Beef farming systems across the world: an expert assessment from an international co-operative research project (IFCN)

Claus Deblitz[1], AA Charry[2] and KA Parton[2]
[1] Federal Agricultural Research Centre, Institute of Farm Economics, Bundesallee 50, D-38116 Braunschweig, Germany
[2]Charles Sturt University, Faculty of Science and Agriculture, School of Rural Management, Orange NSW 2800 Australia
claus.deblitz@fal.de

Contents

Introduction
Background
Characteristics of IFCN
The IFCN research methodology
- Typical farms
- TIPI-CAL computer modelling

The global perspective of beef production
The typical beef finishing farms
- Technical performance indicators
- Economic peprformance indicators

Overall analysis of competitiveness
Factors affecting competitiveness
FAPRI projections
IFCN beef outlook
Highlights
References
Appendix

Abstract. The International Farm Comparison Network (IFCN), Beef Section is a co-operative research project among countries with an interest in beef production. IFCN is developing a common methodology for reliable comparison of farming systems within a global perspective. Innovative methodologies including "typical farms" and "spreadsheet based computer modelling" are allowing the integration of a historical database that allows for diagnostics and projections of beef trends across the world. This paper summarises the results for the countries participating in developing the IFCN database for the year 2003. FAPRI projections and IFCN outlook closes the paper.

Keywords: beef farming systems, international beef benchmarking

Introduction

The International Farm Comparison Network (IFCN) is an international partnership among scientists trying to define a common methodology for reliable comparison of farming systems across the world. IFCN has three sections: dairy, beef and cropping. This paper explores key aspects of the beef section.

Background

Until the late eighties, international farm comparisons were only carried out on an ad hoc basis (Isermeyer 1988; Deblitz 1994) or as part of international co-operation programs under the umbrella of international research centres (Sere and Vera 1985). The results of these comparisons were recognised as being useful, but at the same time they revealed the following problems:

- required data was not available at all or not available to the required depth for performing total cost analysis
- available data did not allow returns to be differentiated into their price and their volume components to explain cost differences
- available data was usually not comparable between countries
- available data was very often outdated
- the organisational framework of the studies was not designed to be sustainable

The main conclusion from this experience was that the establishment of an own database for international farm-level comparisons is more efficient than the adjustment of existing databases. As a consequence, in 1991 the network of the European Dairy Farmers (EDF) was founded to explore the feasibility of ongoing farm comparisons in the European dairy sector. EDF is a club of individual dairy farms, the data of which are analysed on an annual basis. Despite solving the abovementioned problems, a number of challenges remained:

- The possibility to generalise results was limited as individual farm data were used

- The analysis was limited to dairy and to Europe
- There was no possibility to simulate farms into the future

The International Farm Comparison Network (IFCN) was founded in 1997 with the objective of overcoming these problems.

Characteristics of IFCN

The vision of IFCN is 'to improve understanding of farming world-wide'. This implies the provision of facts, data and information in a structured, harmonised and comparable way across countries worldwide. So far IFCN has established sections for dairy, beef (finishing and cow-calf) and arable crops. It is planned to extend the activities to sheep, pigs and poultry. While being able to provide advice to policy makers and agents in the supply chain, IFCN does not make value judgements or design policies.

The main characteristics of IFCN are:

- a global network of researchers, advisors and farmers
- a long-term, sustainable project-infrastructure
- a partnership win-win approach: 'put your country in and get the world back'
- an open and independent system committed to truth, science and reliable results

IFCN is a consortium among the participating partner institutions coordinated by the Federal Agricultural Research Centre (FAL) in Braunschweig, Germany. The Centre consists of the Institute of Farm Economics (FAL) and management companies. While FAL has the scientific lead of the network and the method developments, a private company provides professional management of the IFCN Beef network. The countries participating of IFCN-Beef are Austria, Germany, France, Czech Republic, Hungary, Poland and Spain from the European Union. U.S.A. from North America. Argentina, Brasil and Uruguay from South America and Australia, Namibia and Pakistan. The network co-ordination is mainly funded by the consortium fee from the participating countries. Further, partnerships with agribusiness and global institutions related to agriculture are envisaged to be established.

IFCN is a working network with defined topics, schedules and activities agreed upon by all partners. Taking the IFCN Beef Branch as an example, the annual activities comprise:

- Create a harmonised database of farms.
- Analyse the farms using the IFCN methods.
- Provide up-to-date sector information.
- Validate the results at the IFCN Beef Conference.
- Publish the results in the IFCN Beef Report.
- Improve the IFCN methods continuously.
- **Exchange** ideas on current beef issues and research projects.

The IFCN research methodology

Typical farms

Farm data for comparison are based on typical farms instead of statistical averages or individual farm data. The typical farms are located in the most important beef production regions in each country and apply the prevailing production system of that country. The definition of the farms follows a distinct pattern using available statistics and bookkeeping data. Data collection is done through 'panels' with participation of advisors and farmers where a consensus on each figure is achieved. A standard questionnaire is used in all countries allowing a very detailed specification of physical and financial farm and enterprise data. Data are generally collected on whole-farm level and – where necessary – whole-farm figures are allocated to single enterprises for cost and enterprise analysis. Intermediate and final results are returned to the panel for feedback.

TIPI-CAL computer modelling

TIPI-CAL is an Excel-based spreadsheet accounting and simulation model. It is multi-period, dynamic-recursive and can be operated in a deterministic or stochastic mode. With TIPI-CAL, an annual analysis is performed, the focus of which is on analysis of returns, cost, profitability and productivity of the beef finishing enterprise and the other enterprises mentioned above. A number of additional modules linked to TIPI-CAL allow policy, farm strategy and risk analysis. TIPI-CAL is shareware for all IFCN partners and clients and regular training in the use of the model is offered by the IFCN Centre.

