MEAT & LIVESTOCK
AUSTRALIA

On farm

Collation of basic biological data on beef cattle production in North Australia.

Version 2

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Final Report collated for MLA by:

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Animal Production

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DISCLAIMER

TABLE OF CONTENTS

1. INTRODUCTION

This document is an updated version the *Collation of basic biological data on beef cattle production in north Australia* (Holroyd and O'Rourke 1989). It provides basic biological data on growth, reproduction and mortality for beef herds in Queensland, Northern Territory and the northern part of Western Australia. In addition to data from research studies, data from producer demonstration sites are also included.

A companion publication, *Beef Cattle Performance in Northern Australia: a summary of recent research**, contains more detailed summaries of reports of research studies and producer demonstration sites produced during the period 1988 to 1998.

The Holroyd and O'Rourke (1989) publication was the first overall collation and summary for production traits across north Australia. It served as an inventory of research carried out and provided reliable input data on growth, reproduction and survival for herd dynamics and simulation models. Since Holroyd and O'Rourke produced their collation, further research material has been published. The results of this research have been collated and incorporated into those of Holroyd and O'Rourke thereby extending their work by another ten years.

* Hasker, P.J.S. (in press). *Beef Cattle Performance in Northern Australia: a summary of recent research.* Department of Primary Industries; Meat and Livestock Australia Ltd.

2. USING THIS BOOK

The methodology and means of presentation of collated data used by Holroyd and O'Rourke was adopted for this update. Collated data is presented in tables accompanied by reference lists for breeders and growing animals, respectively.

Data collated was restricted to production traits for grazing beef cattle. Information from pen feeding or laboratory situations was not included. Neither was data from short term studies of less than a full season (6 months). Also, disease records, biochemical parameters, pasture attributes and carcase data were not part of their collation.

Holroyd and O'Rourke developed a set of rules to undertake the task and pointed out:

- In some cases, conflict situations had to be resolved in a manner that was decided as reasonable rather than by applying clear-cut rules.
- These rules indicate how the summaries should be used and what are their strengths and weaknesses.
- To make best use of the collated information, the reader should have an appreciation of the rules applied

Details of the methodology used (specification of regions, indices of quality and quantity of data, presentation of collated data and limits to interpretation) are given in the appendix. The reader should refer to the methodology prior to viewing the data, in particular the sections on indices used to rank the relative value of different sources of information (page 119) and the limits to interpretation (page 122).

Basic Biological Data for Breeders in North Australia

Research

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Indices†			Mating period
					F	M	W	
					1. Queensland -			
1.1	Compton et al. 1989	Isis Junction 25° 12'S, 152° 28'E	Brahman cross	1974-80	18	0	18	seasonal
1.2	Evans & Biggs 1979	Beerwah RS 26°40'S, 153°02'E	Hereford	1972-77	19	0	0	Nov-Jan
1.3	Jones et al. 1989	Samford RS 27° 22'S, 152° 53'E	Belmont Red	1979-86	20	0	0	
1.4	Round et al. 1978	Orient, Ingham 18°40'S, 146° 10'E	Brahman	1973-75	15	0	15R	Dec-Jun
1.5	Tierney & Taylor 1983	Coolum RS 26°31'S, 153°04'E	Hereford	1971-75	15	0	18	Oct-Dec
					2. Queensland -			
2.1	Bakry 1981	Lansdown 19°06'S, 146°08'E	Droughtmaster	1964-78	27	0	24R	Feb-Apr
2.2	Barr 1971	Bruslee, Ch. Towers 20° 50'S, 146°25'E	Shorthorn	1967-70	17	0	0	
2.3	Davis et al. 1993	Lansdown 23° 24'S, 150° 30'E	Droughtmaster	1988-91	22	0	18	Jan-Apr
2.4	Dixon 1998a, p12	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1986-93	27	0	0	Jan-Apr
2.5	Dixon et al. 1998e	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1995-96	8	0	14	Jan-Apr
2.6	Dixon et al. 1998b	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1996-97	8	0	12	Dec-Apr
2.7	Dixon et al. 1998c	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1997-98	10	0	16	Jan-Apr
2.8	Dixon et al. 1998a	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1995-96	9	0	15	Dec-Apr
2.9	Dixon et al. 1998f	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1996-97	8	0	14	
2.10	Dixon et al. 1996a; Dixon et al.1998d	Swan's Lagoon 20° 05S, 147° 14'E	Brahman cross	1994-95	16	0	16	Dec-Apr

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.

†† Values with a "w" are weaning rates.

BREEDER FERTILITY, MORTALITY AND LIVEWEIGHT IN NORTH AUSTRALIA

Class	Pregnancy rate (%)			Calve rate (%)	Brand rate†† (%)	Loss to Brand (%)	Cow deaths (%)	Weight (kg)		
	Wet	Dry	All					Mid-dry	End dry	End wet
high rainfall										
cows				70-96						406-445
				84-100	70-100					
first calf				86-91						
cows				85-97						
heifers		61-82							249-314	
first calf	18-35									
mature	56	100	100	61-76						
	91	88	89-91			13-16		409-426	434-466	453-483
northern spear grass										
heifers		41-91	67			14				
first calf	17-90									
mature	56-83	66-96	75			12				
cows	65	78	52-87			6-43			364-400	
cows			54-69							
cows			64-85		52-80w	4-23			382	
cows			69-94		63-87w	7-14				
first calf	86							365	380	375
first calf	74								330	
second calf	88								343	
second calf	32	96						348	339	
cows	91									399
first calf	53							361	312	362
first calf	76									376
second calf	64									363

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.

†† Values with a "w" are weaning rates.

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Indices†			Mating period
					F	M	W	
2.11	Dixon et al. 1996b	Swan's Lagoon 20°05'S, 147°14'E	Brahman cross	1993-94	8	0	14	Jan-Apr
2.12	Donaldson 1971	Cromarty 19°25'S, 147°05'E	Brahman cross	1967-68	14	0	0	all year
2.13	Donaldson 1971	80km SW Mackay	Brahman cross	1967	10	0	0	all year
2.14	Donaldson et al. 1964	Cromarty 19°25'S, 147°05'E	Shorthorn	1961	8	0	11	
2.15	Donaldson et al. 1967	Bluff Downs, Charters Towers 19°30'S, 145°30'E	Shorthorn	1960-62	17	0	14R	Mar-May
2.16	Donaldson et al. 1967	Wondovale, Pentland 19°40'S, 144°50'E	Hereford	1961-62	14	0	11R	Mar-Jun
2.17	Doogan et al. 1991	Swan's Lagoon 20°05'S, 147°14'E	Brahman Sahiwal (1st backcross)	1975-79	20	0	25R	Jan-Apr
2.18	Doogan et al. 1991	Swan's Lagoon 20°05'S, 147°14'E	Brahman Sahiwal (F2 et seq.)	1978-86	20	0	25R	Jan-Apr
2.19	Edye et al. 1971	Lansdown 19°06'S, 146°08'E	Droughtmaster	1964-68	16	0	16	Jan-Mar
2.20	Entwistle & Goddard 1984	Fletcherview 19°50'S, 145°20'E	B. indicus	1979-83	19	0	0	Jan-Apr
2.21	Fordyce 1988	Swan's Lagoon 20°05'S, 147°14'E	Brahman cross	1981-83	16	0	0	Jan-May
2.22	Fordyce 1988	Swan's Lagoon 20°05'S, 147°14'E	Brahman cross	1984-87	18	0	0	all year
2.23	Fordyce 1994	Swan's Lagoon 20°05'S, 147°14'E	Brahman cross	1987-91	19	0	0	Jan-Apr
2.24	Fordyce & Cooper 1997	Swan's Lagoon 20°05'S, 147°14'E	Brahman cross	1985-97				Jan-Apr
2.25	Fordyce et al. 1988	Swan's Lagoon 20°05'S, 147°14'E	B. indicus cross	1982	9	0	15	Jan-Apr
2.26	Fordyce et al. 1990	Charters Towers	Brahman cross	1982-83 1986-87	10 9	11 0	12 8	Jan-May

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.

†† Values with a "w" are weaning rates.

BREEDER FERTILITY, MORTALITY AND LIVEWEIGHT IN NORTH AUSTRALIA

Class	Pregnancy rate (%)			Calve rate	Brand rate††	Loss to Brand	Cow deaths	Weight (kg)		
	Wet	Dry	All	(%)	(%)	(%)	(%)	Mid-dry	End dry	End wet
first calf	71								309	365
heifers			25-57							
cows			63-64							
	58	97	80							
heifers		88						261		261
cows			50			18				
cows			75			48				
heifers		76-95							274-339	
heifers		24-91							216-343	
cows			75	79		4				364-507
first calf	19									
mature	20	87	20-86			4-10				
heifers		70-80								
first calf	48-51									
mature	68	91	63-82							
heifers		78-86								
first calf	44-64									
mature	60-78	88-89	66-80		72-89					
heifers		85								
cows			72-92							
cows			86						398	
cows	73	100	75			9	21			
			62							

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.

†† Values with a "w" are weaning rates.

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Indices†			Mating period
					F	M	W	
2.27	Fordyce et al. 1996	Swan's Lagoon 20°05'S, 147°14'E	Brahman cross	1990	8	0	14	Jan-Apr
2.28	Goddard et al. 1980	Lansdown 19°06'S, 146°08'E	Droughtmaster	1979	10	0	9R	Jan-Apr
2.29	Hassall et al. 1968	Meadowbank, Mt Garnet 18°16'S, 144°58'E	Brahman cross	1962-67	22	0	21R	Feb-Mar Sep-Oct
2.30	Hetzel et al. 1989	Lansdown 19°06'S, 146°08'E	Droughtmaster	1984-86	17	18	18	Jan-Apr
2.31	Holroyd 1985	Swan's Lagoon 20°05'S, 147°14'E	Brahman cross	1972-82	26	0	24R	Jan-Apr
2.32	Holroyd 1985	Swan's Lagoon 20°05'S, 147°14'E	Brahman cross	1974-80	21	0	19R	Jan-Apr
2.33	Holroyd 1985	Swan's Lagoon 20°05'S, 147°14'E	Brahman cross	1978-83	22	0	20R	Jan-Apr
2.34	Holroyd 1987	Swan's Lagoon 20°05'S, 147°14'E	B. indicus	1971-82	29	0	0	Jan-Apr
2.35	Holroyd et al. 1979	Swan's Lagoon 20°05'S, 147°14'E	Shorthorn	1970-73	16	0	16	Sep-Jan
2.36	Holroyd et al. 1979	Swan's Lagoon 20°05'S, 147°14'E	Brahman cross	1970-73	16	0	16	Sep-Jan
2.37	Holroyd et al. 1983	Swan's Lagoon 20°05'S, 147°14'E	Brahman cross	1973-77	25	0	22R	Jan-Apr
2.38	Holroyd et al. 1988a	Swan's Lagoon 20°05'S, 147°14'E	Droughtmaster	1977-80	21	0	18R	Jan-Apr
2.39	Holroyd et al. 1988b	Swan's Lagoon 20°05'S, 147°14'E	Brahman cross	1977-80	16	18	19R	Jan-Apr
2.40	Holroyd et al. 1990a	Swan's Lagoon 20°05'S, 147°14'E	B. indicus (F1)	1972-74 1973-75 1974-76 1975-79	26	0	27	Jan-Apr

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.

†† Values with a "w" are weaning rates.

BREEDER FERTILITY, MORTALITY AND LIVEWEIGHT IN NORTH AUSTRALIA

Class	Pregnancy rate (%)			Calve rate (%)	Brand rate†† (%)	Loss to Brand (%)	Cow deaths (%)	Weight (kg)		
	Wet	Dry	All					Mid-dry	End dry	End wet
cows	41							413	391	
cows	92								426	431
heifers		60-82								
first calf	27									
mature	68	90								
heifers		53								
first calf	38		40-62							
mature	10-40	47-90								
heifers		4	50-63							
mature	0-35	5-82								
cows	64	81	72		55w		3.4		433	466
heifers		88-94				12-13			286-330	
first calf	77-92					10-30			371-404	
mature	78	92	60-98			4-34			369-434	
heifers		92				7			283	
first calf	90					5			356	
mature	82	93	75-92			2-29			392-418	
heifers		80-93				13-18			265-341	
first calf	23-34					11-12			293-332	
mature	41	89	52-90			5-25			300-405	
cows						9-19				
cows	65-91	98		70-91						349-423
cows	34-84	98		78-84						361-420
first calf	58			55	50	8				
mature	61-96			57-93	57-92	4-11				359-484
heifers						22				
first calf	28			39	37	8				
mature	41-83	92-100		38	78	11				
cows	41-75	94				0-18	0-5			430-503
heifers		88-94			76-84w			337-359	287-330	
cows 3y	57-84				40-77w			371-418	341-374	
cows 4y	82-95				72-84w			365-442	403-422	
cows 5-9y	68-92				60-78w			395-412	372-454	

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SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Indices†			Mating period
					F	M	W	
2.41	Holroyd et al. 1990a	Swan's Lagoon 20° 05'S, 147° 14'E	B. indicus (1st backcross)	1975-79 1976-80 1977-79 1978-83	26	0	27	Jan-Apr
2.42	Holroyd et al. 1990b	Swan's Lagoon 20° 05'S, 147° 14'E	B. indicus (F2 et seq)	1978-86 1979-86 1980-86 1981-86	26	0	27	Jan-Apr
2.43	Holroyd et al. 1990c	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1977-80	13	0	19	Jan-Apr
2.44	Holroyd et al. 1993	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross		9	0	10	Jan-Apr
2.45	Lamond 1969	Wrotham Park (F) Chillagoe 16° 40'S, 143° 50'E	Shorthorn	1964-65	14	0	0	all year
2.46	Lamond 1969	Lansdown 19° 06'S, 146 °8'E	Brahman cross	1964	10	0	0	all year
2.47	Landsberg 1973	Trafalgar Charters Towers	Brahman cross	1966-71	19	0	0	
2.48	Loxton et al. 1983	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1976-78	0	16	15	
2.49	Mackinnon et al. 1987	Lansdown 19° 06'S, 146 °8'E	Droughtmaster	1984-86	16	0	16	Jan-Apr
2.50	Mackinnon et al. 1990	Lansdown 19° 06'S, 146 °8'E	Droughtmaster	1987-89	14	0	14	
2.51	O'Rourke et al. 1995a	Swan's Lagoon 20° 05'S, 147° 14'E	B. indicus 50% (F1)	1972-81	0	28	0	Jan-Apr
2.52	O'Rourke et al. 1995a	Swan's Lagoon 20° 05'S, 147° 14'E	B. indicus 50% and 75% (F2)	1975-91	0	30	0	Jan-Apr
2.53	Plasto 1968, Plasto & Strachan 1970	Swan's Lagoon 20° 05'S, 147° 14'E	Shorthorn	1963-66	25	21	0	5 periods
2.54	Rankine & Donaldson 1968	Meadowbank, Mt Garnet 18° 16'S, 144° 58'E	Brahman cross	1962-67	19	0	0	Feb-Mar and Sep-Oct
2.55	Rea et al. 1981	Lisgar, Gumlu 19° 40'S, 147° 30'E	Droughtmaster	1978-80	14	0	0	

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†† Values with a "w" are weaning rates.

BREEDER FERTILITY, MORTALITY AND LIVEWEIGHT IN NORTH AUSTRALIA

Class	Pregnancy rate (%)			Calve rate (%)	Brand rate†† (%)	Loss to Brand (%)	Cow deaths (%)	Weight (kg)		
	Wet	Dry	All					Mid-dry	End dry	End wet
heifers		76-95			63-86w			292-352	274-340	
cows 3y	38-60				23-48w			293-339	282-343	
cows 4y	57-79				48-62w			352-392	320-353	
cows 5-9y	30-87				25-74w			366-482	309-400	
heifers		29-96			20-77w			270-343	213-340	
cows 3y	8-71				7-59w			309-414	238-357	
cows 4y	10-69				12-66w			337-431	275-380	
cows 5-9y	15-91				0-71w			368-465	290-434	
heifers	71-90						0-11		252-308	324-366
heifers		44							227	316
heifers		67-85								
first calf	23-32									
mature	40-43	80-87	66							
heifers		57								
first calf	21									
mature	29	80	44							
heifers		63-91								
cows	13-97	53-100	47-98							
cows							4-12			309-410
cows	66	77	72						409-437	
heifers		78							304	
cows							0-5.3			
cows							0-11.6			
cows	49	76	59-67	50-60		11-20	0-10			
		7-69				8-39				
heifers		82-97								
cows	76-88	98-100	81-91							

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.

