agri benchmark

Beef and Sheep Network

Claus Deblitz

Costs of production for beef and national cost share structures

Working Paper 2012/3

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1 International competitiveness of beef production

1.1 Summary

Farms and production systems

47 farms from the agri benchmark data set were selected for the study. All countries in the network are represented with at least one farm. Some of the farms are specialised in beef finishing (mainly feedlots) but the majority of the farms combine beef finishing with at least one more enterprise.

The focus of the study is on beef finishing enterprises and production systems. Pre-finishing systems such as cow-calf (weaner) production and backgrounding are excluded from this study due to the limited time and resources available.

The main products of the beef finishing systems are bulls, steers and in some cases heifers. A large variety of breeds are used by the farms. The breeds involved depend on the importance of dairy vs. beef production, natural conditions, market preferences, production systems and technology and tradition.

Four production systems are defined within agri benchmark: pasture, silage, feedlot and cut & carry. The latter was not relevant for the study and was excluded from the analysis. The basis for defining these production systems are a) feed composition, b) housing systems and c) extent of purchase feed.

Prices and direct payments

Beef prices received differ significantly between countries. Europe, China and Indonesia are high price countries, Argentina, Brazil, Ukraine are the lowest price countries.

Coupled direct payments at the enterprise level are of minor importance, mainly due to the decoupling in Europe. With few exceptions, the remaining direct payments are low enough to not constitute a reason to produce or not. Decoupled payments on whole-farm level are significant in EU-countries.

Beef and livestock price relationships on a per kg basis are similar throughout the countries and beef price – animal purchase cost relations are homogeneous at a ratio of roughly 2:1 with few exceptions.

Cost of production

Total costs vary by a factor of 2-3 and relative levels between countries are similar to price differences. High and low cost levels are found for all production systems. Cost differences seem to be determined by regional input and factor prices, as opposed to production systems. The prevalence of certain production systems is reflected in these price differences.

However, differences in cost composition are driven by production systems as well as animal category and its origin, which has an impact on the finishing period and the purchase price of the animals.

Factor productivity

Labour is critical production factor and is driven by wages and labour productivity. There are enormous variations in wage levels between countries. Feedlots lead the physical labour (as well as land and capital) productivity, mainly due to the design and size of these operations. Farms in countries with low wages often display low physical labour productivity, but due to the low value of labour they can achieve relatively high economic labour productivity, which can compensate.

Land productivity is mainly driven by stocking rates, which again is driven by regional land price levels. Capital productivity is relatively homogeneous throughout the farms and systems analysed (feedlots excluded in both statements).

Profits

During 2009, long-term profitability in the beef finishing enterprise of the farms analysed was a rare occurrence. In contrast, whole-farm profitability was mostly positive, indicating that losses in beef finishing could be offset by (decoupled) direct payments and/or profits in other enterprises. Furthermore, beef finishing is not competitive on local labour markets, as return to labour is mostly below local wage rates.

Finally, costs seem to determine profitability rather than returns, meaning that high returns in high price countries such as the EU or parts of Asia need to be accompanied by controlling the costs to maintain or achieve profitability.

1.2 Overview of the farms

Number of farms analysed

In 2009, the agri benchmark sample of typical beef finishing farms comprised a total of 64 farms. Of these, 47 were chosen for Section 1 to ensure that each country had at least one farm included in the study.

With the exception of feedlots and some grazing farms in South America, all other farms run more than just a beef finishing enterprise. They combine beef finishing with crop production or cow-calf, finishing their own weaners. Details on the return composition are provided in Section 1.3.

Three main animal categories

Bulls, steers and heifers are the three main finishing products. The type of male animals is linked to housing and management systems.

- Bulls are typically found in confined systems, with animals often coming from dairy, but also from cow-calf origin in the European countries.
- Pasture and feedlot animals are typically steers from cow-calf origin, as they are easier to manage on pasture than bulls. This also applies to animals finished in feedlots as they have typically undergone an initial pre-finishing period (backgrounding) on pasture before they are moved to feedlots.

A variety of breeds

Breeds involved depend primarily on the predominance of dairy or the cow-calf herd, as well as the natural conditions in the production regions.

- Dairy breeds like Holstein, Swedish Red. They are mainly found in countries with a clear dominance of the dairy herd (Germany, Poland, Sweden, Norway, some of UK).
- Dual purpose breeds like Fleckvieh (Simmental), Norwegian Red are found in Austria, Germany and Norway.
- Continental beef breeds like Charolais, Limousin and their crosses dominate in the French and Italian farms. They are also found in the UK and Spanish farms keeping all kinds of crosses originating throughout the entire EU-27.
- British beef breeds, mainly Angus and Hereford and their crosses, are common in farms in North America, Argentina and Southern Australia.
- Indicus (zebu) breeds. Brazil features the Nelore breed that constitutes the majority of Brazil's beef herd. Crosses of Brahman and other Indicus are common in Queensland (AU), Peru, Colombia and South Africa, respectively. They are well adapted to hot / tropical climates.
- Other breeds. Bali Cattle and Madura are found in Indonesia. The Chinese Yellow Cattle represent the vast majority of China's beef herd. South Africa has Bonsmara and Dragensberger and Simbra. The Ukraine features breeds like Volynska, Polisska and Chomorjaba.

Origin determines animal basis of finishing

There are basically three types of animals used for finishing:

- Young calves between seven days and two months, sourced from dairy herds.
- Weaner (calves) of typically six to nine months, sourced from cow-calf herds.
- Backgrounders of typically twelve months or more, either from dairy or cow-calf origin. They have undergone an initial fattening phase before being bought from the finishing enterprise.

The animal type and origin is linked to the level of livestock prices (older animals would have c.p. higher per head and lower per kg live weight prices) and the duration of finishing periods (older animals would c.p. have shorter finishing periods). This has implications on the cost structures, which are discussed in Section 2.

Feed basis and housing system determines production system

Figure 1.2 highlights the main feed sources. This information was combined with the information on housing systems and the extent of purchased feed to classify each farm into one of four production systems. Details on production systems are provided in Section 1.4.

Tab 1.2. Overview of the typical farms

Farm name (1)	No. & type of beef cattle sold per year	Region	Breeds	Category of animals	Other activities	Production system (2)	Main feed sources
AT-35	35 bulls	Oberösterreich	Fleckvieh	Calves	—	S	Maize & grass silage + grains, soybean, hay
AT-120	120 bulls	Oberösterreich	Fleckvieh	Calves	Cash Crops, Mach. Service	S	Maize & grass silage + grains, soybean, hay
DE-230	228 bulls	Bayern	Fleckvieh	Calves	Cash Crops, Forestry	S	Maize silage + grains
DE-285	286 bulls	Schleswig Holstein	Holstein	Calves	Cash Crops	S	Maize & grass silage + concentrates
DE-525T	525 bulls	Nordrhein-Westfalen	Fleckvieh	Backgrounder	Cash Crops	S	Maize silage, concentrates, by-products
FR-70	37 bulls, 22 heifers, 14 cows	Limousin	Limousin	Weaner	Cow-calf	S	Maize silage + grains for bulls Pasture, silage and grains for females
FR-90B	90 bulls	Bretagne	Charolais * Holstein, Normand	Calves	Cash Crops, Poultry	S	Maize silage + grains
FR-200	200 bulls	Pays de la Loire	Charolais	Weaner	Cash Crops	S	Maize silage, hay + concentrates
ES-520	196 bulls, 230 heifers, 98 cows	Guijuelo, Salamanca, CYL	Crosses	Weaner Cows	Cow-calf	F	Straw + concentrates + grains
ES-5500	5,500 bulls	Aragón	Simmental, Montbellard, Crosses	Calves	—	F	Straw + concentrates + grains
IT-910	910 bulls	Veneto	Charolais	Weaner	Cash Crops	F	Maize silage + grains + concentrates, straw
IT-2880T	2,660 bulls	Emilia-Romagna	Charolais	Weaner	—	F	Maize silage + concentrates
UK-35	21 steers, 15 heifers	Suffolk	Limousin cross	Weaner	Cow-calf, Cash Crops, Lease hunting	P	Pasture, grass silage + grains
UK-80	41 steers, 41 heifers	Yorkshire	Continental cross	Weaner	Cow-calf	P	Pasture, grass silage + concentrates
UK-90	47 bulls, 46 heifers	Somerset	Holstein * Hereford, Simmental	Calves	Dairy, Cash Crops	S	Maize silage + grass silage + concentrates
SE-100	71 bulls, 32 heifers	Sävjö kommun, Småland	Charolais cross	Weaner	Cow-calf	S	Grass silage + grains
SE-210	214 bulls	Västergötland	Dairy	Calves	Forestry	S	Maize & grass silage + grains
NO-60	56 bulls, 6 heifers	Oppland	Dairy, Simmental * Angus	Calves Weaner	Cow-calf, Fishing, Forestry, Tourism	S	Grass silage + concentrates
PL-12	7 bulls, 5 heifers	Wielkopolskie	Black & White	Calves	Dairy, Cash Crops	S	Grass silage + grains
PL-30	21 bulls, 9 heifers	Podlaskie	Black & White	Calves	Dairy, Cash Crops	S	Maize & grass silage + grains, concentr.
CZ-500	578 bulls	Central Bohemia	Holstein/Fleckvieh/Beef crosses	Calves Weaner	Dairy, Cash Crops	S	Maize silage + concentrates
UA-275	276 bulls	Lviv, Jovkva	Volinska & Limousin	Weaner Backgrounder	Cow-calf, Dairy, Cash Crops	P	Pasture + grains + concentrates
UA-5600	5,600 bulls	Kyiv	Angus, Simmental, Poliska, Ukrainian	Calves, Weaner, Backgrounder	Cow-calf, Dairy, Cash Crops	S	Maize silage + grains
CA-9600	6,362 steers, 3,180 heifers	Alberta	Angus	Weaner	—	F	Feed barley grain + barley silage
US-7200	7,195 steers	Kansas	British + Cont.	Weaner	—	F	Grains + soybean meal + alfalfa hay
US-75K	41,882 steers, 33,111 heifers	Kansas	Mainly beef breed + some dairy breed	Backgrounder	—	F	Corn + distiller grain + alfalfa hay
MX-1500	1,485 steers	Chihuahua	Angus & Brangus	Backgrounder	—	F	Corn silage + cotton + peanut straw + concentrates
AR-550	325 steers, 212 heifers	Cañuelas	Angus	Weaner	Cow-calf	P	Natural and temporary pastures
AR-630	377 steers, 255 heifers	Zona Núcleo, Santa Fe region	Angus	Weaner	Cow-calf, Cash Crops	F	(Grain) pastures, maize
AR-1200	990 steers, 235 heifers	East of Buenos Aires region	Angus	Weaner	Cash Crops	S	(Grain) pastures, maize silage, maize
AR-40K	21,375 steers, 8,550 bulls, 9,120 heifers	prov.Bs.As.	Angus & crosses	Weaner Backgrounder	—	F	Side products and grains
BR-240	245 steers	Mato Grosso do Sul	Nelore	Weaner	—	P	Pasture
BR-600	600 steers	Mato Grosso do Sul	Nelore	Weaner	—	P	Pasture
BR-600B	604 steers	Araguaina, Tocantins	Nelore	Weaner	—	P	Pasture
BR-1550	1,547 steers	Goias	Nelore	Backgrounder	—	F	Corn silage + cottonseed + corn + soy
CO-130	131 bulls	Meta	Zebu, Zebu * Angus	Weaner	Cow-calf	P	Pasture + minerals
CO-800	800 bulls	Magdalena centro	Zebu * Taurus	Weaner	—	P	Pasture, concentrates and hay
PE-1700	1,680 steers	Lima	Zebu	Backgrounder	—	F	Hay, concentrates
CN-300	300 bulls	Gu Yingji county, Heze	Yellow Cattle * Sim	Weaner	Cash Crops	S	Maize silage + wheat straw
CN-940	640 bulls, 294 cows	Beijing	Yellow Cattle	Backgrounder	—	F	Maize silage, corn, cotton seed, hay
ID-2	2 bulls	Bulukumba, South Sulawesi	Bali Cattle Beef breed * Bali Cattle	Weaner	Cow-calf, Cash Crops	C&C	King grass, rice bran
ID-100	90 bulls, 35 cows	NTT	Bali Cattle	Weaner	Maize for sale	P	Pasture, king grass, leuceana, sesbania, maize
AU-310	310 steers	North Queensland	Indicus	Weaner	Cow-calf	P	Pasture
AU-450	223 steers, 273 heifers	North west slopes NSW	Charolais * Angus	Weaner	Cow-calf, Sheep	P	Pasture, hay, sorghum
AU-45K	44,724 steers		Angus, British + crosses	Backgrounder	Manure sales	F	Grain, cotton seed, molasses, supplements
ZA-3000	2,079 steers, 891 heifers	Heilbron	Bonsmara, Sussex, Simbra, Angus, Beefmaster	Backgrounder	—	F	Maize silage, hay, hominey chop, molasses, HPC
ZA-75K	45,000 steers, 30,000 heifers	Gauteng, Northern Free State	Taurus * Indicus	Weaner	—	F	Corn, hay + concentrates

(1) Number refers to total finished cattle sold per year.

(2) Production system: **P**= Pasture; **S**= Silage; **F**= Feedlot; **CC**= Cut&Carry; for details see also Chapter 1.4.

1.3 Whole farm returns, government payments and profits

Specialised and mixed farms

Figure 1.3.1 shows the composition of the market returns of the farms. While the feedlots are typically specialised, other farms are mixed enterprise farms. Most of these farms combine beef finishing with crops, which are either grown to produce own feed or to produce a market crop. Other combinations comprise cow-calf enterprises and in some cases dairy enterprises. In the latter cases, beef finishing often is just a minor enterprise.

Beef payments less important, transformed into decoupled whole-farm payments

Figure 1.3.2 shows the proportion of government payments in total returns on both the enterprise and whole-farm level.

The change from coupled to decoupled payments in 2005 had consequences for the cost analysis of agri benchmark. Decoupled payments can not be accounted for on the enterprise level anymore because the payment is received whether the producer produces beef or not. The payment does therefore not constitute a reason to produce or not. Hence, the decoupled payments are not relevant for the enterprise profits. They appear, however, on whole-farm level and impact whole-farm profitability.

Beef enterprise payments

All farms receiving government payments are European (including the Ukrainian farms), with the exception of the Argentinean feedlot, which receives a (temporary) feed subsidy. After the decoupling, the importance of government payments to the beef finishing is low to negligible in most EU-farms. Exceptions are: Swedish farms (and Norway as a non EU member) where part of the payments to finished cattle remain coupled and Ukrainian farms which receive a direct payment to stimulate declining beef production.

Whole-farm payments

On the whole-farm level, the proportion of payments is higher than on enterprise level. The reason is that most of the previously coupled payments for beef finishing were shifted to whole-farm payments.

Most farms profitable on whole-farm level

Figure 1.3.3 indicates that the majority of the farms are profitable at the whole farm level. Due to their size, some of the feedlots (Argentina, Australia and South Africa) generate a profit of USD 1.5 to 4.5 million. However, the North American feedlots experienced large losses in 2009.

