



# Grass fed versus Grain fed beef

## Issue

There is a large amount of inaccurate information on the internet regarding the Australian grass and grain fed cattle production systems and their respective beef products. This is largely due to the fact that much of this information is driven by commercial vested interest and/ or based on overseas data which has limited or no relevance to Australia.

The reality is that in Australia, the grass and grain fed production systems are highly complementary with one not necessarily superior to the other. Both have strengths and weaknesses and both provide consumers choice in accordance with their personal purchasing preferences. This document aims to explain the facts surrounding the two cattle production systems and their respective beef products in Australia.

## Background

Around 97-98% of Australia's 28 million cattle herd is located in extensive grass fed cattle properties with the remainder within cattle feedlots<sup>1</sup>. Despite the small number of cattle within feedlots, they are however able to contribute around 34% of Australia's beef production due to the ability of the feedlot production system to deliver customer requirements more quickly and efficiently than the extensive grass fed production system<sup>2</sup>.

As with many issues, the debate surrounding grass and grain fed production systems (and beef) is not clear cut and accordingly broad generalisations often lead to inaccurate reporting. This is because;

- Grass and grain fed beef production is highly diverse in Australia. On the grass fed side for instance, there are considerable differences in cattle breed, soil fertility, pasture quality, farm size, topography and climatic conditions. Some areas in Australia for example are more conducive to running *Bos Taurus* bred cattle (which more consistently produce higher eating quality beef) whilst in other areas, more hardy *Bos Indicus* cattle (which produce leaner beef) are better suited. Accordingly, it is difficult to make generalisations about the grass fed beef production system and grass fed beef. On the grain fed side, there is a similar degree of variance given differences in cattle breeds, climatic conditions, feedlot size and market requirements. Some feedlots for example only produce 'short fed' (leaner) beef for Australian or export markets using *Bos Indicus* or *Bos Indicus* cross cattle whilst others produce highly marbled 'long fed' beef from *Wagyu* cattle for specialist Australian and export markets. Accordingly, it is similarly difficult to make generalisations regarding the grain fed beef production system and grain fed beef. Overall, given it is difficult to make generalist conclusions about each production system, it is also difficult to make generalist comparisons between the two.
- Grain fed beef production in Australia is very different to that in other countries such as the United States. For this reason, much of the information on the internet about the feedlot industry and grain fed beef is not relevant to Australia. Some of the key differences between Australian and US feedlots for example are as follows;

Australian feedlots	US feedlots
Grain in the cattle diet can include wheat, barley or sorghum	Grain in the cattle diet is predominantly corn.
Around 34% of all Australian cattle are finished in feedlots	Around 90% of all US cattle are finished in feedlots <sup>3</sup>
Cattle spend around 10-15% of their life in a feedlot ie around 95 days.	Cattle spend around 20-25% of their life in a feedlot ie between 120-180 days <sup>4</sup> . Accordingly, US based human nutritional studies of grass vs grain fed beef can't be compared to Australia.

<sup>1</sup> ABS, Agricultural commodities 2011, sourced from the internet, <http://www.abs.gov.au/ausstats/abs@.nsf/Products/7121.0~2010-11-Main+Features-Livestock?OpenDocument>

<sup>2</sup> MLA, sourced from the internet, <http://www.mla.com.au/About-the-red-meat-industry/Industry-overview/Cattle>