The global perspective of beef production

The present situation of the world beef markets can be characterised by a slight production increase in 2004 compared with 2003 and a reduced global trade due to higher prices and import-bans on products originating from North America. The resulting supply gaps cannot be fully compensated by other suppliers like South America and Australia (FAO 2004).

Table 1 shows the importance of world regions for cattle inventories, production and trade while Figure 1 provides an overview of the most important countries for beef and buffalo meat production. 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 side and the Asian and African states on the other side. The United States is by far the largest beef producer, followed by the EU-15 and Brazil, which has caught up with the European Union.

Table 1:Regional shares in cattle inventories, beef production and trade, averages of the years 2001-2003 (inventory and production) and 2000-2002 (export and import)

	Percentage share of the regions in ...			
Region	Inventory (mio. head)	Production (mio. tons)	Export (mio. US$)	Import (mio. US$)
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.

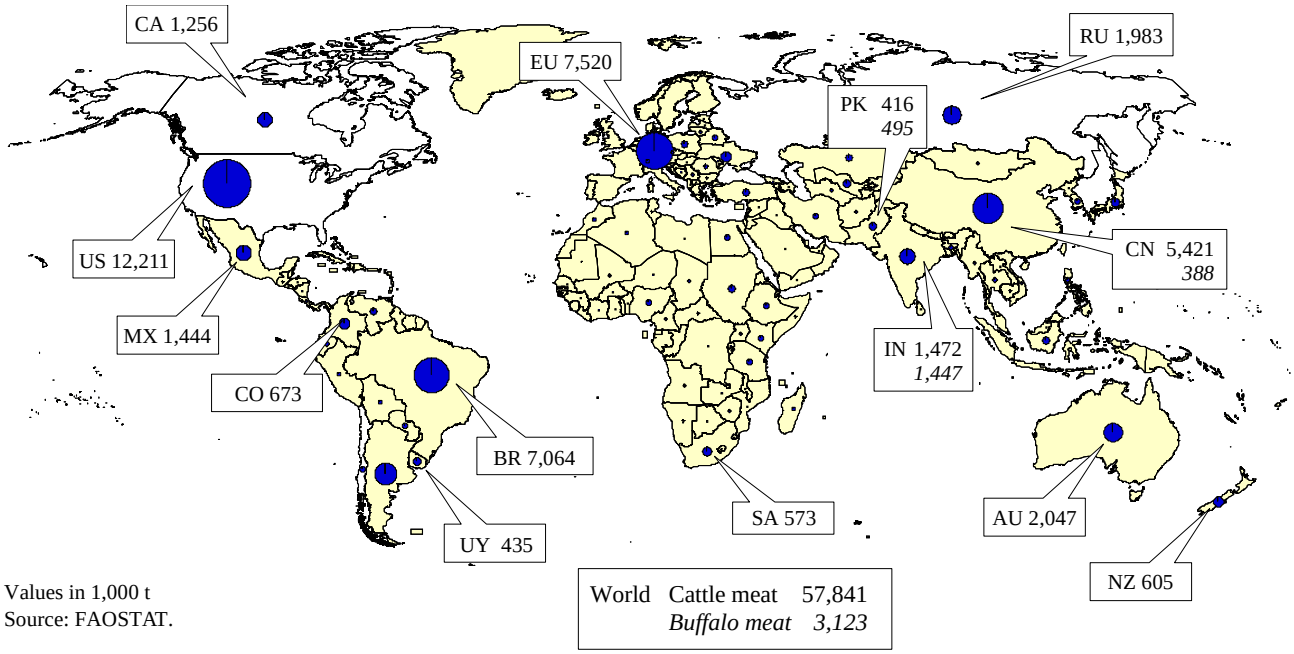
When it comes to trade, the concentration on a few regions becomes even more obvious. North America, South America and Australia/New Zealand contribute approximately 85 percent of the total export value whereas imports are dominated by Japan and the U.S.A. at comparable levels, followed by the Far East (without Japan) with growing importance. The Extra-EU trade (i.e., the internal EU-trade is not reflected) has a share of only around 5 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.A.-beef that are in force at least until end of 2004.

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 Figure. 2):

- 'Milk countries' with a share of suckler cows of < 25 percent of the total number of cows are Poland, Pakistan, Hungary, the Czech Republic and Germany.
- 'Mixed countries' with a share of between 25 and 75 percent of suckler cows in the total number of cows are New Zealand, Austria, France, Ireland and Spain.
- 'Beef countries' with > 75 percent of suckler cows in the total number of cows are the U.S., Canada, Brazil, Australia, Argentina and Uruguay.