Other farms with high profits are the large Ukrainian farm which also generates substantial income from cash crops. On the other hand, the mixed Czech farm is unprofitable, despite the variety of enterprises and high proportion of direct payments.

Fig 1.3.1. Composition of market returns on whole-farm level (percentage)

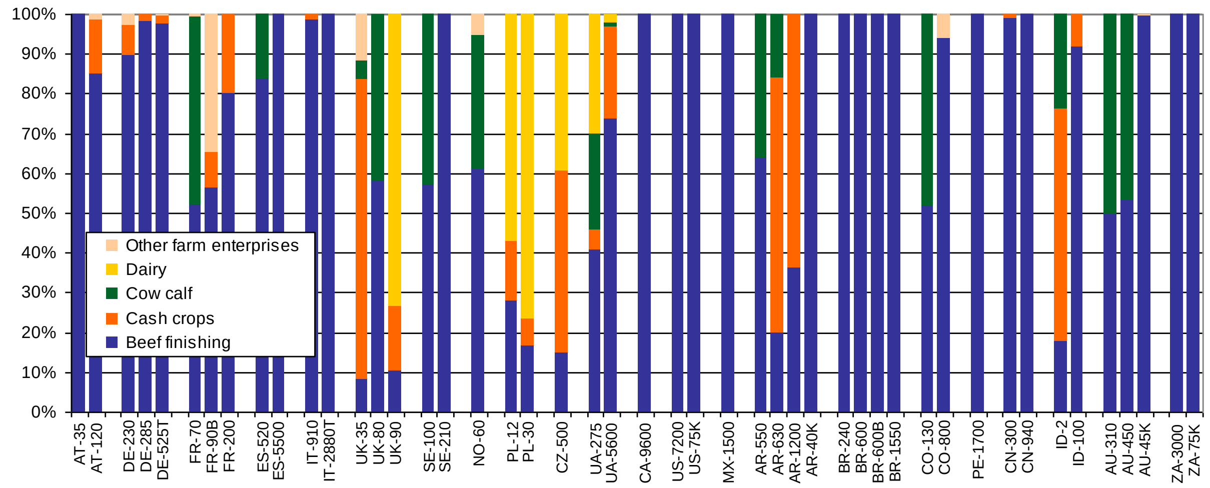


Fig 1.3.2. Proportion of government payments in total returns on enterprise and whole farm level

Enterprise level (beef finishing) | Whole farm level

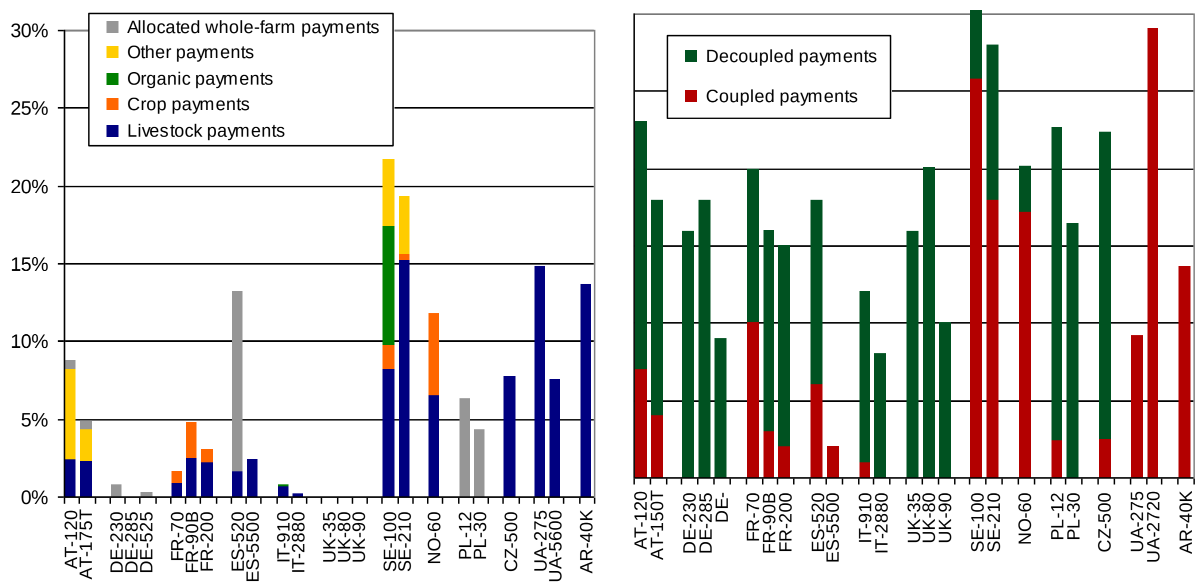
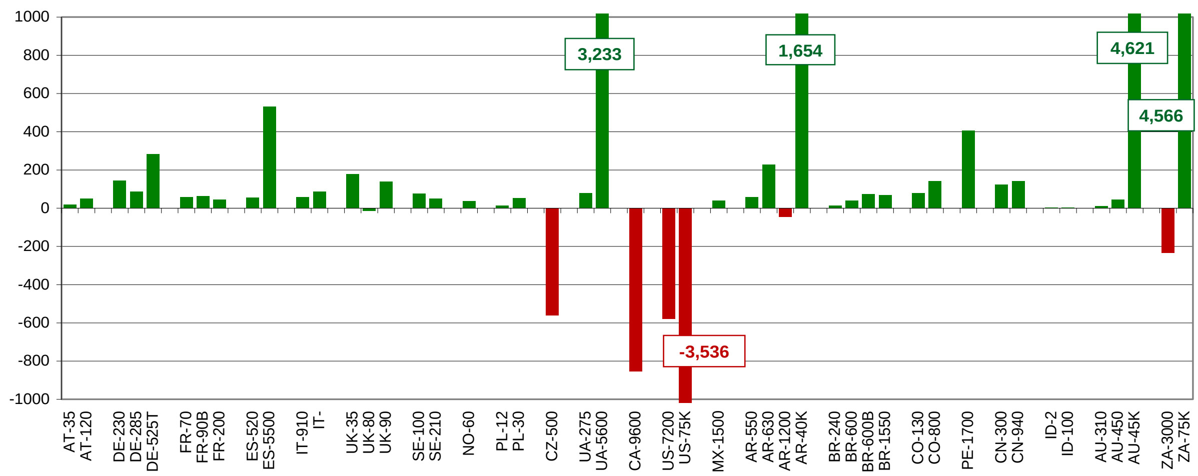


Fig 1.3.3. Whole farm mid-term profit (USD 1,000 per farm)



1.4 Production systems and origin of animals

Four main production systems

Within agri benchmark, farms are classified into four different production systems, shown in Figure 1.4.1. The main criteria are a) the dry matter feed composition, b) the housing and management system, and c) the extent of purchased feed. The other criteria shown in the figure are for documentation purposes, as opposed to classification. Most of the farms can be easily classified into one of the categories based on feed ratios. Exceptions include the Italian farms, which were classified as feedlots despite the fact that the majority of their feed is maize silage. This was due to their substantial size and because they purchase the majority of their feed.

Age at start and end, as well as feed intensity, determine finishing periods

There seems to be a positive correlation between low weights at start and long finishing periods (Figure 1.4.2). Pasture and silage systems tend towards longer finishing periods than

Feedlots, which are typically between 90 and 150 days, with the Spanish straw-concentrate systems exceeding 200 days. The record finishing period of more than three years is held by the extensive Australian pasture system in North Queensland. The main reasons for differences in finishing periods are a) the age of the animals when entering the finishing process and b) the feeding intensity.

Pasture animals are usually weaners of six to nine months, with their breed specific weaning weights. In the silage systems there are younger calves coming from dairy and in the feedlots, the majority of the animals would be backgrounders which have undergone a pre-finishing fattening period after weaning.

Final weights in the silage systems tend to be higher than in pasture and feedlot systems. Reasons are different breeds (British breeds < Indicus < Continental breeds) and market preferences.

Fig 1.4.1. *Definition of production systems*

	Pasture	Silage	Feedlot	Cut & Carry
				
Feed % in dry matter	> 30% pasture	> 30% silage and other forages	> 50% grains and other energy feed	> 30% freshly cut grass & other vegetation
Management/ Housing System	Outdoor year round or part of the year	Closed or semi-open barns with slatted floors and/or straw bedding	Confined, large, open pens, partially with sun-covers	Mix of pens and grazing of paths and paddies
Extent of purchase feed	Low	Medium	High	Low
Type of animals	Mainly steers (and heifers)	Mainly bulls (and heifers)	Mainly steers (and heifers)	Mainly bulls (and heifers)
Main locations	Southern Hemisphere, Ireland, UK	Europe, China, increasingly South America	North America, Australia, Italy, Spain, South Africa, incr. South America	Asia and Africa
Farm sizes	Small to large	Medium	Large 1,000-50,000 head one time capacity	Small

Daily weight gains not the whole story

(Average) Daily weight gain (DWG) is the most important physical performance indicator in beef finishing systems. Figure 1.4.3 shows that DWG seems to be highest in feedlots, followed by silage, pasture and cut & carry systems. Further analysis revealed that breeds did not significantly impact the level of DWG. The fact that some of the silage systems come close to feedlot performances supports the view that high feed energy content is a primary factor for achieving high weight gains. In some cases, particularly feedlots, compensatory gain of animals coming from extensive pasture conditions can be an additional factor (such as in the Brazilian feedlot).

The key words 'short finishing periods' and 'compensatory gains' lead to the second part of Figure 1.4.3, the net gain. Net gain is an extended concept of DWG and reflects the whole life of the animal. It is calculated by dividing the carcass weight at the end of finishing by the age of the animals. Thus, net gain reflects the life of the animals before the finishing period. The result shows that the feedlot performance is relatively lower and closer to the silage systems than with DWG because the animals enter the feedlot at relatively high age having already been through a pasture-based backgrounding period with a relatively low DWG.

Fig 1.4.2. Finishing periods and weights (days and kg live weight)

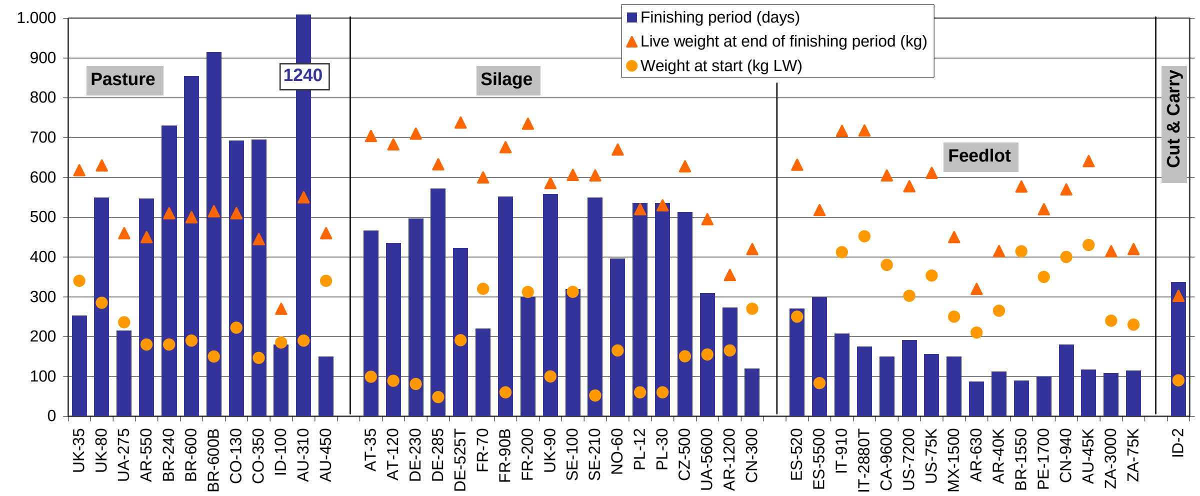
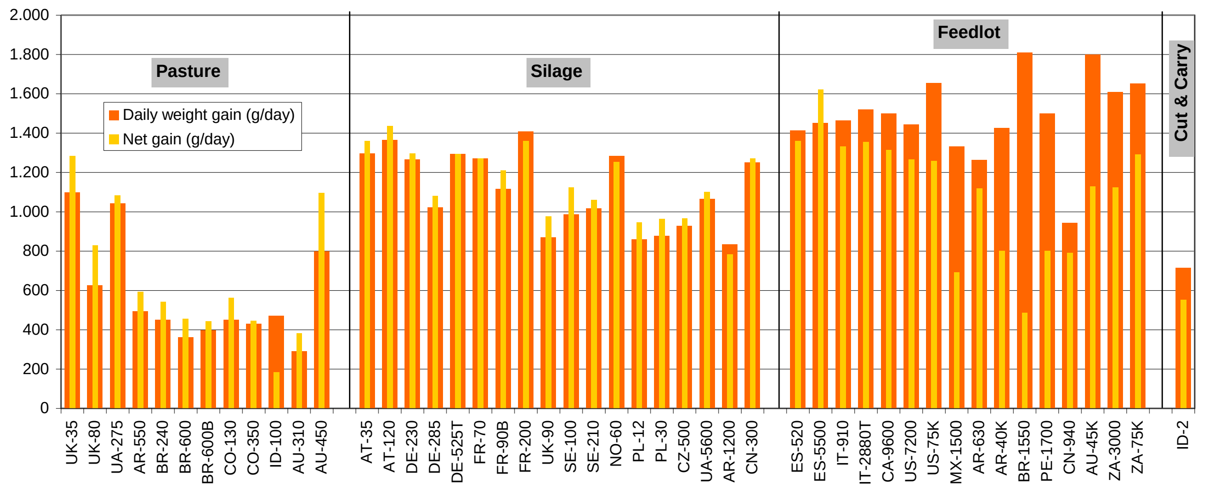


Fig 1.4.3. Daily weight gains and net weight gain (grams per day)



1.5 Prices and direct payments in the beef finishing enterprise

Factor of two to three between high and low price countries

As mentioned in Section 1.3, the proportion of government payments on enterprise level is low to negligible when compared with returns from beef sales (Figure 1.5.1).

Beef prices are measured per 100 kg carcass weight and can be classified into four main groups:

- Highest beef prices (USD 400 to 500 and above) can be observed in the (Western) European countries, with top prices in Norway and Italy. China, as well as Indonesia, can also be considered high price countries.
- Medium prices (USD 300 to 400) are found for the dairy breeds in the EU, Peru, and New South Wales (Australia), where British breeds a re prevailing.
- Low prices (USD 200 to 300) are common in North America, Colombia, Queensland (Australia) where mainly Indicus breeds prevail, and South Africa. In 2009, most Brazilian farms belonged to this group, a development mainly driven by the appreciation of the BRL against the USD.

Lowest prices (USD 200 and below) are found in one of the Ukrainian farms (mainly dairy breed), Argentina, the Brazilian frontier region Tocantins and Ukraine, at around half to one third of EU-levels.

Beef and livestock price relations similar

Figure 1.5.2 analyses livestock prices (per 100 kg live weight) against beef prices. With few exceptions, livestock prices show a very similar pattern to beef prices, supporting the economic perception that beef and livestock prices are closely related. Exceptions are the farms in Austria and Germany buying Simmental (and Holstein) calves of relatively low weights and age, resulting in high live weight prices.

