MEAT & LIVESTOCK AUSTRALIA

Fact sheet

FEEDLOTS

Case study – developing a carbon neutral beef brand

This case study investigates the development of a carbon neutral brand and is modelled on a feedlot with 10,000 head on feed at any one time. The feedlot expects to retail around 1,000 head from their domestic class of cattle in this brand.

Livestock emissions

Table 1: Livestock inventory data for case study

Activity data	Domestic heifers	Short-fed export steers	Long-fed export steers
Livestock data			
Livestock purchased (head number)	13,826	16,591	4,563
Livestock sold (head number)	13,715	16,508	4,526
Days on feed (DOF) (days)	66	110	200
Entry weight (kg)	340	425	350
Exit weight (kg)	459	645	650
Mortality (%)	0.80	0.50	0.80
Average daily gain (ADG) (kg)	1.80	2.00	1.50
Total live weight sold (kg)	6,292,512	10,647,631	2,941,900
Hot standard carcase weight (HSCW) (kg/head)	238	354	357
Dressing percentage (%)	51.97	54.85	54.93
Feed data			
Feed intake DMI (kg DM/head/day)	8.4	10.7	9.0
Dry matter digestibility (DMD) (%)	85.11	87.32	88.49
Crude protein (CP) (% of DM)	13.80	13.59	13.00
Ash (% of DM)	4.23	4.13	4.07
Soluble residue (% of DM)	52.38	53.34	54.30
Hemicellulose (% of DM)	18.53	17.84	17.47
Cellulose (% of DM)	6.69	6.38	6.21
Nitrogen retention (%)*	21.66	14.54	14.47
Feed conversion ratio (FCR)	4.67	5.35	6.00