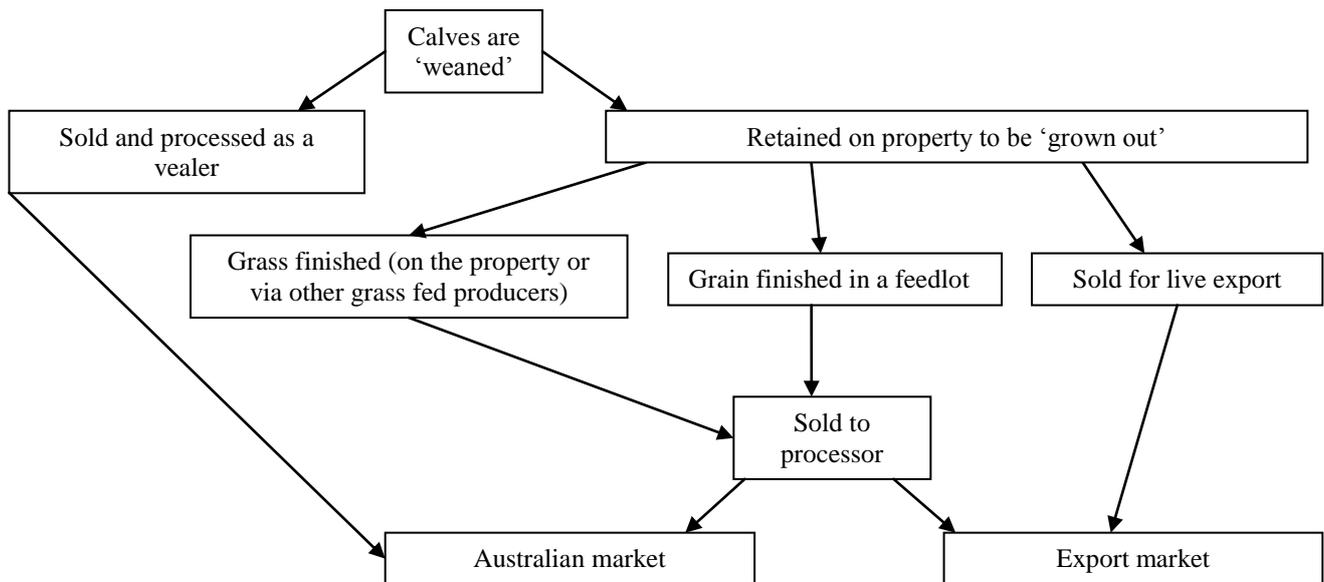
<sup>3</sup> Runge C.F (1996), *Feedlot Production of Cattle in the United States and Canada: Some Environmental Implications of the North American Free Trade Agreement*, Sourced from the internet [http://www.ccc.org/Storage/52/4486\\_engfeed\\_EN.pdf](http://www.ccc.org/Storage/52/4486_engfeed_EN.pdf), University of Minnesota, p 222.

<sup>4</sup> Runge C.F (1996), *Feedlot Production of Cattle in the United States and Canada: Some Environmental Implications of the North American Free Trade Agreement*, Sourced from the internet [http://www.ccc.org/Storage/52/4486\\_engfeed\\_EN.pdf](http://www.ccc.org/Storage/52/4486_engfeed_EN.pdf), University of Minnesota, p 223.

Average feedlot size is smaller (the average capacity of the top 10 feedlot businesses is 26,000 head)	Average feedlot size is significantly larger (the average capacity of the top 10 feedlot businesses is 75,772 head) <sup>5</sup> .
Are accredited under an independently owned, managed and audited quality assurance program where animal welfare, environmental and food safety requirements exceed that within legislation.	Rely on legislation to deliver animal welfare, environmental and food safety outcomes. Given that legislation always lags behind changes in technology and best management practices, progression on these issues has not been as great as in Australia.
Antibiotics are only used once disease is detected. This is consistent with their use in the grass fed cattle sector and in human medicine. Very few antibiotics are used in both cattle and human medicine.	Antibiotics are used to also prevent infection from diseases. Therefore antibiotic use is higher. A higher proportion of antibiotics are used in both cattle and human medicine.
Grain fed beef is <u>more</u> expensive to produce than grass fed beef due to <u>higher</u> costs of production.	Grain fed beef is <u>less</u> expensive to produce than grass fed beef due to <u>lower</u> costs of production.

Given the growing disconnect between city consumers and the agricultural sector, there is a large level of ignorance regarding food production in this country. The beef industry is no exception. A graphical explanation of the beef supply chain is depicted below;

### The Australian grass and grain fed beef supply chain



### Grass fed beef production

The term 'grass fed' generally means that cattle have spent their whole life grazing pastures. However, it is important to note (and as depicted in the above graph) that many grass fed cattle are 'finished' in feedlots. To put it another way, all grain fed cattle are sourced from grass fed properties. For those grass fed cattle producers wishing to use 'Pasture fed' as a marketing claim, the peak representative body for the grass fed cattle industry, Cattle Council of Australia has recently released a 'Pasture fed cattle assurance system'. Among other things the standard requires;

*Cattle to have never been fed separated grain or grain by-products and have continuous access to graze pasture with the diet. The Diet is derived solely from forage consisting of grass (annual and perennial), forbs (e.g., legumes, Brassica), browse, or cereal grain crops in the vegetative (pre-grain) state for the lifetime of the ruminant animal, with the exception of milk consumed prior to weaning.*

Grass fed beef has excellent texture and flavor though can be less tender with eating quality more inconsistent (as pasture quality is affected by seasons and droughts).

Grass fed beef producers either breed their own cattle or purchase them from other producers. Depending on soil fertility, pasture quality, property size or business model, cattle are generally sold for breeding

<sup>5</sup> Northwest farm credit services (2007), *Industry Perspective – Feedlot*, sourced from the internet, <http://agr.wa.gov/fof/docs/feedlot.pdf>, p 3.

purposes, as 'feeder' cattle (ie to the grain fed feedlot sector), live export, or as 'finished' cattle (ie direct to processors).