Beef price – animal purchase cost relations homogeneous

Livestock prices will impact upon animal purchase cost. In a separate analysis, a visible but weak correlation could be seen between livestock / purchase cost and total cost. One of the main reasons is that the proportion of animal purchases in total costs is closely linked to the age of the animals at the start and the duration of the finishing period. Taking the proportion of animal purchases as an indicator may therefore be misleading. For example, in the Argentine feedlot AR-40K, animal purchases have a proportion of approximately 70 percent in total costs. Nevertheless, the feedlot is the lowest cost producer in the comparison study. The question seems to rather whether animal purchase costs are correlated with beef prices.

Figure 1.5.3 examines the relationship between beef prices and animal purchases costs on a per kg carcass weight output basis. For this purpose, farms were ranked in ascending order by total cost of production.

The result shows that over the broad spectrum of farms and countries, relationships between the two indicators are around 2 and relatively similar. The exceptions in the centre of the figure refer to farms finishing dairy breeds (Holstein). In these cases, calves are typically bought at low age and weight (and relatively low price) and stay in the system for a long period to be finished. This means that the relative importance of the beef price compared with the purchase cost increases.

Fig 1.5.1. *Beef prices and composition of direct payments (USD per 100 kg carcass weight sold)*

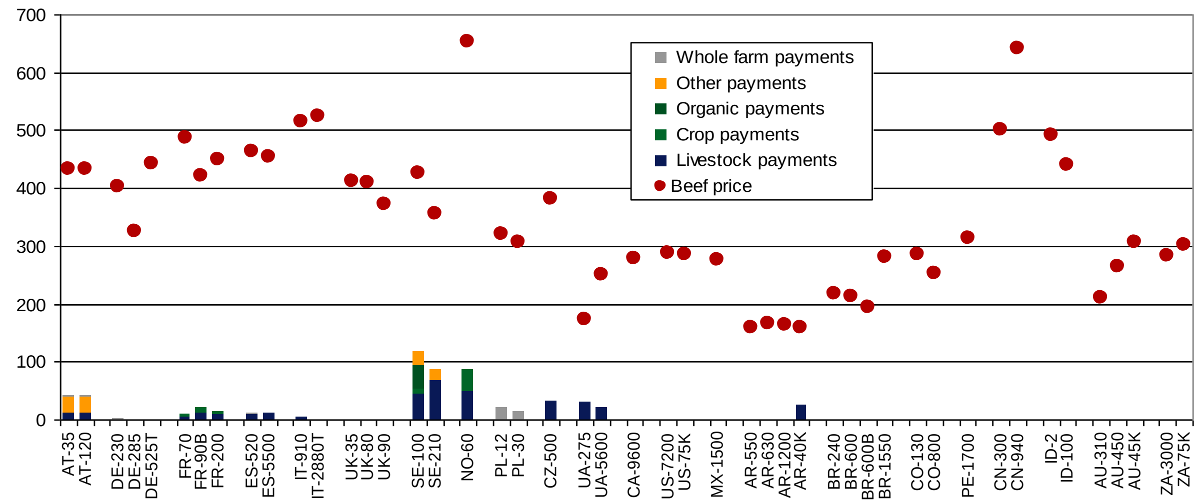


Fig 1.5.2. *Beef price and livestock prices (USD per 100 kg live weight; USD per 100 kg carcass weight)*

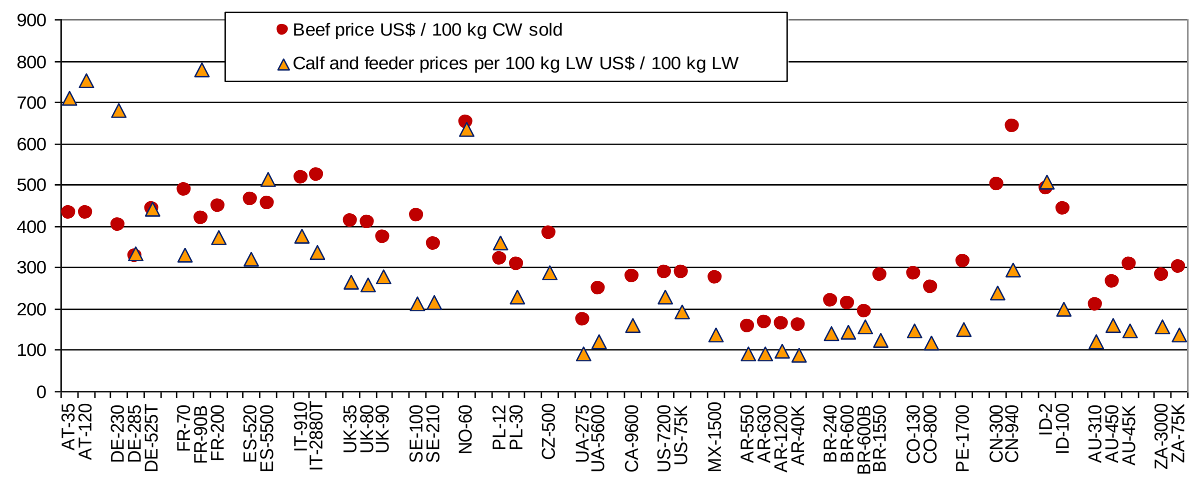
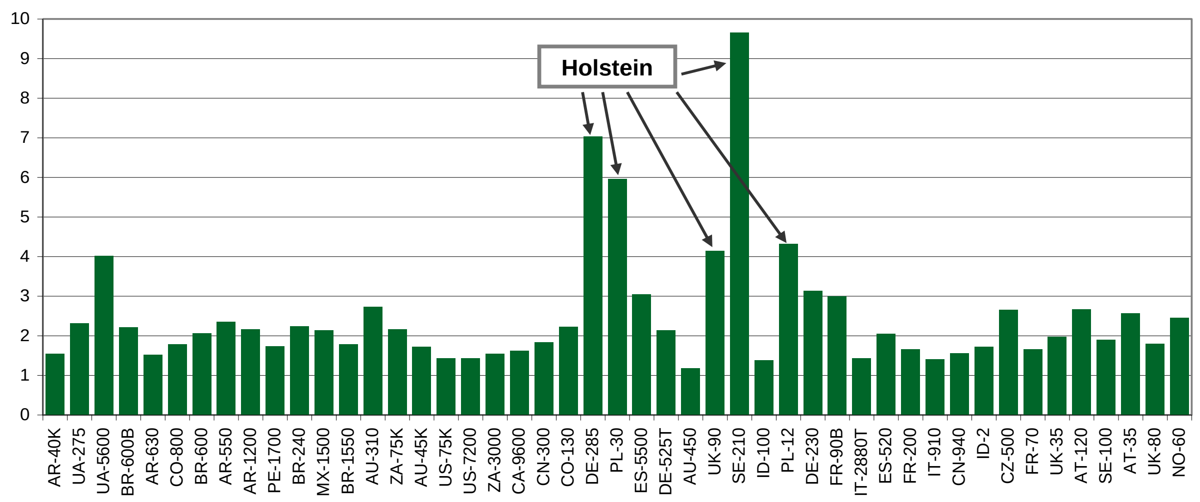


Fig 1.5.3. *Beef price purchase cost relations (Beef price / by purchase cost in USD per 100 kg carcass weight)*



1.6 Costs of production

Cost differ by factor 2-3

The country comparison of total costs of beef production shows similar variations between countries as the price differences in the previous section (Figure 1.6.1).

The EU belongs to the high cost producers. Lowest cost producers are located in South America and also the Ukrainian. The time series analysis of identical farms shows that the cost difference between the EU and Argentina/Brazil has narrowed in the last five years due to exchange rate developments and rising land prices in South America, particularly in Argentina. In Australia and South Africa, at least one of the typical farms belongs to low-cost producers. Further, the cost difference between the US/Canada and the EU is higher in finishing than in cow-calf production, which can be attributed to the size and efficiency of the North American feedlots.

High & low costs in all production systems

Figure 1.6.2 shows that there are farms with high and low costs in each production system. We can therefore not conclude that a specific production system is superior to any other. Rather, it seems that certain production systems develop under certain price and market conditions (for example, a pasture system would not be found in locations with high land prices).

With the exception of the European and the Chinese farm, the feedlots appear to be the most homogeneous group – most likely due to their standardised production system and the low importance of factor costs. Lowest cost producers in each group include farms from:

- Pasture: Ukraine, Argentina, Australia, Brazil
- Silage: Ukraine, Argentina, China, Poland, Germany
- Feedlot: North and South America, Australia, South Africa

Different cost composition

Figure 1.6.3 reveals that non-factor costs are the most important cost component in all production systems. Their proportion is highest in feedlots, lower in silage systems and even lower in pasture systems. However, some differences can be explained as follows:

- Feedlots are characterised by very high factor productivity due to their size, resulting in low factor costs per unit output.
- Silage systems are relatively labour-intensive due to the labour required for feed production and distribution. They are often located in regions with high wage rates. However, the relatively high animal performances seem to partially compensate these disadvantages.
- Pasture systems have to cope with a higher proportion of land costs, particularly when they are located in areas where the land is suitable for cropping.

Further analysis showed that factor costs have similar proportions in high cost and low cost farms. This means that non-factor costs – especially livestock price and associated purchase costs of cattle – have a similar relative importance. In other words, it seems that a) the overall economic framework conditions and price levels determine cost levels and that b) high cost farms seem to be able to compensate for high factor prices of labour and land via higher factor productivity levels. An example for labour productivity is contained in Section 1.7.

Fig 1.6.1. Total costs of beef production by country 2009 (USD per 100 kg carcass weight sold)

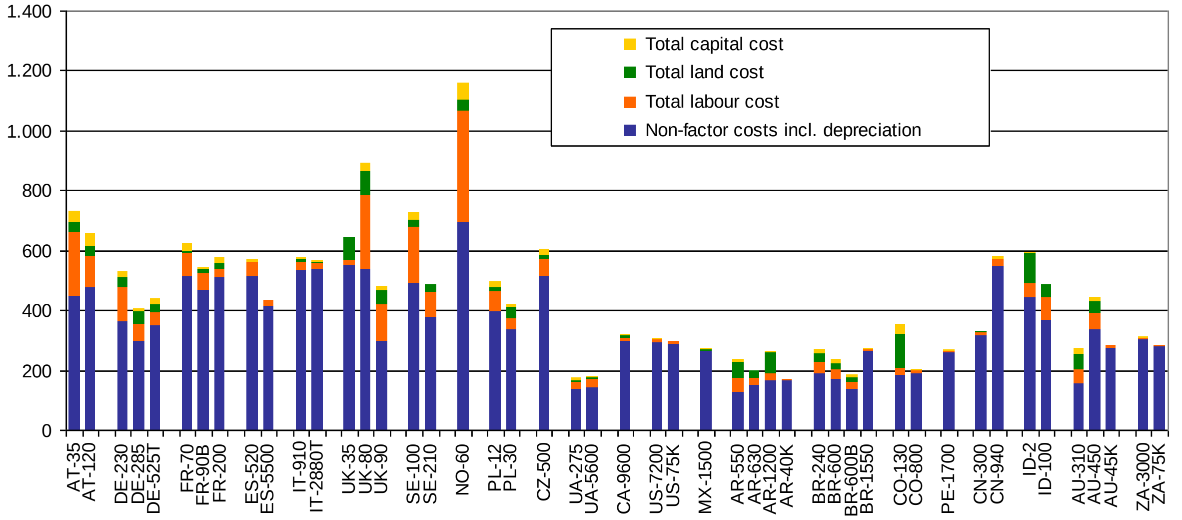


Fig 1.6.2. Total costs of beef production by production system 2009 (USD per 100 kg carcass weight sold)

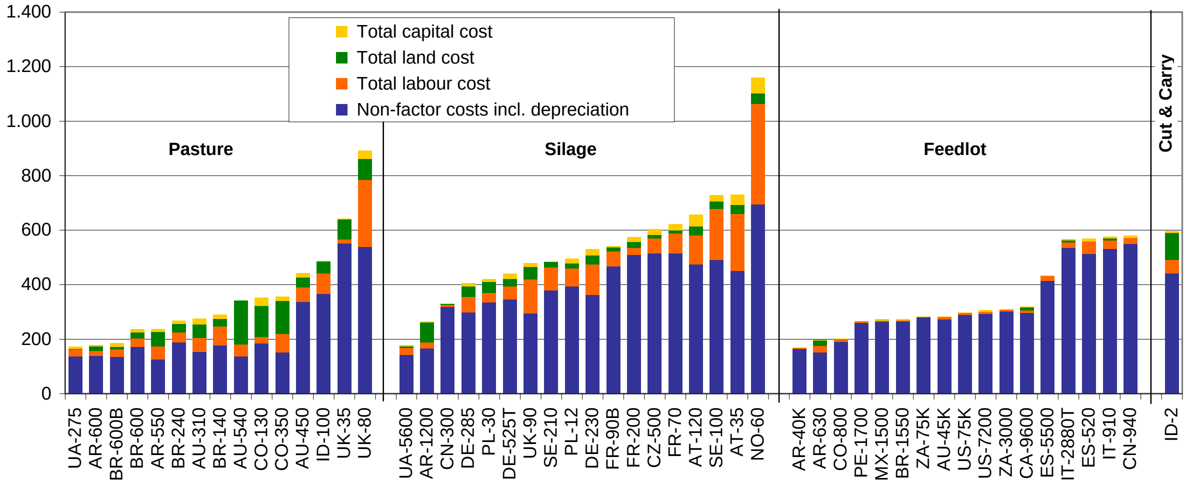
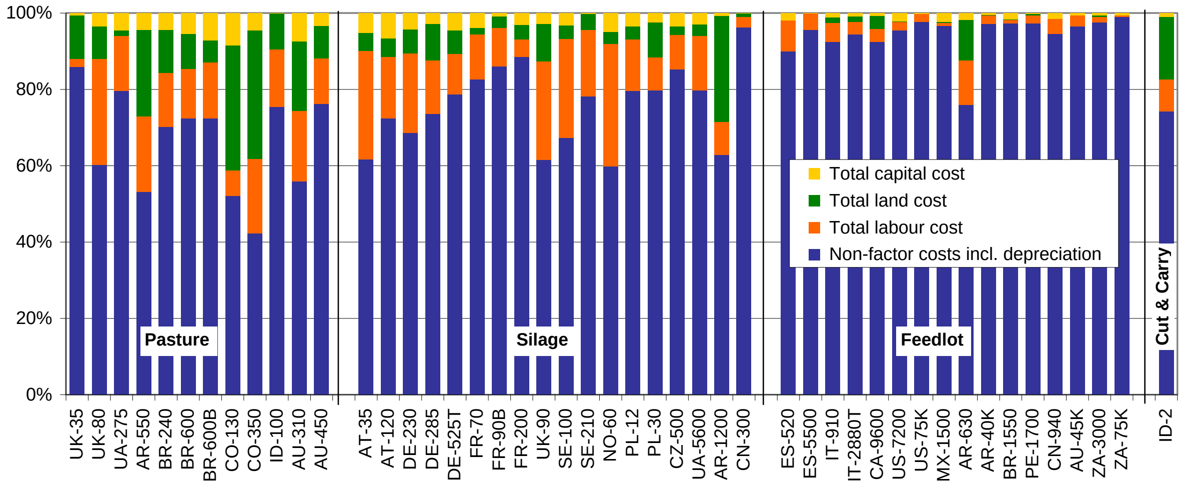


Fig 1.6.3. Composition of total costs by production system (percentage of total costs)



1.7 Production factors: labour, land and capital

Labour is critical production factor

Labour costs are particularly important in smaller farms, usually in terms of opportunity costs. Furthermore, the main purpose of most farm activity is to create labour income. Finally, contrary to other cost factors such as livestock and input prices, the level of labour costs can be influenced by management. As a result, additional analysis was undertaken to look at what determines labour costs. There are basically two factors: a) wages and b) labour productivity.