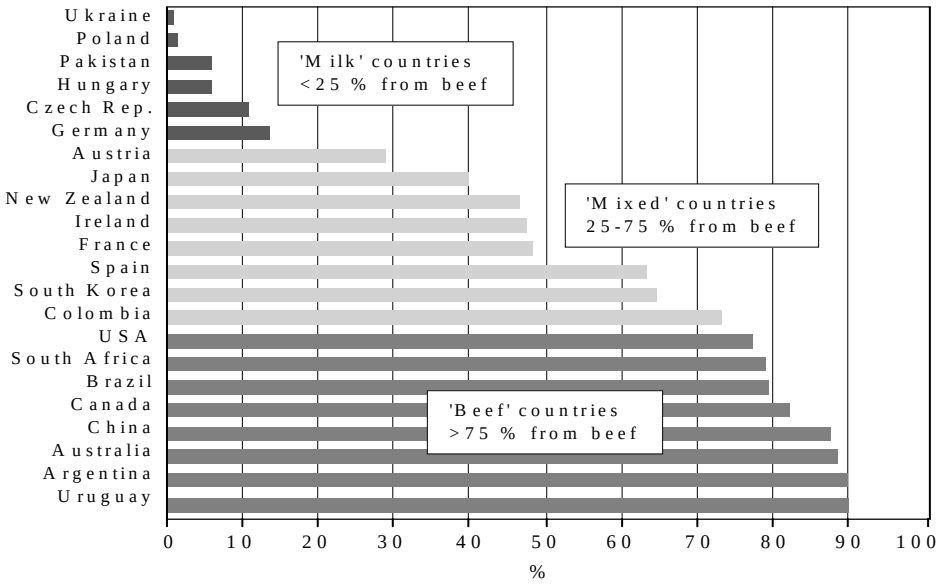
Due to different productivity levels of the suckler cow and the dairy cow herds, their share to total beef production may differ from the cow-ratios but these figures provide at least an idea of the herd composition (for more details on selected countries see IFCN Beef Report 2003). This composition 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.

Figure 1. World production of beef and buffalo meat, average of the years 2001-2003 in 1,000 t



Values in 1,000 t
Source: FAOSTAT.

Figure 2. Share of suckler cows in total cow number



Source: USDA-FAS, national statistics.

The typical beef finishing farms

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 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.

Taking the existing differences between animal categories, cuts and qualities into account, it should be clear that an international comparison of beef production systems will probably never be able to compare identical products. However, an approximation can be made with the aim of) comparing products that are as homogenous as possible and b) maintaining feasibility of the analysis. The types of animals compared within the IFCN are so far:

- Animals produced for meat export, animals which can potentially be exported in the future or animals from which the meat is a domestic substitute for beef imports from other countries.
- Final products, i.e., finished animals that go to slaughter. Intermediate products like weaners and feeders/backgrounders/stores are usually not traded on an international scale.
- Heavy male animals (bulls or steers), as these categories can be better compared than males with females or even calves. The Spanish farm ES-950 is an exception. It exclusively produces heifers which have a share of approximately 30 percent in the Spanish production systems.

Technical performance indicators

Table 2 gives an overview of the farms analysed and Table 3 provides an overview of the most important indicators of the production systems.

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 table.

The farms are located in main production areas for the countries considered. Most farms are located either on plains or high plains. Exceptions are the Austrian AT-7 (hill region in the Alps), the French cow-calf farm FR-75 in the Limousin (edge of Massif Central) and the U.S. cow-calf farms US-240 in New Mexico and US-500 in Montana (rolling hills)

There is a group of specialised farms producing finished animals with the purchase of calves from outside of the farm or from their own weaners. All other farms combine beef finishing with cow-calf, arable crops, dairy or other enterprises. Finishing farms with dairy or cow-calf enterprises use their own calves for finishing, some of them buy additional calves or stores/backgrounders from outside the farm.

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. Separate cases are Brazil (Nelore, coming 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 landscapes, 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.

Finishing periods are determined by the age at start, the intensity of the finishing process and the final weights, which again are influenced by the breeds chosen. Rather short periods of 200–300 days are found in the intensive feedlot-type of systems in Spain and the U.S. as well as in the Australian farm, where animals are either rather old at the start of finishing and/or rather young at the end of finishing. Periods of between 400 and 600 days are found for both the intensive maize silage/grain systems in Austria, Germany, France and the Czech Republic based on young dairy calves as well as for the pastoral systems in Argentina and Uruguay based on weaners from the cow-calf herd. Extreme values are revealed for Brazil where the combination of climatic conditions, rather poor forage resources and the use of the Nelore breed leads to rather high finishing periods of 2.6 to almost 3 years.

Table 2. Overview of typical beef finishing farms in comparison

Name (1)	Region	Location	No. & category of animals sold p.a.	Breeds	Origin finishing cattle		Other activities (4)
					dairy cow-calf (2)	own purchase (3)	
AT-7	Steiermark	Hill	7 steers	Lim x Fleck	cc	o	Cow-calf, Forestry
AT-30	Niederösterreich	Plain	30 bulls	Fleckvieh	d	p	Crops
DE-190	Bavaria	Plain	120 bulls 70 Feeder	Fleckvieh	d	p	Crops
DE-240	Bavaria	Plain	240 bulls	Fleckvieh	d	p	Crops/Forestry
DE-280	Northrhine-Westphalia	Plain	280 bulls	Fleckvieh	d	p	Crops
DE-360	Mecklenburg-Vorpommern	Plain	282 bulls 80 steers 130 fem. weaner	Fleckvieh X / Holstein	cc/d	o/p	Cow-calf, Crops
FR-45	Pays de la Loire	Plain	31 bulls 16 cows 2 breed. heifers	Charolais	cc	o	Cow-calf, Crops
FR-90A	Brittany	Plain	90 bulls	Char / Lim	cc	p	Crops
FR-90B	Brittany	Plain	90 bulls	Char x Dairy / Normands	d	p	Crops/Poultry
ES-950	Catalunya	Plain	950 heifers	Crossbreeds	cc/d	p	–
ES-6950	Aragón	Plain	3,808 bulls 3,128 heifers	Crossbreeds	d/cc	p	–
IE-75	Connaught	Plain	75 steers	Continental X	cc	p	–
CZ-160	North-east Bohemia	Plain	160 bulls	Holstein	d	o	Crops / Dairy / Hogs & Sows
CZ-780	North-east Bohemia	Plain	780 bulls	Holstein	d	o/p	Crops / Dairy / Hogs & Sows
HU-80	South Transdanubia	Plain	80 bulls 61 breed. heif.	Hereford	cc	o	Cow-calf
HU-440	Central Transdanubia	Plain	440 bulls	Holstein	d	o/p	Crops/Dairy
PL-12	Wielkopolskie	Plain	7 bulls 5 heifers	Black-white	d	o/p	Crops/Dairy
PL-30	Podlaskie	Plain	20 bulls 9 heifers	Black-white	d	o	Crops/Dairy
US-7200	Plains	Plain	7,195 steers	British x Continent.	cc	p	–
AR-1300	Buenos Aires	Plain	1,300 steers	Angus/Heref./Zebu	cc	p	Crops
AR-2700	Buenos Aires	Plain	2,061 steers 648 heifers	Angus	cc	p	Cow-Calf (breeding) Crops
AR-1000	Buenos Aires	Plain	1,000 steers 181 breed. heif.	Angus/Hereford	cc	o/p	Cow-calf
BR-180	Mato Grosso do Sul	Savannah	180 steers 94 breed. heif.	Nelore	cc	o	Cow-calf, Legal Reserve
BR-500	Mato Grosso do Sul	Savannah	500 steers 265 breed. heif.	Nelore	cc	o	Cow-calf, Legal Reserve
UY-880	Litoral Centro	Plain	880 steers	Hereford X	cc	p	Crops
AU-1100	New South Wales	Plain	922 steers 184 heifers 79 breed. heif.	Angus X	cc	o/p	Cow-calf, Crops
NA-125	Omaheke	Plain	80 steers 44 heifers 16 breed. heif.	Brahman x Fleck	cc	o	Cow-calf
PK-3	Layyah, Punjab	Plain	3 bulls	Nilli Ravi (Buffalo)	d	o	Dairy
PK-50	Faisalabad, Punjab	Plain	50 bulls	Nilli Ravi (Buffalo)	d	p	Crops