The Australian grass fed beef industry is broadly grouped into the northern and southern areas. The northern cattle production system is characterized by a relatively small number of large properties which have high cattle numbers and lower stocking rates. The dominant cattle breeds are *Bos Indicus* (eg Brahman) or *Bos Indicus* cross (eg Droughtmaster) which are both more able to withstand harsh environmental conditions and ticks. In contrast, the southern production system is characterized by a large number of smaller properties which have lower cattle numbers but higher stocking rates. The dominant cattle breeds are *Bos Taurus* (eg Angus or Hereford) which are better suited to the more temperate environmental conditions.

In general the main steps in the grass fed cattle cycle are as follows;

1. Bulls are joined with cows;
2. Calves are born;
3. If they are not required for breeding purposes, male calves are generally castrated at a young age (to prevent aggressive behavior and to improve productivity as they mature). Male castrated cattle are called 'steers'.
4. Calves are weaned from their mothers (ie after which they are called 'weaners'). Weaners may be dehorned (to prevent injury to people, other cattle or themselves and to avoid hide damage), branded or ear tagged (for identification purposes) and vaccinated (for disease prevention) depending on the breed type and property situation.
5. Steers, heifers (ie female cattle which are yet to produce a calf) or bullocks (ie older steers) are then fed on pastures (ie backgrounded) until desired market specifications are achieved.
6. Steers, heifers and bullocks are then either sold to other producers, feedlots, live exporters or direct to processors.

There are a number of regularly espoused myths surrounding grass fed cattle production in Australia;

Myths	Facts
It takes 50,000 litres of water to produce a kg of grass fed beef	According to a <a href="#">2009 University of New South Wales red meat production life cycle assessment</a> (LCA), it actually takes between 103 and 540 litres of water to produce a kilogram of grass fed beef. The 50,000 litre figure incorrectly assumed that all rainfall that fell on land was used for beef production when the reality is that much of this rainfall ends up in rivers and ground water systems or is absorbed by trees and plants not grazed by cattle.
Grass fed cattle are never fed grain	Grass fed cattle are often fed grain as a supplement or as a substitute for pasture during droughts or dry seasons.
Grass fed cattle are never given antibiotics	Grass fed cattle are given antibiotics in the same way as in the feedlot production system and in human medicine ie only after illness is detected.
Grass fed cattle are never given Hormone Growth Promotants (HGP's)	Whilst a higher proportion of grain fed cattle receive HGP's, twice as many are actually sold to the larger grass fed sector. Importantly, HGP's are safe for both cattle and humans, comprise natural hormones found in all plants and animals; and are at levels lower than that naturally found in many other commonly consumed goods such as beer, eggs and milk.
Grass fed beef producers do not use chemicals	Whilst organic beef can be sourced from the grass fed beef production system, it comprises only a small (albeit increasing) proportion of overall production. The vast majority of grass fed producers use chemicals for fertilizer, weed and insect control, and for animal health management. All such chemicals have been approved by regulatory authorities as safe for both cattle and humans with producers having a strong track record of responsible use without food safety or market access issues occurring. This is evidenced by the results of Government and industry residue testing programs undertaken in both Australia and overseas.
Grass fed cattle experience less disease than grain fed cattle	The number of diseases experienced in each production system is approximately the same, however the types and prevalence differ. For example, Anthrax, Tick fever, Leptosperosis, Tetany, Blacks disease, Black leg, Pestivirus, Vibriosis, Botulism and Bovine Johnes Disease are all diseases that are more prevalent in the grass fed cattle sector. The grain fed cattle sector has in turn its share of diseases that are more prevalent than the grass fed cattle sector.
Grass fed cattle have lower mortality rates	Whilst mortality rates in southern grass fed cattle are comparable to the grain fed sector, the majority of cattle in the grass fed industry are found in the north where

	mortality rates are higher. As a result, overall average mortality rates for grass fed cattle are actually higher than for grain fed cattle. In general this is because grain fed cattle are more closely supervised by feedlot veterinarians and stockmen and women, have diets developed and monitored by consultant nutritionists and are protected from drought, fire, flood and predators.
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### **Grain fed beef production**

For lot feeders to be able to market their beef as 'grain fed', feedlot cattle must be fed a predominantly grain based diet for a nominal number of days. For heifers this is a minimum of 60 days and for steers a minimum of 70 days. Adherence to this requirement is delivered through the industry's independently audited quality assurance program, the National Feedlot Accreditation Scheme (NFAS).

Whilst grain fed beef can be a leaner product (as demanded by Australian retailers) it generally has more marbling and a smoother texture than grass fed beef. Given that the feedlot production system is able to deliver consistent eating quality and quantity, grain fed beef is in high demand by both domestic and international customers.

