm Comparison Network (IFCN) . Countries

Fig. 2. World beef and buffalo meat trade, average of the years 2001-2003 in US$

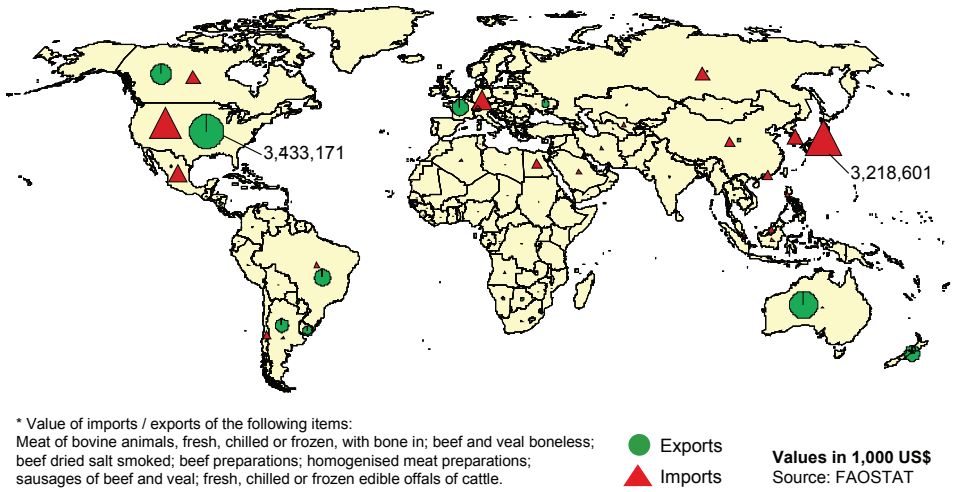
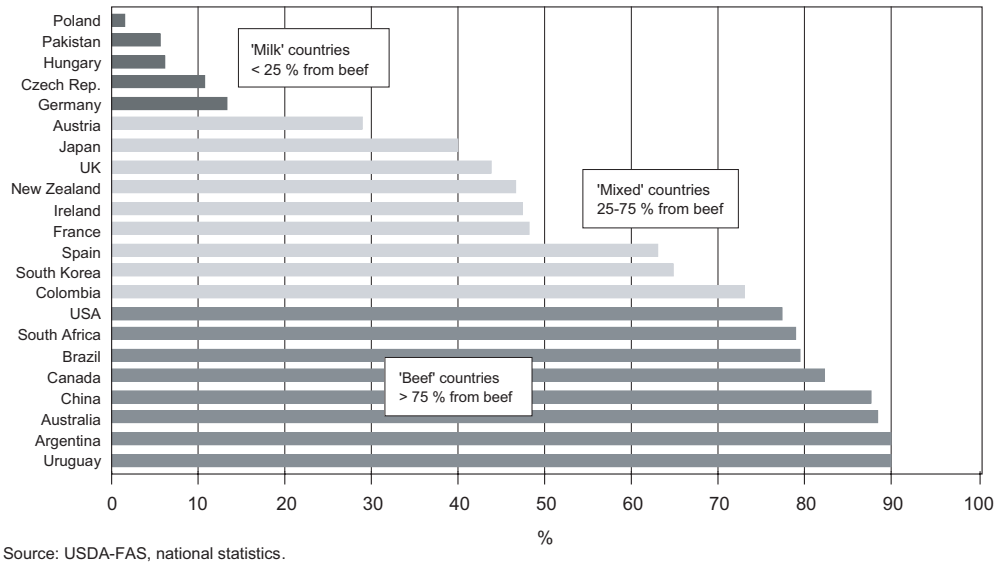


Fig. 3. Share of suckler cows in total cow numbers



Source: USDA-FAS, national statistics.

analysed were Austria, Germany, France, Ireland and Spain in the EU-15, the Czech Republic, Hungary and Poland for the New Member States of the EU; the U.S., Argentina, Brazil and Uruguay for the Americas; and Australia, Namibia and Pakistan. The typical farms are located in the most important beef production regions in their countries and apply the prevailing production system in their country. For methods and details of data collection and processing see the separate paper on IFCN.