Enormous variation in wages

Figure 1.7.1 shows the wages paid for permanent and casual workers, as well as the wages used to calculate opportunity costs. The variations are considerable and the factor between low and high wage countries is estimated at between 30 and 40. Relatively high wages are found in Europe, North America and Australia. Low-wage countries include Mexico, Colombia, Peru, China, Indonesia, South Africa and Ukraine. Poland also belongs to this group, but there is a large gap between agricultural and other wages.

Feedlots lead physical productivity

Physical labour productivity is measured as kg of beef produced per hour of labour input, and reaches several hundred kg in the US, Canadian, Argentinean and Australian feedlots. In other cases, such as the Mexican, Colombian, Peruvian and Spanish feedlots, productivity is below 50 kg per hour. Labour productivity of most other farms is well below 50 kg. Size economies certainly impact the differences, but production systems, capital input and management systems are another part of that equation.

However, low physical labour productivity is not necessarily disadvantageous if a) wages are low as shown above and/or b) the beef produced per hour has a high value.

As a consequence, the second y-axis (right hand side) in Figure 1.7.2 shows the economic labour productivity, which is expressed as USD returns per USD labour cost. In other words, it indicates how much USD output is generated with each USD of labour input. The result shows that a number of farms in countries with low wage levels including China, South Africa, Peru, Colombia and Mexico can improve their relative position against the farms in countries with higher wage levels, in some cases even outperforming them.

Land productivity driven by stocking rates

Figure 1.7.3 displays land and capital productivity of the farms. This figure excludes feedlots, because land does not constitute a production factor and capital productivity is extremely high due to their size.

Land productivity appears to be higher in silage systems than in pasture systems, particularly in Western Europe and / or in regions where the land is suitable for cropping. In these situations, high land prices trigger higher intensity and stocking rates. Lowest land productivity is found in the South American and Australian pasture systems.

Capital productivity relatively homogeneous

Levels of capital productivity reach up to USD 1,500 but they do not appear significantly different between production systems shown in Figure 1.7.3. The extreme value for the Chinese farm is a result of an almost purely labour-based production system (see low labour productivity) with very little capital involved, but relatively high animal performance.

Fig 1.7.1. *Wages paid and calculated wages for family labour (opportunity costs) (USD per hour)*

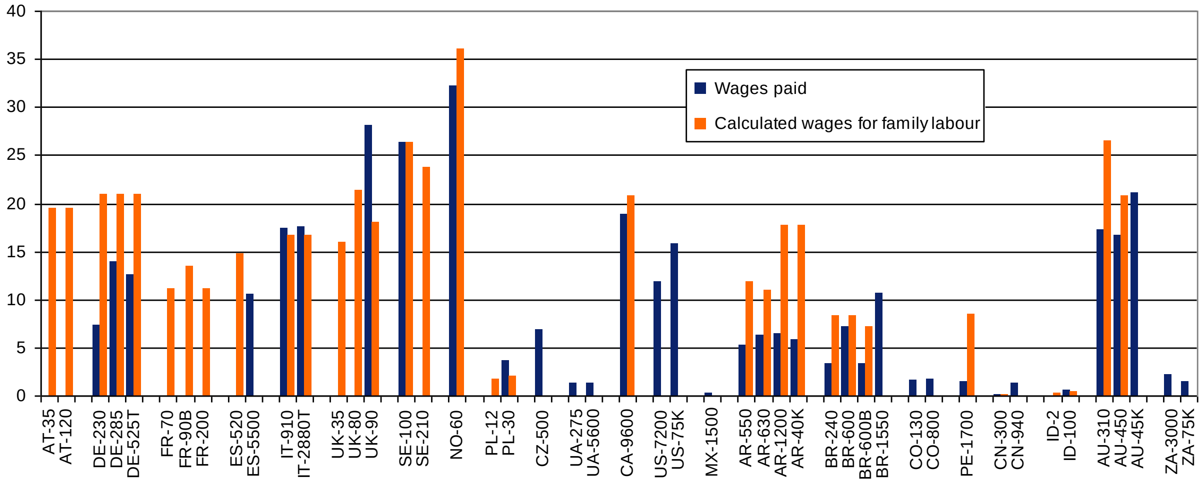


Fig 1.7.2. *Physical (left axis) and economic labour productivity (right axis) (physical: kg beef per hour labour input; economic: USD returns per USD labour cost)*

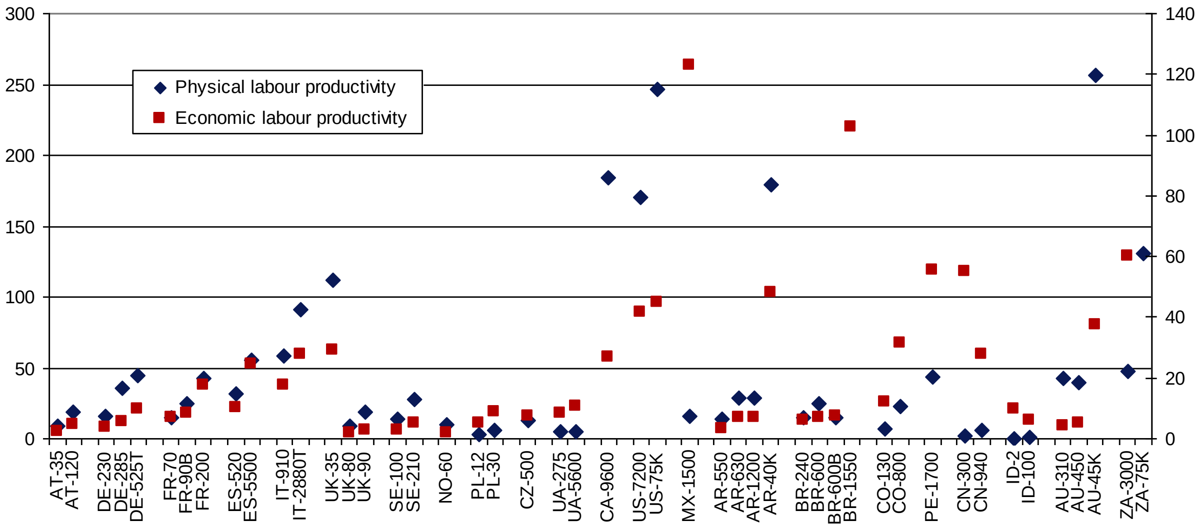
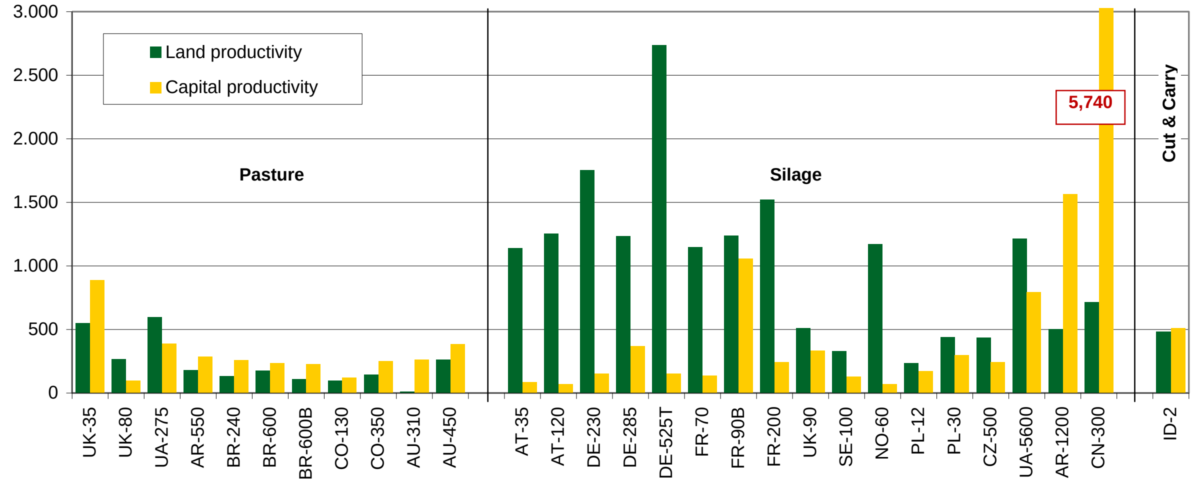


Fig 1.7.3. *Land and capital productivity (feedlots excluded) (kg beef per ha / kg beef per USD 1,000 capital)*



1.8 Profitability

Enterprise profitability different to whole farm profitability

Profitability at the farm level, discussed in Section 1.3, showed a generally positive situation. Figure 1.8.1 displays the profitability of the beef enterprise, where all relevant overhead and factor costs, as well as coupled direct payments (if existing), were allocated to the enterprise.

Three levels to measure profitability

Three indicators related to time are used to measure profitability:

***Short-term profitability**: Total returns less cash costs.*

40 out of 62 enterprises (65 percent) are profitable short-term. Five farms need direct payments to achieve this profitability; they can not cover cash costs with market returns only. The remainder of the farms (many of which were feedlots and companies having to pay for most or all production factors) could not even cover cash costs in 2009.

***Mid-term profitability**: Total returns less cash costs less depreciation.*

32 farms (52 percent) are profitable mid-term, six of which were only profitable with the help of direct coupled payments.

***Long-term profitability**: Total returns less cash costs less depreciation less opportunity costs.*

Only 17 farms (27 percent) are profitable long-term, one of them with the help of direct coupled payments. In the EU-27, the German top farm DE-525T and the large Spanish feedlot ES-5500 belong to this group, while all other farms with long-term profitability come from non-EU countries.

Time series analysis of identical farms shows that profitability – especially in feedlots – varies significantly between years.

Profits driven by costs rather than returns

Further analysis into the question of what determines profit levels, involved the relationship between returns, costs and profits. The question raised is whether high costs can be offset by high prices to generate reasonable profits. This is a reasonable option in the EU-countries, where the border protection allows the existence of high prices in a high cost region.

The left hand side of Figure 1.8.2 suggests that farms with low costs seem to have low returns and vice versa. However, the right hand side of the figure indicates that there is no clear correlation between high returns and profit levels. It can therefore be assumed that keeping costs under control seems to be more important in typical farming situations than receiving high prices.

Beef finishing not competitive on local labour markets

Earning labour income can be considered as the ultimate objective of the majority of farms. The (long-term) question for farm operators and investors is whether the desired labour income can be achieved by farming or by pursuing other, non-farm activities.

Figure 1.8.3 compares the return to labour (paid and unpaid) with the regional wage rates. If the return to labour is below the regional wage rate, the beef finishing activity can not compete with other income. If this situation becomes persistent, it is likely that the agricultural activity will decline, usually within a generation change on the farms. However, annual variations of profitability / return to labour, as well as the availability of alternative jobs, need to be considered for a final assessment.

Fig 1.8.1. Total returns vs. total costs (USD per 100 kg carcass weight)

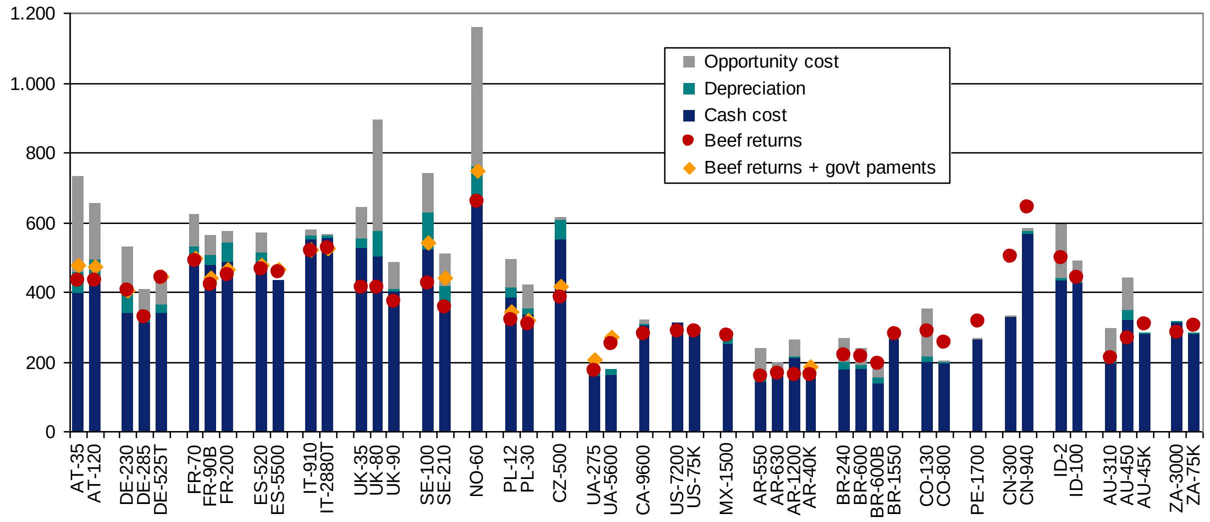


Fig 1.8.2. Relationship between returns and costs (left) and returns and profits (right) (USD per 100 kg carcass weight sold)