†† Values with a "w" are weaning rates.

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Indices†			Mating period
					F	M	W	
2.56	Round 1987	Lisgar, Gumlu 19°40'S, 147°30'E	Droughtmaster	1980-86	21	0	0	Jan-Jul
2.57	Schlink et al. 1988	Lansdown 19°06'S, 146 °8'E	Droughtmaster		7	0	11	seasonal
2.58	Schlink et al. 1994b	Lansdown 19°06'S, 146 °8'E	Brahman cross	1992	7	0	10	Jan-Mar
2.59	Siebert et al. 1976	Lansdown 19°06'S, 146 °8'E	Droughtmaster	1970-75	16	0	16	Jan-Feb
2.60	Taylor et al. 1982	Kirk River, Mingela 19°55'S, 146°45'E	Brahman cross	1971-73	11	15	14	Dec-Apr
2.61	Tyler & Fordyce 1988	Swan's Lagoon 20°05'S, 147°14'E	Brahman cross	1981-83	0	10	0	
						3. Queensland -		
3.1	Barr 1971	Mt Eugene, Jambin 24°10'S, 150°25'E	Brahman cross	1962-70	20	0	0	Oct-Mar
3.2	Barr & Burns 1971; Barr 1971	Glenhowden, Harlin 26°55'S, 152°20'E	Hereford	1967-70	14	12	14R	Nov-Mar
3.3	Barr & Burns 1972	Glenhowden, Harlin 26°55'S, 152°20'E	Hereford	1970-71	12	0	15R	Sep-Mar
3.4	Bewg et al. 1969	Brian Pastures 25°38'S, 151°47E	Hereford	1961-65	19	0	16R	3 periods
3.5	Burrow et al. 1991	Belmont, R'ton 23°15'S, 150°25'E	Mixed	1984-86	18	0	0	Dec-Feb
3.6	Coates & Mannetje 1990	Narayen, M'bera 25° 41'S, 150° 52'E	Hereford	1972-76	18	0	0	Nov-Dec
3.7	Coates & Mannetje 1990	Narayen, M'bera 25° 41'S, 150° 52'E	Belmont Red	1977-82	18	0	0	Nov-Dec
3.8	Coates et al. 1987	Narayen, M'bera 25° 41'S, 150° 52'E	Hereford	1972-82	29	25	24	Nov-Dec
3.9	Coates et al. 1987	Narayen, M'bera 25° 41'S, 150° 52'E	Belmont Red	1972-82	29	25	24	Nov-Dec
3.10	Donaldson et al. 1967	Glenprarie, Marlborough 20°40'S, 149°50'E	Brahman cross	1961	10	0	0	Apr-Jul

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.

†† Values with a "w" are weaning rates.

BREEDER FERTILITY, MORTALITY AND LIVEWEIGHT IN NORTH AUSTRALIA

Class	Pregnancy rate (%)			Calve rate (%)	Brand rate†† (%)	Loss to Brand (%)	Cow deaths (%)	Weight (kg)		
	Wet	Dry	All					Mid-dry	End dry	End wet
heifers		68-96								
cows			77-93							
cows	60									407
first calf	75								367	414
cows	60								437	412
first calf		15-83							238-359	
heifers		37-89					5-24	180-248		
first calf	30-47							254-265		
cows							21			
southern spear grass										
heifers		91-94								
first calf	81-88									
mature			88-92							
heifers		63		51		19	3		203	266-320
first calf	37	98	65							
first calf	28									
mature	62							270	280	
heifers		89		79						
cows			82-92	66-86						
cows					66w	4.6				
cows			89-92	80-88		10				
cows			71-94	62-87		8				
cows			69-97	63-88		0-14	2	355		456
cows			61-85	58-85		0-6	1	380		473
heifers		68								
first calf	20									

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.

†† Values with a "w" are weaning rates.

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Indices†			Mating period
					F	M	W	
3.11	Donaldson et al. 1967	Torilla Plains, Marlborough 22°30'S, 150°10'E	Shorthorn	1961	8	0	0	all year
3.12	Frisch 1973a	Belmont, R'ton 23°15'S, 150°25'E	B. taurus	1960-69	0	28	17R	
3.13	Frisch 1973a	Belmont, R'ton 23°15'S, 150°25'E	B. indicus	1960-69	0	28	17R	
3.14	Frisch 1973b	Belmont, R'ton 23°15'S, 150°25'E	B. taurus	1954-69	25	29	0	Jan-Feb
3.15	Frisch 1973b	Belmont, R'ton 23°15'S, 150°25'E	B. indicus	1954-69	25	29	0	Jan-Feb
3.16	Frisch et al. 1998	Belmont, R'ton 23°15'S, 150°25'E	straightbreds		9	0	0	
3.17	Frisch et al. 1998	Belmont, R'ton 23°15'S, 150°25'E	crossbreds		10	0	0	
3.18	Gulbransen 1994	Belmont, R'ton 23°15'S, 150°25'E	Brahman cross		0	0	0	Dec-Feb
3.19	Lamond 1969	near R'ton (B)	Hereford	1964-65	16	0	0	all year
3.20	Lamond 1969	near R'ton (H)	Brahman cross	1964-65	14	0	0	all year
3.21	Lamond 1969	near R'ton (I)	Brahman cross	1964	10	0	0	all year
3.22	Lamond 1969	near R'ton (J)	Brahman	1964	10	0	0	all year
3.23	Lamond 1969	near Bundaberg (K)	Mixed	1964	10	0	0	all year
3.24	Lamond 1969	near Bundaberg (L)	Brahman cross	1964	9	0	0	all year
3.25	Lamond 1969	near Bundaberg (M)	Brahman cross	1964	9	0	0	all year

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.
†† Values with a "w" are weaning rates.

BREEDER FERTILITY, MORTALITY AND LIVEWEIGHT IN NORTH AUSTRALIA

Class	Pregnancy rate (%)			Calve rate (%)	Brand rate†† (%)	Loss to Brand (%)	Cow deaths (%)	Weight (kg)		
	Wet	Dry	All					Mid-dry	End dry	End wet
cows	34	78	55							
heifers								302	328-355	
first calf								395	325-425	
mature							0-6	447	403-467	
heifers								362	371-406	
first calf								439	381-459	
mature							0-2	453	442-471	
heifers						8				
cows						8	3			
heifers						7				
cows						6	1			
cows			79							
cows			88							
heifers		96							361	
first calf	58								365	
heifers		69-83								
first calf	55-68									
mature	63-76	89-90	66-82							
cows	57-74	68-76	65-72							
heifers		50								
first calf	30									
mature	31	80	47							
heifers		50								
first calf	37									
mature	57	87	58							
heifers		87								
first calf	43									
mature	62	85	75							
heifers		62								
first calf	33									
mature	44	83	54							
heifers		64								
first calf	23									
mature	40	61	48							

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.

†† Values with a "w" are weaning rates.

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Indices†			Mating period
					F	M	W	
3.26	Lampkin & Kennedy 1965	Belmont, R'ton 23°15'S, 150°25'E	B. taurus	1954-59	21	0	20R	Jan-Feb
3.27	Lampkin & Kennedy 1965	Belmont, R'ton 23°15'S, 150°25'E	B. indicus	1957-62	21	0	20R	Jan-Feb
3.28	Loxton 1996a, Loxton & Holroyd 1989	Develin, Marlborough 22° 54'S, 149°44'E	Brahman	1986-87	7	0	14	Dec-Apr
3.29	Loxton 1996b	Rowanlea, Calliope 24°17'S, 151°06'E	B. indicus cross	1989-90	7	0	7	Nov-May
3.30	Loxton & Holroyd 1989	Rowanlea, Calliope 24°17'S, 151°06'E	B. indicus cross	1987-89	7	0	12	Nov-Apr
3.31	Mackinnon et al. 1989	Belmont, R'ton 23°15'S, 150°25'E	Africander	1957-84	26	0	0	Dec-Feb
3.32	Mackinnon et al. 1989	Belmont, R'ton 23°15'S, 150°25'E	Brahman	1957-84	26	0	0	Dec-Feb
3.33	Mannetje & Coates 1976	Narayan RS, M'bera 250 41'S, 1500 52'E	Hereford	1972-75	16	0	0	Nov-Dec
3.34	Post 1980	Belmont, R'ton 23°15'S, 150°25'E	Brahman cross	1978-80	11	0	0	Jan-Feb
3.35	Rowan 1985	QAC Gatton 27°40'S, 152°25'E	Brahman cross	1982-84	16	0	0	
3.36	Rudder et al. 1976	Mt Eugene, Jambin 24°10'S, 150°25'E	Brahman cross	1970-75	24	0	21R	Oct-Feb
3.37	Rudder et al. 1981	Mt Eugene, Jambin 24°10'S, 150°25'E	Brahman cross		13	0	0	Oct-Feb
3.38	Rudder et al. 1985	Mt Eugene, Jambin 24°10'S, 150°25'E	Brahman cross	1972-83	26	0	26R	Oct-Feb
3.39	Seebeck 1973	Belmont, R'ton 23°15'S, 150°25'E	B. taurus	1954-59	21	0	0	Jan-Feb
3.40	Seebeck 1973	Belmont, R'ton 23°15'S, 150°25'E	B. indicus (F1)	1957-62	21	0	0	Jan-Feb
3.41	Seebeck 1973	Belmont, R'ton 23°15'S, 150°25'E	B. indicus	1961-68	23	0	0	Jan-Feb

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.
†† Values with a "w" are weaning rates.

BREEDER FERTILITY, MORTALITY AND LIVEWEIGHT IN NORTH AUSTRALIA

Class	Pregnancy rate (%)			Calve rate (%)	Brand rate†† (%)	Loss to Brand (%)	Cow deaths (%)	Weight (kg)		
	Wet	Dry	All					Mid-dry	End dry	End wet
cows				25-81						
cows				71-85						
heifers		91						258	304	378
first calf			58							417
heifers		90						268	287	441
first calf			40							413
cows				56						
cows				55						
cows			93	84						
heifers		82								
cows	20-35	69-75		62						
cows			93-95		85-88	8-9				
heifers		62-87				13				
cows			85			5				
heifers		90				16				
first calf	67					7				
heifers		19-94							191-278	
first calf	29-75								299-353	
mature	67-93								342-456	
				36-71						
				69-81						
				26-74						

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.

†† Values with a "w" are weaning rates.

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Indices†			Mating period
					F	M	W	
						4. Queensland -		
4.1	Beasley et al. 1979	Markwell, Lotus Crk 21°20'S, 149°00'E	Brahman cross	1973-75	14	0	0	Oct-Mar
4.2	Edwards et al. 1973	Woodlawn, St George 27°S, 149°E	Hereford	1968-72	19	0	22	Dec-Mar
4.3	Rudder & Barnett 1979	Broadmeadow, Nebo 21°45'S, 148°20'E	B. taurus	1966-70	22	0	23	Oct-May
						5. Queensland -		
5.1	Clarke 1991	Moombidary, Hungerford 28°50'S, 143°40'E	Shorthorn	1972-75	0	0	0	seasonal
5.2	Clarke 1991	Talpa, Wyandra 27° 19'S, 145°37'E	Africander	1966-68	0	0	0	seasonal
5.3	Clarke 1991	Quilberry, Wyandra 27°05'S, 145°55'E	Santa Gertrudis	1986-88	0	0	0	seasonal
5.4	Plasto et al. 1976	Moombidary, Hungerford 28°50'S, 143°40'E	Shorthorn	1971-75	21	0	0	Jan-Jun
						6. Queensland -		
6.1	Holroyd 1977	Morstone (D), Camooweal 19°30'S, 138°30'E	Shorthorn	1971-75	18	0	15R	all year
6.2	Holroyd et al. 1988c	Katandra, Stamford 21°40'S, 143°40'E	Droughtmaster	1972-80	26	0	23R	Feb-May
						7. Queensland -		
7.1	Churchward 1965	Property A1		1958-63	22	0	0	all year
7.2	Churchward 1965	Property A2		1958-63	22	0	0	all year
7.3	Churchward 1965	Property B2		1958-63	22	0	0	all year
7.4	Churchward 1965	Property B2		1958-63	22	0	0	all year
7.5	Holroyd 1977	Buckingham Downs (E) Dajarra 22°05'S, 139°40'E	Hereford	1971-73	18	0	15R	all year

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.

†† Values with a "w" are weaning rates.

BREEDER FERTILITY, MORTALITY AND LIVEWEIGHT IN NORTH AUSTRALIA

Class	Pregnancy rate (%)			Calve rate (%)	Brand rate†† (%)	Loss to Brand (%)	Cow deaths (%)	Weight (kg)		
	Wet	Dry	All					Mid-dry	End dry	End wet
aristida-bothriochloa										
yearling	83	96 39	80-92							
heifers		84-93				4-9			258-362	322-378
first calf	77-92								341-395	366-397
mature			88-92						370-434	373-421
cows			62-89			5-12			330-417	378-420
mulga										
cows			91-93							
cows			40-82							
cows			80-84							
heifers		74-91								
cows			91-93		82-91	8-24				
mitchell grass downs										
heifers		80								
first calf	80									
mature			76-87		53	28				
heifers		86-98								
first calf	41-97									
mature	74-97	91-98	79-96			5-16				
spinifex										
cows					17-70					
cows					29-73					
cows					29-96					
cows					20-64					
heifers		93								
first calf	90									
mature			89-92		85	6				

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.

†† Values with a "w" are weaning rates.

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Indices†			Mating period
					F	M	W	
7.6	Tuen et al. 1982	Eurunga, Torrens Crk 20° 50'S, 144° 50'E	Brahman cross	1979-80	8	0	0	Jan-Jun
						8. Queensland -		
8.1	Arthur & Mayer 1975	Fort Constantine Cloncurry 20° 30'S, 140° 40'E	Shorthorn	1970-73	15	0	0	all year
8.2	Churchward 1965	Property C1		1958-63	22	0	0	all year
8.3	Churchward 1965	Property C2		1958-63	22	0	0	all year
8.4	Churchward 1965	Property C3		1958-63	22	0	0	all year
8.5	Daly 1971	Kamilaroi, Cloncurry 19° 20'S, 140° 05'E	Shorthorn	1963-66	20	17	0	all year
8.6	Holroyd 1977	Escott (A) Burketown 17° 30S, 139° 20'E	Shorthorn	1970-73	18	0	15R	all year
8.7	Holroyd 1977	Planet Downs (B) Gregory 18° 30'S;139° 15'E	Droughtmaster	1970-73	17	0	14R	all year
8.8	Holroyd 1977	Wondoola (C) Normanton 18° 40'S, 140° 50'E	Brahman cross	1971-73	18	0	15R	all year
8.9	Lamond 1969	Kamilaroi, Cloncurry 19° 20'S, 140° 05'E	Shorthorn	1964-65	14	0	0	Feb-Sep
8.10	Lamond 1969	Magowra (D). Normanton 18°S, 140° 40'E	B. taurus	1964	10	0	0	all year
8.11	Lamond 1969	Granada (E). Cloneurry 19° 55'S, 140° 30'E	Brahman cross	1964-65	14	0	0	all year
						9. Queensland -		
		NO DATA AVAILABLE						
						10. Queensland -		
10.1	Anon 1987, Anon. 1988	Junedale, Theodore 24° 45'S, 144° 50'E	mixed	1987-88	13	0	16	Nov-Mar

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.
†† Values with a "w" are weaning rates.