(1) Number refers to total finished cattle sold per year **(2)** d= dairy; cc= cow-calf **(3)** p= purchase; o= own
(4) Legal Reserve in Brazil: 20% of the farm area may not be used, must be dedicated to existing natural vegetation or replanted with native species.

Source: IFCN Beef Report 2004.

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 for 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.

Dressing percentages are calculated as carcass weight divided by live weight in percent. They lie between 50 percent for the Pakistani farms (buffalo), 57 percent and more for farms with Simmental-bulls in Germany and Austria and up to 61 percent in France (Charolais/Limousin) and the U.S.A.-feedlot.

Economic performance indicators

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 Figure 3 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 Table 4.

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 farms increased approximately US$ 80 per 100 kg CW compared with 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

Profitability is grouped depending on the time period under consideration. For this purpose, total returns are compared with the following subgroups of cost: for a long-term consideration with total cost, for mid-term consideration with cash cost plus depreciation (cost from the profit and loss account), for short-term consideration with cash cost. It should be noted that the assignment of the typical farms to this classification is not fixed and can change from year to year (see Chapter 3.4).

Long-term profitability
The following farms make an entrepreneur's profit, i.e., covering 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.

Medium-term profitability
Other farms make a profit from the profit and loss account, i.e., returns covering cash costs plus depreciation: 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.

Short-term profitability
These are farms that live at the expense of their depreciation, i.e., returns covering the cash costs but not the depreciation. In this year's comparison, only the Brazilian farms belong to this group.

Unprofitable
These farms do not even cover their cash costs with the returns: the farms in the Czech Republic, Hungary, Poland, Australia, Namibia and PK-3.

Table 3. Physical indicators of the international beef production system

Farm name	No. & type of beef cattle sold per year	Main feed sources	Age at start (days)	Finishing period (days)	Daily weight gain (g / day)	Final weight (kg LW)	Dressing percentage (%)
AT-7	7 Steers	Pasture + grass silage	240	540	704	700	53
AT-30	30 Bulls	Maize silage + grains	100	403	1390	705	57
DE-190	120 Bulls 70 Feeder	Maize silage + grains	50	437	1291	649	57
DE-240	240 Bulls		50	473	1255	673	58
DE-280	280 Bulls		60	514	1154	680	60
DE-360	282 Bulls 80 Steers	Grass & maize silage + grains	180	360 - 500	920 - 1236	620 - 685	52 - 57
FR-45	31 Bulls 16 Cows	Grass & maize silage + hay + grains	244	265	1566	695	59
FR-90A	90 Bulls	Maize silage + grains	274	310 - 315	1250 - 1349	673 - 710	58 - 61
FR-90B	90 Bulls		7	547 - 557	1110 - 1122	667 - 685	54 - 56
ES-950	950 Heifers	Straw + concentrates + grains	35 - 135	212 - 283	1254 - 1368	430 - 470	54 - 56
ES-6950	3,808 Bulls 3,128 Heifers		20	313 - 323	1327 - 1428	497 - 528	54 - 55
IE-75	75 Steers	Pasture + grass silage + concentrates	563	365	548	675	54
CZ-160	160 Bulls	Grass & maize silage hay + grains	28	730	836	656	56
CZ-780	780 Bulls		28 - 345	365 - 612	805 - 922	620	54
HU-80	80 Bulls	Maize silage + grains	230	230	1304	525	56
HU-440	440 Bulls		95	429	933	520	53
PL-12	7 Bulls 5 Heifers	Pasture + grass silage + hay + grains	15	535	860	520	56
PL-30	20 Bulls 9 Heifers	Pasture + grass & maize silage + grains	15	535	879	530	54
US-7200	7,195 steers	Grains + alfalfa hay	265	191	1444	578	61
AR-1000	1,000 Steers	Pasture + hay	180	463 - 546	540 - 549	400 - 450	58
AR-1300	1,300 Steers	Pasture + hay	210 - 255	365 - 450	549 - 603	390 - 425	59
AR-2700	2,061 Steers 648 Heifers	+ maize stubble (+ grains)	210	365 - 540	500 - 644	405 - 410	59 - 60
BR-180	180 Steers	Pasture	240	1095	319	490	53
BR-500	500 Steers		210	945	347	480	53
UY-880	880 Steers	Pasture + hay + maize stubble	210	527 - 645	450 - 550	440	54
AU-1100	922 Steers 184 Heifers	Pasture + grains	210	224	964	486	54
NA-125	80 Steers 44 Heifers	Pasture	240	690	355	530	57
PK-3	3 Bulls	Freshly cut green grains + cottonseed	120	330	463	300	50
PK-50	50 Bulls	Freshly cut green grains + concentrates	600 - 780	180	778	460	50