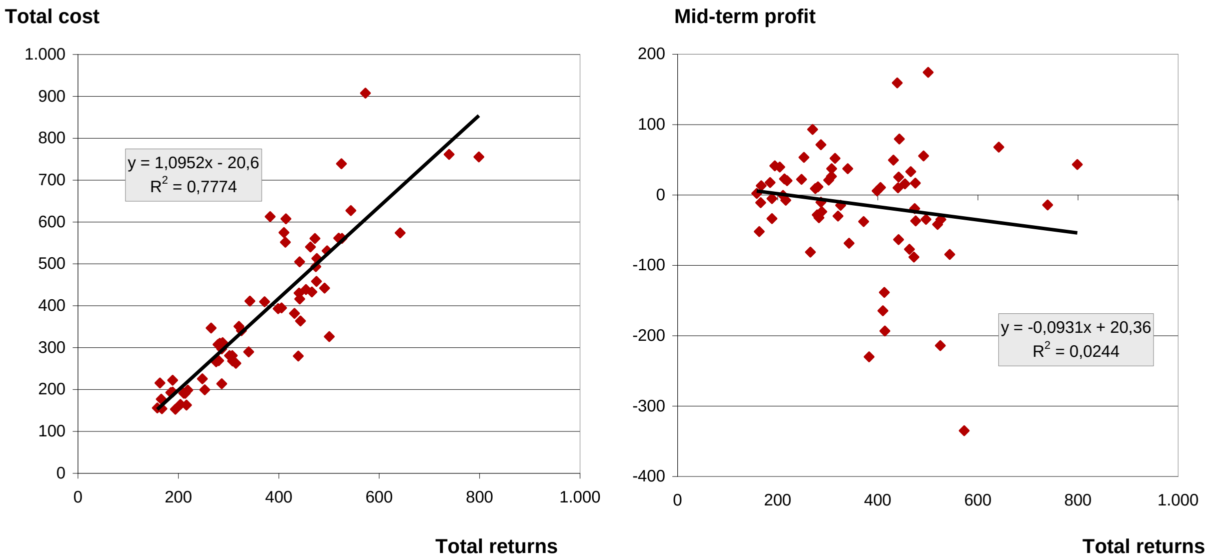
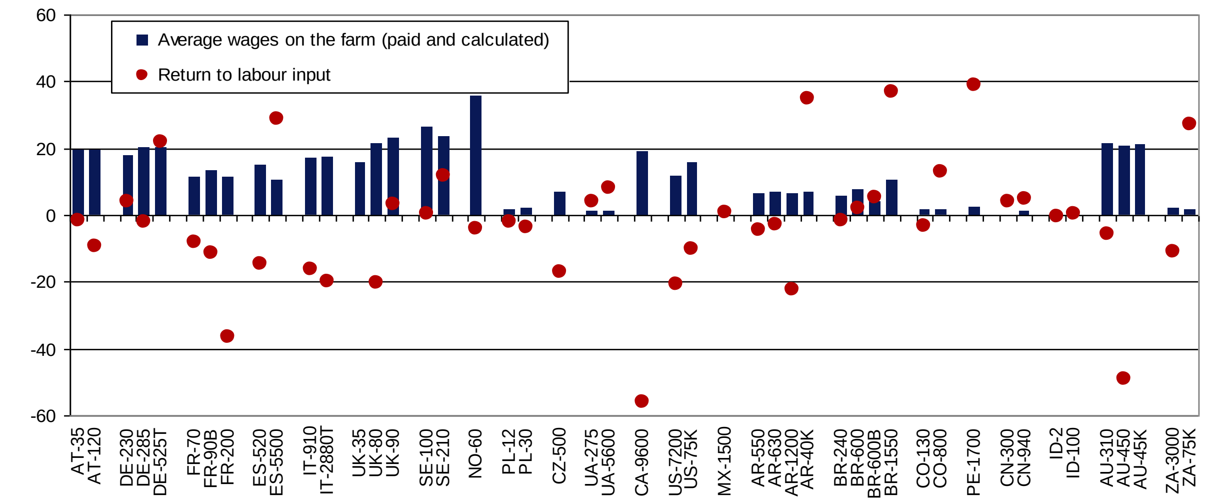


Fig 1.8.3 Return to labour (USD per 100 kg carcass weight)



2 Estimation of national cost share structures

2.1 Background

This section of the report presents the results of case studies in Australia, Brazil, Germany and the US to examine the feasibility developing national cost share structures from *agri benchmark* data, using a product-adjusted approach. This involves an exploratory approach of generalising the typical farms results for key selected countries. However, the intent is not to arrive at representative costs in a statistical sense.

National, scientific *agri benchmark* partners were consulted for this exercise. In principle, *agri benchmark* data provides a reliable source for estimating national cost share structures based on product specific production system data. All key inputs – be it direct inputs, machinery, labour and buildings – are measured in physical and monetary terms. However, existing *agri benchmark* data for typical farms is meant to represent the majority of production (systems) for a particularly region of a country. Countries consist of a large number of different production regions and as such, the number of typical farms does not necessarily reflect this diversity. Therefore, it is suggested that *agri benchmark* data, without any refinement, can usually not be used to develop national averages. Moreover, the relevant farming population is defined as full time farmers. The extent that part time farming accounts for national output in a given product can lead to discrepancies between *agri benchmark* data and representative national data. The key issue for developing national averages is to put existing *agri benchmark* data into perspective with regard to the entire farm population and other regions, which are not covered by typical *agri benchmark* farms.

2.2 Method and data

The following general approach was taken:

- The agri benchmark data set allows for the extraction of absolute cost figures, as well as their percentage composition for each typical farm. A key result is that throughout all farms, animal purchase costs and feed related costs are the two most important cost components.
- All farms are classified into one of the following four production systems: pasture; silage; feedlot; and cut & carry. Criteria for classification are dry matter feed content, extent of purchase feed and housing system (details see Section 1.4).
- The origin and the age of the feeder cattle (dairy calves, weaners, backgrounders) entering the finishing process have an important impact on the proportion of animal purchases in total cost (Details see Section 1.2).
- The various combinations of production system and animal origin were examined. Each of these combinations can be characterised by distinct cost compositions.
- To obtain a clearer understanding about the cost structure of a greater number of farms in a specific country, information would be required on the proportion of each production system/origin combination in each country.
- Corrections for size effects were reflected, where appropriate.

Data used are from the following sources:

1. *All countries*: *agri benchmark* typical farm and production system data.
2. *Australia*: Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) and Department of Agriculture, Fisheries and Forestry (DAFF) data.
3. *Brazil*: Instituto Brasileiro de Geografia e Estatística (IBGE) and Centro de Estudios avancados em Economia aplicada (CEPEA - ESALQ/USP) data.
4. *Germany*: Statistisches Bundesamt (DESTATIS) data.
5. *USA*: National Agricultural Statistics Service (NASS)/USDA and Iowa, Nebraska and Kansas State University feedlot budget data.

2.2.1 Production systems and origin of animals

Figure 1.4.1 (Section 1.4) showed the four production systems, as defined within *agri benchmark*. The Indonesian Cut & Carry system is not part of this consideration. The three primary systems are:

- Pasture based on weaners from the suckler-cow (cow-calf) herd (Australia, Brazil)
- Silage based on calves from the dairy herd (mainly Holstein or Fleckvieh, Germany)
- Feedlot based on weaners from cow-calf and / or backgrounders (Australia, Brazil, USA)

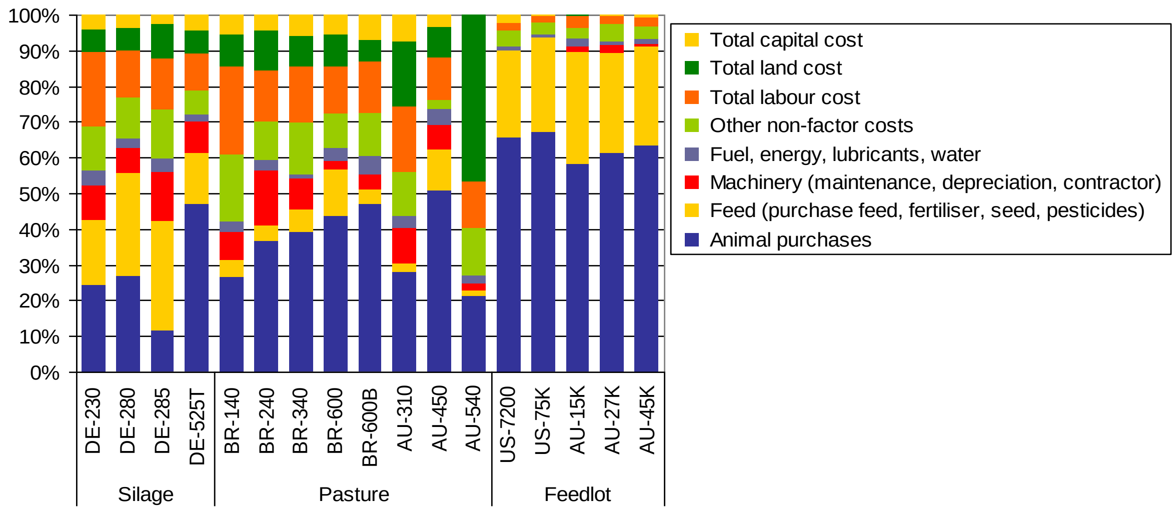
Figure 2.2.1 displays the cost structure of the typical farms in the *agri benchmark* data set. It is differentiated into silage, pasture and feedlot systems. The following can be observed:

Non-factor costs are the most important cost item in all farms and systems and contribute to at least 55 percent of total cost. The only exception is the extensive grazier, AU-310 in North Queensland (Australia), where land costs play a significant role.

Cost for buying animals and feed constitute 90+ percent in the feedlots. On the other hand, factor costs play an insignificant role due to the high productivity and size of the operations (labour, capital) and the fact that land cannot be considered as a production factor.

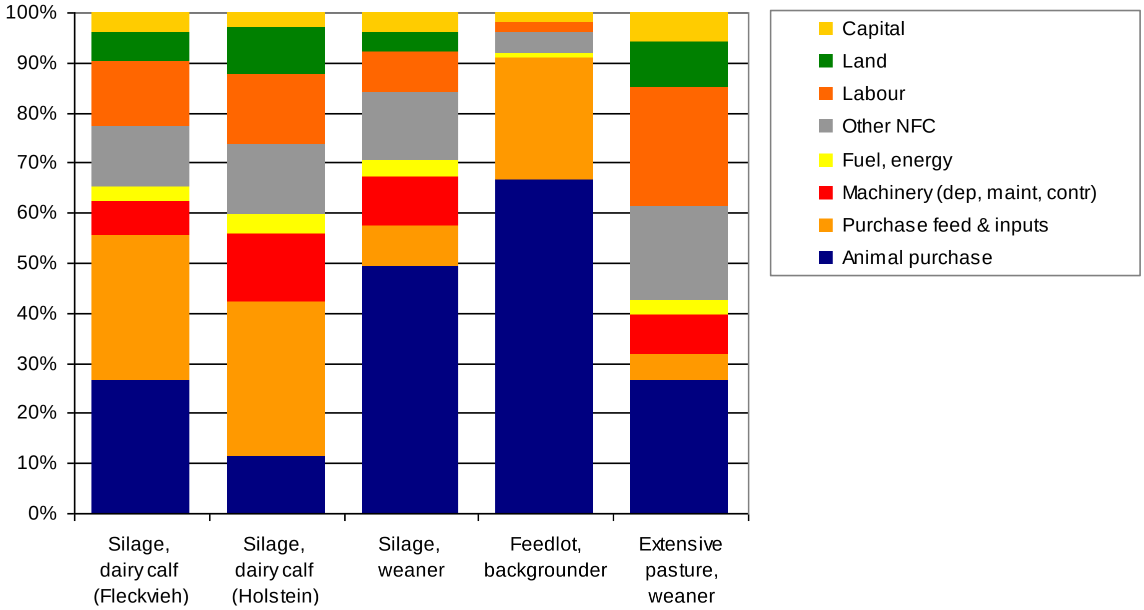
Cost structures between silage and pasture systems are more aligned, but still reveal significant differences, as demonstrated in Figure 2.2.2.

Fig 2.2.1. *Cost structure of typical finishing farms by production syste* (percentage)



Source: *agri benchmark* Beef and Sheep Report 2010

***Fig 2.2.2.** Cost composition by production system and animal origin (percentage)*



Source: *agri benchmark* Beef and Sheep Report 2010

The determinants of the cost composition appear to be:

1. The production system

The typical feedlot cost structure has been detailed previously. The silage system would typically display relatively high costs for purchasing feed or for producing its own feed (inputs, machinery, fuel, energy). Labour can also constitute an important proportion of costs, primarily due to low to medium productivity and high wages in countries with silage systems. Pasture systems tend to have relatively high costs of labour (and sometimes land) as well as other important net factor costs (NFC), such as depreciation of fences. Despite finishing weaners, animal purchase cost can be diluted by a relatively long finishing period (see below).

2. The origin and the age of the animals

The origin and age of animals is, to a certain degree, correlated.

- Calves from dairy herds would usually be young (1 week to max. 2 months of age), relatively light (40 to 100 kg live weight) and relatively low-priced.
- Weaners from cow-calf are typically 6-9 months old, between 250 and 350 kg live weight and relatively more expensive than dairy calves.
- With identical final weights and similar weight gains, the proportion of animal purchase cost in total cost would be higher for finishing based on weaners than for systems based on dairy calves.
- The latter can be further differentiated in calves based on Holstein and calves based on Fleckvieh or other dual purpose breeds, prices for which would be significantly higher. As a consequence, the proportion of animal purchase cost in total costs is higher in the systems using Fleckvieh than in those using Holstein.
- A further variation in silage and feedlot systems is that both systems, particularly feedlots, would use backgrounders / store cattle instead of calves/weaners that

have undergone an initial fattening process on pasture (usually the case in feedlot systems) or on silage (usually the case in silage systems).

3. The duration of the finishing period

The finishing period mainly on animal purchase and feed costs – the shorter the finishing period, the higher c.p. animal purchase costs and the lower c.p. feed costs. Finishing periods are directly linked to production systems and indirectly to the origin of the animals, with the production system having more weight in this equation. It is therefore concluded that finishing periods are typically linked to the production system – shortest periods in feedlots and longest periods in pasture systems, with silage systems in between the two.

These principles were reflected in the analysis of the four countries chosen for this exploratory analysis.

2.3 Australia

2.3.1 Method

The approach taken in Australia was the following:

1. *agri benchmark* cost structures of typical grass-fed and grain-fed farms (feedlots) were taken as a basis.
2. Australian Department of Agriculture Fisheries and Forestry (DAFF, 2006) data were used to determine the spatial cattle and farm type distribution for each of the key Australian production regions.
3. Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES, Customised report, 2011) data on cost structures of these farms were compared with the *agri benchmark* farms.

2.3.2 Results

The study conducted by DAFF (2006) dissected the Australian beef industry into 12 different beef Regions, based on production intensity, climate and topography, and into six complementary production systems, according to different enterprises and degrees of specialisation.

A review of the DAFF production regions enabled three of them to be linked with *agri benchmark* typical farms: *Lower North*, *Central Qld and North West NSW* and *Temperate South-east Coast and Tablelands*. These three DAFF regions account for 57 percent of Australia's finishing herd.

A similar review was conducted on the ABARES (2011) data. The ABARES data is derived from a survey of farming establishments with an estimated value of agricultural operations of greater than AUD $40,000 *and* where the primary source of income is derived from beef production. The ABARES farms are more broadly characterised than the DAFF study, and broken down into just two regions (northern and southern) and into non-grain and grain/feedlot production systems.

Figure 2.3.1 details how the classifications used in the three data sources can be overlaid and the percentage of finishing cattle.

The percentage of feedlot cattle in total finishing cattle was calculated as an additional weighting factor. While the figure for Central Queensland and North West New South Wales might be realistic, it does not appear plausible that the proportion of feedlot cattle in the Lower North and Temperate and South-east Coast and Tablelands is zero percent. However, this issue was not relevant for the estimation of cost structures in these regions as there was only one data point available from *agri benchmark*. Finally, the feedlot percentage was also neglected for the first case because it was not possible to properly associate the percentages to the farms.