Fig. 4 gives an overview of the farms analysed and provides an overview of the most important indicators of the production systems.

Name (1)	Region	No. & category of animals sold p.a.	Breeds	Main feed sources	Age at start (days)	Daily weight gain (g / day)	Final weight (kg LW)
AT-7	Steiermark	7 steers	Lim x Fleck	Pasture + grass silage	240	704	700
AT-30	Niederösterreich	30 bulls	Fleckvieh	Maize silage + grains	100	1390	705
DE-190	Bavaria	120 bulls 70 Feeder	Fleckvieh	Maize silage + grains	50	1291	649
DE-240	Bavaria	240 bulls	Fleckvieh		50	1255	673
DE-280	Northrhine-Westphalia	280 bulls	Fleckvieh		60	1154	680
DE-360	Mecklenburg-Pomerania	282 bulls 80 steers 130 fem. weaner	Fleckvieh X / Holstein	Grass & maize silage + grains	180	920 - 1236	620 - 685
FR-45	Pays de la Loire	31 bulls 16 cows 2 breed. heifers	Charolais	Grass & maize silage + hay + grains	244	1566	695
FR-90A	Brittany	90 bulls	Char / Lim	Maize silage + grains	274	1250 - 1349	673 - 710
FR-90B	Brittany	90 bulls	Char x Dairy / Normands		7	1110 - 1122	667 - 685
ES-950	Catalunya	950 heifers	Crossbreeds	Straw + concentrates + grains	35-135	1254 - 1368	430 - 470
ES-6950	Aragón	3,808 bulls 3.128 heifers	Crossbreeds		20	1327 - 1428	497 - 528
IE-75	Connaught	75 steers	Continental X	Pasture + grass silage + concentrates	563	548	675
CZ-160	North-east Bohemia	160 bulls	Holstein	Grass & maize silage hay + grains	28	836	656
CZ-780	North-east Bohemia	780 bulls	Holstein		28-345	805 - 922	620
HU-80	South Transdanubia	80 bulls 61 breed. heif.	Hereford	Maize silage + grains	230	1304	525
HU-440	Central Transdanubia	440 bulls	Holstein		95	933	520
PL-12	Wielkopolskie	7 bulls 5 heifers	Black-white	Pasture + grass silage + hay + grains	15	860	520
PL-30	Podlaskie	20 bulls 9 heifers	Black-white	Pasture + grass & maize silage + grains	15	879	530
US-7200	Plains	7,195 steers	British x Continent.	Grains + alfalfa hay	265	1444	578
AR-1300	Buenos Aires	1,300 steers	Angus/Heref./Zebu	Pasture + hay	180	540-549	400-450
AR-2700	Buenos Aires	2,061 steers 648 heifers	Angus	Pasture + hay + maize stubble (+ grains)	210-255	549-603	390-425
AR-1000	Buenos Aires	1,000 steers 181 breed. heif.	Angus/Hereford		210	500 - 644	405 - 410
BR-180	Mato Grosso do Sul	180 steers 94 breed. heif.	Nelore	Pasture	240	319	490
BR-500	Mato Grosso do Sul	500 steers 265 breed. heif.	Nelore		210	347	480
UY-880	Litoral Centro	880 steers	Hereford X	Pasture + hay + maize stubble	210	450 - 550	440
AU-1100	New South Wales	922 steers 184 heifers 79 breed. heif.	Angus X	Pasture + grains	210	964	486
NA-125	Omaheke	80 steers 44 heifers 16 breed. heif.	Brahman x Fleck	Pasture	240	355	530
PK-3	Layyah, Punjab	3 bulls	Nilli Ravi (Buffalo)	Freshly cut green grains + cottonseed	120	463	300
PK-50	Faisalabad, Punjab	50 bulls	Nilli Ravi (Buffalo)	Freshly cut green grains + concentrates	600-780	778	460

(1) Initial letters refer to the country; number refers to total finished cattle sold per year

Source: IFCN Beef Report 2004.