In Australia, feedlots essentially operate as 'finishing' system as they can ensure customer requirements are delivered despite cattle only spending 10-15% of their lives there. Cattle are generally finished in feedlots for two main reasons. Firstly, Australia's dry/ unpredictable seasons and/ or dry/ unpredictable years result in pastures that have insufficient nutritional value to allow cattle to reach customer requirements in a timely and sustainable manner. Secondly, customers in both Australia and our export markets actively demand grain fed beef due to the industry's ability to consistently meet market requirements in terms of quality and quantity (irrespective of seasons or droughts).

The health, welfare and performance of grain fed cattle is highly dependent upon their health, welfare and performance as grass fed cattle prior to feedlot entry. This stands to reason given that feedlot cattle spend the vast majority of their lives in a grass fed environment. Accordingly, the profitability of lot feeders is highly dependent upon the grass fed cattle industry. Conversely, the grain fed cattle industry provides an important market for grass fed cattle, particularly during droughts or dry seasons. Accordingly, the profitability of grass fed beef producers is similarly highly dependent upon the grain fed cattle industry as feedlots help underpin cattle prices. This symbiotic relationship again demonstrates the dependency and complementarities between the two production systems.

NFAS is a core element of the Australian cattle feedlot industry. The Australian Lot Feeders' Association (ALFA), the peak body for the grain fed cattle sector, implemented NFAS in 1994. It was the first quality assurance program implemented for an agricultural industry in this country. The scheme is independently owned, managed and audited to industry and covers animal welfare, environment and food safety matters. Annual independent audits ensure that NFAS requirements and legislation regarding such matters are adhered to. NFAS requirements are more encompassing and stringent than those within legislation. The program involves strong recording and reporting requirements with audit results provided to a management committee that is dominated by Government representatives. Continuous improvement of this program enables industry and participants to keep abreast of changing requirements and the expectations of consumers, markets, regulatory authorities and the wider community. Notably, NFAS accreditation is compulsory for the supply of grain fed beef to our major domestic retailers and the export market.

In general, the main steps in the grain fed beef cycle are as follows;

1. Heifers and steers are transported from grass fed cattle properties or sale yards to the feedlot.
2. Cattle are then 'inducted'. This involves a number of steps. Key details such as National Livestock Identification Scheme (NLIS) number, property of origin, health status, breed, age and weight are recorded. This information is used to identify cattle which have similar attributes so they can be yarded together. Cattle are then treated to eradicate internal/ external parasites along with specific bacterial/ viral diseases they may have been exposed to prior to feedlot entry. Cattle are also provided an ear tag for dual identification and traceability purposes. Some cattle may be treated with Hormone Growth Promotants (HGP's) depending on customer requirements.
3. Cattle are then placed in a yard according to their breed, age, weight and likely market destination (ie Australian or export). Each yard is up to 6,000m<sup>2</sup> in size - enough space for all cattle to exhibit natural behaviour in terms of movement and interaction. Plentiful quantities of clean fresh water and feed are supplied 24 hours a day, 365 days per year. Feedlot cattle diets are formulated by consultant nutritionists and comprise energy, protein, fibre, minerals and vitamins. The length of time cattle spend

in the feedlot depends on specific customer requirements. For example, cattle destined for Australian retailers will spend between 60-80 days in the feedlot whereas cattle destined for hotels and restaurants both in Australia or overseas may spend on average up to 130 days in the feedlot. The current average time cattle spend in Australian feedlots is 95 days.

4. Once cattle reach a condition which meets market or customer requirements, they are then transported to abattoirs for processing.

There are also a plethora of regularly espoused myths regarding the Australian cattle feedlot industry. A separate document addressing the full suite of these is found elsewhere on the ALFA website. However, some of the more common myths are as follows;