BREEDER FERTILITY, MORTALITY AND LIVEWEIGHT IN NORTH AUSTRALIA

Class	Pregnancy rate (%)			Calve rate	Brand rate††	Loss to Brand	Cow deaths	Weight (kg)		
	Wet	Dry	All	(%)	(%)	(%)	(%)	Mid-dry	End dry	End wet
cows			58							
gulf lowlands										
cows			69-89							
cows					53-73					
cows					38-57					
cows					51-77					
heifers		67		50		23	26			
cows			32-70	36-56	27-51	37	1-25			
heifers		78								
first calf	69									
mature			75		68	7				
heifers		81								
first calf	82									
mature			82-86		66	18				
heifers		95								
first calf	80									
mature			84-88		70	16				
heifers		66-81								
first calf	45-50									
mature	54-74	76-87	65-66							
heifers		56								
first calf	36									
mature	55	73	57							
heifers		52-72								
first calf	33-43									
mature	52-62	85-86	67-68							
peninsula										
					NO DATA AVAILABLE					
brigalow										
cows			91-93							467-485

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.

†† Values with a "w" are weaning rates.

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Indices†			Mating period
					F	M	W	
10.2	Anon. 1987, 1988	Junedale, Theodore 24° 45'S, 144° 50'E	Brahman	1987-88	10	0	10	Nov-Mar
10.3	Anon. 1987, 1988	Junedale, Theodore 24° 45'S, 144° 50'E	Simmental x Brahman (F1)	1987-88	10	0	10	Nov-Mar
10.4	Anon. 1987, 1988	Junedale, Theodore 24° 45'S, 144° 50'E	Brahman x Hereford (F1)	1987-88	10	0	10	Nov-Mar
10.5	Barr 1971	Kaluroo, Dingo 23°S, 149°E	Hereford	1964-69	22	0	0	Oct-Mar
10.6	Burns et al. 1992	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Hereford	1981-85	22	0	0	Dec-Mar
10.7	Burns et al. 1992	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Simmental	1981-85	22	0	0	Dec-Mar
10.8	Burns et al. 1992	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Belmont Red	1981-85	22	0	0	Dec-Mar
10.9	Burns et al. 1992	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Mixed	1981-85	22	0	0	Dec-Mar
10.10	Carroll 1984	Berrigurra, Blackwater 23° 30'S, 148° 45'E	Belmont Red	1979-83	22	0	0	
10.11	Coates et al. 1987	Narayen, M'bera 25° 41'S, 150° 52'E	Hereford	1970-77	29	25	24	Nov-Dec
10.12	Coates et al. 1987	Narayen, M'bera 25° 41'S, 150° 52'E	Belmont Red	1970-77	29	25	24	Nov-Dec
10.13	Loxton 1996a, Loxton & Holroyd 1989	Belah Valley, Marlborough 22° 40'S, 149° 59'E	Brahman	1986-87	7	0	12	Nov-Apr
10.14	Mason et al. 1985	Banana 24° 30'S, 150° 15'E	Brahman cross	1980-84	17	0	0	

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.
†† Values with a "w" are weaning rates.

BREEDER FERTILITY, MORTALITY AND LIVEWEIGHT IN NORTH AUSTRALIA

Class	Pregnancy rate (%)			Calve rate	Brand rate††	Loss to Brand	Cow deaths	Weight (kg)		
	Wet	Dry	All	(%)	(%)	(%)	(%)	Mid-dry	End dry	End wet
cows			85-97							487-519
cows 5yo			92-95							505-454
cows 5yo			94-96							446-444
heifers		69-85								
first calf	74-90									
mature	87-92		81-92							
cows			78	76	68w		2.8			
cows			75	73	60w		4.1			
cows			87	85	61w		1.1			
heifers		89		87	67w					
cows ≥3y		88		85	80w					
cows 3y	71			70	61w					
cows 4y	75			74	68w					
cows ≥5y	76			75	71w					
cows			69-89	66-84		5-10				
cows			81-95	67-88		3-13	2	454		542
cows			80-96	74-94		0-12	1	459		538
heifers 1y		14						198	232	306
heifers 2y		55						286	313	398
heifers		24-94								
first calf	74-80									
mature	74-97									

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.

†† Values with a "w" are weaning rates.

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Indices†			Mating period
					F	M	W	
10.15	O'Rourke et al. 1992	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Hereford	1979-85	17	0	17	Dec-Feb
10.16	O'Rourke et al. 1992	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Simmental	1979-85	17	0	17	Dec-Feb
10.17	O'Rourke et al. 1992	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Belmont Red	1979-85	17	0	17	Dec-Feb
10.18	Rudder 1986	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Hereford	1981-85	22	0	21	Dec-Feb
10.19	Rudder 1986	Brigalow RS Theodore 24° 50'S, 149° 45'E	B. indicus	1981-85	22	0	21	Dec-Feb
10.20	Rudder & McCamley 1972	Memooloo, Comet 23°S, 148°E	Hereford	1964-70	22	0	0	Oct-Mar
10.21	Rudder et al. 1980	El Rocco, Moura 24°S, 149°E	Brahman cross	1976-78	13	0	13	Oct-Mar
10.22	Silvey et al. 1978	Narayen, Mundubbera 25° 41'S, 150° 52'E	Hereford	1969-72	16	0	0	Nov-Mar
10.23	Tierney et al. 1992	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Hereford	1982-86	0	0	23	Dec-Feb
10.24	Tierney et al. 1992	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Simmental	1982-86	0	0	23	Dec-Feb
10.25	Tierney et al. 1992	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Belmont Red	1982-86	0	0	23	Dec-Feb
								11. Northern Territory -
11.1	Andrews 1976	Darwin A	Shorthorn	1969-71	15	0	0	all year
11.2	Andrews 1976	Darwin B	Shorthorn	1969-70	13	0	0	all year

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.

†† Values with a "w" are weaning rates.

BREEDER FERTILITY, MORTALITY AND LIVEWEIGHT IN NORTH AUSTRALIA

Class	Pregnancy rate (%)			Calve rate	Brand rate††	Loss to Brand	Cow deaths	Weight (kg)		
	Wet	Dry	All	(%)	(%)	(%)	(%)	Mid-dry	End dry	End wet
heifers 2y		63-97							287-404	
cows ≥3y		65-94							361-527	
cows 3y	40-87								314-457	
cows ≥4y	51-87								375-500	
heifers 2y		55-91							312-447	
cows ≥3y		71-92							423-594	
cows 3y	12-79								358-526	
cows ≥4y	35-80								448-567	
heifers 2y		75-94							323-404	
cows ≥3y		92-100							399-508	
cows 3y	43-96								343-443	
cows ≥4y	71-94								394-505	
heifers		79								
first calf	59									
mature	66	98	64-85	63-83	49-76				350-465	416-495
heifers		87								
first calf	81									
mature	85	100	76-92	73-91	68-89				375-468	427-500
heifers		89-95				4-11				
first calf	83-100									
mature	91-96		91-96			2-13				
heifers		47								302
first calf	51									320
mature	77		67-72							392
cows			90-100	88-100						
cows									417	465
cows									467	519
cows									431	481
Darwin/Gulf										
cows			74							
cows			50							

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.
†† Values with a "w" are weaning rates.

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Indices†			Mating period
					F	M	W	
11.3	Andrews 1976	Darwin C	Shorthorn	1967-71	22	0	0	all year
11.4	Andrews 1976	Darwin D	Shorthorn	1967-68	13	0	0	all year
11.5	Andrews 1976	Darwin E	Shorthorn	1969-71	17	0	0	all year
11.6	Andrews 1976	Darwin F	Shorthorn	1967-70	17	0	0	all year
11.7	Andrews 1976	Darwin H	Shorthorn	1970	8	0	0	all year
11.8	Andrews 1976	Darwin I	Shorthorn	1967	6	0	0	seasonal
11.9	Andrews 1976	Katherine A	Shorthorn	1968-71	20	0	0	all year
11.10	Andrews 1976	Katherine B	Shorthorn	1966-71	22	0	0	seasonal
11.11	Andrews 1976	Katherine C	Shorthorn	1971	10	0	0	all year
11.12	Andrews 1976	Katherine D	Shorthorn	1967-71	22	0	0	all year
11.13	Andrews 1976	Katherine E	Shorthorn	1970	8	0	0	all year
11.14	Andrews 1976	Katherine F	Shorthorn	1969-71	18	0	0	all year
11.15	Andrews 1976	Katherine G	Shorthorn	1968	10	0	0	all year
11.16	Eggington et al. 1990	Mt Bundey 13°15'S, 131°07'E	Brahman cross	1981-83	16	0	0	
11.17	Ford 1975	Tortilla RS 13°05'S, 131°15'E	Brahman cross	1969-73	16	0	15R	Feb-May
11.18	Kirby 1977	Beatrice Hill RS 12°33'S, 131°25'E	Mixed	1962-70	23	0	0	
11.19	McCosker & Eggington 1986	Mt Bundey No.1 13°15'S, 131°07'E	Brahman cross	1981-84	17	14	16	Dec-May
11.20	McCosker & Eggington 1986	Mt Bundey No.2 13°15'S, 131°07'E	Brahman cross	1980-84	21	18	20	Dec-May
11.21	McCosker & Eggington 1986	Mt Bundey No.3 13°15'S, 131°07'E	Brahman cross	1980-84	21	18	20	Dec-May
11.22	McCosker & Eggington 1986	Mt Bundey No.4 13°15'S, 131°07'E	Brahman cross	1980-84	19	16	18	Dec-May
11.23	McCosker & Eggington 1986	Mt Bundey No.5 13°15'S, 131°07'E	Brahman cross	1982-84	15	12	14	Dec-May

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.
†† Values with a "w" are weaning rates.

BREEDER FERTILITY, MORTALITY AND LIVEWEIGHT IN NORTH AUSTRALIA

Class	Pregnancy rate (%)			Calve rate (%)	Brand rate†† (%)	Loss to Brand (%)	Cow deaths (%)	Weight (kg)		
	Wet	Dry	All					Mid-dry	End dry	End wet
cows			59			15				
cows			63							
cows			70			17				
cows			45							
cows			63							
cows			91							
cows			69			22				
cows			54							
cows			47							
cows			64			48				
cows			52							
cows			58			53				
cows			41							
cows	25-61									
heifers		83								
first calf	46									
mature	30-46	74-96								
cows			49			23	7			
first calf	0-20						0-57			257-309
mature	14-29	88-100	32-63		38-49	10-42	7-26			315-410
first calf	7-57						4-13			285-322
mature	33-62	93-100	55-71		48-57	11-24	3-12			276-399
first calf	24-53						0-5			304-326
mature	42-75	93-99	58-80		47-76	6-8	1-4			330-433
first calf	40-45						0-22			320-340
mature	52-76	91-98	65-82		29-64	6-28	2-9			295-415
first calf	10-50						0			302-312
mature	16-68	100	23-79			6	0			318-369

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.

†† Values with a "w" are weaning rates.

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Indices†			Mating period
					F	M	W	
11.24	McCosker & Eggington 1986	Mt Bundey No.6 13° 15'S, 131° 07'E	Brahman cross	1980-84	22	19	21	all year
11.25	McCosker et al. 1991	Mt Bundey 13° 15'S, 131° 07'E	Brahman cross	1982-84 1981-84	20	19	0	Dec-May
11.26	O'Rourke et al. 1991a	Mt Bundey 13° 15'S, 131° 07'E	Brahman cross	1980-84	18	0	19	Dec-May
11.27	Pearson 1978	Katherine Expt Farm 14° 28'S, 132° 19'E	Brahman cross	1971-73	16	14	13R	4 periods
11.28	Schlink et al. 1994a	McArthur River 16° 26'S, 135° 05'E	Brahman cross	1986-89	17	18	18	all year
								12. Northern Territory -
12.1	Andrews 1976	Victoria R. Dist. A	Shorthorn	1967-69	12	0	0	all year
12.2	Andrews 1976	Victoria R. Dist. B	Shorthorn	1967-68	15	0	0	all year
12.3	Andrews 1976	Victoria R. Dist. C	Shorthorn	1968	8	0	0	all year
12.4	Andrews 1976	Victoria R. Dist. D	Shorthorn	1969-70	14	0	0	seasonal
12.5	Dixon 1998a, p36	Mt Sanford 17° 2'S, 130° 38'E		1994-95	11	0	13	all year
12.6	Hooper & Letts 1962	Cattle Ck, Wave Hill 18°S, 132°E	Shorthorn	1961	9	0	0	Mar-May
12.7	O'Rourke et al. 1991b	Kidman Springs 16° 07'S, 130° 57'E	B. indicus eross	1981-85	19	0	18R	all year
12.8	O'Rourke et al. 1995b	Kidman Springs 16° 07'S, 130° 57'E	B. indicus cross	1981-89	26	27	0	all year
12.9	Perkins et al. 1988	Newry &Auvergne 16°S, 129°E & 15°S, 130°E	Mixed	1986	10	0	0	all year
12.10	Robertson 1988	Kidman Springs 16° 07'S, 130° 57'E	Droughtmaster	1981-85	28	19	21R	all year
12.11	Sullivan & O'Rourke 1997	Kidman Springs 16° 07'S, 130° 57'E	B. indieus cross	1985-90	24	23	0	all year

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.
†† Values with a "w" are weaning rates.

BREEDER FERTILITY, MORTALITY AND LIVEWEIGHT IN NORTH AUSTRALIA

Class	Pregnancy rate (%)			Calve rate (%)	Brand rate†† (%)	Loss to Brand (%)	Cow deaths (%)	Weight (kg)		
	Wet	Dry	All					Mid-dry	End dry	End wet
first calf	8-25						0-21			275-307
mature	17-58	77-96	37-61		44-75	15-25	4-19			310-428
first calf	12-54					8	5.4			
cows	41-64						4.6			
heifers		72-76								308-313
cows		93-97								395-410
first calf	13-42									294-311
mature	40-61									325-352
aged	47-60									348-364
cows			60	50			7			
cows			64-76			24	11-28			
Victoria River District										
cows			72							
cows			84			41				
cows			90							
cows			44			12				
cows	57				82w				401	414
cows	50	74	60							
cows			54			20	15			
cows					29-59	21	6-25			
cows	29	71								
heifers		55-96	70-88							
cows	76	94					7-17			304-330
cows			49-65		52		11.8			

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.
†† Values with a "w" are weaning rates.

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Indices†			Mating period
					F	M	W	
12.12	Sullivan et al. 1992	Kidman Springs 16° 07'S, 130° 57'E	B. indicus cross	1981-85	19	20	19	all year
12.13	Sullivan et al. 1997	Kidman Springs 16° 07'S, 130° 57'E	B. indicus cross	1987-90	21	18	0	all year
								13. Northern Territory -
13.1	Andrews 1976	Barkly A	Shorthorn	1968-71	20	0	0	all year
13.2	Andrews 1976	Barkly B	Shorthorn	1967-69	18	0	0	all year
13.3	Andrews 1976	Barkly C	Shorthorn	1968-69	12	0	0	all year
13.4	Andrews 1976	Barkly D	Shorthorn	1969	8	0	0	all year
13.5	Hart & Michell 1965	R'ton Downs 19°S, 133°E	Shorthorn	1961-62	13	0	18	all year
13.6	Stefani 1994	Brunette Downs 18° 38'S, 135° 50'E	Santa Gertrudis	1988-91	16	15	0	all year Mar-Sep
								14. Northern Territory -
		NO DATA AVAILABLE						
								15. Western Australia -
15.1	Carrick & Pratchett 1984	Ord River Station 17° 23'S, 128° 56'E	Brahman cross	1980-82	15	0	0	Mar-Apr
15.2	Carrick & Pratchett 1984	Ord River Station 17° 23'S, 128° 56'E	Shorthorn	1980-82	14	0	0	Mar-Apr
15.3	Dixon 1998a, p39	Ord River Station 17° 23'S, 128° 56'E	Shorthorn, Brahman cross	1980-88	0	0	0	
15.4	Holm 1971	Packsaddle Plains 15° 31'S, 128° 43'E	Shorthorn	1967-70	17	18	20R	all year
15.5	Petty et al. 1994	Flora Valley Station		1991-93	16	17	0	
15.6	Petty et al. 1994	Ord River Station 17° 23'S, 128° 56'E		1991-93	15	16	0	
15.7	Pratchett 1986	Ord River Station 17° 23'S, 128° 56'E	Mixed	1980-85	24	0	0	Mar-May
15.8	Pratchett 1986	S of Broome	Brahman	1983-86	14	0	0	all year
15.9	Pratchett 1987	Blackgin, ORRS	Brahman cross	1984-86	15	15	0	all year
15.10	Pratchett 1987	Tweed ORRS	Brahman cross	1984-86	15	15	0	all year

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.