Production systems and physical indicators

The number and type of cattle sold per year ranges from three buffalo bulls in Pakistan to 7,200 steers in the U.S.-feedlot. The farm names indicate the country and the total number of cattle finished per year. Some of the farms produce female cattle as well as male cattle. Female cattle are not shown in the comparison. The only exception is the Spanish farm ES-950 which exclusively produces heifers of around one year of age. Despite not being directly comparable with the male cattle, they were taken into consideration as they form an important part of Spanish beef production. Other cases for producing animals other than male cattle are shown in the figure.

The prevailing breeds in Western Europe, Poland and Czech Republic are Holstein breeds and their crosses, Fleckvieh (Simmental) and the French beef breeds Limousin and Charolais. In Hungary, Ireland, the U.S. and the Southern Hemisphere, breeds of British origin (mainly Hereford, Angus and their crosses) dominate. Particular cases are Brazil (Nelore, originating from India) and Pakistan, where the local buffalo breed is used for both milk and beef production.

With regard to the main feed sources for the male cattle, in general steer production is common in systems based on grass and/or with calves of cow-calf origin, whereas bull production is found in the confined systems and/or origin from dairy. The two main systems are:

– Grass (pasture) based systems, mainly found in the Southern hemisphere, in the Austrian hills, Ireland and, to some extent, in Poland.

– Maize (silage) / grain / soybean based systems in the intensive conventional farms in Austria, Germany, France, the Czech Republic and Hungary. The Spanish farms and the U.S.-feedlot are special cases with no feed-producing land, buying all feed from outside the production site. The Spanish farms feed rations of straw, concentrates and grains, and the U.S.-feedlot has a ration of 85 percent grains (mainly corn), 12 percent alfalfa hay plus three percent minerals

The age at start of finishing mainly depends on whether the calves come from dairy herds (young calves) or from cow-calf herds (animals between seven and eight months). Some farms finish backgrounder cattle (CZ-780, IE-75, PK-50) with a significantly higher age at the start of finishing.

Daily weight gains are mainly determined by the intensity of the finishing process. Consequently, the highest weight gains of 1,100 grams per day and more can be observed in the U.S.-feedlot, Spain, Germany, France and the small Hungarian farm. The opposite end is observed in the Brazilian and the Namibian farms where weight gains just reach between 300 and 350 grams per day.

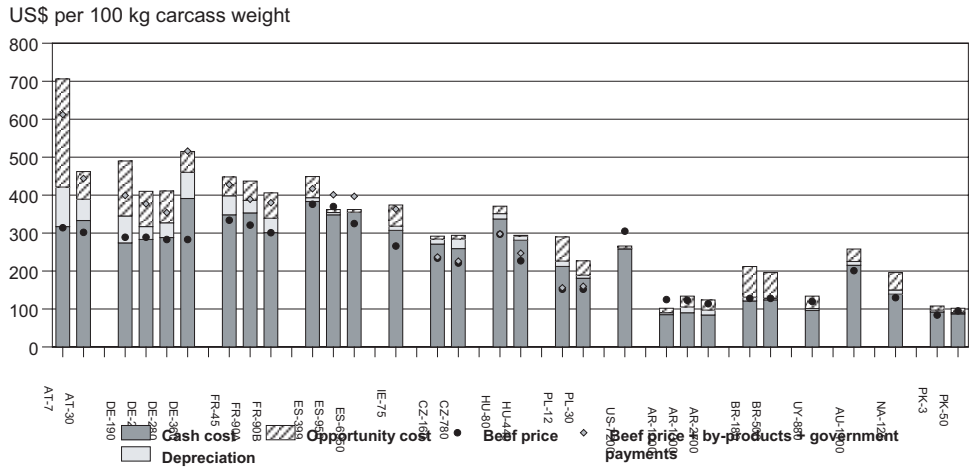
Final weights in most of the Western European countries and the Czech Republic are between 600 and 700 kg live weight (LW). Spain is an exception with rather low finishing weights due to the preference of the local consumers for light coloured meat from young animals. Weights in most of the Southern Hemisphere countries are between 400 and around 500 kg LW. This is mainly due to the smaller-framed breeds used, the farming system applied and some (local) market preferences. In the small Pakistani farm, animals are sold at rather low weights before the bulls create management problems in the smallholder farms with no or inadequate confinement possibilities for the animals. They might be sold for slaughter or to another more specialised finisher like PK-50. The latter, however, is not yet very widespread.