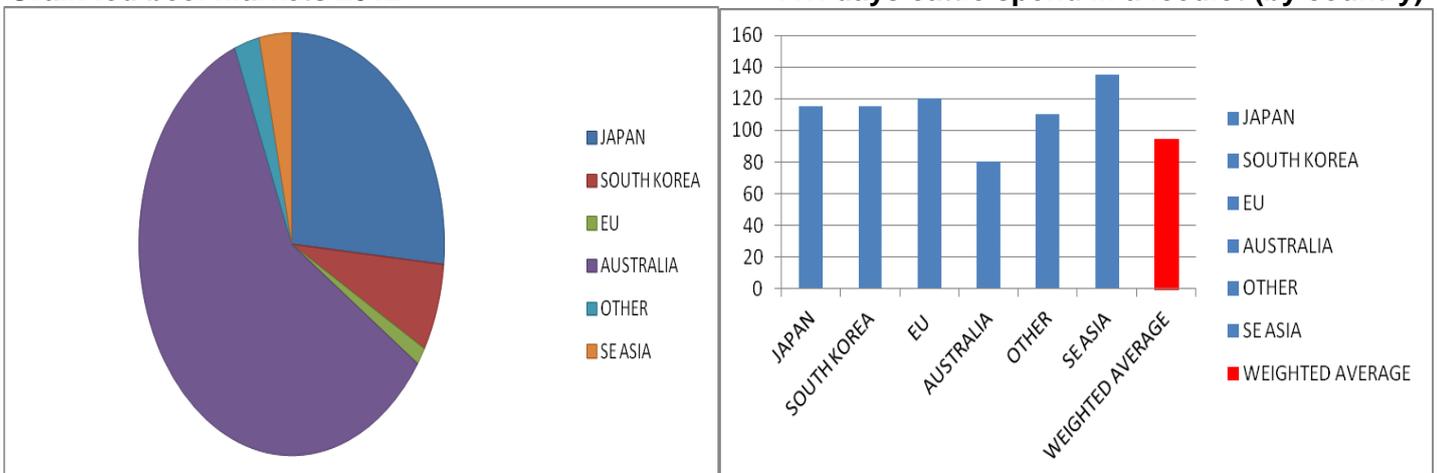
1. Feedlot cattle spend their whole life in a feedlot	In Australia, feedlots are only used to 'finish' cattle ie get them to particular market requirements. As a result they spend between 85-90% of their lives in an extensive pasture environment.
2. Feedlot cattle are placed in individual pens or are crowded together	Cattle are free to roam in yards of up to 6,000m <sup>2</sup> in size ie around 14 basketball courts. This provides ample room for cattle to display their normal behaviour. Whilst legislation stipulates minimum space allowances of 9m <sup>2</sup> per animal, lot feeders generally provide around 15-20m <sup>2</sup> as this can improve animal health, welfare and productivity. Interestingly, despite the provision of large areas, cattle tend to herd together as they are social animals by nature. This means that total yard space is often never fully utilised.
3. All feedlot cattle are fed large amounts of antibiotics to prevent future infection and as a result are a major contributor to antibiotic resistance in human medicine	In Australia, antibiotics are used in the cattle feedlot sector in the same way as in human medicine ie only after infection is detected. As a result, on average only 1-3% of feedlot cattle are treated with antibiotics in any one year. Notably, the overwhelming majority of antibiotics used in the cattle industry are not used in human medicine. In addition, resistance to antibiotics in human health is a recent phenomenon whilst antibiotics have been used by livestock industries to treat sickness for over 50 years. Lastly, antibiotics are used judiciously in the Australian feedlot sector as this is not only an auditable requirement under the industry's quality assurance program but an important insurance from potential beef export bans as a result of potential beef antibiotic residues. As a result, it is of no surprise that several Government reports over the last decade have confirmed that antibiotic resistance in Australian cattle was nil or extremely low.
4. Hormone Growth Promotants (HGP's) are only provided to feedlot cattle	In reality, twice as many HGP's are sold in the grass fed cattle sector than in the cattle feedlot sector. HGP's are implants of naturally occurring hormones that improve cattle growth rates (by 15-30%), feed efficiency (by 5-15%) and carcass leanness (by 5-8%). More importantly, HGP's have been approved by regulatory authorities as safe for humans and cattle and have been used around the world for over 30 years without incident. In addition, the level of hormones in beef derived from treated cattle is significantly less than the natural level of hormones found in many other products consumed every day by the general public. For instance a serving of beer contains 7 times the level of hormones as a serving of HGP treated beef - a serving of peas 179 times and ice cream 273 times.
5. Feeding grain to cattle is unnatural and results in negative cattle health impacts	It is easy to forget that grain is the seed of grass, hence is a natural product that cattle have been eating for millennia. In fact cattle prefer a grain based diet. Feedlot cattle diets are developed by animal nutritionists and comprise grain (eg wheat, barley, sorghum) fibre (eg hay and silage), protein (eg sunflower and lupins), water, vitamins and minerals. Whilst cattle require a short period of time to become accustomed to a grain based diet, this process is easily managed by consultant feedlot animal nutritionists and professional feedlot managers.
6. Cattle are more stressed in a feedlot environment	Research conducted by the CSIRO has determined that cattle when provided a choice between a feedlot and pasture based environment, actually prefer the feedlot during the day whilst choosing pasture to lie down at night. Because feedlots employ veterinarians to oversee health programs, consultant animal nutritionists to determine and monitor cattle diets; and highly trained stockmen and women to supervise them on a daily basis (whilst also protecting feedlot cattle from starvation, floods, fire, droughts and predators), feedlot cattle have lower average mortality rates than grass fed cattle. Moreover, there is a close correlation between cattle stress and beef eating quality. As a result, it is in the interests of all grain and grass fed beef producers to reduce cattle stress levels. The fact that the feedlot industry implemented the eating quality program Meat Standards Australia because it is more able to secure premiums under the program for higher eating quality beef is further evidence that feedlot cattle are not stressed.
7. The feedlot industry is closed, clandestine and shameful of its practices	The Australian feedlot industry is in fact very open, transparent and proud of its systems and practices. The industry conducts thousands of feedlot tours each year, regularly meets with the RSPCA and major retailers, actively discusses its practices in the media and provides a significant amount of information on its website. Notably, the industry's quality assurance program is far more stringent and encompassing than legislative requirements and is superior to