Fig 2.3.1. *DAFF and ABARES regions and typical agri benchmark farms*

ABARE	Northern	Southern	Northern	Northern	Northern	Southern
ABARE	Non-grain	Non-grain	Non-grain	Grain/Feedlot	Grain/Feedlot	Grain/Feedlot
agri benchmark	**AU-310**	**AU-450**	**AU-540**	**AU-15K**	**AU-27K**	**AU-45K**
DAFF	Lower North	Central Qld and North-west NSW				Temperate South-east Coast and Tablelands
Percentage of finishing cattle *	14%	35%				8%
of which % of feedlot cattle	0%	4%				0%
Weighing factor for selected regions	24%	16%	16%	16%	16%	14%

Proportion of selected regions in all regions	57%
Proportion of non-grain farms in selected regions	71%
Proportion of grain/feedlot farms in selected regions	38%

* Measured as 'Other (non-breeding cattle) of more than 1 year'.

Source: Own calculations based on *agri benchmark* Beef and Sheep Report (2010), DAFF (2006)

There are some considerable limitations in the detail and practicality of the ABARES data:

- The data reflects real mixed farm situations and their economics.
- It represents averages for a particular region and production, as it is derived from survey data.
- Costs are estimated for cash costs only (no depreciation and opportunity costs).
- In non-trading farms (i.e. farms using their own stock for finishing), cash costs include a mix of the cow-calf and finishing enterprises.
- This means that a specific enterprise analysis for cow-calf or finishing cannot be performed.
- Land costs are not reflected in the data.

The different data collection methods and inclusions for the ABARES and *agri benchmark* farm data create some difficulties in comparing their cost structures. For example, while the ABARES data is based on specialised beef producers, this requires the majority of the income to be derived from beef, as opposed to just being single enterprise producers. As a result, the ABARES cost data contains estimates across the whole farm, and not enterprise specific breakdowns.

In order to enable some form of comparison, costs in the ABARES sample were allocated to the beef enterprises based on the proportion of farm income. It is acknowledged that this approach is not without limitations and most likely overstates the beef proportion of farm costs, due to their lower acreage related costs. Furthermore, as is not possible to disaggregate the beef enterprise into cow-calf and finishing production systems, the only cost structures that can be directly compared is between agri benchmark and ABARES traders (buying cattle for finishing from outside).

ABARES estimates, unlike *agri benchmark* data, do not provide detail on the age structure and composition of the herd, and the scale of the trading enterprises vary substantially between the two data sources. It was observed that interest costs and their proportions in the ABARES data are systematically higher than in *agri benchmark* models. This is most like due to variations in assumptions and calculation modes of cash flow.

With this in mind, Figure 2.3.2 details the cost structure comparisons between the six *agri benchmark* farms and the two ABARES farm group averages. A notable discrepancy was the *Northern non-grain farms* in the *agri benchmark* sample and the *Northern traders* from the ABARES sample, where the key cost breakdown differences are highlighted in grey. The most likely explanation for this divergence is that a) farms in the Northern sample comprise of grain finishers buying significant proportions of feed and b) finishers in the South use less grains, as they tend to finish on grass when the season enables, and thus fodder purchase costs are lower.

Fig 2.3.2. *Comparison between agri benchmark and ABARE cost structures*

	Southern			Northern				
Source	ab		ABARE	ab	ab	ab	ab	ABARE
Region	Southern	Southern	Southern	Northern	Northern	Northern	Northern	Northern
Feeding	Non-grain	Feedlot	Traders	Non-grain	Non-grain	Feedlot	Feedlot	Traders
Number of cattle sold p.a.	450	45,000	655	310	540	15,000	27,000	835
Farm name (ab)	AU-450	AU-45K		AU-310	AU-540	AU-15K	AU-27K	
Beef cattle purchases	70%	64%	68%	45%	45%	59%	62%	55%
Contracts	0%		2%	2%		0%		1%
Fodder (purchase, chemicals, fertiliser)	16%	28%	17%	4%	3%	32%	28%	26%
Fuel, oil and grease	6%	1%	2%	6%	5%	2%	1%	2%
Handling and marketing	3%	2%	3%	14%	26%	2%	3%	1%
Hired labour	0%	3%	2%	13%	16%	4%	2%	5%
Interest	3%	0%	4%	8%	0%	0%	0%	5%
Repairs and maintenance	1%	1%	2%	8%	5%	1%	2%	4%
Total cash costs	100%	100%	100%	100%	100%	100%	100%	100%

ab = agri benchmark   Farm name: country prefix plus total number of cattle sold per year; example AU-450 sells 450 cattle per year

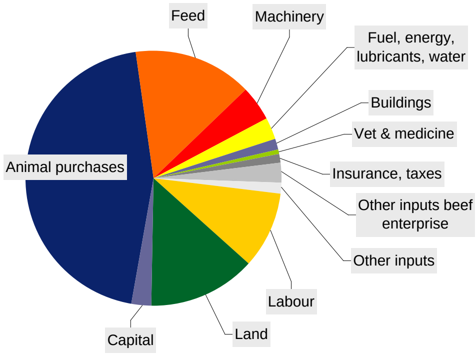
Source: Own calculations based on *agri benchmark*, ABARES

In considering this comparison, it should be again emphasised that ABARES data consist only of cash costs, while *agri benchmark* data also incorporates non-cash costs, such as depreciation and opportunity costs. The proportion of non-cash costs against total production costs are 98-99 percent for the feedlots and 55-72 percent for the non-grain finishers. For long-term analyses, such as trade analyses, these opportunity costs should be taken into account.

As a result of these analyses and the additional detail and accuracy of the *agri benchmark* data, the *agri benchmark* typical farms were selected to have their production costs weighed with the regional percentage of finishing cattle obtained from the DAFF study to obtain an overall picture of the cost structure of the Australian beef industry. The result is shown in Figure 2.3.3.

Fig 2.3.3. *Weighted average cost structures of Australian beef finishing enterprises*

	US$ per 100 kg carcass weight	% composition
Animal purchases	141	45%
Feed (purchase feed, fertiliser, seed, pesticides)	47	15%
Machinery (maintenance, depreciation, contractor)	14	5%
Fuel, energy, lubricants, water	8	3%
Buildings (maintenance, depreciation)	5	2%
Vet & medicine	1	0%
Insurance, taxes	4	1%
Other inputs beef enterprise	8	3%
Other inputs	4	1%
Labour	31	10%
Land	43	14%
Capital	8	2%
Cash cost	257	82%
Total cost of the beef enterprise	314	100%



Source: Own calculations based on *agri benchmark* Beef and Sheep Report 2010

2.3.3 Conclusions and next steps

The results obtained are a first step in estimating national cost structures for beef finishing farms in Australia. Due to the size of the country, the array of seasonal, agronomic and resource conditions, production systems, farm sizes and the low number of farms currently represented in the *agri benchmark* network, they can only provide approximate estimate. However, the data was able to provide a detailed cost structure for beef finishing in Australia.

It became clear that the estimation of cost structures can not be achieved with existing data systems presently available in Australia. The survey based data does not have the level of detail and breakdowns required to accurately depict the cost structure at the national level. It was found that the existing Australian data was best utilised to set the scene of beef production in Australia and illustrate where the typical *agri benchmark* farms sit within regional and national production systems. As well as being a source of validation for the *agri benchmark* data, the Australian datasets were also used to derive weighting factors for estimating detailed national cost structures from *agri benchmark* data.

In order to derive a more comprehensive, representative and accurate estimate of cost structures in Australia, the national *agri benchmark* network in Australia needs to be extended to include additional regions and production systems. Particular attention is needed in southern, central and western production regions and also large scale and mixed grazing farms. Due to their rather homogeneous cost structure it appears that feedlots are rather well represented by *agri benchmark* data (see also Section 2.6 on the US).

It should also be considered whether a national cost structure estimate – that is, a single data point for the country – is realistic and of value in a country with such an immense range and variation of production systems and climates, or whether a higher degree of detail on production systems etc. should be provided and applied. This additional level of detail would be of particular value when utilising international trade models and would be relatively straightforward to complete, given the *agri benchmark* approach.

Furthermore, additional analysis of cow-calf systems should be taken into account to cover pre-finishing cost structures. Given the level of detail required on both the overall enterprise and the production system, it is expected that the *agri benchmark* approach would deliver these outputs at least cost, while retaining the representativeness of the overall Australian beef industry.

2.4 Brazil

2.4.1 Method

The following approach was taken in Brazil:

1. *agri benchmark* data from four typical finishing farms was taken as a basis.
2. Data from the statistical office (IBGE) about the importance of finishing steers was used for calculation of weighting factors.
3. Additional information from the Brazilian network of typical beef farms was included.

2.4.2 Results

Figure 2.4.1 shows the composition of the Brazilian cattle herd, which is clearly dominated by beef cattle. States with *agri benchmark* farms are highlighted grey. The traditional beef cattle region Mato Grosso do Sul is the most important in terms of total cattle numbers, beef cattle and steers.

Figure 2.4.2 includes feedlot information from the states with feedlots. Feedlotting in Brazil is still a rather seasonal business to bridge dry periods when grass is scarce. Due to its high profitability, it can be expected that feedlotting will expand in the future. The figure shows that approximately five percent of the steers – in those states where feedlots are operated – are finished in feedlots. In relation to the total number of steers in Brazil, this percentage is less than three percent.

Fig 2.4.1. Composition and spatial distribution of the cattle herd in Brazil 2006

	Inventories				Percentages of steers		
	Steers Head	Total cattle Head	Beef cattle Head	Beef cattle in total cattle %	in total steers in Brazil %	in total cattle in state %	in beef cattle in state %
Mato Grosso do Sul	13.680.179	20.379.721	20.129.017	99%	13%	67%	68%
Mato Grosso	12.814.336	19.807.559	19.289.070	97%	12%	65%	66%
Minas Gerais	10.345.494	19.911.193	16.634.542	84%	10%	52%	62%
Goias	10.262.761	17.259.625	15.702.587	91%	10%	59%	65%
Para	8.609.362	13.354.858	12.723.251	95%	8%	64%	68%
Sao Paulo	6.839.085	10.433.021	9.753.103	93%	6%	66%	70%
Rio Grande do Sul	6.836.898	11.184.248	11.014.364	98%	6%	61%	62%
Bahia	6.359.438	10.229.459	9.434.940	92%	6%	62%	67%
Parana	5.933.597	9.053.801	8.566.483	95%	6%	66%	69%
Rondonia	4.709.666	8.490.822	7.506.118	88%	4%	55%	63%
Maranhao	3.759.038	5.592.007	5.385.587	96%	4%	67%	70%
Tocantins	3.715.432	6.076.249	5.858.442	96%	4%	61%	63%
Santa Catarina	1.888.858	3.126.002	2.909.723	93%	2%	60%	65%
Ceara	1.265.545	2.105.441	1.766.712	84%	1%	60%	72%
Acre	1.137.112	1.721.660	1.684.649	98%	1%	66%	67%
Pernambuco	1.064.569	1.861.570	1.586.790	85%	1%	57%	67%
Rio de Janeiro	1.003.931	1.924.217	1.617.446	84%	1%	52%	62%
Piaui	969.235	1.560.552	1.493.603	96%	1%	62%	65%
Espirito Santo	945.308	1.791.501	1.493.906	83%	1%	53%	63%
Paraiba	779.527	1.313.662	1.146.730	87%	1%	59%	68%
Amazonas	715.498	1.154.269	1.113.608	96%	1%	62%	64%
Alagoas	562.095	886.244	794.468	90%	1%	63%	71%
Sergipe	559.868	899.298	817.000	91%	1%	62%	69%
Rio Grande do Norte	518.671	878.037	757.546	86%	0%	59%	68%
Roraima	239.622	480.704	466.047	97%	0%	50%	51%
Distrito Federal	40.944	79.889	69.810	87%	0%	51%	59%
Amapa	17.819	57.728	56.085	97%	0%	31%	32%
Brazil	**105.573.889**	**171.613.337**	**159.771.628**	**93%**	**100%**	**62%**	**66%**

Source: IBGE (2006)

Figure 2.4.2. States with feedlots and their proportions in Brazil 2006

	Feedlot cattle			Total cattle		Feedlot proportion in	
Animals/State	**Steers**	**Other cattle**	**Total**	**All**	**Steers**	**All**	**Steers**
Goias	762.087	113.875	875.962	15.702.587	10.262.761	5,6%	7,4%
Mato Grosso	479.255	100.900	580.155	19.289.070	12.814.336	3,0%	3,7%
Sao Paulo	312.460	29.837	342.297	9.753.103	6.839.085	3,5%	4,6%
Mato Grosso do Sul	544.882	52.031	596.913	20.129.017	13.680.179	3,0%	4,0%
Minas Gerais	669.163	99.990	769.153	16.634.542	10.345.494	4,6%	6,5%
Parana	271.154	25.893	297.046	8.566.483	5.933.597	3,5%	4,6%
Total	**3.039.001**	**422.526**	**3.461.526**	**90.074.802**	**59.875.452**	**3,8%**	**5,1%**

Source: CEPEA, ASSOCON and IBGE (2006)

Based on these data, the following calculations were performed (see identical numbering in Figure 2.4.3):

1. The proportion of feedlots in total steers numbers across states (Figure 2.4.2).
2. The proportions of finishing steers across states (Figure 2.4.1).
3. For the Goias feedlot, the proportion of steers in the state was weighted with the proportion of steers in feedlots. For the other states, only the proportion from point 2 was used as the *agri benchmark* data set does not have feedlots in these states.

4. A new total of the proportions from point 3 was calculated and set to 100, and the proportions of the typical farms in the new total were calculated.

The result is displayed in Figure 2.4.3.

Fig 2.4.3. Weighted average cost structures of finishing farms in Brazil

US$ per 100 kg carcass weight	Mato Grosso	Mato Grosso do Sul	Mato Grosso	Mato Grosso do Sul	Araguaina, Tocantins	Goias	Weighted average
	BR-140	BR-240	BR-340	BR-600	BR-600B	BR-1550	
[1] Proportion of state in total feedlot cattle	3,7%	4,0%	3,7%	4,0%	nr	7,4%	23%
[2] Proportion of state in total steers *	6,1%	6,5%	6,1%	6,5%	3,5%	9,7%	38%
[3] Combined factor of [1] + [2] **	6,1%	6,5%	6,1%	6,5%	3,5%	0,7%	29%
[4] Final weighing factor	20,7%	22,1%	20,7%	22,1%	12,0%	2,5%	100%
Animal purchases	77	98	93	104	88	157	94
Feed (purchase feed, fertiliser, seed, pesticides)	14	12	15	30	8	85	18
Machinery (maintenance, depreciation, contractor)	23	41	21	6	7	7	20
Fuel, energy, lubricants, water	8	8	3	8	10	3	7
Buildings (maintenance, depreciation)	34	16	23	11	14	12	20
Vet & medicine	2	2	2	3	2	1	2
Insurance, taxes	0	1	0	0	1	1	1
Other inputs beef enterprise	8	6	7	6	3	1	6
Other inputs	11	3	3	3	3	0	5
Labour cost	71	38	37	30	27	3	41
Land cost	26	30	20	22	11	1	22
Capital cost	16	12	14	13	13	4	13
Total	290	267	239	236	186	274	250

Percentage composition	Mato Grosso	Mato Grosso do Sul	Mato Grosso	Mato Grosso do Sul	Araguaina, Tocantins	Goias	Weighted average
	BR-140	BR-240	BR-340	BR-600	BR-600B	BR-1550	
Animal purchases	27%	37%	39%	44%	47%	57%	38%
Feed (purchase feed, fertiliser, seed, pesticides)	5%	4%	6%	13%	4%	31%	7%
Machinery (maintenance, depreciation, contractor)	8%	15%	9%	2%	4%	2%	8%
Fuel, energy, lubricants, water	3%	3%	1%	3%	5%	1%	3%
Buildings (maintenance, depreciation)	12%	6%	10%	5%	7%	4%	8%
Vet & medicine	1%	1%	1%	1%	1%	0%	1%
Insurance, taxes	0%	0%	0%	0%	0%	0%	0%
Other inputs beef enterprise	3%	2%	3%	3%	2%	0%	2%
Other inputs	4%	1%	1%	1%	2%	0%	2%
Labour cost	24%	14%	16%	13%	15%	1%	16%
Land cost	9%	11%	9%	9%	6%	0%	9%
Capital cost	6%	4%	6%	5%	7%	2%	5%
Total	100%	100%	100%	100%	100%	100%	100%

* State proportion was divided by number of typical farms in that state to avoid overestimation.
** Only relevant for the feedlot in Goias state.