Economic results for the year 2003

In the following, a summary of the economic analysis for the year 2003 is presented. Figures are stated in US$ per 100 kg carcass weight (CW) of beef sold. Total costs in Fig. 5 are grouped into cash cost, depreciation and opportunity cost for production factors owned by the

farmer and his family (labour, land, capital). Returns are stated as a) 'beef returns' on one side and b) 'beef returns plus government payments' on the other side. The difference between b) and a) are the government payments, if there are any. With the exception of ES-950, the analysis was made for the male cattle shown in Fig. 5.

Fig. 5. Total returns, cost and profitability of beef production 2003



Source: IFCN Beef Report 2004.

Total cost went up in 2003 compared with 2002 due to the valuation of most national currencies against the US$. Unlike in 2002, when production costs in Argentina were less than US$ 100 per 100 kg CW, in 2003 none of the farms analysed managed to produce beef for less than US$ 100. At the same time, the cost of the Western European countries jumped up approximately US$ 80 per 100 kg CW compared to the previous year. The production costs in Western Europe are still 3.5 to four times higher than the cost of the low-cost producers in South America and Pakistan.

The total cost can be grouped as follows:

– Very high: > US$ 400 per 100 kg CW for the farms in Austria, Germany and France with an extreme of US$ 700 for the Austrian hill farm AT-7.

– High: US$ 300–400 for the Irish and the Spanish farms and the small Hungarian farm

– Medium: US$ 200–300 for the Czech farms, the large Hungarian farm, the Polish farms, the Brazilian, Australian and Namibian farms

– Low: US$ 100–150 for the farms in Argentina, Uruguay and Pakistan

Only a few farms could cover total cost with the beef price (plus government payments, if there are any): the Spanish farms, the U.S. feedlot (recovered from a heavy loss in last year's comparison) and AR-1000. Most other farms realise a profit from the profit and loss account, i.e., covering cash costs plus depreciation with the returns: all Western European farms except Spain (where farms even make an entrepreneur's profit) – but only with the help of government payments – the Uruguayan farm, the two larger Argentinian farms and the specialised Pakistani farm PK-50, the latter with a very small profit. The rest of the farms either live at the expense of their depreciation (Brazil) or do not even cover their cash costs with the returns: the farms in the Czech Republic, Hungary, Poland, Australia, Namibia and PK-3 make a loss.

Benchmarking of single farms and farm groups

Benchmarking of single farms or farm groups means comparing an indicator set of with another single farm or an average of farms. This allows detailed analysis of strengths and weaknesses of farms. Fig. 6 shows benchmarking of a Brazilian farm from Mato Grosso do Sul producing 500 steers per year with four farms in Germany and three farms in Argentina. Advantages for the Brazilian farm appear in dark grey, disadvantages appear in light grey. The column 'n' indicates in how many cases values of one country were higher or lower than in the other country. The column 'Ø' indicates the average factor the indicator is higher or lower than in the country of comparison, for example the beef returns in the three Argentinian were on average 0.9 times lower (90 %) than in the Brazilian farm. Finally, the columns 'min' and 'max' correspond to the minimum and maximum deviations of the factors.