Note: Figures in the table are for the male cattle only; exception: ES-950 (exclusively heifer production).

Source: IFCN Beef Report 2004.

Overall analysis of 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 to production in agriculture can provide an idea about the competitive situation.

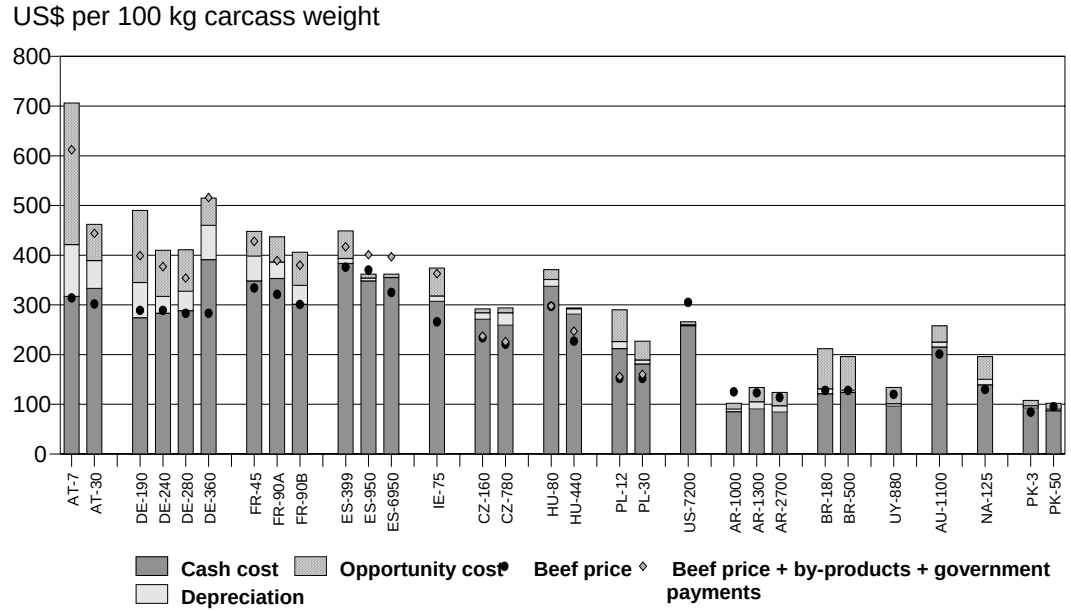
In general, for countries characterised by comparably low costs at the farm level, there is an incentive to export to countries with high costs, if beef prices in the high-cost country are higher than in the low cost country. Low-cost countries would have a favourable competitive situation compared with 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).

Assuming 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 bone-in. Transport costs by 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. These results in costs of US$ 116–130 of Argentinian beef compared with costs of around US$ 300 per 100 kg CW for beef (bone-in) 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 assuming 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.A, Australia with the European Union, or some Eastern European farms with Western European farms.

Figure 3.Total returns, cost and profitability of beef production 2003



Source: IFCN Beef Report 2004.

Factors influencing competitiveness

A strong competitive cost advantage as shown above would suggest that production and exports in low-cost countries should expand and in high-cost countries should shrink very quickly. However, whether a country can explore its potential to produce and to increase net exports or not (which after all are relevant for the international beef trade) depends on the following conditions:

- World market price developments
- Market access to the countries of destination
- Domestic agricultural support, trade and tax policies
- Level and development of domestic consumption
- Competition of beef production with other enterprises
- Availability of land to expand production
- Development of the climatic situation and its management (droughts, flooding)
- Opportunities to intensify production (genetics, forage production, feeding)

- Opportunities to substitute domestic consumption by exports
- Disease status relevant for trade
- Quality and traceability requirements

Albeit incomplete, this list should make clear that the assessment of future production has to reflect numerous factors, which are hard to predict.

Table 4. Net surplus or deficit for beef in 2013 compared with 2003

	Change in '000 tonnes	2013 as factor of 2003 value		Change in '000 tonnes	2013 as factor of 2003 value
Surplus increases			**Deficit increases**		
Argentina	292	1.92	Indonesia	-32	61.18
Australia	453	1.37	Japan	-307	1.36
Brazil	154	1.14	Mexico	-101	1.21
Canada	258	2.58	Philippines	-129	2.08
India	103	1.22	Russia	-53	1.08
New Zealand	7	1.01	South Africa	-18	3.62
			South Korea	-89	1.22
Deficit decreases			**Surplus decreases**		
EU-15	95	-1.25	Poland	-16	0.65
EU-25	149	-1.47	Ukraine	-55	0.62
Deficit turns into surplus			**Surplus turns into deficit**		
USA	383		China	-287	

Source: FAPRI (2004).