Source: Own calculations based on *agri benchmark* Beef and Sheep Report 2010; CEPEA (Personal communication); IBGE (2006)

2.4.3 Conclusions and next steps

Similarly to Australia, additional analysis of cow-calf systems should be taken into account to cover pre-finishing cost structures. A structured, pre-finishing backgrounding period, as in the US, is not yet relevant in Brazil (see Section 2.6.3).

The development of the Brazilian beef industry has been, and is, expected to remain particularly dynamic for some time. The IBGE-survey appears to be the only reliable and nation-wide source on cattle inventories. However, the survey is only conducted at relatively long time intervals of approximately 5-6 years. *agri benchmark* results suggest that cost levels and structures shows differences between the traditional cattle regions (Mato Grosso do Sul) and frontier regions (Tocantins). In this dynamic environment, the use of outdated inventory and structural data can result in misleading outputs from trade models.

Information on cattle herd size structure is only available on a hectare (ha) basis; differentiated into three broad categories of less than 100 ha; 100-499 ha; and more than 500 ha. In general, it would be possible to associate cattle numbers to the hectare figures if the stocking rates were known or identical throughout the larger regions. This information could be used for further weighting of *agri benchmark* data. In this project, time was insufficient to further investigate this issue.

A possible way around this issue may be the use of the Brazilian network operated by CEPEA, which has 75 typical beef farms based on the *agri benchmark* methodology. This feasibility of this option should be elaborated in further research.

2.5 Germany

2.5.1 Method

The method and procedures employed in Germany were the following:

1. *agri benchmark* farm data were used as a basis
2. Breed and market information was used to classify the existing *agri benchmark* farms.
3. Production system information from Deblitz et al. (2006) was used for further classification.
4. The information from steps 2 to 3 was used to weight the costs available in step 1 and to arrive at an estimation of a national cost structure.

2.5.2 Results

Figure 2.5.1 shows the composition of the German beef production. Cows are cull cows, as are the vast majority of heifers, as heifer finishing is not (yet) common in Germany. The majority of finished beef in Germany comes from young bulls. Taking out the proportion of cows and heifers, young bulls represent 91 percent of the finished beef herd. Thus, the focus of the following analysis is on young bulls.

Approximately 88 percent of the cows in Germany are dairy cows. As a consequence, beef production is closely linked to milk production and the dairy herd. Further, Fleckvieh (Simmental) and Holstein are the dominating breeds in bull finishing (Figure 2.5.2). They represent 68 percent of the German bull production. They are also represented in crossbred cattle which represent approximately 14 percent of the total. It can also be assumed that they form part of 'Other breeds' representing another 11 percent.

Fig 2.5.1. *Composition of beef production in Germany 2009*

	'000 tons	Percent	Percent of finished
Cows	415	35%	
Heifers	143	12%	
Bulls	571	48%	91%
Steers	14	1%	2%
Calves	42	4%	7%
Subtotal	*626*	*53%*	*100%*
Total	**1.184**	**100%**	

Source: Own calculations based on DESTATIS (2010)

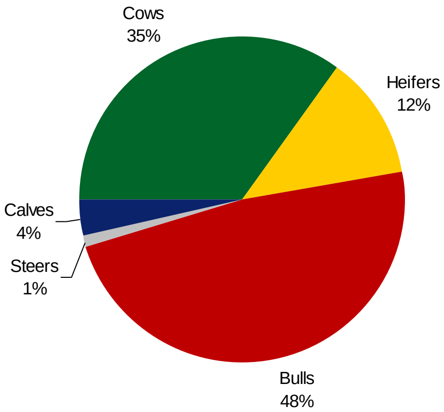
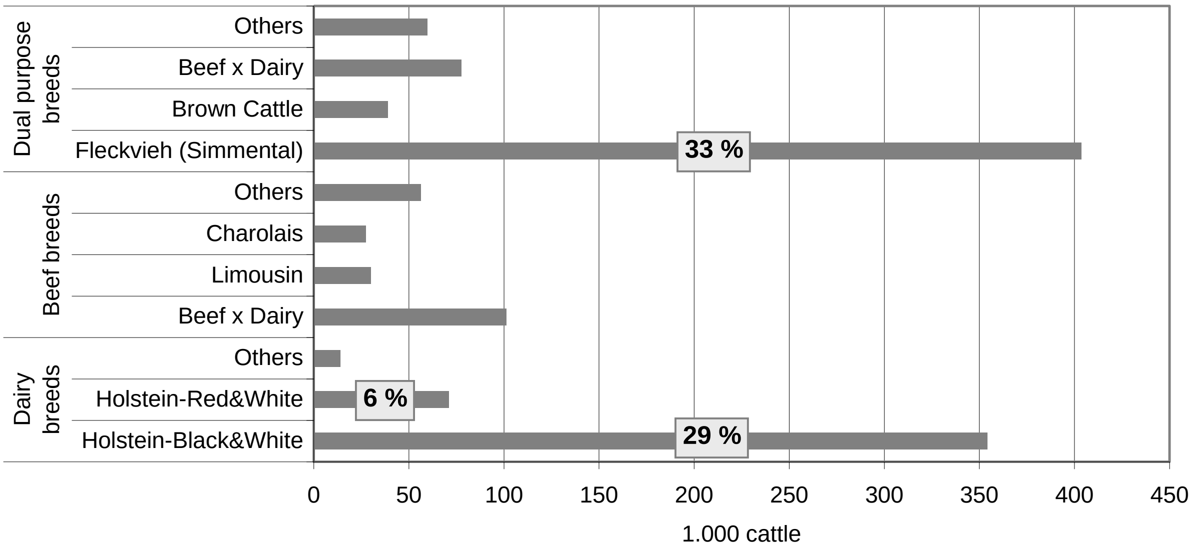


Fig 2.5.2. *Breed composition of beef production in Germany*



Source: Statistisches Bundesamt DESTATIS (2010)

Beef production systems in Germany can be classified as shown in Figure 2.5.3. The vast majority of the production systems are contained in numbers 1 to 3, where the difference between numbers 1 and 2 is mainly breed specific. In the production system *Bulls from calves,* the calves would typically come from Holstein dairy cows between 2 and 3 weeks of age. The starters in the system, *Bulls from starters,* are also calves but from Fleckvieh (Simmental) dual purpose dairy cows, with an age of 1 – 3 months. Number 3, *Bulls from stores / backgrounders,* are based on heavier animals, typically around 200 kg and coming from both Holstein and Fleckvieh. *Bulls from weaners* are much less frequent due to the low proportion of suckler-cows in total cow numbers and because a high proportion of weaners are exported to other European countries for finishing. The contribution of the other systems to beef production is negligible. Expert assessment available from a study conducted on German beef production systems suggests that – aside from regional exceptions – the majority of the animals used for *bull finishing from stores / backgrounders* are Fleckvieh bulls (Brömmer, 2006).

Fig 2.5.3. Beef production systems in Germany

		Age at start days	Weight at start kg live weight	Age at end days	Weight at end kg live weight
1 Bulls from calves	Core values	14 - 21	55 - 70	545 - 640	590 -670
	Full range		(45 - 70)	(480 - 700)	(540 - 710)
2 Bulls from starters	Core values	40 - 80	80 - 105	525 - 590	675 - 700
	Full range	(28 - 90)	(65 - 120)	(495 - 620)	(650 - 720)
3 Bulls from stores /backgr.	Core values	135 - 155	190 - 200	595 - 670	615 - 695
	Full range	(120 - 165)	(180 - 210)	(540 - 750)	(570 - 740)
4 Bulls from weaners	Core values	220 - 290	245 - 350	530 - 665	615 - 695
	Full range	(180 - 330)	(200 - 400)	(475 - 720)	(610 - 720)
5 Steers	Core values	260 - 280	290 - 300	680 - 700	590 - 600
	Full range	(240 - 300)	(290 - 300)	(660 - 720)	(580 - 660)
6 Stores /backgr. production	Core values	35	80	120 - 150	190 - 200
	Full range	(28 - 56)	(65 - 95)	(100 - 165)	(180 - 210)
7 Rosé calves from calves/starters	Core values	35 - 65	65 - 100	280 - 290	390 - 410
	Full range	(14 - 85)	(45 - 120)	(270 - 300)	(380 - 420)
8 Calf production (white veal meat)	Core values	14	45-50	170	245 - 250
	Full range			(165 - 175)	
9 Bulls from pasture	Core values	14	45	300 - 335	385 - 405
	Full range			(270 - 360)	(365 - 425)
10 Bulls concentrate finishing	Core values	85 - 240	110 - 185	555 - 560	695 - 710
	Full range	(40 - 210)		(540 - 570)	(680 - 720)

Source: Deblitz et al. (2006)

The above information was incorporated to calculate a first proxy of beef finishing cost structures in Germany using the following procedure:

1. The breed composition shown in Figure 2.5.2 was applied to the four typical farms from *agri benchmark*. The Holstein breed proportion was applied to the typical farm finishing Holstein cattle. Regarding the Fleckvieh breed proportion, a third of the total of 33 percent was applied to each of the three Fleckvieh farms. This is a wide-reaching assumption, suggesting that one third of the Fleckvieh finishing bulls are stores / backgrounders.
2. The total of the above breed composition (67 percent) was then set to 100 and the proportion of each of these farms in the new total was calculated. This provides the weighting factors shown at the top of Figure 2.5.4.
3. The weighting factors were then applied to calculate a weighted average of cost of production.

The result is displayed in Figure 2.5.4.

Fig 2.5.4. Weighted average cost structures of finishing farms in Germany

US$ per 100 kg carcass weight	Starter Fleckvieh DE-230	Starter Fleckvieh DE-280	Calf Holstein DE-285	Stocker Fleckvieh DE-525T	Weighted average
Percentage in breed composition	11%	11%	34%	11%	67%
Weighing factor (% of new total)	16%	16%	51%	16%	100%
Animal purchases	128	127	46	207	99
Feed (purchase feed, fertiliser, seed, pesticides)	98	134	125	63	112
Machinery (maintenance, depreciation, contractor)	51	34	56	39	49
Fuel, energy, lubricants, water	20	12	15	9	15
Buildings (maintenance, depreciation)	32	19	28	10	24
Vet & medicine	9	7	7	1	7
Insurance, taxes	9	8	8	4	8
Other inputs beef enterprise	9	13	7	9	8
Other inputs	6	9	6	5	6
Labour cost	111	60	57	46	64
Land cost	34	30	39	27	35
Capital cost	22	18	11	20	16
Total	530	471	405	440	442

Percentage composition	Starter Fleckvieh DE-230	Starter Fleckvieh DE-280	Calf Holstein DE-285	Stocker Fleckvieh DE-525T	Weighted average
Animal purchases	24%	27%	11%	47%	22%
Feed (purchase feed, fertiliser, seed, pesticides)	18%	29%	31%	14%	26%
Machinery (maintenance, depreciation, contractor)	10%	7%	14%	9%	11%
Fuel, energy, lubricants, water	4%	3%	4%	2%	3%
Buildings (maintenance, depreciation)	6%	4%	7%	2%	6%
Vet & medicine	2%	1%	2%	0%	2%
Insurance, taxes	2%	2%	2%	1%	2%
Other inputs beef enterprise	2%	3%	2%	2%	2%
Other inputs	1%	2%	2%	1%	1%
Labour cost	21%	13%	14%	11%	14%
Land cost	6%	6%	10%	6%	8%
Capital cost	4%	4%	3%	5%	3%
Total	100%	100%	100%	100%	100%

Source: Own calculations based on *agri benchmark* Beef and Sheep Report 2010; Statistisches Bundesamt DESTATIS; Expert assessments

2.5.3 Conclusions and next steps

The assessment of the German cost structure was the most difficult among the countries analysed in this section due to several factors:

1. The available information could not provide a clear picture about the proportions of bull finishing based on stores/backgrounders that could be used to calculate weighting factors for the three main production systems. At present, there is no readily available statistical information on this issue. Expert surveys and analysis of regional information on livestock markets and livestock trader information – if available – could provide guidance about the importance of store/backgrounder finishing in Germany.
2. As a result, the costs of producing store/backgrounder cattle should also be reflected in the analysis.
3. As with other countries, information on cow-calf production and the finishing of weaners should be added to the analysis. However, due to the relatively low importance of cow-calf production in Germany, this issue is of less importance than in other countries analysed in this report.
4. The German farms in the *agri benchmark* sample are large farms for German conditions and represent less than five percent of production. They were selected because they represent part of the industry as well as families making a living

from beef finishing. In large parts of the industry, beef finishing takes place in combination with milk and / or cash crop production. It can be expected that reflecting these structures and systems would lead to different results from those presented in table 2.5.4. However, the question remains of how significant these changes would be. Firstly, due to the size of these beef finishing enterprises, absolute cost levels could be expected to be higher. Further, the composition may change towards higher proportions of overhead and factor costs. To accurately address these issues, the number of *agri benchmark* farms in Germany would need to be increased.

2.6 USA

2.6.1 Method

The following approach was taken in the US:

1. *agri benchmark* cost structures of two typical feedlots were taken as a basis. As Figure 2.6.1 shows, the cost structures of the large feedlot (75,000 animals output per year) and the smaller feedlot (7,500 animals output per year) are rather identical, despite the size difference.
2. Statistics available from the National Agricultural Statistics Service (NASS) and USDA (2010) were used to obtain information about inventory classes of feedlots for the US and the most important by states. Time series data from 1999 to 2010 indicate that average feedlot weights were 349 kg live weight (in-weights) and 573 kg LW (finished weights) for steers and 316 kg LW (in weights) and 516 kg LW (finished weights) for heifers, respectively. Average days on feed were 148 days (steers) and 149 days on a grain ration. Expert knowledge further suggests that, until recently, feedlot rations are rather stable and comparable throughout the industry. With the expansion of the biofuel industry, corn has partially been replaced by distiller's grain.
3. Feedlot budgets (i.e., planning data but not from real feedlots) from the main feedlot states (Kansas, Nebraska, Iowa) for smaller, family operated feedlots.
4. The data from *agri benchmark* and the additional budgets are then compared and in another step weighed with the number of cattle in the size classes, resulting in a size-weighted cost structure for US feedlots.