Comparing the Brazilian farm with the German farms (upper part of the chart) reveals the following results:

– The German farms realise approx. 3 times higher returns than the Brazilian farm and higher profits from the profit and loss account

– All cost components except land costs are much higher in the German farms

– Land costs in the German farms are lower than in the Brazilian farm (approx. 60 %) because the high land rents (16 times higher than in Brazil) are compensated by an enormous land productivity (26 times higher than the Brazilian farm)

Comparing the Brazilian farm with the Argentinian farms (lower part of the chart) shows the following results:

– The Brazilian farm has around 10 percent higher returns but a lower profitability than the Argentinian farms

– All costs of the Brazilian farm except depreciation are higher than in the Argentinian farms; extremes are expenses other than animals, labour costs and land costs

– The main reason for higher cost and lower profitability is the low productivity of the Brazilian system.

It should be mentioned that the Brazilian system represents the traditional low input finishing system with finishing periods of up to three years and no supplement, grain or concentrate feeding. Whether the analysis of more intensive systems yields to different results will be investigated in further IFCN research (see also Moura de Torres/Rosa/Nogueira, 2004):

Fig. 6. Benchmarking of a Brazilian 500-steer finishing farm against four German and three Argentinian finishing farms (reference unit: 100 kg carcass weight)

	Values in DE > values in BR				Values in DE < values in BR			
	Max.	Min.	Ø	n	n	Ø	Min.	Max.
Returns	3,1	2,8	**2,9**	4				
Beef returns	2,3	2,2	**2,2**	4				
Government payments				4				
Expenses & Depreciation	2,7	2,4	**2,6**	4				
Animal purchases	2,1	2,1	**2,1**	4				
Other expenses	2,5	2,3	**2,4**	4				
Depreciation	17,5	8,4	**11,3**	4				
Factor costs	2,2	1,4	**1,6**	4				
Wages (paid & imputed)	10,9	7,9	**9,8**	4				
Labour productivity	3,0	1,2	**2,2**	4				
Labour costs	8,1	3,6	**5,0**	4				
Land rents (paid & imputed)	18,7	12,7	**16,4**	4				
Land productivity	28,5	22,4	**26,1**	4				
Land costs					4	**0,6**	0,6	0,7
Intest rates (paid & imputed)					4	**0,5**	0,4	0,6
Capital productivity					4	**0,3**	0,3	0,4
Capital costs	3,8	2,9	**3,2**	4				
Profitability								
Farm income				4				
Return to labour				4				
Entrepreneur's profit				3	1			

	Values in AR > values in BR				Values in AR < values in BR			
	Max.	Min.	Ø	n	n	Ø	Min.	Max.
Returns					3	**0,9**	0,9	1,0
Beef returns					3	**0,9**	0,9	1,0
Government payments								
Expenses & Depreciation					3	**0,7**	0,6	0,8
Animal purchases					3	**0,9**	0,8	0,9
Other expenses					3	**0,5**	0,5	0,6
Depreciation	3,7	1,2	**2,7**	3				
Factor costs					3	**0,4**	0,4	0,5
Wages (paid & imputed)	1,7	1,2	**1,5**	3				
Labour productivity	3,7	1,6	**2,6**	3				
Labour costs					3	**0,6**	0,4	0,7
Land rents (paid & imputed)	3,8	2,1	**3,1**	3				
Land productivity	9,0	6,8	**8,0**	3				
Land costs					3	**0,4**	0,3	0,4
Intest rates (paid & imputed)					3	**0,4**	0,4	0,4
Capital productivity	2,3	1,2	**1,9**	3				
Capital costs					3	**0,6**	0,4	0,8
Profitability								
Farm income				3				
Return to labour				3				
Entrepreneur's profit				3				