	systems within virtually every other agriculture industry in the country. The program is independently owned and managed to the industry and requires that feedlots be independently audited on an annual basis. Audit results are provided to Government representatives who comprise the largest number of representatives on the programs management committee.
8. Feedlots pollute the environment	Because beef production is more efficient in a feedlot, more beef can be grown using less cattle, emissions, land, feed, manure and water <sup>6</sup> . Feedlot manure is also composted and sold as a valuable soil conditioner or can be used for renewable energy generation. Regardless of these benefits, feedlots are regulated by federal, state and local environmental authorities to ensure there is no adverse environmental impact. In addition, the industry's quality assurance program (NFAS) imposes requirements that are more stringent and encompassing than legislation with feedlots independently audited against NFAS and legislative requirements each year to ensure compliance. The integrity of NFAS is so highly regarded that it is in fact recognised within environmental legislation as meeting the compliance function of Government in several Australian states.
9. Feedlots produce higher greenhouse gas emissions than grass fed beef production	Despite the inputs required to produce grain fed beef, feedlots produce significantly less greenhouse gas emissions than grass fed cattle farms. Why? – Because of superior diets, feedlot cattle convert feed energy into beef more efficiently, reach marketable weights more quickly and hence produce fewer emissions over their lifetime. Australian life cycle research concludes that grain fed cattle produce 38% less Co2 equivalent emissions per kg of beef production compared to grass fed cattle <sup>7</sup> . This research is supported by international studies.

The largest single market for grain fed beef is Australia, demanding around 59% of all production. Unsurprisingly, the largest domestic customers for grain fed beef are supermarket chains. Around 75% of beef demanded by these retailers is grain fed. The grain fed beef required by these customers is typically lower in fat as per Australian consumer demands. To deliver this product attribute, cattle spend a minimum of 60-70 days in a feedlot depending on whether they are heifers (60 days) or steers (70 days). The remaining 25% of grain fed beef destined for the Australian market spends a higher average number of days in a feedlot and is sold to butchers, hotels and restaurants.

For grain fed beef export markets, the average number of days cattle spend in a feedlot (ie 'days on feed') is higher than the Australian market (see bar graph below). Historically, Australia's largest export market, Japan, sought highly marbled and hence more expensive beef sourced from cattle fed in a feedlot for longer periods. However, since 2007, Japanese consumers have altered their preferences to less expensive, leaner beef sourced from cattle which have been in a feedlot for considerably less time. This change is due mainly to declines in disposable incomes among Japanese consumers as a result of the global financial crisis and the Fukushima incident. It is not expected that this situation will change in future.

**Grain fed beef markets 2012**



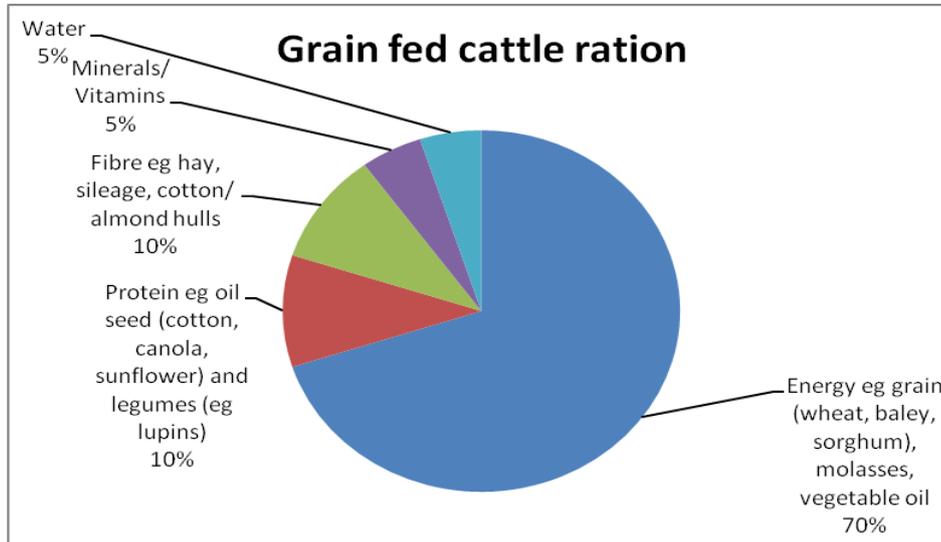
As the above right hand graph demonstrates, the weighted average time that cattle spend in Australian feedlots across all markets where grain fed beef is sold is 95 days.