†† Values with a "w" are weaning rates.

BREEDER FERTILITY, MORTALITY AND LIVEWEIGHT IN NORTH AUSTRALIA

Class	Pregnancy rate (%)			Calve rate (%)	Brand rate†† (%)	Loss to Brand (%)	Cow deaths (%)	Weight (kg)		
	Wet	Dry	All					Mid-dry	End dry	End wet
cows			70-88				6.8-16.7			304-330
heifers		47-66			32-62	9-47	5-22			
Barkly Tableland										
cows			64			61				
cows			70			16				
cows			59							
cows			82							
cows	55	78	64					404	397	419-437
heifers			36-77		36-74		8			
heifers			25-88		28-81		2			
Alice Springs					NO DATA AVAILABLE					
Kimberleys										
cows				45-63						
cows				47-66						
cows					29-71		7-21			
cows				70-80	62-74		1	315-345	290-330	320-375
cows					40-86		1-13			
cows					65-80		0-4			
cows				26-66		3-11				
cows				42-65						
cows					45		14			
cows					84		6			

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.

†† Values with a "w" are weaning rates.

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Indices†			Mating period
					F	M	W	
15.11	Pratchett 1987	Tom Gee ORRS	Brahman cross	1984-86	15	15	0	Nov-May
15.12	Prachett & Young 1989	Ord River Station 17° 23'S, 128° 56'E	Shornhorn	1984-87	20	0	0	all year Nov-May
15.13	Pratchett et al. 1988	Ord River Station 17° 23'S, 128° 56'E	Brahman	1981-87	20	0	0	Mar-May
15.14	Pratchett et al. 1988	Ord River Station 17° 23'S, 128° 56'E	Shornhorn	1981-87	20	0	0	Mar-May
15.15	Pratchett et al. 1988	Ord River Station 17° 23'S, 128° 56'E	Brahman-Shorthorn (F1)	1981-87	20	0	0	Mar-May
15.16	Pratchett et al. 1988	Ord River Station 17° 23'S, 128° 56'E	Brahman-Shorthorn (F2)	1981-87	20	0	0	Mar-May
15.17	Pratchett et al. 1988	Ord River Station 17° 23'S, 128° 56'E	Africander-Shorthorn (F1)	1981-87	20	0	0	Mar-May
15.18	Pratchett et al. 1988	Ord River Station 17° 23'S, 128° 56'E	Africander-Shorthorn (F2)	1981-87	20	0	0	Mar-May
15.19	Pratchett et al. 1993	Ord River Station 17° 23'S, 128° 56'E	Brahman	1981-87	20	0	0	Mar-May
15.20	Pratchett et al. 1993	Ord River Station 17° 23'S, 128° 56'E	Shornhorn	1981-87	20	0	0	Mar-May
15.21	Pratchett et al. 1993	Ord River Station 17° 23'S, 128° 56'E	Brahman-Shorthorn (F1)	1981-87	20	0	0	Mar-May
15.22	Pratchett et al. 1993	Ord River Station 17° 23'S, 128° 56'E	Brahman-Shorthorn (F2)	1981-87	20	0	0	Mar-May
15.23	Pratchett et al. 1993	Ord River Station 17° 23'S, 128° 56'E	Africander-Shorthorn (F1)	1981-87	20	0	0	Mar-May
15.24	Pratchett et al. 1993	Ord River Station 17° 23'S, 128° 56'E	Africander-Shorthorn (F2)	1981-87	20	0	0	Mar-May
								16. Western Australia -
16.1	Gardiner et al. 1983	Prairie Downs 23° 45'S, 119° 39'E	Shorthorn	1973-76	17	16	0	all year
16.2	Kok et al. 198?	Boodarie 20° 25'S, 118° 28'E	Shorthorn	1980-85	21	20	0	all year

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.
†† Values with a "w" are weaning rates.

BREEDER FERTILITY, MORTALITY AND LIVEWEIGHT IN NORTH AUSTRALIA

Class	Pregnancy rate (%)			Calve rate	Brand rate††	Loss to Brand	Cow deaths	Weight (kg)		
	Wet	Dry	All	(%)	(%)	(%)	(%)	Mid-dry	End dry	End wet
cows					72		7			
cows					30-89		8-25			
cows					56-71		7-14			
cows				76						
cows				76						
cows				88						
cows				68						
cows				86						
cows				82						
cows				24-78						
cows				36-81						
cows				34-93						
cows				29-78						
cows				42-89						
cows				33-84						
Pilbara										
cows					54-78		8-23			
cows					60-81		5			

† F = fertility, M = mortality, W = weight (see Appendix A2). R indicates that relationships between fertility and other measurements are given in the reference.

†† Values with a "w" are weaning rates.

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Basic Biological Data for Breeders in North Australia

Producer Demonstrations

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Indices†			Mating period
					F	M	W	
								1. Queensland -
		NO DATA AVAILABLE						
								2. Queensland -
2.1	Hill 1996	Lucky Downs, Greenvale 18° 55'S, 144° 59'E		1989-91	15	0	19	
2.2	Laing 1998	Mt Aberdeen 20° 13'S, 147° 57'E	Brahman cross	1995-99	19	0	0	Jan-Jun
2.3	Smith 1996a	Kangaroo Hills, Charters Towers 18° 56'S, 145° 40'E	Brahman cross	1993-96	18	0	0	all year
2.4	Smith 1996b	Meadowbank, Charters Towers 18° 15'S, 144° 58'E	Droughtmaster	1986-87	0	0	16	
2.5	Smith 1996c	Wambiana, Charters Towers 20° 33'S, 146° 06'E	Brahman cross	1991-92	8	0	0	Feb-May
2.6	Smith 1996d	Blackbraes, Hughenden 19° 32'S, 144° 12'E	Brahman cross	1987	8	0	9	
2.7	Smith 1998a	Lochwall, Charters Towers 19° 52'S, 145° 51'E	Brahman cross	1996-97	15	0	0	all year
2.8	Smith 1999	Mt Ravenswood, Ravenswood 20° 26'S, 146° 58'E	Brahman cross	1996-99	9	0	0	Jan-Jul
2.9	Webber 1996a	Blancourt, Georgetown 18° 17'S, 143° 10'E	Brahman cross	1988	7	0	8	
2.10	Webber 1996b	Dagworth, Georgetown 17° 52', 143° 42'E		1990-93	16	0	0	all year
2.11	Webber 1996c	Clothes Peg, Hughenden 19° 46'S, 144° 12'E	Brahman cross	1990-91	14	0	0	all year

†F = fertility, M = mortality, W = weight (see Appendix A2).

BREEDER FERTILITY, MORTALITY AND LIVEWEIGHT IN NORTH AUSTRALIA

Class	Pregnancy rate (%)			Calve rate	Brand rate	Loss to brand	Cow deaths	Weight (kg)		
	Wet	Dry	All	(%)	(%)	(%)	(%)	Mid-dry	End dry	End wet
high rainfall										
				NO DATA AVAILABLE						
northern spear grass										
cows					70-81					409-462
heifers		44-81								
first calf			51-89							
cows	56-95									
cows	0-38	84-92								
cows									293	330
first calf			11							
cows			70							405
cows	26-31	89-96	45-71		84					
heifers 1y		55								
first calf	51	93	70							
cows 3y	74	94	79							
cows 4y			33							345
cows					53-65					
cows			58-30							433

†F = fertility, M = mortality, W = weight (see Appendix A2).

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Indices†			Mating period
					F	M	W	
								3. Queensland -
		NO DATA AVAILABLE						
								4. Queensland -
4.1	Sullivan 1996a	Millungera, Julia Ck 19° 52'S, 141° 34'E	Brahman cross	1989-93	18	0	0	all year
								5. Queensland -
		NO DATA AVAILABLE						
								6. Queensland -
6.1	Bawden 1996a	Brides Creek, Blackall 25° 2'S, 145° 27'E	Brahman cross	1994-96	13	0	0	seasonal
6.2	Edmondston 1998	Duck Creek, Blackall 27° 14'S, 145° 37'E	Herefords	1995-99	18	17	0	Jan-May
								7. Queensland -
7.1	Bawden 1996b	Swanlea, Aramac 22° 26'S, 145° 32'E	Brahman cross	1995-96	4	0	4	Dec-Jun
7.2	Bawden 1996c	Swanlea, Aramac 22° 26'S, 145° 32'E	Brahman cross	1990-96	21	0	0	Sep-Jun
7.3	Sullivan 1996b	Coolullah, Cloncurry 19° 51'S, 140° 10'E	Brahman	1991	13	0	0	
7.4	Smith 1998b	Bowthorn Station 18° 07'S, 138° 10'E	Brahman cross	1995-97	14	0	0	all year
								8. Queensland -
8.1	Smith 1998b	Brinawa Station 18° 10'S, 139° 14'E	Brahman cross	1995-97	14	0	0	all year
								9. Queensland -
		NO DATA AVAILABLE						
								10. Queensland -
10.1	Mullins 1996	Omega, Alpha 23° 54'S, 146° 44'E	Brahman	1992	8	0	8	Nov-Jun

†F = fertility, M = mortality, W = weight (see Appendix A2).

BREEDER FERTILITY, MORTALITY AND LIVEWEIGHT IN NORTH AUSTRALIA

Class	Pregnancy rate (%)			Calve rate	Brand rate	Loss to brand	Cow deaths	Weight (kg)		
	Wet	Dry	All	(%)	(%)	(%)	(%)	Mid-dry	End dry	End wet
southern spear grass										
				NO DATA AVAILABLE						
aristida/bothriochloa										
cows					71-81					
Queensland - mulga										
				NO DATA AVAILABLE						
mitchell grass downs										
heifers		91								
first calf			71							
second calf			90							
cows			95							
heifers		94-99			82-87	9-13				
spinifex										
cows	69									392
cows		70-93								
heifers		85			80	5				
cows 2-9 y	30-42	88-94	47-59							
gulf lowlands										
2-9 yo cows	27-40	91-96	54-59							
peninsula										
				NO DATA AVAILABLE						
brigalow										
heifers		49								307

†F = fertility, M = mortality, W = weight (see Appendix A2).

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years		Indices†		Mating period
					F	M	W	
								11. Northern Territory -
		NO DATA AVAILABLE						
								12. Northern Territory -
		NO DATA AVAILABLE						
								13. Northern Territory -
		NO DATA AVAILABLE						
								14. Northern Territory -
14.1	Dixon 1998, p37	Central Mt Wedge 23°S, 132°E	Poll Hereford	1990-93	13	0	0	all year
								15. Western Australia -
15.1	Dixon 1998, p41	Jubilee Downs 18° 22'S, 125° 18'E	Shorthorn	1989-94	19	20	0	
15.2	Dixon 1998, p42	Glenroy 17° 22'S, 126° 07'E		1991-94	16	17	0	all year
								16. Western Australia -
		NO DATA AVAILABLE						

†F = fertility, M = mortality, W = weight (see Appendix A2).

BREEDER FERTILITY, MORTALITY AND LIVEWEIGHT IN NORTH AUSTRALIA

Class	Pregnancy rate (%)			Calve rate	Brand rate	Loss to brand	Cow deaths	Weight (kg)		
	Wet	Dry	All	(%)	(%)	(%)	(%)	Mid-dry	End dry	End wet
Darwin/Gulf										
				NO DATA AVAILABLE						
Victoria River District										
				NO DATA AVAILABLE						
Barkly Tableland										
				NO DATA AVAILABLE						
Alice Springs										
cows			43							
Kimberleys										
cows					51-88		5-13			
cows					42-67		7-17			
Pilbara										
				NO DATA AVAILABLE						

†F = fertility, M = mortality, W = weight (see Appendix A2).

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Basic Biological Data for Growing Animals in North Australia

Research

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Index
				1. Queensland -	
1.1	Bewg et al. 1970	Oakwood, Kandanga 20°26'S, 152°40'E		1966-68	16
1.2	Bryan & Evans 1971	Beerwah RS 26°40'S, 153 °2'E	Hereford	1966-67 1968-70	14 16
1.3	Donaldson & Larkin 1963	Orlent, Ingham 18°40'S, 146°10'E	Brahman cross	1956-61	22
1.4	Evans 1969	Beerwah RS 26°40'S, 153°02'E	Hereford	1965-67	13
1.5	Evans & Biggs 1979	Beerwah RS 26°40'S, 153°02'E	Hereford	1972-76	21
1.6	Evans & Bryan 1973	Beerwah RS 26°40'S, 153°02'E	Hereford	1966-71	23
1.7	Evans & Hacker 1992	Beerwah RS 26°40'S, 153°02'E	Hereford	1974-77	18
1.8	Gartner et al. 1968	Coolum RS 26°31'S, 153°04'E	Hereford	1965-67	14
1.9	Jones 1976	Samford RS 27°02'S, 152°53'E	Hereford	1962-66	17
1.10	Jones 1984	Samford RS 27°02'S, 152°53'E	Hereford	1977-82	19
1.11	Jones 1989	Samford RS 27°02'S, 152°53'E		1971-74	17
1.12	Jones & Bunch 1995	Samford RS 27°02'S, 152°53'E		1980-92	21
1.13	Jones & Bunch 1995	Samford RS 27°02'S, 152°53'E		1980-92	21
1.14	Jones & Jones 1984	Samford RS 27°02'S, 152°53'E	Belmont Red	1975-80	19
1.15	Knights & Venamore 1985	Koumala	Brahman cross	1982-83	10
1.16	Mellor & Round 1974	Utchee Creek 17°30'S, 146°E	Mixed	1968-70	18

LIVEWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stock. rate (ha/hd)	Class	Weight (kg) Nov	May	Average daily gain (g) Dry	Wet	Annual	Mortality (%)
high rainfall							
.5-.8	steers					420-520	
.4	heifers					512	
.2	steers					473	
	calves				539-738		
0.1	heifers					480	
.4-1	calves	34	195-207		803-855		
.4-.8	steers					388-620	
0.17	steers					161-411	
.2						274-485	
.25						288-578	
	steers			-537	452-463		
0.2	yearlings					366	
0.4	yearlings					299-534	
0.2	steers					316-510	
.31-.53	steers					252-512	
.37-.5	mixed					288-551	
.4-.7	steers					234-803	
	steers					250	
.3-.5	steers					570-610	0.9

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Index
1.17	Mellor et al. 1983	Utchee Creek 17°30'S, 146°E	Brahman cross	1973-76	15
1.18	Miller & van der List 1976	Walkamin RS 17°07'S, 145°26'E	Brahman cross	1964-71	25
1.19	Round et al. 1982	Utchee Creek 17°30'S, 146°E	Brahman cross	1968-72 1968-72	22 20
1.20	Tierney & Goward 1983	Coolum RS 26°31'S, 153°04'E	Hereford	1970-72	15
1.21	Tierney & Taylor 1983	Coolum RS 26°31'S, 153°04'E	B. indicus	1972-75	18
1.22	Tierney et al. 1983	Coolum RS 26°31'S, 153°04'E	Hereford	1972-75	17
1.23	Tierney et al. 1985	Coolum RS 26°31'S, 153°04'E	Hereford	1973-76	16 13
1.24	Teitzel & Wilson 1991	Tully River Station 17°57'S, 145°45'E		1978-79	9
1.25	Teitzel et al. 1991	Utchee Creek 17°30'S, 146°E		1977-81	17
1.26	Whiteman et al. 1985	Mt Cotton RS 27°30'S, 153°40'E	Hereford	1975-80	17
1.27	Wilson & Holmes 1988	King Ranch, Tully 18°S, 146°E	Brahman cross	1981-83	14
1.28	Wilson & O'Rourke 1990	Utchee Creek 17°30'S, 146°E	Mixed	1977-86	24
1.29	Winks et al. 1979a	Kairi RS 17°14'S, 145°34'E	Mixed	1970-75	16
1.30	Winks et al. 1980b	Kairi RS 17°14'S, 145°34'E	Brahman cross	1971-73	17
1.31	Winks et al. 1983	Kairi RS 17°14'S, 145°34'E	Brahman cross	1974-77	20
					2. Queensland -
2.1	Barnett et al. 1979	Taranga, Bloomsbury 21°18'S, 148°25'E	Mixed	1966-68	16

LIVEWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stock. rate (ha/hd)	Class	Weight (kg) Nov	May	Average daily gain (g) Dry	Wet	Annual	Mortality (%)
.3-.6	weaners					370-468	
.2-.3	steers			310-610	500-670	430-638	
.3	weaners					430-630	
.4	steers					521-810	
.1-.2	steers			-220	480-690		
	calves	32-34	192-204		640-700		
	steers				500-580		
	calves	32-34	185-202		665-722		
	weaners	252-280		379-642			
.28-.37	weaners					493	
.29-.37	weaners					479	
.2-.3	steers					306-348	
0.4	steers				285-295	285-340	
	steers					468	
	steers					415-435	
0.4	steers					573-636	
.2-.3	steers			300-520	640-950	510-570	
northern spear grass							
	steers					347-373	

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Index
2.2	Coates 1994	Lansdown 19°06'S, 146°08'E	Droughtmaster	1984 -89	21
2.3	Coates et al. 1997	Springmount 17° 13'S, 145° 18'E		1988-90 1985-87	
2.4	Coates et al. 1997	Lansdown 19°06'S, 146°08'E		1979-90	
2.5	Davis et al. 1993	Lansdown 19°06'S, 146°08'E	Droughtmaster	1988-92	10 12
2.6	Dixon et al. 1998	Swan's Lagoon 20°05'S, 147°14'E	Brahman cross	1995-96	11
2.7	Donaldson et al. 1964	Cromarty 19°25'S, 147°05'E	Shorthorn	1960-61	11
2.8	Doogan et al. 1991	Swan's Lagoon 20°05'S, 147°14'E	B. indicus 1st backcross	1975-79	24
2.9	Doogan et al. 1991	Swan's Lagoon 20°05'S, 147°14'E	B. indicus cross F2 et seq	1978-86	24
2.10	Edye et al. 1972	Lansdown 19°06'S, 146°08'E	Droughtmaster	1964-68	20
2.11	Entwistle & Goddard 1984	Fletcherview 19°50'S, 146°20'E	B. indicus	1979-83	20 24
2.12	Fordyce et al. 1993a	Swan's Lagoon 20°05'S, 147°14'E	Sahiwal 1st backcross	1973-77	23
2.13	Fordyce et al. 1993a	Swan's Lagoon 20°05'S, 147°14'E	Brahman 1st backcross	1973-77	23
2.14	Fordyce et al. 1993a	Swan's Lagoon 20°05'S, 147°14'E	Half Sahiwal F2	1979-84	25
2.15	Fordyce et al. 1993a	Swan's Lagoon 20°05'S, 147°14'E	Half Brahman F2	1979-84	25
2.16	Fordyce et al. 1993a	Swan's Lagoon 20°05'S, 147°14'E	Sahiwal cross	1979-84	25
2.17	Fordyce et al. 1993a	Swan's Lagoon 20°05'S, 147°14'E	Brahman cross	1981-86	25
2.18	Fordyce et al. 1993b	Swan's Lagoon 20°05'S, 147°14'E	Brahman cross	1990-92	15

LIVEWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stock. rate (ha/hd)	Class	Weight (kg) Nov	May	Average daily gain (g) Dry	Wet	Annual	Mortality (%)
1-2	heifers					276-497	
4	steers					482	
3-5	steers					386	
.8						356	
1						378	
1.5						419	
	calves	39	178		800		
	yearlings	194	307	51	615	339	
4	weaners		171		730		
	heifers					246	
4	weaners		148-177	20-150			
4	weaners		128-175	-90 to 110			
1.8	calves	28-32	186-207				
	calves		123-170				
	weaners	150-230	235-294				
	calves	28	169		784		
	calves	33	180		818		
	calves	28	175		818		
	calves	29	171		790		
	calves	26	164		768		
	calves	28	170		788		
	heifers		166	66	223	163	

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Index
2.19	Fordyce et al. 1993c	Swan's Lagoon 20° 05'S, 147° 14'E	First backcross 3/4 Brahman	1973-87	32
2.20	Fordyce et al. 1993c	Swan's Lagoon 20° 05'S, 147° 14'E	First backcross 3/4 Sahiwal	1973-87	32
2.21	Fordyce et al. 1993c	Swan's Lagoon 20° 05'S, 147° 14'E	F2 et seq. 1/2 Brahman	1973-87	32
2.22	Fordyce et al. 1993c	Swan's Lagoon 20° 05'S, 147° 14'E	F2 et seq. 1/2 Sahiwal	1973-87	32
2.23	Fordyce et al. 1993c	Swan's Lagoon 20° 05'S, 147° 14'E	F2 et seq. 3/4 Brahman	1973-87	32
2.24	Fordyce et al. 1993c	Swan's Lagoon 20° 05'S, 147° 14'E	F2 et seq. 3/4 Sahiwal	1973-87	32
2.25	Fordyce et al. 1994	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1987-92	24
2.26	Gardener et al. 1993	Lansdown 19° 40'S, 146° 51'E	Droughtmaster	1973-85	23
2.27	Gillard 1979	Kangaroo Hills 18° 50'S, 145° 40'E	Brahman cross	1965-75	24
2.28	Gillard et al. 1980	Wrotham Park 17°S, 144°E		1972-77	13
2.29	Gillard et al. 1980	Lansdown 19° 06'S, 146° 08'E		1973-77	13
2.30	Gillard et al. 1980	Kangaroo Hills 18° 50'S, 145° 40'E		1973-77	13

LIVEWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stock. rate (ha/hd)	Class	Weight (kg) Nov	May	Dry	Average daily gain (g) Wet	Annual	Mortality (%)
	weaner strs		189	82	506		
	steers 18m		286	56	382		
	steers 30m		399			286	
	weaner hfrs		162	98	407		
	heifers 18m		250	69	544		
	weaner strs		179	112	473		
	steers 18m		276	105	363		
	steers 30m		389			267	
	weaner hfrs		157	81	340		
	heifers 18m		233	100	390		
	weaner strs		149	47	469		
	steers 18m		254	77	600		
	steers 30m		374			345	
	weaner hfrs		139	33	470		
	heifers 18m		232	117	374		
	weaner strs		150	20	456		
	steers 18m		247	76	560		
	steers 30m		360			338	
	weaner hfrs		139	5	450		
	heifers 18m		223	112	349		
	weaner strs		152	44	505		
	steers 18m		262	92	598		
	steers 30m		382			350	
	weaner hfrs		140	34	488		
	heifers 18m		236	117	357		
	weaner strs		145	40	477		
	steers 18m		248	100	543		
	steers 30m		361			330	
	weaner hfrs		133	28	452		
	heifers 18m		222	119	323		
	heifers		158	21	510		
.8	steers					79-471	
1.7						219-537	
4.8-9.6	weaners					323-915	
	steers					380-440	
	steers					390-430	
	steers					350-390	

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Index
2.31	Hendricksen et al. 1994	Springmount 17° 13'S, 145° 18'E	Brahman cross	1989-90	9
2.32	Hetzel et al. 1989	Lansdown 19° 40'S, 146° 51'E	Droughtmaster	1984-86	20
2.33	Holroyd 1980	Swan's Lagoon 20° 05'S, 147° 14'E	B. indicus	1972-77	25
2.34	Holroyd & Dunster 1978	Swan's Lagoon 20° 05'S, 147° 14'E	Droughtmaster	1975-77	14 14
2.35	Holroyd et al. 1979	Swan's Lagoon 20° 05'S, 147° 14'E	Shorthorn	1970-73	19
2.36	Holroyd et al. 1979	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1970-73	19
2.37	Holroyd et al. 1983	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1973-77	21
2.38	Holroyd et al. 1984	Swan's Lagoon 20° 05'S, 147° 14'E	B. indicus	1977-81	23 23
2.39	Holroyd et al. 1988a	Swan's Lagoon 20° 05'S, 147° 14'E	Droughtmaster	1977-80	18
2.40	Holroyd et al. 1988b	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1977-80	19
2.41	Holroyd et al. 1990	Swan's Lagoon 20° 05'S, 147° 14'E	B. indicus cross	1977-83	28
2.42	Houston et al. 1992	Lansdown 19° 40'S, 146° 51'E	Droughtmaster		11
2.43	Jones 1997	Lansdown 19° 40'S, 146° 51'E	Droughtmaster	1989-92	14
2.44	Lindsay & Cooper 1997	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1995-96	9
2.45	Lindsay et al. 1989	Swan's Lagoon 20° 05'S, 147° 14'E	B. indicus	1986-89	10
2.46	Lindsay et al. 1990a	Swan's Lagoon 20° 05'S, 147° 14'E	B. indicus	1988-89	9

LIVEWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stock. rate (ha/hd)	Class	Weight (kg) Nov	May	Average daily gain (g) Dry	Wet	Annual	Mortality (%)
4	steers			24	477	324	
	ealves	31	192				
	calves	28	177		820		
	weaners			186	254		
	heifers			-333	639		
	calves	26-31	121-148		501-648		
	calves	30-33	150-171		650-763		
	calves	32-34	165-184		730-840		
	steers			-250-220	630-1130	420-530	
	steers			-250-270	470-930	240-430	
	calves	27-32	157-179		715-820		
	calves	30-34	152-162		805-855		
1.2-1.5	weaner strs		159 -181	-99 to 71	341-635		
4-6	steers 18m					251-392	
	steers 30m					220-392	
1.2-1.5	weaner hfrs		152-171	-75 to 68	329-541	184-290	
2.8	steers	472	589		595		
1-3	weaners					342	
	yearlings					255	
	steers					126	
3.3	weaners					600	
	steers					361	
3	steers	181			490		

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Index
2.47	Lindsay et al. 1990b	Swan's Lagoon 20° 05'S, 147° 14'E	B. indicus	1987-89	15
2.48	Lindsay et al. 1995a	Swan's Lagoon 20° 05'S, 147° 14'E	B. indicus cross	1988-91	18
2.49	Lindsay et al. 1995b	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1989-92	15
2.50	Lindsay et al. 1995c	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1991-94	18
2.51	Lindsay et al. 1995d	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1993-94	18
2.52	Lindsay et al. 1995e	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1989-92	18
2.53	Lindsay et al. 1995f	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1990-92	18
2.54	Lindsay et al. 1995g	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1990-93	13
2.55	Lindsay et al. 1995h	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1992-93	15
2.56	Lindsay et al. 1995i	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1992-94	16
2.57	Lindsay et al. 1995j	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1992-95	14
2.58	Lindsay et al. 1997b	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1996-97	11
2.59	Lindsay et al. 1997c	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1994-95	18
2.60	Lindsay et al. 1997d	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1993-94	9
2.61	Loxton et al. 1990	Swan's Lagoon 20° 05'S, 147° 14'E	B. indicus cross	1985-87	13
2.62	Loxton et al. 1995b	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1987-89	17
2.63	McCaskill & McIvor 1993	Lansdown 19° 40'S, 146° 51'E	Droughtmaster	1973-85	28

LIVEWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stock. rate (ha/hd)	Class	Weight (kg) Nov	Weight (kg) May	Average daily gain (g) Dry	Average daily gain (g) Wet	Average daily gain (g) Annual	Mortality (%)
3	weaners			14-366	454		
	weaners					384-386	
	steers					362	
	steers					301-447	
	steers					463	
	steers					300-335	
	steers					267-404	
	weaners		127			357	
	steers					329	
	steers					417-523	
4	steers					274-345	
3.3-4	weaner strs					532	
	steers		127			471	
	weaners			565			
	steers					252	
	steers			-70 to -110	470-760		
0.8	steers					78-437	
1.7	steers					210-541	

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Index
2.64	Mackinnon et al. 1990	Lansdown 19° 40'S, 146° 51'E	B. indicus	1984-86	18
2.65	McLennan & Hobbs 1987	Swan's Lagoon 20° 05'S, 147° 14'E	B. indicus	1971-86	25
2.66	McLennan et al. 1981	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1975-79	23
2.67	McLennan et al. 1984	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1982-83	10
2.68	McLennan et al. 1991a	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1984-86	16
2.69	McLennan et al. 1991b	Swan's Lagoon 20° 05'S, 147° 14'E	B. indicus	1986-91	20
2.70	Miller & Hendricksen 1993	Springmount 17° 13'S, 145° 18'E	Brahman cross	1988-89	9
2.71	Petherick et al. 1998	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross		10
2.72	Thompson 1990	Lockinvar, via Ayr	Brahman cross		10
2.73	Winks et al. 1972	Swan's Lagoon 20° 05'S, 147° 14'E	Mixed	1970-71	14
2.74	Winks et al. 1974	Swan's Lagoon 20° 05'S, 147° 14'E	Shorthorn	1965-69	18
2.75	Winks et al. 1976	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1970-73	20
2.76	Winks & O'Rourke 1977	Swan's Lagoon 20° 05'S, 147° 14'E	Mixed	1971-73	15
2.77	Winks et al. 1977a	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1973-75	14
2.78	Winks et al. 1977b	Swan's Lagoon 20° 05'S, 147° 14'E	Shorthorn	1970-73	21
2.79	Winks et al. 1977b	Swan's Lagoon 20° 05'S, 147° 14'E	Brahman cross	1970-73	21
2.80	Winks et al. 1978b	Swan's Lagoon 20° 05'S, 147° 14'E	B. indicus	1970-73 1971-74	18 19

LIVEWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stock. rate (ha/hd)	Class	Weight (kg) Nov	May	Average daily gain (g) Dry	Wet	Annual	Mortality (%)
	weaner strs		198	44	742		
	yearling strs	206	341				
	weaner hfrs		178	-52	655		
	yearling hfrs	268	288				
1.2-4	steers					316	
2.7	steers			-25-214	618-836	297-375	
2.3	weaners	139		11			
3.4	weaner hfrs		153-167	92-227	387-678	268-365	
1.8-2.6	steers					273-481	
3-4	steers			0-66	612-683		
	calves		154				
	steers				635		
	steers			143	694	488	
1.2-4	steers					96-182	
1.8	weaners			-123-62	595-675	280-445	
2	steers			-208--170	466-693		
	steers				584-621		
2	steers		338-447	-246-32	580-1040		
2	steers		385-456	-150-108	720-1140		
	weaners					280-445	
	steers		304-395			225-385	

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Index
2.81	Winks et al. 1978a	Swan's Lagoon 20°05'S, 147°14'E	B. indicus	1969-72	19
2.82	Winks et al. 1979b	Swan's Lagoon 20°05'S, 147°14'E	Brahman cross B. indicus	1970-73 1971-75	20 23
2.83	Winks et al. 1980a	Swan's Lagoon 20°05'S, 147°14'E	B. indicus	1971-77	26
2.84	Winks et al. 1982	Swan's Lagoon 20°05'S, 147°14'E	Braham cross	1973-77	23
2.85	Winter et al. 1990	Springmount 17° 13'S, 145° 18'E		1985-87	
2.86	Winter et al. 1990	Lansdown 19° 40'S, 146° 51'E		1984-87	
					3. Queensland -
3.1	Addison et al. 1984a	Brian Past., Gayndah 25°38'S, 151°47'E	Hereford	1969-70	13
3.2	Addison et al. 1984b	Brian Past., Gayndah 25°38'S, 151°47'E	Hereford	1971-74	13
3.3	Alexander & Beattie 1968	Brian Past., Gayndah 25°38'S, 151°47'E	Hereford	1955-62	26
3.4	Alexander et al. 1964	Brian Past., Gayndah 25°38'S, 151°47'E	Hereford	1955-60	25
3.5	Barr & Burns 1971	Glenhowden, Harlin 26°55'S, 152°20'	Hereford	1969-70 1967-68 1968-69	10 10 14
3.6	Bisset & Marlowe 1974	Charnwood, Lowmead 24°40'S, 151°38'E	Braham cross	1966-71	18
3.7	Bisset & Marlowe 1974	Gigoomgan, Maryborough 25°30'S, 152°E	Hereford	1966-71	14
3.8	Bowen & Rickert 1979	Brian Past., Gayndah 25°38'S, 151°47'E	Hereford	1971-76	17
3.9	Bowen & Rickert 1979	Tecoma, Gayndah 24°56'S, 150°48'E	Hereford x Santa Gertrudis	1971-75	15
3.10	Burns 1983	Mt Brisbane, Esk 27°10'S, 152°40'E	Droughtmaster	1980-82	14

LIVEWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stock rate (ha/hd)	Class	Weight (kg) Nov	May	Average daily gain (g) Dry	Wet	Annual	Mortality (%)
	calves	31-34	156-164		675-730		
2.1	weaners			-210-50	490-670	280-390	
2.7	steers		363-505	25-350	415-875	298-395	
2.4	steers			-98-375	375-705	255-518	
2.3	steers			-98-235	518-750	290-395	
3-5	steers					211	
1.3	mixed					408	
southern spear grass							
.6-.8	weaners			191		416	
.8	weaners				607-704		
	weaners		215-266				
	calves	31-34	141-175		626-753		
	calves		148				
	weaners		224				
	heifers	203	266				
.8-1.6	weaners					480-623	
.8-1.6	weaners					273-603	
	weaners					238-578	
.8-1.6	weaners					344-514	
2.4	steers			4	770	368	

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Index
3.11	Burrow et al. 1991	Belmont, R'ton 23° 15'S, 150° 25'E	mixed	1983-86	16
3.12	Burrow 2000	Belmont, R'ton 23° 15'S, 150° 25'E	mixed	1982-90	20
3.13	Coates & Bean 1978	Narayan, Mundubbera 25°41'S, 150° 52'E	mixed	1971-73	14
3.14	Coates & Mannetje 1990	Narayan, Mundubbera 25°41'S, 150° 52'E	Hereford	1972-77	15
3.15	Coates & Mannetje 1990	Narayan, Mundubbera 25°41'S, 150° 52'E	Belmont Red	1972-77	15
3.16	Coates et al. 1987	Narayan, Mundubbera 25°41'S, 150° 52'E	Hereford	1973-78	19
3.17	Coates et al. 1987	Narayan, Mundubbera 25°41'S, 150° 52'E	Belmont Red	1973-78	19
3.18	Cooksley & Paton 1982	Brian Past., Gayndah 25°38'S, 151°47'E	Braham cross	1979-81	17 17
3.19	Corlis et al. 1980	Mt Eugene, Jambin 24°10'S, 150°25'E	Mixed	1972-75 1973-76 1974-77	14 18 18
3.20	Foster & Blight 1983	Brian Past., Gayndah 25°38'S, 151°47'E	Hereford	1977-78 1978-79	11 11
3.21	Foster & Blight 1984	Brian Past., Gayndah 25°38'S, 151°47'E	Hereford	1973-79	20
3.22	Frisch 1973	Belmont, R'ton 23° 15'S, 150° 25'E	B. indicus	1954-69	26
3.23	Gillard et al. 1980	Westwood 23°39'S, 150 °7'E		1975-77	9
3.24	Graham & Mayer 1972	Lowville, Marlborough	Brahman	1966-67 1967-68	12 12
3.25	Gulbransen & Roberton 1995a	Brian Past., Gayndah 25°38'S, 151°47'E	Brahman cross	1989	
3.26	Gulbransen & Roberton 1995b	Brian Past., Gayndah 25°38'S, 151°47'E	Brahman cross	1990	9

LIVEWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stock. rate (ha/hd)	Class	Weight (kg) Nov	May	Average daily gain (g) Dry	Wet	Annual	Mortality (%)
	calves	33	172		750		
	steers		311			390	
	calves	34	176		765		
	yearlings	215	304	220	625	400	
	weaners					342-434	
2	calves male		242				
	calves female		228				
2	calves male		221				
	calves female		199				
4	calves male		186		705		
4	calves male		200		800		
	weaners	217-219	289-321				
	steers	323-337	428-431				
	calves		202				
	weaners	246	318				
	steers	395	478				
.8	weaners					149	
1.7	steers					356	
.5-1.6	steers			-125-80		95-255	
	weaners						1.3
	steers					400	
	weaners					374	
	steers					335	
2.5	mixed					527	
	weaners			235			

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Index
3.27	Hunter et al. 2000	Belmont, R'ton 23° 15'S, 150° 25'E	Belmont Red		11
3.28	Kennedy & Chirchir 1971	Belmont, R'ton 23° 15'S, 150° 25'E	Mixed	1964-69	22
3.29	Knights & Venamore 1985	Duaringa	Santa Gertrudis		11
3.30	Knights & Venamore 1985	Marlborough	B. indicus	1981-82	9
3.31	Knights & Venamore 1985	Childers	Brahman cross	1981-82	11
3.32	Knights & Venamore 1985	Marlborough	Brahman cross	1982-83	10
3.33	Knights & Venamore 1985	Childers	Brahman cross	1982-83	13
3.34	Knights & Venamore 1985	Childers	Brahman cross	1983-84	9
3.35	Laing et al. 1984	Brian Past., Gayndah 25°38'S, 151°47'E	B. indicus	1979-82	17
3.36	Loxton et al. 1995c	Rowanlea, Calliope 24° 17'S, 151° 04'E	Brahman	1990-94	15
3.37	Loxton et al. 1995c	Rowanlea, Calliope 24° 17'S, 151° 04'E	Santa Gertrudis	1990-94	13
3.38	Loxton et al. 1995c	Rowanlea, Calliope 24° 17'S, 151° 04'E	Brahman x Santa (F1)	1990-94	11
3.39	Mannetje & Coates 1976	Narayan, Mundubbera 25°41'S, 150°52'E	Hereford	1972-75	17
3.40	Middleton et al. 1993 Middleton 1996a	The Springs, R'ton 22° 15'S, 150° 08'E	Brahman cross	1984-91	23
3.41	Middleton et al. 1993 Middleton 1996b	Wycheproof, R'ton 23° 15'S; 151° 08'E	Brahman cross	1987-91	12
3.42	Milles et al. 1982	Brian Past., Gayndah 25°38'S, 151°47'E	Sahiwal-Hereford	1979-80	12
3.43	Milles et al. 1982	Narayan, Mundubbera 25°41'S, 150°52'E	Belmont Red	1979-80	12
3.44	Nicol & Smith 1981	Palm Range, Bundaberg 24°34'S, 151°49'E	Braford	1977-78	15

LIVEWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stock. rate (ha/hd)	Class	Weight (kg) Nov	May	Average daily gain (g) Dry	Wet	Annual	Mortality (%)
	steers			527	698		
	calves	29-34	161-195				
	calves					554	
	steers				685		
	calves		250		920		
	steers					190	
	calves		248		670		
	calves				943		
.4-1.0	weaners	318-362				360-480	
4	weaners steers					312-410 310-329	
4	weaners steers					266-377 293-304	
4	weaners steers					345-440 318-323	
	calves		218		800		
3.1-4.2	weaners					422	
2.7	steers					334	
	heifers	188	252		315		
	heifers	230	345		518		
	weaners		237	105	230	170	

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Index
3.45	Nicol et al. 1982	Charnwood, Lowmead 24°40'S, 151°38'E	Brahman cross	1971-74 1974-75	17 11
3.46	Partridge & Wright 1992	Gin Gin 25°S, 154°E	B. indicus	1985-89	17
3.47	Paton et al. 1992	Brian Past., Gayndah 25°38'S, 151°47'E	Sahiwal Hereford cross	1983-88	19
3.48	Quirk et al. 1990	Brian Past., Gayndah 25°38'S, 151°47'E	Sahiwal Hereford cross	1984-85	8
3.49	Seifert et al. 1974	Mt Eugene, Jambin 24°10'S, 150°25'E	Mixed	1972-73	10
3.50	Seifert et al. 1980	Mt Eugene, Jambin 24°10'S, 150°25'E	B. indicus		14 18 18
3.51	Shaw 1978	Rodd's Bay, Gladstone 24°S, 151°30'E	Mixed	1966-73	26
3.52	Shaw & Mannetje 1970	Rodd's Bay, Gladstone 24°S, 151°30'E	Hereford	1959-66	21
3.53	Sutherland 1959	Brian Past., Gayndah 25°38'S, 151°47'E	Hereford	1954-58	19 15 15 17
3.54	Venamore 1981	Nether Haven 30 km NE R'ton	Brahman cross	1979-80	12
3.55	Winks et al. 1987	Wivenhoe 27° 26'S, 152° 37'E	Hereford	1981-83	20
3.56	Winks et al. 1987	Wivenhoe 27° 26'S, 152° 37'E	Brahman cross	1981-83	20
3.57	Winter et al. 1990	Narayan, Mundubbera 25°41'S, 150°52'E		1985-87	
					4. Queensland -
4.1	Beasley et al. 1979	Markwell, Lotus Crk 21°20'S, 149°E	Brahman cross	1974-75 1974-76 1976	13 13 9
4.2	Edwards et al. 1973	Woodlawn, St George 27°S, 149°E	Hereford	1969-72	18

LIVEWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stock. rate (ha/hd)	Class	Weight (kg) Nov	May	Average daily gain (g) Dry	Wet	Annual	Mortality (%)
.7-1.7	weaners			288-339		408-463	
.7-1.8	steers			488		464	
1.6-2.4	yearlings					347	
1.1	steers 6-30m					383-517	
1.4	weaner strs					385	
	calves		235				
	calves		202				
	weaners	240	324				
	steers	369	460				
.6-2.4	weaners					200-340	
1.6-3.6	steers					164-390	
	calves	31-34	151-182		708-735		
	weaners					51-147	
	yearlings					229-275	
	steers					147-383	
	steers					367	
.75-1.5	weaners				397-492	282-329	
.75-1.5	weaners				518-561	355-356	
1.2	steers					405	
aristida/bothiochloa							
	calves		176-210				
	weaners	230	277				
	steers		425				
	calves		184-199				

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Index
4.3	Knights & Venamore 1985	Bauhania Downs	Brahman cross		11
4.4	Rudder & Barnett 1979	Broadmeadow, Nebo 21°45'S, 148°20'E	B. taurus	1966-70	18
4.5	Russell 1985	Tong Park, Kogan 27°02'S, 150°55'E	Hereford	1974-79	18
4.6	Silcock 1996	Keilambete, Rubyvale 23° 27'S, 147° 36'E	B. indicus cross	1994-96	6
4.7	Silcock 1996	Glentulloch, Injune 25° 48'S, 148° 15'E	B. indicus cross	1994-96	6
4.8	Tierney et al. 1992a	Bindaroo, Roma 26° 40'S, 149° 02'E	Hereford	1981-82	15
4.9	Tierney et al. 1992a	Bindaroo, Roma 26° 40'S, 149° 02'E	Simmental	1981-82	13
4.10	Tierney et al. 1992a	Bindaroo, Roma 26° 40'S, 149° 02'E	Belmont Red	1981-82	13
4.11	Tierney et al. 1992a	Taraba, Goondiwindi 28° 34'S, 149° 42'E	Hereford	1983-84	7
4.12	Tierney et al. 1992a	Taraba, Goondiwindi 28° 34'S, 149° 42'E	Simmental	1983-84	5
4.13	Tierney et al. 1992a	Taraba, Goondiwindi 28° 34'S, 149° 42'E	Belmont Red	1983-84	5
4.14	Tierney et al. 1992a	Bantry, Toowoomba 27° 46'S, 151° 38'E	Hereford	1981-83	5
4.15	Tierney et al. 1992a	Bantry, Toowoomba 27° 46'S, 151° 38'E	Simmental	1981-83	5
4.16	Tierney et al. 1992a	Bantry, Toowoomba 27° 46'S, 151° 38'E	Belmont Red	1981-83	5
					5. Queensland -
5.1	Clarke 1991	Charleville Pastoral Laboratory, Charleville 26.40S, 146.25E		1986-87	
5.2	Plasto et al. 1976	Moombidary, Hungerford 28° 50'S, 143° 40'E	Shorthorn	1972-75	18

LIVEWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stock. rate (ha/hd)	Class	Weight (kg) Nov	May	Average daily gain (g) Dry	Wet	Annual	Mortality (%)
	steers					518	
	calves		175-199				
.8-4	steers				360		
1.2-7.2	weaner strs				779		
1.3-6	weaner strs				898		
6-12	steers		278	380	566	351	
6-12	steers		311	400	583	375	
6-12	steers		326	372	550	355	
4.5-5.3	steers		447	-22	456	214	
4.5-5.3	steers		531	0	556	274	
4.5-5.3	steers		484	-50	417	471	
1.3	steers		344	528			
1.3	steers		408	656			
1.3	steers		373	589			
mulga							
	steers					403	
	calves		154-200				

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Index
					6. Queensland -
6.1	Cheffins 1980	Stirling Downs, Tambo	Santa Gertrudis	1977-79	11
6.2	Clarke & Wythes 1988b	Westquarter, Tambo 21° 07'S, 142° 27'E	Poll Shorthorn	1981	9
6.3	Dodt et al. 1984	Toorak RS, Julia Crk 21°02'S, 141°48'E	Mixed	1980-82	16
6.4	Knights & Venamore 1985	Barcaldine	Devon	1981-83	12
6.5	Knights & Venamore 1985	Barcaldine	Hereford	1981-82	11
6.6	Knights & Venamore 1985	Blackall	Brahman cross	1983-84	8
6.7	Murphy 1985	Hazelwood, Richmond	Brahman cross	1982-84	12 12
					7. Queensland -
7.1	Clarke & Wythes 1988a, 1992	Bulloo Downs, Thargomindah 28° 30'S, 140°E	Shorthorn	1983-86	9
7.2	Clarke & Wythes 1988a, 1992	Bulloo Downs, Thargomindah 28° 30'S, 140°E	Brahman cross	1983-86	9
7.3	Clarke & Wythes 1988b	Bulloo Downs, Thargomindah 28° 30'S, 140°E	Mixed	1983-85	9
					8. Queensland -
8.1	Arthur & Mayer 1975	Melinda Downs Cloncurry	Shorthorn	1972-73	11
8.2	Dodt 1980	Rocklands, Camooweal	Mixed	1977-78	14
8.3	Tyler & Arthur 1977	Cubbaroo, Cloncurry	Mixed	1973-74	12
					9. Queensland -
9.1	Boorman & Hosegood 1986	Crocodile, Laura	Braham cross	1976-79 1976-79	13 13
9.2	Winter et al. 1977a	Heathlands, Weipa 11° 42'S, 142° 37'E	Droughtmaster	1973-75	18

LIVEWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stock rate (ha/hd)	Class	Weight (kg) Nov	May	Average daily gain (g) Dry	Wet	Annual	Mortality (%)
mitchell grass downs							
18-28	heifers					360	
	steers				495		
	steers			-167	536	361	
	steers			320		330	
	steers					380	
	steers				570		
	weaners					495	
	steers					215	
spinifex							
	steers					348	
	steers					365	
	steers					457	
gulf lowlands							
	weaners	214	337				
	weaners		231	113	510	293	
	weaners					325	
peninsula							
	ealves	115-122	161-213				
	weaners				193-346	138-191	
.5-1.4	steers					310-360	

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Index
9.3	Winter et al. 1977b	Heathlands, Weipa 11°42'S, 142°37'E	Brahman cross	1974	7
					10. Queensland -
10.1	Bindon et al. 1999	Duckponds, Comet	Brahman	1996-98	16
10.2	Bindon et al. 1999	Duckponds, Comet	Brahman cross	1996-98	16
10.3	Cheffins 1977	Frankfield 100 km NW Clermont	Brahman cross	1975-76	14
10.4	Clem et al. 1993, Esdale 1996	Silverleigh 24° 40'S, 150° 08'E	Brahman cross	1990-91	10
10.5	Coaldrake et al. 1969	Tarewinnabar, Goondiwindi 28°S, 150°E			15
10.6	Coates et al. 1987	Narayan, Mundubbera 25°41'S, 150°52'E	Hereford	1973-78	20
10.7	Coates et al. 1987	Narayan, Mundubbera 25°41'S, 150°52'E	Belmont Red	1973-78	20
10.8	Corlis & Taylor 1979	Wirranda, Moura	Mixed	1978-79	11
10.9	Esdale et al. 1990	Junedale 240 45'S, 1440 50'E	Brahman cross (F1)	1982-87	16
10.10	Filet et al. 1993	Somerby, Rolleston 24° 04'S, 148° 42'E	Droughtmaster	1989-91	11
10.11	Graham et al. 1983	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Hereford	1972-75	13
10.12	James et al. 1995	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Brahman cross	1990-92	15
10.13	Jeffery et al. 1995	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Brahman cross	1992-94	16
10.14	Jones et al. 1995	Narayan, Mundubbera 25°41'S, 150°52'E		1985-93	23
10.15	Knights & Venamore 1985	Clermont	Brahman		12
10.16	Knights & Venamore 1985	Emerald	Brahman cross		12

LIVEWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stock. rate (ha/hd)	Class	Weight (kg) Nov	May	Average daily gain (g) Dry	Wet	Annual	Mortality (%)
.8	steers					390	
brigalow							
	calves	33	182				
	weaners	242	363			496	
	calves	34	200				
	weaners	263	397			540	
	steers			228	417	350	
1.2	steers				900		
1.1-2.2	steers					490-500	
1.7	calves		221		782		
1.7	calves		233		851		
	steers					393	
	steers		212			377	
2.3-7.5	steers					460-475	
	weaners			438-458			
2-2.4	weaner strs					434	
3	steers			230-480	640-730		
	heifers			170-410	640-670		
.7-1	weaners					297-568	
	heifers					406	
	weaners					312	

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Index
10.17	Knights & Venamore 1985	Moura	Brahman cross		12
10.18	Knights & Venamore 1985	Duaringa	Droughtmaster		11
10.19	Knights & Venamore 1985	Duaringa	Droughtmaster	1981-83	9
10.20	Knights & Venamore 1985	Banana	Brahman cross	1983-84	11
10.21	Lindsay et al. 1995h	Berrigurra, Blackwater 23° 33'S, 148° 44'E	Brahman cross	1990-91	9
10.22	Lindsay et al. 1995j	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Brahman cross	1992-94	13
10.23	Lindsay et al. 1997a	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Mixed	1995-97	8
10.24	Loxton & Holroyd 1989	Berrigurra, Blackwater 23° 33'S, 148° 44'E	B.indicus cross	1987-88 1988-89	
10.25	Loxton et al. 1991, Loxton & Holroyd 1989	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Brahman cross	1987-89 1988-90	13
10.26	Loxton et al. 1990	Airlie, Emerald 23° 37'S, 147° 57'E	B. indicus cross	1985-87	13
10.27	Loxton 1996, Loxton et al. 1991	Berrigurra, Blackwater 23° 33'S, 148° 44'E	B. indicus cross	1989-91	14
10.28	Loxton et al. 1995b	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Brahman cross	1987-89	13
10.29	Loxton et al. 1995a, 1992	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Brahman cross	1990-91	12
10.30	Loxton et al. 1995a	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Brahman Simmental cross	1993-94	11
10.31	Mayer et al. 1980	Berrigurra, Blackwater 23° 33'S, 148° 44'E	Brahman cross		14 13 13
10.32	Plasto et al. 1983	Taroom 26°S, 150°E	Hereford	1977-78	11

LIVEWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stock. rate (ha/hd)	Class	Weight (kg) Nov	May	Average daily gain (g) Dry	Wet	Annual	Mortality (%)
	steers					319	
	weaners					533	
	steers					535	
	steers					550	
	steers		180			458	
2.5	steers					411-452	
2.5	steers					449	
	heifers					390	
2.7-3.2	weaners		223	493			
2.7-3.2	weaners		297	519			
2.5-3	weaners		194	579		630	
	steers		424			379	
2.5-3	weaners		222	626		607	
	steers		444			388	
	steers					304	
3-3.4	steers					343-600	
	weaners			330-360	410-720		
2-3	yearlings	238	359				
	steers	455	543				
2-2.4	yearlings			787			
	steers			564			
	weaners		210		413		
	yearlings		478			650	
	steers	566		497			
	steers					220	

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Index
10.33	Rudder & Short 1978	Consuelo 24°45'S, 148°25'E	B. indicus	1975 1975-76 1976-77 1977-78	10 14 9 9
10.34	Rudder et al. 1980	El Rocco, Moura 24°S, 149°E	Brahman cross	1977 1977-78	10 9
10.35	Strachan et al. 1980	Sunnyholt, Injune 26°S, 148°E	mixed	1975-78	16 16
10.36	Tierney et al. 1992a	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Hereford	1982-83	7
10.37	Tierney et al. 1992a	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Simmental	1982-83	5
10.38	Tierney et al. 1992a	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Belmont Red	1982-83	7
10.39	Tierney et al. 1992b	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Hereford	1982-86	20
10.40	Tierney et al. 1992b	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Simmental	1982-86	20
10.41	Tierney et al. 1992b	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Belmont Red	1982-86	20
10.42	Tudor et al. 1992	Brigalow RS, Theodore 24° 50'S, 149° 45'E	B. indicus	1989-90	9
10.43	Walker et al. 1987	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Hereford	1968-72	21
10.44	Wood et al. 1985	Brigalow RS, Theodore 24° 50'S, 149° 45'E	Mixed	1976-79	18 17
				11. Northern Territory -	
11.1	Austin 1970	Douglas Daly 13°48'S, 131°12'E	Brahman cross	1969-70	9
11.2	Dance 1977	Katherine Expt Farm 14° 28'S, 132° 19'E	Shorthorn	1970-71	14
11.3	Eggington et al. 1984	Mt Bundey 13°05'S, 131°07'E	Brahman cross	1980-81	15
11.4	Eggington et al. 1986	Mt Bundey 13°05'S, 131°07'E	Brahman cross	1983-84	11 9

LIVEWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stock. rate (ha/hd)	Class	Weight (kg) Nov	May	Average daily gain (g) Dry	Wet	Annual	Mortality (%)
	calves		197				
	weaners	207	331				
	steers		515				
	steers		552				
2	calves		182				
	weaners		222				
1.3	weaners					590	
	steers					476	
1.8	steers		265	61	600	326	
1.8	steers		305	83	650	362	
1.8	steers		304	111	661	381	
0.5-1	calves	36	184				
0.5-1	calves	41	220				
0.5-1	calves	33	191				
2.3-3	steers				495		
.7-2.4	steers				510-720	434	
	calves	29-32	150-179				
	weaners	193-225		97-293			
Darwin/Gulf							
.4-1.6	steers			-180	816	382	
.8	steers			410-490	1190		
	weaners	123	206			228	
	weaners			166	560		
	heifers			40			

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Index
11.5	Ford 1976	Adelaide River 13°05'S, 131°07'E	Brahman cross	1973-74	18
11.6	Ford 1981	Berrimah, Darwin 12°30'S, 130°30'E	Brahman cross	1971-72	11
11.7	Gee et al. 1971	Berrimah, Darwin 12°30'S, 130°30'E	Brahman cross	1967-69	14
11.8	Gee et al. 1971	Berrimah, Darwin 12°30'S, 130°30'E	Shorthorn	1967-69	13
11.9	Kirby 1977	Beatrice Hill RS 12°33'S, 1310 25'E	Mixed	1963-69 1963-69	23 23
11.10	McCosker 1987a	Mt Bundey 13°05'S, 131°07'E	Brahman cross	1983-84	13
11.11	McCosker 1987b	Mt Bundey 13°05'S, 131°07'E	Brahman cross	1980-84	14
11.12	McCosker & Eggington 1986	Mt Bundey No.1 13°05'S, 131°07'E	Brahman cross	1981-84	14 13
11.13	McCosker & Eggington 1986	Mt Bundey No.2 13°05'S, 131°07'E	Brahman cross	1980-84	18 17
11.14	McCosker & Eggington 1986	Mt Bundey No.3 13°05'S, 131°07'E	Brahman cross	1980-84	18 17
11.15	McCosker & Eggington 1986	Mt Bundey No.4 13°05'S, 131°07'E	Brahman cross	1980-84	18 15
11.16	McCosker & Eggington 1986	Mt Bundey No.5 13°05'S, 131°07'E	Brahman cross	1982-84	13 11
11.17	McCosker & Eggington 1986	Mt Bundey No.6 13°05'S, 131°07'E	Brahman cross	1980-84	20 17
11.18	McCosker et al. 1984	Mt Bundey 13°05'S, 131°07'E	Brahman cross	1980-82	20
11.19	McCosker et al. 1991	Mt Bundey 13°05'S, 131°07'E		1980-84	15
11.20	Norman 1967	Katherine Expt Farm	Mixed	1962-65	20
11.21	Wesley-Smith 1972	Adelaide River 13°05'S, 131°15'E	Shorthorn	1966-68	17

LIVEWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stock. rate (ha/hd)	Class	Weight (kg) Nov	Weight (kg) May	Average daily gain (g) Dry	Average daily gain (g) Wet	Average daily gain (g) Annual	Mortality (%)
	steers			-213 to -5	454-530	218-316	
.2-.8	yearlings					212-262	
	steers					132-276	
	steers					79-149	
	calves	26-30	106-128				
	weaners		182-244				
.3-1	weaners			50-112			
	weaners			-40-22	420-490	310-350	
14	calves		126-164			130-170	
14	steers						
14	calves		149-176			199-310	
14	steers						
14	calves		158-185			198-439	
14	steers						
14	calves		133-181			219-443	
14	steers						
14	calves		133-165			321	
14	steers						
5	calves		154-184			232-331	
5	steers						
	weaners		178-205				24-32
14	steers					273-281	
5.6	heifers			-484-306	527-654	111-198	
	steers			-250	550		

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Index
11.22	Wesley-Smith 1972	Adelaide River 13° 05'S, 131° 15'E	Brahman cross	1966-68	15
11.23	Winter et al. 1990	Katherine Expt Farm 14° 28'S, 132° 19'E		1984-86	
				12. Northern Territory -	
12.1	Dixon 1998, p36	Mt Sanford 17° 02'S, 130° 38'E		1994-95	9
12.2	Ford & Hill 1977	Kidman Springs 15° 58'S, 131°E	Shorthorn	1971-72	13
12.3	Hill & Robertson 198?	Kidman Springs 15° 58'S, 131°E	Shorthorn	1976-81	17
12.4	Moran 1972	Kidman Springs 15° 58'S, 131°E	Shorthorn	1970-71	12
12.5	Pearson 1975	Kidman Springs 15° 58'S, 131°E	Shorthorn	1974-75	11
12.6	Pearson 1977	Kidman Springs 15° 58'S, 131°E	Mixed	1973-75 1973-76 1974-77	21 21 21
12.7	Robertson 1987	Kidman Springs 15° 58'S, 131°E	Droughtmaster	1981-85	20 20
12.8	Sullivan 1988	Kidman Springs 15° 58'S, 131°E	Droughtmaster	1986-87	15
12.9	Sullivan et al. 1992	Kidman Springs 15° 58'S, 131°E	B. indicus cross	1981-85	23
12.10	Sullivan et al. 1997	Kidman Springs 16° 07'S, 130° 57'E	B. indicus cross	1985-91	27
12.11	Winter 1987	Manbulloo Expt Site 14° 47'S, 131° 57'E	Brahman cross	1980-83	17
12.12	Winter et al. 1989a, 1989b	Manbulloo Expt Site 14° 47'S, 131° 57'E	Brahman cross	1979-80	18
				13. Northern Territory -	
		NO DATA AVAILABLE			
				14. Northern Territory -	

LIVEWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stock. rate (ha/hd)	Class	Weight (kg) Nov	May	Average daily gain (g) Dry	Wet	Annual	Mortality (%)
	steers			-350	640		
1.1-2	steers					148	
Victoria River District							
6.7-20	steers					361	
	steers			-101-226			
1,4-8.1	steers				237-403	32-225	
	weaners					218	
	yearlings				181-351		
	weaners	133-164	199-226	0-220	405-545		
	yearlings	216-237	314-383	8-168	670-840		
	steers	301-411	404-471	-110--15	395-880		
	steers					102-253	
	steers					118-206	
10	weaners	167	228	82	393	219	
5-12	weaners		149-161			214-306	<2
3-12	weaners		91-104			246-378	2.5
16	steers					170	
	weaners					230-307	
2.2	steers			-211	434	97	
1.7	steers			-90	566	225	
1.3	steers			-165	542	170	
Barkly Tableland							
			NO DATA AVAILABLE				
Alice Springs							

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Index
14.1	Bertram 1984	Neutral Junction, Alice Springs 21°40'S, 134°E	Hereford	1983-84	12
14.2	Bertram 1984	Orange Creek, Alice Springs 20°S, 133°30'E	Hereford	1983-84	11
14.3	Bertram 1985	Mt Skinner, Alice Springs 22°S, 134°E	Hereford	1984-85 1985 1984-86	12 12 12
14.4	Low & Wood 1979	Hamilton Downs 23°30', 133°40'E	Shorthorn	1970-75	26 30
14.5	Low & Wood 1979	Hamilton Downs 23°30', 133°40'E	Shorthorn	1972-75	20 24
14.6	Low & Wood 1979	Todd River Station 24°S, 134°E	Hereford	1970-74	19 23
				15. Western Australia -	
15.1	Armstrong et al. 1968	Kimberley RS 15°39'S, 128°43'E	Shorthorn	1960	13
15.2	Blunt & Jones 1977	Kimberley RS 15°39'S, 128°43'E	Shorthorn	1973-74 1974-75	11 7
15.3	Bolam et al. 1998	Kimberley RS 15°39'S, 128°43'E	Brahman cross	1996	7
15.4	Carrick & Pratchett 1984	Ord River Station 17° 30'S, 129° 0'E	Brahman cross	1980-82 1980-82 1980-82	17 16 14
15.5	Dixon 1998, p39	Ord River Station 17° 30'S, 129° 0'E	mixed	1980-88	0
15.6	Dolling 1983	Derby 17°18'S, 123°37'E	Shorthorn	1971-72	10
15.7	Dolling 1983	Broome 18°S, 122°E	Shorthorn	1974-76	15
15.8	Haeker 1982	Ord River Station 17° 30'S, 129° 0'E	Shorthorn	1979-81 1979-81	11 11
15.9	Holm 1971	Packsaddle Plains 15°31'S, 128°43'E	Shorthorn	1967-70	19

LIVEWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stock. rate (ha/hd)	Class	Weight (kg) Nov	May	Average daily gain (g) Dry	Wet	Annual	Mortality (%)
	steers					270	
	steers					432	
	calves		163		498		
	weaners	195		155			
	steers					317	
	calves				350-800		
	weaners			240-650	70-490		
	calves				380-700		
	weaners			-170-540	0-130		
	calves				350-850		
	weaners			260-650	90-740		
Kimberleys							
	weaners	109	177				
	weaners					290	
	steers					390	
0.2	weaners			515			
	calves	31	133-150		540-590		
	weaners		277-324				
	steers	291-374	445-481				
	steers						3-14
	steers					240	
	steers				225-555	445-495	
	steers					385	
	heifers					320	
	calves				530-630		

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Index
15.10	Holm & Payne 1980	Derby 17° 18'S, 123° 37'E	Shorthorn	1973-76	18
15.11	Holm et al. 1981	Fitzroy PRS, Fitzroy Crossing 18° 08'S, 125° 19'E	Shorthorn	1971-76	22
15.12	Pratchett 1986	Ord River Station 17° 30'S, 129° 0'E	mixed	1980-85 1980-85 1980-86 1980-86	24 24 22 20
15.13	Pratchett 1986	Ord River Station 17° 30'S, 129° 0'E	Brahman cross	1980-86	17
15.14	Pratchett 1986	Kununurra	mixed	1984-86	14
15.15	Prachett & Triglone 1989	Ord River Station 17° 30'S, 129° 0'E		1984-87	
15.16	Pratchett et al. 1992	Kimberley RS 15° 39'S, 128° 43'E	Brahman cross	1987-88	5
15.17	Pratchett et al. 1992	Kimberley RS 15° 39'S, 128° 43'E	Africander cross	1987-88	5
15.18	Prachett et al. 1993	Ord River Station 17° 30'S, 129° 0'E	Shorthorn	1981-88	21
15.19	Prachett et al. 1993	Ord River Station 17° 30'S, 129° 0'E	Brahman	1981-88	21
15.20	Ryan et al. 1987	Ord River Station 17° 30'S, 129° 0'E	Shorthorn	1980-82	15
				16. Western Australia -	
16.1	Kok et al. 198?	Boodarie Port Hedland	Shorthorn	1980-85	21