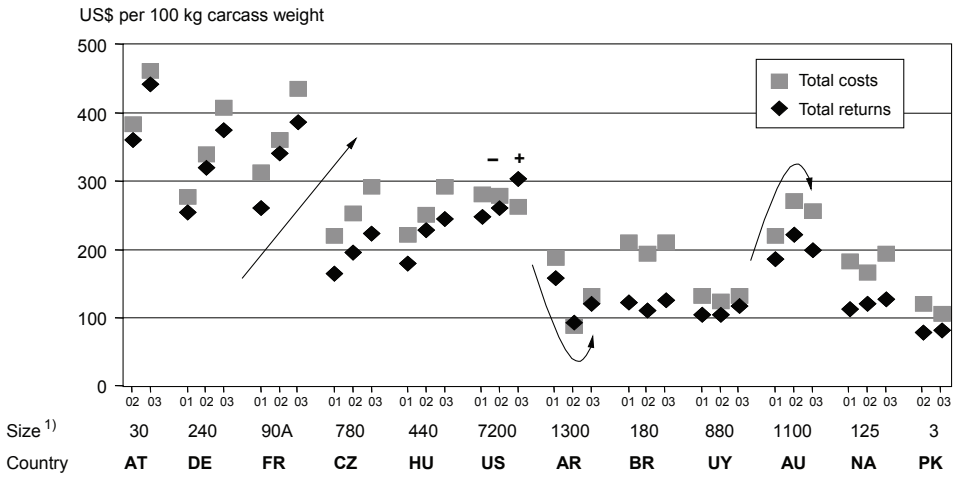
Strengths of the Brazilian farm in dark grey, weaknesses in light grey. Numbers are rounded to one digit.
Source: Own calculations, IFCN 2004.

In the very beginning, every IFCN branch has to focus on cross-country and status-quo comparisons. The disadvantage of a status quo analysis is that it is only valid for the year considered. Due to domestic productivity and price changes, as well as to changes in exchange rates, results between years may differ significantly. Fig. 7 shows the first attempt for a time series analysis for identical farms of the IFCN Beef branch. The chart shows identical farms for

the years 2001 (where available), 2002 and 2003. Values are stated in US$ per 100 kg carcass weight and show the total cost and the total returns of the beef enterprise. Though just a few years are reflected, the rapid change of results can be shown with a few examples. There are relatively large variations in costs and returns resulting from national price and cost developments as well as from changes in the exchange rate to the US$. In the U.S.-feedlot, a switch from an entirely unprofitable situation in 2001 and 2002 to a very profitable situation in 2003 can be observed. When comparing the Western European farms with most of the other countries, it becomes clear that the competitive situation (total costs) gradually worsened from 2001 to 2003 due to the revaluation of the Euro against the US$. The example of the Argentinian farms demonstrates the effect of the financial default in 2002, when cost and prices measured in US$ dropped by more than 70 percent compared to the previous year. And finally, the Australian farm shows a decrease of cost and returns in 2003 despite the revaluation of the AU$ against the US$, which is a result of the drought that hit the country in 2003. These results underline the necessity of doing regular (annual) analysis within the framework of the IFCN.

Fig. 7.

Time series analysis of identical beef finishing farms – total costs and returns



1) The size indicates the total number of finished cattle sold per year.
Source: Own calculations based on IFCN Beef Report 2004.

Conclusions for competitiveness

Competitiveness is here defined as the '... sustained ability to profitably gain and maintain market shares' (Martin et al., 1991). Factors influencing profitability are costs and returns. Thus, the comparison of costs and returns of production in agriculture can provide an idea about the competitive situation.

In general, for countries characterised by comparably low costs on the farm level, there is an incentive to export to countries with high costs, if beef prices in the high-cost country are higher than in the low cost country. Low-cost countries would have a favourable competitive situation compared with high cost countries. This is, for example, the case when comparing the South American farms (low cost, low price) with the Western European farms (high cost, high price).