<sup>6</sup> Capper, J. L. (2012) *Is the Grass Always Greener? Comparing the Environmental Impact of Conventional, Natural and Grass-Fed Beef Production Systems*, Washington State University, sourced from the internet <http://www.mdpi.com/2076-2615/2/2/127>

<sup>7</sup> Peters et al. (2009) "Red Meat Production in Australia: Life Cycle Assessment and Comparison with Overseas Studies", *Env.Sci.Tech*

The diet of feedlot cattle comprises a number of natural products, with grain only one ingredient. These diets are developed by animal nutritionists who regularly consult to lot feeders and comprise the following;

<b>Energy</b>	Obtained from grain along with other products (eg molasses, vegetable oil, distillers grain and lupins) Comprises 55-75% of the ration depending on energy levels and market requirements.
<b>Protein</b>	Obtained from oil seed meal and legumes. Comprises 2-20% of the ration depending on the product ie less with oilseeds (eg cotton seed, canola, sunflower) & more with higher energy legumes (eg lupins).
<b>Fibre</b>	Obtained from silage, hay & straw or cotton/ almond hulls. Comprises 3-20% of the ration depending on grain cost, type of silage and dietary requirements ie long fed cattle use more silage than short fed.
<b>Minerals/ Vitamins</b>	Specialized mineral and vitamin supplements. Comprises up to 6% of the ration.
<b>Water</b>	Water optimizes the energy availability in grains (eg in tempering and steam flaking process) and increases the palatability of the diet. Comprises up to 7% of the ration.



Whilst making comparisons between the Australian grass and grain fed production systems is difficult, some broad statements about the positives from each can be made;

Grass fed beef	Grain fed beef
<b>Animal health and welfare</b>	
Grass and grain fed cattle producers have an attachment to the animals they have often raised from birth and know that healthy and well cared for animals also produce better quality beef. Everyone involved in the industry understands that consumers want their food to be produced humanely and ethically. Good animal welfare is therefore not only vital from a moral and ethical perspective, but also to their productivity, profitability and sustainability. Both the grass and grain fed beef industry have been supporters of the implementation of legislated animal welfare standards with such standards among the world's best.	
Grass fed cattle have plenty of space to demonstrate natural behavior.	Feedlot cattle are closely supervised by feedlot veterinarians and stockmen and women, have diets developed and monitored by consultant nutritionists and are protected from drought, fire, floods and predators. Consequently, mortality levels are on average lower.
The grass fed cattle industry has a food safety program called 'Livestock Production Assurance' (LPA). LPA accredited producers are randomly audited to ensure compliance. A quality assurance element is an additional optional requirement within LPA. This element also addresses animal welfare and requires annual third party audits.	The feedlot industry has a quality assurance system, the National Feedlot Accreditation Scheme (NFAS) which is independently owned, managed and audited to the industry. NFAS accreditation is compulsory to supply grain fed beef to major domestic retailers and all export markets. Uptake among the industry is over 90%. All grass fed cattle entering feedlots must be from an LPA accredited property. NFAS standards are more encompassing and stringent than legislation. Feedlots are third party audited each year to ensure compliance with NFAS standards as well as animal welfare, environment and food safety legislation.
<b>Environment</b>	
Grass and grain fed cattle producers understand that looking after the environmental is essential for ecologically and economically sustainable production. Good management of natural resources isn't a choice; protecting the environment protects their business for future generations.	
Grass fed cattle are a key element in the carbon cycle. By grazing and through manure deposition, cattle help foster pasture growth and hence contribute to carbon sequestration in both plants and soils. Current international emission accounting rules don't take into consideration the sequestration benefits of this carbon cycle.	Feedlots are very efficient and hence produce more beef with less cattle, emissions, land, manure, feed and water <sup>8</sup> .
Contrary to popular misconception, new research has found that grass fed cattle when rotationally grazed help reduce land degradation, desertification and soil erosion <sup>9</sup> .	Feedlots can collect manure and effluent for use as a valuable alternative to synthetic fertilizer and/ or to produce renewable energy.
The grass fed production system is looking to expand the LPA program to include an environmental component.	The feedlot industry has a quality assurance system which is independently owned, managed and audited to the industry. Feedlots are third party audited each year to ensure compliance with animal welfare, environment and food safety legislation.
<b>Nutrition</b>	
Both grass and grain fed beef are excellent nutritional products which provide a wide range of essential nutrients including: iron, zinc, omega-3s, protein, B vitamins,	