Food and Agricultural Policy Research Institute (FAPRI) projections

In FAPRI's (2004) agricultural outlook, some of the conditions mentioned above were reflected. The future development of both production and consumption for the world beef market and selected countries was estimated for the period 2003 to 2013. It should be noted that the latest EU-CAP reform (mainly decoupling of direct payments) is basically reflected but further assumptions on future WTO-agreements are not included. Table 5 - Appendix shows the results for the net surplus or deficit (production minus consumption) for selected countries in the year 2013 as compared with the year 2003. The figures are stated in absolute terms '000 tonnes carcass weight' and in relative terms.

There are some countries which have already been important exporters and are now projected to be able to increase their net exports. The highest relative growth is predicted for Canada and the biggest increase in total volume is projected for Australia. The low values for Brazil are somewhat surprising. The assumption behind it is that after the strong production growth over the last six years, from 2006 onwards domestic consumption will grow at a faster rate than production, thus reducing the net surplus. The EU-15 and EU-25 are net importers of beef but the small deficit of 2003 is supposed to decrease until 2013. This assumption, however, depends heavily on the final impact of the CAP-reform. And finally, the U.S.A is expected to turn from a net importer into a net exporter.

On the other side, there are some countries which have already been important importers and are now projected to face a growing deficit. The highest relative growth is predicted for Indonesia and South Africa (but both coming from very low levels) and the biggest increase in volume is projected for Japan. China is expected to turn a very low surplus in 2003 into a low deficit in 2013. This projection must however be interpreted particularly carefully because, a) China's overall production is very large (approx. 8.5 million tons) in relation to the net surplus calculated; and b) the country's overall economic situation is difficult to predict.

According to FAPRI, the world beef trade is projected to grow from 3.7 million tonnes in 2003 to 4.8 million tonnes in 2013. The additional demand will come chiefly from the aggregated rest of the world not shown in the table.

IFCN beef outlook

Based on these projections, an expert-based assessment of the future of beef production until 2013 for the countries in the farm comparison was made during the IFCN Beef Conference 2004

(Deblitz et al, 2003). Similar to the FAPRI-projections, the EU-CAP reform was reflected in the assessment but no changes in the WTO-regime beyond the Uruguay-round were assumed.

In the *European Union* countries, the most important factor for the mid-term future of beef production is the implementation of the CAP-reform, mainly the decoupling of government payments. The difficulty for making predictions is that the various member states did not opt for the same way of implementation of the reform. The main differences occur on two levels:

Full or partial decoupling: Some member states opted for full decoupling of all livestock payments; others opted for maintaining parts of the payments coupled. These are mainly livestock payments like the suckler cow premium and slaughter premiums.

Payment scheme: All payments are based on the historical annual average of the years 2000-2002 (reference period). Some member states opted for the so-called single-farm payment (SFP) where the active farmer receives a payment based on the individual premiums received in the reference period. Other countries opted for a unified acreage-based payment which is independent from the individual-farm payments in the reference period. It is calculated as total payments in the region divided by the acreage eligible for payments in the reference period. Finally, some countries opted for a hybrid model of both types, some of them phasing out the SFP component by replacing it by the acreage payment.

The impact on beef production will mainly depend on a) the development of beef prices on one side and calf prices on the other side and b) the reaction of dairy farmers to the dairy reform (mainly in 'milk' countries, see Deblitz et al 2003, Chapter 2.2). For single countries, the following trends could be identified:

- *Austria* opted to maintain the full coupling of the suckler cow premium and slaughter premium for calves as well as a partial coupling of the slaughter premium of male cattle. Austria will apply the payment scheme of the SFP. Despite the partial coupling, the production is estimated to drop between 11 and 14 percent until 2013. The decoupling of the special premium for male cattle, lack of land, low profitability of beef production and the animal protection legislation that requires huge investments in new barn fittings are the main reasons.
- *Germany* opted for a full decoupling of all livestock premiums and applies a hybrid model with phasing out of the SFP into acreage payments from 2009 to 2012. Research based on the representative farm data network of Germany indicates a change in dairy cow numbers between –1 and +4 percent, a reduction in suckler cow numbers of 30 to 40 percent, a reduction of finishing bulls between 17 and 26 percent and a reduction of beef production of between 9 and 15 percent (Kleinhanß et al., 2004).
- Like Austria, *France* opted to maintain the full coupling of the cow-calf premium given the importance of cow-calf production in the mountainous areas. The full coupling has also been kept for the slaughter premium for calves as well as for male cattle, whereas the special premium for male cattle has been fully decoupled. France will apply the payment scheme of the SFP. These measures will keep cow-calf farms in business but will not help beef finishers to cover production costs unless calf prices drop.
- *Ireland* opted for a full decoupling of all livestock premiums and for the SFP payment scheme. Until 2012, the following changes are predicted to occur in the scenario of full decoupling versus the baseline of no policy change: reduction of the suckler cow herd by 18 percent and an overall reduction in beef production of nearly 7 per cent (Binfield et al., 2003). Furthermore, at the farm level, an increase in part-time farming as well as sofa farming is predicted to occur, with part-time farming increasing by 10 per cent over the baseline of no policy change (Breen and Hennessy, 2003a), and 'sofa farming' (i.e. farmers who stop producing cattle, maintain the land under conditions according to the cross-compliance regulations and receive the decoupled SFPs) to account for between 8 and 6 percent of beef farmers over the projection period until 2012 (Breen and Hennessy 2003b).
- Like Ireland, *Spain* opted for full decoupling and the SFP payment scheme. At present, it is very difficult to say in which direction the production will move but it is likely that farms below 90 animals will gradually disappear in favour of bigger and more integrated systems. A growing consumption rising from a low level (16 kg per capita) would help to sustain domestic production on a very specific market characterised by a high share of rather young and female slaughter cattle. On the other hand, growing environmental problems and conflicts with local residents are likely to occur with ongoing concentration of the prevailing feedlot-type finishing system.