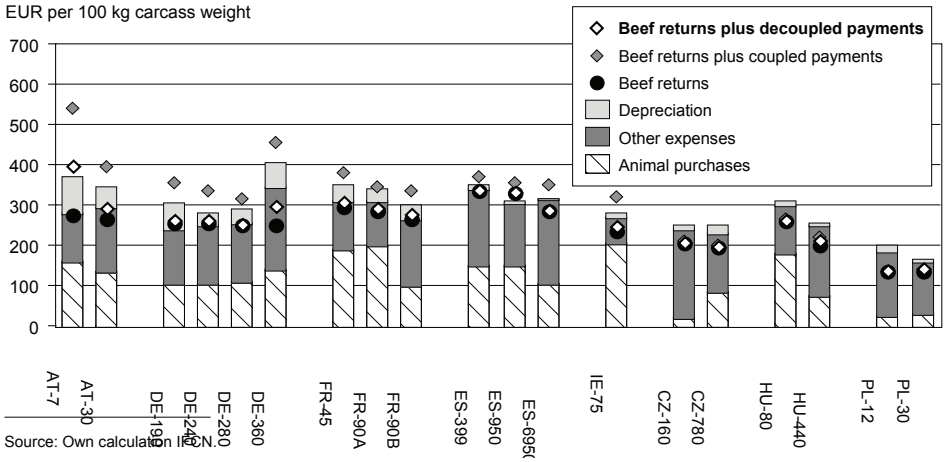
Assumed that slaughtering and processing costs in all countries are identical, the transport cost from South America to Europe must be added to obtain a comparable cost level. The on-farm cost of production of Argentinian beef (cash cost plus depreciation) is approximately US$ 90–100 per 100 kg CW in-bone. Transport costs on sea from Buenos Aires to Hamburg are between US$ 30–34 per 100 kg carcass weight of de-boned chilled meat at 2003 exchange rates (Imke, 2004). Assuming a share of bones of around 14–16 percent in the carcass, the bone-in cost would be approximately US$ 26–30 per 100 kg CW. This results in costs of US$ 116–130 of Argentinian beef compared with costs of around US$ 300 per 100 kg CW for beef (in-bone) produced in Germany (all figures for 2003). At the same time, price levels in Germany were around US$ 290 per 100 kg CW.

At these price-cost relations, and supposed the quality is comparable, there is a strong incentive for Argentina to export beef to Germany and to the European Union, respectively. Similar observations can be made when comparing South America with the U.S., Australia with the European Union, or some Eastern European farms with Western European farms.

Policy impact and supply reaction analysis

Fig. 8 shows the economic situation of typical EU beef farms in the year 2003 compared with the situation in 2005/2006, respectively. The figures show the total returns (split into beef market returns and beef market returns plus government payments) and the cost from the profit and loss account (cash expenses and depreciation). It shows that in the situation with payments coupled to the production (before the current CAP-reform), in most farms a part of the payment had to be used to compensate a loss that would have occurred without the existence of the coupled payments. In the situation with decoupled payments (after implementation of the CAP-reform), the payments may no longer be allocated to the beef enterprise. This leads to dramatic changes in profitability, showing that without adjustments in most of the farms, the beef production would become unprofitable. As the farms are no longer forced to produce beef to receive the payments, one could conclude that all farms shown here in an unprofitable situation should stop beef farming. This preliminary conclusion, however, could be altered once further restrictions and conclusions, such as cross-compliance requirements, are included in a more profound analysis.

Fig. 8.
Impact of the CAP-reform on typical beef finishing farms in the EU
– total cost, returns and profitability of beef production



Source: Own calculation IFCN.

Future potential

The potential to increase production depends on numerous factors, amongst them the availability of additional land, the possibilities for intensifying production and the competition with other land uses. The development of beef production in the EU is mainly determined by the impact of the latest CAP-reform. In many countries (like Brazil, the U.S., Canada and Australia) the main potential lays in intensification rather than making additional land resources available for beef production. In the next ten years, a world-wide increase of beef production as well as world trade can be expected. In some countries, the increases of production are likely to be at least partially offset by consumption in the short term (China) or over the long term (Brazil). For more details on the future potential see Deblitz et al. (2004).

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