<sup>8</sup> Capper , J. L. (2012) *Is the Grass Always Greener? Comparing the Environmental Impact of Conventional, Natural and Grass-Fed Beef Production Systems*, Washington State University, sourced from the internet <http://www.mdpi.com/2076-2615/2/2/127>

<sup>9</sup> Savory, A sourced from the internet, <http://ourworld.unu.edu/en/reversing-desertification-with-livestock/>

selenium and vitamin D. Grass fed beef has a higher level of beneficial Conjugated Linoleic Acid (CLA) and Omega-3 polyunsaturated fatty acids than grain fed beef however it also has higher levels of unhealthy trans fats <sup>10</sup> . Concentrations of saturated, monounsaturated and total fatty acids are similar between grass and grain fed beef. Notably, beef, whether finished on grass or grain, is not a strong source of Omega 3's compared to other foods such as fish. Therefore the negligible Omega-3 difference between grass and grain fed beef is unlikely to have any discernible impact upon human health. To put this in perspective, a 250 gram <u>salmon</u> steak has 3.5 times the level of Omega-3 compared to a 250 gram <u>grass fed</u> steak (ie 1125 milligrams vs 323 milligrams) <sup>1112</sup> . In comparison a 250 gram <u>grain fed</u> steak has 180 milligrams of omega 3.	
	Feedlots can produce beef which is more consistent in terms of both eating quality and quantity because cattle diets are not influenced by seasons/ droughts.
<b>Other</b>	
The grass fed cattle sector is one of the largest agricultural industries in rural Australia. Accordingly, it employs a significant number of people and provides valuable capital injections to rural and regional economies.	Feedlots have high economic multipliers and hence are comparatively strong employers and financial contributors to rural and regional economies. Importantly, they also provide a large market for both grain and cattle whilst helping rural regions particularly during droughts when other agricultural industries are financially struggling.
Grass fed cattle can convert food (ie grass) which cannot be consumed by humans into a nutritious product.	

## Conclusion

The Australian grass and grain fed beef production systems are highly complementary, interrelated and dependent upon each other. The health, welfare and performance of grain fed cattle is highly dependent upon their health, welfare and performance as grass fed cattle prior to feedlot entry. This stands to reason given that feedlot cattle spend the vast majority of their lives in a grass fed environment. Accordingly, the profitability of lot feeders is highly dependent upon the grass fed cattle industry. Conversely, the grain fed cattle industry provides an important market for grass fed cattle, particularly during droughts or dry seasons. Accordingly, the profitability of grass fed beef producers is similarly highly dependent upon the grain fed cattle industry as feedlots help underpin cattle prices. This symbiotic relationship demonstrates the dependency and complementarities between the two production systems.

Grass and grain fed beef similarly have more commonalities than differences. They both provide an excellent source of essential nutrients such as iron, zinc, omega-3s, protein, B vitamins, selenium and vitamin D. Whilst the fatty acid profiles vary between the two, the differences are unlikely to have a discernible impact upon human health.

All in all, the grass and grain fed cattle sectors (and grass and grain fed beef) both have strengths and weaknesses with one not necessarily superior to the other. Ultimately they provide consumers choice in accordance with their personal purchasing preferences.

<sup>10</sup> Ponnampalam, E, et al (2006), *Effect of feeding systems on omega-3 fatty acids, conjugated linoleic acid and trans fatty acids in Australian beef cuts: potential impact on human health*, RMIT University, Melbourne and Department of Primary Industries, sourced from the internet <http://www.seattlecentral.edu/faculty/jwhorley/FatsInBeef.pdf>

<sup>11</sup> Ponnampalam, E et al (2006), *Effect of feeding systems on omega-3 fatty acids, conjugated linoleic acid and trans fatty acids in Australian beef cuts: potential impact on human health*, RMIT University, Melbourne and Department of Primary Industries, sourced from the internet <http://www.seattlecentral.edu/faculty/jwhorley/FatsInBeef.pdf>

<sup>12</sup> Heart Foundation, *Q&A: Omega 3-Professionals*, sourced from the internet, <http://www.heartfoundation.org.au/sitecollectiondocuments/fish-fishoils-qa.pdf>