The *New Member States* of the European Union faced some dramatic drops in cattle inventories and beef production during the period 1993-2003 (CZ: 50 percent, HU and PL: 40 percent).

Furthermore, as the results suggest, beef production is apparently not a profitable business. In addition, the meat processing plants as well as beef quality are still behind EU-15 levels (see also Hartmann and Schornberg 2004). The implementation of the CAP-reform is much more homogeneous than in the EU-15 countries. The payment volumes available are based on the past production and were subject to pre-accession negotiations due to the decreases in animal production. In all countries, payments are fully decoupled and the acreage payment system is applied with relatively low start values per hectare which are increasing over time. Taking this background into account, the assessments for future production were as follows:

- *Czech Republic*: there are areas with a high share of presently underused marginal grassland. With the CAP-payments, the existing shift towards cow-calf and/or organic production – which appear the most profitable land use in these areas – is expected to strengthen. On the other hand, the dairy herd will shrink over time. The total beef production is expected to remain stable at a low level.
- *Hungary*: as in the Czech Republic, a shift from dairy to beef cows is expected. Further, consumption could recover but coming from very low levels (less than 4 kg per capita and year), inducing higher domestic production.
- *Poland*: after accession in May 2004 there was a strong price increase for beef (mainly cows) and live animals (mainly calves) due to import demand from EU-15 countries. However, profitability did not increase due to higher feed costs, resulting from the bad harvest in 2003. For the future, it is expected that beef production will remain at a low but stable level with a higher export orientation than in the past. The rebuilding of the cattle inventories will need at least three years.

Despite BSE and subsequent import bans, the *United States* are presently characterised by historically high prices as a result of strong internal demand, mainly due to high-protein diets. The U.S.-market will be able to compensate for the export drop of almost 1 million tons in 2004. The cattle herd is projected to rebuild starting in 2007. Unless consumer confidence in beef dwindles, cattle prices are predicted to remain high for the next three years and then decline gradually. Production is supposed to grow 16 percent by 2013 (FAPRI 2004).

The situation in the *South American* countries can be described as follows:

- *Argentina* has a large set of favourable conditions for beef production at its disposal. The main potential appears to be in the Northeast of the country, mainly via increases of the cow-calf productivity. However, even with more liberal trade conditions, an increase of beef production appears to be only gradually possible. Competition with other land uses, possible price increases in the domestic beef price with increasing exports, orientation toward traditional production systems, the reputation for natural beef and lack of capital for intensification set the limits for substantial expansion of exports and/or beef production (for more details see Deblitz and Ostrowski 2004).
- *Brazil* is presently *the* growing country for agriculture and has shown a strong upward trend in both production and net exports in the last five years despite less land availability for beef production. It is expected that Brazil will maintain its rank among the top 3 beef exporters in the future. This increase was mainly due to productivity gains in terms of genetics, higher extraction rates of the cow-calf herd, improved pastures and shorter finishing periods (see also Moura et al. 2004). Further increases can be expected as a result of further productivity gains and expansion of production to frontier regions in the North and the Centre-West of the country.
- *Uruguay*: the country is characterised by a limited potential due to a) relatively low production and b) limited land availability. Similar to Argentina, production gains can mainly be expected via increased productivity, provided that beef prices remain high and credits for pasture improvement are available.

Australia is presently characterised by the rebuilding of the national cattle herd after the recent droughts. Special international market conditions are favouring a high demand for Australian beef. In 2005 a drop of exports is expected due to the reduced cattle supply and the return of the U.S.A to Australian market niches. From 2006 onwards, there are good prospects for increasing exports, mainly to Asia (Japan, South Korea) and USA. Over time it is expected that the importance of feedlots in total beef production will rise from the present share of approximately 30 percent as a result of higher demand for grain-fed beef from Japan and the domestic market (see also Weeks 2004). However, as recent experience shows, droughts are likely to create drawbacks in the future and land availability for cow-calf operations is limited.

Pakistan: The demand is expected to grow further at about twice the rate of population growth due to increasing per-capita consumption associated with increased incomes. Live exports to Middle

East countries are expected to grow provided that the disease status can be improved. The government supports these activities with various programmes, partly assisted by foreign development aid. Further, there are opportunities to further improve the marketing of cattle leather. All these factors will most likely lead to an increase in beef production provided that enough additional feed can be made available.

Highlights

The IFCN-Beef is attempting to develop a methodology for homogeneous comparison of farming systems across the world. For doing so, it has implemented a methodology of "typical farm" analyses, where the typical farm is a virtual farm representing the most common production systems of a region within a country. The typical farm integrates aggregate data with on-farm data. Early results from IFCN are indicating that the methodology is worthwhile though further refinement is an on-going process within the IFCN –Beef action. On the other hand, IFCN supports its across-countries comparison with the TIPI-CAL computer simulation model, available to researchers all around the world participating of the research project.

The global perspective of beef production, with 15 countries participating of the project, which included the major world beef producers, allowed to observe the importance of world regions for cattle inventories, production and trade (see Table 1 and Figure 1 - Appendix). The performance indicators show meaningful differences in production across countries depending upon the implemented production systems and the input:output economic relationships. As an example, the intensive production systems of USA and EU-15 countries have contrasting performance indicators to those from South American countries and Australia. Net farm incomes per 100 kg CW were found high in countries were technological packages characterised by intensive use of resources were implemented (e.g. USA and EU-15). Traditional and/or extensive pasture-based farming produced low to negative net-cash farm income. However, a question is raised in terms of how much the high income of some of the countries is attributable more to direct payments than to real return from the farm enterprises; at least this seems to be the case for the EU-15 countries and the USA (Deblitz et al; 2003).