LIVEWEIGHT, GROWTH AND MORTALITY IN NORTH AUSTRALIA

Stock. rate (ha/hd)	Class	Weight (kg) Nov	May	Average daily gain (g) Dry	Wet	Annual	Mortality (%)
	steers				541-911	342-461	
	weaners	139-171	172-228	76-347	195-459	209-360	
	calves		140-166				3-11
	weaners	147-184					1-15
	steers		388-469				
	steers		496-573				
	steers						5-11
.17-.5	steers					334-436	
0.5	steers					720	
0.3	steers					680	
0.25	weaners					717	
0.25	weaners					662	
15	steers					318	
15	steers					356	
	weaners		160-269	86-97	487-686	304-398	
	yearlings		224-337	8-69	534-603	325-348	
	steers		340	-26	466	281	
Pilbara							
	steers						3

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Basic Biological Data for Growing Animals in North Australia

Producer Demonstration

SOURCES AND INDICES OF BASIC BIOLOGICAL DATA FOR

Key	Reference	Site	Breed	Years	Index
					1. Queensland -
		NO DATA AVAILABLE			
					2. Queensland -
2.1	Bishop et al. 1993, 1996	Carfax, Nebo 22°S, 180°E		1982-89	17
2.2	Shaw 1996	Spring's Road, Mareeba	Brahman cross	1984-91	17
2.3	Smith 1996a	Thalanga, Charters Towers 20° 24'S, 145° 53'E	Brahman cross	1984-91	19
2.4	Smith 1996b	Blackbraes, Hughenden 19° 32'S, 144° 12'E	Brahman cross	1987	10
					3. Queensland -
3.1	Cheffins 1996	Gaythorn, Miriam Vale 24° 25'S, 151° 32'E	B. indicus cross	1993	12
3.2	Malcolmson 1996	Coal Creek, Esk 27° 17'S, 152° 26'E		1992	
3.3	Murphy 1998	Melrose, Mornish 23°S, 150°E	Brahman	1996-98	9
3.4	Tyler 1996a	Bronte, Gayndah 42° 04'S, 151° 30'E	Brahman cross	1987-93	19
3.5	Tyler 1996b	Moonboonbury, Mundubbera 25° 48'S, 151° 11'E	Brahman cross	1988-90	
3.6	Wright 1996	Cedarvale, Lowmead 26° 51'S, 151° 24'E		1989-92	11
					4. Queensland -
4.1	Sullivan 1996	Millungera, Julia Creek 19° 52'S, 141° 34'E	Brahman cross	1989-921	16
					5. Queensland -
		NO DATA AVAILABLE			
					6. Queensland -
6.1	Bawden 1996a	Brides Creek, Blackall 25° 02'S, 145° 27'E	Brahman cross	1995-96	14

Stock. rate (ha/hd)	Class	Weight (kg) Nov	May	Average daily gain (g) Dry	Wet	Annual	Mortality (%)
high rainfall							
			NO DATA AVAILABLE				
northern spear grass							
8	steers					162-548	
7.3-9	steers					80-440	
	steers					266	
	calves		172				
southern spear grass							
2	weaners		187	28			
1.8	weaners		186	-55			
3.2	heifers		226			461	
2.2-3						301-416	
	weaners		118			366	
2.3	steers					274-384	
aristida/bothiochloa							
	weaners			80		273	
mulga							
			NO DATA AVAILABLE				
mitchell							
	calves		204-242				

Key	Reference	Site	Breed	Years	Index
6.2	Hill 1996	Cassilis, Richmond 21° 07'S, 142° 27'E	Santa Gertrudis	1995-96	11
6.3	Hill 1998	Morungle, Richmond 20° 28'S, 142° 53'E	Brahman	1996-98	
6.4	Hill 1998	Morungle, Richmond 20° 28'S, 142° 53'E	B. indicus eross	1996-98	
				7. Queensland -	
7.1	Bawden 1996b	Swanlea, Aramac 22° 26'S, 145° 32'E	Brahman cross	1995-96	4
				8. Queensland -	
		NO DATA AVAILABLE			
				9. Queensland -	
9.1	Boorman 1998	Sudley Station, Weipa 12° 24'S, 142° 24'E	Brahman	1996-97	9
				10. Queensland -	
10.1	Bawden 1996c	Brigalow RS 24° 50'S, 149° 45'E	Brahman cross	1993	9
10.2	Esdale 1996	Silverleigh, Banana 24° 40'S, 150° 08'E	Brahman cross	1990-93	
10.3	Middleton 1996	Melmoth, Dingo 23° 27'S, 149° 16'E	Santa Gertrudis	1988-92	15
10.4	Mullins 1993,1996	Omega, Alpha 23° 54'S, 146° 44'E	Brahman	1991-92	10
				11. Northern Territory -	
		NO DATA AVAILABLE			
				12. Northern Territory -	
		NO DATA AVAILABLE			
				13. Northern Territory -	
		NO DATA AVAILABLE			
				14. Northern Territory -	
		NO DATA AVAILABLE			

Stock. rate (ha/hd)	Class	Weight (kg) Nov	May	Average daily gain (g) Dry	Wet	Annual	Mortality (%)
	steers			-372	995	326	
	steers					0.42	
	steers					0.45	
spinifex							
	calves		161				
gulf							
			NO DATA AVAILABLE				
peninsula							
	weaners					344	
brigalow							
	weaners					541	
	steers				500-870		
1.6-2.7	steers					224-508	
	yearlings	214	349	-32	833		
Darwin/Gulf							
			NO DATA AVAILABLE				
Victoria River District							
			NO DATA AVAILABLE				
Barkly Tableland							
			NO DATA AVAILABLE				
Alice Springs							
			NO DATA AVAILABLE				

Key	Reference	Site	Breed	Years	Index
				15. Western Australia -	
15.1	Dixon 1998, p41	Jubilee Downs 18° 22'S, 125° 18'E	Shorthorn	1989-94	21
15.2	Dixon 1998, p42	Glenroy 17° 22'S, 126° 07'E		1991-94	15
				16. Western Australia -	
		NO DATA AVAILABLE			

Stock rate (ha/hd)	Class	Weight (kg) Nov	May	Average daily gain (g) Dry	Wet	Annual	Mortality (%)
Kimberleys							
	weaners					184-471	
22	weaners					134-353	
Pilbara							
			NO DATA AVAILABLE				

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APPENDIX (METHODOLOGY)

The following details about categorising and summarising the data are taken from Holroyd and O'Rourke (1989).

A1 Specification of regions

North Australia was regarded as the whole of Queensland and the Northern Territory and the section of Western Australia north of 25°S latitude.

North Australia was divided in 16 regions, 10 in Queensland, 4 in the Northern Territory and 2 in Western Australia. In Queensland the regions were derived from the 14 native pasture communities mapped by Weston *et al.* (1981). They were:

(1) high rainfall – covering the coastal strips south from Cairns, around Mackay and around Brisbane

(2) northern speargrass – coastal and inland strip from Cooktown to Marlborough

(3) southern speargrass – coastal and inland strip south from Marlborough to the New South Wales border

(4) aristida/bothriochloa – inland area west of the ranges and south from Mackay

(5) mulga – south-western areas

(6) mitchell grass downs – central western areas

(7) spinifex – several areas in the far west and one in the central west

(8) gulf lowlands – north-western areas bordering Gulf of Carpentaria

(9) peninsula – northern section of Cape York Peninsula

(10) brigalow – discrete areas inland of the ranges and south from Mackay where brigalow scrub has been cleared for improved pastures.

Although derived from the 14 communities of Weston *et al.* (1981), these 10 regions differed in some important aspects. Firstly, the gulf lowlands contained both aristida/bothriochloa pasture and blue grass-brown top grass areas. Secondly, no specific allowance has been made for channel pastures, Queensland blue grass, blady grass or gidgee pastures. Finally, a high rainfall region has been included. Even though some of these areas were named after the principal grass species, it is recognised that there are data reports from some of these which were based on other pasture types. For example, Belmont, although in the southern spear grass region, contained a considerable amount of brigalow country.

For Northern Territory the 4 regions were Darwin/Gulf, Victoria River District, Barkly Tableland and Alice Springs. For Western Australia the 2 regions considered were

Kimberleys and Pilbara. These regions corresponded with the Statistical Divisions of the Australian Bureau of Statistics.

The break-up for Queensland was based on native pasture communities rather than purely geographic divisions because firstly, more information was available for Queensland; secondly, the beef industry was much more developed and much larger in Queensland; and, thirdly, property development and management styles offered a far greater range here than in the other states.

These 16 regions gave the primary classification and grouping of sites for the study. All data tabulations in the appendices were done separately for these 16 regions. The site where data have been collected was further defined by the name of the property, its nearest town and latitude and longitude. In some cases the research report did not identify the property where the work was performed. This could be to retain confidentiality or purely because the information was considered unnecessary or was not available.

A2 Indices of quality and quantity of data

Holroyd and O'Rourke developed an index to rank the data sets on their quality and quantity. It consisted of 3 components which were added together. The first component reflected the number of years, the second the number of animals and the third the type and amount of data available. Separate indices were established for fertility, mortality and liveweight/condition score of breeders and for liveweight, growth and mortality of calves, weaners and heifers/steers.

All indices used the same loadings for the number of years of available data, as follows:

No. of years	1	2	3	4	5	6-7	8-10	>10
Loading	2	6	8	10	12	14	16	18

The need for greater numbers of breeders than growing animals for the same precision of information was reflected in their different loadings for the number of animals. The scale for breeders was:

No. of breeders	10	20	50	100	200	>500
Loading	1	2	3	4	5	6

The corresponding scale for growing animals was:

No. of animals	10	20	30	40	50	>100
Loading	1	3	4	5	5	6

Both scales reflected the decreasing importance of extra animals beyond what was considered a reasonable number. For numbers of animals in between those listed, the loading appropriate for the closest indicated number was used.

The loadings for the type and amount of data varied with the different categories and have been set out separately for each one. For fertility data there was a loading of 2 for each of pregnancy rate, branding/weaning rate and losses from confirmed pregnancy to

branding/weaning. Where more than one of these rates was given, the loadings were added together, so that any two of them had a loading of 4 and all three together scored 6. Where calving rate was reported as well as the other three, a loading of 10 was allocated. A loading of 2 was used when calving rate only was reported.

The loadings for liveweight (LW) and condition scores (CS) of breeders were as follows:

Loading	Measurement
1	1 CS
2	1 LW
3	1 LW & CS or 2 CS
4	>2 CS
5	2 LW
6	2 LW & CS
7	>2 LW
8	>2 LW & CS

If relationships of liveweight or liveweight change with fertility measures were given, an extra loading of 1 was used. The rationale in this scale was that liveweight gave more information than condition scores. Further, recordings twice a year were proportionately more valuable.

Mortality of breeders was given a loading determined from the number of musters per year, as follows:

No. of musters	1	2	3	>3
Loading	1	3	5	6

Counts at each muster, together with mustering efficiency, determined the accuracy of the distinction between mortality and failure to muster. More frequent mustering gave better estimates of both numbers dying and when deaths occurred.

Growing animals were considered in the three classes of calves, weaners/yearlings and older animals, with the latter class variously described as heifers, steers or bullocks. Heifers were considered only up to their first mating with subsequent information regarded as for breeders.

The loadings for calf data were assigned for each measurement and then accumulated if several measurements were taken. A loading of 2 was assigned for each of birth weight, branding or weaning weight, average daily gain and mortality. Two weights and average daily gain were given a loading of 5, since redundancy reduced the overall value of these three measurements. Weaning weight was considered as a weight taken at 5-8 months irrespective of whether calves were actually weaned or not.

The term weaner was used for animals in the age range 6-18 months. Generally, the starting date was June or the end of the animal's first wet season. A loading of 4 was assigned for weight at the end of the second wet season or average daily gain over the full year. Weight at the end of the dry season (November) and average daily gains over

dry and wet seasons were each given loadings of 2. Average daily gains in addition to weights were assigned a reduced loading of 1 to compensate for partial redundancy. An additional loading of 2 was assigned for reports of mortality rates.

The same loadings as indicated above for weaners were used for older animals. Generally, steers and heifers were in the age range 18-30 months. The term steer was used for older castrated males. No information is presented on growth of bulls.

To help with the application of these rather complex rules an example is presented to illustrate the procedure. A study by Winks, O'Rourke and McLennan (1982) was carried out at Swan's Lagoon. A loading of 10 was assigned for the 4 years of the study. A further loading of 6 was given for the 156 animals used each year. Initial liveweights and average daily gains for dry season, wet season and full year were reported. These data were assigned a loading of 7 made up of 2 for each of dry and wet season gains, 4 for the full year gain and a discount of 1 for redundancy. Hence, the overall index for these growth data was 23.

A3 Presentation of collated data

Collated data are presented in tables accompanied by reference lists for breeders and growing animals, respectively. The first part of the tables in each case cites the reference, some descriptive information and the indices. Subsequent parts summarise the relevant production data. The link between these tables and the references is provided by a "key", which gives a unique identifier for each unit of information within the breeder and growth sets.

Data for each separate key is specified by region and breed with separate entries for each class of animal. Where possible, separate entries are given for *Bos indicus* and *Bos taurus* genotypes. Apart from this distinction, data and indices are bulked or averaged across breeds. The actual years over which data have been recorded are given to facilitate interpretation in terms of climatic data and, particularly, for rainfall totals and patterns.

The index number has no real meaning, but an entry with a higher index number than another site has "better" information. An "R" appended to the index value for breeder liveweight indicates that relationships between liveweight and fertility were given in the original report for that study.

The production data have been summarised in the remaining parts of the tables, for fertility, mortality and liveweight for breeders and liveweight, growth and mortality for growing animals.

The critical times for liveweight and average daily gain were November, at the end of the dry season, and May, at the end of the wet season. An additional weight in the mid dry season (August-September) was given for breeders.

The preferred way to present data was to give a range over the years recorded. Wherever possible data were combined or averaged across treatments or any other factors in the original study to give a single, overall figure for the production trait for each year. The lowest and highest values across years were quoted to give the range for

each production trait. A single figure was given when only the overall mean was available from the research report.

References are listed alphabetically and include the key or keys linking the tables and each reference. This list enables readers to check the information quoted, to search for more detailed information and to summarise the data in a more appropriate way for their applications.

A4 Limits to interpretation

Data was aggregated across groups, treatments or other factors. The methods used were less than ideal. No single method of summarising was appropriate because of different designs, methods of statistical analysis and ways of presenting data. Simple averages, weighting by the number of animals and least squares means or constants were used in different situations. Quite often there were significant differences between groups which were "averaged" or there were interactions between factors. An alternative strategy would have been to use only data from the "control" or typical production system. Another alternative would have been to present the collated information separately for each group. Holroyd and O'Rourke considered this cumbersome and unwieldy, suggesting that if this type of information is required, it would be best extracted from the original source, as given in the bibliography. The exceptions to these rules were presentation of separate information for *Bos indicus* and *Bos taurus* genotypes and for different age/sex classes, as well as the recognition of seasonal condition, reflected in years, as the overriding source of variability.

The ranges quoted for production parameters were often very wide, indicating the dominant influence of seasonal conditions and particularly rainfall patterns. Hence, as an indication of average regional production levels they are not particularly useful. The actual years over which the study was done were given so that the production levels may be interpreted in the light of seasonal conditions. Detailed paralleling of production levels and seasonal conditions for use in modelling would require reference back to the original research report.

One specific ambiguity encountered with the measures of reproductive efficiency was the clear identification of the denominator. The number of cows mated was the desired choice as the denominator for pregnancy, calving and branding rates as well as losses from pregnancy diagnoses to branding. However, this definition was not used uniformly in all research reports. Furthermore, some reports did not give the critical information so that it could be determined which denominator had been used.

No use was made of information on variability, either between animals or between replicate paddocks. Similarly, nothing beyond a simple summary of the information collated was attempted.

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