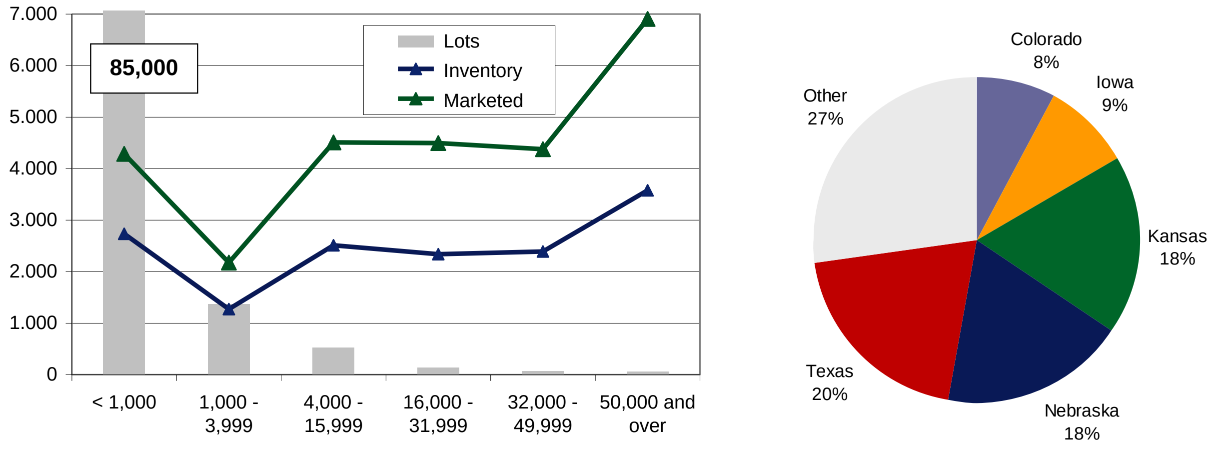
2.6.2 Results

Figure 2.6.1 shows the size distribution of cattle on feed in the US for the year 2008. It reveals the bi-polarity of the industry:

- A large number of feedlots with less than 1,000 head capacity, representing approximately 97 percent of the feedlots but only 18.5 percent of the inventory.
- A relatively small number of feedlots with a capacity of above 1,000 cattle, representing less than two percent of the feedlots but more than 90 percent of capacity. In this group, feedlots beyond 32,000 head capacity represent 40 percent of the industry's capacity.

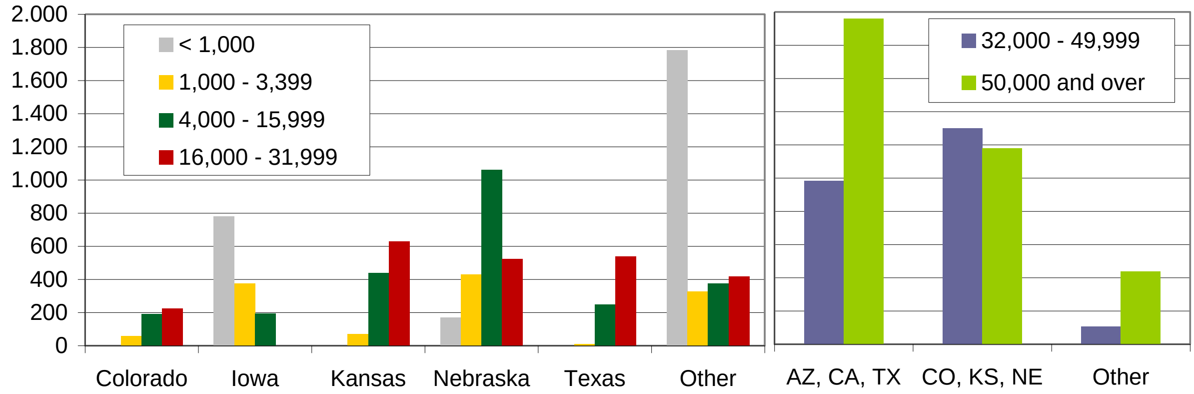
  Figure 2.6.1 also shows that the five biggest feedlot states represent almost 75 percent of total feedlot capacity. Figure 2.6.2 adds a state-specific picture and shows that Iowa seems to represent the smaller size feedlots whereas the large feedlots are located in the other important states. Nebraska leads the cattle numbers in the medium sizes of 4,000-16,000 cattle, while Kansas and Texas represent most of the cattle in feedlots between 16,000 and 32,000. Beyond 32,000 head capacity their number becomes too small to be displayed on a per state basis for data confidentiality reasons. As a consequence, selected states are grouped. Despite the aggregation, it becomes clear that the statements made for the previous group are also valid for the aggregated groups.

Fig 2.6.1. *Feedlot size structure in the US and cattle on feed by states (2008)*



Source: USDA (2009)

Fig 2.6.2. *Feedlot size structure for selected states (2008)*



Source: USDA (2009)

As mentioned previously, the cost of production structures form the two Kansas feedlots in the *agri benchmark* sample were similar, despite their significantly different capacity. The large feedlot has a capacity of almost 40,000 cattle and produces 75,000 cattle per year, the smaller one has a capacity of 3,700 cattle and produces 7,200 cattle per year. This means that *agri benchmark* data cover the size classes of 1,000-3,999 cattle capacity as well as the size class 32,000-49,999 cattle capacity. Because of theses results, it can be assumed that the cost structure in the remaining size classes would not differ significantly from the two observations made.

The question remains as to whether the feedlots below or close to 1,000 cattle capacity show a different cost composition. To answer this question, feedlot data from regional surveys were analysed and are presented in Figure 2.6.3. According to the sources, these feedlot data reflect a typical farmer-feeder type of operation, as opposed to a commercial feedlot. The first feedlot data is a combination of backgrounding[1] and finishing from 20 existing farms, thus displaying a slightly different cost structure than the other examples which are budgets for specialised finishers without backgrounding**.**

Fig 2.6.3. Feedlot cost structures for selected states and feedlot sizes

Year	2009	2010	2010	2010	2010	2010
No. of farms	20	Budget	Budget	Budget	Budget	Budget
No. Sold	984	unknown	unknown	unknown	unknown	unknown
Type of animal	Steers	Steers	Steers	Steers	Steers	Steers
Ration	Grain - hay - supplement	Grain - forage - supplement		Corn, hay, distiller's grain, supplement	Corn - hay	Corn - silage
Production	Backgrounding & Finishing	Finishing	Finishing	Finishing	Finishing	Finishing
Region	Kansas	Kansas	Kansas	Nebraska	Iowa	Iowa
Source	Kansas Farm Management Association	Kansas Livestock Budgets		Nebraska Cattle Budgets	Livesock Budgets for Iowa	Livesock Budgets for Iowa
Data source	Survey	Budget	Budget	Budget	Budget	Budget
Unit	%	%	%	%	%	%
Quartiles	Average	Above average	Below average	Average	Average	Average
Costs						
Animal purchase	52,3%	66,2%	60,4%	71%	67%	68%
(Purchase) Feed	32,9%	28,2%	33,4%	20%	23%	22%
Grain		24,8%	29,4%		15%	12%
Supplement		1,5%	1,8%		1%	1%
Harvested forage		1,9%	2,3%		2%	3%
Distiller grain						
Machinery repairs	1,0%	0,7%	0,8%	0%	1%	1%
Machine hire - lease	0,1%					
Depreciation	0,9%	0,9%	1,0%	0%		
Gas / Fuel /Oil	0,5%	0,6%	0,7%			
Farm fees / travel / publ.	0,1%	0,1%	0,1%			
Vet & Medicine	1,3%	0,9%	1,0%	1%	1%	1%
Livestock Maketing	1,1%	0,5%	0,5%	2%	1%	1%
Property tax	0,0%					
Farm Insurance	0,2%	0,0%	0,0%			
Real Estate Tax	0,1%					
Utilities	0,2%			1%	1%	1%
Auto expense	0,0%					
Miscellaneous		0,5%	0,6%	1%	1%	1%
Labour	3,2%	0,7%	0,8%	1%	2%	2%
Unpaid Operator Labour	1,7%			0%		
Hired labour	1,5%			1%		
Capital	5,9%	0,5%	0,6%	2%	3%	3%
Interest paid	1,2%					
Interest charge	4,7%					
Total costs	100,0%	100,0%	100,0%	100%	100%	100%
Animal purchase + feed	85,1%	94,4%	93,8%	91%	90%	90%

Source: See table

[1] For details on backgrounding see Section 2.6.3.

1. The combined proportions of the size groups 1,000-3,999 and 16,000-31,999 in the total feedlot size groups shown in Figure 2.6.1 was set to 100 percent.
2. The proportion of the two groups in the new total from step 1 was calculated.
3. The cost of production for the two feedlots were weighted with the factors calculated in step 2.

The result is shown in Figure 2.6.4.

Fig 2.6.4. *Weighted feedlot cost structures for the US*

US$ per 100 kg carcass weight	US-7250	US-75K	Weighted average
Weighing factor	33%	67%	
Animal purchases	202	200	200
Feed (purchase feed, fertiliser, seed, pesticides)	75	78	77
Machinery (maintenance, depreciation, contractor)	0	0	0
Fuel, energy, lubricants, water	3	2	3
Buildings (maintenance, depreciation)	1	1	1
Vet & medicine	4	3	3
Insurance, taxes	1	1	1
Other inputs beef enterprise	4	3	4
Other inputs	3	1	2
Labour cost	7	6	7
Land cost	0		0
Capital cost	7	1	3
Total	307	297	300

Percentage composition	US-7250	US-75K	Weighted average
Animal purchases	65,6%	67,3%	66,7%
Feed (purchase feed, fertiliser, seed, pesticides)	24,3%	26,2%	25,6%
Machinery (maintenance, depreciation, contractor)	0,1%	0,2%	0,1%
Fuel, energy, lubricants, water	1,1%	0,7%	0,8%
Buildings (maintenance, depreciation)	0,4%	0,5%	0,5%
Vet & medicine	1,2%	1,0%	1,1%
Insurance, taxes	0,3%	0,3%	0,3%
Other inputs beef enterprise	1,4%	1,1%	1,2%
Other inputs	0,9%	0,3%	0,5%
Labour cost	2,3%	2,2%	2,2%
Land cost	0,1%		0,0%
Capital cost	2,2%	0,2%	0,9%
Total	100,0%	100,0%	100,0%

Source: Own calculations based on *agri benchmark* Beef and Sheep Report 2010; USDA (2009)

2.6.3 Conclusions and next steps

Contrary to the Australian case, the estimation of a US beef finishing cost structure was less complex due to the fact that a) almost all cattle in the US are grain-finished in feedlots, b) the statistics relating to feedlot distribution and sizes of these feedlots are available from USDA/NASS, and c) the costs structures available from *agri benchmark* and other sources was relatively homogeneous.

However, *agri benchmark* time series analysis shows that a) feedlot profitability varies widely between years, b) it is primarily driven by variation in livestock and particularly, grain prices and c) feedlot margins are rather small. This means that – despite their dominance in total costs – small variations in livestock and feed costs can change a profit into a loss and vice versa. To reflect these particularities, annual updates of the cost structures needs to occur.

Further, the main challenge in the US lies rather in the pre-finishing sector due to a variety of reasons:

1. Feedlot finishing only represents a small part of the life of the cattle. The average finishing period is 150 days at a final age of 460-480 days, leaving 310-330 days of 'pre-feedlot life'. In the feedlot's cost of production, this part is only reflected in a purchase price with no further cost information behind it.
2. One part of the pre-feedlot life is the weaner production in cow-calf enterprises, constituting the main origin of US finishing cattle. Approximately 31 million (78 percent) out of the 40 million total cows are beef cows with the main objective of producing weaner calves. Cow-calf operations are surprisingly small structured: only 10 percent of cow-calf farm have more than 100 cows but they represent 55 percent of the beef cow inventory. Weaners are typically weaned at an age of 180-270 days.
3. Backgrounding (stocker cattle production) is the pre-finishing period after weaning and constitutes an integrated part of beef production in the States. It takes place mainly in farms with multiple enterprises and a surplus of forage. Backgrounding fulfils a marketing system function and an adding value function (Peel, 2006). Typically, backgrounding periods last from 60 to150 days (Langemeier, 2011). It would be uncommon for these programs to last longer than 150 days. Weight gains vary, but are typically within the 700 to 1,100 g per day range. Production of backgrounders takes place in different production and feeding systems such as winter grazing, summer grazing, intensive drylot and preconditioning (Brüggemann, 2006, p. 34).
4. The US cattle cycle characterises a periodical change in cattle numbers every 10-14 years (see Feuz and Umberger, 2003) and has an impact on livestock prices.

To obtain a more complete picture of US beef industry cost structures, cow-calf and backgrounder production and their systems should be reflected. Similar to the conclusions in Australia, the data should be harmonised and detailed enough to reflect the quantities and prices (and their fluctuations) of the most important inputs and production factors required to feed trade models. agri benchmark methods and data can potentially fill this gap if the US network could be expanded.

2.7 Conclusions

Some conclusions were drawn in the country-specific discussions in the previous sections. The following are some general conclusions, based on the experience and lessons learned from within the study.

1. In general, it appears to be possible to use *agri benchmark* data as a basis for national cost share structures.
2. The non-*agri benchmark* data available and used in this study lack at least two of the following features required to perform an accurate enterprise / per unit output cost analysis that can be used in trade models:
   - In mixed farms, the data sets do not distinguish between enterprises. As a consequence, a per unit output (for example per kg beef) analysis can not be performed accurately.
   - The data is average survey data and does not provide consistent data sets and usually mixes different production systems and farm sizes, which can have an impact on cost structures.
   - The data sets do not contain total costs, i.e., they lack non-cash costs such as depreciation and opportunity costs required for long-term cost and profitability analysis.
   - The data sets have no or limited production system information and no to limited quantity information. As a consequence, cost differences can not be explained by productivity and price effects.
   - The data is budget / engineering data and reflects planning situations rather than real farming situations.
3. Another issue that should not be underestimated is the fact that existing data sets do not have a global approach, are not harmonised and are characterised by inhomogeneous data collection, calculation and presentation (if this is made transparent at all). Isermeyer (1988) and Deblitz (1994) used secondary (bookkeeping) data from FADN, ERS, ABARE and other sources to perform international comparative enterprise cost analysis for dairy, cow-calf and sheep, respectively. It was found that the attempt to harmonise this data required more time and was potentially more error-prone than creating an standalone data base such as *agri benchmark*. As a consequence, the international networks European Dairy Farmers, IFCN and *agri benchmark* were established.

The key conclusion is that *agri benchmark* can serve as a solid base for national cost share structure information. In most countries, it would necessitate the expansion of the network of typical farms to allowing the representation of farming situations that result in different cost structures – those are the differences required to accurately feed trade models. Determinants were discussed above and comprise production systems, farm sizes and possible regional price differences. It can be expected that, compared with other approaches and using existing statistical data on cattle population and farm size structures, the *agri benchmark* methodology would provide the required cost information at least cost.

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