The farm profit calculated by adjusting the net-cash farm income for depreciation, changes in inventory and capital gain/losses indicates that profitability varies among countries independent of the farming system (i.e. German farms became as unprofitable as Argentinian or Australian farms), showing in general a striving profitability for beef farming systems across the world.

Finally, the outlook for IFCN participating countries anticipates meaningful differences between the EU countries participating of the common agricultural payment (CAP) process, with full or partial decoupling and different payment schemes; the USA where prices will remain high and production continues in the increase. The South American countries should expect production gains by increase in productivity a situation that is also applicable to Australia –in spite of its recurrent droughts- though the lot-feeding sector is growing in importance in this latter country as a result of higher demand for grain-fed beef from niche markets.

References

Babcock BA, Fabiosa JF, Matthey H, Isik M, Tokgoz S, Elobeid A, Hart CE, Fuller F, Meyer S 2003, Analysis of the proposed Doha Round modalities [online]. FAPRI working paper [03-SR 98], zu finden in http://www.card.iastate.edu/publications/DBS/PDFFiles/03sr98.pdf [zitiert am 06.10.04].

Binfield J, Donnellan T, Hanrahan K, Westhoff P 2003, The Luxembourg CAP reform agreement : implications for EU and Irish agriculture. In: The Luxembourg CAP reform agreement : analysis of the impact on EU and Irish agriculture. Dublin : Teagasc pp 1-69 ISBN 1-84170-344-3.

Breen JP, Hennessy TC 2003a, The Impact of the MTR and the WTO on Irish Farms. In: Outlook 2003 Medium Term Analysis for the Agri-Food Sector , Teagasc, Dublin: 78-92.

Breen JP, Hennessy TC 2003b, The impact of the Luxembourg agreement on Irish farms. In: The Luxembourg CAP reform agreement : analysis of the impact on EU and Irish agriculture. Dublin : Teagasc pp 70-78 ISBN 1-84170-344-3.

Deblitz C 1994, Internationaler Vergleich von Systemen extensiver tiergebundener Grünlandnutzung : produktionstechnische und ökonomische Analyse, Wettbewerbsfähigkeit, internationale Übertragbarkeit. Getr. Zählung , Zugl: Göttingen, Univ, Diss, 1993.

Deblitz C, Izquierdo-Lopez MD, Davier Z von eds. 2004, IFCN beef report 2004 : for a better understanding of beef farming world-wide [online]. Braunschweig : FAL, 107 p, zu finden in <http://www.ifcnnetwork.org> [zitiert am 30.11.2004].

Deblitz C, Izquierdo-Lopez MD, Davier Z von eds. 2003, IFCN beef report 2003 : status and prospects of typical beef farms world-wide. Braunschweig : FAL, 113 p.

Deblitz C, Izquierdo-Lopez MD, Davier Z von eds. 2002, IFCN beef report 2002 : status and prospects of typical beef farms world-wide. Braunschweig : FAL, 81 p

Deblitz C, Ostrowski B 2004, How competitive is Argentina's beef production? Landbauforsch Völkenrode 54(2):103-112.

FAO 2004, June 2004, meat market assessment [online]. Zu finden in <http://www.fao.org/es/ESC/en/20953/21014/highlight_27269en.html> [zitiert am 06.10.04]

FAPRI (Food and Agriculture Policy Research Institute) 2004, U.S. and world agricultural outlook 2004 [online]. Staff report 1-03, ISSN 1534-4533, zu finden in <http://www.fapri.iastate.edu/outlook2004/> [zitiert am 06.10.04].

Hartmann M, Schornberg S 2004, Is meat processing in Central and Eastern European new member states competitive after EU accession? Eurochoices 3(1):26-31.

Imke M 2004, Telefonische Auskunft vom 24.09.2004.

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

Kleinhanß W, Hüttel S, Offermann F 2004, Auswirkungen der MTR-Beschlüsse und ihrer nationalen Umsetzung : Studie im Auftrag des Bundesministeriums für Verbraucherschutz, Ernährung und Landwirtschaft [online]. Braunschweig : FAL, 42 p Arbeitsber. Inst. Betriebswirtsch. 04/05, zu finden in. <http://bw.fal.de/download/AB_5-2004.pdf> [zitiert am 28.09.2004].

Martin L, Westgren R, Van Duren E 1991, Agribusiness competitiveness across national boundaries. In: Am J Agric Econ 73:1456-1464.

Moura de Torres jr. A, R Tito Rosa F, Palma Nogueira M 2004, Mais boi em menos pasto. Rev Agronegocios FGV, Agosto 2004:37-39.

OANDA 2004, Oanda : the currency site [online]. Zu finden in http://www.oanda.com [zitiert am 15.04.04].

Rosegrant MW, Paisner MS, Meijer S, Witcover J 2001, Global food projections to 2020 : emerging trends and alternative futures. Washington DC : International Food Policy Research Institute, XVII, 206 p, ISBN 0-89629-640-7.

Sere C and Vera R 1985m, Technical and Economic Evaluation of Beef Production Systems in the Tropical Savannas of America – ETES Project, CIAT, Tropical Pastures Program, Cali.

Weeks P 2004, Australian cattle industry projections : summary ; mid-year-update. Sydney: Meat and Livestock Australia, Publication Code 174036502X.

ZMP-Marktbilanz : Vieh und Fleisch ; Deutschland, Europäische Union, Weltmarkt 2003. Bonn: ZMP-Verl.