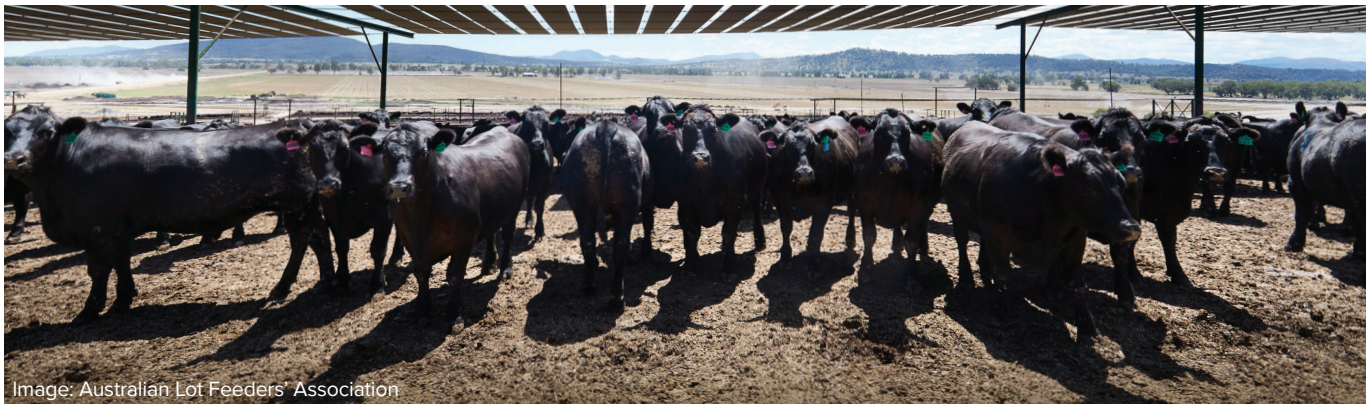

Image: Australian Lot Feeders' Association

Table 2: Inputs and services used for feedlot operations

Activity data	Units	Quantity
Energy		
Feedlot services (fuel)		
Diesel	L/year	45,694
Petrol	L/year	27,656
LPG	L/year	20
Feedlot services (electricity)		
Grid electricity	kwH/year	148,732
Renewable energy	kwH/year	
Feedmill (fuel)		
Diesel (feed trucks, loaders)	L/year	72,122
Petrol	L/year	203
LPG	L/year	238,477
Feedmill (electricity)		
Grid electricity	kwH/year	284,671
Renewable energy	kwH/year	
Purchased feed inputs used*		
Barley	t/year	4,013
Sorghum	t/year	10,558
Wheat	t/year	11,347
Maize	t/year	594
Straw	t/year	988
Cereal hay	t/year	995
Silage	t/year	4,697
Cottonseed meal	t/year	701
White fluffy cottonseed	t/year	1,935
Canola meal	t/year	40
Molasses	t/year	1,360
Oil	t/year	346
Dry supplement	t/year	294
Wet supplement	t/year	1,741
Cotton hulls	t/year	417
Transportation		
B-double (fuel transport)	tkm/year	29,986
B-double (grain)	tkm/year	6,003,739
B-double 38t load (feeder cattle)	tkm/year	4,004,631
B-double 38t load (finished cattle)	tkm/year	5,566,972
Feeder cattle – surveyed supply chain		
Domestic	no.	13,826
Short-fed export	no.	16,591
Long-fed export	no.	4,563
Domestic live weight on feedlot entry	kg	340
Short-fed export live weight on feedlot entry	kg	425
Long-fed export live weight on feedlot entry	kg	350

Developing a carbon account

The reportable emissions for the feedlot's domestic cattle turn-off (13,715 head) are provided in the baseline carbon account in Table 1. The emissions intensity was 10.26kg CO_2-e /kg LW sold, including energy-related emissions and scope three emissions.

To determine the emissions associated with beef from the branded product, a total of 458,800kg LW was required. For the 1,000 head, at an emission intensity of 10.26kg CO_2-e per kg of LW, total emissions were 4,709t CO_2-e.

Table 1: Carbon account for domestic feedlot cattle. The branded product utilised 458,800kg LW (1,000 head) or 7.3% of emissions from the domestic cattle

t CO_2-e	Scope one emissions	Scope two emissions	Scope three emissions	Total	Contribution analysis
Feedlot enteric methane	4,535			4,535	7.0%
Feedlot manure methane	189			189	0.3%
Feedlot manure nitrous oxide	400			400	0.6%
Feedlot indirect nitrous oxide			77	77	0.1%
Feedlot services	47	30	7	84	0.1%
Feedmill	187	58	18	263	0.4%
Feed			1,949	1,949	3.0%
Transport			204	204	0.3%
Feeder cattle emissions			56,879	56,879	88.1%
Total (excluding meat processing)	5,358	88	59,134	64,580	100.0%

Emissions from meat processing

A total of 1,000 head were processed. This was equivalent to 458,800kg LW or 238,417kg HSCW to provide 183,581kg boxed beef.

For the volume of meat processed this contributed an additional 184t CO_2-e to the carbon account. Total emissions allocated to boxed beef were 91.2% (after accounting for co-products) resulting in 4,460t CO_2-e.

Table 2: Major inputs associated with meat processing used per 1,000kg of hot standard carcase weight processed

Major Inputs	Units	Per tonne carcase weight (beef)
Electricity	kWh	318
LPG	MJ	83
Diesel	MJ	40
Petrol	MJ	7
Coal	MJ	693
Fuel oil	MJ	0
Natural gas	MJ	1,230

Source: Wiedemann, McGahan, Murphy, Yan, *et al.* 2015

Offset requirements

The offset requirement associated with 183,581kg of boxed beef was 4,460t CO_2-e.

Cost of carbon neutrality

Table 3: Cost comparison to offset full carbon footprint of 1,000 head

			ACCUs	CERs+	VERs+	VCUs+
Carbon offset summary	Abatement (t CO_2-e)	Price low ($USD/t) *		0.15	3.00	2.00
		Price high ($USD/t) *		0.24	9.00	8.00
		Price low ($AUD/t)	16.14	0.20	4.05	2.70
		Price high ($AUD/t)	16.14	0.32	12.16	10.81
Meat processing	4,460	Cost using low price $AUD	71,989	904	18,082	12,055
		Cost using high price $AUD	71,989	1,447	54,246	48,219
Price premium required per kg of branded beef sold to cover carbon offset costs**		Cost using low price $AUD	0.79	0.40	0.50	0.46
		Cost using high price $AUD	0.79	0.41	0.69	0.66

*Assumes a currency conversion rate of $1 AUD to $0.74 USD on 1 December 2020.

+ A range of carbon credit prices was determined from an analysis of drivers of carbon price and consultation with a carbon broker.

** Offset credits are often the largest cost. This is inclusive of licence fees, project development and verification fees.

More information Read the *Moving towards carbon neutrality – Opportunities for the feedlot industry* technical manual.

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